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Washington DC ServiceNow AI Platform Capabilities

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Extend ServiceNow AI Platform capabilities

Extend the ServiceNow AI Platform with additional applications and features.

Get started

Choose one of these tiles to get started.

Manage the Configuration Management Database (CMDB)



Configure connected devices, apps, and services you use with a powerful decision support tool.

Create Conversational Interfaces



Empower the ServiceNow AI Platform to resolve user issues with the AI-powered Virtual Agent chatbot.

Manage Instance Data Sources



Handle all your data efficiently across instances, databases, and more.

Manage Content



Create and share documents and knowledge articles with your users.

Manage Services



Manage service-related applications like self-service, and the service catalog.

Manage People and Work



Take care of administrative and management demands in one place.

Legacy Capabilities



Review the legacy apps and plugins with capabilities for existing customers.

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Manage the CMDB

Control your organization's infrastructure by tracking assets, services, and the relationships between them in the CMDB. Use configuration strategies and consistent modeling in the CMDB to work with all ServiceNow products on the ServiceNow AI Platform.



Create Conversational Interfaces

Provide optimal conversational experiences for your users in the chat channels that they prefer (live agents, virtual agents, or both) using ServiceNow® Conversational Interfaces.



Manage Instance Data Sources

Ensure clear oversight of all data in your instances, databases, and third-party applications using ServiceNow tools to manage data retrieval, storage, sharing, standardization, and monitoring.

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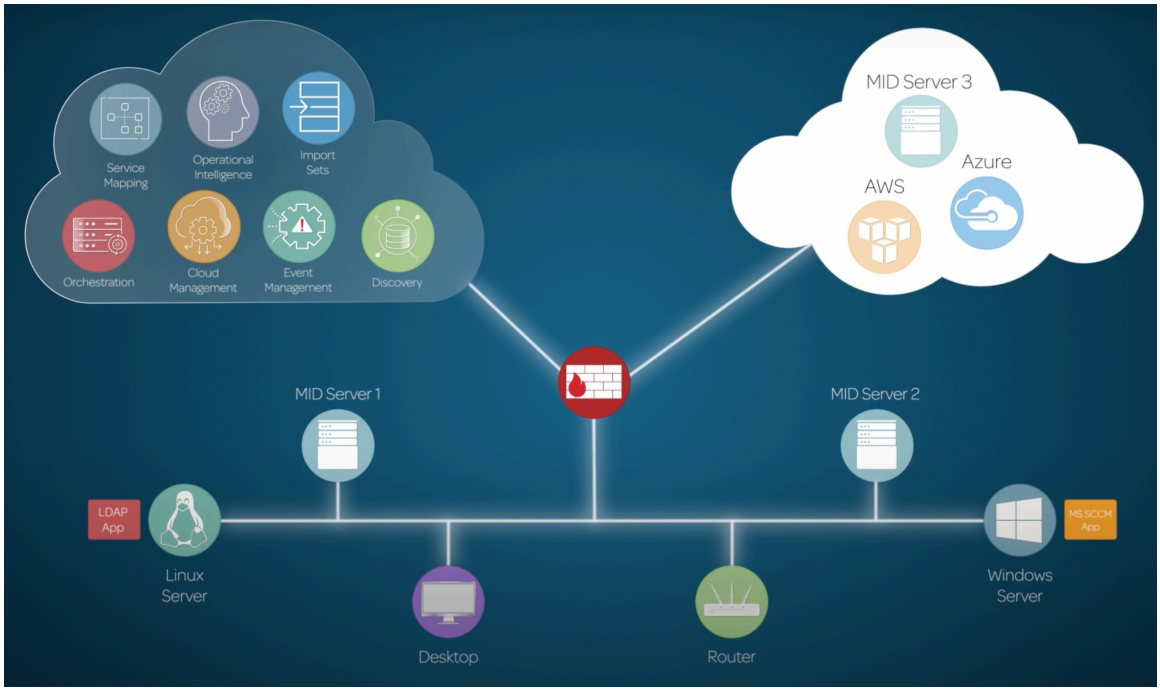
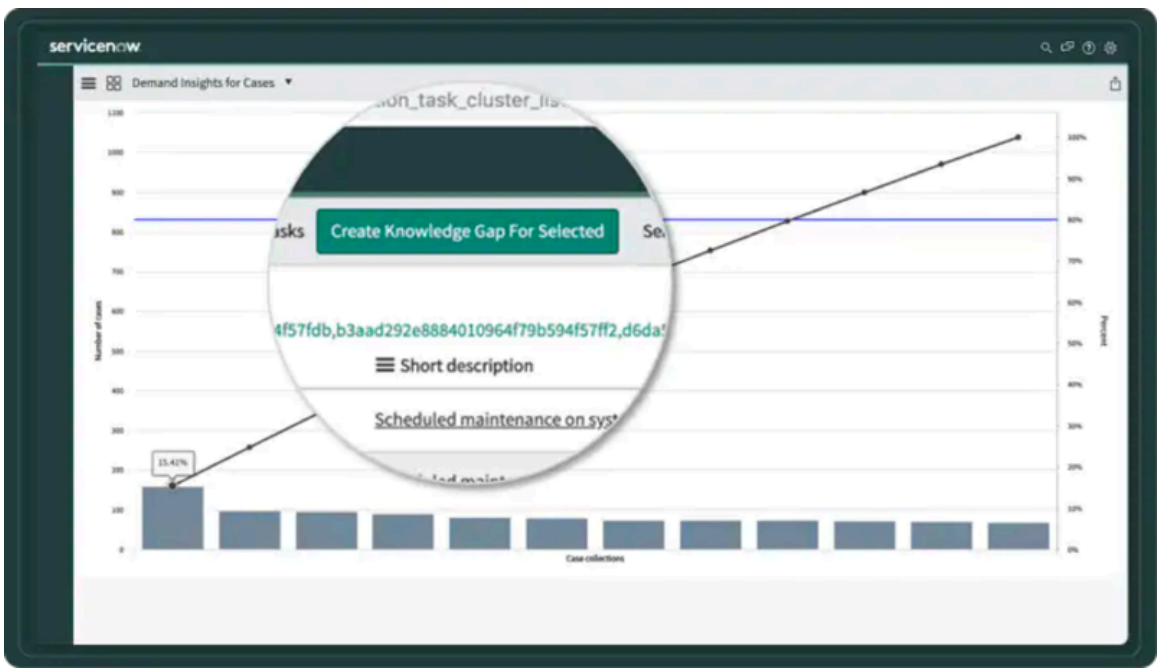


Manage Content

Give your users access to the information that they need quickly and easily using the content management suite with products for document and knowledge base management.



Manage Services

Give your customers tailored catalogs for products and create portals for service requests using the ServiceNow® Service Catalog application. Combine this application with the Self-Service plugin to provide your users with quick access to the tools at their disposal.

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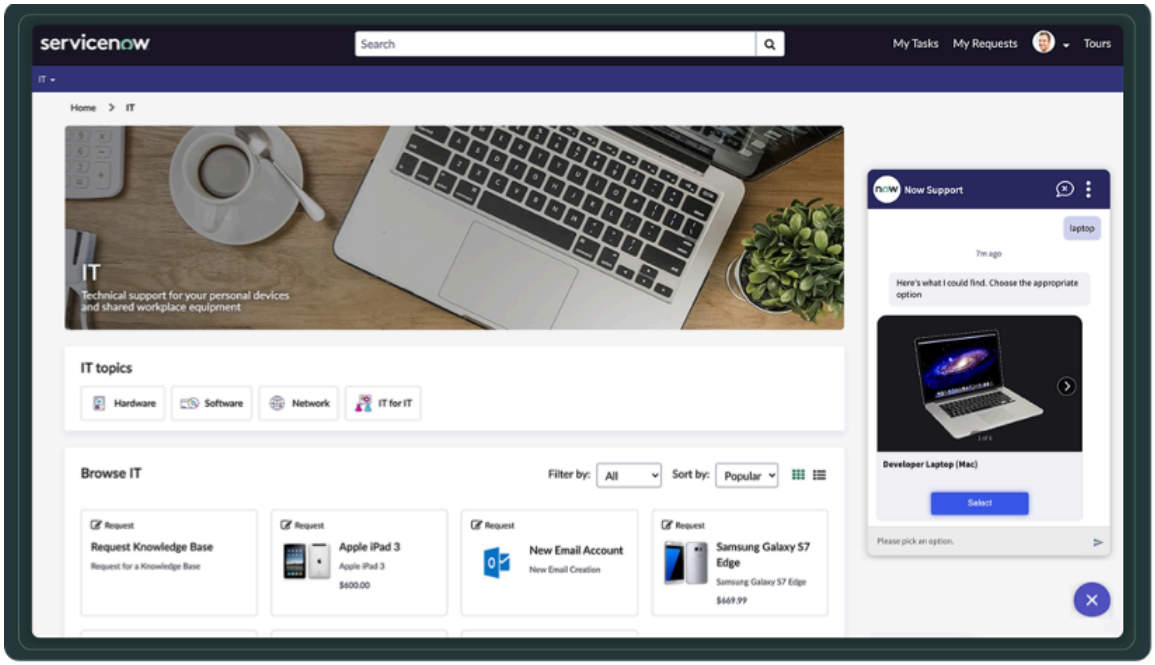
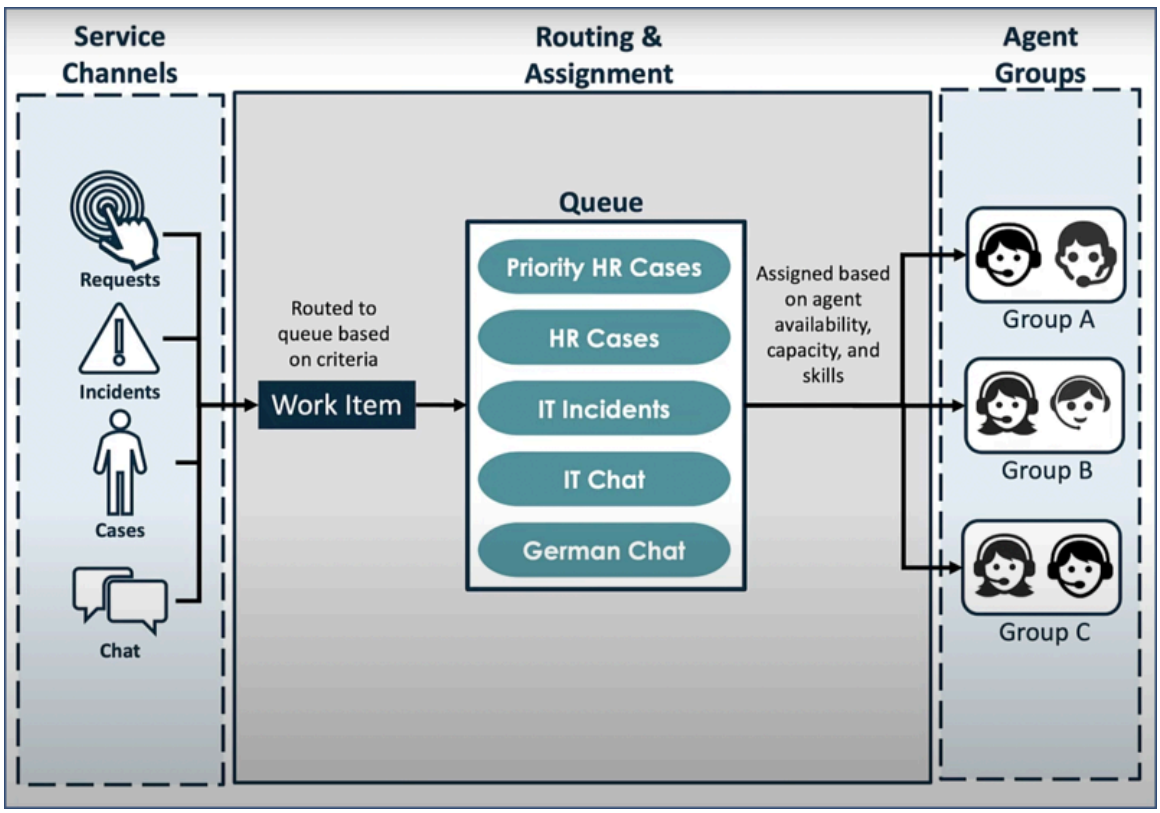


Manage People and Work

Supervise personnel, assignments, and tasks all on the ServiceNow AI Platform using tools to centralize communications, connect agents and users across apps, assess and associate skills with people, and assign tasks based on available personnel.



Legacy Capabilities

Explore the various ServiceNow Legacy options for past releases of the ServiceNow AI Platform, including automated work processes, communications process management, and voice and text messaging integrations.

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Applications and features

- Configuration Management Database (CMDB)
- Conversational interfaces
- Advanced Work Assignment
- Interaction management
- Live Feed core UI
- E-signature
- ServiceNow Voice
- Password Reset
- Skills Management
- Service Catalog

Configuration Management

The Configuration Management Database (CMDB) application is a centralized source that gives you full visibility into your IT environment. By storing information about your organization's infrastructure and how it is configured, this system allows you to monitor your network and ensure stability and best performance. Other ServiceNow® applications enhance the effectiveness of the CMDB application or closely overlap to enable needed business goals.

Overview

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Configuration Management CMDB (CMDB)	Common Service Data Model (CSDM)	Application Services
 Build, adjust, and monitor representations of your business infrastructure to support ServiceNow® products and services.	 Get consistent modeling in the CMDB, with standardized data terminology that can be used across the entire ServiceNow AI Platform.	 Create application services CIs from devices and applications that business units and different products can use.

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Data integration  Use Service Graph and associated tools to populate the CMDB with data from third-parties. Convert imported data to comply with CMDB definitions and structures to ensure CMDB integrity.		

Configuration Management Database (CMDB)

Create models of your infrastructure using Configuration Management. Store your infrastructure data, represented by configuration items (CI)—all the computers, servers, routers, database instances, and services in your network. Analyze trends, reduce problems, and handle incidents by monitoring relationships between CI.

Common Service Data Model (CSDM)

Ensure your data is consistent across every database and ready for every ServiceNow product. The CSDM provides standard terms and definitions for your CI, and any IT services you use. Map your data to CMDB tables clearly using this modeling to provide it to the apps that use it, across the entire ServiceNow AI Platform.

Application services

Use application services to represent and manage operations of various ServiceNow business units and products. An application service is a set of interconnected applications and hosts which are configured to offer a service to the organization such as an organization's internal email system. The various CIs and the relationships between them comprise an application service and are stored in the CMDB.

Data integration

Populate the CMDB by importing and integrating third-party data into the CMDB, in bulk. Use Service Graph connectors to specify process parameters and any needed conversions to be applied to the imported data. Such integrations utilize robust CMDB processes, such as Identification and Reconciliation, to ensure the integrity of the CMDB after third-party data integrations.

Troubleshoot and get help

- Whitepaper: CMDB Design & Configuration
- Whitepaper: CMDB Design
- White Paper: ServiceNow CMDB - Unlocking the Power of Configuration Management
- Whitepaper: CMDB Design Guidance

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- CMDB 101 - What is a configuration management database and why do you need one? (ServiceNow® Community post)
- KB0546686: CMDB Resources Page
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Configuration Management Database (CMDB)

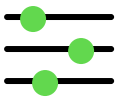
Use the ServiceNow® Configuration Management Database (CMDB) application to build logical representations of assets, services, and the relationships between them that comprise the infrastructure of your organization. Details about these components are stored in the CMDB as configuration items (CIs) which you can use to monitor the infrastructure, helping ensure integrity, stability, and continuous service operation.

Overview

Use core features such as CMDB Health, CMDB Identification and Reconciliation, and CMDB Data Manager to monitor and detect health issues, reconcile data integrity issues, and manage data life cycle.

Note:
CMDB modules, features, and wizards are not supported on mobile devices. You cannot use a mobile device to access the CI Class Manager, Query Builder, or Duplicate CI Remediator or to access or configure CMDB features such as Identification and Reconciliation, CMDB Health, CI Life-cycle Management, baseline CMDB, and proposed changes.

Get started

Explore	Configure	CMDB Workspace
		
Overview of CMDB	Populate the CMDB	Manage CMDB health through dashboards.

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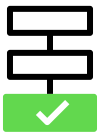
CI Class Manager



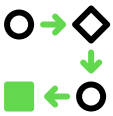
View, create, or edit basic class definitions and class settings for identification and Reconciliation, and CMDB Health.

CMDB 360 / Multisource CMDB



Track and manage how multiple sources populate the same CI attributes.

CMDB Data Manager



Perform bulk management of CI life cycle operations such as deletion, archival, and attestation.

Duplicate CIs remediation



Remediate single or bulk de-duplication tasks.

CIs attestation



Verify the existence of actual IT infrastructure and applications, systematically and in bulk.

Data Certification



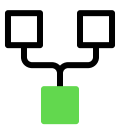
Validate all your data in the CMDB on a regular schedule or on-demand, in CMDB and non-CMDB tables.

CMDB Query Builder



Build complex infrastructure and service queries.

Unified Map



View a hierarchical map of CIs and the relationships between them.

CMDB Health



Monitor and maintain CMDB health: duplicate CIs, required CI fields, and audits.

Reference



Reference topics provide detailed descriptions of tables, properties, forms, and roles.

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Troubleshoot and get help

- CMDB Design & Configuration
- CMDB Design
- Improving Configuration Item Data Quality
- CMDB Design Guidance
- CMDB 101: What is a configuration management database and why do you need one? (ServiceNow® Community post)
- KB0546686: CMDB Resources Page
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Overview of CMDB

The Configuration Management data base (CMDB) creates and maintains the logical configurations your network infrastructure needs to support a ServiceNow service.

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In CMDB, logical service configurations are mapped to the physical layout data of the supporting network and application infrastructure in each of your respective domains. They track the physical and logical state of IT service elements and associate incidents to the state of service elements, which helps in analyzing trends and reducing problems and incidents.

The configurations are stored in a configuration management database (ServiceNow CMDB) which consists of entities, called Configuration Items (CI), that are part of your environment. A CI may be:

- A physical entity, such as a computer or router
- A logical entity, such as an instance of a database
- Conceptual, such as a Requisition Service

In each case, there are attributes about the CI that you want to maintain, and there is control you want to have over the CI. There are changes that may need to be made and tracked against the CI. Also, a CI does not exist on its own. CIs have dependencies and relationship with other CIs. For example, the loss of disk drives may take a database instance down, which affects the requisition service that the HR department uses to order equipment for new employees.

It is this relationship data that makes the CMDB a powerful decision support tool. Understanding the dependencies and other relationships among your CIs can tell you, for example, exactly who and what is affected by the loss of that bank of disk drives. When you find out that a router has failed, you will be able to assess the effect of that outage. When you decide to upgrade the processor in a server, you can tell who or what will be affected during the outage.

Configuration items differ from environment to environment because each customer has unique needs. Details about the exact physical attributes of a computer may be needed by one customer, but may represent meaningless data to another. The ServiceNow AI Platform provides a mechanism to easily define new classes of configuration items and new relationships that may exist between CIs. New classes can be defined that extend other classes. For example, a laptop class exists that extends the computer class. The computer class itself extends the base CI class. Customer class extensions are automatically part of the ServiceNow environment and blend seamlessly into the integration points for other ITIL processes.

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You can for example, set the *Used for* attribute in the cmdb_ci_server table to a value such as 'development', 'test', or 'production'. These values indicate the environment that the CI is supporting, and serve as a way of tracking a CI through its lifecycle in a changing environment.

Extended CMDB

In base systems, CMDB provides core functionality for the configuration management database, including modules for hardware and configuration items. The separate Extended CMDB plugin includes a collection of modules for specialized configuration items, such as radio hardware, test equipment, and voice system hardware.

To extend the CMDB you can activate the following plugins to access the modules for specialized configuration items.

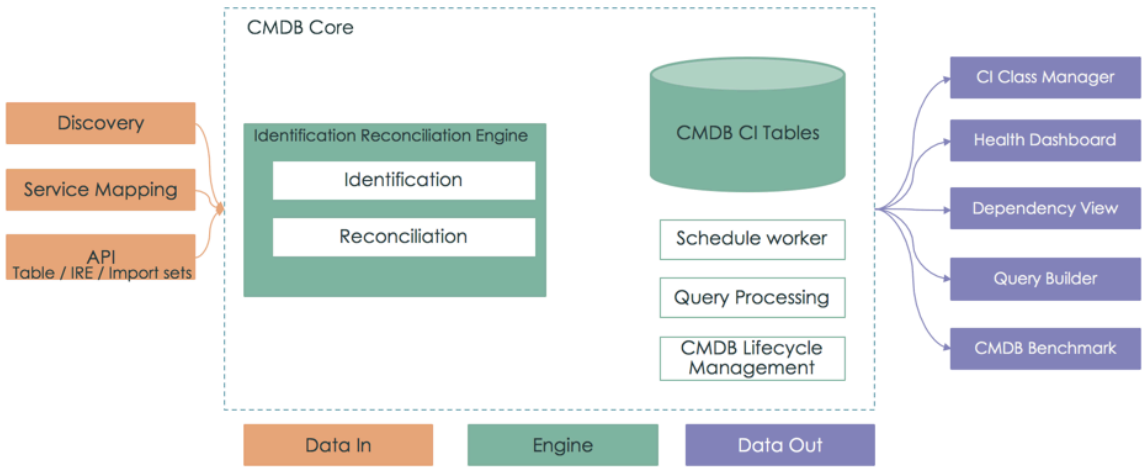
- CMDB Mainframe (com.snc.cmdb.mainframe)
- CMDB Radio Category (com.snc.cmdb.radio.category)
- CMDB Telecom Category (com.snc.cmdb.telecom.category)
- CMDB Test Equipment (com.snc.cmdb.test.equipment)

CMDB hierarchy and CI Class Manager

Sets of CIs that share attributes are stored in their own class table. All CMDB tables are connected by relationships and inherit attributes from each other to form a web of tables referred to as the CMDB hierarchy.

Use the CI Class Manager to manage CMDB classes within the CMDB hierarchy, CMDB Health, and other class-related definitions. For example, in the CI Class Manager you can view class attributes, class identification rules, and the list of CIs for a specific class. To view the list of CIs in the CMDB, you can also enter `cmdb_ci_list.do` in the filter navigator.

Architecture



Related tables

There are tables that are not part of the CMDB hierarchy but which still qualify as CMDB data. Related tables, such as the Serial Number [cmdb_serial_number] table, don't inherent from the Configuration Item [cmdb_ci] table, but have at least one column that references a CMDB CI. Related tables are specified in the Related Entries [cmdb_related_entry] table.

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Some scenarios that involve related tables, can result in orphan or otherwise stale records in related tables. A CI in a related table can, for example, become orphan if the referenced CI in the CMDB is deleted. You can use the CMDB Data Manager to create a policy of the 'Delete CMDB Related Entry' policy type, that will cascade-delete that un-needed related items data. For more information about creating that CMDB Data Manager policy, see Create a CMDB Data Manager policy in CMDB Workspace.

Localization

Using the Translated Text field type (instead of string) for attributes in CMDB tables, can reduce overall performance, including performance of features such as CMDB Health. This is because values in CMDB tables are dynamic and are likely to change often, and the data itself is likely to continuously grow. Using the Translated Text field also requires manual update of related text. The Translated Text field type is typically effective with static data that doesn't change and doesn't grow. For more information about field types, see Field types.

Roles required

Reading CMDB tables directly requires the cmdb_read role, however accessing the **Configuration** module requires the asset, itil, or itil_admin roles. For viewing CMDB-related records in the user interface, the itil role is usually sufficient. For updating records and for other manipulation of records, roles with higher credentials are usually required, as noted in each procedure throughout the documentation set.

For details about CMDB and other roles, see Base system roles, or see a feature components topic such as Components installed with CMDB Workspace.

Related topics

CMDB schema model

Domain separation and Configuration Management Database (CMDB)

Domain separation is supported in the Configuration Management Database (CMDB). Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Overview

The following topics provide details about domain separation in Configuration Management (CMDB) modules:

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- Domain separation in CMDB Health
- Domain separation and CMDB Query Builder
- Domain separation and CMDB Identification and Reconciliation
- Domain separation and the relations formatter and the CI relationship editor
- CMDB APIs (CMDB SDK)

Related topics

Domain separation and Configuration Management Database (CMDB)

CMDB classifications and class dependency

CMDB classifications are groups of CIs that share attributes and are stored in their own class table. Classifications let administrators to define a class hierarchy for the CIs within the CMDB.

A CI class refers to the actual table name in the instance database. In that context, 'CI type' is a friendly name that a CI is known by, such as computer, router, or printer.

One of the characteristics of a CMDB class is its dependency on other classes. A class can be independent or dependent, which determines the dependency or independence of the class CIs.

Independent CIs

CIs from an independent class, such as Linux Server CIs, have their own identity, exist by themselves, and aren't dependent on any other CIs.

Dependent CIs

CIs from a depended class have relationships with CIs from other classes and exist meaningfully only if these relationships exist. Dependent CIs don't exist on their own in the absence of the dependent relationship. For example:

- Network Adapter CIs don't exist meaningfully without the Hardware CIs that contain them.
- Application CIs don't exist on their own without the Server CI they are hosted on.

Identification processes in the Identification and Reconciliation engine (IRE) CMDB feature extensively use CIs dependency classification. To find out the dependency classification of a class, open the Identification Rule page for a class in CI Class Manager. To establish CI dependency, use the CI Class Manager to specify dependent relationship rules for a CI class.

For more information, see Identification rules.

Dependent CIs management

A life cycle update for a CI affects its dependent CIs. For example, when the CI that a dependent CI depends on is deleted, the dependent CI becomes orphan with no further use. To maintain the integrity and health of the CMDB, the system applies cascade-cleanup processes to dependent CIs that are affected by a life cycle update.

For information about independent and dependent CIs, see CMDB classifications and class dependency.

To ensure that dependent CIs are properly managed after deleting or archiving CIs, you must:

1. Enable dependent CIs management as described on this page.
2. Manually approve the CMDB Data Manager tasks that dependent CIs management generates, or configure those tasks to not require a review or an approval.

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Note:
An Orphan dependent CI in the context of Data Manager is different from an orphan CI in the context of CMDB Health. An orphan dependent CI within the context of Data Manager belongs to a dependent class, and is missing the dependent relationship. The definition of an orphan CI in the context of CMDB Health is broader, and includes any CI that matches CMDB Health orphan rules. For more information about orphan CIs in CMDB Health, see CMDB Health KPIs and metrics.

Examples of dependent CIs needing cascade-cleanup:

- Tomcat application (T1) runs on a Linux Server (L1) and contains a WAR file (W1). When L1 is deleted, T1 and W1 become orphan dependent CIs.
- Network Adapters become orphan dependent CIs when the hardware itself is deleted.
- A Linux Server has retired and is set with end of life, the assumption is that if the server is no longer operational then applications which depend on it shouldn't be operational either.

Enable dependent CIs management

To enable dependent CIs management:

- Configure your environment for CMDB Data Manager. For details about how to configure the environment for CMDB Data Manager and the CMDB Data Manager own prerequisites, see Working with CMDB Data Manager.
- Ensure that the *cmdb.dependent.ci.cascade.op.enabled* system property is set to **true** (true by default). This property enables cascade operations and doesn't exist in the base system. Therefore, to view or modify the property value, you must first add it to the System Properties [sys_properties] table.
- To enable cascade-retirement processes, ensure that the system property *cmdb.dependent.ci.cascade.retire.enabled*, which is used to manage cascade-retirement of CIs, is set to true (true by default). The business rule *After BR: Track "Retired" CIs*, that checks for downstream CI dependencies, runs only if this property is set to true. This property doesn't exist in the base system and to view or modify it, you must first add it to the System Properties [sys_properties] table.

Cascade-cleanup operations apply only from when you enable the dependent CIs management feature. To apply cascade-cleanup to orphan dependent CIs that already existed in the CMDB before enabling the feature, see Cascade-cleanup existing orphan dependent CIs.

Use of CMDB Data Manager to perform cascade-cleanup operations

Dependent CIs management processes use the CMDB Data Manager to process the life cycle updates for the dependent CIs in the CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger] table in the following ways:

1. Requesting and getting approvals from users for the life cycle updates for the CIs.
2. Performing the actual delete, archive, or retire CI updates after these operations are approved.

The system generates tasks for the 'Dependent CI - Deletion', 'Dependent CI - Archive', and 'Dependent CI - Retire' Data Manager policies, with the CIs that are ready to be deleted, archived, or retired as target CIs. These policies are set with the respective 'On Demand' policy types. Then, a Data Manager admin or user, according to the *Managed By Group* setting, must review and approve these tasks before the Data Manager applies the respective subflow to the dependent CIs.

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To automatically approve those tasks, use the CMDB Data Manager to clear the **Needs Review** flag of the respective Data Manager policies. Those tasks will then run without requiring any user intervention.

Cascade-retire dependent CIs

When a CI is set to retire, dependent CIs management data processes attempt to cascade-update all the CIs depending on that CI, also to retire.

1. CI is updated to retire as the CI's *`Life Cycle Stage`* attribute is set to **End of Life** according to CSDM standards.

2. Business rule *`After BR: Track "Retired" CIs`* runs (only if the system property *`cmdb.dependent.ci.cascade.retire.enabled`* is **true**) to check if the CI belongs to a class which has any downstream dependencies.

   If yes: The CI is added to the CMDB CI End Of Life Ledger [cmdb_ci_end_of_life_ledger] table.

3. For each CI in the CMDB CI End Of Life Ledger [cmdb_ci_end_of_life_ledger] table, the scheduled job *`CMDB Cascade Retire Dependent CIs`* checks the CI's relationships in the CI Relationship [cmdb_rel_ci] table. If there is a dependent relationship with a dependent CI, then that dependent CI is added to the CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger] table with the **Retire** action.

   For more information about dependent relationship rules, see CMDB dependent relationship rules.

4. Scheduled Job *`CMDB DependentCI Policy Processor`* runs (if the system property *`cmdb.dependent.ci.cascade.retire.enabled`* is true) to process the CIs in the CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger] table. Those CIs are set as being ready to retire upon approval using the CMDB Data Manager. A task is created in the CMDB Data Manager against the Dependent CI Retire policy to actually retire the CIs.

Cascade-archive of dependent CIs

Archiving a CI can leave its dependent CIs as orphans in the CMDB. To prevent the accumulation of stale data, the system applies cleanup processes that cascade-archive those orphan dependent CIs.

Orphan dependent CIs are not immediately archived. When a CI is archived, all the CI relationship records for that CI in the [cmdb_rel_ci] table, are also archived. The system then checks for any dependent CIs that were orphaned as a result of this archiving. Any CIs in the dependency chain that are identified as orphan dependent CI, are checked for any of the following conditions. CIs that meet any of these conditions are not orphan dependent CIs and therefore will not be archived:

- The CI is an unhandled duplicate CI (the CI is associated with an unresolved de-duplication task).
- The CI has multiple parent CIs.
- The CI belongs to an excluded class. Excluded classes are stored in the CMDB Dependent CI Class Exclusion [cmdb_dependent_ci_class_exclusion] table. In the base system, that table is pre-populated with some classes such as *`cmdb_ci_vm`*, *`cmdb_ci_vmware_instance`*, and other VMware-related classes. You can manage the set of classes that are exempt from management of orphan dependent CIs, by adding or removing records to that table.

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Eventually, only those CIs that these conditions do not apply to are added to the CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger] table. Those CIs are set as being ready for archival using the CMDB Data Manager, upon approval.

Cascade-delete of dependent CIs

Deleting a CI can leave its dependent CIs as orphans in the CMDB. To prevent the accumulation of stale data, the system applies cleanup processes that cascade-delete those orphan dependent CIs.

Orphan dependent CIs are not immediately deleted. When a CI is deleted, all the CI relationship records for that CI in the [cmdb_rel_ci] table, are cascade-deleted. Prior to deleting each of these relationship records, the system checks if the CI on the other end of the relationship belongs to a dependent class. Any CIs in the dependency chain that are identified as dependent on the deleted CI, are checked for any of the following conditions. CIs that meet any of these conditions are not orphan dependent CIs and therefore will not be deleted:

- The CI is an unhandled duplicate CI (the CI is associated with an unresolved de-duplication task).
- The CI has multiple parent CIs.
- The CI belongs to an excluded class. Excluded classes are stored in the CMDB Dependent CI Class Exclusion [cmdb_dependent_ci_class_exclusion] table. In the base system, that table is pre-populated with some classes such as *cmdb_ci_vm*, *cmdb_ci_vmware_instance*, and other VMware-related classes. You can manage the set of classes that are exempt from management of orphan dependent CIs, by adding or removing records to that table.

Eventually, only those CIs that these conditions do not apply to are added to the CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger] table. Those CIs are set as being ready for deletion using the CMDB Data Manager, upon approval.

Extraneous relationships

For the delete and archive operations, the system also tracks CIs' extraneous relationships in the Dependent CI Relations Evaluation Config [cmdb_dependent_ci_extra_rels_config] table. Extraneous relationships are those relationships that are not in the CI's chain of dependency and deleting or archiving them depends on the value of the *cmdb.dependent.ci.extra.rel.check* system property. This property is set to **true** by default, in which case extraneous relationships are not deleted or archived. You can set the property to **false** to delete and archive those relationships.

The *cmdb.dependent.ci.extra.rel.check* property doesn't exist in the base system and to view or modify the property value, you must first add it to the System Properties [sys_properties] table.

Cascade-cleanup existing orphan dependent CIs

When enabling the dependent CIs management feature, the cascade-cleanup operations apply only from when the feature is enabled. However, it might be necessary to apply a similar cascade-cleanup operation to orphan dependent CIs that already existed in the CMDB before the feature was enabled.

Activate the Cleanup Orphan CIs scheduled job to perform a one-time cascade-cleanup of orphan dependent CIs across the CMDB. The Cleanup Orphan CIs scheduled job checks throughout the entire CMDB to identify any orphan dependent CIs. These CIs are then processed in the same manner that CIs that are cascade-deleted are processed. CIs that are ready to be deleted are added to the CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger]

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table. The CMDB Data Manager is then leveraged as described in the Use of CMDB Data Manager to perform cascade-cleanup operations section.

The Cleanup Orphan CIs scheduled job is intended to run only once, after which the job deactivates itself. Depending on the size of the CMDB, it might take the Cleanup Orphan CIs scheduled job several days to complete.

Sample scenario: cascade-retire

1. Enable dependent CIs management.
2. In CMDB Data Manager, create and publish a Retire policy. For example, retire an independent Linux Server CI with relationships to the dependent CIs Network Adapter and File System.
3. Wait for the scheduled job *`CMDB Data Manager Retire Policy Processor`* to run, or run it manually.
4. In the Data Manager overview page, select the Open task card and approve the retirement task (Approval=Approved). Change the state of the task to 'Work in progress' if it doesn't change automatically. This will retire the Linux Server CI and add it to the cmdb_ci_end_of_life_ledger table.
5. Run the scheduled job *`CMDB Cascade Retire Dependent CIs`*.

   This scheduled job processes each CI in the cmdb_ci_end_of_life_ledger table, and queries the relationships in the cmdb_rel_ci table for this CI. If a relationship exists with other dependent CI, then those dependent CI are added to the cmdb_dependenct_ci_ledger table with the settings of state = 'Ready' and action = 'Retire'.
6. Wait for the scheduled job *`CMDB DependentCI Policy processor`* to run, or run it manually. This scheduled job creates a task against the OOB Dependent CI Retire policy, targeting the CIs in the cmdb_dependenct_ci_ledger table.
7. In the Data Manager overview page, select the Open task card and approve the task described with “Dependent CI – Retire..”.

CMDB record types

The CMDB contains the following major record types.

CMDB record types

Record types	Description
Configuration Item (CI)	Any computer, device, or service in the CMDB. A CI's record includes all of the relevant data, such as manufacturer, vendor, location, etc. Configuration items can be created or maintained either using tables, lists, and forms within the platform, or using the Discovery application.
Relation Type	A defined relationship between a CI and either another CI, a user, or a group. Relation types are defined twice, once from the perspective of the child CI and once from the parent CI's perspective. For example, a parent CI that powers a child CI uses relation type **Powers::Is Powered By**. Example relation types include **In Rack::Rack contains**, **Log Reviewed by::Reviews logs** for, or **Backup done by::Does backups** for.

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CMDB record types (continued)

Record types	Description
	CMDB relationships can be established using Discovery or using the tables, lists, and forms within the platform. The CMDB form has a specific Related Items toolbar optimized for modifying relationships.

Related Lists of CI components

Related lists in CI records display additional components contained by that CI, such as disk drives on a server and the rules that control the behavior of a network router.

When Discovery runs, the Related List is populated with the components that Discovery finds running on the CI. The CI record might show different lists from scan to scan, depending on whether or not Discovery found the component.

By default, the Related Lists only display those components that are associated with that CI in the CMDB that has been discovered by the last scan. Components that are recorded in the CMDB but are not discovered in a scan, are deemed absent and do not appear in the list.

There are two types of components that appear in the Related List: components that are CIs themselves (such as hard disks), and components that are not (serial numbers and rules). The default filter condition in the breadcrumbs for components that are CIs is **[Status] [!=] [Absent]**. The filter condition for components that are not CIs is **[Absent] [=] [false]**.

For example, a router can have several Related Lists affected by these filter conditions, including routing rules, disk drives, interfaces, and network adapters. Only those components found during the last Discovery appear in these Related Lists.

Icons in related lists

Any of the following icons may appear in lists of CI related items.

	For currently active incidents against this configuration item
	For currently active problems against the configuration item
	For currently active changes against the configuration item that are not covered in the past, current, pending changes. For example, a request to update the operating system on a server that is currently in progress may display this icon.
	For changes that were recently completed against the configuration item. changes with an "Actual_end_date" in the past.
	For changes that are planned soon against the configuration item. changes with an "Actual start date" in the future.

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(continued)

	For currently active changes against the configuration item that have an "Actual start date"
	For outages that were recently completed against the configuration item. outages with an "end" date in the past.
	For outages that are planned soon against the configuration item. outages with a "begin" date in the future.
	For currently active outages against the configuration item that have a "begin" date in the past and no "end" date
	This will only show up in the Tree view and indicates that a configuration item that is downstream has at least one of the above issues against it.

The system looks five calendar days into the past and seven calendar days into the future when looking at recent outages and changes.

Teams related list

The Teams related list associates a user group to a CI based on group type, providing flexibility in tracking the different types of groups assigned to a CI. The Teams related list appears on CI forms for CIs of the Service [cmdb_ci_service] class and its descendent classes such as the Application Service [cmdb_ci_service_auto] class.

Using the Teams related list can be useful if many data sources are used in the organization, and when using the IntegrationHub ETL.

In the base system, the Teams related list contains group types that match the fields:

- *Approval Group*
- *Change Group*
- *Managed by Group*
- *Support Group*

When you set a group assignment on a CI form of one of those classes, that group assignment is automatically synchronized with the Teams related list. If you set an assignment group for an application service, a relationship record is created to represent the new group assignment for the CI. The Teams related list on such CI forms, always shows the current settings for the various group assignments for the CI.

If there are multiple groups assigned to a CI, then on the **Teams** related list on a CI form, you can designate one of those groups as primary. When an incident involving that CI is created, the incident is assigned to that primary group. Only one group type can be designated as primary for a CI at any given moment.

As an example, use the Teams related list for an application service with the following characteristics:

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- Requires access to a database
- Runs on Linux servers
- Has a group assigned to manage the software portion of the actual application

In that example, you can track all of these group assignments by adding the appropriate group types and setting CIs with the new custom group types.

By-directional synchronization

When you set or modify the value of one of the assignment group fields on a Service CI form, then the Teams related list is updated with that change, adding a Teams related record if a corresponding one doesn't exist. For example, when you set an empty **Support group** field to **Database San Diego** and save the form, then the system adds a Teams record in which *Group type* is **Support Group** and **User group** is **Database San Diego**.

In the opposite direction, any change in a Teams related record, where *Group type* corresponds one of the group assignment fields in the CI, is synchronized to the corresponding field. For example, if you set *User group* to **CAB Approval** in the *Support Group* group type, the **Support group** field on the CI form is updated with the **CAB Approval** value.

Deleting a Teams record doesn't affect the group assignment fields in the CI.

Add the Teams related list to a Service CI form

By default, the tab for the Teams related list doesn't appear in the Related Lists section on Service CI forms. You can add the Teams related list by selecting the form's Additional actions menu, selecting **Configure** and then **Related Lists**. In the Available list that appears, move **Teams** to the Selected list and then select **Save**.

Add a custom group type to the Teams related list

The Teams related list lets you add custom group types that are needed in your organization, extending the initial list of supported group types.

Before you begin

Role required: itil_admin, asset, or cmdb_admin

About this task

To add a group type, you must modify the dictionary definition of the *group_type* column in the *cmdb_rel_team* table.

Procedure

1. On a Service CI form, select the **Teams** related list.
2. In the **Columns** tab, select the **Group type** column.
3. On the Dictionary Entry form, in the **Choices** related list tab, insert a new row for a new Teams choice such as **Datacenter Group**.
4. Save your changes.

Create a CI class

Create a CI class (table) that is an extension of an existing CI class. Then create identification and reconciliation rules for the new class.

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Before you begin

The class that is being extended must have its *Is_Extendable* field checked, indicating that the class is extendable.

Role required:

- itil_admin and personalize_dictionary: Required for editing the dictionary table
- admin: Full access

About this task

The CI Class Manager is a centralized location for managing CMDB tables and for creating a class that is derived from another CMDB class. Creating a class requires basic details such as a label and a name. Identification and reconciliation rules are also required to ensure that the class can be successfully identified by the identification engine.

For more information about extending a class and how attributes are derived from a parent class in that process, see Table extension and classes.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to expand the CI Classes list.
3. Select the class that the new class is extended from.
4. Click **Add Child Class**.
   The **Add Child Class** option appears only if the selected class is extendable.
5. On the **Provide Basic Info** tab, fill out the information and then click **Next**.

Field	Description
Display name	A unique label for the class (such as Laptops or Thin Clients). The label appears on list and form views for the class. Updating the **Label** field also updates the label record in the language file for the current language. See Field Labels in Data dictionary tables. Maximum string length is 80 characters.
Table name	Automatically populated based on the table label and the prefix string 'u_cmdb_ci'. You cannot modify the prefix; however, you can modify the rest of the table name. The name can contain only lowercase, alphanumeric ASCII characters and underscores (_). Maximum string length is 80 characters.
Description	Explanation of the use purpose of the class.
Icon	The icon associated with the class.
Extensible	Indicator of whether this class can be extended.

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Field	Description
Principal Class	Denotes whether this class is included in the Principal Class filter. If this class is included in the Principal Class filter, then CIs from this class appear in CI list views when the Principal Class filter is applied.

6. On the **Add Attributes** tab, click the + sign and enter details for each new class column.
7. Click **Next**.
   For description of the different columns in the list view, see Dictionary entry form. To designate an attribute as a CI identifier for class identification, double-click the attribute's Identification Rule column and set it to **true**.
8. On the **Set Identification Rule** tab, examine the **Derived** identification rule and its **Identifier Entries**.
   You can click **Replace** to replace the derived rule with a new identification rule and new identifier entries specific to the new class. See Identification rules for details about identification rules and identifier entries.
9. On the **Dependencies** tab, click **Add dependency** to add dependent rules.
   The **Dependencies** tab appears only if there are dependent identification rules for the selected class.
10. On the **Add Reconciliation Rules** tab, click **Add** to create the following rules:
    a. Reconciliation Rules
    b. Data Refresh Rules
11. On the **Add Suggested Relationships** tab, review the diagram of the class derived suggested relationships.
12. Use the filter to display only inbound, outbound, or specific relationship types.
13. To add a suggested relationship for the class:
    a. Click **New**.
    b. In the Add Suggested Relationship dialog box, select a **Relationship** and a **Target Class** for the relationship. **This Class** and the **Target Class** become parent or child in the suggested relationship, based on your selection of the **Relationship**.
    c. Click **Save**.
    When building relationships for the class in the Query Builder, the list of suggested relationships is updated.
14. Click **Done**.

Related topics

CMDB Identification and Reconciliation

Reclassify a CI

You can upgrade, downgrade, or switch the class of a CI by modifying its **Class** attribute.

Before you begin

Role required: itil or asset (In general, the roles required to update a CI)

About this task

Each class is defined with a unique set of attributes. This set consists of attributes that were derived from the parent class, and additional attributes defined for the class.

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When you reclassify a CI, the following occurs.

1. The set of attributes is adjusted to match the set of attributes of the newly assigned class. Attributes are added or removed as needed.
2. If any attributes are unique to the current class and are not defined in the newly reclassified class, they are lost.
3. A new record with the CI's current sys_id is inserted to the table of the new class, with the appropriate set of attributes for the class (the sys_id of the CI is retained).

Depending on the reclassification, the following occurs.

Downgrade

The CI class is updated to a class that is higher in the class hierarchy, and the newly assigned class is a parent of the current class. For example, reclassifying a CI from the *cmdb_ci_server* class to the *cmdb_ci_computer* class.

For example, the *cmdb_ci_server* class has attributes that the *cmdb_ci_computer* class does not have. During the downgrade, these attributes and their respective values are not included in the new CI record that is inserted into the *cmdb_ci_computer* class.

Upgrade

The CI class is updated to a class that is lower in the class hierarchy, and the newly assigned class is a derived child of the current class and has additional attributes. For example, reclassifying a CI from the *cmdb_ci_computer* class to the *cmdb_ci_server*.

Switch

The newly assigned class is in a different branch in the class hierarchy and has a different set of attributes than the current class. For example, reclassifying a CI from the *cmdb_ci_linux_server* class to the *cmdb_ci_win_server* class.

A switch is a combination of a downgrade and an upgrade. For example if the CI is downgraded to the *cmdb_ci_server*, and then upgraded to the *cmdb_ci_win_server* class. Therefore, attributes are lost in the same manner as in a downgrade operation.

Note:
Avoid the CI class downgrade and CI class switch operations as those can lead to data loss. When automatic CI reclassification is enabled (which is by default), the identification process can result in some automatic reclassifications which lead to data loss.

For information about CI reclassification by the Identification and Reconciliation Engine (IRE) and related system properties that control the behavior of automatic CI reclassification, see CI reclassification during IRE processing.

Procedure

1. Locate the CI that you want to reclassify and display it in a list view.
   You can use the application navigator. Or for example, if the CI is a server, then in the navigation search box, type `cmdb_ci_server.list` to display the CI in the **Servers** view.
2. Ensure that the **Class** field is displayed in the list.
   If you do not see this attribute, personalize the list to add the **Class** field.

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3. Double-click the **Class** value for the CI, and select a new class.
4. Click the green check box to confirm your selection.

Delete CIs

You can use the CI Class Manager to delete CIs that are no longer needed.

Before you begin
Role required: itil_admin

About this task
For information about policy-based, large scale automated CI deletions, see Working with CMDB Data Manager.

Note:
You can't delete base system tables. For information about deleting custom tables, see Delete a table.

Procedure
1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to expand the CI Classes list and then select the class from which you want to delete CI records.
3. In the class navigation bar on the left, click **CI List**.
4. On the CI List form view, select the CIs that you want to delete.
   Select the check box in the header to select all the CIs that are visible.
5. Click **Actions on selected rows** and then click **Delete**.
6. Click **Delete** in the **Confirmation** dialog box.

Result
After deleting CIs that a dependent CI depends on, the dependent relationship is also deleted. The dependent CI becomes an orphan and is not immediately deleted. In this situation, the system attempts to cascade delete such orphan dependent CIs to prevent the accumulation of stale data and maintain the health of the CMDB. For information about how the system manages orphan dependent CIs, see Management of orphan dependent CIs.

View and edit class definitions and metadata

Use the CI Class Manager as a central location to explore the CMDB class hierarchy, CI table definitions, and class CIs. View the details of each table such as its label and fields, relationships, and all related metadata definitions.

Before you begin
Role required: none

About this task
The CI Class Manager displays the entire CMDB class hierarchy in a tree-view format, consolidating class definitions into a central location. It lets you display metadata information for a class, such as reconciliation rules, mandatory and recommended fields, and audit templates. You can also select a specific class to view, to modify, or to extend its definition to create a derived class. For each class, you can directly access CMDB Health settings, identification and reconciliation rules, orphan scorecard, and certificate template, defined for the class.

For more information about extending a class and how attributes are derived from a parent class in that process, see Table extension and classes.

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Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to expand the CI Classes list and then select a class to display details for.
3. On the class navigation bar, expand the following items to display further details for the class.
   - **Class Info**:
     - **Basic Info**: Displays details for the selected class, such as the display and table name, description, and class icon. Lets you edit some of the class definitions, and prevents editing of some details such as the table name.

       Role required: itil for reading, and itil_admin and personalize_dictionary for writing.

     - **Attributes**: Displays table attributes (columns). Lets you edit those attributes and add new ones. For description of the different attributes in the list view, see Dictionary entry form.

       Role required: personalize_dictionary for reading and writing

       To add an attribute:

       a. Click the **Added** tab and scroll to the bottom of the list.
       b. Double-click **Insert new column**, and enter details for each new class attribute. Set **Identification** to true to designate an attribute as a CI identifier for class identification.
       c. Click **Save**, and fix any errors that appear.

     - **Identification** and **Reconciliation**: Displays and lets you edit, create, and delete identification and inclusion rules, reconciliation and data refresh rules for the class.

       See CMDB Identification and Reconciliation for more information.

       Role required: itil for reading, and itil_admin (on top of itil) for writing.

     - **Dependent Relationships**: Displays and lets you edit, create, and delete hosting and containment relationships for the class. See CMDB dependent relationship rules for more information.

       Role required: itil for reading and itil_admin (on top of itil) for writing.

     - **Suggested Relationships**: Displays a diagram of all suggested relationships for the class, and lets you delete or add suggested relationships for the class. Use the navigation tools to increase or decrease the diagram, and to move the diagram on the page. Use the filter to display specific relationship types. See Suggested class relationships for more information.

       Role required: itil.

   - **All Relationship Rules**: Displays a combined diagram of all suggested relationships and all dependent relationships for the class. Use the navigation tools to zoom in or out, and to move or center the diagram on the page. Use the filter to display specific relationship categories.
   - **Health**: Lets you review and configure CMDB Health-related system properties, scorecards, and rules and settings for all CMDB health KPI and metrics, at the class level. See CMDB Health for information about enabling and configuring CMDB Health, and displaying health reports.

     Role required: Itil for reading and itll_admin (on top of itil) for writing.

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- **CI List**: Displays the CIs of the selected class. Lets you create CIs of the selected class and perform other operations such as delete.

  Role required: Itil for reading. Writing requirements follow the selected table settings.

Related topics

Create or modify map icons

Update the list of classes in the Principal Class filter

Manage the list of classes that are included in the Principal Class filter to restrict the CIs that appear in CIs list views to only specific classes that you need. You can add or remove CMDB classes from the Principal Class filter.

Before you begin

Role required: itil_admin and personalize_dictionary

About this task

Apply the CMDB Principal Class filter in list views of CMDB CIs so that only CIs that belong to the classes in the filter, appear. In a base system, the Principal Class filter doesn't contain any classes. The principal class setting applies only to the current class and is not derived by child classes. For more information about list view filters, see Save and use filters in a list view.

You can also use the Principal Class filter in the Discovery sources card in the CMDB 360 dashboard in CMDB Workspace. For more information about using the Principal Class filter, see CMDB 360 experience in CMDB Workspace.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to expand the CI Classes list and then select a class to add or remove from the Principal Class filter.
3. On the class navigation bar, navigate to **Class Info** > **Basic Info**.
4. On the Basic Info form, select or clear **Principal Class**.
5. Select **Save**.

Result

The Principal Class filter is updated with the addition or the removal of the class from the list of classes in the filter. When you apply the Principal Class filter to a Configuration Items list view, only CIs from classes included in the filter, appear.

What to do next

In both of the following scenarios, the list of CIs refreshes to show only CIs whose class is included in the Principal Class filter:

- 1. In the **Filter navigator**, type `cmdb_ci.list` and then press the Enter key.
  2. In the Configuration Items list view, select the **List controls** menu icon, select **Filters** and then select **Principal Class**.

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1. Open a Change Request form.
2. Scroll down and select the **Affected CIs** tab. Select **Add**.
3. In the **Add Affected CIs** form, select the **List controls** menu icon, select **Filters** and then select **Principal Class**.

For more information about adding affected CIs to change requests, see Associated CIs on a change request.

CI relationships in the CMDB

The CMDB, in contrast to a static asset list, helps you track not only the configuration items (CIs) within your system, but also the relationships between those items.

A relationship in the CMDB consists of two CIs and a relationship type:

- Parent CI
- Child CI
- Type of the relationship that links both CIs

For example, in the [Server1] [Managed by] [Server2] relationship:

- Server1 is the child CI
- Server2 is the parent CI
- [Managed by] is the relationship type

For example, a web application might read data from an instance of Oracle, which in turn might depend on a piece of underlying hardware. Most CIs in a CMDB have multiple relationships to other CIs, users, and groups.

The relationships between CIs can be automatically discovered. If you use Discovery, many relationships can be automatically loaded into the system through the discovery process. If you import your data from another system, you get some form of relationships.

You can add to automatically discovered relationships, create relationships, or edit relationships for a CI by launching the CI relationship editor from the CI form.

Dependent and non-dependent relationships

Dependent relationships, such as tomcat RunsOn Hardware, are used by the Identification and Reconciliation Engine (IRE) to identify dependent CIs.

Non-dependent relationships are not used for CI identification, and therefore can be deleted if no longer needed. CMDB tracks discovery source and last scanned time for non-dependent relationship in the Relationship Sources [sys_rel_source] table. Dependent relationships are used for CI identification. Therefore they should not be directly deleted and they are not tracked.

Information in the Relationship Sources [sys_rel_source] table can be used to decide if it is safe to delete a non-dependent relationship. For example, a discovery source which is attempting to delete a non-dependent relationship can confirm that:

- There are no other data sources for that relationship.
- The relationship was not updated for some specified length of time and therefore is no longer needed.

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When a non-dependent relationship is deleted from the CI Relationship [cmdb_rel_ci] table, all cascading corresponding records in the Relationship Sources [sys_rel_source] table are deleted.

Key relationships

The following table contains descriptions for some key CMDB relationships.

Parent	Child	Description
Applicative Flow To	Applicative Flow From	Connections between endpoint CIs. **Note:** For internal use only (service model).
Connects to	Connected by	Network Connections between elements that are talking to each other. Examples: Workstation to switch, switch to switch, kubernetes workload to service.
Contains	Contained by	Typically a containment relationship (CI to contained CI). The child CI typically has a single parent CI with this relationship type. Examples: Tomcat to Tomcat WAR, VMware Datacenter contains Network.
Defines resources for	Gets resources from	Parent CI defines/gets resources from a child CI. Example: VMware - Resource pool gets resources from ESX Server.
Depends on	Used by	Parent CI depends on child CI. Meaning that problem/change in the child CI may impact the parent CI.
Hosted on	Hosts	Hosting relationship between an element and its host. Examples: Cloud resource to logical data center, k8s workload to k8s cluster.

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Parent	Child	Description
Implement End Point To	Implement End Point From	Endpoint to CI that exposes this endpoint. **Note:** For internal use only (service model).
Manages	Managed by	Typically used where one CI manages one or more other CIs. Example: vCenter manages vCenter Datacenter.
Members	Member of	Typically used with clusters where a cluster node is a member of a cluster. Example: ESXi Server is a member of vCenter Cluster.
Owns	Owned by	Usually a containment relationship (CI to owned CI). The child CI typically has a single parent with this relationship type.
Runs on	Runs	Typically between a CI that represents a software application, to the hosting hardware/VM. Example: Tomcat 'Runs on' Linux server.
Use End Point To	Use End Point From	From the CI to an outgoing endpoint. **Note:** For internal use only (service model).

Related topics

Create a CI relation rollup

Suggested class relationships

The system keeps a table (Suggested Relationship [cmdb_rel_type_suggest]) of relationship types that are appropriate for a CI type, based on its class. You can manage suggested relationships by navigating to **Configuration** > **Suggested Relationships**, or in the CI Class Manager.

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Suggestion model

The relationship editor has a base CI. The base CI designates the CI that a user was on before launching the editor, as the base CI in the new relationship. If you launched the relationship editor from the lnux100 CI, then lnux100 becomes the base CI. Also, every CI in the system has a type (class). For example, bond lnux100 is of the Linux server type.

Many CI types are children of other types in the hierarchy. For example, the class hierarchy for a Linux server is:

`cmdb_ci` -> `cmdb_ci_hardware` ->`cmdb_ci_computer` -> `cmdb_ci_server` -> `cmdb_ci_linux_server`

The suggestion model works by analyzing the suggested relationship table for all relationships whose base class is the current base class of the user or any one of its parent classes. For example, looking at a Linux server, the suggestion model would retrieve any relationships whose base class was:

`cmdb_ci_linux_server`, `cmdb_ci_server`, `cmdb_ci_computer`, `cmdb_ci_hardware`, or `cmdb_ci`

ITOM Visibility, if available, uses enhanced discovery patterns to identify and add CI relationships to the Suggested Relationships table.

Suggested CI relationships in the relationship editor

The CI relationship editor uses the suggestion model to help users select reasonable relationships for configuration items.

For example, consider these relationship types in the system:

- Provides Power for :: Receives Power From
- Runs on :: Hosts

Typically, a user uses these relationships to define the following reasonable relationships between two items as follows:

- a database runs on a server
- a rack provides power for a server

Typically, neither of the following definitions would be appropriate:

- a rack runs on a server
- a server runs on a database

For descriptions of some key relationships, see CI relationships in the CMDB.

Related topics

CI Class Manager

Add a suggested relationship

Add a suggested relationship for a class. The list of suggested relationships for a class is available when you create a new relationship for a CI of that class.

Before you begin

Role required: To view — itil. To create, update, or delete suggested relationships — itil_admin.

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Procedure

1. Use the CI Class Manager (Role required: itil_admin):
   a. Navigate to **All** > **Configuration** > **CI Class Manager**.
   b. Click **Hierarchy** to expand the CI Classes list, then select the class where you want to add a suggested relationship.
   c. In the class navigation bar, click **Suggested Relationships**.
   d. Click **New**.
   e. In the Add Suggested Relationship dialog box, select a **Relationship** and a **Target Class** for the relationship.
   This Class and the **Target Class** become parent or child in the suggested relationship, based on your selection of the **Relationship**.
   f. Click **Save**.
2. Or, navigate to **All** > **Configuration** > **Relationships** > **Suggested Relationships** (Role required: admin):
   a. Click **New**.
   b. On the form, fill in the fields.

Suggested Relationship fields

Field	Description
Base class	The base class in the relationship, which depending on the relationship type, is either the parent or the child in the relationship.
Relationship	Relationship type.
Dependent class	The dependent class in the relationship, which depending on the relationship type, is either the parent or the child in the relationship.

Example: Suggested relationship you can add

Base Class	Relationship	Dependent/Target Class
Oracle	Is Hosted On	Linux Server
Oracle	Is Hosted On	Solaris Server

Note:
The same parent class and relationship can appear more than once.

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What to do next

You may need to delete a suggested relationship, for example, to limit the choice of available relationships in the CI relationship editor. Removing a suggested relationship does not affect relationships that are created or updated by Discovery.

Relationship governance rules

Relationship governance rules is a set of relationship rules used to ensure consistency and validity in modeling relationships between configuration items (CIs) in the CMDB. Use relationship governance rules to prevent the selection of relationship types or directions that are not allowed between specific CI types.

Different applications such as Discovery and Service Mapping, create relationships between CIs. Each application might use inconsistent relationship type or direction to represent the same entity, resulting in multiple views of the same CIs. Relationship governance rules define what are valid relationship types and valid directions between pairs of CI types resulting in valid and consistent relationships in the CMDB.

Relationship governance rules consist of:

- CMDB dependent relationship rules: Rules (hosting and containment rules) that are used for CI identification. You can view and modify dependent relationship rules in the CI Class Manager, after selecting a class from the class hierarchy and clicking **Dependent Relationship**.
- Suggested relationships: Rules that are based on existing suggested relationships in the Suggested Relationship [cmdb_rel_type_suggest] table. Suggested relationships are used in the CI relationship editor. You can view and modify suggested relationships in the CI Class Manager, after selecting a class from the class hierarchy and clicking **Suggested Relationships**.
- Reference rules: Rules that are used mostly by Cloud Management to represent all the possible valid combinations of pairs of referencing and referenced CIs in the service definition.
- Built-in valid relationships: The following relationships are pre-defined in the base system as valid relationships:
  - cmdb_ci_endpoint -> Applicative Flow To::Applicative Flow From -> cmdb_ci_endpoint
  - cmdb_ci_endpoint -> Implement End Point To::Implement End Point From -> cmdb_ci
  - cmdb_ci -> Use End Point To::Use End Point From -> cmdb_ci_endpoint

General behavior

- Relationship governance rules support inheritance.

  For example, suppose that the suggested relationship cmdb_ci_appl Runs On::Runs cmdb_ci_hardware exists. Then a Runs On::Runs relationship between a cmdb_ci_appl_dot_net CI and a cmdb_ci_windows_server CI is valid. That is because .Net Application class inherits from the Application class and the Windows Server class inherits from the Hardware class.

- Duplicate relationship governance rules are not allowed.
- Relationship governance rules are not domain separated.
- It is allowed to have more than one relationship type between the same two CI types.

  For example, the following relationships are valid:
  - cmdb_ci_appl Depends On::Used by cmdb_ci_service
  - cmdb_ci_appl Receives data from::Sends data to cmdb_ci_service

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Reports

A relationship between CIs is considered valid if it conforms to any of the relationship governance rules. Use the CMDB dashboard to view reports about overall relationships health including relationships compliance with relationship governance rules. The 'Relationships not compliant with all relationship rules' report shows CI relationships that are not compliant with any of the relationship governance rules.

CI relations formatter

The default CI form includes a CI relations formatter from which you can examine a CI and its relationships in various views. From the CI relations formatter, you can also launch the CI relationship editor for the CI.

If the domain separation plugin is activated, then only relationships in which the logged on user is authorized to view both CIs, are displayed.

The CI relations formatter contains a list of related CIs and a toolbar with controls for viewing the relationships between the current CI and related CIs. You can configure the controls in this formatter to modify varying aspects of the view. For more information about formatters, see Create a formatter and add it to the form.

Note:

- If an endpoint is a child in one relationship and the same endpoint is a parent in another relationship, then that endpoint is hidden and does not appear in the relations formatter view. Similarly, relationship qualifier chains are also hidden and do not appear in the relationship formatter view.
  - Example: CI1 > endpoint > CI2

    In this example, CI1 is related to CI2 through relationships with endpoint. A single relationship appears in the relations formatter:

    CI1 > CI2 (These relationships appear as a direct relationship without endpoint, because endpoint is a parent in one relationship and a child in another relationship).

  - Example: CI1 > endpoint1 > CI2 > endpoint2

    Two relationships appear in the relations formatter:

    CI1 > CI2 (endpoint1 is hidden because it is a parent in one relationship and a child in another relationship).

    CI1 > CI2 > endpoint2 (appears as level 2 relationship – endpoint1 is hidden and endpoint2 appears as it a child and not a parent in any other relationship).
- On instances that do not meet the internet browser requirements for the CI relations formatter, the default CI form includes the legacy CI relations formatter instead. For more information, see Legacy CI relations formatter.
- CIs not extended from the Configuration Item [cmdb_ci] table, are not displayed in Dependency Views maps and in CI relation formatters.
- The *Applicative Flow To::Application Flow From* relationship is a special relationship type used only between Service Mapping endpoints. This relationship type is not intended for use in the CMDB as a relationship between CIs and therefore it is not displayed in the relations formatter.

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Controls for viewing related CIs

Control	Definition
 Add CI relationship	Starts the relationship editor to manually create CI relationships. For more information (including about roles required for the '+' control to appear), see Create or edit a CI relationship.
 Show dependency views	Launches a Dependency Views map in another window or tab. The CI is the central node in the map, with a configurable number of levels above and below that node in the hierarchy. Map indicators next to the nodes indicate the number of tasks, incidents, problems, changes, or outages related to that node. Right-click to expand collapsed nodes or display a list of related tasks or problems. For more information, see Dependency Views map.
Search for CI	Filters the CIs included in the display.

Click the Settings icon () to configure additional view settings that filter the data displayed. Settings are preserved through logging out and logging back in.

Related items settings

Setting	Description
Show Relations in Flat/Tree Layout	To view a flat list of related CIs that are grouped by relationship type in alphabetical order, click **Flat** (default value). To view groups of related CIs in a hierarchical tree, click**Tree**. If you select the tree view, you cannot configure any other settings for viewing related CIs. A single list of upstream and downstream relationships is displayed.
Show Relations in Split/Merge Layout	To view a single list that includes both upstream and downstream relationships, click **Merge** (default value). Relationships are grouped by relationship type. To view separate lists for upstream and downstream relationships, click **Split**.
Filter Relations by Max Level	Select the number of downstream and upstream levels in the hierarchy to include when displaying CIs in a flat view. Default value is 3.
Filter Relations by Relationship Type	Select the types of relationships to view. Default value is 'All Relationship Types'.
Filter Relations by CMDB View	Filter by tables specified in CMDB views, if any relationship filters exist.

The relations formatter uses the following icons to provide additional information about changes, problems, and outages related to CIs in the relationship:

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Icons related to CIs

Icon	Description
	Recently closed changes
	Planned changes
	Currently open changes
	Recently closed outages
	Problems
	Incidents
	Planned outages
	Currently open outages

In large networks, a list of related CIs might be excessively long, which can slow performance when a CI form is rendered. You can configure these properties to control the amount of data that is displayed. To find a property, enter `sys_properties.list` in the left navigation filter and search for the property.

Properties related to performance

Property	Description
glide.ecmdb.find_relationship_issues	Hides or displays an icon in the CI relations formatter that links to open issues for the CI. This property defaults to true (displays the icon).
glide.ui.max_relation_levels	Specifies the maximum level for displaying CIs in flat view before reaching the maximum relations limit. The default value is 5.
glide.ui.max_relations	Specifies the maximum number of related CIs to display. When exceeded: • A notification appears indicating that the limit has been reached, and that not all relations are displayed. The default value is 1000. • Flat layout reverts to the tree layout view.

Related topics

Create a formatter and add it to the form

Create or edit a relationship filter

Domain separation and the relations formatter and the CI relationship editor

Domain separation is supported in the relations formatter and the CI relationship editor. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

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Overview

How domain separation works in the relations formatter and relationship editor

- **Relations formatter**

  The relations formatter is domain-separation supported. The relations formatter is used to display CMDB relationships in the UI in different views. Since the CI Relationship (cmdb_rel_ci) table is not domain separated, relationships are visible in the relations formatter only if both parent and child CIs (cmdb) are visible in the domain.

  The CI Relationship Type (cmdb_rel_type) table is not domain separated. Therefore, in the relations formatter, all the relationship types are available to be selected as a filter.

  By default domain separation is supported in the relations formatter.

- **Relationship editor**

  The relationship editor is domain-separation supported. You can use the relationship editor to add new relationships or delete existing relationships for the current CI.

  - The CI relationship editor displays a list of CIs to add or remove from relationships. Since they are domain separated, the CI list view in the relationship editor displays the CIs that are visible to the current domain.
  - The CI relationship editor displays a list of relationships to add or remove. Since the CI Relationship [cmdb_rel_ci] table is not domain separated, the relationships list view displays all the relationships of the current CI.

The Suggested Relationship (cmdb_rel_type_suggest) table is not domain separated, which means that all the suggested relationship types in the relationship editor are visible for all domains.

By default domain separation is supported in the relationship editor.

Related topics

Domain separation and Configuration Management Database (CMDB)

Create or edit a relationship filter

Create a custom relationship filter to display CI relationships from selected tables in the CI relations formatter.

Before you begin

Role required: ecmdb_admin

About this task

The CI relations formatter displays related CIs for the base CI, and the relationships between the CIs. You can use relationship filters on the CI relations formatter to customize CI relationship views.

Procedure

1. Navigate to **All** > **Configuration** > **Relationships** > **Relationship Filters**.
2. Click **New** or select a filter to edit.
3. Enter or edit the relationship filter name.
4. Right-click the form header and click **Save**.

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5. In the **Configuration Types** section, click **Edit**.
6. On the **Edit Members** form, select the tables of the CIs that you want to show with the filter and then move the tables to the **Configuration Types list**.
7. Click **Save**.

Result

On a CI form, in the relations formatter settings, you can select the newly defined relationship filter from the **Filter Relations by CMDB View** list.

In the legacy CI relations formatter, you can click **View** and select the newly defined relationship filter.

After you select a filter, the relations formatter displays only CIs from the tables specified in the filter or from descending tables.

Exclude relationships from the relations formatter view

Create a list of relationships that should not appear in the relations formatter view on CI forms.

Before you begin

Role required:

- To view the relationship type exclusion list — itil
- To create, update, or delete the relationship type exclusion list — itil_admin

Procedure

1. Navigate to **All** > **Configuration** > **Relationships** > **Relationship Type Exclusion List**.
2. In the CI Relation Filters list view, click **New**.
3. Fill out the CI Relation Filter form to specify the relationship that you want to exclude from view.
4. Click **Submit**.
   Excluded relationships do not appear in the relations formatter view on CI forms.

Legacy CI relations formatter

On instances that do not meet the internet browser requirements for the latest CI relations formatter, the default CI form includes the legacy CI relations formatter instead.

This element contains the list of related CIs and a toolbar with controls for viewing the relationships between the current CI and related CIs. For information about the latest CI relations formatter, see CI relations formatter.

Related items field



Note:
The legacy BSM map provides a more complete view of CI relationships.

Configure the controls in this formatter with two properties that restrict varying aspects of the view.

Flat layout

Click the flat layout icon ( ) to group related CIs by relationship.

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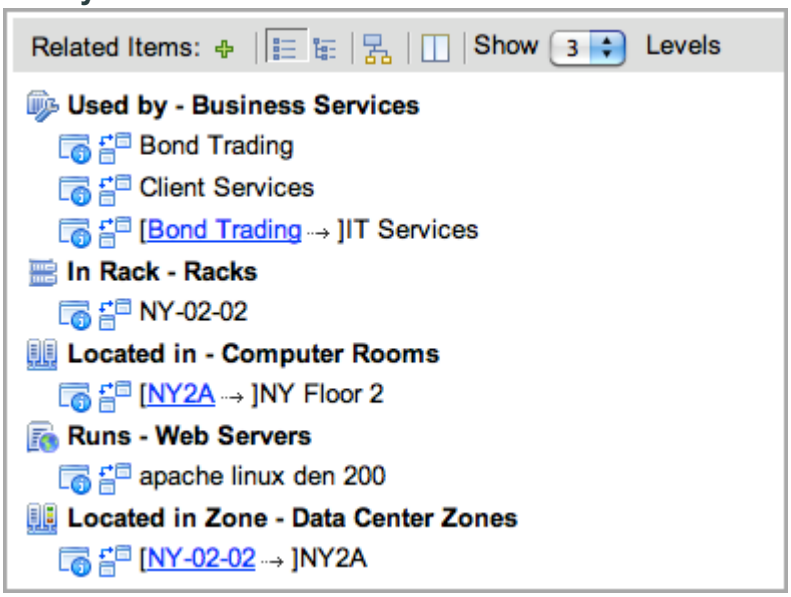
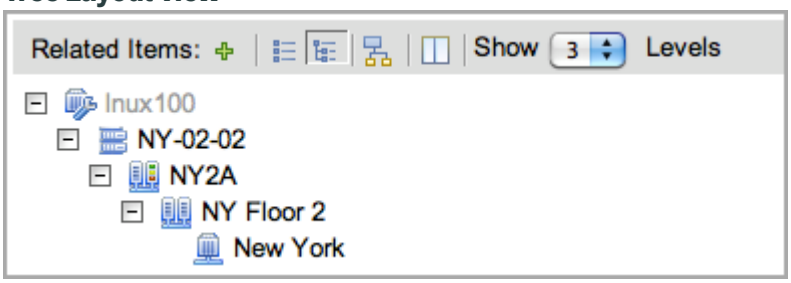
Flat layout view



Tree layout

Click the tree layout icon ( ) to group related CIs in a hierarchical tree.

Tree Layout view



CI relationship editor

Use the relationship editor to view, create, modify, or delete CI relationships. Open the relationship editor from the CI Relations formatter.

When you use the relationship editor, the CI from which the editor was launched is designated as the base CI. You can then select one or more CIs as a second CI for the relationship. Depending on the selected relationship type, the base CI can become the parent CI or the child CI in the new relationship.

The relationship editor operates differently, depending on whether you select the **Use suggested relationship** check box.

- With suggested relationships, the relationship editor lists all available relationship types for the base CI. To define a new relationship, select a relationship type, and then select a second CI for the relationship.

  Suggested relationships are highlighted for you. These relationships are displayed in blue with a prefix of [Suggested].

- Without suggested relationships, you define a new relationship by first selecting a second CI for the relationship and then selecting a parent or a child relationship type.

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Note:
The following relationship types are used only for Service Mapping endpoints, and you cannot use them as a relationship type between two CIs:

- *Implement End Point To:Implement End Point From*
- *Use End Point To: Use End Point From*
- *Applicative Flow To:Applicative Flow From*

Suggested relationships

If you select the **Use suggested relationship** check box in the editor, the **Suggested relationship** list appears. It displays all available CI, user and group relationship types for the base CI. Relationship types have a suffix of **(Parent)** or **(Child)** to note the relationship descriptor, and suggested relationship types are displayed in blue and have a "*" prefix.

When you select a relationship, you are also designating the base CI as being the parent or the child CI in the new relationship. For example, if you select the 'Feeds' relationship type, the base CI becomes the designated parent CI, and the second CI that you select becomes the child CI in this relationship.

Downstream relationships

If you do not select the **Use suggested relationship** check box in the editor, the **Downstream relationships** list appears. It displays all relationships in which the base CI is the parent CI. The child CI of the relationship is displayed in the **Child** column.

Upstream relationships

If you do not select the **Use suggested relationship** check box in the editor, the **Upstream relationships** list appears. It displays all relationships in which the base CI is the child CI. The parent CI in each relationship is displayed in the **Parent** column.

Related topics

Add a suggested relationship

Create or edit a CI relationship

Legacy CI relationship builder

Create or edit a CI relationship

Use the relationship editor to view, create, or modify CI relationships. You can open the relationship editor from the CI Relations formatter.

Before you begin

Role required:

- To create relationships: ITIL or asset
- To view relationships, depending on the state of the Table API ACL:
  - If inactive (default): ITIL or asset
  - If active: ITIL or asset, and snc_platform_rest_api_access

  For more information, see CI relationship security, REST API, and Table API.

About this task

The relationship editor operates differently, depending on whether you check the **Use suggested relationship** option or not.

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Procedure

1. Launch the relationship editor:

   a. Open a CI form.
   For example:

      i. Navigate to **All** > **Configuration** > **CI Class Manager**.

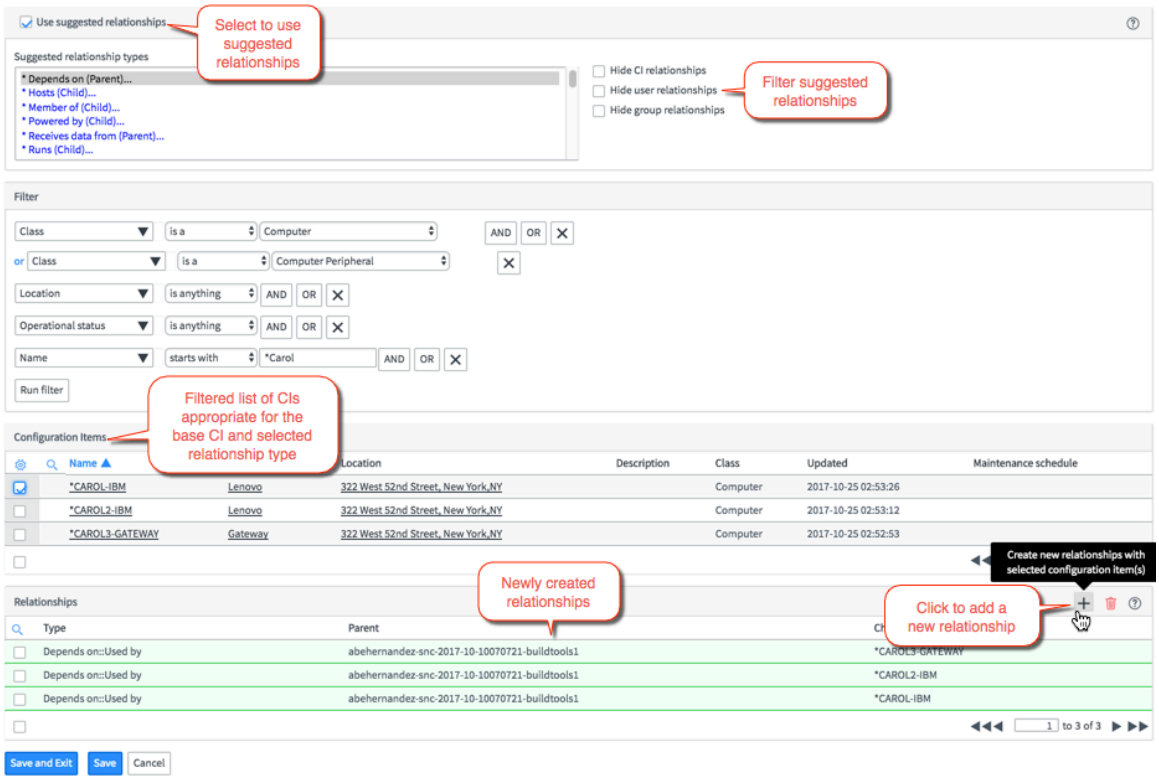
      ii. On the CI Class Manager page, select **Open Hierarchy**.

      iii. On the CI Class panel search and select the class of the CI for which you want to create or edit relationships.

      iv. Select **CI List** in the left-side panel and then in the list view, select the CI.

   b. On the CI form, scroll down as needed to select the Add CI relationship icon (+ sign) in the Related Items section.

2. To use suggested relationships, first select a relationship type, and then select one or more CIs to be the child CIs in the relationship:



   a. Select **Use suggested relationship**.

   b. From the **Suggested relationship type** list, select a relationship type.
   You can filter the list of suggested relationships by using the filter check boxes.

Filter option	Description
Hide CI relationship	Hides any relationships between the base CI and another CI (such as "Receives data from"). Default filter is stored in the ci_manage_relationships_filter_hint.cmdb_ci user preference.

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Filter option	Description
Hide user relationship	Hides any relationships between the base CI and a user (such as "Logs reviewed by"). The default filter is stored in the ci_manage_relationships_filter_hint.sys_user preference.
Hide group relationship	Hides any relationships between the base CI and a group (such as "Backups done by"). Default filter is stored in the ci_manage_relationships_filter_hint.sys_user_group user preference.

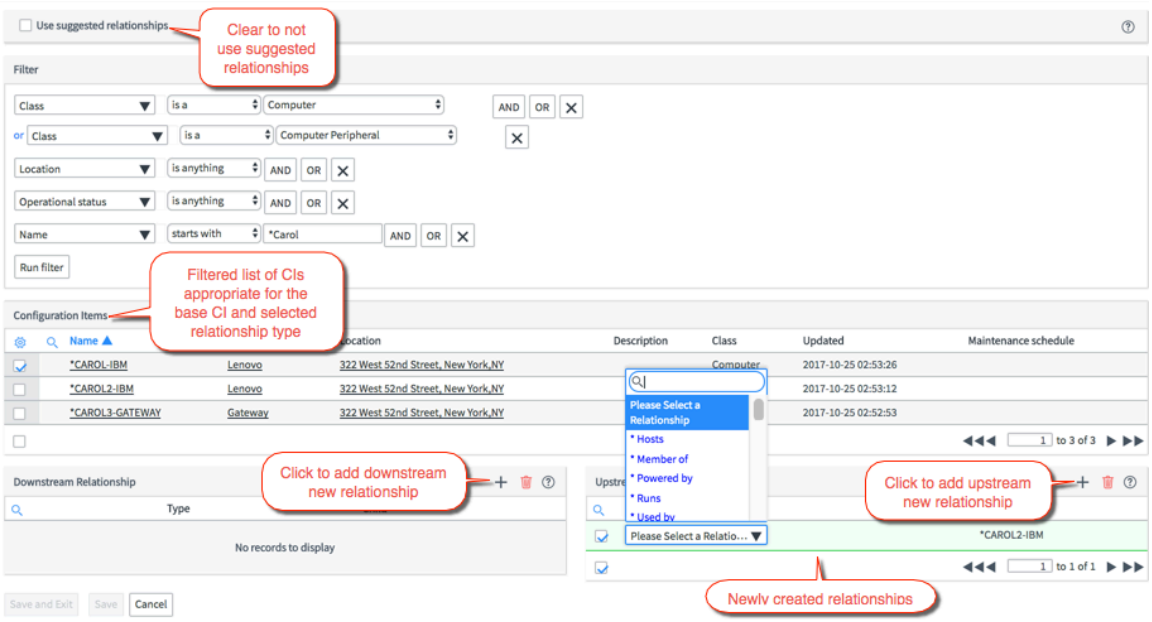
The **Configurations Items** list displays all the CIs that are appropriate for the base CI and the selected relationship type. The **Relationships** list at the bottom of the editor, displays all existing relationships of the selected relationship type, in which the base CI is a parent CI or a child CI.

c. From the **Configuration Items** list, select one or more CIs as a second CI for the relationship. You can filter the list of **Configurations Items** by adding conditions in the **Filter** section and clicking **Run filter**.

If you selected a parent relationship type, these CIs becomes the child CI in the relationship, and if you selected a child relationship type, then the selected CIs become the parent CI in the relationship.

d. In the **Relationships** section, click the plus icon (+) to add the new relationships. Alternatively, you can drag the selected CIs to the **Relationships** list. Each new relationship will consist of the base CI, the selected relationship type, and a selected second CI.

3. To not use suggested relationships, first select one or more CIs to be the child CIs in the relationship, and then select the relationship type:



a. Clear **Use suggested relationship**.

b. In the **Configuration Items** list, select one or more CIs as a second CI for the relationship. You can filter the list of **Configurations Items** by adding conditions in the **Filter** area and clicking **Run filter**. Depending on the relationship type that you will select, the selected CIs might become a parent or a child CI in the relationship.

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c. With at least one CI selected in the **Configuration Items** list, click the '+' sign in the **Downstream Relationships** section or the **Upstream Relationships** section to create the relationship.
   - Add the relationship to **Downstream Relationships** to create a relationship in which the base CI is the parent CI and the selected CI is the child CI.
   - Add the relationship to **Upstream Relationships** to create a relationship in which the base CI is the child CI and the selected CI is the parent CI.

d. For each newly created relationship in either the **Downstream Relationships** or the **Upstream Relationships** lists, click **Please select a relationship** and select a relationship type.
   - The list of available relationship types in the **Downstream Relationships** list contains parent relationships only, in which the base CI is the parent CI.
   - The list of available relationship types in the **Upstream Relationships** list contains child relationships only, in which the base CI is the child CI.

e. Click **Save** or **Save and Exit**.
   Only after you enter all the information that is necessary for creating the relationship, these buttons light up indicating that there are pending updates that require saving.

Related topics

Suggested class relationships

CI relationships in the CMDB

CI relationship security

Delete a CI relationship

Maintain the integrity of the CMDB by deleting any CI relationships that are no longer relevant or needed for a CI. Use the relationship editor to delete CI relationships.

Before you begin
Role required: ITIL or asset

Note:
Deleting a relationship to a dependent CI can result in identification problems as the dependent CI will no longer have a relationship to the CI it depends on.

Procedure

1. Launch the relationship editor:
   a. Open the CI form of the CI for which you want to delete a relationship.
   b. Locate the **Related Items** section near the center of the form.
   c. Click the plus (+) icon on the **Related items** section.
2. In the Relationship Editor, in the Relationships section, select the relationships that you want to delete for the CI.
3. Click the **Delete selected relationships** icon.
4. Click **Save** or **Save and Exit**.

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Legacy CI relationship builder

Used to define CI relationships manually, this page is a sophisticated version of the standard slushbucket. In the legacy CI relations formatter, click the CI relationship builder icon ( ) to display the legacy Define Relationships page.

For information about the latest CI relationship editor, see CI relationship editor.

Select a CI relationship type

The top half of the legacy relationship editor contains a large option box that allows you to select which type of relationship you want to manipulate. Click the particular type of relationship you are interested in working with.

Filter the list of CI relationships

In the legacy relationship editor, the check boxes along the right hand edge of the select box provide a quick way to filter down the list of available relationships.

By default, the system displays a list of all suggested relationships for the type of CI you selected. For example, if you selected a Database instance, a relationship of "Runs on" makes sense, but a relationship of "Provides HVAC for" does not. The default filter is stored in the user preferences ci_manage_relationships_filter_hint.cmdb_cici_manage_relationships_filter_hint.sys_user, and ci_manage_relationships_filter_hint.sys_user_group.

- **Hide CI relationship** -- Hides any relationships between this CI and another CI (e.g. "Receives data from").
- **Hide user relationships** -- Hides any relationships between this CI and a user (e.g. "Logs reviewed by").
- **Hide group relationships** -- Hides any relationships between this CI and a group (e.g. "Backups done by").
- **Show all relationships** -- If you have the appropriate role (out of the box this is itil_admin) you will have an additional check box labeled "Show all relationships." If you click that check box, the system will let you choose any relationship defined in the system, regardless of where it is on the "suggested" list for this type of CI.

Select CI relationship targets

In the legacy relationship editor, users can link or unlink CIs for a relationship type.

As soon as you pick a relationship type, the system will fill in the two select boxes at the bottom of the screen with CI's that are appropriate for the relationship you suggested. The left hand select box will contain a list of CI's that might reasonably be linked via this relationship, while the right hand box contains a list of those CI's which are already linked.

1. Link or unlink items.

Link new items	Move that CI from the left hand box to the right hand box.
Unlink existing items	Move them from the right hand box to the left.

When you make either type of change, a message appears indicating that you have pending changes.

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2. Apply or cancel your changes.

Click the Save button.	This will save your set of changes, and go back to the previous screen (either a CI or the BSM map depending on how you got here).
Click the Cancel button.	This causes you to exit without saving your changes.

Related topics

CI relationships in the CMDB

Relation qualifier

A relation qualifier, which is a CI of the Qualifier [cmdb_ci_qualifier] type, stores important information about the CI relationships.

In a relation qualifier, you can annotate arbitrary unique information about the relationship between two CIs. You can define multiple qualifiers for a single relationship, resulting in a qualifier chain. But, there can be only a single qualifier chain for a specific relationship type between two CIs.

For example, for a relationship between a parent CI and a child CI, you can add a relation qualifier to note that the relationship was discovered based on traffic (such as *`cmdb_ci_qualifier_trafficbased`*). This results in having two records in the CI Relationship [cmdb_rel_ci] table for the relationship.

- A record that links the parent CI and the new qualifier
- A record that links the new qualifier and the child CI

For this relationship, there is a parent CI and a child CI, and a relation qualifier of type *`cmdb_ci_qualifier_trafficbased`*.

For information about usage of relation qualifiers in the identification process, see Identification rules.

CI relationship security

When applying security to CI relationships, it is important to apply the access controls both to the CI Relationship (cmdb_rel_ci) table and to create an operation editCIRelations to the * table as well.

If the current instance has defined security for editCIRelations, it will be applied to edit_ci_relations automatically in the process of upgrading, and the out-of-date security will be removed.

Related topics

CI relationships in the CMDB

Create a CI relation rollup

Create a CI relation rollup

A CI relation rollup allows you to sum, count, max, min, or mean a relationship type. You can create CI relation rollups.

Before you begin

Role required: ecmdb_admin

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About this task

CI relation rollup can be useful for tracking and for receiving notifications. For example:

- In a sum roll up, add up fields from multiple CIs and display the result on another CI to which they are related. So, if you have four configuration items in a rack that are all consuming power, create a CI relation rollup to add all the power usage together and display the result in one field on the rack CI form.
- If a certain level of power consumption in a rack is exceeded, send a notification.
- With a rack that has 10 slots, send a notification when 9 slots are filled.

CI relation rollups use the *cmdb synch event* business rule on the [cmdb_ci] table. Although this business rule is active by default, you must modify the rule slightly before it will run.

Procedure

1. Navigate to **All** > **Configuration** > **Relationships** > **CI Relation Rollups**.
2. Click **New**.
3. Complete the form.

CI Relationship Rollup fields

Field	Description
CI Relationship Type	Select a relationship type from the list to use with the rollup. For example, **Members::Member** of contains the parent descriptor **Members** and the child descriptor **Member of**.
Type	Select the type of rollup from the drop-down list: COUNT, MAX, MEAN, MIN, or SUM.
Parent field	The target field on which the operation will be done.
Child field	The input to the equation type. The Parent field is affected by the selections in the child field.
Rollup class	The classes that can use the relationship. For example, you can specify that the relationship only applies to racks.

4. To run the *cmdb synch event* business rule, navigate to **Business Rules**.
5. Use the search box to find the [cmdb synch event] table.
6. Click the *cmdb synch event* business rule to go to the **Business Rule** page.
7. Select the **Update**, **Delete**, and **Query** check boxes.
   Additionally, if you wish CI relation rollups to recalculate when there is a change to a relationship, use a similar procedure to select the **Active** check box on the *cmdb_rel_ci synch event* business rule.

Related topics

CI relationships in the CMDB

CMDB schema model

The Configuration Management Database (CMDB) schema model is a series of connected tables that contain all the assets and business services controlled by a company and its configurations.

Related ServiceNow® Store apps and reference information:

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- CMDB tables descriptions: Descriptions of key CMDB tables in the base system.
- CMDB CI Class Models: A ServiceNow Store app that adds class models that extend the base CMDB class hierarchy. This includes class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can then use the added classes as any other CMDB base class.
- Populating the CMDB: Information about the various options for populating the CMDB.
- Discovery patterns: A ServiceNow Store app that provides a library of Discovery patterns for discovering specific devices and applications in the industry.
- Getting started with Service Graph Connectors: ServiceNow Store apps that provide pre-defined integrations for importing and integrating common third-party data into CMDB classes. Also includes the IntegrationHub ETL wizard for creating new ETL transform maps.

CMDB tables contain information about computers and devices on the network, software contracts and licenses, business services, and so on. The IT desk can use the CMDB to better understand their network users' equipment, and the relationships between them. The CMDB can also be referenced by other processes within the system.

Applications such as Asset Management and Contract Management, operate in conjunction with the CMDB. Asset Management and Software Asset Management link to CMDB all assets, hardware, software, assets in stock, as well as records for manufacturers and vendors. The Contract Management application contains information about contracts, including leases, service contracts, purchase orders, warranties, and software licenses. The Configuration Management Database (CMDB) application has a focus on operation.

For more background information about the CMDB, see the ServiceNow Community post) at CMDB 101- What is a configuration management database and why do you need one?.

Key CMDB tables

Key tables in the configuration management database (CMDB):

- The Base Configuration Item [cmdb] table, which is the core CMDB table for non IT CIs (descending classes are non IT CIs).
- The core Configuration Item [cmdb_ci] table, which stores the basic attributes of all the CIs. The admin, itil, or asset user role is required to access this table (descending classes are IT CIs).
- The CI Relationship [cmdb_rel_ci] table, which defines all relationships between CIs.

The Configuration Item table is extended to other tables, such as Database [cmdb_ci_database] and Computer [cmdb_ci_computer]. The Computer table is extended to the Server [cmdb_ci_server] table, which is extended to the UNIX Server [cmdb_ci_unix_server] table, and so on.

Note:
The Base Configuration Item [cmdb] table uses the table per partition extension model, which has different behaviors for replicating and deriving information than other extended tables. See Table extension and classes.

You can use the schema map to view more details of tables and their relationships:

1. Navigate to **System Definition** > **Tables & Columns**.
2. Select a table and click **Schema Map**.

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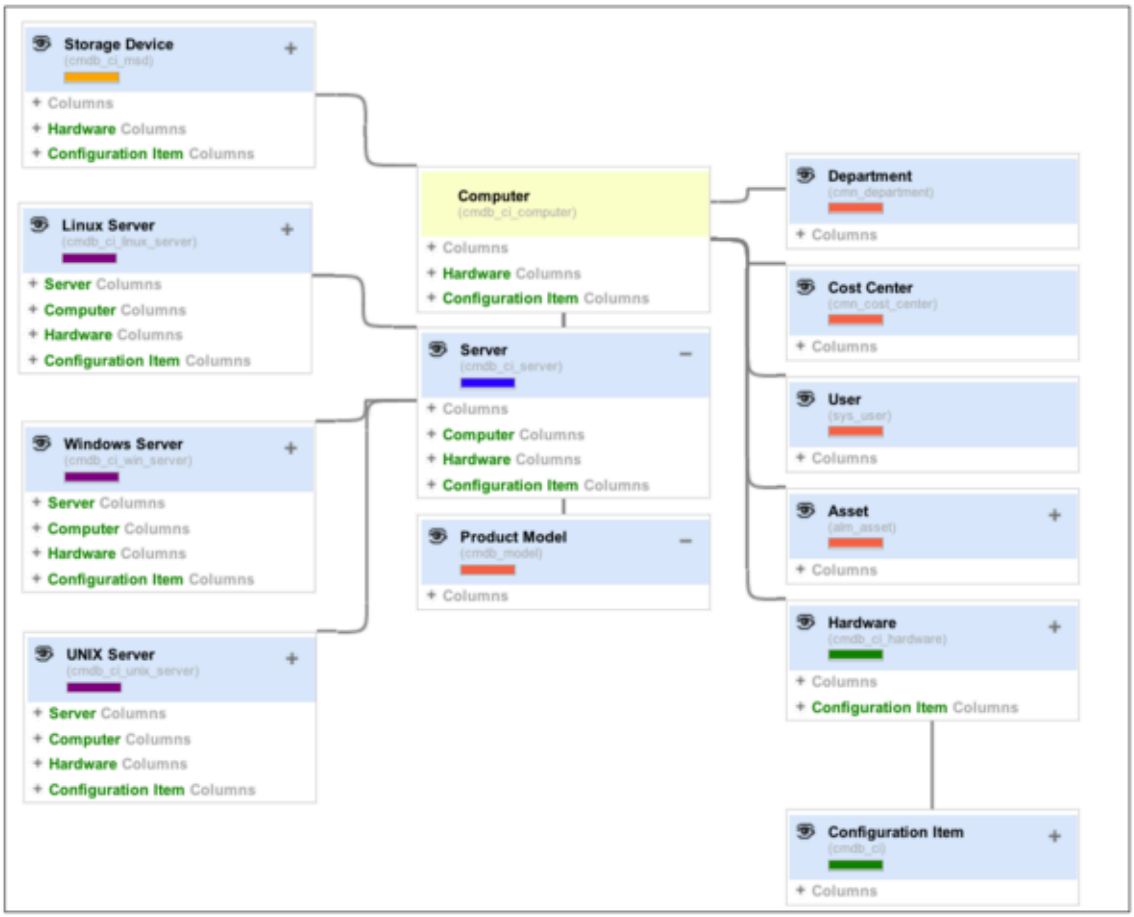
Schema Map



Note:
CIs not extended from the Configuration Item [cmdb_ci] table, are not displayed in Dependency Views maps and in CI relation formatters.

CI attributes

Attributes apply to all the CIs in a classification. To change attribute values for a CI, edit the appropriate CI. To add a unique attribute to a class, extend the class table and create a new classification for that CI.

The position of a CI in a classification hierarchy is determined by the attributes it shares with the CIs below it. Each time a CI has a single different attribute from its parent, the classification hierarchy branches.

For example, servers have different attributes from computers, which include workstations and laptops. Linux servers and UNIX servers have different attributes from the parent server classification and from each other, so they occupy separate branches in the hierarchy.

CMDB tables descriptions

List of tables in the CMDB in a base system with table name, label, and a description of the type of information that is stored in the table.

You can extend tables in a base system by installing a CMDB CI Class Models store app which adds class models that support specific technologies. These extensions include class definitions, identification rules, identifier entries, and dependent relationships if applicable. The CMDB CI Class Models store app can also modify the label of a base table. For more information, see CMDB CI Class Models store app.

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Table name	Display name (label)	Table description
cmdb_ci	Configuration Item	Base configuration item table.
cmdb_ci_acc	Accessory	Accessories for phones, computers, and so on.
cmdb_ci_ad_controller	Active Directory Domain Controller	Microsoft Active Directory domain controller.
cmdb_ci_ad_domain	AD Domain	Microsoft Active Directory domain.
cmdb_ci_aix_server	AIX Server	Server running the AIX operating system.
cmdb_ci_alias	Alias	Pseudonym for data locations, virtual email addresses, pointers, and so on.
cmdb_ci_apache_web_server	Apache Web Server	Server hosting Apache web server software.
cmdb_ci_appl	Application	Application, which is a collection of files and data that deliver a service and manage business processes.
cmdb_ci_appl_now_app	ServiceNow Application	CIs that Event Management generates for various components such as Impact calculator, which are used to bind alerts that are later shown in maps. Used internally by self-health when monitoring internal health checks for key components such as connector instance status and MID Server status. Parent class for all ServiceNow applications.
cmdb_ci_application_cluster	Application Cluster	Logical group of servers with clustering software installed on each of the servers in the group so that the group acts like a single system.
cmdb_ci_application_server_resource	Application Server Resource	Parent class for application servers such as Coldfusion application server.
cmdb_ci_app_server	Application Server	A base table for logical CIs, which indicate the primary function of a physical or virtual server such as a Tomcat server or a WebSphere server.

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Table name	Display name (label)	Table description
cmdb_ci_app_server_composer	Composer	Server hosting IBM WebSphere Multichannel Bank Transformation Toolkit.
cmdb_ci_app_server_datapower	Data Power	Server hosting IBM DataPower Gateway Secure software.
cmdb_ci_app_server_domino	Domino	Server hosting IBM Domino software.
cmdb_ci_app_server_hp_ucmdb	HP uCMDB	Server hosting HP uCMDB software.
cmdb_ci_app_server_java	JavaServer	Server hosting Java application.
cmdb_ci_app_server_jb_module	delivery Controler	Server hosting inner module of JBoss application (deployed application).
cmdb_ci_app_server_jboss	JBoss	Server hosting JBoss Application Server (JBoss AS), which is a cross-platform Java application server, open-source developed by JBoss software company.
cmdb_ci_app_server_jrun	Jrun	Server hosting JRun application.
cmdb_ci_app_server_jrun_war	Jrun WAR	Server hosting the inner module of JRun application (deployed application).
cmdb_ci_app_server_ora_ess	Oracle Essbase Server	Server hosting Oracle Essbase software.
cmdb_ci_app_server_ora_ias	Oracle iAS	Server hosting Oracle Internet Application Server.
cmdb_ci_app_server_ora_ias_m	Oracle iAS Web module	Server hosting the inner module of Oracle iAS application (deployed application).
cmdb_ci_app_server_remedy	Remedy HSServer	Server hosting Remedy HSSServer application.
cmdb_ci_app_server_tomcat	Tomcat	Server hosting Apache Tomcat software.
cmdb_ci_app_server_tomcat_war	Tomcat WAR	Server hosting inner module of Apache Tomcat application (deployed application).
cmdb_ci_app_server_vendavo	Vendavo Application Server	Server hosting Vendavo Application Server software.
cmdb_ci_app_server_weblogic	BEA Weblogic	Server hosting Oracle WebLogic Server.

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Table name	Display name (label)	Table description
cmdb_ci_app_server_webseal	Webseal	Server hosting IBM Tivoli Access Manager solution.
cmdb_ci_app_server_websphere	IBM Websphere	Server hosting IBM WebSphere software.
cmdb_ci_app_server_wl_module	WeblogicModule	Server hosting inner module of WebLogic.
cmdb_ci_app_server_ws_ear	Websphere EAR	Server hosting inner module of IBM WebSphere software.
cmdb_ci_app_server_ws_odr	Websphere ODR LB	Server hosting WebSphere ODR LB application.
cmdb_ci_appl_active_directory	Active Directory Service	Inner software module of AD Domain application.
cmdb_ci_appl_biztalk	BizTalk	Microsoft BizTalk Server software.
cmdb_ci_appl_biztalk_orch	BizTalk Orchestration	Inner module of Microsoft Biztalk Server software.
cmdb_ci_appl_ca	CA Enterprise Communicator	CA Enterprise Communicator software.
cmdb_ci_appl_ca_dir_server	CA eTrust Directory Server	CA eTrust Directory Server software.
cmdb_ci_appl_ca_ent_man	CA Introscope Enterprise Manager	CA introscope Enterprise Manager software.
cmdb_ci_appl_ca_id_man	CA Identity Manager Provisioning Server	CA Identity Manager Server software.
cmdb_ci_appl_cisco_call_man	Cisco CallManager	Cisco CallManager (Cisco Unified Communications Manager) software.
cmdb_ci_appl_cisco_fibre	Cisco Fibre InterConnect	Cisco Fibre InterConnect software.
cmdb_ci_appl_citrix_app	Citrix Application Icon	Inner module of Citrix software.
cmdb_ci_appl_citrix_collector	Citrix Collector	Citrix Collector software.
cmdb_ci_appl_citrix_xenapp	Citrix XenAPP or Presentation Server	Citrix XenApp software.
cmdb_ci_appl_connectit	Connect-It Service	Connect-It software.
cmdb_ci_appl_controlm	Control-M	Control-M software.
cmdb_ci_appl_delivery_controler	Delivery Controler	Application delivery controller software.
cmdb_ci_appl_doc_brava_proc	Documentum Brava Job Processor	Brava (EMC Documentum) job processor software.
cmdb_ci_appl_doc_brava_server	Documentum Brava License Server	Brava (EMC Documentum) License Server software.

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Table name	Display name (label)	Table description
cmdb_ci_appl_doc_docbase	Documentum DocBase	Documentum Docbase software.
cmdb_ci_appl_doc_docbroker	Documentum Broker	Documentum Docbase broker software.
cmdb_ci_appl_dot_net	.NET Application	Microsoft .NET application software.
cmdb_ci_appl_fastsearch	Fast Search	Microsoft FAST Search software (for the SharePoint collaboration platform).
cmdb_ci_appl_generic	Generic Application	Generic application, which is identified by the system when there is an endpoint with an open port in listen mode and there is no pattern for it.
cmdb_ci_appl_glassfish	GlassFish	Oracle GlassFish Server software.
cmdb_ci_appl_glassfish_war	GlassFish WAR	Inner module of GlassFish application (deployed application).
cmdb_ci_appl_groundwork	Groundwork	Groundwork (open source) monitoring software.
cmdb_ci_appl_hp_index	HP SM Index Server	HP Service Manager Index Server software.
cmdb_ci_appl_hp_operations	HP Operations Manager	HP Operations Manager software.
cmdb_ci_appl_hp_qc	HP Quality Center	HP Quality Center software.
cmdb_ci_appl_hp_service	HP Service Manager	HP Service Manager software.
cmdb_ci_appl_hp_sm_kb	HP SM KnowledgeBase	HP Service Manager KnowledgeBase software.
cmdb_ci_appl_ibm_cics	IBM CICS	IBM CICS Transaction Server software.
cmdb_ci_appl_ibm_ctg	IBM CTG	IBM CICS Transaction Gateway software.
cmdb_ci_appl_ibm_wmb	IBM WebSphere Message Broker	IBM WebSphere Message Broker software.
cmdb_ci_appl_ibm_wmb_listener	IBM WMB Http Listener	IBM WebSphere HTTP Listener software.
cmdb_ci_appl_ibm_wmq	IBM WebSphere MQ	IBM Websphere MQ software.
cmdb_ci_appl_ibm_wmq_queue	IBM WebSphere MQ Queue	Inner module of IBM WebSphere MQ software.
cmdb_ci_appl_itam	ITAM Asset Center	HP Asset Center software.
cmdb_ci_appl_mongo_config_serv	Mongo Config Server	Mongo Configuration Server software.

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Table name	Display name (label)	Table description
cmdb_ci_appl_mongos	Mongos Server	MongoDB server software.
cmdb_ci_appl_ms_dynamic_crm	Dynamic CRM Component	Microsoft Dynamic CRM software.
cmdb_ci_appl_msmq	MSMQ	Microsoft Message Queuing (MSMQ) software.
cmdb_ci_appl_ora_conc	Oracle Concurrent Server	Oracle Concurrent Server software.
cmdb_ci_appl_ora_disc	Oracle Discoverer Engine	Oracle Discoverer software.
cmdb_ci_appl_ora_disc_ui	Oracle Discoverer UI	Oracle Discoverer UI module software.
cmdb_ci_appl_ora_ebs	Oracle ESB	Oracle Enterprise Service Bus software.
cmdb_ci_appl_ora_forms	Oracle Forms Engine	Oracle Forms software.
cmdb_ci_appl_ora_forms_ui	Oracle Forms UI	Oracle Forms UI software.
cmdb_ci_appl_ora_fs	Oracle Fulfillment Server	Oracle Fulfillment Server software.
cmdb_ci_appl_ora_http	Oracle HTTP Server	Oracle HTTP Server software (web tier of Oracle Fusion middleware).
cmdb_ci_appl_ora_jms_queue	Oracle Weblogic JMS Queue	Oracle WebLogic JMS software.
cmdb_ci_appl_ora_metric_client	Oracle Metric Client	Oracle Metric client software.
cmdb_ci_appl_ora_metric_svr	Oracle Metric Server	Oracle Metric server software.
cmdb_ci_appl_ora_notif_svr	Oracle Notification Server	Oracle Notification Server (ONS) software.
cmdb_ci_appl_ora_oacore	Oracle OACORE Server	Oracle OACORE server software.
cmdb_ci_appl_ora_oafm	Oracle OAFM Server	Oracle OAFM server software.
cmdb_ci_appl_ora_pm	Oracle Process Manager	Oracle BPEL Process Manager server software.
cmdb_ci_appl_ora_queue	Advanced Queue Queue	Oracle Advanced Queuing software.
cmdb_ci_appl_ora_report	Oracle Report Server	The Oracle Report Server software.
cmdb_ci_appl_ora_tns	Oracle App TNS Service	Oracle Application Express (TNS) listener software.
cmdb_ci_appl_ora_tnslsnr	Oracle TNS Listener Engine	Oracle Application Express software.
cmdb_ci_appl_peoplesoft	Peoplesoft Application Server	Peoplesoft Application Server software.

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Table name	Display name (label)	Table description
cmdb_ci_appl_rabbitmq	RabbitMQ	RabbitMQ (open source) software.
cmdb_ci_appl_rabbitmq_cluster	RabbitMQ Cluster	RabbitMQ Cluster (open source) software.
cmdb_ci_appl_sap_ascs	SAP ASCS Application	SAP ASCS software.
cmdb_ci_appl_sap_bo	SAP Business Objects CMS Server	SAP Business Objects CMS server software.
cmdb_ci_appl_sap_bo_scheduler	SAP BO BOXISScheduleRouter	SAP BO BOXISScheduleRouter software.
cmdb_ci_appl_sap_bus_obj	SAP Business Objects	SAP bushiness Object application.
cmdb_ci_appl_sap_ci	SAP CI Application	The SAP Central Instance software.
cmdb_ci_appl_sap_di	SAP DI Application	Oracle Development Infrastructure (DI) software.
cmdb_ci_appl_sap_ers	SAP ERS Application	Oracle Evaluated Receipt Settlement (ERS) software.
cmdb_ci_appl_sap_hana_db	SAP Hana Db	SAP HANA software.
cmdb_ci_appl_sap_jc	SAP JC Application	SAP JC (java application) software.
cmdb_ci_appl_sap_scs	SAP SCS Application	SAP SCS (central services) software.
cmdb_ci_appl_sendmail	Sendmail	Sendmail (open source) software.
cmdb_ci_appl_sharepoint	SharePoint	Microsoft SharePoint software.
cmdb_ci_appl_sp_service	SharePoint Service	Microsoft Windows Sharepoint Services (WSS) software.
cmdb_ci_appl_tibco_hawk	Tibco Hawk	TIBCO Hawk software.
cmdb_ci_appl_tibco_matrix	ActiveMatrix Business Works	TIBCO ActiveMatrix BusinessWorks software.
cmdb_ci_appl_tibco_matrix_proc	ActiveMatrix Business Works Process	TIBCO ActiveMatrix BusinessWorks Process software.
cmdb_ci_appl_tibco_message	Tibco Enterprise Message Service	TIBCO Enterprise Message Service software.
cmdb_ci_appl_tibco_queue	EMS Queue	Tibco EMS (Enterprise Message Service) Queues software.
cmdb_ci_appl_tuxedo	Tuxedo	Tuxedo software (middleware transactions for Unix,

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Table name	Display name (label)	Table description
		Extended for Distributed Operations).
cmdb_ci_appl_tuxedo_portal	Tuxedo Portal	Tuxedo portal software.
cmdb_ci_appl_vign_content_svr	Vignette Content Management Server	Vignette (Open Text Corp) Content Management Server software.
cmdb_ci_appl_vignette_search	Vignette Search Starter	Vignette (Open Text Corp) Search Server software.
cmdb_ci_appl_vignette_server	Vignette Server	Vignette (Open Text Corp) Server software.
cmdb_ci_appl_weblogic_jms	Weblogic JMS Server	WebLogic JMS software.
cmdb_ci_appl_weblogic_lb	Weblogic LB	WebLogic Server load balancer software.
cmdb_ci_appl_weblogicmodule	Weblogic Module Server	WebLogic Server software.
cmdb_ci_appl_websphere_portal	Websphere Portal	WebSphere Portal software.
cmdb_ci_appl_wmb	WMB Flow	WebSphere Message Broker software.
cmdb_ci_application_cluster	Application Cluster	Logical cluster of application-tier servers.
cmdb_ci_application_software	Application Software	Computer program designed to perform a group of coordinated functions, tasks, or activities for the benefit of the user. An extension of the Software table, providing installed software information (not a running process).
cmdb_ci_ats_power_eq	Automatic Transfer Switch	Electrical power switch that switches a load between two sources.
cmdb_ci_availability_set	Availability Set	Logical grouping of virtual machines running on Microsoft Azure platform.
cmdb_ci_batch_job	Batch Job	A computer program or set of programs processed in batch mode.
cmdb_ci_aws_datacenter	AWS datacenter	Logical representation of an Amazon Web Services datacenter.
cmdb_ci_azure_datacenter	Azure datacener	Logical representation of a Microsoft Azure datacenter.

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Table name	Display name (label)	Table description
cmdb_ci_base_rpa_process	Base Bot Process	Business reason, process type, and schedule.
cmdb_ci_base_rpa_robot	Base Robot	Machine where robot is running, state, and type.
cmdb_ci_business_app	Business Application	All business applications.
cmdb_ci_business_process	Business Process	A process that is owned and carried out by the business and contributes to the delivery of a product or business service to a business customer.
cmdb_ci_chassis_server	Server Chassis	A metal structure that is used to house or physically assemble servers in various different form factors.
cmdb_ci_cim_profile	CIM Profiles	CIM Profiles (UML).
cmdb_ci_cim_server	CIM Server	Server hosting CIM profiles.
cmdb_ci_circuit	Circuit	Electrical circuits information.
cmdb_ci_cloud_database	Cloud Database	Database which runs on a cloud computing platform.
cmdb_ci_cloud_ip_address	Cloud IP Address	Web server which runs on a cloud computing platform.
cmdb_ci_cluster	Cluster	Logical group of computing resources bound together by software in order to function as one logical computing resource.
cmdb_ci_cluster_node	Cluster Node	Single computing resource which is logically/ operationally bound into a cluster.
cmdb_ci_cluster_resource	Cluster Resource	System object that is a set or grouping of cluster resources that are used to manage events that occur in a clustered environment.
cmdb_ci_cluster_vip	Cluster Virtual IP	Cluster VIP information.
cmdb_ci_cmp_price_product_base	Cloud Product Price Base	Used to calculate the approximate monthly cost of running a stack built on Virtual Servers in cloud environment: • Cloud Price Base: Common price base to store pricing info of all the resources of all the supported clouds.

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Table name	Display name (label)	Table description
		• Cloud Price Product Base: Base table to store the common attributes of all the pricing resources. • VM Instance Price: Specific table which extends the Cloud Price Product base to store the VM specific product info of all the supported clouds. Parent class for cloud product prices such as VM instance price.
cmdb_ci_cmp_resource	Cloud Resource	Generic cloud resources.
cmdb_ci_comm	Communication Device	Communication devices information. A choice list containing devices such as cellphone, phone, conference phone, and Wi-Fi.
cmdb_ci_computer	Computer	An extension of the Hardware table, capturing computer properties.
cmdb_ci_computer_room	Computer Room	Logical representation of a computer room.
cmdb_ci_config_automation_server	Management Server	Dev Ops tools such as Chef and Puppet, that are used to manage server configurations. Parent class for application management servers such as Puppet Master.
cmdb_ci_config_file	Configuration file	Configuration files which establish the parameters and initial settings for some computer programs.
cmdb_ci_crac	Computer Room AC	Air conditioning units used to cool data centers.
cmdb_ci_csu_dsu_network	CSU/DSU	Digital-interface device used to connect networking equipment to a digital circuit.
cmdb_ci_database	Database	Organized collection of data such as the set of files where data is stored, the reason for a database, and the metadata about the data.

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Table name	Display name (label)	Table description
cmdb_ci_datacenter	Data Center	Facility used to house computer systems and associated components, such as telecommunications and storage systems. It generally includes redundant or backup power supplies, redundant data communications connections, environmental controls (such as air conditioning and fire suppression), and various security devices.
cmdb_ci_datapower_server	Data Power Hosting Server	Server running IBM DataPower Gateway software.
cmdb_ci_datastore	Datastore	Datastores are like file systems, abstracting the physical storage and providing a model for storing files. The child class represents the VMware specific Datastore. Parent class for VMWare datastore object types such as vCenter Datastores.
cmdb_ci_db_catalog	Database Catalog	Metadata which defines database objects such as base tables, views (virtual tables), synonyms, value ranges, indexes, users, and user groups, for a specific database instance.
cmdb_ci_db_db2_catalog	DB2 Catalog	Database catalog for DB2 database.
cmdb_ci_db_db2_instance	DB2 Instance	Instance of a DB2 database.
cmdb_ci_db_hbase_instance	HBase Instance	Instance of an HBase database.
cmdb_ci_db_instance	Database Instance	Software and memory used to manipulate data in a database.
cmdb_ci_db_mongodb_instance	MongoDB Instance	Instance of a MongoDB database.
cmdb_ci_db_mssql_analysis	SQL Server Analysis Services	Microsoft SQL Server Analysis Services software.
cmdb_ci_db_mssql_catalog	MSFT SQL Catalog	Database catalog for a specific instance of a Microsoft SQL database.

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Table name	Display name (label)	Table description
cmdb_ci_db_mssql_int_job	SQL Server Integration Services Job	Scheduled job to run a SQL Server Integration Service package.
cmdb_ci_db_mssql_integration	SQL Server Integration Services	MSQL Server Integration Services software.
cmdb_ci_db_mssql_reporting	SQL Server Reporting Services	SQL Server software used for server-based reporting generation.
cmdb_ci_db_mysql_catalog	MySQL Catalog	Database catalog for a specific instance of a MySQL database.
cmdb_ci_db_mysql_clustermgnode	MySQLClusterMGMNode	MySQL primary administrative interface to a running cluster.
cmdb_ci_db_mysql_clusternode	MySQLClusterDataNode	Summary table used in the [ndbd] or [ndbd default] sections of a config.ini file for configuring MySQL Cluster data nodes.
cmdb_ci_db_mysql_instance	MySQL Instance	Instance of a MySQL database.
cmdb_ci_db_ora_catalog	Oracle Catalog	Database catalog for a specific instance of an Oracle database.
cmdb_ci_db_ora_instance	Oracle Instance	Instance of an Oracle database.
cmdb_ci_db_ora_listener	Oracle Database Listener	Process that runs on an Oracle Database Server.
cmdb_ci_db_postgresql_instance	PostgreSQL Instance	Instance of a PostgreSQL database.
cmdb_ci_db_syb_catalog	Sybase Catalog	Database catalog for a specific instance of a Sybase database.
cmdb_ci_db_syb_instance	Sybase Instance	Instance of a Sybase database.
cmdb_ci_desktop_software	Desktop Software	Software used on desktops and laptops.
cmdb_ci_dir_policy_server	Policy Server	Policy server, which provides a security component of a policy-based network that provides authorization services and facilitates tracking and control of files.
cmdb_ci_dir_site_minder_server	Site Minder	Server running SiteMinder software.
cmdb_ci_directory_ad_forest	AD Forest	Active Directory forest.

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Table name	Display name (label)	Table description
cmdb_ci_directory_ha	HA Proxy	HAProxy software.
cmdb_ci_directory_iifp	IIFP	Identity Identification Feature Pack (Active Directory) software.
cmdb_ci_directory_ldap	LDAP DB	LDAP (Lightweight Directory Access Protocol) database software.
cmdb_ci_directory_server	Directory Server	Server running LDAP software.
cmdb_ci_disk	Disk	General category of data storage mechanisms.
cmdb_ci_disk_partition	Disk Partition	Sections of a disk separated so that information in each section can be managed separately.
cmdb_ci_display_hardware	Display Hardware	Hardware used to display information in visual form.
cmdb_ci_dns_alias	DNS Alias	Synonym for the host used to resolve DNS addresses.
cmdb_ci_dns_name	DNS Name	Primary DNS names.
cmdb_ci_docker	Docker Container	Docker containers (a runtime instance of a docker image).
cmdb_ci_docker_engine	Docker Engine	Docker software for running and managing Docker containers.
cmdb_ci_docker_image	Docker Image	Docker images. Ordered collection of root filesystem changes and the corresponding execution parameters for use within a container runtime.
cmdb_ci_docker_image_tag	Docker Image Tag	Docker tag, which is a label applied to a Docker image in a repository.
cmdb_ci_docker_local_image	Docker Local Image	Locally managed Docker image.
cmdb_ci_drs_vm_config	DRS VM Config	Distributed Resource Scheduler (DRS) behavior for the VMs in the vCenter that override the cluster behavior.
cmdb_ci_ec2_instance	EC2 Virtual Machine Instance	Virtual machine running in the Amazon Elastic Compute Cloud (EC2) platform.
cmdb_ci_email_server	Email Server	Server running email software.

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Table name	Display name (label)	Table description
cmdb_ci_email_server_jes	JES	Server running JES software (multi-featured hybrid MTA/ MDA server).
cmdb_ci_endpoint	Endpoint	Endpoint, which represents the entry point to a service, a process, or a queue or topic destination in service-oriented architecture.
cmdb_ci_environment	Environment	Logical grouping of hardware and software used to develop, test, and deliver computing services. For example: development, test, quality assurance, and production.
cmdb_ci_esx_resource_pool	ESX Resource Pool	VMware set of physical resources.
cmdb_ci_esx_server	ESX Server	Physical ESX server running the VMware ESXi operating system.
cmdb_ci_exchange_backend	ExchangeBackEndServer	Server running Exchange software.
cmdb_ci_exchange_cas	Exchange Client Access Server	Server running Exchange software providing client access services.
cmdb_ci_exchange_edge_transport_server	Exchange Edge Transport Server	Server running Exchange Edge Transport software.
cmdb_ci_exchange_frontend	ExchangeFrontEndServer	Server running Exchange software.
cmdb_ci_exchange_hub	ExchangeHub	Server running Exchange Hub software.
cmdb_ci_exchange_hub_transport_server	Exchange Hub Transport Server	Server running Exchange Hub software providing transport services.
cmdb_ci_exchange_mailbox	Exchange MailBox	Exchange email account.
cmdb_ci_exchange_mailbox_server	Exchange Mailbox Server	Server running Exchange software providing client access services.
cmdb_ci_exchange_service_component	Exchange Service Component	Exchange Service Component software.
cmdb_ci_facility_hardware	Facility Hardware	Base class for hardware used to facilities services such as electric, water, sewer, air, and security.
cmdb_ci_fc_disk	Fibre Channel Disk	Base table for fibre channel disk.

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Table name	Display name (label)	Table description
cmdb_ci_fc_export	Fibre Channel Export	Storage volume exported by a storage server via Fibre Channel protocol.
cmdb_ci_fc_port	Fibre Channel Port	Fibre Channel port on a storage server, FC switch, or on a host's HBA.
cmdb_ci_fddi_network	FDDI Cards	Fiber Distributed Data Interface cards.
cmdb_ci_file_system	File System	File system information for a server, capturing details such as mount point, capacity, and type of file system.
cmdb_ci_file_system_nfs	NFS File system	Extension of File System, which provides NFS file system information.
cmdb_ci_file_system_smb	SMB File system	Extension of File System, which provides SMB file system information.
cmdb_ci_firewall_network	Firewall Hardware	Firewall hardware.
cmdb_ci_ftp_server	FTP Server	Server providing FTP services.
cmdb_ci_fuel_tank	Fuel Tank	Fuel tank.
cmdb_ci_generator_power_eq	Power Generator	Power generator.
cmdb_ci_group	Group	Logical group of CIs.
cmdb_ci_hardware	Hardware	Base class for hardware.
cmdb_ci_host_cluster	Host Cluster	Cloud agnostic way of representing a group of hosts as a cluster. The child class represents VMware vCenter Cluster specific details. Parent class for VMWare host cluster object types such as vCenter Clusters.
cmdb_ci_hpux_server	HPUX Server	Server running HPUX software.
cmdb_ci_hub_network	Hub Hardware	Physical network hub.
cmdb_ci_hvac	HVAC Equipment	Heating, ventilation, and air conditioning equipment.
cmdb_ci_hyper_v_cluster	Hyper-V Cluster	Cluster of the Hyper-V servers.
cmdb_ci_hyper_v_instance	Hyper-V Virtual Machine Instance	Hyper-V virtual machine instance. This table extends the generic Virtual Machine Instance [cmdb_ci_vm_instance] table.

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Table name	Display name (label)	Table description
cmdb_ci_hyper_v_network	Hyper-V Virtual Network	Hyper-V virtual network.
cmdb_ci_hyper_v_object	Hyper-V Object	Base class for all Hyper-V objects.
cmdb_ci_hyper_v_resource_pool	Hyper-V Resource Pool	Hyper-V resource pool.
cmdb_ci_hyper_v_rpool_comp	Hyper-V Resource Pool Component	Resource pool component belonging to resource pool.
cmdb_ci_hyper_v_server	Hyper-V Server	Server running Hyper-V software.
cmdb_ci_ids_network	Intrusion Detection System	Security intrusion detection systems.
cmdb_ci_iisdirectory	IIS Virtual Directory	Virtual Directory in IIS Manager.
cmdb_ci_imaging_hardware	Imaging Hardware	Hardware used to create electronic/physical images.
cmdb_ci_inetinfo	Inetinfo service	Inetinfo service of IIS application.
cmdb_ci_inf_software	Infrastructure Software	Base class for enterprise software or programs specifically designed to help business organizations perform basic tasks such as workforce support, business transactions and internal services, and processes.
cmdb_ci_information_object	Information Object	Types of information that a business application or any other entity handles. For example: 'Employee Salary Data', Employee Personal Data', and 'Sales Data'.
cmdb_ci_installed_bundles	Installed Bundles	Extension of the Virtual Machine Object [cmdb_ci_vm_object] table, which represents bundles of installed software.
cmdb_ci_infra_service	Infrastructure Service	IT services which support providing computing infrastructure.
cmdb_ci_infra_service_ldap	LDAP Service	Running LDAP service.
cmdb_ci_ip_address	IP Address	IP address.
cmdb_ci_ip_device	IP Device	Base class for devices with an IP address.

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Table name	Display name (label)	Table description
cmdb_ci_ip_firewall	IP Firewall	Firewall hardware.
cmdb_ci_ip_network	IP Network	IP network information capturing details such as subnet, router, and router_interface_type.
cmdb_ci_ip_phone	IP Phone	IP-enabled (VOIP) phone.
cmdb_ci_ip_router	IP Router	Specialization of the Network Gear [cmdb_ci_netgear] table.
cmdb_ci_ip_server	IP Server	Server hardware.
cmdb_ci_ip_service	IP Service Instance	Base table for IP services running on a server such Unix daemon or Windows service.
cmdb_ci_ip_switch	IP Switch	Specialization of the Network Gear [cmdb_ci_netgear] table.
cmdb_ci_iplanet_web_server	Iplanet Web Server	Server running Oracle iPlanet Web Server (OiWS) software.
cmdb_ci_isam_server	ISAM Server	Server running ISAM software.
cmdb_ci_iscsi_disk	iSCSI Disk	Host mount of an iSCSI disk.
cmdb_ci_iscsi_export	iSCSI Export	Storage volume exported by a storage server via iSCSI.
cmdb_ci_kubernetes_component	Kubernetes Component	Kubernetes cluster, ingress, namespace, node, pod, service, volume, and workload. Also represents open shift build conf, deployment conf, docker images repository, group, images, images, stream, project, route, and user. Parent class for Kubernetes components such as Pods and Clusters.
cmdb_ci_kvm	KVM	Hypervisor that manages kernel-based virtual machines (KVMs).
cmdb_ci_kvm_network	Network	KVM Virtual network.
cmdb_ci_kvm_object	KVM Object	Base object for all KVM objects.
cmdb_ci_kvm_storage_pool	Storage Pool	KVM storage pool.
cmdb_ci_kvm_storage_volume	Storage Volume	KVM storage volume.
cmdb_ci_kvm_vm_instance	KVM Virtual Machine Instance	Virtual machine instance running on a KVM hypervisor.

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Table name	Display name (label)	Table description
cmdb_ci_lb	Load Balancer	Server functioning as a load balancer.
cmdb_ci_lb_a10	A10 Load Balancer	Server functioning as an A10 load balancer.
cmdb_ci_lb_ace	ACE	Server functioning as an ACE load balancer.
cmdb_ci_lb_alteon	Alteon	Server functioning as an Alteon load balancer.
cmdb_ci_lb_appl	Load Balancer Application	Application that provides load balancing functionality.
cmdb_ci_lb_backend_server	LB Backend Server	Server functioning as a backend load balancer.
cmdb_ci_lb_bigip	F5 BIG-IP	Server functioning as an F5 BIG-IP load balancer.
cmdb_ci_lb_cisco_csm	Cisco CSM	Server functioning as a Cisco CSM load balancer.
cmdb_ci_lb_cisco_css	Cisco CSS	Server functioning as a Cisco CSS load balancer.
cmdb_ci_lb_f5_gtm	F5 BigIP GTM	Server functioning as an F5 BigIP GTM load balancer.
cmdb_ci_lb_f5_ltm	F5 BigIP LTM	A server functioning as an F5 BigIP LTM load balancer.
cmdb_ci_lb_haproxy	HAProxy Load Balancer	Server functioning as an HA Proxy load balancer.
cmdb_ci_lb_isa	ISA Server	Server functioning as an ISA load balancer.
cmdb_ci_lb_modjk	Modjk Load Balancer	Server functioning as a Cisco CSM load balancer.
cmdb_ci_lb_modproxy	ModProxy Load Balancer	Server functioning as a ModProxy load balancer.
cmdb_ci_lb_netscaler	Citrix Netscaler	Server functioning as a Citrix Netscaler load balancer.
cmdb_ci_lb_network	Network Load Balancer	Server performing network load balancing.
cmdb_ci_lb_nginx	Nginx Load Balancer	Server functioning as an Nginx load balancer.
cmdb_ci_lb_pool	Load Balancer Pool	Collection of host-to-port mappings to be balanced.
cmdb_ci_lb_pool_member	Load Balancer Pool Member	Host-to-port mapping of a request to be balanced.
cmdb_ci_lb_radware	Radware Load Balancer	Server functioning as a Radware load balancer.

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Table name	Display name (label)	Table description
cmdb_ci_lb_service	Load Balancer Service	Virtual service that the device balances by forwarding requests to members within a pool.
cmdb_ci_lb_template	Load Balancer Template	Load balancer template which contains load balancer-related configuration settings for a specific type of network traffic.
cmdb_ci_lif	LIF	Logical interface.
cmdb_ci_lb_vlan	Load Balancer VLAN	Virtual LAN segment.
cmdb_ci_linux_server	Linux Server	Server running Linux software.
cmdb_ci_logical_datacenter	Logical Datacenter	VMware vCenter logical datacenter.
cmdb_ci_lpar	Logical Partition	Logical partition, commonly called an LPAR, is a subset of a computer's hardware resources, virtualized as a separate computer.
cmdb_ci_lvm_pool	LVM Pool	Linux Volume Manager storage pool.
cmdb_ci_lvm_pool_member	LVM Pool Member	Linux Volume Manager storage pool member.
cmdb_ci_mainframe	IBM Mainframe	IBM large-scale computer system.
cmdb_ci_mainframe_hardware	Mainframe Hardware	The hardware components of a large-scale computer system.
cmdb_ci_mainframe_lpar	IBM Mainframe LPAR	Logical partition, which is commonly called an LPAR, and is a subset of a mainframes computer's hardware resources, virtualized as a separate computer.
cmdb_ci_memory_module	Memory Module	Circuit board that provides for memory storage.
cmdb_ci_mfp_printer	Multi-function Printer	Physical device with scan, copy, and fax capabilities.
cmdb_ci_microsoft_iis_web_server	Microsoft iis Web Server	Server running Internet Information Services (IIS) for Windows software.
cmdb_ci_modem_network	Modem Hardware	Physical modem hardware.
cmdb_ci_mpio_pool	Multipath IO Pool	Multipath IO pool, representing multiple redundant paths to storage.

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cmdb_ci_mpio_pool_group	Multipath IO Pool Group	Group of multipath IO pools.
cmdb_ci_mpio_pool_path	Multipath IO Pool Path	Single path in an MPIO pool.
cmdb_ci_msd	Mass Storage Device	Physical storage device.
cmdb_ci_nas_file_system	NAS File System	Extension of the File System [cmdb_ci_file_system] table, representing network attached storage.
cmdb_ci_nat_gateway	NAT Gateway	Functionality for NAT gateway.
cmdb_ci_netapp_cdot	NetApp CDOT	Functionality of NetApp Clustered Data OnTap operating system
cmdb_ci_netapp_datacenter	NetApp Datacenter	NetApp logical datacenter.
cmdb_ci_netapp_svm	NetApp SVM	NetApp Storage Virtual Machine.
cmdb_ci_netapp_volume	NetApp Volume	NetApp FlexVol storage volume.
cmdb_ci_net_app_server	Network Appliance Hardware	Server configured to perform as a networking appliance.
cmdb_ci_netgear	Network Gear	Extension of the Hardware table, that captures network equipment such as router, switch, hub, gateway, and bridge.
cmdb_ci_netware_server	Netware Server	Server running NetWare software.
cmdb_ci_network	Cloud Network	VMware vCenter cloud network.
cmdb_ci_network _acl	Network ACL	Network access control list (ACL).
cmdb_ci_network_acl_rule	Network ACL Rule	Rule used to control networking access rights.
cmdb_ci_network_adapter	Network Adapter	Network adapter hardware.
cmdb_ci_network_policy_group	Network Policy Group	Group policy consumed by Active Directory services.
cmdb_ci_network_template	Network Template	OpenStack file used to configure a network.
cmdb_ci_nic	Cloud Mgmt Network Interface	Virtual network adapter.
cmdb_ci_nginx_web_server	Nginx Web Server	Server running Nginx software.

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cmdb_ci_openstack_datacenter	OpenStack Datacenter	OpenStack logical datacenter.
cmdb_ci_optical_transport	Fiber Optic Equipment	Fiber optics which are used for long-distance and high-performance data networking. Fiber optics are commonly used in telecommunication services such as internet, television and telephones. Child class of Transport Hardware and parent class for telecom fiber optic equipment such as optical multiplexers and terminal equipment.
cmdb_ci_oslv_container	Operating-system-level Virtualization Container	Containers (a runtime instance of a docker image).
cmdb_ci_oslv_engine	Operating-system-level Virtualization Engine	Software for running and managing containers.
cmdb_ci_oslv_image	Operating-system-level Virtualization Image	Container images. Ordered collection of root filesystem changes and the corresponding execution parameters for use within a container runtime.
cmdb_ci_oslv_image_tag	Operating-system-level Virtualization Image Tag	Container tag, which is a label applied to a container image in a repository.
cmdb_ci_oslv_local_image	Operating-system-level Virtualization Local Image	Locally managed container image.
cmdb_ci_osx_server	OS/X Server	Server running OS/X operating system.
cmdb_ci_os_template	Image	Software files used to create a new instance of a compute resource such as server, desktop, virtual machine, and virtual router.
cmdb_ci_outofband_device	Out-of-Band Device	Hardware used to perform out-of-band management.
cmdb_ci_patches	Patch	Patch software to fix or improve a computer program or its supporting data.
cmdb_ci_pc_hardware	Personal Computer	Multi-purpose electronic computer whose size,

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Table name	Display name (label)	Table description
		capabilities, and price make it feasible for individual use.
cmdb_ci_pcf_component	CloudFoundry Component	Cloud Foundry provides a highly efficient, modern model for cloud native application delivery on top of Kubernetes. Component represents application, domain, organization, quota, routes, service, service plan, space, and space instances. Parent class for price base of cloud products such as virtual machines.
cmdb_ci_pdu	PDU	Power distribution unit (PDU).
cmdb_ci_pdu_outlet	Outlet	Single outlet of a PDU.
cmdb_ci_peripheral	Computer Peripheral	Various computer peripherals such as monitor, docking station, KVM switch, projector, scanner, keyboard, mouse, and UPS.
cmdb_ci_personal_printer	Personal Printer	Printer whose size,capabilities and price make it feasible for individual use.
cmdb_ci_plotter	Plotter	Printer with capabilities to print large vector graphic images.
cmdb_ci_power_eq	Power Equipment	Hardware used to manage electrical power.
cmdb_ci_port	Port	Interface between a computer and other electronic devices.
cmdb_ci_port_group	Port Group	Group of ports on a virtual switch.
cmdb_ci_print_queue	Print Queue	Print queue, which is a list of printer output jobs held in a reserved memory area, including the most current status of all active and pending print jobs.
cmdb_ci_printer	Printer	Physical device which makes a persistent human-readable representation of graphics or text on paper or similar physical media.
cmdb_ci_printing_hardware	Printing Hardware	Physical device which makes a persistent human-readable

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Table name	Display name (label)	Table description
		representation of graphics or text on paper or similar physical media.
cmdb_ci_puppet_master	Puppet Primary	Server running PuppetMaster application.
cmdb_ci_qtree	Qtree	Qtree file system.
cmdb_ci_qualifier	Qualifier	Relation qualifier CIs which contain important information about CI relationships. In a relation qualifier, you can annotate arbitrary unique information about the relationship between two CIs. You can define multiple qualifiers for a single relationship, resulting in a qualifier chain. However, there can be only a single qualifier chain for a specific relationship type between two CIs. Parent class for the various relation qualifier types such as EntryPoint Markers and Boundary Connections.
cmdb_ci_rack	Rack	Datacenter racks containing details such as rack units, rack units in use, and power consumption.
cmdb_ci_raid	RAID	Storage pool using RAID mechanisms to ensure data integrity.
cmdb_ci_raid_member	RAID Member	Member of storage pool using RAID mechanisms.
cmdb_ci_resource_group	Resource Group	Resource pool is a logical abstraction for flexible management of resources.
cmdb_ci_sa_scaling_pol_base	Scaling Policy	Parent class for virtual machines scaling policy options such as simple and dynamic.
cmdb_ci_san	Storage Area Network	Network which provides access to block level storage.
cmdb_ci_san_connection	SAN Connection	Connection in a SAN network.
cmdb_ci_san_disk	SAN Disk	Base table for the iSCSI Disk [cmdb_ci_iscsi_disk]

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Table name	Display name (label)	Table description
		and the Fibre Channel Disk [cmdb_ci_fc_disk] tables.
cmdb_ci_san_endpoint	SAN Endpoint	One end of a SAN connection.
cmdb_ci_san_export	SAN Export	Base table for the iSCSI Export [cmdb_ci_iscsi_export] and the Fibre Channel Export [cmdb_ci_fc_export] tables.
cmdb_ci_san_fabric	SAN Fabric	Hardware that connects workstations and servers to storage devices in a SAN. Referred to as a "fabric."
cmdb_ci_san_zone	SAN Zone	Subset of SAN storage that certain users are restricted to.
cmdb_ci_san_zone_alias	SAN Zone Alias	Collection of SAN zone members.
cmdb_ci_san_zone_alias_member	SAN Zone Alias Member	M2m relationship between SAN zone aliases and SAN zone members.
cmdb_ci_san_zone_member	SAN Zone Member	Ports and devices in a SAN zone.
cmdb_ci_san_zone_set	SAN Zone Set	Collection of SAN zones.
cmdb_ci_scanner	Scanner	Hardware used to create digital imagine of paper documents.
cmdb_ci_server	Server	Base class for all types of servers.
cmdb_ci_server_snapshot	Server Snapshot	Server snapshot, which is the state of a system at a particular point in time.
cmdb_ci_service	Service	IT Service that directly supports a Business Process (ITIL).
cmdb_ci_service_auto	Application Service	Services that can be monitored by the system, which in the base system, includes only application services. If Service Mapping is activated, there can also be records for dynamic CI groups. If Event Management is activated, there can be records for alert groups.
cmdb_ci_service_business	Business Service	Business services are published to business users and typically underpin one or more business capabilities.

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Table name	Display name (label)	Table description
		Business services are often orderable by business users.
cmdb_ci_service_discovered	Mapped Application Service	Application services, created by the Manual service population method. For each application service, there is a container CI record that models the application service.
cmdb_ci_service_technical	Technical Service	Technical services are published to service owners and typically underpin one or more business services. A technical service may have an operational view made up of one or more technical service offerings.
cmdb_ci_solaris_instance	Solaris Virtual Machine Instance	Virtual machine instance running Solaris software.
cmdb_ci_solaris_server	Solaris Server	Physical server running Solaris software.
cmdb_ci_spkg	Software	Software package information containing details such as version, install count, license count, package name, and key (when SAM enabled).
cmdb_ci_storage_controller	Storage Controller	Logical device that controls a storage volume or Fibre Channel port.
cmdb_ci_storage_device	Storage Device	Base table for block storage devices such as DAS, SAN, and NAS.
cmdb_ci_storage_disk	Storage Disk	Disk installed in a storage server.
cmdb_ci_storage_export	Storage Export	Base table for the SAN Export [cmdb_ci_san_export] table.
cmdb_ci_storage_fileshare	Storage File Share	NAS file system on a storage server (an exported file system).
cmdb_ci_storage_hba	Storage HBA	Host bust adapter for Fibre Channel. The physical device that provides Fibre Channel ports.
cmdb_ci_storage_pool	Storage Pool	Logical collection of storage.
cmdb_ci_storage_pool_member	Storage Pool Member	Logical volume in a storage pool.
cmdb_ci_storage_switch	Storage Switch	Fibre Channel switch.

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Table name	Display name (label)	Table description
cmdb_ci_storage_volume	Storage Volume	Volume on a storage server.
cmdb_ci_storage_vol_snapshot	Storage Volume Snapshot	Server snapshot is the state of a system at a particular point in time.
cmdb_ci_subnet	Cloud Mgmt Subnet	Part of a larger network.
cmdb_ci_sun_dir_proxy_server	Sun Directory Proxy Server	Server running Sun ONE Directory Proxy Server software.
cmdb_ci_sun_ldap_dir_server	Sun LDAP Server	Server running Sun ONE Directory Server (LDAP) software.
cmdb_ci_surge_power_eq	Surger Protection Equipment	Power equipment used to prevent power surges.
cmdb_ci_tape_server	Server Tape Unit	Hardware for using magnetic tape storage.
cmdb_ci_tomcat_connector	Tomcat Connector	Software which provides web server plugins to connect web servers with Tomcat and other backends.
cmdb_ci_tower_eq	Tower Equipment	Parent class for facility towers and tower equipment such as lights and beacons.
cmdb_ci_translation_rule	NAT	Rules to allow router to remap one network address to another.
cmdb_ci_transport_hardware	Transport Hardware	Telecommunication hardware used for digital communication and related hardware such as telecommunication racks, servers to connect port to LAN, relays, channel banks, and network circuit switch. Parent class for telecom transport hardware such as multiplexers and fiber optic equipment.
cmdb_ci_ucs_blade	Cisco UCS Blade	Physical Cisco UCS Blade server hardware.
cmdb_ci_ucs_chassis	Cisco UCS Chassis	Physical Cisco UCS chassis hardware used to hold Cisco UCS Blade server hardware.
cmdb_ci_ucs_equipment	Cisco UCS Equipment	Cisco Unified Computing System (UCS) products.

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Table name	Display name (label)	Table description
cmdb_ci_unix_cluster	UNIX Cluster	Set of computers clustered together to present a single Unix server resource.
cmdb_ci_unix_daemon	UNIX Daemon	Long running Unix background process used to answer requests for services.
cmdb_ci_unix_server	UNIX Server	Server running Unix software.
cmdb_ci_ups	UPS	Uninterrupted Power Supply devices, where devices are traditional UPS devices.
cmdb_ci_ups_alarm	UPS Alarm	Uninterrupted Power Supply alarm.
cmdb_ci_ups_bypass	UPS Bypass	Uninterrupted Power Supply bypass.
cmdb_ci_ups_input	UPS Input	Electrical input to an Uninterrupted Power Supply device.
cmdb_ci_ups_output	UPS Output	Electrical output from an Uninterrupted Power Supply device.
cmdb_ci_ups_power_eq	Uninterruptible Power Supply	Uninterrupted Power Supply devices, where devices are any non-traditional UPS devices that manage electrical power.
cmdb_ci_vcenter	VMware vCenter Instance	Installed instance of VMware VCenter software.
cmdb_ci_vcenter_cluster	VMware vCenter Cluster	Set of servers that work together while running VMware VCenter software.
cmdb_ci_vcenter_cluster_drs_rule	VMWare vCenter Cluster DRS Rule	vCenter specific table which stores Distributed Resource Scheduler (DRS) basic rule information. Stores the affinity rule specifying that the members of a selected virtual machine DRS group can or must run on the members of a specific host DRS group. Populated by the vCenter API ClusterRuleInfo(vim.cluster.RuleInfo).
cmdb_ci_vcenter_datacenter	VMware vCenter Datacenter	VMware VCenter data center objects.
cmdb_ci_vcenter_datastore	VMware vCenter Datastore	VMware VCenter datastore objects containing details

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Table name	Display name (label)	Table description
		such as capacity, freespace, filesystem, and type.
cmdb_ci_vcenter_datastore_disk	Datastore Disk	Individual VMware VCenter datastore disk.
cmdb_ci_vcenter_folder	VMware vCenter Folder	VCenter folders, which can be used to group objects of the same type for easier management.
cmdb_ci_vcenter_network	VMware vCenter Network	VMWare vCenter virtual network.
cmdb_ci_vcenter_object	VMware vCenter Object	Base class for most VMware VCenter objects.
cmdb_ci_vcenter_server_obj	VMware vCenter Server Object	VMware hypervisor.
cmdb_ci_veritas_disk	Veritas Disk	Physical disk that is controlled by Veritas Volume Manager.
cmdb_ci_veritas_disk_group	Veritas Disk Group	Collection of disks in Veritas Volume Manager.
cmdb_ci_veritas_plex	Veritas Plex	Logical partition in Veritas Volume Manager.
cmdb_ci_veritas_subdisk	Veritas Subdisk	Partition of a Veritas_disk.
cmdb_ci_veritas_volume	Veritas Volume	Aggregation of plexes.
cmdb_ci_virtualization_server	Virtualization Server	Base table used by the ESX Server [cmdb_ci_esx_server] table.
cmdb_ci_virtual_desktop	Virtual Desktop	User's desktop environment (such as icons, wallpaper, windows, folders, toolbars, and widgets) is stored remotely on a server.
cmdb_ci_virtual_pvt_gateway	Virtual Private Gateway	Two VPN endpoints for automatic failover.
cmdb_ci_vm	Virtual Machine HyperVisor	Hypevisor software.
cmdb_ci_vm_instance	Virtual Machine Instance	Generic virtual machines information.
cmdb_ci_vm_object	Virtual Machine Object	Base class for all VM objects. Parent for all objects such as Hyper-V object and KVM object.
cmdb_ci_vm_parallels	Parallels	Instance of Parallels software.
cmdb_ci_vm_template	Virtual Machine Template	Template, which is a master copy of a virtual machine that can be used to create many

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Table name	Display name (label)	Table description
		clones. Base table for all VM templates.
cmdb_ci_vm_user_credentials	VM User Credentials	Credentials, which are used to authenticate access rights and permissions.
cmdb_ci_vm_vmware	VMware	VMWare specialization of the Virtual Machine table. No longer used.
cmdb_ci_vm_zones	Zones	Partitioned virtual OS environment working in a Solaris operating system space.
cmdb_ci_voice_hardware	Voice System Hardware	Telecommunication systems that represent telephone systems, telephone exchanges, and voice mail. Parent class for telecom voice system hardware such as voicemail and private branch exchanges.
cmdb_ci_volume_template	Volume Template	Set of rules that specify one or more capabilities of a storage volume (storage selection and layout rules).
cmdb_ci_vmware_instance	VMware Virtual Machine Instance	VMware VM instance on VMware hypervisor.
cmdb_ci_vmware_template	VMware Virtual Machine Template	Master copy of a VMware virtual machine that can be used to create many clones.
cmdb_ci_vpc	Virtual Private Cloud	On-demand configurable pool of shared computing resources allocated within a public cloud environment.
cmdb_ci_vpn	Virtual Private Network	Private network configured to run across a public network.
cmdb_ci_vpn_connection	VPN Connection	Secure connection to another network over the Internet.
cmdb_ci_vserver_peer	Vserver Peer	Extends the Virtual Machine Object [cmdb_ci_vm_object] table. Peer relationship between the Vservers (NetApp).
cmdb_ci_wap_network	Wireless Access Point	Networking hardware device that allows a Wi-Fi compliant device to connect to a wired network.

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Table name	Display name (label)	Table description
cmdb_ci_web_application	Web Application	Client–server software application in which the client (or user interface) runs in a web browser.
cmdb_ci_web_domino	Lotus Domino HTTP Server	Server running IBM Notes software (formerly Lotus Notes/IBM Domino).
cmdb_ci_web_server	Web Server	Computer system that processes requests via HTTP from the World Wide Web.
cmdb_ci_web_service	Web Service	Service offered by an electronic device to another electronic device, communicating with each other via the World Wide Web.
cmdb_ci_web_site	Web Site	A collection of related web pages.
cmdb_ci_websphere_cell	Websphere Cell	A logical grouping of IBM Websphere nodes (each of which runs one or more application servers) that are centrally managed.
cmdb_ci_win_cluster	Windows Cluster	A single (virtual) server composed of one ore more physical Windows Servers.
cmdb_ci_win_cluster_node	Windows Cluster Node	A physical member of the Windows Cluster application.
cmdb_ci_win_cluster_resource	Windows Cluster Resource	A logical or physical entity managed by the Windows Cluster application.
cmdb_ci_win_domain_controller	Windows Domain Controller	A server that responds to security authentication requests within a Windows Server domain.
cmdb_ci_win_server	Windows Server	A server running Microsoft Windows Server operating system.
cmdb_ci_windows_service	Windows Service	A Windows computer program that operates in the background.
cmdb_ci_zone	Data Center Zone	A specified portion of a data center facility.

Service tables

In the CMDB, child tables of the Service [cmdb_ci_service] table store information about services, including application services.

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Key fields in the Service table

Field	Description
Business criticality	The importance of this service to the business. This field can be used to determine disaster recovery strategies for this service. Default options are: • 1 - most critical • 2 - somewhat critical • 3 - less critical • 4 - not critical
SLA	A reference to the Agreement [sla] table.
Service classification	Designates the type of the service. • Application Service (For more information, see Application services) • Technical Service (For more information, see Application services and Populate an application service using the Dynamic CI Group method) • Service Offering (For more information, see Service Portfolio Management service offerings) • Shared Service (For more information, see IT shared services) • Billable Service (To represents a service that is billed, or that is cost managed)
Used for	Designates how this service is used. Default options are: • Production • Staging • QA • Test • Development • Demonstration • Training • Disaster Recovery
Users supported	The users that this service supports. A reference to the Group [sys_users_group] table.
Version	Use this field for your own versioning processes.

Service Configuration Item Association table

The Service Configuration Item Association table [svc_ci_assoc] binds an application service and a CI to track which CIs are part of each application service.

Field	Description
Configuration Item Id	A reference to the Configuration Item [cmdb_ci] table.

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Field	Description
Service Id	A reference to the Service [cmdb_ci_service] table.

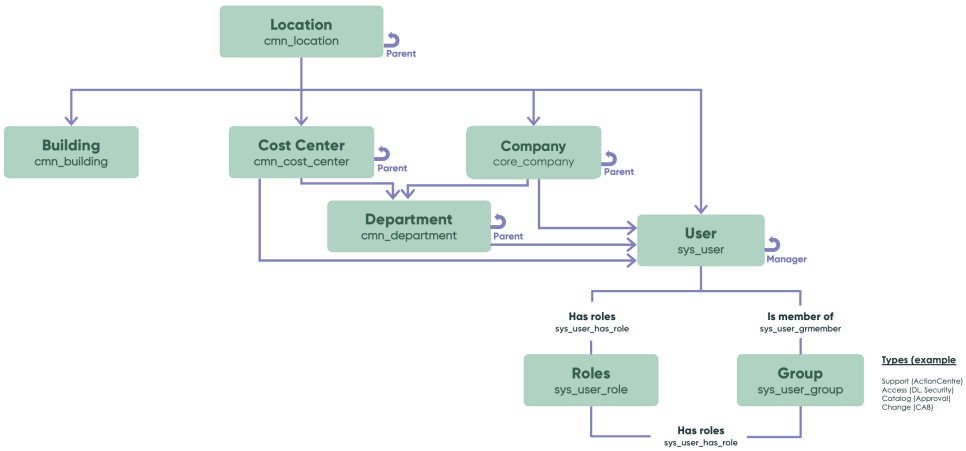
Configuration Item [cmdb_ci] class

Attributes in the Configuration Item [cmdb_ci] class, which extends the Base Configuration Item [cmdb] class.

> **Warning:**
> Do not modify any of these attributes in the dictionary. For example, do not modify the type of the *location* attribute from reference to list. Such modifications may prevent features that use the CMDB, from functioning properly.

For descriptions of common CMDB tables in a base system, see CMDB tables descriptions.

Common core, user tables



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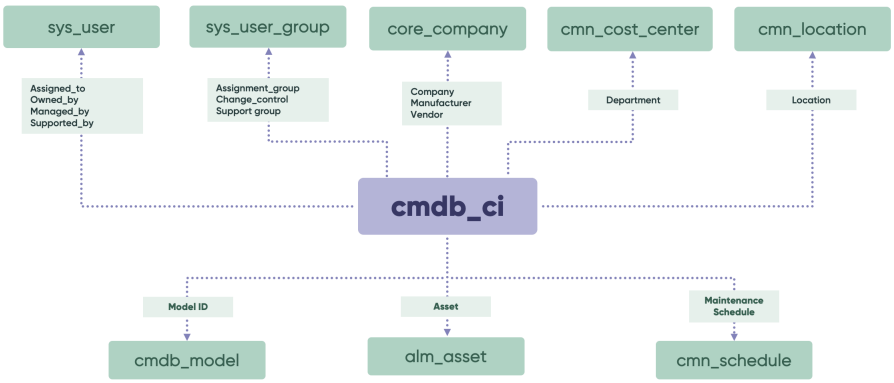
CMDB CI schema related to common core and non-core tables



Attributes

Attribute	Description
Asset tag	Asset tag/service tag for the specific asset
Assigned	Date and time of assignment to user
Attributes	Description of usage of attributes for the instance
Can Print	Indicates whether the instance can print
Category	Name of category applicable to the instance
Checked in	Date and time of checking in
Checked out	Date and time of checking out
Class	System class name
Comments	Comments related to the instance
Correlation ID	ID of the instance from another data source
Cost	Financial value in local currency (as defined in the Cost Currency field)
Cost currency	Name of currency (such as dollars, pounds, Euros)
Created	Date and time record was created
Created by	Name of person/data source which initially created the record
Description	Fit (how deployed) and function (purpose) of the instance

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Attribute	Description
Discovery source	Name of primary (most trusted) discovery source
DNS Domain	Name of the DNS domain to which the instance belongs
Domain	ID of the domain to which the instance belongs
Domain Path	Path of the domain to which the instance belongs
Due	Date and time instance was due
Due in	Description of the manner of which the instance was due
Fault Count	Number of faulty recorded against the instance to date
First Discovered	Date and time instance was initially discovered
Fully Qualified Domain Name	Full path name of domain to which the instance belongs
GL account	General Ledger account name/number
Installed	Date and time instance was most recently installed
Invoice number	Invoice number used in acquisition process
IP Address	Primary IP address used by the instance
Justification	Description of the justification for the instance
Lease contract	Number of current leasing contracts
MAC Address	MAC address of the instance
Model Number	Manufacturer original model number
Monitor	Indicates whether the instance is monitored
Most Recent Discovery	Date and time instance was last discovered
Name	Name of the CI instance
Operational Status	Configurable choice list with values for current operational states
Order received	Date and time instance was initially received
Ordered	Date and time instance was initially ordered
PO number	Purchase order number used in acquisition process
Purchased	Date instance was purchased
Requires verification	Flag indicating whether verification is required for the instance
Serial number	Serial number of the instance

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Attribute	Description
Skip sync	Flag indicating whether synchronization between Asset Management and CMDB can be skipped
Start Date	Date and time the instance was last started
Subcategory	Name of Subcategory applicable to the instance
Sys ID	ServiceNow Sys ID (GUID)
Tags	Related tags
Updated	Date and time instance was last updated
Updated by	Person/data source which last updated the record
Updates	Configurable choice list with values for update states
Warranty expiration	Date current warranty expires

Reference attribute	Reference to
Approval Group	Group table
Asset	Asset table
Assigned to	User table
Change Group	Group table
Company	Company table
Cost center	Cost Center table
Department	Department table
Location	Location table
Maintenance Schedule	Schedule table
Managed by	User table
Manufacturer	Company table
Model ID	Product Model table
Owned by	User table
Schedule	Schedule table (for normal processing)
Support group	Group table
Supported by	User
Vendor	Company table

Hardware [cmdb_ci_hardware] class

Attributes, identification rule, and other important schema structures for the CMDB Hardware [cmdb_ci_hardware] class.

For descriptions of common CMDB tables in a base system, see CMDB tables descriptions.

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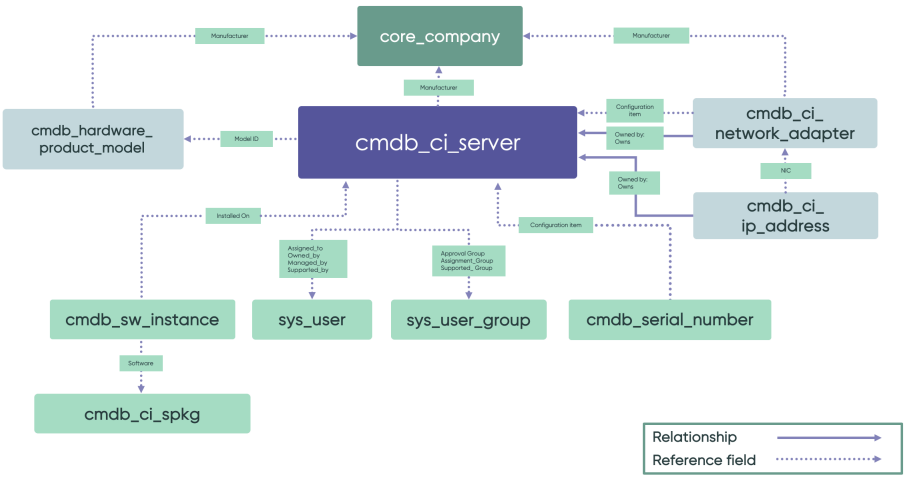
Hardware, Computer, Server Schema



Note:
cmdb_sw_instance noted in the diagram, is a reference to the cmdb_software_instance class, and Supported_Group is a reference to Support_Group.

Attributes

The Hardware class adds the following unique attributes:

Attribute	Description
hardware_status	Status of hardware such as **In Maintenance** or **Retired**. Used to sync status to the Asset class.
hardware_substatus	Secondary hardware status. Each setting in *`hardware_status`* results in a different set of choices available for this field.
default_gateway	Default gateway that the computer is connected through.

Key relationship structures

Use the following key relationships as important guidelines when creating Hardware, Computer, or Server CIs:

- Serial number: During CI identification, Identification and Reconciliation Engine (IRE) processes search for a serial number in two locations. One is the CI serial number attribute, and the second one is the Serial Number [cmdb_serial_number] table, with reference back to the Hardware [cmdb_ci_hardware] table.
  - Store any serial number of any type other than System, only in the Serial Number table (and not in the server CI attribute).
  - If the system serial number is available, store it in both the *`Serial Number`* attribute of the CI and in the Serial Number table.

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The Serial Number table is a many to one relationship linking back to the server CI. This table has a type field for specifying the type of the serial number (system, uuid, chassis, bios, or baseboard) and storing the actual value itself. Use the following Windows standards for serial number types in the Serial Number [cmdb_serial_number] table:

- *system*: Product identification such as a serial number for software, a die number on a hardware chip, or a project number (for noncommercial products).
- *uuid*: Universally unique identifier (UUID) for the product. A UUID is a 128-bit identifier that is guaranteed to be different from other generated UUIDs.
- *chassis*: Manufacturer-allocated number that is used to identify a physical element. Value is the Serial Number member of the System Enclosure or Chassis structure in the SMBIOS information. This type represents the properties associated with a physical system enclosure.
- *bios*: The assigned serial number of the BIOS. This type represents the attributes of the computer system basic input/output services (BIOS) that are installed on the computer.
- *baseboard*: Manufacturer-allocated number that is used to identify the physical element. This property is inherited from CIM_PhysicalElement, and is sometimes referred to as the 'Motherboard Serial Number'.

- Network adapter:
  - Use the Network Adapter [cmdb_ci_network_adapter] class to store network adapters.
  - Set the *Name* attribute in the Network Adapter class to be the name of the Network Adapter device (such as eth0, eth1).
  - Set the *MAC Address* attribute to be the MAC address value. Format the string with colon separators between octets and lower case hexadecimal characters with padded zeros.

    For example: 'f8:f2:1e:00:d4:66'
  - In the CI Relationship [cmdb_rel_ci] table, create an *Owned By::Owns* relationship to the associated Hardware CI. Specify a reference from the Network Adapter [cmdb_ci_network_adapter] table using the CI with a reference to the associated Hardware CI.

- IP address:
  - Use the IP Address [cmdb_ci_ip_address] class to store IP addresses.
  - Store an IP address value in the *IP Address* attribute, and in the *Name* attribute (to avoid empty *Name* attributes).
  - Store an IPv4 IP address value using the format 'NNN.NNN.NNN.NNN', with decimal-based octets and period separators. Non-conforming values should be considered invalid and cleansed to null values.
  - Store an IPv6 IP address value using lower case hexadecimal with colon separators. Non-confirming values should be considered invalid and cleansed to null values.
  - Set the *Netmask* attribute to the IP address.
  - In the CI Relationship [cmdb_rel_ci] table, create an **Owned By::Owns** relationship to the associated Hardware CI.

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- Specify for the IP address a reference to the Network Adapter [cmdb_ci_network_adapter] table using the Configuration Item with a reference to the associated Hardware CI.
- To ensure that base system identification rules work properly, also store the IP address in the associated Network Adapter class.

- Network adapter and IP address:
  - Store the MAC address of the network adapter installed on a server, in the Network Adapter [cmdb_ci_network_adapter] class.
  - Store the IP address in the IP Address [cmdb_ci_ip_address] class.
  - Do not store the MAC address or the IP address in the Server [cmdb_ci_server] class.

Key reference structures

Use the following key references as important guidelines when creating Hardware, Computer, or Server CIs:

- Software and processes running on a server: The Software [cmdb_ci_spkg] class contains the generic software package that is related to the server CI. The cmdb_software_instance table instantiates each instance of the software package with:
  - One to one reference back to the Server [cmdb_ci_server] class
  - Many to one reference back to the Software class
  These references are stored in the *Installed on* and the *Product Name* reference attributes respectively.

  If either the Software Asset Management Foundation [com.snc.sams] or the Software Asset Management [com.snc.software_asset_management] plugin is installed, then store software details in the Software Installation [cmdb_sam_sw_install] table instead of the cmdb_software_instance table.
- The *Manufacturer* and *Model ID* are reference attributes to the Company [core_company] and Product Model [cmdb_model] tables respectively.
- The *Owned By*, *Assigned To*, *Managed By*, and *Supported By* are reference attributes to the User [sys_user] table. The *Change Group* and *Support Group* are reference attributes to the Group [sys_user_group] table.

Identification rule

The base system contains pre-defined identification rules for the Hardware, Computer, and Server classes, which are identical. That identification rule has the following key identifier entries, listed in priority order:

1. Identifier entry which uses lookup-based identification specified with Serial Number [cmdb_serial_number] as the lookup table. The Serial Number table is a many to one reference from Serial Number back to the server CI.
2. Identifier entry specified with the *Serial Number* attribute in the CI.
3. Identifier entry for the *Name* attribute. If *Serial Number* is not available, then the *Name* (which is the hostname) attribute is used. If both the *Serial Number* and the *Name* attributes are provided, then Identification and Reconciliation Engine (IRE) looks first for the Serial Number. Then, if a Serial Number is not found, IRE falls back to using Name.

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4. Identifier entry specified for the *MAC Address*/*IP Address* attributes in the Network Adapter table. However, do not rely only on the *MAC Address*/*IP Address*.

   If both *Serial Number* and *Name* are not available, and only *MAC Address*/*IP Address* are available, use *MAC Address* as the name of the CI. Using the *MAC Address* as the name of the CI ensures that you don't create an empty CI.

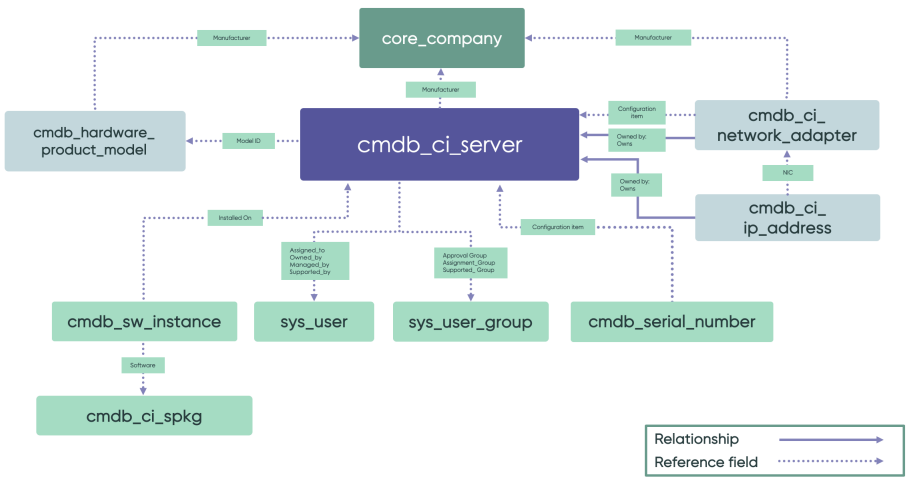
For more information, see CMDB Identification and Reconciliation.

Computer [cmdb_ci_computer] class

Attributes, identification rule, and other important schema structures for the CMDB Computer [cmdb_ci_computer] class.

For descriptions of common CMDB tables in a base system, see CMDB tables descriptions.

Hardware, Computer, Server Schema



Note:
cmdb_sw_instance noted in the diagram, is a reference to the cmdb_software_instance class, and Supported_Group is a reference to Support_Group.

Attributes

The Computer class adds the following unique attributes:

Attribute	Description
CD_ROM	Denotes whether a CD ROM exists.
CD Speed	Speed of CD_ROM.
Chassis type	Type of computer chassis.
CPU core count	Number of cores per CPU.
CPU core thread	Number of threads per core.
CPU count	Number of CPUs.

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Attribute	Description
CPU name	Name of CPU.
CPU speed (MHz)	Speed of CPU.
CPU type	CPU type.
Disk space (GB)	Amount of disk space (in GB).
Floppy	Type of floppy drive.
Form factor	Form factor of the computer.
Object ID	Object ID of the computer (such as the virtual machine ID associated with the computer).
Operating System	Name of the operating system.
OS Address Width (bits)	Operating system bit (such as 32, 64).
OS Domain	NA
OS Service Pack	Service pack installed on the operating system .
OS Version	Version of the operating system.
RAM (MB)	Amount of RAM on the computer.
IsVirtual	True/False denoting whether the device is running on a virtual machine instance.

Reference attribute	Reference to
CPU manufacturer	Company [core_company] table

Schema description

The CMDB schema model does not separate between servers and computers that are physical and servers and computer that are virtual. Instead, the Computer and the Server classes have a field named *IsVirtual*. If a computer or server is a virtual instance, set this *IsVirtual* attribute to **true**.

As described in the Virtual Machine schema section, to fully model a virtual machine, set the *IsVirtual* attribute in the Computer or Server CI to **true**. Create a Virtual Machine Instance [cmdb_ci_vm_instance] record using the *BIOS UUID* attribute as the key identifier. Then create a Hosted_On relationship between the Virtual Machine Instance record and the Computer or Server instance and set *IsVirtual* to **true**.

Key relationship structures

Use the following key relationships as important guidelines when creating Hardware, Computer, or Server CIs:

- Serial number: During CI identification, Identification and Reconciliation Engine (IRE) processes search for a serial number in two locations. One is the CI serial number attribute, and the second one is the Serial Number [cmdb_serial_number] table, with reference back to the Hardware [cmdb_ci_hardware] table.

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- Store any serial number of any type other than System, only in the Serial Number table (and not in the server CI attribute).
- If the system serial number is available, store it in both the *Serial Number* attribute of the CI and in the Serial Number table.

The Serial Number table is a many to one relationship linking back to the server CI. This table has a type field for specifying the type of the serial number (system, uuid, chassis, bios, or baseboard) and storing the actual value itself. Use the following Windows standards for serial number types in the Serial Number [cmdb_serial_number] table:

- *system*: Product identification such as a serial number for software, a die number on a hardware chip, or a project number (for noncommercial products).
- *uuid*: Universally unique identifier (UUID) for the product. A UUID is a 128-bit identifier that is guaranteed to be different from other generated UUIDs.
- *chassis*: Manufacturer-allocated number that is used to identify a physical element. Value is the Serial Number member of the System Enclosure or Chassis structure in the SMBIOS information. This type represents the properties associated with a physical system enclosure.
- *bios*: The assigned serial number of the BIOS. This type represents the attributes of the computer system basic input/output services (BIOS) that are installed on the computer.
- *baseboard*: Manufacturer-allocated number that is used to identify the physical element. This property is inherited from CIM_PhysicalElement, and is sometimes referred to as the 'Motherboard Serial Number'.

- Network adapter:
  - Use the Network Adapter [cmdb_ci_network_adapter] class to store network adapters.
  - Set the *Name* attribute in the Network Adapter class to be the name of the Network Adapter device (such as eth0, eth1).
  - Set the *MAC Address* attribute to be the MAC address value. Format the string with colon separators between octets and lower case hexadecimal characters with padded zeros.

    For example: 'f8:f2:1e:00:d4:66'
  - In the CI Relationship [cmdb_rel_ci] table, create an *Owned By::Owns* relationship to the associated Hardware CI. Specify a reference from the Network Adapter [cmdb_ci_network_adapter] table using the CI with a reference to the associated Hardware CI.

- IP address:
  - Use the IP Address [cmdb_ci_ip_address] class to store IP addresses.
  - Store an IP address value in the *IP Address* attribute, and in the *Name* attribute (to avoid empty *Name* attributes).
  - Store an IPv4 IP address value using the format 'NNN.NNN.NNN.NNN', with decimal-based octets and period separators. Non-conforming values should be considered invalid and cleansed to null values.
  - Store an IPv6 IP address value using lower case hexadecimal with colon separators. Non-confirming values should be considered invalid and cleansed to null values.

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- Set the *Netmask* attribute to the IP address.
- In the CI Relationship [cmdb_rel_ci] table, create an **Owned By::Owns** relationship to the associated Hardware CI.
- Specify for the IP address a reference to the Network Adapter [cmdb_ci_network_adapter] table using the Configuration Item with a reference to the associated Hardware CI.
- To ensure that base system identification rules work properly, also store the IP address in the associated Network Adapter class.

- Network adapter and IP address:
  - Store the MAC address of the network adapter installed on a server, in the Network Adapter [cmdb_ci_network_adapter] class.
  - Store the IP address in the IP Address [cmdb_ci_ip_address] class.
  - Do not store the MAC address or the IP address in the Server [cmdb_ci_server] class.

Key reference structures

Use the following key references as important guidelines when creating Hardware, Computer, or Server CIs:

- Software and processes running on a server: The Software [cmdb_ci_spkg] class contains the generic software package that is related to the server CI. The cmdb_software_instance table instantiates each instance of the software package with:
  - One to one reference back to the Server [cmdb_ci_server] class
  - Many to one reference back to the Software class

  These references are stored in the *Installed on* and the *Product Name* reference attributes respectively.

  If either the Software Asset Management Foundation [com.snc.sams] or the Software Asset Management [com.snc.software_asset_management] plugin is installed, then store software details in the Software Installation [cmdb_sam_sw_install] table instead of the cmdb_software_instance table.
- The *Manufacturer* and *Model ID* are reference attributes to the Company [core_company] and Product Model [cmdb_model] tables respectively.
- The *Owned By*, *Assigned To*, *Managed By*, and *Supported By* are reference attributes to the User [sys_user] table. The *Change Group* and *Support Group* are reference attributes to the Group [sys_user_group] table.

Identification rule

The base system contains pre-defined identification rules for the Hardware, Computer, and Server classes, which are identical. That identification rule has the following key identifier entries, listed in priority order:

1. Identifier entry which uses lookup-based identification specified with Serial Number [cmdb_serial_number] as the lookup table. The Serial Number table is a many to one reference from Serial Number back to the server CI.
2. Identifier entry specified with the *Serial Number* attribute in the CI.
3. Identifier entry for the *Name* attribute. If *Serial Number* is not available, then the *Name* (which is the hostname) attribute is used. If both the *Serial Number* and the *Name*

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attributes are provided, then Identification and Reconciliation Engine (IRE) looks first for the Serial Number. Then, if a Serial Number is not found, IRE falls back to using Name.

4. Identifier entry specified for the *MAC Address*/*IP Address* attributes in the Network Adapter table. However, do not rely only on the *MAC Address*/*IP Address*.

   If both *Serial Number* and *Name* are not available, and only *MAC Address*/*IP Address* are available, use *MAC Address* as the name of the CI. Using the *MAC Address* as the name of the CI ensures that you don't create an empty CI.

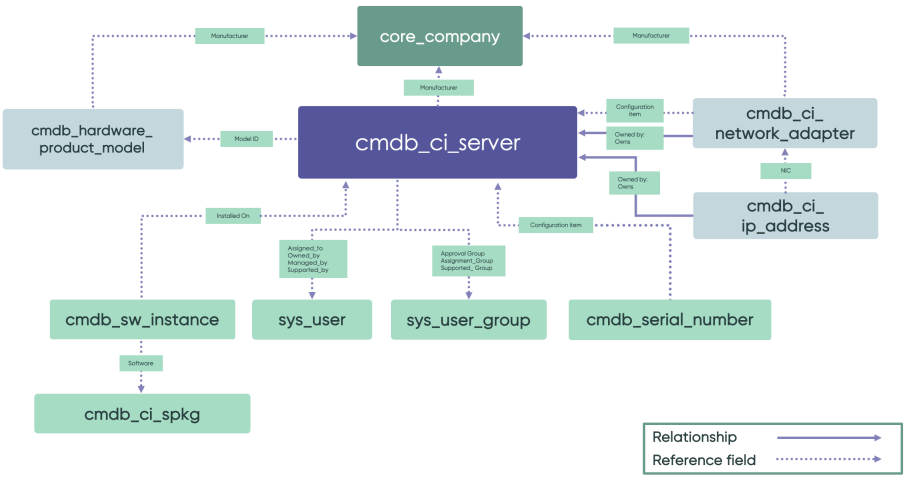
For more information, see CMDB Identification and Reconciliation.

Server [cmdb_ci_server] class

Attributes, identification rule, and other important schema structures for the CMDB Server [cmdb_ci_server] class.

For descriptions of common CMDB tables in a base system, see CMDB tables descriptions.

Hardware, Computer, Server Schema



Note:
cmdb_sw_instance noted in the diagram, is a reference to the cmdb_software_instance class, and Supported_Group is a reference to Support_Group.

Attributes

The Server class adds the following unique attributes:

Attribute	Description
Classification	Type of server, such as production, development, disaster recovery, or user acceptance testing (UAT).
Firewall status	Internet or intranet facing server.

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Attribute	Description
Host name	Use the Name attribute to store the host name of the server instead of the Host name attribute.
Used for	Business service supported by the server, such as production, staging, or quality assurance (QA). This attribute uses the *Used for* choice list field from the Service [cmdb_ci_service] table.

Reference attribute	Reference to
Disaster backup	Server [cmdb_ci_server] table. Reference to another server that is the backup server for this server.

Reference classes

The following reference classes extend the Server class. They do not add any new attributes.

Reference class	Name	Description
cmdb_ci_solaris_server	Solaris Server	Server running Oracle Solaris operating system.
cmdb_ci_lb_cisco_csm	Cisco CSM	Cisco Security Manager (CSM) load balancer.
cmdb_ci_win_server	Windows Server	Server running Microsoft Windows Server operating system.
cmdb_ci_lb_ace	ACE	Cisco Application Control Engine load balancer.
cmdb_ci_lb_netsclaer	Citrix Netscaler	Citrix Netscaler load balancer.
cmdb_ci_lb_alteon	Alteon	Alteon load balancer.
cmdb_ci_lb	Load Balancer	Generic load balancer.
cmdb_ci_lb_a10	A10 Load Balancer	A10 load balancer.
cmdb_ci_lb_cisco_css	Cisco CSS	Cisco Content Services Switch (CSS) load balancer.
cmdb_ci_lb_cisco_gss	Cisco GSS	Cisco Global Site Selector (GSS) load balancer.
cmdb_ci_osx_Server	OS/X Server	Server running OS/X operating system.
cmdb_ci_HPUX_Server	HPUX Server	Server running HP-UX operating system.
cmdb_ci_tape_server	Server Tape Unit	Server using a tape drive.
cmdb_ci_Server_Hardware	Server Hardware	Server hardware.
cmdb_ci_datapower_server	Data Power Hosting Server	IBM DataPower hosting server.

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Reference class	Name	Description
cmdb_ci_net_app_server	Network Appliance Hardware	NetApp hardware.
cmdb_ci_netware_server	Netware Server	Server running NetWare operating system.
cmdb_ci_ibm_zos_server	IBM zOS Server	Server running IBM z/OS operating system.
cmdb_ci_storage_node_element	Storage Node Element	Storage node.
cmdb_ci_chassis_server	Server Chassis	Server chassis.
cmdb_ci_lb_network	Network Load Balancer	Network load balancer hardware.
cmdb_ci_Unix_Server	Unix Server	Server running Unix operating system.
cmdb_ci_linux_server	Linux Server	Server running Linux operating system.
cmdb_ci_virtualization_server	Virtualization Server	Abstract base table used by Hyper-V Server [cmdb_ci_hyper_v_server] and ESX Server [cmdb_ci_esx_server].
cmdb_ci_mainframe	IBM Mainframe	Large-scale computer system with high-end capabilities.

Schema description

The CMDB schema model does not separate between servers and computers that are physical and servers and computer that are virtual. Instead, the Computer and the Server classes have a field named *IsVirtual*. If a computer or server is a virtual instance, set this *IsVirtual* attribute to **true**.

As described in the Virtual Machine schema section, to fully model a virtual machine, set the *IsVirtual* attribute in the Computer or Server CI to **true**. Create a Virtual Machine Instance [cmdb_ci_vm_instance] record using the *BIOS UUID* attribute as the key identifier. Then create a Hosted_On relationship between the Virtual Machine Instance record and the Computer or Server instance and set *IsVirtual* to **true**.

Key relationship structures

Use the following key relationships as important guidelines when creating Hardware, Computer, or Server CIs:

- Serial number: During CI identification, Identification and Reconciliation Engine (IRE) processes search for a serial number in two locations. One is the CI serial number attribute, and the second one is the Serial Number [cmdb_serial_number] table, with reference back to the Hardware [cmdb_ci_hardware] table.
  - Store any serial number of any type other than System, only in the Serial Number table (and not in the server CI attribute).
  - If the system serial number is available, store it in both the *Serial Number* attribute of the CI and in the Serial Number table.

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The Serial Number table is a many to one relationship linking back to the server CI. This table has a type field for specifying the type of the serial number (system, uuid, chassis, bios, or baseboard) and storing the actual value itself. Use the following Windows standards for serial number types in the Serial Number [cmdb_serial_number] table:

- *system*: Product identification such as a serial number for software, a die number on a hardware chip, or a project number (for noncommercial products).
- *uuid*: Universally unique identifier (UUID) for the product. A UUID is a 128-bit identifier that is guaranteed to be different from other generated UUIDs.
- *chassis*: Manufacturer-allocated number that is used to identify a physical element. Value is the Serial Number member of the System Enclosure or Chassis structure in the SMBIOS information. This type represents the properties associated with a physical system enclosure.
- *bios*: The assigned serial number of the BIOS. This type represents the attributes of the computer system basic input/output services (BIOS) that are installed on the computer.
- *baseboard*: Manufacturer-allocated number that is used to identify the physical element. This property is inherited from CIM_PhysicalElement, and is sometimes referred to as the 'Motherboard Serial Number'.

- Network adapter:
  - Use the Network Adapter [cmdb_ci_network_adapter] class to store network adapters.
  - Set the *Name* attribute in the Network Adapter class to be the name of the Network Adapter device (such as eth0, eth1).
  - Set the *MAC Address* attribute to be the MAC address value. Format the string with colon separators between octets and lower case hexadecimal characters with padded zeros.

    For example: 'f8:f2:1e:00:d4:66'
  - In the CI Relationship [cmdb_rel_ci] table, create an *Owned By::Owns* relationship to the associated Hardware CI. Specify a reference from the Network Adapter [cmdb_ci_network_adapter] table using the CI with a reference to the associated Hardware CI.

- IP address:
  - Use the IP Address [cmdb_ci_ip_address] class to store IP addresses.
  - Store an IP address value in the *IP Address* attribute, and in the *Name* attribute (to avoid empty *Name* attributes).
  - Store an IPv4 IP address value using the format 'NNN.NNN.NNN.NNN', with decimal-based octets and period separators. Non-conforming values should be considered invalid and cleansed to null values.
  - Store an IPv6 IP address value using lower case hexadecimal with colon separators. Non-confirming values should be considered invalid and cleansed to null values.
  - Set the *Netmask* attribute to the IP address.
  - In the CI Relationship [cmdb_rel_ci] table, create an **Owned By::Owns** relationship to the associated Hardware CI.

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- Specify for the IP address a reference to the Network Adapter [cmdb_ci_network_adapter] table using the Configuration Item with a reference to the associated Hardware CI.
- To ensure that base system identification rules work properly, also store the IP address in the associated Network Adapter class.

- Network adapter and IP address:
  - Store the MAC address of the network adapter installed on a server, in the Network Adapter [cmdb_ci_network_adapter] class.
  - Store the IP address in the IP Address [cmdb_ci_ip_address] class.
  - Do not store the MAC address or the IP address in the Server [cmdb_ci_server] class.

Key reference structures

Use the following key references as important guidelines when creating Hardware, Computer, or Server CIs:

- Software and processes running on a server: The Software [cmdb_ci_spkg] class contains the generic software package that is related to the server CI. The cmdb_software_instance table instantiates each instance of the software package with:
  - One to one reference back to the Server [cmdb_ci_server] class
  - Many to one reference back to the Software class
  These references are stored in the *Installed on* and the *Product Name* reference attributes respectively.

  If either the Software Asset Management Foundation [com.snc.sams] or the Software Asset Management [com.snc.software_asset_management] plugin is installed, then store software details in the Software Installation [cmdb_sam_sw_install] table instead of the cmdb_software_instance table.
- The *Manufacturer* and *Model ID* are reference attributes to the Company [core_company] and Product Model [cmdb_model] tables respectively.
- The *Owned By*, *Assigned To*, *Managed By*, and *Supported By* are reference attributes to the User [sys_user] table. The *Change Group* and *Support Group* are reference attributes to the Group [sys_user_group] table.

Identification rule

The base system contains pre-defined identification rules for the Hardware, Computer, and Server classes, which are identical. That identification rule has the following key identifier entries, listed in priority order:

1. Identifier entry which uses lookup-based identification specified with Serial Number [cmdb_serial_number] as the lookup table. The Serial Number table is a many to one reference from Serial Number back to the server CI.
2. Identifier entry specified with the *Serial Number* attribute in the CI.
3. Identifier entry for the *Name* attribute. If *Serial Number* is not available, then the *Name* (which is the hostname) attribute is used. If both the *Serial Number* and the *Name* attributes are provided, then Identification and Reconciliation Engine (IRE) looks first for the Serial Number. Then, if a Serial Number is not found, IRE falls back to using Name.

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4. Identifier entry specified for the *MAC Address*/*IP Address* attributes in the Network Adapter table. However, do not rely only on the *MAC Address*/*IP Address*.

   If both *Serial Number* and *Name* are not available, and only *MAC Address*/*IP Address* are available, use *MAC Address* as the name of the CI. Using the *MAC Address* as the name of the CI ensures that you don't create an empty CI.

For more information, see CMDB Identification and Reconciliation.

VMware vCenter Object [cmdb_ci_vcenter_object] class

Attributes, identification rule, and other important schema structures for Virtual Machine related classes.

For descriptions of common CMDB tables in a base system, see CMDB tables descriptions.

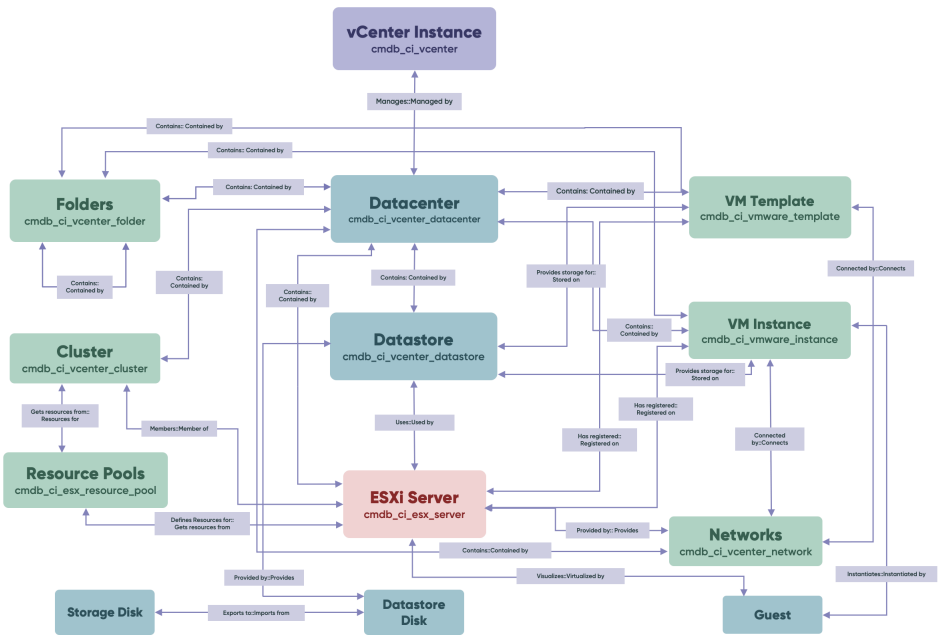
Schema description

ServiceNow® has an extensive modeling of virtual machines (VMs) environment, with classes such as:

- VMware vCenter Cluster [cmdb_ci_vcenter_cluster]
- VMware vCenter datacenter [cmdb_ci_vcenter_datacenter]
- VMware Virtual Machine Instance [cmdb_ci_vmware_instance]

Virtual machines are modeled just like any other server, but with the *IsVirtual* attribute set to **true**.

VMWare vCenter Instance schema structure



In the diagram above, the 'Discovered' virtual server is referred to as the 'Guest' (VM object). Follow the preceding diagram for any further modeling of VMWare components.

Key reference structures

The Guest has the following important key reference structures:

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- An Instantiates::InstantiatedBy relationship with the cmdb_ci_vmware_instance (which is the VM instance reported by Center).
- A Virtualizes::Virtualized by relationship with ESXi Server (the hardware with the ESXi virtualization software installed).
- Guest (Discovered, VMObject) also has a HasRegistered::RegisteredOn relationship to ESXi Server.

Identification rules

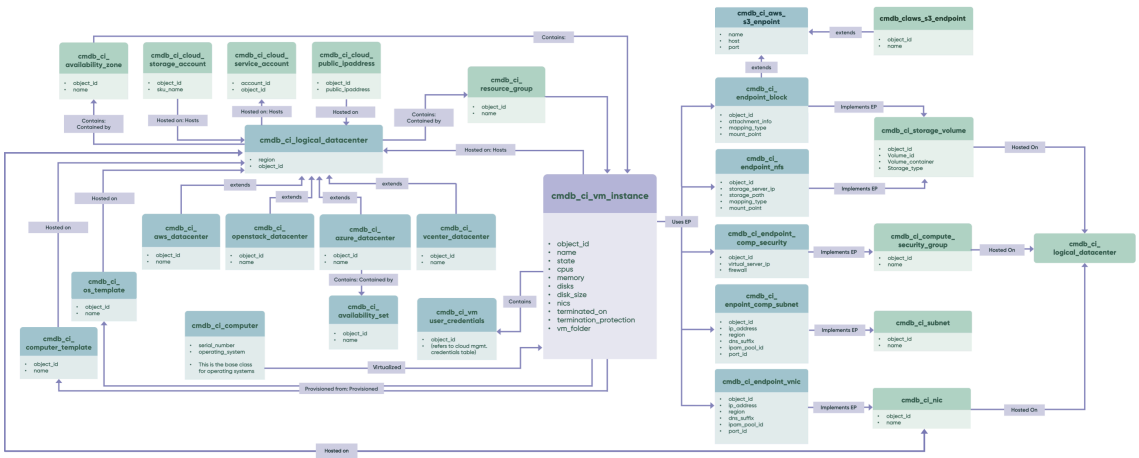
- Guest operating system: Guest operating system is modeled as Server (with *`IsVirtual`* set to **true**) and therefore identification rules follow the rules for the Server class. In most operating systems, BIOS UUID is reported as serial number. It is essential that you follow proper VMware guidelines to ensure that BIOS UUID is not being reused. Having a cloned BIOS UUID causes issues with identification rules.
- VM Instances: IRE uses instance MosRef ID as key identifier.
- ESX Server: Server is modeled as bare metal Server (with *`IsVirtual`* set to **false**) and therefore applies the Server class identification rules.

Cloud class

Description, identification rule, and other important schema structures for the CMDB cloud classes.

For descriptions of common CMDB tables in a base system, see CMDB tables descriptions.

AWS/Azure/OpenStack class model



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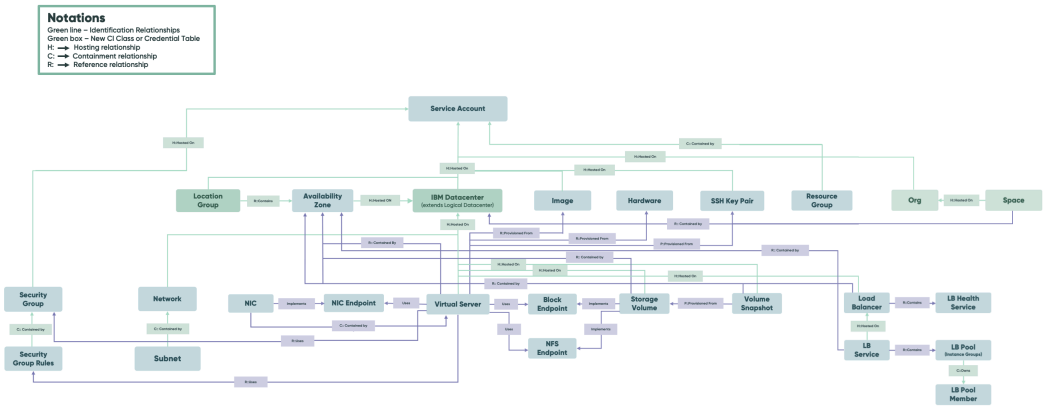
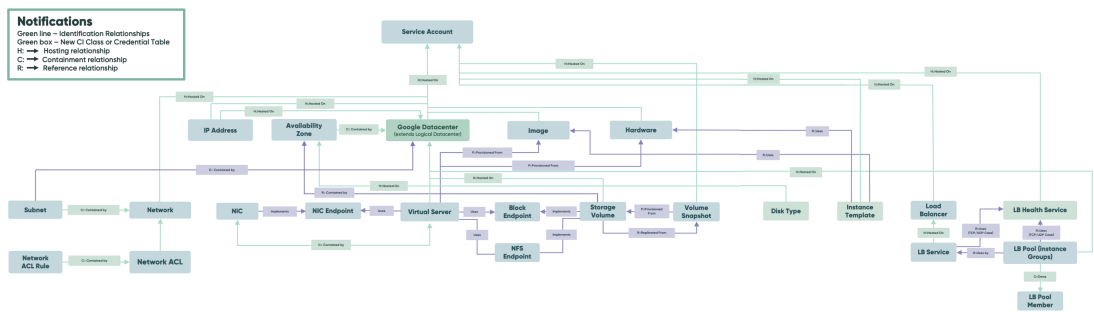
IBM Datacenter Cloud Schema model



Google Datacenter Schema Model



Cloud schema description

ServiceNow has extensive models of cloud environments including Amazon Web Services (AWS), Microsoft Azure service, Google Cloud Platform (GCP), and IBM Cloud. Focusing on the compute side, the models for cloud environments and for Virtual Servers are similar. For example, instances of Amazon Elastic Compute Cloud (EC2) and Microsoft® Azure Cloud Compute, are an extension of Virtual Machine instances, where CIs are typically created by connecting directly to cloud inventory. However, Virtual Machine instances do not represent actual usage of the cloud instance.

Cloud Service Account [cmdb_ci_cloud_service_account] is the main class for tracking cloud accounts such as AWS, GCP, and Azure (replacing for example, use of the cmdb_ci_aws_account table for AWS).

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For example, you can represent a Linux guest host running on Amazon EC2 by the Server [cmdb_ci_server] class, with the *IsVirtual* attribute set to **true** and with the relationship Runs on:Runs to the EC2 instance. Integrating the AWS Config Service or the Amazon CloudWatch application, provides information on the EC2 object ID. Running Discovery or another discovery program on the guest Linux host, provides the *hostname*.

Ensure the following:

- Getting the correct UUID which gets stored in the Serial Number [cmdb_serial_number] table.
- Connecting/creating the cloud instance to Host OS, matching on the UUID/Object ID and creating the Runs On:Runs relationship.

Also, there is a complete model of Storage, Networking, Lamda/Functions in addition to modeling of different regions using the concept of the table Logical Datacenter [cmdb_ci_logical_datacenter] with Hosts:HostedOn relationship with Compute, Storage, and such.

Identification rule

The base system contains pre-defined identification rules for cloud schema classes. A cloud object requires the following identification items:

- Object ID: Which is synonymous with the IDs that cloud vendors use for each type of cloud resource, such as Azure Compute, EC2, and Amazon Simple Storage Service (S3).

- Object ID is unique per region and therefore has dependent relationship requiring information from the Logical Datacenter [cmdb_ci_logical_data_center] table, about the region where the cloud resource is being hosted. For example, AWS Datacenter [cmdb_ci_aws_datacenter], Azure Datacenter [cmdb_ci_azure_datacenter], Google Datacenter [cmdb_ci_google_datacenter] that are extended from Logical Datacenter.

  Logical Datacenter itself, has two identifier entries:

  - Object ID: Unique ID of the logical datacenter where applicable
  - Region: The region of the cloud resource

- Logical Datacenter has a dependency on cloud service accounts, which has two identifier entries:

  - Object ID: Unique ID of the account where applicable.
  - Account ID: The unique Account ID that encompasses the different cloud resources. Account ID is generally more applicable than Object ID.

For more information, see CMDB Identification and Reconciliation.

CMDB CI Class Models store app

The Configuration Management Database (CMDB) contains out-of-the-box classes that store data about Configuration Items (CIs). The CMDB CI Class Models store app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable.

You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping can use these class extensions to populate CIs and discover various technologies and software.

Related ServiceNow® Store apps and reference information:

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- CMDB schema model: A collection of class diagrams and class attributes for key CMDB classes.
- CMDB tables descriptions: Descriptions of key CMDB tables in the base system.
- Populating the CMDB: Information about the various options for populating the CMDB.
- Discovery patterns: A ServiceNow Store app that provides a library of Discovery patterns for discovering specific devices and applications in the industry.
- Service Graph Connectors: ServiceNow Store apps that provide pre-defined integrations for importing and integrating common third-party data into CMDB classes. Also includes the IntegrationHub ETL wizard for creating new ETL transform maps.

Add class models

The app adds classes, columns, and the associated metadata as related records in the following tables:

- CMDB Class Information [cmdb_class_info]: Class descriptions
- Identifier [cmdb_identifier]: Identification rules
- Identifier Entry [cmdb_identifier_entry]: Identification entries
- CMDB Metadata Hosting Rules [cmdb_metadata_hosting]: Dependent relationships

Discover using extension classes

The table lists the software and technologies that applications can discover using the extension classes. It provides links to documentation for CMDB CI Class Models and the corresponding discovery patterns.

Software/Technology	CMDB CI Class Models Store app	ServiceNow Store discovery patterns
Avi load balancer	Avi load balancer extension classes	Avi Vantage load balancer discovery
BYOL Model of RDS for Oracle	BYOL model of RDS for Oracle extension classes	
Firewall	Firewall extension classes	
IBM Hardware Management Console (HMC)	IBM Hardware Management Console (HMC) extension classes	IBM Virtualization and Hardware Management Console discovery
Internet of Things (IoT)	Internet of Things (IoT) extension classes	N/A
Nutanix	Nutanix extension classes	Nutanix Acropolis discovery
OpenStack	OpenStack extension classes	OpenStack resource discovery
Red Hat Virtualization (RHV)	Red Hat Virtualization (RHV) extension classes	Red Hat Virtualization discovery
Transport Layer Security (TLS)	Transport Layer Security (TLS) extension classes	Discovery procedures provided by Certificate Inventory and Management ServiceNow Store app

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Software/Technology	CMDB CI Class Models Store app	ServiceNow Store discovery patterns
VMware NSX load balancer	VMware NSX load balancer extension classes	VMware NSX Advanced load balancer discovery

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Verify successful installation

After installing the CMDB CI Class Models store app, make sure the classes were added successfully:

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to display the CI Classes list.

   This list contains the added classes, such as the Nutanix classes.
3. Select a class to see the corresponding class details, identification rules, identifier entries, and dependent relationships, if applicable.

Note:
Uninstalling the CMDB CI Class Models application might compromise the integrity of the CMDB and result in unexpected behavior.

API extension classes

The CMDB CI Class Models ServiceNow Store app adds or updates classes for APIs (application programming interface).

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

APIs

APIs are a set of definitions and protocols that enable computer programs to communicate with each other, which enables you to build or integrate application software. APIs typically use web-based technology to communicate with other APIs. APIs are generally used to programmatically perform jobs or tasks, or to view, import, export, delete, or modify data.

The classes added in this release extend the CMDB data model and provide a foundation for the representation of API CI classes. You can use this foundation to do the following:

- Gain greater visibility into your APIs.
- Identify security issues and vulnerabilities associated with an API endpoint.

Classes

For additional detail, see the Community article titled "New Data Model in CMDB for APIs".

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CMDB CI Class Models: The following classes for API are available.

Class	Extends	Description
API [cmdb_ci_api]	Configuration Item [cmdb_ci]	APIs that enable two computer programs to communicate with each other, typically using web-based technologies. Example: ChatAPI (https://[apiID].execute-api.use-east-2.amazonaws.com).
API Component [cmdb_ci_api_component]	Configuration Item [cmdb_ci]	Reusable objects related to your API definition that facilitate functionality or exchange of data. API Headers related list. Example: GET https://[instance].service-now.com/api/now/table/{tablename}.
API Frontend [cmdb_ci_api_frontend]	API Component [cmdb_ci_api_component]	The part of an API from which a client or user interacts or makes requests. Example: GET https://[apiID].execute-api.us-east-2.amazonaws.com/{proxy+}.
API Backend [cmdb_ci_api_backend]	API Component [cmdb_ci_api_component]	The part of an API that fulfills requests by interacting with backend services, such as servers. Example: Lambda:Chat-API-Proxy.
API Gateway [cmdb_ci_api_gateway]	Application [cmdb_ci_appl]	API infrastructure that centralizes client API requests and manages backend processes and services. Example: Kong Gateway.
Managed API [cmdb_ci_managed_api]	Configuration Item [cmdb_ci_api]	API discovered from a gateway or management service. You can enforce a dependency on a gateway for APIs in this class.

Class attributes

CMDB CI Class Models: Release 1.49.0 adds the following attributes to the respective classes.

API [cmdb_ci_api]

Attribute	Data type	Description
Base URL	String (1024)	Base address from which all API components extend.

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API [cmdb_ci_api] (continued)

Attribute	Data type	Description
ID	String (1024)	Unique identifier from the source system.
Type	Choice list	Type of API. You can specify: • REST • SOAP • HTTP • gRPC • GraphQL • Websocket
Version	Numeric	Version of the API.
Spec Location	URL	URL to the location of the API specification. Example: OpenAPI spec definition.
Technical Specification Location	String	Location of the technical specification repository for an API. Example: GitHub repository containing the deployed API code.
Design Specification Location	String	URL to the location of the API design or documentation. Example: SwaggerHub API Design Specification URL.

The API [cmdb_ci_api] class supports mapping of tags and labels to the Key Value [cmdb_key_value] table to enable key-value storage for API metadata.

API Component [cmdb_ci_api_component]

Attribute	Data type	Description
Method	String	REST API methods. Examples: • GET • POST • DELETE
Protocol	String	Communication protocol. Example: HTTP, HTTPS.
Host	String (100)	System that hosts the API.
Path	String (1024)	Specific route the API follows.
Port	String	Communication port. Example: 80, 443, and so on.

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API Component [cmdb_ci_api_component] (continued)

Attribute	Data type	Description
URL	String (1024)	URL of the resource being called.
ID	String (1024)	Unique identifier from the source system.
Internet Facing	Boolean	Boolean that denotes whether the component is reachable from the public internet. Specify 1 or "true" if the component is reachable.
Authorization	String	Type of authorization or authentication method. Example: • Basic • Key • OAuth • None
Request data types	String (255)	List of data types in the request. Examples: • CC • Email • Address
Response data types	String (255)	List of data types in the response. Examples: • CC • Email • Address

The API Component [cmdb_ci_api_component] class supports mapping of tags and labels to the Key Value [cmdb_key_value] table to enable key-value storage for API component metadata.

API Frontend [cmdb_ci_api_frontend]

Attribute	Data type	Description
Parent ID	Reference to [cmdb_ci_api_frontend]	Reference to a parent API component.

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API Backend [cmdb_ci_api_backend]

Attribute	Data type	Description
Type	String	Backend protocol types of the API. Examples: • Lambda • HTTP • Logic App

API Gateway [cmdb_ci_api_gateway]

Attribute	Data type	Description
ID	String (255)	Unique identifier from the source system.

The API Gateway [cmdb_ci_api_gateway] class supports mapping of tags and labels to the Key Value [cmdb_key_value] table. The mapping enables key-value storage for API gateway metadata.

The following marker classes are available for API gateways. These classes inherit all attributes from the API Gateway [cmdb_ci_api_gateway] parent class.

- Anypoint API Gateway [cmdb_ci_api_gateway_anypoint] (provided by MuleSoft)
- Tyk API Gateway [cmdb_ci_api_gateway_tyk]
- Boomi API Gateway [cmdb_ci_api_gateway_boomi]

The marker classes follow the existing class structure and do not require changes to Identification and Reconciliation engine (IRE) rules.

Note:
The Managed API [cmdb_ci_managed_api] class is specific to APIs discovered from gateways and other managed services, and does not introduce new attributes.

API Product Bundle [cmdb_ci_api_product_bundle]

Attribute	Data type	Description
ID	String (255)	Unique identifier of the API product bundle.
Discovered Approval Type	String	Type of request approval as discovered from the source system.
Discovered Access Type	String	Access configuration as discovered from the source system. For example, public or internal.
Creation Date	Date/Time	Date and time when the API product bundle was initially discovered or recorded.

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API Product Bundle [cmdb_ci_api_product_bundle] (continued)

Attribute	Data type	Description
Last Modified Date	Date/Time	Date and time of the most recent update to the API product bundle.
Discovered State	String	Current state of the product bundle as reported by the source. For example, published or deprecated.

API Consumer Subscription [cmdb_ci_api_consumer_subscription]

Attribute	Data type	Description
Discovered Scope	String	Scope of access as discovered from the source system. For example, all APIs or specific APIs.
API Consumer	Reference	Reference to the API consumer record. For example, cmdb_ci_api_consumer.
ID	String (255)	Unique identifier of the API consumer subscription.
Discovered State	String	Subscription status as discovered from the source system. For example, active or inactive.
Creation Date	Date/Time	Date and time when the API consumer subscription was created in the source system.
Last Modified Date	Date/Time	Date and time of the most recent update to the API consumer subscription.

Key relationship structures

There are a number of key relationships that must be defined for API and Kong classes.

API relationships

Parent class	Relationship	Child class	Relationship type
API [cmdb_ci_api]	Uses::Used by	API Component [cmdb_ci_api_component]	Suggested
API Gateway [cmdb_ci_api_gateway]	Provides::Provided By	Managed API [cmdb_ci_managed_api]	Dependent

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API relationships (continued)

Parent class	Relationship	Child class	Relationship type
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]	Suggested
API Backend [cmdb_ci_api_backend]	Uses::Used By	Kong Load Balancer [cmdb_ci_kong_lb]	Suggested
API Gateway [cmdb_ci_api_gateway]	Provides::Provided By	API Product Bundle [cmdb_ci_api_product_bundle]	Dependent
API Gateway [cmdb_ci_api_gateway]	Provides::Provided By	API Consumer Subscription [cmdb_ci_api_consumer_subscription]	Dependent
API Product Bundle	Contains::Contained by	API [cmdb_ci_api]	Suggested
API Product Bundle	Used by::Uses	API Consumer Subscription [cmdb_ci_api_consumer_subscription]	Suggested

Related non-CMDB tables

CMDB CI Class Models v 1.49.0 introduces the following non-CMDB tables as related lists for the following API extension classes:

API related list

API Deployment [api_deployment]

Attribute	Data type	Description
Name	String (100)	Name of the API deployment.
API	Reference	Reference to the deployed API (cmdb_ci_api).
Unmatched API Endpoint	Reference	Reference to the unmatched API endpoint, if the API doesn't match an existing API (cmdb_ci_unmatched_api_endpoint).
Configuration Item	Reference	Reference to the Configuration Item. This is typically manually specified as a reference, if

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API Deployment [api_deployment] (continued)

Attribute	Data type	Description
		you know what CI the API is deployed to.

Note:
The API Deployment non-CMDB table relates to both the API [cmdb_ci_api] and Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint] classes.

API Component related list

API Header [api_header]

Attribute	Data type	Description
Name	String (100)	Name of the API header.
API Component	Reference	Reference to the component where the API header is defined (cmdb_ci_api_component).
Unmatched API Endpoint	Reference	Reference to the unmatched API when the endpoint can't be matched to an existing API or component (cmdb_ci_unmatched_endpoint).

API Gateway related lists

API Consumer [api_consumer]

Attribute	Data type	Description
Username	String (100)	Name of the API consumer. **Note:** The **Consumer** field in the api_policy table is a reference field. To display the username in the **Username** field on the API Policies list, you must set the *`display`* attribute of **Username** to `true`. If the attribute is not set to `true`, then the list displays the Sys ID instead.

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API Consumer [api_consumer] (continued)

Attribute	Data type	Description
ID	String (255)	Unique identifier from the source system.
Custom ID	String (100)	Alternate display name of the user.
API Gateway	Reference	Reference to the gateway where the consumer is defined (cmdb_ci_api_gateway).
API Consumer Type	Choice list	API user type (user_type). You can specify: • Internal • External • Unknown
Discovered State	String	Represents the current status of the API consumer's account.
Provider	String	Name of the identity management provider responsible for authenticating the API consumer.
Email	String	Email address of the API consumer.
Registration Date	Date/Time	Date the consumer registered with the providing platform.

API Consumer Access [api_consumer_access]

Attribute	Data type	Description
API Consumer	Reference	Reference to the API consumer record. For example, cmdb_ci_api_consumer.
API	Reference	Reference to the API [cmdb_ci_api] to which the consumer is requesting access.
Auth Method	String	Authentication method used by the API consumer to access the API. For example, API key or OAuth.

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API Consumer Access [api_consumer_access] (continued)

Attribute	Data type	Description
State	Choice	Indicates whether the access is currently active or inactive.
Last used	Date/Time	Last date and time the API consumer accessed the API.
Valid to	Date/Time	Expiration date of the consumer's access to the API.

API Policy [api_policy]

Attribute	Data type	Description
Name	String (100)	Name of the API policy.
ID	String (255)	Unique identifier from the source system.
Frontend	Reference	Reference to the API Frontend (cmdb_ci_api_frontend).
Managed API	Reference	Reference to the Managed API (cmdb_ci_managed_api).
Consumer	Reference	Reference to the API Consumer (api_consumer) non-CMDB table. **Note:** **Consumer** is a reference field. To display the api_consumer (Username) in the API Policies list, you must set the *display* attribute to `true` for **Username** field on the api_consumer table. If the attribute is not set to `true`, then the list displays the Sys ID instead.
Protocols	String	Array of protocols that this API policy can apply to.

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API Policy [api_policy] (continued)

Attribute	Data type	Description
Active	Boolean	Determines if this non-CMDB table is considered active or inactive.
API Gateway	Reference	Reference to the gateway where the consumer is defined (cmdb_ci_api_gateway).

Unmatched API extension classes

The CMDB CI Class Models store app adds or updates classes for unmatched APIs (application programming interface).

The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships (if applicable). You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping Patterns can use these class extensions to populate CIs and discover various technologies and software.

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Unmatched APIs

API endpoints that are not structured well enough to populate the API [cmdb_ci_api] and API Component [cmdb_ci_api_component] classes instead populate the Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint] class. Unmatched APIs are typically used by integrations like security scanners or observability tools.

Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates.

CMDB CI Class Models: Release 1.49.0 adds the following class for unmatched API endpoints. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint]	Configuration Item [cmdb_ci]	APIs with unstructured endpoints that cannot populate cmdb_ci_api or cmdb_ci_api_component.

Class attributes

CMDB CI Class Models: Release 1.49.0 adds the following attributes to the Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint] class.

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Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint]

Attribute	Data type	Description
Method	String	Backend protocol types of the API. Examples: • Lambda • HTTP • Logic App
Protocol	String	Communication protocol. Example: HTTP, HTTPS.
URL	String (1024)	URL of the resource being called.
ID	String (1024)	Unique identifier from the source system.
Internet Facing	Boolean	Boolean that denotes whether the component is reachable from the public internet. Specify 1 or "true" if the component is reachable.
Authorization	String	Type of authorization or authentication method. Example: • Basic • Key • Oauth • None
Request data types	String (255)	List of data types in the request. Examples: • CC • Email • Address
Response data types	String (255)	List of data types in the response. Examples: • CC • Email • Address

Key Relationship Structures

The Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint] CMDB class and API Endpoint Discovered [api_endpoint_discovered] non-CMDB table are intended for scenarios

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where unstructured API data is ingested and needs to be processed beyond the capabilities of IntegrationHub-ETL.

API Endpoint Discovered [api_endpoint_discovered] can serve as a staging table for raw data for the API [cmdb_ci_api] and API Component [cmdb_ci_api_component] classes. API data that does not come from a well-structured data source or cannot have standard identification rules applied can first populate the API Endpoint Discovered [api_endpoint_discovered] table. You can then use a customer-defined integration to ensure that well-formed data that matches the quality and condition requirements for API [cmdb_ci_api] and API Component [cmdb_ci_api_component] populates the most appropriate table.

In cases where the data cannot be correctly parsed or is structured in an unexpected fashion, you can instead use a customer-defined integration to populate the Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint] table.

Data that populates the API Endpoint Discovered [api_endpoint_discovered] table is purged every 30 days.

API Endpoint Discovered [api_endpoint_discovered]

Attribute	Data type	Description
Name	String (100)	Name of the API endpoint.
Method	String	REST API methods. Examples: • GET • POST • DELETE
URL	String (1024)	URL of the resource being called.
Type	Choice list	Type of API. You can specify: • REST • SOAP • HTTP • gRPC • GraphQL • Websocket
Authorization	String	Type of authorization or authentication method. Example: • Basic • Key • OAuth • None
Internet Facing	Boolean	Boolean that denotes whether the component is reachable from the public internet.

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API Endpoint Discovered [api_endpoint_discovered] (continued)

Attribute	Data type	Description
		Specify 1 or "true" if the component is reachable.
Request Datatypes	String (255)	List of data types in the request. Examples: • CC • Email • Address
Response Datatypes	String (255)	List of data types in the response. Examples: • CC • Email • Address
Headers	String (255)	Comma-separated list of header names.
Configuration Item	Reference	Reference to a matching CMDB CI (API Component or Unmatched API Endpoint).

Related non-CMDB tables

The Unmatched API extension class uses the API Deployment [api_deployment] non-CMDB table as a related list:

API Deployment [api_deployment]

Attribute	Data type	Description
Name	String (100)	Name of the API deployment.
API	Reference	Reference to the deployed API (cmdb_ci_api).
Unmatched API Endpoint	Reference	Reference to the unmatched API endpoint, if the API doesn't match an existing API (cmdb_ci_unmatched_api_endpoint).
Configuration Item	Reference	Reference to the Configuration Item. This is typically manually specified as a reference, if you know what CI the API is deployed to.

Avi load balancer extension classes

The CMDB CI Class Models store app adds or updates classes for the Avi load balancer.

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The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

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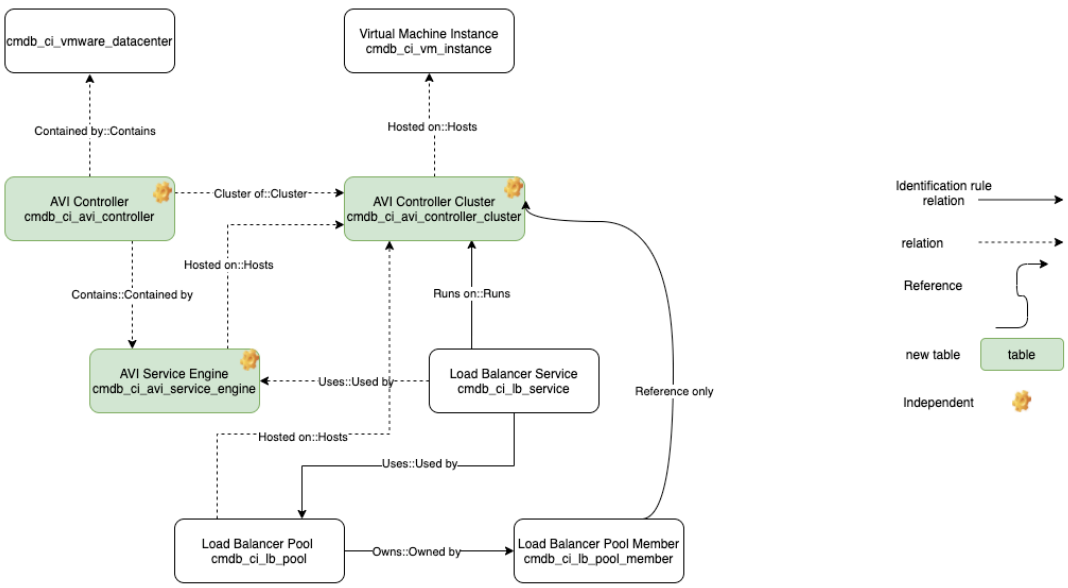
Avi load balancer

The Avi Vantage platform is built on software-defined principles, enabling a next generation architecture to deliver the flexibility and simplicity expected by IT and lines of business. The Avi Vantage platform architecture separates the data and control planes to deliver application services beyond load balancing, such as application analytics, predictive autoscaling, micro-segmentation, and self-service, for app owners in on-premises or cloud environments. The platform provides a centrally managed, dynamic pool of load balancing resources on commodity x86 servers, virtual machines, or containers, to deliver granular services close to individual applications. Providing these services allows network services to scale near infinitely without the added complexity of managing hundreds of disparate appliances.

Discovery uses the Avi Vantage load balancer discovery pattern to find Avi load balancer resources.

Avi load balancer classes integrated with the CMDB class hierarchy



Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates. CMDB CI Class Models: Release 1.6.0 adds the following classes for the Avi load balancer. For the list of classes in a base system, including classes that this store app might be extending, see CMDB tables descriptions.

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Class	Extends	Description
Avi Controller [cmdb_ci_avi_controller]	Virtual Machine Object [cmdb_ci_vm_object]	Avi Controller is a single point of management and control that is the 'brain' of the entire Avi Vantage system, and typically deployed as a redundant three-node cluster.
Avi Controller Cluster [cmdb_ci_avi_controller_cluster]	Virtual Machine Object [cmdb_ci_vm_object]	Avi Controller cluster uses big data analytics to analyze the data and present actionable insights to administrators on intuitive dashboards on the Avi Admin Console.
Avi Service Engine [cmdb_ci_avi_service_engine]	Virtual Machine Object [cmdb_ci_vm_object]	Avi Service Engines (SEs) handle all data plane operations within Avi Vantage by receiving and executing instructions from the Avi Controller.

Class columns

CMDB CI Class Models: Release 1.6.0 adds the following column to the respective class.

Avi Service Engine [cmdb_ci_avi_service_engine]

Added column	Description
version	The version of the Avi Service Engine resource.

Related topics

CMDB schema model

BYOL model of RDS for Oracle extension classes

The CMDB CI Class Models store app adds or updates classes for the BYOL Model of RDS for Oracle.

The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

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BYOL Model of RDS for Oracle

The Amazon RDS for Oracle is a fully managed commercial database that makes it easy to set up, operate, and scale Oracle deployments in the cloud. You can run Amazon RDS for Oracle under two different licensing models – "License Included" and "Bring-Your-Own-License (BYOL)". In the "License Included" service model, you do not need separately purchased Oracle licenses; the Oracle Database software has been licensed by AWS.

We support discovery of the RDS Databases and their licenses.

Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates. CMDB CI Class Models: Release 1.23.0 adds the following classes for the BYOL Model of RDS for Oracle. For the list of classes in a base system, including classes that this store app might be extending, see CMDB tables descriptions.

Class	Description
cmdb_ci_cloud_database	The cloud databases.
cmdb_ci_serverless_hardware	Hardware type information of the databases.

Class Columns

CMDB CI Class Models: Release 1.23.0 adds the following column to the respective class.

Serverless Hardware [cmdb_ci_serverless_hardware]

Added column	Description
cloud_vendor	The cloud vendor.
host_type	The host type such as PaaS/IaaS.
cpu_core_count	Amount of CPU cores.
cpu_core_thread	Amount of CPU threads.
cpu_count	Amount of CPUs.
object_id	ID of the CI.

Cloud Database [cmdb_ci_cloud_database]

Added column	Description
multi_az	Determines if the database is deployed on multiple availability zones (true/false).
replication_enabled	Determines if replication is enabled (true/false).
replication_type	Replication type.
replica_source	Database name of the replication source.

Firewall extension classes

The CMDB CI Class Models store app adds or updates classes for firewall devices.

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The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships (if applicable). You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

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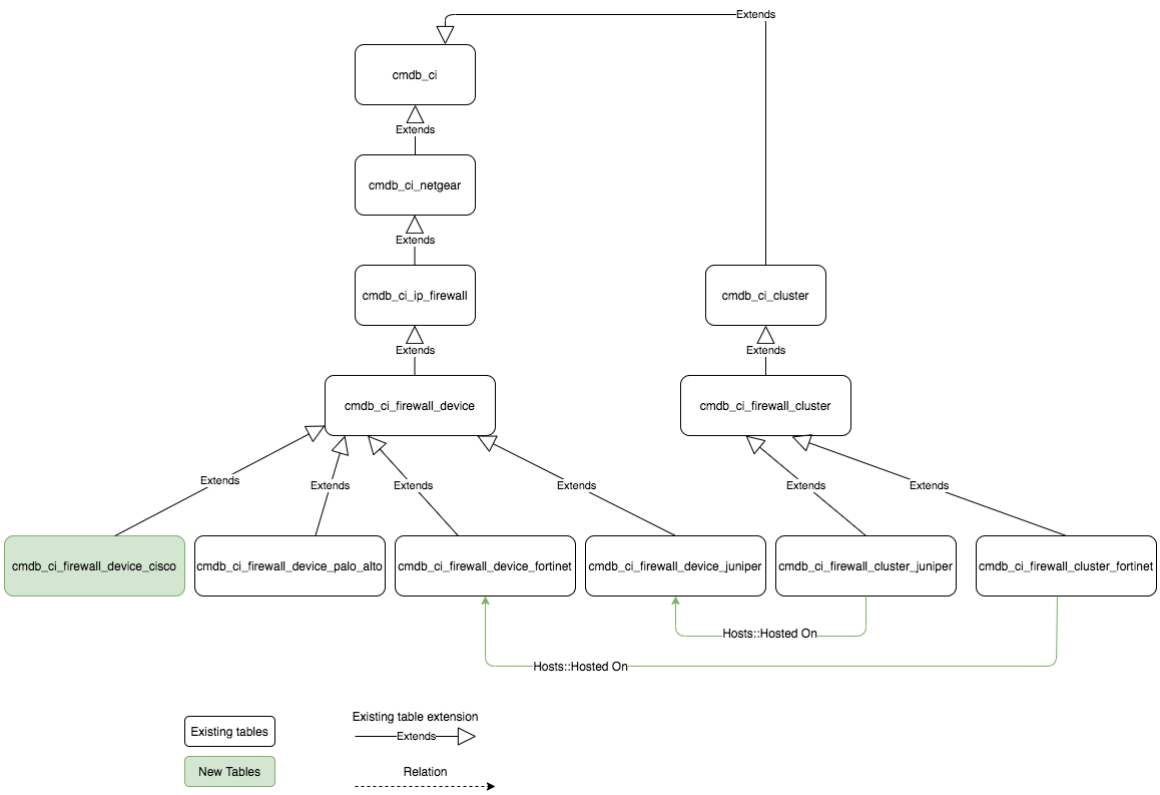
Firewalls

A firewall is a network security system that monitors and controls incoming and outgoing network traffic, based on security policies. Firewalls typically form a barrier between an internal network and an untrusted external network, such as the internet. It usually consists of security policies that help secure an organization from external threats and cyber attacks. Firewall vendors may provide a centralized firewall manager to manage many firewall devices and the security policies residing on them. For example, Panorama™ is the centralized management system for Palo Alto Networks firewalls.

Firewall extension classes integrated with the CMDB class hierarchy (CMDB CI Class Models: Release 1.11.0)



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Firewall extension classes integrated with the CMDB class hierarchy (CMDB CI Class Models: Release 1.10.0)



Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates.

CMDB CI Class Models: Release 1.10.0 adds or updates the following classes for the discovery of network firewall devices. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
IP Firewall [cmdb_ci_ip_firewall]	NETGEAR [cmdb_ci_netgear]	Contains all network firewalls.
Firewall Device [cmdb_ci_firewall_device]	IP Firewall [cmdb_ci_ip_firewall]	Network security system that monitors and controls incoming and outgoing network traffic, based on security policies.

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Class	Extends	Description
Fortinet Firewall Device [cmdb_ci_firewall_device_fortinet]	Firewall Device [cmdb_ci_firewall_device]	Fortinet firewall device.
Juniper Firewall Device [cmdb_ci_firewall_device_juniper]	Firewall Device [cmdb_ci_firewall_device]	Juniper firewall device.
Firewall Device Group [cmdb_ci_firewall_device_group]	CMDB CI [cmdb_ci]	Group of firewall devices.
Panorama Firewall Device Group [cmdb_ci_firewall_device_group_panorama]	Firewall Device Group [cmdb_ci_firewall_device_group]	Group of Panorama firewall devices.
Palo Alto Firewall Device [cmdb_ci_firewall_device_palo_alto]	Firewall Device [cmdb_ci_firewall_device]	Palo Alto firewall device.
Firewall Cluster [cmdb_ci_firewall_cluster]	[cmdb_ci_cluster]	Group of firewall nodes that work as a single logical entity.
Fortinet Firewall Cluster [cmdb_ci_firewall_cluster_fortinet]	Firewall Cluster [cmdb_ci_firewall_cluster]	Fortinet firewall cluster.
Juniper Firewall Cluster [cmdb_ci_firewall_cluster_juniper]	Firewall Cluster [cmdb_ci_firewall_cluster]	Juniper firewall cluster.
Firewall Manager [cmdb_ci_firewall_manager]	CMDB CI [cmdb_ci]	System that provides centralized management for many firewall devices and the security policies residing on them.
Panorama Firewall Manager [cmdb_ci_firewall_manager_panorama]	Firewall Manager [cmdb_ci_firewall_manager]	The centralized network security management tool for Palo Alto Networks firewalls.
Firewall Security Policy [cmdb_ci_firewall_sec_policy]	CMDB CI [cmdb_ci]	The security policy that the firewall device enforces.
Panorama Firewall Security Policy [cmdb_ci_firewall_sec_policy_panorama]	Firewall Security Policy [cmdb_ci_firewall_sec_policy]	The security policy that the Panorama firewall device enforces.

CMDB CI Class Models: Release 1.12.0 adds the following class for the discovery of network firewall devices.

Class	Extends	Description
Cisco Firewall Device [cmdb_ci_firewall_device_cisco]	Firewall Device [cmdb_ci_firewall_device]	All Cisco Firewall devices.

Class columns

CMDB CI Class Models: Release 1.10.0 adds the following columns to the respective classes.

IP Firewall [cmdb_ci_ip_firewall] class

Added columns	Description
Hardware Operating System	OS running on the hardware.

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IP Firewall [cmdb_ci_ip_firewall] class (continued)

Added columns	Description
Hardware OS Version	OS version running on the hardware.

Firewall Cluster [cmdb_ci_firewall_cluster] class

Added columns	Description
Hardware Operating System	OS running on the hardware.
Hardware OS Version	OS version running on the hardware.

CMDB CI Class Models: Release 1.12.0 adds no columns to the existing classes.

Related topics

CMDB schema model

IBM Hardware Management Console (HMC) extension classes

The CMDB CI Class Models store app adds or updates classes for the IBM Hardware Management Console (HMC).

The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

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IBM Hardware Management Console (HMC)

The IBM HMC extension classes support discovery of IBM virtualization technology by providing:

- Discovery of LPARs/FRAMEs, which SAM use cases need
- Topology data of IBM HMC, which event correlation requires
- Topology data for ITSM use cases, such as in-frame migration

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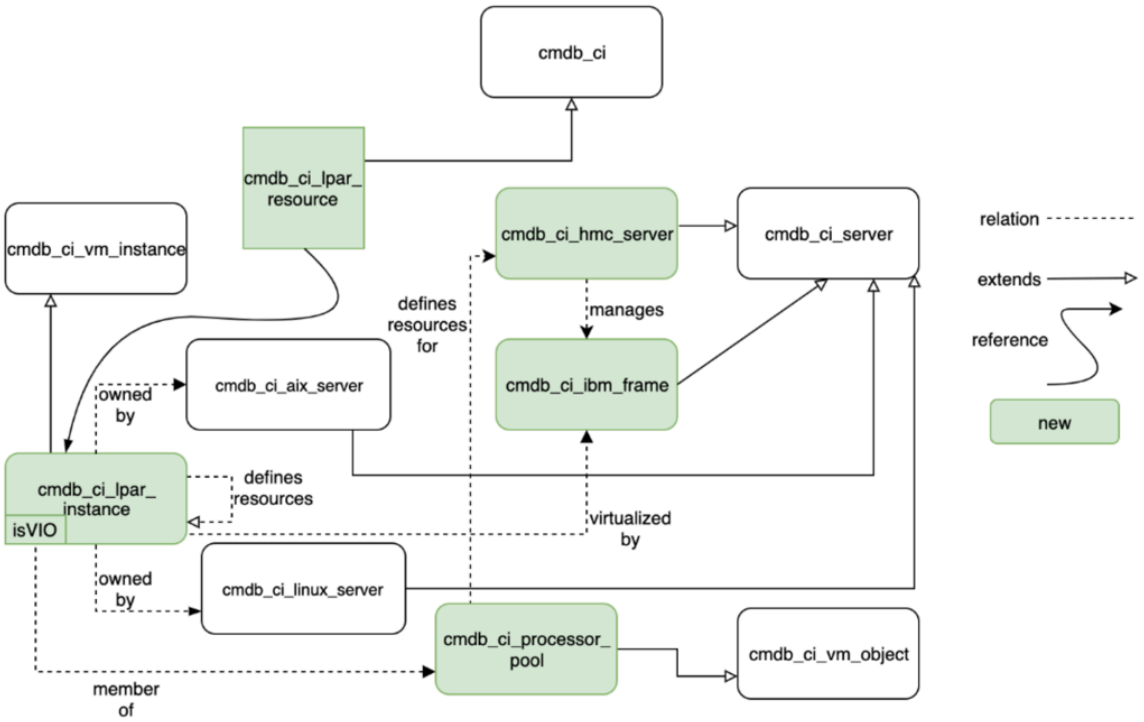
IBM HMC extension classes integrated with the CMDB class hierarchy



Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates. See the class columns table for further details about the columns added for each class.

CMDB CI Class Models: Release 1.3.0 adds the following classes for the IBM HMC. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
IBM Frame [cmdb_ci_ibm_frame]	Server [cmdb_ci_server]	IBM physical machine with considerable resources which can be virtualized.
IBM HMC Processor pool [cmdb_ci_processor_pool]	Virtual Machine Object [cmdb_ci_vm_object]	IBM shared pool used to allocate processors to a group of LPARs.

CMDB CI Class Models: Release 1.2.0 adds the following classes for the IBM HMC.

Class	Extends	Description
IBM HMC Server [cmdb_ci_hmc_server]	Server [cmdb_ci_server]	IBM console that manages frames and assigns logical partitions (LPARs) to pools.
IBM Frame [cmdb_ci_ibm_frame]	Server [cmdb_ci_server	IBM physical machine with considerable resources which can be virtualized.

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Class	Extends	Description
IBM LPAR Instance [cmdb_ci_lpar_instance]	Virtual Machine Instance [cmdb_ci_vm_instance]	IBM logical partition representing the virtual aspect of the operating system.
LPAR Resource [cmdb_ci_lpar_resource]	Configuration Item [cmdb_ci]	Resource of an LPAR instance.
IBM HMC Processor pool [cmdb_ci_processor_pool]	Virtual Machine Object [cmdb_ci_vm_object]	IBM shared pool used to allocate processors to a group of LPARs.

Class columns

CMDB CI Class Models: Release 1.3.0 adds the following columns to the respective classes.

IBM Frame [cmdb_ci_ibm_frame] class

Added columns	Description
Current available processor units	Current available processor units.
Configurable processor units	Configurable processor units.
Configurable memory units	Configurable memory units.
Installed processor units	Installed processor units.
Current available memory units	Current available memory units.
Installed memory units	Installed memory units.

IBM HMC Processor pool [cmdb_ci_processor_pool] class

Added columns	Description
LPAR IDs	LPAR IDs.
LPAR names	LPAR names.
Frame name	Frame name.

CMDB CI Class Models: Release 1.2.0 adds the following columns to the respective classes.

IBM HMC Server [cmdb_ci_hmc_server] class

Added columns	Description
Frame count	Count of frames.

Added columns	Description
Is VIO	Flags whether this VM is a (VIO) virtual input/output server in the HMC topology.
High Watermark VCPU	Peak in the utilization of virtual CPU assigned to during the reporting period.

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Added columns	Description
Frame Serial Number	Serial number of a frame (frame being a physical machine such as ESX).
VIO Servers	List of VIO servers.

LPAR Resource [cmdb_ci_lpar_resource] class

Added columns	Description
Node name	Name of the node.
Partition Name	Name of the partition.
Partition Number	Number of the partition.
Type	Type of LPAR Resource.
Mode	Mode of LPAR Resource.
Entitled Capacity	Allotted capacity granted.
Partition Group-ID	ID of a group of partitions.
Shared Pool ID	ID of a pool of shared processors.
Online Virtual CPUs	A virtual CPU.
Maximum Memory	Maximum amount of memory.
Minimum Memory	Minimum amount of memory.
Variable Capacity Weight	Logical partition processor capacity weight.
Minimum Capacity	Minimum number of processes.
Capacity Increment	Increments of process.
Maximum Physical CPUs in system	Maximum CPUs allotted in system.
Active Physical CPUs in system	Current CPUs in system.
Active CPUs in Pool	Number of active CPUs within a pool.
Shared Physical CPUs in system	Number of shared CPUs within a system.
Maximum Capacity of Pool	Maximum capacity of processes within a pool.
Entitled Capacity of Pool	Number of processes that are entitled.
Unallocated Capacity	Number of free spaces.
Physical CPU Percentage	Number of CPUs allocated to system.
Unallocated Weight	At no extra charge resources on instance.
Desired Virtual CPUs	Target number of virtual CPUs.
Desired Memory	Target amount of memory.
Desired Variable Capacity Weight	Targeted processor load.
Desired Capacity	Target resources used within instance.
High Watermark VCPU	Peak in the utilization of virtual CPU assigned to during the reporting period.

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IBM HMC Processor pool [cmdb_ci_processor_pool] class

Added columns	Description
Pool ID	ID of pool of processors.
CPU Core count	Number of CPU cores.
Memory count	Amount of memory used.
Unassigned cores	Number of unused cores.
Unassigned memory	Amount of unassigned memory.

The following class has no added columns: IBM Frame [cmdb_ci_ibm_frame].

Related topics

CMDB schema model

Internet of Things (IoT) extension classes

The CMDB CI Class Models store app adds or updates classes for the Internet of Things (IoT).

The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

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Internet of Things (IoT)

IoT is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The classes added in this release, extend the Data Model to provide a foundation for the representation of IoT CI classes. This foundation underpins workflows for Enterprise Asset Management (EAM), Governance Risk Compliance (GRC), Component Supply Management (CSM), and Field Service Management (FSM) surrounding the management of IoT devices and the transport vehicles that some reside in.

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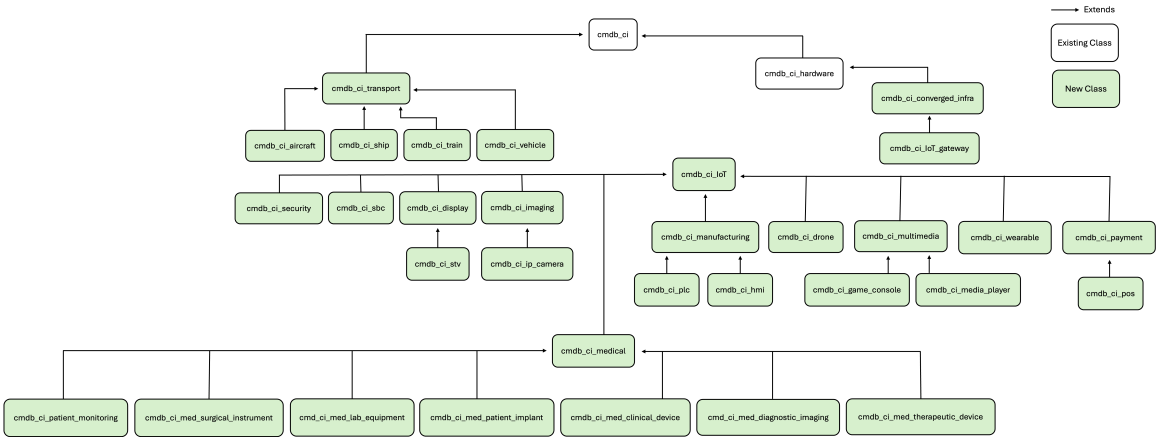
IoT extension classes integrated with the CMDB class hierarchy



Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates.

CMDB CI Class Models: Release 1.6.0 adds the following classes for IoT. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
Transport Type [cmdb_ci_transport]	cmdb_ci	Types of transportation that contain interconnected technology.
Converged Infrastructure [cmdb_ci_converged_infra]	cmdb_ci_hardware	Devices that serve both computing and networking functions.
IoT Device [cmdb_ci_IoT]	cmdb_ci_hardware	Parent table that contains Internet of Things device types.
Aircraft [cmdb_ci_aircraft]	Transport Type [cmdb_ci_transport]	A transportation method that utilizes air or space as its primary pathway. For example, airplanes and helicopters.
Ship [cmdb_ci_ship]	Transport Type [cmdb_ci_transport]	A transportation method that utilizes water as its primary pathway. For example, ships.
Train [cmdb_ci_train]	Transport Type [cmdb_ci_transport]	A transportation method that utilizes rails as its primary pathway. For example, Amtrak.
Vehicle [cmdb_ci_vehicle]	Transport Type [cmdb_ci_transport]	A transportation method that utilizes wheels or tracks as its method of movement. For example, cars, trucks, bulldozers.
IoT Gateway	Converged Infrastructure	A device that provides the following services:

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Class	Extends	Description
[cmdb_ci_IoT_gateway]	[cmdb_ci_converged_infra]	• Forwards packets between LAN and WAN on the IP layer. • Performs application layer functions between IoT nodes and other entities. • Enables local, short-range communication between IoT devices.
Security Device [cmdb_ci_security]	IoT Device [cmdb_ci_IoT]	Connected device that serves a security function such as badge readers.
Single Board Computing [cmdb_ci_sbc]	IoT Device [cmdb_ci_IoT]	Single Board Computing device such as a Raspberry Pi.
Display Device [cmdb_ci_display]	IoT Device [cmdb_ci_IoT]	Connected device that displays images.
Imaging Device [cmdb_ci_imaging]	IoT Device [cmdb_ci_IoT]	Connected device that captures images.
Medical Device [cmdb_ci_medical]	IoT Device [cmdb_ci_IoT]	Connected device that serves a Medical Care function such as a nurse call unit.
Manufacturing Device [cmdb_ci_manufacturing]	IoT Device [cmdb_ci_IoT]	Connected device that helps a manufacturing process.
Multimedia Device [cmdb_ci_multimedia]	IoT Device [cmdb_ci_IoT]	A connected device that helps the generation or delivery of media content.
Payment Device [cmdb_ci_payment]	IoT Device [cmdb_ci_IoT]	Connected device that allows for purchasing goods or services.
Drone [cmdb_ci_drone]	IoT Device [cmdb_ci_IoT]	Unmanned connected device with mobility.
Wearable Technology [cmdb_ci_wearable]	IoT Device [cmdb_ci_IoT]	Connected device that is worn by an entity such as a smart watch.
Smart Television [cmdb_ci_stv]	Display Device [cmdb_ci_display]	A television that is network connected and can run applications.
IP Camera	Imaging Device	A camera that is network connected.

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Class	Extends	Description
[cmdb_ci_ip_camera]	[cmdb_ci_imaging]	
Patient Monitoring [cmdb_ci_med_patient_monitoring]	Medical Device [cmdb_ci_medical]	Monitors and tracks various physiological parameters of a patient. Monitors heart rate, blood pressure, oxygen levels, respiratory rate, and so on.
Surgical Instrument [cmdb_ci_med_surgical_instrument]	Medical Device [cmdb_ci_medical]	Devices used during surgical interventions. Life support tools and tools to assist surgeons in precise and controlled maneuvers.
Lab Equipment [cmd_ci_med_lab_equipment]	Medical Device [cmdb_ci_medical]	Specialized tools, apparatus, and instruments used in scientific research, experiments, and analyses.
Patient Implant [cmdb_ci_med_patient_implant]	Medical Device [cmdb_ci_medical]	Medical devices or tissues that are surgically placed inside a patient's body.
Clinical Device [cmdb_ci_med_clinical_device]	Medical Device [cmdb_ci_medical]	Devices used in a clinical setting for overall management, medical staff, and patient aid.
Diagnostic Imaging [cmd_ci_med_diagnostic_imaging]	Medical Device [cmdb_ci_medical]	Specialized equipment used in medicine to visualize the internal structures of the body.
Therapeutic Device [cmdb_ci_med_therapeutic_device]	Medical Device [cmdb_ci_medical]	Specialized tools designed to aid in the treatment, rehabilitation, or management of health conditions. Can range from orthopedic supports to cardiac implants and neurostimulation devices.
Process Logic Controller [cmdb_ci_plc]	Manufacturing Device [cmdb_ci_manufacturing]	A logic controller that is network connected which is used in manufacturing. For example, devices made by Siemens and Allen Bradley.
Human Machine Interface [cmdb_ci_hmi]	Manufacturing Device [cmdb_ci_manufacturing]	An HMI that is network connected which is used in manufacturing. For example, devices made by Siemens and Allen Bradley.
Game Console [cmdb_ci_game_console]	Multimedia Device [cmdb_ci_multimedia]	A device that is network connected which is used to play games or stream media. For example, an Xbox or Playstation.

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Class	Extends	Description
Media Player [cmdb_ci_media_player]	Multimedia Device [cmdb_ci_multimedia]	A device that is network connected which is used to play digital media content. For example, Amazon Fire TV.
Display Monitor Control [cmdb_ci_monitor_control]	Multimedia Device [cmdb_ci_multimedia]	A device that is network connected that controls the display of media on a monitor. For example, a Crestron Media Controller.
Point of Sale Device [cmdb_ci_pos]	Payment Device [cmdb_ci_payment]	A device that is network connected which is used in the purchase of goods or services. For example, a credit card reader.

Related topics

CMDB schema model

Kong extension classes

The CMDB CI Class Models store app adds or updates classes for Kong gateways.

The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships (if applicable). You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping Patterns can use these class extensions to populate CIs and discover various technologies and software.

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Kong

Kong is an API management platform that enables enterprise companies to better manage client and host traffic.

Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates.

CMDB CI Class Models: Release 1.49.0 adds the following classes for Kong. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
Kong Gateway [cmdb_ci_kong_gateway]	API Gateway [cmdb_ci_api_gateway]	The Kong gateway application that hosts and manages individual APIs. Example: Kong Gateway instanceName.

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Class	Extends	Description
Kong Load Balancer [cmdb_ci_kong_lb]	Load Balancer Application [cmdb_ci_lb_appl]	The default load balancer on the Kong gateway application that points to backend service instances when fulfilling API requests. Example: httpbin-upstream.
Kong Target [cmdb_ci_kong_target]	API Component [cmdb_ci_api_component]	The load-balanced backend of the gateway that fulfills API requests. Example: httpbin-target1.

Class attributes

CMDB CI Class Models: Release 1.49.0 adds the following attributes to the respective classes.

Kong Gateway [cmdb_ci_kong_gateway]

Attribute	Data type	Description
Admin URL	String (255)	URL for making admin API requests.
Database	String	Type of database used by the Kong gateway. Example: Postgres or Cassandra.

Kong Load Balancer [cmdb_ci_lb_appl]

Attribute	Data type	Description
Algorithm	String	Type of algorithm used for load balancing. Example: round robin.
ID	String (255)	Unique identifier from the source system.

Kong Target [cmdb_ci_kong_target]

Attribute	Data type	Description
Target	String (255)	URL of target integration.

Key Relationship Structures

There are a number of key relationships that must be defined for API and Kong classes.

Kong relationships

Parent class	Relationship	Child class	Relationship type
API Backend [cmdb_ci_api_backend]	Uses::Used By	Kong Load Balancer	Suggested

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Kong relationships (continued)

Parent class	Relationship	Child class	Relationship type
Kong Load Balancer [cmdb_ci_lb_appl]	Contains::Contained By	Kong Target	Dependent
Kong Gateway [cmdb_ci_kong_gateway]	Provides::Provided By	Kong Load Balancer	Dependent

Related non-CMDB tables

The Kong Gateway class uses the Kong Workspace non-CMDB table as a related list:

Kong Workspace [kong_workspace]

Attribute	Data type	Description
Name	String (100)	Name of the Kong workspace.
ID	String (255)	Unique identifier from the source system.
API Gateway	Reference	Reference to the Kong API gateway.

Kong gateway example

Here is an example of a dependency view for the Kong gateway class that shows how a gateway would populate the dependent managed API-dependent class with related APIs and components. The Managed API class is considered a first-level relationship with respect to the gateway, while the frontend and backend components are considered second-level relationships. From here, you can then bind alerts to these CIs, configure dynamic CIs for service views and incidents, or establish any additional workflows that use CIs.

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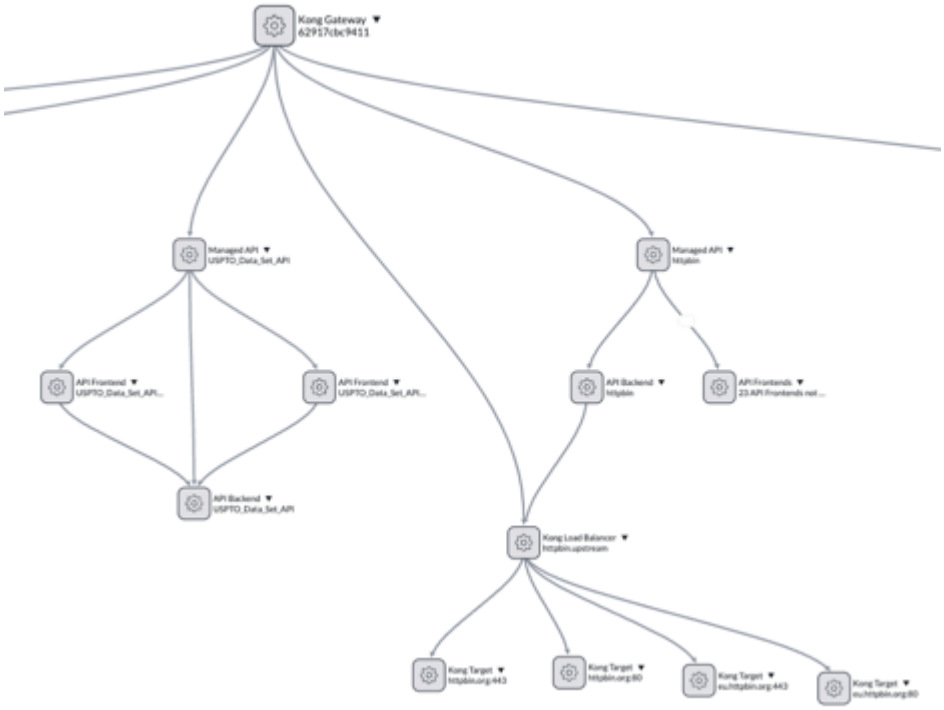

Kubernetes extension classes

The CMDB CI Class Models store app adds or updates classes for the Kubernetes pattern.

The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

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Kubernetes pattern

The Kubernetes pattern main flow helps with discovering Kubernetes core elements. The classes in this release, extend the support to discover kubernetes workload controller components like deployments, daemonsets, and statefulsets. The Workload Share library captures information about deployments, daemonsets, and statefulsets and stores them in the respective tables. Other extensions include a YAML and service mesh extension that generates a YAML file to track configuration files and creating service to service relations by discovering service mesh information.

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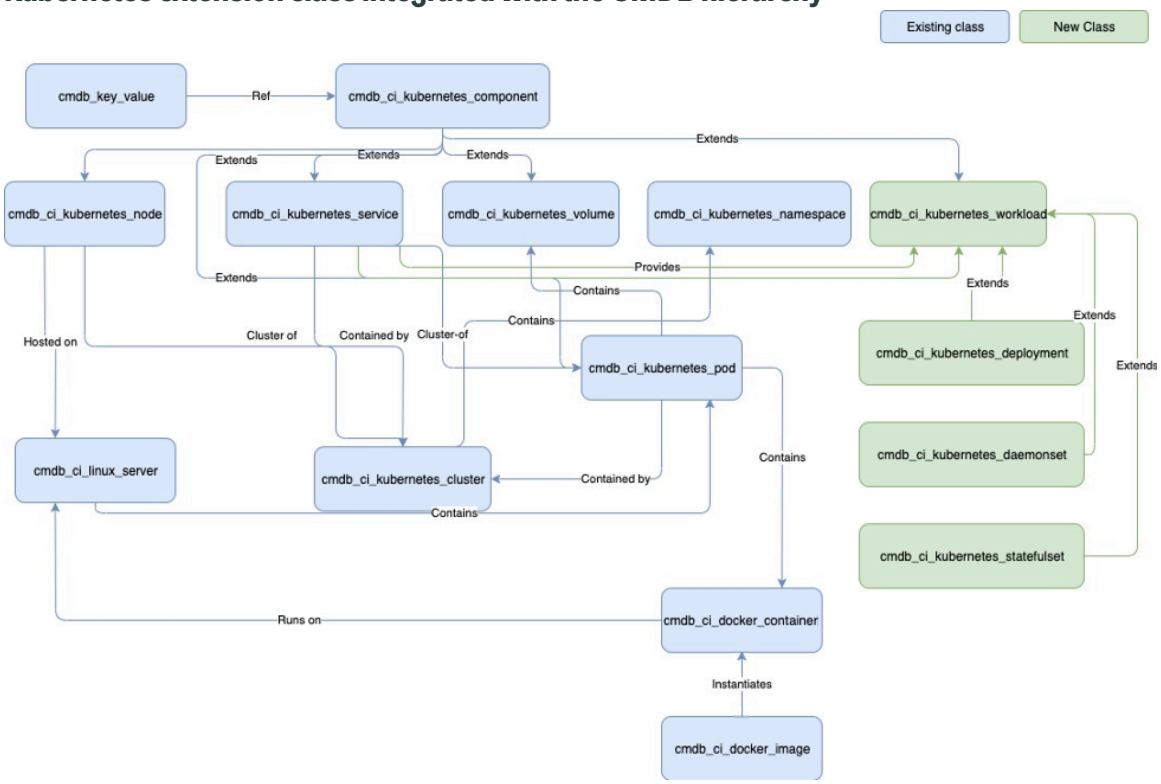
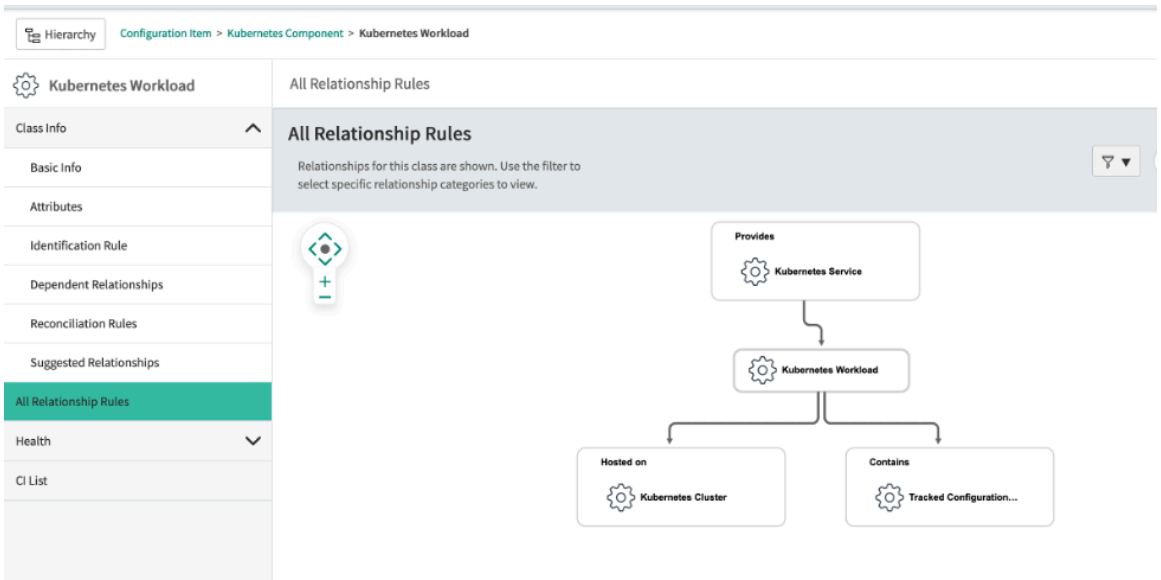
Kubernetes extension class integrated with the CMDB hierarchy



Kubernetes workload



Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates.

CMDB CI Class Models: Release 1.12.0 adds the following classes for Kubernetes pattern. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

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Class	Extends	Fields	Relation
cmdb_ci_kubernetes_workload	cmdb_ci_kubernetes_components		Provides from cmdb_ci_kubernetes_service
cmdb_ci_kubernetes_deployment	cmdb_ci_kubernetes_workload	• Replicas Desired • Replicas Updated • Replicas Total • Replicas Available • Replicas Unavailable	Hosted on Cluster
cmdb_ci_kubernetes_daemonset	cmdb_ci_kubernetes_workload	• Pods running • Pods Waiting • Pods Succeeded • Pods Failed • Pods Available	Hosted on Cluster
cmdb_ci_kubernetes_statefulset	cmdb_ci_kubernetes_workload	• Pods running • Pods Waiting • Pods Succeeded • Pods Failed • Pods Available	Hosted on Cluster

Related topics

CMDB schema model

Network Intrusion Detection System (NIDS) CI extension class

The Network Intrusion Detection System (NIDS) [cmdb_ci_nids] class builds the relationships between passive network monitoring appliances, and the devices on the network that it discovers. A NIDS Manager manages the NIDS sensors that detect the devices and builds "Detects::detected by" relationships between the NIDS records (parent) and the CIs it discovers (child).

This topic lists the relevant classes that the CMDB CI Class Models store app adds or updates. See the class columns table for further details about the columns added for each class.

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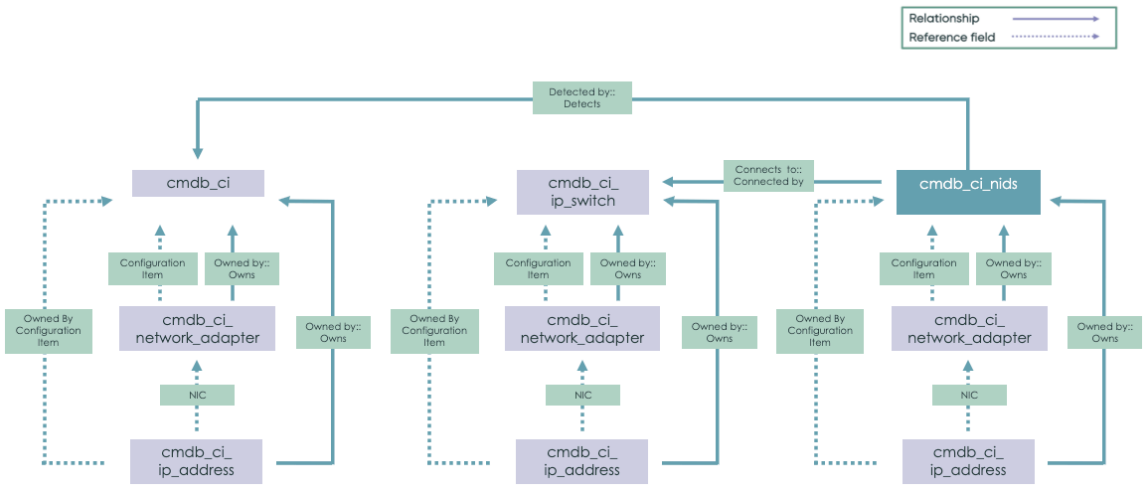
Network Intrusion Detection System (NIDS) schema structure



Classes

CMDB CI Class Models: Release 1.30 adds the following classes for the Network Intrusion Detection System (NIDS). For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
Network Intrusion Detection System (NIDS) (cmdb_ci_nids)	cmdb_ci_ids_network	NIDS is an intrusion detection system within the network that examines the traffic from all devices on the network. NIDS scanners build relationships between the OT network scanning appliances, and the OT devices on the network. An NIDS Manager manages the NIDS sensors.

Class columns

CMDB CI Class Models: Release 1.30 adds the following columns to the Network Intrusion Detection System (NIDS) [cmdb_ci_nids] class.

Network Intrusion Detection System (NIDS) [cmdb_ci_nids] class

Column label	Column name	Description
NIDS source ID	Correlation_id	Identifier of the NIDS device. Uses the assigned Correlation ID for the NIDS as its nids_source_id.
NIDS source name	nids_source_name	Name of the NIDS device.
Network type assignment	network_type_assignment	Designates if the device is on an IT or OT network.

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Network Intrusion Detection System (NIDS) [cmdb_ci_nids] class (continued)

Column label	Column name	Description
NIDS assignment site	isa_entity_site	ISA site assigned to the NIDS. This information is available when the logged in user has an assigned ISA Admin role.

Roles and Access Control Logic (ACLs)

The NIDS Admin (cmdb_nids_admin) role is associated with the Network Intrusion Detection System (NIDS) [cmdb_ci_nids] class: Can create, read, update, and delete Network IDS (NDIS) OT records. To view the Network IDS Application selection on the application menu, you must have this role.

Key relationship structure

For each CMDB CI record with a "Detected by" relationship with an NIDS record, a ServiceNow Operational Technology Certified Service Graph Connector does the following:

1. Assigns the following NIDS-related metadata values to the CI:
   a. Location
   b. Company
   c. Related users (Owned by, Managed by, Supported by, Assigned to)
   d. Related user groups (Approval group, Managed by Group, Support group, Change group)
2. If the NIDS network type is set to OT, it assigns the following NIDS-related metadata values to the CI:
   a. Creates an OT device (cmdb_ot_entity) record for the CI, using the cmdb_ot_entity reference on the CI.
   b. Assigns the NIDS assignment zone to the OT device record.
   c. If the Industrial Process Manager is installed, assign the NIDS assignment site to the OT device record.

Network Inventory (NI) extension classes

The CMDB CI Class Models store app adds or updates classes for the Telecommunications Network Inventory application. Telecommunications Network Inventory uses the Network Inventory (NI) extension classes to extend the Configuration Management Database (CMDB) Configuration Item (CI) class hierarchy.

These extensions enable the CMDB to store information about a service provider's network inventory. The store app adds class models that extend the CMDB class hierarchy, including:

- Class descriptions
- Identification rules
- Identifier entries
- Dependent relationships, if applicable.

With the ServiceNow Telecommunications Network Inventory application, you can build a digital representation of your physical and logical networks. This application uses the NI class extensions to populate CIs that form the basis of your digital network inventory model. To learn more, see Telecommunications Network Inventory.

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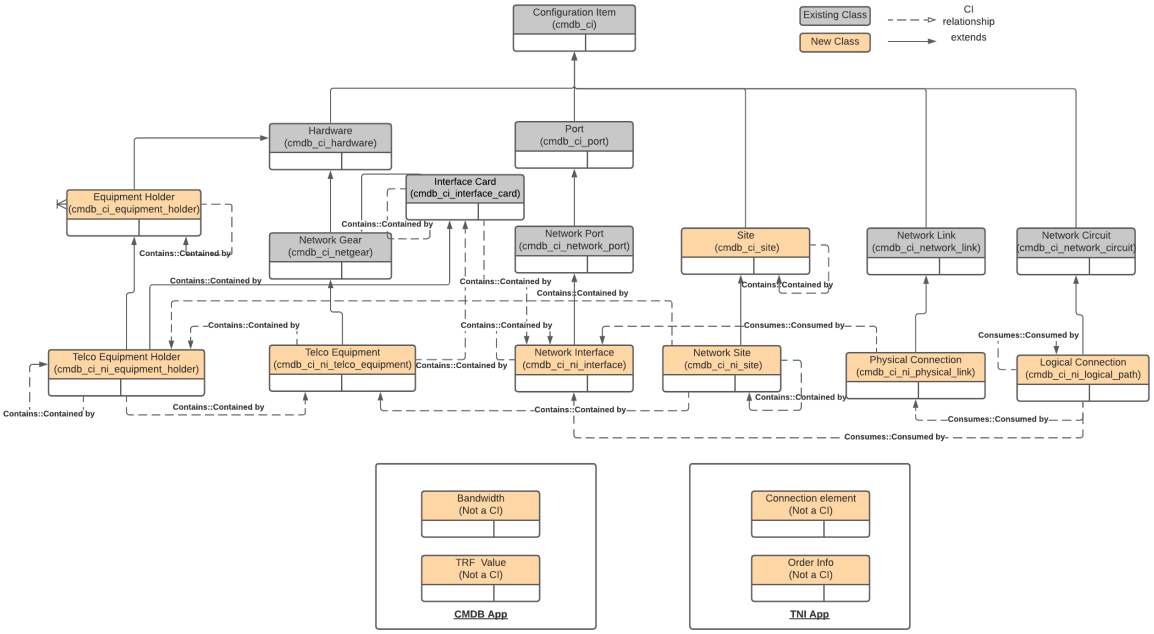
Telecommunications Network Inventory (NI) schema structure



Classes

This section lists the relevant classes that the CMDB CI Class Models store app adds or updates. See the class columns table for further details about the columns added for each class. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

NI extension classes

Class	Extends	Description
Network Site [cmdb_ci_ni_site]	Site [cmdb_ci_site]	Network Site. Captures and maintains the location-specific attributes for each network site, including the network centers, buildings, floors, and rooms where equipment is located. The network site records enable you to view all the equipment at a location. You can filter the locations by the assigned type, role, or function categories.
Telco Equipment Holder [cmdb_ci_ni_equipment_holder]	Equipment Holder [cmdb_ci_equipment_holder]	Telco Equipment Holder.

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NI extension classes (continued)

Class	Extends	Description
		Represents the physical units that contain the telecommunications equipment, including the cages, bays, cabinets, slots, relay racks, and line ups. The line ups contain the individual relay racks. Each relay rack contains the equipment shelves. The equipment holders can contain the other equipment holders. The equipment holder records enable you to track and manage your network assets.
Telco Equipment [cmdb_ci_ni_telco_equipment]	Network gear [cmdb_ci_netgear]	Telco Equipment. Represents a shelf or device that provides the technical functionality in a network. Examples include the routers, modems, mobile devices, optical cables, relays, and switches. The equipment can have slots, cards, or ports. The equipment can exist within an equipment holder or by itself because not all equipment is rack mounted. The equipment records enable you to track and manage your network assets.
Network Interface [cmdb_ci_ni_interface]	Network Port [cmdb_ci_ni_network_port]	Network Interface. Captures and maintain equipment-specific attributes for the network interfaces.
Interface Card [cmdb_ci_interface_card]	Hardware [cmdb_ci_hardware]	Interface Card. Represents interface cards that are stored in a network. Cards can occupy more than one slot and can contain other cards. They can be the equipment ports that are physical or logical (virtual). Each port

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NI extension classes (continued)

Class	Extends	Description
		is assigned a bandwidth value. The bandwidths are consumed when used in network designs.
Physical Connection [cmdb_ci_ni_physical_link]	Network Link [cmdb_ci_network_link]	Physical Connection. Represents the physical port connections on the interface cards in your networks.
Logical Connection [cmdb_ci_ni_logical_path]	Network Circuit [cmdb_ci_network_circuit]	Logical Connection. Represents the logical or virtual port connections on the network interface cards. A logical connection typically represents the multiple physical connections on an interface card.

Nutanix extension classes

The CMDB CI Class Models store app adds or updates classes for Nutanix.

The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

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Nutanix Enterprise Cloud platform

The Nutanix Enterprise Cloud platform is a converged, scale-out compute and storage system that hosts and stores virtual machines. All nodes in a Nutanix cluster share the management of cluster resources. The foundational unit for the cluster is a Nutanix node which runs a standard hypervisor and contains processors, memory, and local storage (SSDs and hard disks). A Nutanix Controller virtual machine runs on each node, enabling the pooling of local storage from all nodes in the cluster.

Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates. See the class columns table for further details about the columns added for each class.

CMDB CI Class Models: Release 1.6.0 adds the following classes for Nutanix. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

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Class	Extends	Description
Nutanix Prism Central [cmdb_ci_nutanix_prism_central]	Virtual Machine Object [cmdb_ci_vm_object]	Multi-cluster manager responsible for managing multiple Acropolis Clusters to provide a single, centralized management interface.

CMDB CI Class Models: Release 1.2.0 adds the following classes for Nutanix.

Class	Extends	Description
Nutanix Cluster [cmdb_ci_nutanix_cluster]	Virtual Machine Object [cmdb_ci_vm_object]	Cluster comprising of the physical nodes running Nutanix software.
Nutanix Controller VM [cmdb_ci_nutanix_controller_vm]	Application [cmdb_ci_appl]	Nutanix controller virtual machine that is present in each node and that provides the storage clustering and management capabilities.
Nutanix Storage Container [cmdb_ci_nutanix_storage_container]	Storage Volume [cmdb_ci_storage_volume]	Subset of Nutanix storage pool used to apply policies such as reserved capacity, replication factor, and storage optimization options.
Nutanix Storage Pool [cmdb_ci_nutanix_storage_pool]	Storage Pool [cmdb_ci_storage_pool]	Grouping of physical disks within a Nutanix cluster which is typically used to create physical separation between virtual machines.
Nutanix Host [cmdb_ci_nutanix_host]	Virtualization Server [cmdb_ci_virtualization_server]	Physical host on which all the virtual machines run.
Nutanix Virtual Machine Instance [cmdb_ci_nutanix_vm_instance]	Virtual Machine Instance [cmdb_ci_vm_instance]	A virtual machine that runs on Nutanix infrastructure.

CMDB CI Class Models: Release 1.1.5 adds the following classes for Nutanix.

Class	Extends	Description
Nutanix Cluster [cmdb_ci_nutanix_cluster]	Virtual Machine Object [cmdb_ci_vm_object]	Cluster comprising of the physical nodes running Nutanix software.
Nutanix Controller VM [cmdb_ci_nutanix_controller_vm]	Application [cmdb_ci_appl]	Nutanix controller virtual machine that is present in each node and that provides the storage clustering and management capabilities.

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Class	Extends	Description
Nutanix Storage Container [cmdb_ci_nutanix_storage_container]	Storage Volume [cmdb_ci_storage_volume]	Subset of Nutanix storage pool used to apply policies such as reserved capacity, replication factor, and storage optimization options.
Nutanix Storage Pool [cmdb_ci_nutanix_storage_pool]	Storage Pool [cmdb_ci_storage_pool]	Grouping of physical disks within a Nutanix cluster which is typically used to create physical separation between virtual machines.
Nutanix Host [cmdb_ci_nutanix_host]	Virtualization Server [cmdb_ci_virtualization_server]	Physical host on which all the virtual machines run.
Nutanix Virtual Machine Instance [cmdb_ci_nutanix_vm_instance]	Virtual Machine Instance [cmdb_ci_vm_instance]	A virtual machine that runs on Nutanix infrastructure.

CMDB CI Class Models: Release 1.1.4 adds the following classes for Nutanix.

Nutanix Cluster [cmdb_ci_nutanix_cluster]	Virtual Machine Object [cmdb_ci_vm_object]	Cluster comprising of the physical nodes running Nutanix software.
Nutanix Controller VM [cmdb_ci_nutanix_controller_vm]	Application [cmdb_ci_appl]	Nutanix controller virtual machine that is present in each node and that provides the storage clustering and management capabilities.
Nutanix Storage Container [cmdb_ci_nutanix_storage_container]	Storage Volume [cmdb_ci_storage_volume]	Subset of Nutanix storage pool used to apply policies such as reserved capacity, replication factor, and storage optimization options.
Nutanix Storage Pool [cmdb_ci_nutanix_storage_pool]	Storage Pool [cmdb_ci_storage_pool]	Grouping of physical disks within a Nutanix cluster which is typically used to create physical separation between virtual machines.
Nutanix Host [cmdb_ci_nutanix_host]	Virtualization Server [cmdb_ci_virtualization_server]	Physical host on which all the virtual machines run.
Nutanix Virtual Machine Instance [cmdb_ci_nutanix_vm_instance]	Virtual Machine Instance [cmdb_ci_vm_instance]	A virtual machine that runs on Nutanix infrastructure.

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Class columns

CMDB CI Class Models: Release 1.6.0 adds no columns to the Nutanix Prism Central [cmdb_ci_nutanix_prism_central] class.

CMDB CI Class Models: Release 1.2.0 adds the following columns to the respective classes.

Nutanix Cluster [cmdb_ci_nutanix_cluster] class

Added columns	Description
Block Serial Numbers	Serial numbers of blocks that are connected to the cluster.
Cluster ID	UUID (Universal Unique Identifier) of the cluster.
External Subnet	Subnet of the external IP address of the cluster.
Full Version	Full version of the cluster. For example: el7.3-release-euphrates-5.10.3.1-stable-655d4def34bf18785782f2adb8cdd5f8457d1fe3
Hypervisor Types	Types of hypervisors that are related to this cluster.
Internal Subnet	Subnet of internal IP addresses.
NCC Version	Nutanix cluster check version.
NTP Servers	NTP servers that are related to this cluster.
Number of Nodes	Number of nodes that are connected to the cluster.
Timezone	Timezone of the cluster.
Version	Version of the cluster. For example: 5.10.3.1

Nutanix Controller VM [cmdb_ci_nutanix_controller_vm] class

Added columns	Description
Hypervisor Type	Type of hypervisor.
Memory (MB)	Amount of memory (in MB) available on the controller.
State	On/off power state of controller.
VM ID	UUID of the controller virtual machine.
Object ID	ID of the controller virtual machine.

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Nutanix Storage Container [cmdb_ci_nutanix_storage_container] class

Added columns	Description
Compression	Indicates whether compression is enabled.
Container ID	UUID of the container.
Deduplication	Indicates whether on disk deduplication is enabled, that is dedup compression applied to data on hard disks (HDD). Performance tier deduplication is a prerequisite for on disk deduplication.
Erasure Code	Indicates whether erasure coding is enabled.
Replication Factor	Number of maintained data copies. The replication factor is specified (2 or 3) when the container is created.

The following classes have no added columns:

- Nutanix Storage Pool [cmdb_ci_nutanix_storage_pool]
- Nutanix Host [cmdb_ci_nutanix_host]
- Nutanix Virtual Machine Instance [cmdb_ci_nutanix_vm_instance]

CMDB CI Class Models: Release 1.1.5 adds the following columns to the respective classes.

Nutanix Cluster [cmdb_ci_nutanix_cluster] class

Added columns	Description
Block Serial Numbers	Serial numbers of blocks that are connected to the cluster.
Cluster ID	UUID (Universal Unique Identifier) of the cluster.
External Subnet	Subnet of the external IP address of the cluster.
Full Version	Full version of the cluster. For example: el7.3-release-euphrates-5.10.3.1-stable-655d4def34bf18785782f2adb8cdd5f8457d1fe3
Hypervisor Types	Types of hypervisors that are related to this cluster.
Internal Subnet	Subnet of internal IP addresses.
NCC Version	Nutanix cluster check version.
NTP Servers	NTP servers that are related to this cluster.
Number of Nodes	Number of nodes that are connected to the cluster.

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Nutanix Cluster [cmdb_ci_nutanix_cluster] class (continued)

Added columns	Description
Timezone	Timezone of the cluster.
Version	Version of the cluster. For example: 5.10.3.1

Nutanix Controller VM [cmdb_ci_nutanix_controller_vm] class

Added columns	Description
Hypervisor Type	Type of hypervisor.
Memory	Amount of memory (in MB) available to the virtual machine.
State	On/off state of power.
VM ID	UUID of the controller virtual machine.
Object ID	ID of the controller virtual machine.

Nutanix Storage Container [cmdb_ci_nutanix_storage_container] class

Added columns	Description
Compression	Indicates whether compression is enabled.
Container ID	UUID of the container.
Deduplication	Indicates whether on disk deduplication is enabled, that is dedup compression applied to data on hard disks (HDD). Performance tier deduplication is a prerequisite for on disk deduplication.
Erasure Code	Indicates whether erasure coding is enabled.
Replication Factor	Number of maintained data copies. The replication factor is specified (2 or 3) when the container is created.

The following classes have no added columns:

- Nutanix Storage Pool [cmdb_ci_nutanix_storage_pool]
- Nutanix Host [cmdb_ci_nutanix_host]
- Nutanix Virtual Machine Instance [cmdb_ci_nutanix_vm_instance]

CMDB CI Class Models: Release 1.1.4 adds the following columns to the respective classes.

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Nutanix Cluster [cmdb_ci_nutanix_cluster] class

Added columns	Description
Block Serial Numbers	Serial numbers of blocks that are connected to the cluster.
Cluster ID	UUID (Universal Unique Identifier) of the cluster.
External Subnet	Subnet of the external IP address of the cluster.
Full Version	Full version of the cluster. For example: el7.3-release-euphrates-5.10.3.1-stable-655d4def34bf18785782f2adb8cdd5f8457d1fe3
Hypervisor Types	Types of hypervisors that are related to this cluster.
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Number of Nodes	Number of nodes that are connected to the cluster.
Timezone	Timezone of the cluster.
Version	Version of the cluster. For example: 5.10.3.1

Nutanix Controller VM [cmdb_ci_nutanix_controller_vm] class

Added columns	Description
Hypervisor Type	Type of hypervisor.
Memory	Amount of memory (in MB) available to the virtual machine.
State	On/off state of power.
VM ID	UUID of the controller virtual machine.
Object ID	ID of the controller virtual machine.

Nutanix Storage Container [cmdb_ci_nutanix_storage_container] class

Added columns	Description
Compression	Indicates whether compression is enabled.
Container ID	UUID of the container.

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Nutanix Storage Container [cmdb_ci_nutanix_storage_container] class (continued)

Added columns	Description
Deduplication	Indicates whether on disk deduplication is enabled, that is dedup compression applied to data on hard disks (HDD). Performance tier deduplication is a prerequisite for on disk deduplication.
Erasure Code	Indicates whether erasure coding is enabled.
Replication Factor	Number of maintained data copies. The replication factor is specified (2 or 3) when the container is created.

The following classes have no added columns:

- Nutanix Storage Pool [cmdb_ci_nutanix_storage_pool]
- Nutanix Host [cmdb_ci_nutanix_host]
- Nutanix Virtual Machine Instance [cmdb_ci_nutanix_vm_instance]

Related topics

CMDB schema model

OpenStack extension classes

The CMDB CI Class Models store app adds or updates classes for OpenStack.

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OpenStack

OpenStack is a cloud operating system that controls large pools of compute, storage, and networking resources throughout a datacenter. All of these resources are managed and provisioned through APIs with common authentication mechanisms. Other components provide services such as orchestration, fault management, and service management to ensure high availability of user applications. OpenStack is broken up into services to enable you to plug and play components depending on your needs. These components are designed for horizontal scalability, so you can easily add new resources to grow your cloud over time.

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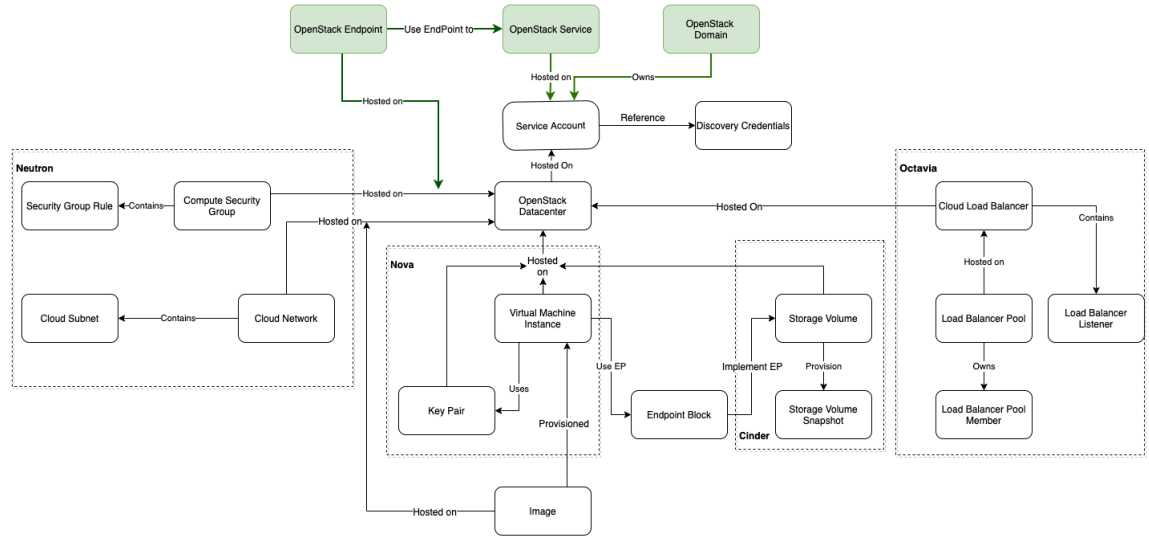
OpenStack classes integrated with the CMDB class hierarchy



Classes

This section lists the relevant classes that the CMDB CI Class Models store app adds or updates. See the class columns table for further details about the columns added for each class.

CMDB CI Class Models: Release 1.8.0 adds the following classes for OpenStack. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
OpenStack Services [cmdb_ci_cloud_openstack_service]	Virtual Machine Object [cmdb_ci_vm_object]	An OpenStack web service that can be accessed via a URL.
OpenStack Endpoint [cmdb_ci_cloud_openstack_endpoint]	Virtual Machine Object [cmdb_ci_vm_object]	The access point of a Service.
OpenStack Domain [cmdb_ci_cloud_openstack_domain]	Virtual Machine Object [cmdb_ci_vm_object]	A collection of users, groups, and projects.

Class columns

CMDB CI Class Models: Release 1.8.0 adds the following columns to the respective classes.

OpenStack Services [cmdb_ci_cloud_openstack_service] class

Added columns	Description
type	The Service type, which describes the API implemented by the Service. Possible values: Compute, ec2, identity, image, network, or volume.
enabled	Defines if the service and its endpoints appear in the Service catalog (true/false).

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OpenStack Endpoint [cmdb_ci_cloud_openstack_endpoint] class

Added columns	Description
interface	The interface type, which describes the visibility of the endpoint. Possible values: • public - Visible by end users on a publicly available network interface. • internal - Visible by end users on an unmetered internal network interface. • admin - Visible by administrative users on a secure network interface.
enabled	Defines if the Service and its endpoints appear in the Service catalog (true/false).

OpenStack Domain [cmdb_ci_cloud_openstack_domain] class

Added columns	Description
enabled	Defines if the domain is enabled (true/false).

Related topics

CMDB schema model

Operational Technology (OT) extension classes

The CMDB CI Class Models store app adds or updates classes for Operational Technology (OT).

Operational Technology (OT) data model

The Operational Technology (OT) data model was created to enable management of "OT device" data. Operational Technology that controls industrial equipment can be based on IT class hardware (computers, servers, network gear, and so on), or on specific hardware profiles not included in the ServiceNow IT class model (PLCs, HMIs, Engineering Workstations, Historians, and so on). Therefore, a single OT device in the OT data model includes two primary components:

1. A CI class record. This can be an IT or an OT class CI.
2. An OT device details record. This describes the OT device type (function) and other OT-specific attributes.

Each OT device in the CMDB can be distinguished as having an "OT Device Details" reference [cmdb_ot_entity reference field] to a specific OT device details [cmdb_ot_entity table] record. This is a bi-directional reference; the ot_device reference on the cmdb_ot_entity table references the CI record. If the cmdb_ot_entity reference of a given CI record is **not** empty, the CI is considered to be an OT device.

For example, an HMI (Human Machine Interface) OT device could be composed in at least two different ways.

1. A computer CI with an OT device detail record describing its "OT device type" as HMI.
2. An HMI CI with an OT device detail record describing its "OT device type" also as HMI.

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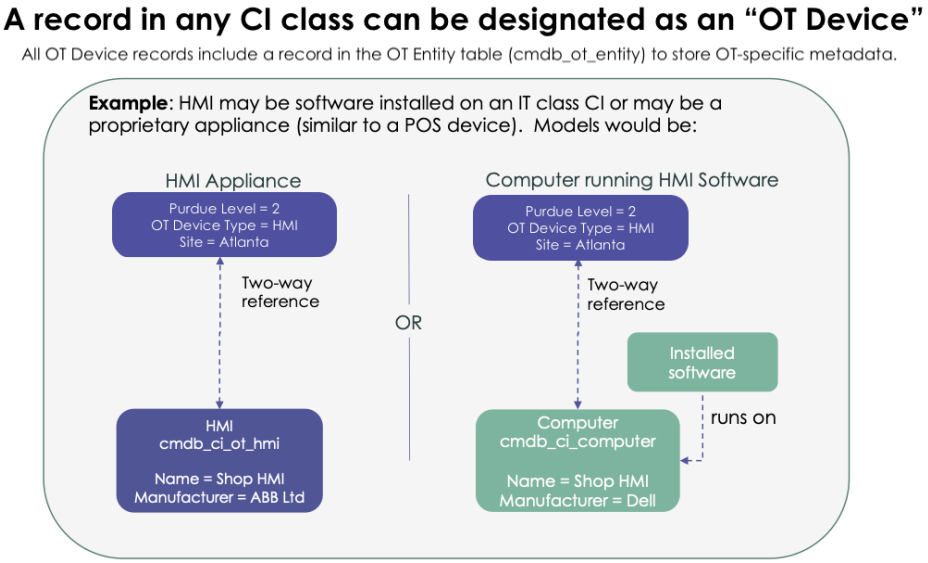

In this way, a list of HMIs can be derived and a list of all computers in an enterprise can also be derived.

For more details on the OT data model, see Implementing the CSDM framework for Operational Technology.

You can use the added classes as any other CMDB class. Applications such as Discovery for Operational Technology, and Service Graph Connector for Operational Technology (Excel) use these class extensions to populate CIs and discover various technologies and software. To learn more, see:

- Service Graph Connector for Operational Technology (Excel)
- Discovery for Operational Technology

Note:
In Operational Technology, CIs used on an OT network to automate an industrial process are often referred to as#ÐT devices. This term shouldn’t be confused with an device record commonly used in the practice of Asset Management.

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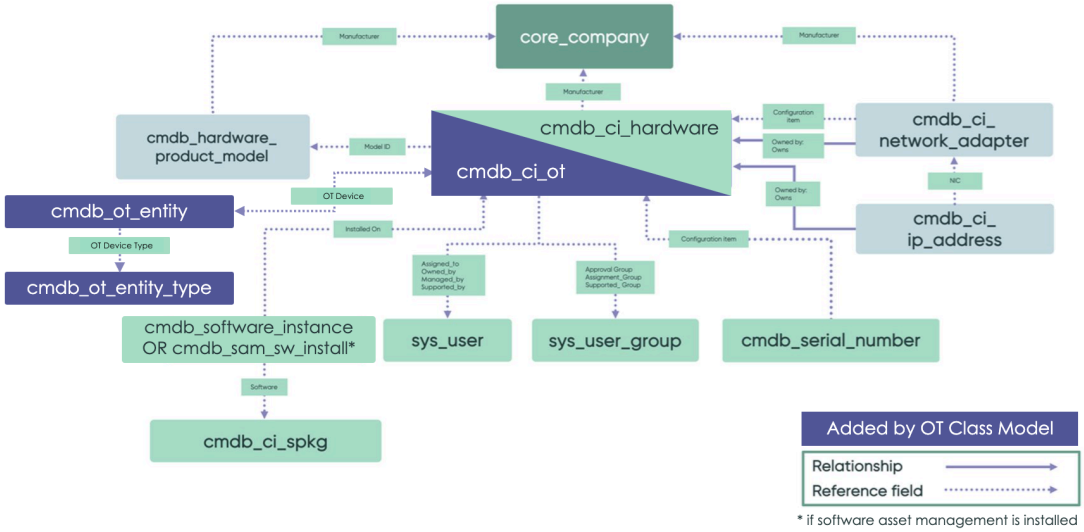
Operational Technology (OT) schema structure



Classes

This section lists the relevant classes that the CMDB CI Class Models store app adds or updates. See the class columns table for further details about the columns added for each class.

CMDB CI Class Models: Release 1.30 adds the following classes for Operational Technology (OT). For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
CNC [cmdb_ci_ot_cnc]	cmdb_ci_ot_control	Computer Numerical Control, used for automated control of machining tools such as drills, lathes, mills, and for 3D printers.
DCS [cmdb_ci_ot_dcs]	cmdb_ci_ot_control	Distributed Control System. Achieves control using intelligence distributed about the controlled process, rather than by a centrally located single unit.
DPU [cmdb_ci_ot_dpu]	cmdb_ci_ot_control	Distributed Processing Units. ICS on a dedicated network, with each DPU handling thousands of points of I/O.
EWS [cmdb_ci_ot_ews]	cmdb_ci_ot_supervisory	Engineering Workstation. A computing platform for configuration, maintenance, and diagnostics of ICS applications and other control system equipment.
Historian [cmdb_ci_ot_historian]	cmdb_ci_ot_supervisory	Data Historian. A centralized database supporting data

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Class	Extends	Description
		analysis for industrial processes.
HMI [cmdb_ci_ot_hmi]	cmdb_ci_ot_supervisory	Human-Machine Interface. Hardware or software through which an operator interacts with a controller.
IED [cmdb_ci_ot_ied]	cmdb_ci_ot_control	Intelligent Electronic Device. Receives or sends data/ control from or to an external source for power grids.
Industrial Actuator [cmdb_ci_ot_industrial_actuator]	cmdb_ci_ot_field_device	Component of a machine that is responsible for moving and controlling a mechanism, such as opening a valve.
Industrial Drive [cmdb_ci_ot_industrial_drive]	cmdb_ci_ot_field_device	Equipment used to control the speed of machinery. It can be a mechanical electromechanical, hydraulic, or electronic device.
Industrial 3D Printer [cmdb_ci_ot_industrial_3d_printer]	cmdb_ci_ot_control	Device used in additive manufacturing for the construction of a three-dimensional object from a CAD model, or a digital 3D model.
Industrial Robot [cmdb_ci_ot_industrial_robot]	cmdb_ci_ot_field_device	Robotic system used for manufacturing.
Industrial Sensor [cmdb_ci_ot_industrial_sensor]	cmdb_ci_ot_field_device	Sensor device used to monitor the health of equipment
Network Gear [cmdb_ci_netgear]	cmdb_ci_hardware	Network gear is an electronic device which is required for communication and interaction between devices on a computer network.
Operations Technology [cmdb_ci_ot]	cmdb_ci_hardware	Base class for Operational Technology, used for industrial control. For instance, in manufacturing.
OPC Client [cmdb_ci_ot_opc_client]	cmdb_ci_ot_supervisory	Software module that enables applications to acquire data from an OPC Server or conduct supervisory control using an OPC Server.
OPC Server [cmdb_ci_ot_opc_server]	cmdb_ci_ot_control	Software module that enables applications to provide their data to the outside world using OPC.

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Class	Extends	Description
OT Control Module [cmdb_ci_ot_control_module]	cmdb_ci_ot_control	Module such as a PLC or DCS connected to an OT Control System.
OT Control System [cmdb_ci_ot_control]	cmdb_ci_ot	Base Class for industrial control systems (ICS), usually at Purdue Model Level 1 or 2.
OT Supervisory System [cmdb_ci_ot_supervisory]	cmdb_ci_ot	Base class for supervisory systems, usually at Purdue Model Level 2 or 3.
OT System Service [cmdb_ci_ot_system_service]	cmdb_ci_ot_system	Category of technology and systems that are used to manage, control, and monitor physical processes, machinery, and industrial operations.
PLC [cmdb_ci_ot_plc]	cmdb_ci_ot_control	Programmable Logic Controller. Used to control OT devices.
Protocol Converter [cmdb_ci_protocol_converter]	cmdb_ci_hardware_network_ge	Device used to convert standard or proprietary protocol of one device to the protocol suitable for the other device or tools to achieve the interoperability.
Quality Inspection Control System [cmdb_ci_ot_qics]	cmdb_ci_ot_control	Control systems that assist specifically in quality and inspection functions.
RTU [cmdb_ci_ot_rtu]	cmdb_ci_ot_control	Remote Terminal Unit. Special purpose data acquisition and control unit designed to support DCS and SCADA remote stations
SCADA Client [cmdb_ci_ot_scada_client]	cmdb_ci_ot_supervisory	Supervisory Control and Data Acquisition. Client that enables an operator to manage a SCADA server.
SCADA Server [cmdb_ci_ot_scada_server]	cmdb_ci_ot_control	Supervisory Control and Data Acquisition. System capable of gathering and processing data and applying operational controls over long distance.

Class columns

CMDB CI Class Models: Release 1.30 adds the following columns to the respective classes.

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Operational Technology (OT) [cmdb_ci_ot] class

Added columns	Description
firmware_version	Firmware version reported by discovery source.
hardware_version	Hardware version reported by discovery source.

OT Control System [cmdb_ci_ot_control_system] class

Added columns	Description
has_module	true/false value describing if the system has modules, such as chassis / blade architecture.
backplane_name	System-reported string name or number for the backplane.
backplane_id	System-reported unique ID for the backplane

OT Control Module [cmdb_ci_ot_control_module] class

Added columns	Description
slot_number	Reported slot in the control system this module is using.
module_type	Module type reported by the discovery source.

OT Field Device [cmdb_ci_ot_field_device] class

Added columns	Description
device_type	List that describes if the device provides input, output, or both to the parent control system.

OT System Service [cmdb_ci_ot_system_service] class

Added columns	Description
display_name	Name of the OT system.
isa_entity_site	Site where the OT system is located.

Form view

All Operational Technology (OT) extension classes have a "Default view" form view that includes the OT Device Details attribute at the top of the form. The following table lists the other classes that have the **Operational Technology (OT)** view on their form context menu. This is the default form view for users with the cmdb_ot_viewer role for the following classes.

Class	Description
base hardware [cmdb_ci_hardware]	Base class for hardware.

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Class	Description
base computer [cmdb_ci_computer]	An extension of the Hardware table, capturing computer properties.
base server [cmdb_ci_server]	Base class for all types of servers.
linux server [cmdb_ci_linux_server]	Server running Linux software.
windows server [cmdb_ci_win_server]	A server running Microsoft Windows Server operating system.
IoT Device base class [cmdb_ci_iot]	Parent table that contains Internet of Things device types.
IP Firewall and extended classes [cmdb_ci_ip_firewall]	Contains all network firewalls.
IP Router [cmdb_ci_ip_router]	Specialization of the Network Gear [cmdb_ci_netgear] table.
IP Switch [cmdb_ci_ip_switch]	Specialization of the Network Gear [cmdb_ci_netgear] table.
Protocol Converter [cmdb_ci_protocol_converter]	Device used to convert standard or proprietary protocol of one device to the protocol suitable for the other device or tools to achieve the interoperability.

Classes not included in the table do not have the Operational Technology (OT) view by default. For any additional classes required, you can add the Operational Technology (OT) view to the form context menu. For more information about form context menu options, see Form context menu.

Roles and Access Control Logic (ACLs)

The following roles are associated with the Operational Technology (OT) [cmdb_ci_ot] classes and associated tables that follow:

Admin (cmdb_ot_admin)

Can create, read, update, and delete OT records. An admin can also edit the OT Device Type on the OT Device form, and manage specific configurations on the OT entity tables.

Editor (cmdb_ot_editor)

Can create, read, update, and delete OT device records.

Viewer (cmdb_ot_viewer)

Can read OT device records.

Note:
For the cmdb_ci_ot and cmdb_ot_entity tables:

- A user must have one of these three OT roles to view OT devices.
- IT users with an assigned itil role are restricted from viewing OT devices in the cmdb_ci_ot table, and records in the cmdb_ot_entity table. IT users are still able to see IT asset classes, such as Computer, Installed Software.

OT customers may want to restrict access to OT devices from users with an IT (itil) only role, for both a viewer and an admin role.

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Key relationship structures

Use the following key relationships as important guidelines when creating Operational Technology (OT) CIs:

OT Entity

Since any CI class may be found on an OT network, the OT Entity table [cmdb_ot_entity] captures additional attributes required in an OT Environment:

Attribute	Description
Business criticality	Business criticality assigned in the discovery source.
OT device	Reference to the CI that is on the OT network.
OT device type	The function of the OT device, regardless of CI class. • For a dedicated HMI appliance, the CI is in the cmdb_ci_ot_hmi class, and the OT device type should be HMI. • For a computer performing the function of an HMI, the CI is in the cmdb_ci_computer class and the OT device type should be HMI
Purdue level	Purdue level of the OT device.
Zone	Zone assigned to the OT device, usually used in the context of a zone/conduit model.

The OT Entity is a related list added to the Operational Technology (OT) [cmdb_ci_ot] table and extended tables. If you want to view OT entity metadata on an existing CI class, first add the related list to the form.

OT Entity Type

The [cmdb_ot_entity_type] table tracks the type of OT device that an OT or non-OT CI is performing the function of. It serves as a necessary part of the Purdue level data model, and extends the Application File [sys_metadata] table.

The ServiceNow AI Platform includes records representing common OT device types of OT device CIs. The OT Entity Type table attributes include:

Attribute	Description
Label	Display name of a specific OT device type.
Name	Value used to identify a specific OT device type.
OT table	Value used for auto-populating the Type field for the OT entity record [cmdb_ot_entity] of an OT Class CI.
Parent	Parent type of a specific type, which is a reference to a record in the same table [cmdb_ot_entity_type].

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Serial number

During CI identification, the Identification and Reconciliation Engine (IRE) processes search for a serial number in two locations. One is the CI serial number attribute, and the other is the Serial Number [cmdb_serial_number] table, with reference back to the Operational Technology (OT) [cmdb_ci_ot] table.

- It stores any serial number of any type other than system serial number, and only in the Serial Number table (and not in the server CI attribute).
- If the system serial number is available, it stores it in both the Serial Number attribute of the CI and in the Serial Number table.
- The Serial Number table is a many-to-one relationship, linking back to the Operational Technology (OT) CI. This table has a Type field for specifying the type of the serial number.
- For Operational Technology (OT), use the string value *system* for the serial number type to ensure proper reconciliation across various sources.

Network adapter

Use the Network Adapter [cmdb_ci_network_adapter] class to store network adapters.

1. Set the MAC Address attribute to be the MAC address value.
   - Format the string with colon separators between octets and lower case hexadecimal characters with padded zeros.
   - For example, 'f8:f2:1e:00:d4:66'.
2. Set the Name attribute in the Network Adapter class to be the same as the MAC Address.
3. In the CI Relationship [cmdb_rel_ci] table, create an Owned By:Owns relationship to the associated Hardware CI.
4. Using the CI with a reference to the associated Hardware CI, specify a reference from the Network Adapter [cmdb_ci_network_adapter] table.

IP Address

Use the IP Address [cmdb_ci_ip_address] class to store IP addresses.

1. Store an IP address value in the IP Address attribute, and in the Name attribute to avoid empty Name attributes.
   - Store an IPv4 IP address value using the format 'NNN.NNN.NNN.NNN', with decimal-based octets and period separators. Non-conforming values should be considered invalid and cleansed to null values.
   - Store an IPv6 IP address value using lower case hexadecimal with colon separators. Non-confirming values should be considered invalid and cleansed to null values.
2. Set the Netmask attribute to the IP address.
3. Set the Name attribute in the Network Adapter class to be the same as the MAC Address.
4. In the CI Relationship [cmdb_rel_ci] table, create an Owned By::Owns relationship to the associated Hardware CI.
5. In the CI Relationship [cmdb_rel_ci] table, create an Owned By::Owns relationship to the associated Hardware CI.
6. For the IP address, specify a reference to the Network Adapter [cmdb_ci_network_adapter] table, using the Configuration Item with a reference to the associated Hardware CI.
7. To ensure that base system identification rules work properly, also store the IP address in the associated Network Adapter class.

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Network adapter and IP address

Use the IP Address [cmdb_ci_ip_address] class to store IP addresses.

1. Store the MAC address of the network adapter installed on a server, in the Network Adapter [cmdb_ci_network_adapter] class.
2. Store the IP address in the IP Address [cmdb_ci_ip_address] class.

> **Note:**
> Do not store the MAC address or the IP address in the Operational Technology (OT) [cmdb_ci_ot] table. The default Operational Technology (OT) form is configured to display the IP address from the Network Adapter table.

Backup Storage Information

Use the Backup Storage Information [cmdb_backup_storage_information] class to create backup records that identify the device in internal or external backup services. The Backup Storage Information table includes the following attributes:

Attributes	Description
Backup Configuration Status	Indicates whether the CI has been configured in the backup service or appliance with relevant policies.
Discovery Source	Discovery source of the backup record.
Backup Service	Reference to the Common Service Data Model Technical Service hosting external and internal backup system, services, or appliances
Managed By	Email ID of the user responsible for managing the backup.
Last Successful Backup	Date and time of the last successful backup made for a device.
Backup Source ID	Backup service record for a device, which identifies the device in external or internal backup services. Backup source id can include host_id, vcenter_id, instance_id, db_id.
Recovery Point Objective	Amount of time that can elapse between backups and the amount of data lost.
Execution Mode	Indicates whether the backup is configured to run automatically on a periodic basis, or if it is manually executed on an as-needed basis.
Last Backup Attempt	Date and time of the last backup attempt made for a device.
Backup Source	Details of the backed up CI. This table holds the backup status details for the referenced CI.
Managed By Group	Primary support group responsible for managing the backup.
Domain	ID of the domain to which the instance belongs.

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Key reference structures

Use the following key references are important guidelines when creating Operational Technology (OT) records:

- When creating computer or server records for OT devices that are running on computers or servers, see the following topics:
  - Computer [cmdb_ci_computer] class
  - Server [cmdb_ci_server] class
- The Manufacturer and Model ID attributes are reference attributes to the Company [core_company] and Product Model [cmdb_model] tables respectively.
- The Owned By, Assigned To, Managed By, and Supported By attributes are reference attributes to the User [sys_user] table. The Change Group and Support Group attributes are reference attributes to the Group [sys_user_group] table.

Identification rules

The ServiceNow AI Platform contains a pre-defined identification rule for the Operational Technology (OT) classes. That identification rule has the following key identifier entries, listed in priority order:

1. Identifier entry that uses the identification specified in Serial Number [cmdb_serial_number] as the lookup table. The Serial Number table is a many-to-one reference from the serial number back to the server CI.
2. Identifier entry that is specified in the Serial Number attribute in the CI.
3. Identifier entry that is specified in the Mac Address attribute in the Network Adapter table.
4. Identifier entry for the Name attribute.
   - If Serial Number and MAC Address are not available, then the Name (which is usually the system reported hostname) attribute is used.
   - If both Serial Number and Name are not available, and only MAC Address is available, use MAC Address as the name of the CI. Using the MAC Address as the name of the CI ensures that you don't create an empty CI.

Note:
To learn more, see CMDB Identification and Reconciliation.

Reclassifying IT devices on your OT network

For Xanadu and later versions, you can create a Network Adapter identifier on the OT identification rule to reclassify IT devices on your OT network. Creating a Network Adapter identifier on the OT identification rule overwrites the Hardware identification rule's Network Adapter identifier entry. To do this, complete the following actions:

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Under **Hardware** in the **CI Classes** menu, select the **Operational Technology (OT)** class.
3. Under the **Class Info** menu, select **Identification Rule**.
4. Under **Identifier Entries**, select **Add**.
5. In the New Identifier Entry pop-up dialog box, choose **Use attributes from another table (Lookup table)** and select **Next**.
6. In the Create Identifier Entry dialog box, complete the following steps:

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a. Select **Hardware table** from **Search On Table** dropdown list.

b. Enter **400** in the **Priority** field.

c. Select **Network Adapter** from the **LookUP Table** from dropdown list.

d. Select **Mac Address** from the **Criterion Attributes** dropdown list.

e. Select **Save**.

Note:
IT devices on an OT network are not reclassified automatically. If you want to automatically reclassify IT devices to OT, you must upgrade to Xanadu or the latest ServiceNow AI Platform version with the latest CMDB CI Class Models.

Related entries

Related entries for OT identification rules allow OT Service Graph Connectors to create related records, such as OT device records and backup records. The Operational Technology [cmdb_ci_ot class] rule contains the following related entries:

- Backup Store [backup_source_configuration_item]
- External system metadata [configuration_item]
- OT device [ot_asset]

The OT Control Module [cmdb_ci_ot_control_module] rule contains the following related entries:

- Backup Store [backup_source_configuration_item]
- OT device [ot_asset]

Deprecated classes

CMDB CI Class Models: Release 1.30 soft deprecated (not removed, but marked as follows) with the release of the OT class model:

Class	Description
Human Machine Interface [cmdb_ci_hmi]	OT devices moved to cmdb_ci_ot to support broader use cases. Use cmdb_ci_ot_hmi instead.
Manufacturing Device [cmdb_ci_manufacturing]	OT devices moved to cmdb_ci_ot to support broader use cases. Use cmdb_ci_ot as the base class or other generic child classes as appropriate.
Programmable Logic Controller [cmdb_ci_plc]	OT devices moved to cmdb_ci_ot to support broader use cases. Use cmdb_ci_ot_plc instead.

A script has been provided to migrate records from these classes to the new class tables. The admin role is required to perform the following tasks:

1. Navigate to **System Definition** > **Script Includes**
2. Find the record named **OTDevicesMigrationUtils**.
3. Navigate to **Definition** > **Script Includes** > **.**

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4. In the background window, copy and paste the provided script.
5. Select the appropriate scope and run the script.

Troubleshooting

The following are some troubleshooting tips:

Problem	Suggested resolution
Unable to see OT device menu items	Ensure that the logged in user has been assigned the appropriate roles. To learn more, see the preceding Roles section.
Error creating or updating an OT device record	Allow only one OT device record (cmdb_ot_entity) per CI.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

The CMDB CI Class Models store app adds class models that extend the CMDB class hierarchy, including:

- Class descriptions
- Identification rules
- Identifier entries
- Dependent relationships, if applicable.

Related topics

CMDB schema model

Red Hat Virtualization (RHV) extension classes

The CMDB CI Class Models store app adds or updates classes for Red Hat Virtualization (RHV).

The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Red Hat Virtualization (RHV)

Red Hat Virtualization (RHV) is a virtualization product which is based on the Kernel-based Virtual Machine (KVM) hypervisor. RHV uses the SPICE protocol and Virtual Desktop Server Manager (VDSM) with a RHEL-based centralized management server. RHV solution is based

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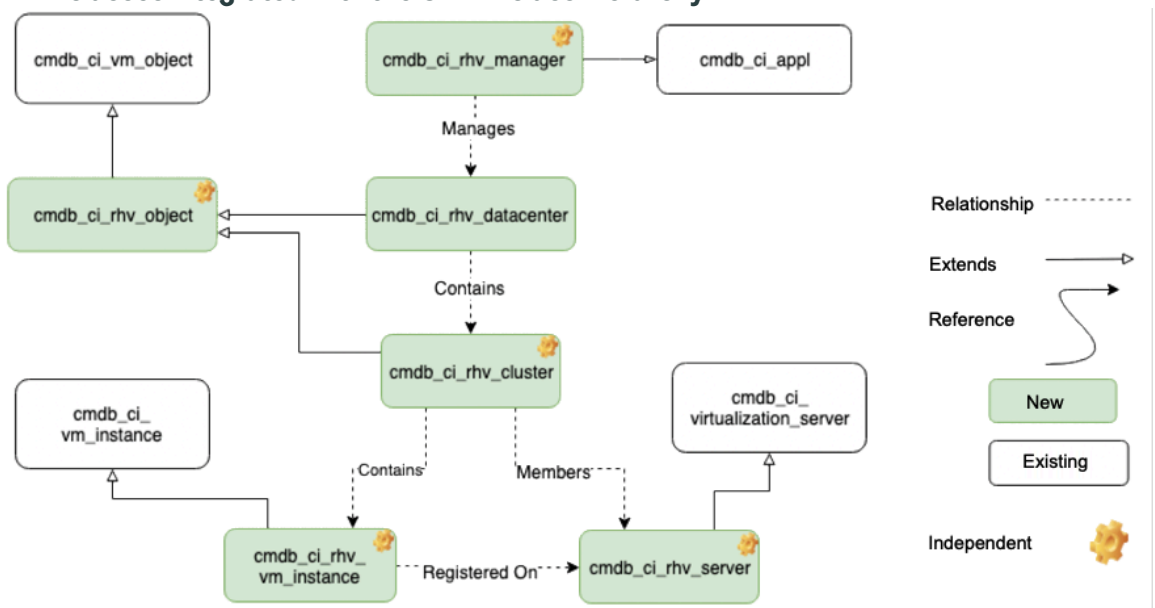
on two primary software components: Red Hat Virtualization Manager (RHV-M) and Red Hat Virtualization Hypervisors or hosts: Red Hat Enterprise Linux or RHV Host (RHV-H).

RHV classes integrated with the CMDB class hierarchy



Classes

This section lists the relevant classes that the CMDB CI Class Models store app adds or updates. See the class columns table for further details about the columns added for each class.

CMDB CI Class Models: Release 1.8.0 adds the following classes for RHV. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
RHV LDC [cmdb_ci_rhv_ldc]	Logical Datacenter [cmdb_ci_logical_datacenter]	RHV logical datacenter.
RHV Datacenter [cmdb_ci_rhv_datacenter] This class is deleted.	N/A	N/A

CMDB CI Class Models: Release 1.6.0 adds the following classes for RHV.

Class	Extends	Description
RHV Server [cmdb_ci_rhv_server]	Virtualization Server [cmdb_ci_virtualization_server]	The RHV virtualization host.
RHV Object [cmdb_ci_rhv_object]	Virtual Machine Object [cmdb_ci_vm_object]	A base class for other classes to derive from.

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Class	Extends	Description
RHV Manager [cmdb_ci_rhv_manager]	Application [cmdb_ci_appl]	RHV Manager instance.
RHV Cluster [cmdb_ci_rhv_cluster]	RHV Object [cmdb_ci_rhv_object]	RHV cluster.
RHV Datacenter [cmdb_ci_rhv_datacenter] **Note:** This class is being deleted in the CMDB CI Class Models 1.6.0 release.	RHV Object [cmdb_ci_rhv_object]	RHV datacenter.
RHV Virtual Machine Instance [cmdb_ci_rhv_vm_instance]	Virtual Machine Instance [cmdb_ci_vm_instance]	RHV virtual machine instance.

Class columns

CMDB CI Class Models: Release 1.6.0 adds the following columns to the respective classes.

RHV Server [cmdb_ci_rhv_server] class

Added columns	Description
url	URL used to access the object.

RHV Object [cmdb_ci_rhv_object] class

Added columns	Description
href_id	Href ID.
manager_id	Manager ID.
url	URL to access the object (used in child classes).

RHV Manager [cmdb_ci_rhv_manager] class

Added columns	Description
url	URL of the manager.
product_name	Product name.

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RHV Cluster [cmdb_ci_rhv_cluster] class

Added columns	Description
cpu_type	CPU type.
cpu_architecture	CPU architecture.
ksm	Enabled state of kernel same-page merging (KSM) memory policy.
fencing_policy	Fencing policy.
memory_overcommitment	Amount of over-commitment memory allowed on the cluster.
transparent_huge_pages	Transparent huge memory pages policy.
ballooning	Memory ballooning for guests.
compatibility_version	Compatibility version.

RHV Virtual Machine Instance [cmdb_ci_rhv_vm_instance] class

Added columns	Description
mgmt_url	Management URL.
cpu_architecture	CPU architecture.
delete_protected	Delete protected (true/false).
ha_priority	HA priority.
high_availability	High availability (true/false).
memory_policy_guaranteed	Amount of memory guaranteed (MB).
memory_policy_max_mb	Maximum memory in the dynamic memory allocation policy.
multi_queues	Multi queues.
placement_policy	Placement policy.
cpu_sockets	Number of CPU sockets.
stateless	Stateless (true/false).
storage_error_resume_behaviour	Behavior of a virtual machine that is paused due to storage I/O error. For examples, AUTO_RESUME, LEAVE_PAUSED, and KILL.
start_time	Start time.
stop_time	Stop time.
threads	Number of threads.
time_zone	Time zone.
usb	USB enabled state.
run_once	Run once.
type	RHV type.

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The following class was deleted in the CMDB CI Class Models 1.6.0 release.

RHV Datacenter [cmdb_ci_rhv_datacenter] class

Added columns	Description
quota_mode	Quota mode policy.

Related topics

CMDB schema model

Transport Layer Security (TLS) extension classes

The CMDB CI Class Models store app adds or updates a class for TLS certificates.

The app adds class models that extend the CMDB class hierarchy. You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

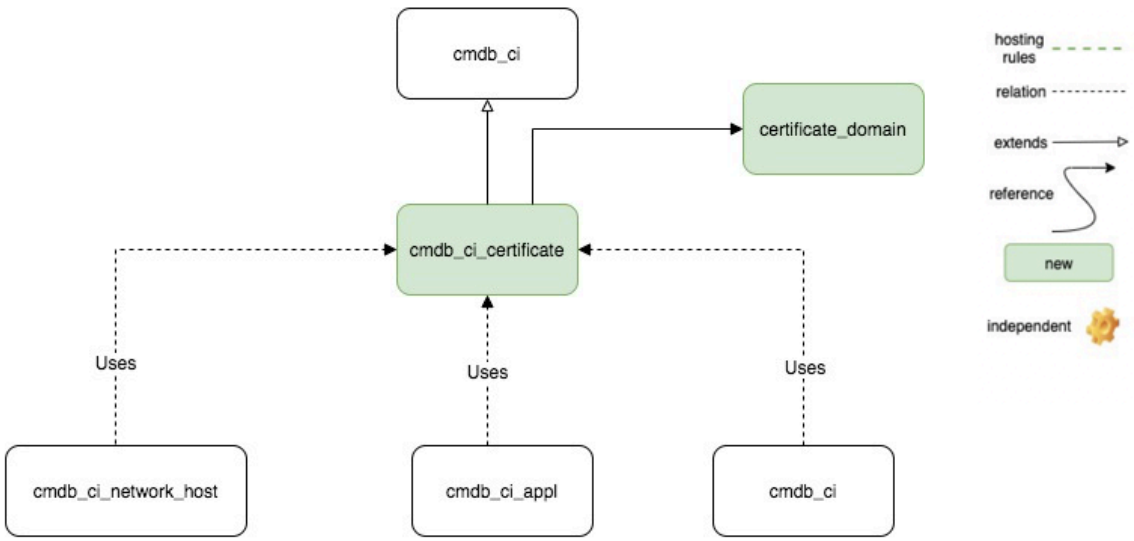
Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Transport Layer Security (TLS)

TLS is a cryptographic protocol designed to provide communications security over a computer network. The TLS protocol provides privacy and data integrity between communicating computer applications. Once the client and the server have agreed to use TLS, they negotiate a stateful connection by using a handshaking procedure. The server usually provides identification in the form of a digital certificate. The certificate contains the server name, the trusted certificate authority (CA) that vouches for the authenticity of the certificate, and the server's public encryption key. The client confirms the validity of the certificate before proceeding. When the handshake is completed, a secured connection is established.

TLS certificate classes integrated with the CMDB class hierarchy



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Scoped apps certification class

The scoped apps certification class supports TLS certificates. With this class you can proactively manage certificates by keeping stakeholders informed about any impending expiries. Use this extension class to ensure that certificates are monitored and renewed before they expire, to prevent severe outage of production systems.

Classes

This section lists the relevant classes that the CMDB CI Class Models store app adds or updates. See the class columns table for further details about the columns added for each class.

The CMDB CI Class Models: Release 1.4.0 updates the following class:

Class	Extends	Description
Unique Certificate [cmdb_ci_certificate]	Configuration Item [cmdb_ci]	A public key certificate in X.509 standard format.

The CMDB CI Class Models store app changes the Unique Certificate [cmdb_ci_certificate] class as follows:

- The *assigned_to* attribute now depends on the *assignment_group* attribute so that users in the *assigned_to* attribute are filtered based on the specified *assignment_group*.
- The Certificate Inventory and Management store app populates the Unique Certificate [cmdb_ci_certificate] table. The list view for that class does not have a **New** button and you can no longer add new records to the table. This is because there are certain fields that are extracted from binary encoded parameters in the certificate which users may not be able to provide. Also, certificates have to be discovered rather uploaded.
- You can no longer add or delete attachments in the *Certificate file* attribute.

The CMDB CI Class Models: Release 1.3.0 adds the following classes. For the list of CMDB classes in a base system, including ones that this store app might be extending, see CMDB tables descriptions.

Class	Extends	Description
Unique Certificate [cmdb_ci_certificate]	Configuration Item [cmdb_ci]	N/A
Certificate Domain [certificate_domain]	N/A	Fully qualified domain name.

Class columns

CMDB CI Class Models: Release 1.4.0 adds the following columns to the respective classes.

Unique Certificate [cmdb_ci_certificate] class

Added columns	Description
Certificate file	Certificate in an encoded form.
Fingerprint	Hash value of the certificate.

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Unique Certificate [cmdb_ci_certificate] class (continued)

Added columns	Description
Fingerprint algorithm	Algorithm used to hash the certificate.
Is certificate authority	Indicates whether a certificate is a Certificate Authority (CA) or not.
Is selfsigned	Indicates whether the certificate is self-signed or not.
Issuer	Entity that has signed and issued the certificate. Reference: Unique Certificate [cmdb_ci_certificate]
Issuer common name	Common name of the issuer.
Issuer distinguished name	Distinguished name of the issuer.
Key size	Size of the key used by the signing algorithm. Choices: • Create priority 1 tasks • Create priority 3 tasks • Do not create renewal tasks
Renewal tracking	Indicates whether to create any priority 1 or priority 3 tasks for the expiring certificates.
Root issuer	Root entity that has signed and issued the intermediate certificate. Choices: • External • Internal Reference: Unique Certificate [cmdb_ci_certificate]
Service type	Indicates whether the certificate is used for external or internal services.
Signature algorithm	The cryptographic algorithm used to sign the certificate. Choices: • Issued • Installed • Revoked • Retired
State	Lifecycle states of the certificate.

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Unique Certificate [cmdb_ci_certificate] class (continued)

Added columns	Description
Subject alternative name	List of fully qualified domain names secured by the certificate. Reference: Certificate Domain [certificate_domain]
Subject common name	Identifies the hostname/domain associated with the certificate.
Subject country	Subject's two letter country code.
Subject distinguished name	Identifying information of the subject.
Subject email	Subject's email.
Subject locality	Subject's locality.
Subject organization	Subject's organization.
Subject organizational unit	Subject's organizational unit.
Subject state	Subject's state.
Valid from	Validity start period of the certificate.
Valid to	Validity end period of the certificate.
Version	X.509 version of the certificate.

Certificate Domain [certificate_domain] class

Added columns	Description
Domain	Fully qualified domain name.

CMDB CI Class Models: Release 1.3.0 adds no columns.

Related topics

CMDB schema model

VMware NSX load balancer extension classes

The CMDB CI Class Models store app adds or updates classes for VMware NSX load balancers.

The app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can use the added classes as any other CMDB class. Applications such as Discovery and Service Mapping patterns can use these class extensions to populate CIs and discover various technologies and software.

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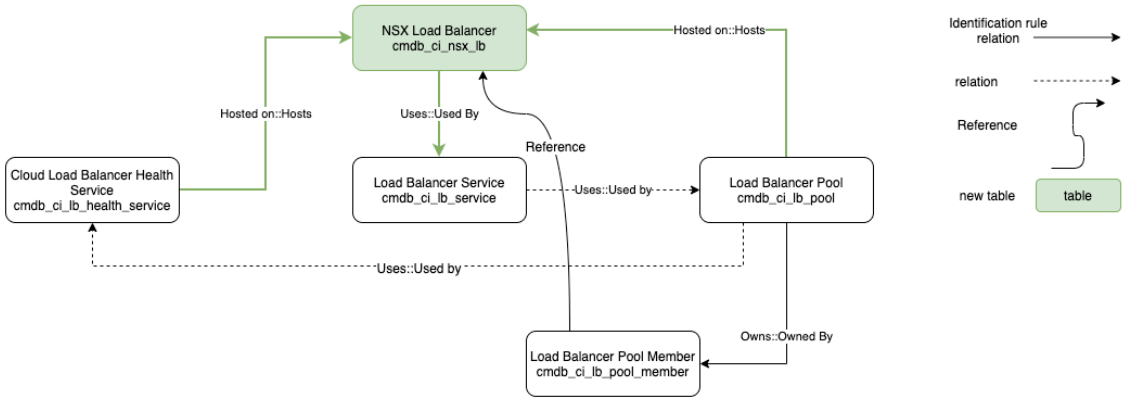
VMware NSX load balancer

NSX is a network virtualization solution offered by VMware. Among the virtual resources included in the NSX solution are virtual LANs (VLANs), virtual load balancers, virtual routers, switches, and firewalls.

ServiceNow Discovery uses the VMware NSX Advanced load balancer discovery pattern to find VMware NSX load balancers and their components: Listeners, pools, pool members, and health services.

VMware NSX load balancer classes integrated with the CMDB class hierarchy



Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates.

CMDB CI Class Models: Release 1.10.0 adds the following classes for the VMware NSX load balancer. For the list of CMDB classes in a base system, including ones that this store app is extending, see CMDB tables descriptions.

Class	Extends	Description
NSX Load Balancer [cmdb_ci_nsx_lb]	Load Balancer [cmdb_ci_lb]	The table containing the NSX Load Balancer resources.

Class columns

The VMware NSX Advanced load balancer discovery pattern introduces one new table with one identification rule and entry. The table uses only the columns inherited from its parent.

Related topics

CMDB schema model

Extend classes and rules

Extend and update CMDB CI Class Models store app classes and rules when using third-party integration tools.

When using a third-party tool to integrate with ServiceNow apps, gaps can occur between the integration and different CIs. Some of the integrated tables and classes may be missing classes and rules not included with the CMDB CI Class Models store app.

The classes and rules in the following table enable you to add and extend the CMDB CI Class Models store app for integrations:

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Table	Extends	Rules and related entries
Postgresql Schema cmdb_ci_postgresql_schema	cmdb_ci_db_catalog	Containment rule: cmdb_ci_db_postgresql_instance->Contains:Contained By->cmdb_ci_postgresql_schema
		Identification Rule: Dependent, Attributes: name
		Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_postgresql_schema • Related table: cmdb_key_value • Referenced field: configuration_item
Information Object cmdb_ci_information_object	cmdb_ci	Identification rule: Independent, attributes: name
		Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_information_object • Related table: cmdb_key_value • Referenced field: configuration_item
Oracle Catalog cmdb_ci_db_ora_catalog	cmdb_ci_db_catalog	Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_db_ora_catalog • Related table: cmdb_key_value • Referenced field: configuration_item
MySQL Catalog cmdb_ci_db_mysql_catalog	cmdb_ci_db_catalog	Containment rule: cmdb_ci_db_mysql_instance->Contains:Contained By->cmdb_ci_db_mysql_catalog
		Identification rule: Dependent, attributes: name
		Related Entries (cmdb_related_entry):

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Table	Extends	Rules and related entries
		• Identifier: cmdb_ci_db_mysql_catalog • Related table: cmdb_key_value • Referenced field: configuration_item
MS SQL Database cmdb_ci_db_mssql_database	cmdb_ci_db_instance	Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_db_mssql_database • Related table: cmdb_key_value • Referenced field: configuration_item
Sybase Catalog cmdb_ci_db_syb_catalog	cmdb_ci_db_catalog	Containment rule: cmdb_ci_db_syb_instance->Contains:Contained By->cmdb_ci_db_syb_catalog
		Identification rule: Dependent, attributes: name
		Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_db_syb_catalog • Related table: cmdb_key_value • Referenced field: configuration_item
DB2 Catalog cmdb_ci_db_db2_catalog	cmdb_ci_db_catalog	Containment rule: cmdb_ci_db_db2_instance->Contains:Contained By->cmdb_ci_db_db2_catalog
		Identification rule: Dependent, attributes: name
		Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_db_db2_catalog • Related table: cmdb_key_value • Referenced field: configuration_item

For the list of CMDB classes in a base system, including ones that this store app is extending, see CMDB tables descriptions.

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Related topics

CMDB schema model

Baseline CMDB

CMDB baseline provides capabilities that help you understand and control the changes that have been made to your configuration items (CIs) in the CMDB.

- You can create a baseline, which is a snapshot of your configuration items in the CMDB. You can review the changes that have been made to that configuration item since a previous baseline. Multiple baselines may be created and the system tracks the changes that have been made per baseline.

  Creating a baseline captures the attributes of the CI as well as all first-level relationships for the CI. Any changes to the base CI or to any related CIs are captured and displayed. Newly created CIs are not automatically added to a baseline.

- Associate a configuration item with a task, a change or change task, and to propose changes to the CI after the change is complete. You can record changes, and these changes are not applied to the CI immediately but are delayed until the change is complete.

  When the change is complete, you can choose to apply the proposed changes which makes all changes previously proposed and associates the changes with the task.

  For information about planning and implementing a baseline CMDB, see the CMDB Baseline life-cycle best practices and Diff Formatter troubleshooting [KB0829681] knowledge base article.

Create a CMDB baseline

You can create a baseline for a CI to track updates to the CI over time.

Before you begin

Role required: ecmdb_admin and itil

Procedure

1. Navigate to **All** > **Configuration** > **Baselines** > **Baselines**.
2. Click **New**.
3. Enter a **Name** for the baseline.
   By default, the cmdb_ci table is selected so that the record creates the baseline for all configuration items in the system.
4. **Optional:** To limit the baseline to specific CIs, select a different **Table** or choose **Conditions** that a CI must meet for it to have a baseline entry.

   Example
   For example, you might create a baseline for the Database table with the condition **[Location] [is] [<configured location>].**
5. Click **Submit**.
   The creation of a baseline is time consuming and occurs in the background. A message at the top of the record list notifies you that your baseline has been scheduled and you will receive an email when the process is complete.

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Display baseline differences

You can see the changes that have been made to a CI or any first level related CIs by configuring the CI form layout to display the CMDB Baseline diff field. This field is labeled Baseline differences on the form.

Before you begin

Role required: itil

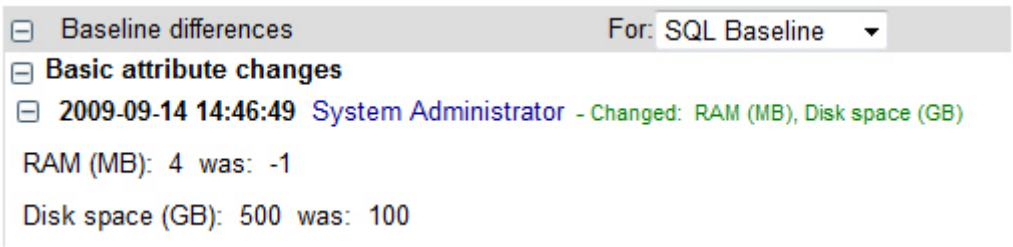
About this task

Changes are displayed only for the cmdb_ci table and child tables. You can change the *com.cmdb.baseline.max_changes* system property to limit the number of relationships and changes that appear in a baseline diff section on a CI form (set to 100 by default).

Procedure

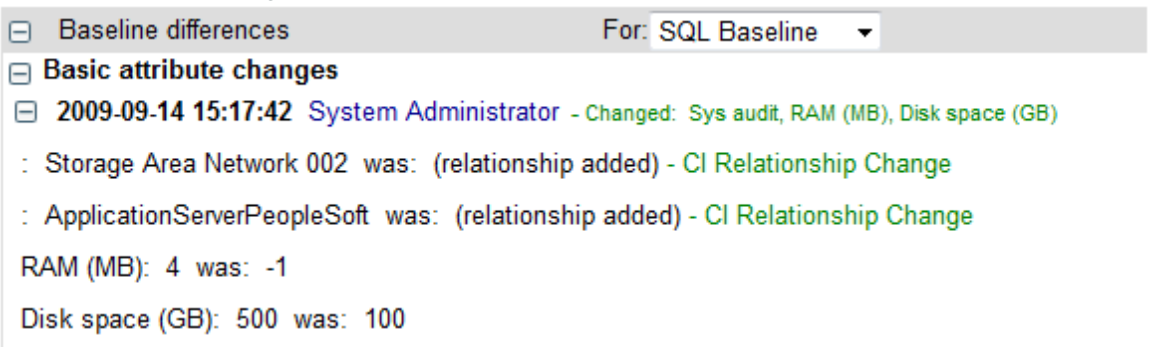
1. Open a CI record.
2. Select the baseline you want to see for this CI from the choice list.
   The field displays the details of any changes that were made to the current record for the selected baseline, or indicates that no changes were made.

Details of baseline differences



3. To add a relationship to the CI, click the green plus icon in the **Related Items** toolbar.
   The new relationship appears below the toolbar. For more information about the Related Items toolbar and how to control the display, see CI relations formatter.
4. Update a related CI and see the changes displayed as **Basic attribute changes** in the current CI record.

Basic Attribute Changes



What to do next

To improve performance and prevent memory issues when showing large amounts of baseline differences data on CI forms, complete the following steps:

1. Set the system property *com.cmdb.baseline.entry.attachment* to true.
2. Manually run once the *CMDB Baseline convert XML to attachment* fix script. For information about running a fix script, see Run fix scripts.

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Properties for baseline CMDB

Use the baseline CMDB properties to configure how many changes and relationships for a CI can appear in the baseline diff for the CI.

These properties are available for baseline CMDB. To view and edit these properties, the admin role is required.

Properties for Baseline CMDB

Property	Description
Maximum number of changes and relationships for a CI that can appear in the baseline diff for the CI. com.cmdb.baseline.max_changes	• Type: integer • Default value: 100 • Location: **Configuration** > **CMDB Properties** > **Baseline Properties**
com.cmdb.baseline.entry.attachment	Lets you manually run the *CMDB Baseline convert XML to attachment* fix script. Setting this property to true and then running the *CMDB Baseline convert XML to attachment* fix script, enables improved performance when showing large amounts of baseline differences data on CI forms. When false, the CMDB Baseline Diff component uses legacy methods which might fail to load large amounts of baseline differences data. • Type: true | false • Default value: false • Location: Add to System Properties [sys_properties] table. • Learn more: Baseline CMDB

CMDB Workspace store app

The CMDB Workspace is an efficient, central, and modernized way for you to work. Use CMDB Workspace to search and explore the CMDB, examine health and recent activity, and access various CMDB dashboards and tools to support tasks in your organization.

Introduction

Watch the following video to get started with CMDB Workspace. Depending on the version of your CMDB Workspace, some UI elements and features might differ. Introduction to CMDB Workspace

General interaction and additional information

- CMDB Workspace leverages many Performance Analytics capabilities and features, such as indicator sources. Throughout the CMDB Workspace views, you can select the various cards to drill down to Performance Analytics KPI Details panes that show trends for the associated data.

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On a KPI Details pane, you can modify different settings to change the scope of the data. You can also select **Show Records** to list the records associated with the chart.

- Lists throughout the CMDB Workspace have a filter icon () that you can select to show the filter definition used for the list.
- You can open your Configurable Workspace experience in UI Builder to access and edit your CMDB Workspace experience.
- See List of workspaces for a list of all Workspaces that ServiceNow® provides.

CMDB Workspace doesn't support domain separation.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Note:
Starting with the San Diego release, the CMDB Workspace store app is automatically installed when installing or upgrading the product.

Enable demo data

Enable demo data to install demo data-specific scheduled jobs that if the needed requirement is met, generates and populates demo data in CMDB Workspace cards such as:

- Cloud vs Non-cloud resources chart in the CMDB Workspace landing page and the Insights view: If Cloud Service Accounts [cmdb_ci_cloud_service_account] table exists
- Cards in the CMDB 360 view: If CMDB 360 is enabled
- Cards in the Insights view, CMDB Feature Adoption tile:
  - CIs processed by IRE
  - CIs processed by IRE based on source
  - Data Manager
  - Data attestation
  - Query Builder
  - Intelligent Search
- Cards in the What's new tile in the CMDB Workspace landing page.

To populate CMDB Workspace dashboards with demo data:

1. When installing the CMDB Workspace store app, check **Load demo data**.
2. Access the *[Demo] – CMDB Workspace demo data* scheduled job and select **Execute Now**.

Note:
As a general practice, don't enable demo data in a production instance to prevent demo data mixing with real production data.

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Prerequisites

- Plugins:
  - Recommended: CSDM Activation (com.snc.cmdb.csdm.activation)

    Allows for legacy *`Lifecycle Status`* field mappings and synchronization to legacy status fields. For details about use and customization of life-cycle rules when this plugin isn't activated, see Life-cycle rules and retirement definitions.
  - Required (activated by default): CMDB CSDM Support (com.snc.cmdb.csdm)
  - Required (activated by default): CMDB Page Templates (sn_cmdb_pg_templts)
  - Required (activated by default): CMDB NLQ Search Connected (sn-cmdb-nlq-search)

  For details about activating a plugin, see Activate a plugin.
- Roles: To access the CMDB Workspace, you must, at a minimum, have one of the following roles, which are essential for interacting with the CMDB Workspace. Depending on which of these roles is assigned to you, you might only have access to some of the features available in the CMDB Workspace:
  - sn_cmdb_admin
  - sn_cmdb_editor
  - sn_cmdb_user

  Note:
  As you drill down in the CMDB Workspace, there are some dashboards and list views that require specific roles in addition to the key CMDB Admin, CMDB Editor, or CMDB User roles.
- Features: CMDB Workspace provides access to a wide range of applications and features. However, for CMDB Workspace to provide meaningful reports, overviews, and trends, you must set up and configure some of those features. Setup for such features is listed under Additional requirements.

Access the CMDB Workspace

Navigate to **Workspaces** > **CMDB Workspace** to access the CMDB Workspace landing page.

In addition to the Home view described below, you can access features in the following views of the CMDB Workspace:

- My Work view: Manage CMDB Data Manager tasks such as attestation tasks, that are assigned to you.
- CMDB 360 view: View aggregations and analysis of CMDB 360 data on a dashboard, and create CMDB 360 queries.
- Management view: View recent key activities and health indicators for the CMDB, and access management tools and dashboards (accessible only to CMDB admins) that support your management tasks.
- Insights view: View level of adoption of key CMDB tools, features, and application services. Explore benefits and install those tools and features to maximize the efficiency of your CMDB functionality.

Intelligent Search

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

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Lets you use Natural Language Query (NLQ) search capabilities provided by Intelligent Search for CMDB. Use the input field to construct a search string using everyday language. As you type, a dynamic list of relevant suggestions appears, with items matching single words or part phrases in the typed-in text, such as table names.

You can:

- Select **Search tips** to see tips about constructing search strings. See details about the usage, examples for single and multi-table search, advanced filtering, and relationships in Intelligent Search.
- Select **Search** to either run the query if the search string is already fully converted into a valid CMDB query, or to open the Refine your query dialog box.
  - If the search string has no ambiguities with the table name or relationships, then the query runs and the results appear in a list view format.

    Only the first 100 results of the query appear in the results pane.
    - Select **Load More Results** to view the next set of 100 results.
    - Select **Load All Results** to view the rest of the query results, up to the number specified by the glide.cmdb.query.max_results_limit system property (10,000 by default).

    If the constructed CMDB query contains more than a single table, then the **View in Query Builder** button appears. Select the button to open the CMDB Query Builder with your query fully constructed on the Query Builder canvas. You can use the Query Builder to continue editing the query.
  - If there are any ambiguities with table names or relationship types in the search string, then the search string can't be converted into a valid CMDB query. In this case, the Refine your query dialog box appears letting you select from suggested CI classes and continue to parse your search string into a valid CMDB query. Those suggested CI classes are based on phrases in your search string. Use the drop-down lists to select the CI classes that match your intended search and then select **View search results** to run the query.
  - If Intelligent Search is unable to convert your search string into a valid CMDB query, then selecting **Search** doesn't generate any query results. Instead, a feedback form appears. Fill out the form and select **Submit Feedback** to record your feedback for your CMDB Admin to review.
- Use the Sample searches list to get you started in running a pre-defined search. This list consists of more common searches, or searches that are more difficult to construct such as searches that involve application services.
- Use the Your recent searches list to rerun a previous search.
- Select **Results Feedback** to submit feedback on the search results for your CMDB Admin to review.

For more details about using NLQ with Intelligent Search, see Intelligent Search for CMDB.

Alternatively, you can select **Use conditional search instead** to use a basic condition builder functionality where you can specify conditions to search for CIs of a specific class.

You can:

- Select **New condition set** to add a condition phrase.
- Select **Related List Condition** to add a condition phrase for related lists.
- Select **Search** to search through the CMDB.

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- Add and then adjust the *sn_cmdb_ws.list.record_count_limit* system property to limit the record count summation and so to minimize the performance impact of that operation. The record count shows on the Conditional search page, for example, above the results list. For more information about adding and modifying that system property, see Components installed with CMDB Workspace.

In the results list, select a CI to see details including a timeline, health overview, and several types of attributes such as key and discovery attributes. For more information, see Cloud vs Non-cloud resources.

UI activity	Additional requirements
• Mapped Application Service • Application Service • Application Service Group • Dynamic CI Group • Tag Based Service	app_service_user role
• Business Service • Technical Service • Application Service Outage	service_viewer role

Important actions

Accessible to: CMDB Admin and CMDB Editor.

Important actions of various categories that require your attention or action. There are several task categories such as:

- Health tasks generated by CMDB Health: In health-related cards, such as Duplicate CIs, Orphan CIs, stale CIs, and De-Duplication tasks, select **View CIs** or **View Tasks** to drill down to the list of associated CIs or important tasks. In de-duplication-related cards generated by IRE, you can access the De-duplication dashboard and de-duplication libraries, to remediate de-duplication tasks in bulk.
- Data attestation and life cycle approval tasks generated by the CMDB Data Manager: In data attestation-related cards, such as Reassignment Requests and Unassigned Overdue cards, selet **View Tasks** to drill down to the associated important tasks.

Important actions are stored in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table that is accessible for editing only to users with the sn_cmdb_admin role. Authorized users can modify attributes of an important action such as *Active* and *Filter conditions*, but can't modify the *Type*, *Persona*, and *Table* attributes.

- Important action cards show per the logged in user role, as specified in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table.
- A card appears only if there is at least one record that meets the card's filter condition.
- If you drill down a Health-related card and modify an associated CI, any resulting impact to health KPIs might appear only after the next cycle of the CMDB Health dashboard jobs.

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For information about managing the cards in the Important actions tile, see Modify important actions in CMDB Workspace.

What's new

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

Counts of newly created CIs within a recent time interval. The New CIs total counts all CI types including applications, hardware, and application services, which also appear in separate cards in the tile. By default, historical data is aggregated for the **Last 24 hours**, which you can set to a different time interval such as **Last 7 days**.

Select a card to drill down to a Performance Analytics KPI Details pane that shows the trend for the respective item.

Counts in the What's new cards are based on the following tables:

Count	Table
New CIs	Configuration Item [cmdb_ci]
New application	Application [cmdb_ci_appl]
New hardware	Hardware [cmdb_ci_hardware]
New application services	Application Service [cmdb_ci_service_auto]

CI overview

The following tabs provide summaries about CIs:

CI Summary

Accessible to: CMDB Admin, CMDB Editor, CMDB User (without tabs).

A chart of all CIs in the CMDB, grouped by up to 20 CMDB groups. The CMDB groups in the chart are specified as groups of closely-related classes.

Select a bar to drill down to the classes in the group and their CIs. Then, drill down a CI to show the Cloud vs Non-cloud resources with a timeline, health overview, and several types of attributes such as key and discovery attributes.

You can add custom class groups by creating CMDB groups with the following settings:

- Group type is set to 'CMDB Workspace'.
- Populated by encoded queries.

Such custom class groups will appear after the next time that the *CMDB Workspace - Group* and *Encoded Query Counts* scheduled jobs run and update the CMDB Workspace.

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Note:

In systems with a very large number of CIs, for example a billion or more CIs, the set of queries that populate the CI Overview widget might run for an unreasonable length of time. In that case, you can choose to switch the default queries with a set of simpler queries that can handle such load and properly load the CI Overview widget. However, the results yielded from the simpler queries aren't as complete or accurate as the results of the original queries. A fundamental difference between the original and the simpler queries is that the simpler queries use only Common Service Data Model (CSDM) attributes for CI status (such as *life_cycle_stage*), while the default queries also use the legacy *operational_status* and *status* attributes. In an environment that hasn't migrated to CSDM, the simple queries yield fewer results.

You can examine (read access only) the simple query in the *Simple Condition* column in the *cmdb_group_contains_encoded_query* table.

To use the simpler set of queries, set the *sn_cmdb_ws.ci_overview.enable_simple_condition* system property to **true** (**false** by default).

My CIs

Accessible to: CMDB Admin, CMDB Editor.

A chart of CIs with *Managed By Group* being one of the groups you are a part of. CIs are grouped by up to 20 common class categories such as *Applications*, *Devices*, and *Servers*. If there are more than 20 classes to show, then all remaining classes are lumped into one additional bar on the chart.

Select a class bar to drill down into the CIs for the class. Then drill down to any Cloud vs Non-cloud resources with a timeline, health overview, and several types of attributes such as key and discovery attributes.

Use the sn_cmdb_ws.ci_overview.managed_by_me.enabled property to show or hide this chart.

Cloud vs Non-cloud resources

Note:
This procedure applies to Vancouver and later instances. If you are using an instance older than Vancouver, see the next item..

Charts showing counts and details for resources that are hosted on various cloud services versus those resources that aren't, with breakdown by key CI classes such as applications, databases, and datacenters. Resources can be deployed on cloud services such as the Microsoft Azure Cloud, or on the local instance or other non-cloud solutions. For some ongoing operations in the organization, it might be necessary to have those details that can be difficult to obtain.

The following conditions must be met for the Cloud vs Non-cloud resources charts to appear and to show meaningful data:

- The table Cloud Service Accounts [cmdb_ci_cloud_service_account] must exist.
- The Logical Datacenter [cmdb_ci_logical_datacenter] table must contain at least one record for a cloud datacenter.

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- The Datacenter Types [sn_cmdb_ws_datacenter_type] table must contain at least one record for a datacenter that is classified as cloud storage in the organization. In the base system, this table is pre-populated with several records for common cloud services such as the Azure Datacenter [cmdb_ci_azure_datacenter) class. The chart calculates and shows data only for cloud services for which there's a record in the Datacenter Types [sn_cmdb_ws_datacenter_type] table.

  For details about adding datacenters in your organization, with the cloud or non-cloud classification, see Configure datacenters for the Cloud vs Non-cloud resources chart.

The following cloud vs Non-cloud charts are available:

- CI classes bar chart:

  Each bar in the CI classes chart represents a pair of a CI class and a storage type (cloud, non-cloud), such as the bar for Applications/Cloud. For each bar, there's a scheduled job that runs every 24 hours to collect and calculate the data for the bar. The running time depends on the amount and complexity of the data that a job collects, which can be different for each scheduled job. Also, the schedules of the jobs are staggered so that they don't all run at the same time and exhaust resources. For details about the class-specific criteria used for the chart calculations, see Class-specific criteria for the Cloud vs Non-cloud resources chart.

  If there's a CI class/type pair that isn't important in the organization, you can exclude that pair from the CI classes chart. For more details, see Configure CI classes for the Cloud vs Non-cloud resources chart.

  On the CI classes chart, you can:

  - Select a bar to open the Cloud vs Non-cloud resources pane. Then, select either of the following tabs to drill down into further details for the bar:

    Cloud vs Non-cloud CIs

    Shows a bar chart for CIs stored on a cloud service and those CIs that aren't, per CI class. For each CI class, select the cloud or the non-cloud bar to show the CIs that are associated with the selected bar, in a list view. You can then select a CI from the list to further drill down to the CI details pane.

    CI Classes by Cloud Providers

    Pie charts per CI class with more granular details for those CIs that are hosted on cloud providers. Pie slices have randomly-selected colors, and they show a breakdown by cloud providers for various CI classes. For each pie, select a slice to show the CIs that are associated with the pie slice, in a list view. You can then select a CI from the list to further drill down to the CI details pane.

  - Select **Latest updates** to see updated status for the scheduled jobs that produce the data for the chart. Status is color-coded to indicate whether the job has completed successfully (green), or failed to complete (red).

- Application Services pie chart:

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The Application Services pie chart is available starting with CMDB Workspace v3.6.

The Application Services pie chart uses the Service Configuration Item Associations [svc_ci_assoc] table and checks the cloud/non-cloud status of application service CIs in the CI classes chart. Application services in the Application Services pie chart are classified as follows:

- Cloud: All of the CIs in the application service have been determined to be hosted on a cloud service.
- Non-cloud: All of the CIs in the application service have been determined not to be hosted on a cloud service.
- Hybrid: The application service contains a mixture of CIs where some are hosted and some aren't hosted on cloud services.
- Unknown: The cloud/non-cloud classification couldn't be determined because some of the application service CIs aren't classified as cloud or non-cloud CIs.

Note:
Because classification of Application Services depends on the classification of CIs in the CI classes chart, there might be some discrepancy between the two charts. This can occur if an application service CI changed its cloud/non-cloud status, and the Application Services chart hasn't refreshed yet to reflect that change.

Select the Application Services chart to access the list views of the associated application services, grouped by cloud/non-cloud classifications. From those list views, you can drill down to the Dependency Views map for application services.

The scheduled jobs associated with the charts are set up with several hard-coded limits that if exceeded, result in failure conditions that are reflected in the job status. Timing out is set to two hours and the maximum number of records to collect is set to 500,000. If a job exceeds any of those limits, it's automatically stopped.

A scheduled job that can't complete for 3 (default) consecutive days is automatically disabled for future runs. You can manage the disabling of scheduled jobs, in the following ways:

- Modify the default number of consecutive days that are counted by adding the *sn_cmdb_ws.insight.category.disable_after_failure* system property to the System Properties [sys_properties] table and then setting its value. For more details, see Add a system property.
- Resume a disabled scheduled job.

UI activity	Additional requirements
• Mapped Application Service view • Application Service • Dynamic CI Group • Tag Based Service	app_service_user role

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My work

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

All open tasks from CMDB Data Manager that are assigned to you, or to an assigned group in the *Managed by Group* attribute which you are a member of. For CMDB Admins, also tasks that aren't assigned to anyone so that CMDB Admins can assign those unassigned tasks. Tasks can be, for example, attestation tasks and life cycle-related tasks.

Select **Open tasks** and **Overdue tasks** to review and process the tasks.

CMDB Health

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

Health metrics for CIs and relationships. Select the percentage numbers to navigate to the CMDB Health and CMDB Relationship Health dashboards:

- The Overall percentage number represents the health of all CIs as an aggregation of all three health Key Performance Indicators (KPIs). Those KPIs are correctness, compliance, and completeness, each consisting of sub-metrics.
- The Relationship percentage number represents the overall health of relationships as an aggregation of the orphan, duplicate, and stale relationships KPIs.
- The color-coded status label follows the CMDB Health scorecard thresholds specified in the CI Class Manager. However, the labels 'Best', 'At Risk', and 'Critical' are replaced by 'Excellent', 'Fair', and 'Poor' respectively. For more information see, Configure CMDB Health scorecard thresholds.
- Select **Factors impacting your score** to see the breakdown of the score percentage by the three key KPIs (Completeness, Compliance, and Correctness).

For more information, see CMDB Health, CMDB Health KPIs and metrics, and View CI relationships health.

UI activity	Additional requirements
CMDB Health	asset or itil role Set up and configure CMDB Health

Total CIs

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

Count and trend of the total number of CIs in the CMDB for the past 7 days.

Use the sn_cmdb_ws.total_cis.enabled property to show or hide this chart.

Quick links

A list of links to key CMDB dashboards and tools. You can add a link to the list of quick links that are available to you.

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- Dependency View: Provides a graphic infrastructure view for a CI and any application or business services that it's part of and that it supports.
- Query Builder: Easily build complex infrastructure and service queries, that span multiple CMDB classes, non-CMDB tables, and that can involve many CIs that are connected by different relationships.
- CMDB Data Manager: Centrally create, edit, review, publish, and track Data Manager policies and the tasks generated by the policies.
- CI Class List : List view of CMDB CIs grouped by common classes.
- Unified Map: Graphical map showing the hierarchy of CIs and the relationships between them, and application services. Directly from the map, you can access attributes of CIs and relationships, and related items such as changes, incidents, and problems for a CI.

UI activity	Accessibility	Additional requirements
Dependency View	CMDB Admin, CMDB Editor, CMDB User	dependency_views role
Query Builder	CMDB Admin, CMDB Editor, CMDB User	cmdb_query_builder_read role
Data Manager	CMDB Admin	
Add or edit a custom quick link	CMDB Admin, CMDB Editor, CMDB User	

Shared pages

For information about the shared pages, see the Dev site as follows:

- CI Service Relationships
- CI Infrastructure Relationships

CI details pane

When you drill down to a CI record, the following details for the CI appear:

- CI Timeline - Last 14 days: A timeline of CI activities such as change requests.
- CI Health: A summary of the health of the CI, showing related items such as critical incidents, incomplete attributes, and stale relationships for the CI.

  Role requirement: itil (for accessing incidents).
- Details: CI attributes, grouped into categories such as Key attributes, Asset attributes, Discovery attributes, Operational attributes, and More attributes.

> **Note:**
> Use the *CMDB - Workspace* form view for a CI class to configure which attributes appear.

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- Activity: An activity stream to track what's changed in the CI record.
- Infrastructure Relationships: List of the infrastructure CIs related to the CI.
- Service Relationships: List of business applications, service offerings, and application services that the CI may be related to.

On the CI details pane, you can:

- Select **Open Dependency View** to open the Dependency Views map and display a graphic infrastructure view of the specific CI record.
- Select **View CMDB 360 Data** to show CMDB 360 details at the CI attribute level for the specific CI record.
- Select **Save** to save any changes made to attributes for the CI record.
- Select the More Actions icon (...) for additional functions:
  - Select **Create Change** to create a new change request for the CI record.
  - Select **Create Incident** to create a new incident for the CI record.
  - Select **Delete** to delete the CI record.

UI activity	Additional requirements
CI Details Accessible to: CMDB Admin, CMDB Editor, CMDB User	
CI Health	itil
Related Open Changes Accessible to: CMDB Admin, CMDB Editor, CMDB User	sn_change_read role
Related Incidents Accessible to: CMDB Admin, CMDB Editor, CMDB User	sn_incident_read role
Related Alerts Accessible to: CMDB Admin, CMDB Editor, CMDB User	Event Management (com.glideapp.itom.snac) plugin evt_mgmt_user role Set up Event Management
Related Application Services Accessible to: CMDB Admin, CMDB Editor, CMDB User	app_service_user role

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UI activity	Additional requirements
View CMDB 360 Data Accessible to: CMDB Admin, CMDB Editor, CMDB User	Enable and configure CMDB 360
Save Accessible to: CMDB Admin	
More Actions/Delete Accessible to: CMDB Admin	

My Work view in CMDB Workspace

Use the My Work view in CMDB Workspace to manage your tasks. Tasks in this view are related to data compliance such as attestation, certification and other life-cycle related tasks. The list of tasks for CMDB administrators can also contain unassigned tasks, for reassignment.

For CMDB administrators, lists of tasks can also contain unassigned tasks, for reassignment. For managers, tasks of direct reports are included, and if you are a manager of a user group, then tasks of members in that group are also included.

Access

Role requirements: sn_cmdb_admin (CMDB Admin), sn_cmdb_editor (CMDB Editor), or sn_cmdb_user (CMDB User).

To access the My Work view, navigate to **Workspaces** > **CMDB Workspace** and then select **My Work** in the CMDB Workspace menu bar.

Task status

The Task status section provides overall counts of tasks by their status. Counts in each status card are for attestation and non-attestation, certification, and life-cycle tasks as applicable. Total tasks for example, is a count of all open tasks from CMDB Data Manager that are assigned to you, or to an assigned group in the *`Managed by Group`* attribute which you are a member of. For CMDB Admins, also tasks that aren't assigned to anyone.

Select a status card to show the associated tasks in the **Attestation tasks** and **All other tasks** tabs in the My tasks section. For example, when you select the In progress status card in the Task status section, the **Attestation tasks** list shows attestation tasks that are in progress and the **All other tasks** list shows all non-attestation tasks that are in progress.

Certification tasks

The Certification tasks list view in the My tasks section lists any Data Certification tasks assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager policies. For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included. Review and process these tasks by checking audit results for the associated CIs and attribute values. For more information about reviewing Data Certification tasks, see Review certification tasks in CMDB Workspace.

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Attestation tasks

The **Attestation tasks** tab in the My tasks section lists any attestation tasks assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager Attestation policies. For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included. Review and process these attestation tasks by checking the physical existence of IT infrastructure or applications associated with the CIs in the tasks. For information about reviewing and processing attestation tasks, see y.

The **Overdue tasks** tab lists those tasks that are overdue so you can review those tasks at a higher priority.

Life-cycle tasks

The **All other tasks** tab in the My tasks section lists any tasks, aside from attestation and certification tasks, assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager policies. For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included. Review and process these tasks.

CMDB 360 view in CMDB Workspace

The CMDB 360 dashboard provides aggregations and analysis of CMDB 360 data. CMDB 360 collects data about all the discovery sources reporting attribute values for CIs. Use the CMDB 360 view in Configuration Management Database (CMDB) Workspace to track activities and identify potential issues of discovery sources. You can also create your own queries and associated schedules and reports to explore CMDB 360 data.

- For concepts and other background information about CMDB 360/Multisource CMDB, see CMDB 360/Multisource CMDB.
- For information about all CMDB 360 dashboard settings, see Configure the CMDB 360 dashboard.
- For information about using the CMDB 360 view, see CMDB 360 experience in CMDB Workspace.

Note:
Most cards on the CMDB 360 dashboard support non-CMDB tables in their aggregation, or can be configured to provide support. However, the CIs not reported by discovery sources card, for example, doesn't apply to non-CMDB tables. Creating queries for non-CMDB tables is also supported. For information about support for non-CMDB tables, see IRE support for non-CMDB tables.

Access

Requirements:

- Role requirement: sn_cmdb_user (CMDB user) or any role containing sn_cmdb_user
- Additional requirement: Enable and configure CMDB 360

To access the CMDB 360 view in the CMDB Workspace, navigate to **Workspaces** > **CMDB Workspace**. In the CMDB Workspace menu bar, select **CMDB 360**.

Management view in CMDB Workspace

The Management view provides CMDB Admins with quick access to key management tools and deep insights into CMDB health and activities. The view provides and details such as duplicate CIs and recent activities in the CMDB.

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Access

Role requirement: sn_cmdb_admin (CMDB Admin)

To access the Management view, navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.

CMDB Data Manager

The following cards show details about CIs and policies associated with CMDB Data Manager:

Rejected CIs

CIs set as rejected during a review of attestation tasks.

Excluded CIs

CIs set as excluded from CMDB Data Manager policies.

Draft policies

Draft Data Manager policies that were created but not published.

CI Correctness

Cards in this section show health state for the sub metrics of the CMDB Health correctness KPI. Counts are based on testing CIs against pre-defined data integrity rules such as:

- Identification rules (to detect duplicate CIs)
- Orphan CI rules
- Staleness CI rules

You can set the time interval used in calculations for these counts.

For more information about the correctness KPI, and the duplicate, orphan, and stale sub metrics, see CMDB Health KPIs and metrics.

Recent activity trends

The following cards show recent activities in the CMDB:

Recent CI Activity

A 7-day chart showing metrics related to CIs such as the number of new CIs and updated CIs.

Recent Application Service Activity

A 7-day chart showing metrics related to Application Services such as the total number of Application Services, new and updated Application Services, and the number of Application Services with outages.

Management tools

Provides links that you can use to access CMDB dashboards, tools, and list views. The links are grouped by categories as described below.

Note:
Some links are conditionally available based on installation of applications, active plugins, and your assigned role. For a link that doesn't appear, make sure that all the requirements for the link are met.

Manage:

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- CI Class Manager: Centrally view, create, or edit class definitions and class settings for Identification and Reconciliation (IRE) and for CMDB Health.

  Additional role requirement: itil or personalize_dictionary.

- Data Manager: Centrally create, edit, review, publish, and track Data Manager policies and the tasks generated by the policies.
- De-duplication Template Library: Create and manage de-duplication templates and libraries to remediate de-duplication tasks in bulk.
- De-duplication Dashboard: Show counts and insights for duplicate CIs in the CMDB, and run and track de-duplication templates to remediate de-duplication tasks in bulk.
- CMDB Groups: Show a list view of current CMDB groups where you can create new CMDB groups, and manage the existing CMDB groups. A CMDB group is a collection of CIs to which you can apply CI actions collectively to all the CIs in the group. For example, CMDB Health can monitor CIs in a Health-type CMDB group, and report the aggregated health for the group as a whole.
- Dynamic CI Groups: Show a list view of current dynamic CI groups where you can create new dynamic CI groups, and manage the existing ones. Dynamic CI Groups act as application services that are populated with members of the CMDB group that is associated with the dynamic CI group. For more information about dynamic CI groups, see Application services.

Optimize:

- CMDB Health: View the CMDB Health dashboards and configure the CMDB health KPIs and metrics that CIs are evaluated by in CMDB Health dashboards.

  Additional requirements:

  - Set up and configure CMDB Health
  - Roles: asset or itil

- CMDB Data Foundations Dashboard: Displays the CMDB Data Foundations dashboard.

  Additional requirements:

  - Set up CSDM and CMDB Data Foundations Dashboards
  - Roles: asset, Itil_admin, or admin
  - Plugin: com.snc.cmdb.getwell

- De-Duplication Tasks: Remediate a de-duplication task by using the Duplicate CI Remediator wizard which guides you through the duplicate CI reconciliation process.

  Additional role requirement: itil.

- CMDB Remediation Rules: Rules associated with a CMDB Health task that was created for a failed CMDB Health test. A CMDB remediation rule runs a remediation workflow to remediate an issue reported by CMDB Health.

Visualize:

- Dependency Views: Provides a graphic infrastructure view for a CI and any applications or business services that it is part of and that it supports.

  Additional role requirement: dependency_views.

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- Query Builder: Easily build complex infrastructure and service queries, that span multiple CMDB classes, non-CMDB tables, and that can involve many CIs that are connected by different relationships.

  Additional role requirement: cmdb_query_builder_read.

Create: New Technical Service

Additional role requirement: service_admin.

Insights view in CMDB Workspace

Use the Insights view in CMDB Workspace to see and increase the level of adoption of key CMDB features and application services to improve the overall health of the CMDB. Explore how tools and features can maximize the health and efficiency of your CMDB and use direct links to install and start using features immediately.

Insights view is available starting with CMDB Workspace v3.4.6.

Access

Role requirement: sn_cmdb_user (CMDB User), or a user role containing sn_cmdb_user (sn_cmdb_admin, sn_cmdb_editor).

To access the Insights view, navigate to **Workspaces** > **CMDB Workspace** and then select **Insights** in the CMDB Workspace menu bar.

The Insights view includes the following tiles:

- CMDB feature adoption
- CMDB performance insights
- Application services
- Cloud vs Non-cloud resources

CMDB feature adoption

Shows dial charts for the overall adoption levels of all three categories of CMDB tools and features:

Data ingestion

Tools and features that support and ensure ingestion of high-quality data into the CMDB.

Data governance

Tools and features that let you manage the CMDB data after it has been ingested.

Search and analytics

Tools and features that provide meaningful and helpful insights into the CMDB data.

Select each dial chart in the tile to access its tab and associated cards with further details about the features in the category. Pay special attention to categories with low levels of adoption and those features that aren't yet implemented in the instance and which you should consider for adoption.

Each category tab shows cards for the features in the category and the following general cards:

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- Overall adoption level for the tab: The calculated overall level of adoption for the tab. Calculations are specific for each tab, and can be based, for example, on the level of adoption of some or all the features in the tab.
- Adoption progress: Installation, activation, or usage status per feature in the tab. Select a feature link to access a relevant resource such as the feature's landing page with an overview dashboard or an installation location.

Depending on adoption level, a card might contain any of the following resource links:

- **Learn more**: Link to documentation to learn and explore the benefits and usage of the feature.
- **View demo**: Link to a short demo about the feature.
- **Get started**: Link to a landing page where you can start immediately utilizing the feature.
- **Install app**: Link to the ServiceNow Store where you can immediately install the app.

Cards use different methods to examine the instance and determine if the card's feature is installed, activated, and being used. For example, some cards check for the installation status of plugins and some cards rely on data in the specific feature tables. Many counts and aggregation data that appear on cards is based on Performance Analytics indicators built on top of the Base Aggregate Data [sn_cmdb_ws_base_aggregate_data] table.

- If the result is that the card's feature is installed or being used, then the card shows charts and counts about the level of usage. In which case, the card's label might slightly adjust.
- If the result is that the card's feature isn't installed or isn't in use, then links are provided to resources where you can explore, install, and start using the feature.

Most of the cards scheduled jobs run every 24 hours, therefore, depending on the type of data, some card data is based on recent but not current data. The Last updated timestamp in the cards reflects the collection time for the data that was used for the card. Also, immediately after getting started with a feature, a card won't reflect on the latest status or usage of the feature, until up to 24 hours when the card's scheduled job runs (for the CIs processed by IRE based on source card, the associated scheduled job, CMDB Workspace - Populate aggregates Monthly, runs monthly).

The following sections provide details for each card, including the calculation script used for the card.

CMDB feature adoption: Data ingestion

The overall adoption level for data ingestion maps to the following findings in the instance:

- Low (red): Less than 80% of CIs are processed by Identification and Reconciliation Engine (IRE)
- Moderate (amber): 80—90% of CIs are processed by IRE
- High (green): Over 90% of CIs are processed by IRE

Data ingestion contains the following features and aggregations:

CIs processed by IRE

Determines the percentage of CIs that are processed by IRE, by checking the Source [sys_object_source] table. CIs that aren't processed by IRE introduce a data integrity risk.

The percentage of CIs that are being processed by IRE determines both, the level of adoption for this feature card and the overall adoption level for the entire data ingestion category.

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Service Graph Connectors

Determines the installation and usage status of Getting started with Service Graph Connectors, by checking:

- If the ITOM Licensing plugin (com.snc.itom.license) is active
- If there is at least one Service Graph Connector installed in the instance

If Service Graph Connectors are installed and are in use, then the card shows a count of those connectors.

> **Note:**
> The count of Service Graph connectors that appears on the card might be slightly different than the number of connectors that show on the ServiceNow Store site because the counting methods that are used are different.

IntegrationHub ETL

Determines whether the IntegrationHub ETL store app is installed and used, based on records in the CMDB Integration Studio Application Data Sources [cmdb_inst_application_feed] table. If IntegrationHub ETL is in use, then the card shows a count of ETL transform maps in IntegrationHub ETL (demo ETL transform maps aren't counted).

Select **View ETL transform maps** to open IntegrationHub ETL where you can examine existing ETL transform maps and create new ones.

CIs processed by IRE based on source

Chart showing CIs processed by IRE, grouped by Service Graph Connectors, ServiceNow Discovery, a combination of both, and others, for the past six months.

The following discovery sources are counted as ServiceNow Discovery:

- ServiceNow
- ServiceWatch
- ACC-Visibility
- AgentClientCollector
- CredentiallessDiscovery

Point to the chart to show monthly aggregation data.

This card is hidden if there are no CIs processed by IRE.

CMDB application for APIs and CLI

Determines whether the CMDB application for APIs and CLI store app is installed.

This card appears only if the store app isn't installed, providing helpful resources for exploration and adoption.

CMDB feature adoption: Data governance

The overall adoption level for data governance maps to the following findings in the instance:

- Low (red): Less than 33% of features are used
- Moderate (amber): 33—66% of features are used
- High (green): Over 66% of features are used

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The overall level of adoption of data governance is based on whether CMDB Data Manager features are used.

Note:
Historical data might not be available for all past 90 days because CMDB Workspace version 3.4, which relies on Performance Analytics indicators to collect and save historical usage data, was deployed less than 90 days ago. This situation might result in a discrepancy between actual usage and what the card shows.

CMDB Data Manager/CIs used in Data Manager policies

Determines usage by checking if either of the following conditions is true:

- There are any user-created Delete, Retire, or Archive policies (by searching table CMDB Data Manager Policy and Attributes [cmdb_data_manager_policy_and_attributes])
- There are any CIs processed by these user-created Delete, Retire, or Archive policies, in the last 90 days (by searching table CMDB Data Management Policy Executions [cmdb_data_management_policy_execution])

If CMDB Data Manager is in use, shows a chart with CIs that were processed by these policies in the past six months, by month, and by policy type.

Data attestation/CIs used in data attestation

Determines usage by checking if either of the following conditions is true:

- There are any user-created Attestation policies (by searching table CMDB Data Manager Policy and Attributes [cmdb_data_manager_policy_and_attributes])
- There are any CIs processed by these user-created Attestation policies, in the last 90 days (by searching table CMDB Data Management Policy Executions [cmdb_data_management_policy_execution])

If data attestation is in use, shows a chart with CIs that were processed by attestation policy tasks in the past six months, by month.

Data synchronization

Checks if there is at least one class for which the *managed_by_group* attribute is globally set so that all class CIs are synchronized on the same value.

For information about synchronizing group assignment attributes using the CI Class Manager, see Set the group for a CI or an entire class of CIs.

The Data synchronization card is available starting with CMDB Workspace v3.6.

Principal classes

Checks if the Principal Class filter is configured with at least one principal class. The Principal Class filter limits the number of CIs that appear in list views, to show only CIs of principal classes. Reducing the amount of data in list views to only relevant data, improves performance and efficiency.

For more information about managing the Principal Class filter in CI Class Manager, see Update the list of classes in the Principal Class filter.

The Principal class card is available starting with CMDB Workspace v3.6.

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CMDB feature adoption: Search & analytics

The overall adoption level for search & analytics maps to the following findings in the instance:

- Low (red): Less than 33% of features are used
- Moderate (amber): 33—66% of features are used
- High (green): Over 66% of features are used

Search & analytics contains the following features and aggregations:

CMDB Query Builder/Query Builder queries

Determines if the CMDB Query Builder is in use, by checking if either of the following conditions is true:

- There are any records in the Saved Queries [qb_saved_query] table in which *Source* is **QB**
- There are any queries executed or queries executed with reports, in the last 90 days

> **Note:**
> Historical data might not be available for all past 90 days because CMDB Workspace version 3.4, which relies on Performance Analytics indicators to collect and save historical usage data, was deployed less than 90 days ago. This situation might result in a discrepancy between actual usage and what the card shows.

If CMDB Query Builder is in use, shows a chart with counts of query executions and query executions in reports, for the past six months, by month.

Point to the chart to see monthly aggregation data.

Intelligent search

Determines if Intelligent Search for CMDB is in use by checking the NLQ Query Logs [nlq_query_log] table for any records where *source* is **CMDB_WS**, from the past 90 days. If Intelligent Search is in use, shows counts of Intelligent Search queries for the past six months, by month.

> **Note:**
> Historical data might not be available for all past 90 days because CMDB Workspace version 3.4, which relies on Performance Analytics indicators to collect and save historical usage data, was deployed less than 90 days ago. This situation might result in a discrepancy between actual usage and what the card shows.

CMDB 360 — Records in Multisource

Total number of raw CMDB 360 records in the CMDB 360 data store that contains records for each discovery source report, per each CI attribute. This card is identical to the Total CMDB 360 records card in the Discovery Sources tile in the CMDB 360 view.

This card appears only if CMDB 360 is enabled, which is determined by checking the ITOM Discovery License (com.snc.itom.discovery.license) plugin and the system property glide.identification_engine.multisource_enabled.

CMDB 360 queries

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Count of CMDB 360 queries that exist in the CMDB Multisource Queries [cmdb_multisource_query] table.

This card appears only if CMDB 360 is enabled, which is determined by checking the ITOM Discovery License (com.snc.itom.discovery.license) plugin and the system property glide.identification_engine.multisource_enabled.

CMDB Data Foundation dashboard

Determines if the CMDB and CSDM Data Foundations Dashboards store app (which includes the CMDB Data Foundation dashboard) is installed.

This card appears only if the store app isn't installed, providing helpful resources for exploration and adoption. However, the feature is still included in calculating the search & analytics overall level of adoption.

CMDB Health Dashboard

Determines if CMDB Health is in use by checking if at least one CMDB Health Dashboard job is enabled.

This card appears only if the feature isn't in use, providing helpful resources for exploration and adoption. However, the feature is still included in calculating the search & analytics overall level of adoption.

CMDB performance insights

CMDB performance insights is available starting with CMDB Workspace v3.6 and only appears for users with the sn_cmdb_admin (CMDB Admin) role.

CMDB performance insights helps you understand the ways in which your configurations impact the performance of your CMDB. You can use the charts and tools within CMDB performance insights to troubleshoot, debug, or diagnose performance issues. CMDB performance insights also analyzes your CMDB and Service Graph Connectors on your instance to generate recommendations on how you can improve the performance of your CMDB. The CMDB performance insights tile itself can show up to two of those recommendations.

Select **View performance insights** to access the CMDB performance insights data.

The Payloads & CIs tab contains the following tiles:

Partial payloads

Partial payloads occur when the data source didn't provide enough information to uniquely identify the CI, preventing IRE from processing the CI.

- Total partial payload count:

  Shows the total number of partial payloads that exist in your instance. Large numbers of partial payloads in your instance can cause performance deterioration of the CMDB.

  For more information about partial payloads, see Identification and Reconciliation engine (IRE).

- Discovery source:

  Breaks down the number of partial payloads by discovery sources. You can drill down on slices in this pie chart to see the list of partial payloads with errors, filtered by discovery source.

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You can drill down on specific partial payloads to better understand the error that you're experiencing. When you drill down on a partial payload, you can see the full payload item, which you can review to troubleshoot and address the specific errors.

For more information about error types, see Generate and simulate payload execution using identification simulation.

Related records

Data about related records that are missing references. A record is missing a reference when the *Referenced* field for that record is empty.

- Related records missing reference:

  Shows the total number of records that do not reference a CI in the *Referenced* field in the Related table. You can see a full list of the Related tables and the associated *Referenced* fields in the Related Entries [cmdb_related_entry] table.

  For more information about Related tables, see Overview of CMDB.

- Related records missing reference by table:

  Breaks down the number of CMDB records missing references, by table. You can drill down on slices in this chart to see the list of specific records filtered by table.

  Before you can drill down on a slice of this pie chart, you must have any user roles required to view the table.

  You can also select **New** from the list view to create a new related entry table record. For more information about creating or editing a related entry table record, see Edit a related table from CMDB performance insights.

Duplicate and stale CIs

A CI is flagged as duplicate during identification and reconciliation. A CI is flagged as stale if it has not been updated within the Effective Duration time period specified in the CMDB Health staleness rule for the CI class.

- CIs:

  Shows the number of CIs that are either duplicate or stale.

- Stale records by class:

  Breaks down the number of stale CIs based on the CI class. You can drill down on slices in this pie chart to see the list of specific CI records filtered by class.

  For more information about stale CIs, see CMDB Health KPIs and metrics.

- Duplicate records by class:

  Breaks down the number of duplicate CIs based on the CI class. You can drill down on slices in this pie chart to see the list of specific CI records.

  For more information about duplicate CIs, see Duplicate CIs remediation.

Relationship records missing parent or child

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Shows the trend line and number of relationship records in the CI Relationships [cmdb_rel_ci] table that are missing a parent or child CI. CIs that are missing a parent or child are considered invalid records and can have a performance impact on your instance.

Recommendations

Recommendations on this panel include a link to the related documentation and typically enable direct access to the associated tool, feature, or system property. Expand or minimize the panel by selecting the light bulb icon.

The first two recommendations appear on the CMDB performance insights tile of the Insights view.

You can only see a recommendation if you have the roles needed to access the feature, tool, or system property. Users with the sn_cmdb_admin role can hide recommendations or adjust the order in which recommendations appear. Users can use the **Active** and **Order** fields in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table to configure those elements.

The Service Graph connectors tab contains the following tiles:

Note:

- The Service Graph connectors tab only appears if your instance has at least one Service Graph Connector and you have the cmdb_inst_admin role.
- To edit data source or scheduled data import records from CMDB Workspace, you may need to set **Application scope** to the **Application** of the data source or data import.

Connectors data source

Configurations on your Service Graph Connector data sources affect the ingestion and processing of incoming data. Changing your Service Graph Connector data source configurations can streamline data handling, making your CMDB more efficient and reducing impacts on the performance of your instance.

- Sources with batch processing turned off:

  Shows the percentage of Service Graph Connector data sources in the Data Sources [sys_data_source] table with disabled **Use Batch Import**. It also lists the total number of data sources, and the number of data sources with enabled or disabled batch processing.

  To enable batch processing, access the record of a specific data source from the list view and select **Use Batch Import**. For more information about batch processing, see Data source fields.

  You can also select **Edit** to update a data source from the list view. For more information about editing a data source, see Edit a data source from CMDB performance insights.

- Sources with concurrent import turned off:

  Shows the percentage of scheduled data imports of Service Graph Connector data sources in the Scheduled Data Imports [scheduled_import_set] table with **Concurrent Import** turned off. It also lists the total number of scheduled data imports, and the number of scheduled data imports with **Concurrent Import** turned on or off.

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To enable concurrent import, access the record of a specific scheduled data import from the list view and select **Concurrent Import**. For more information about concurrent import, see Concurrent imports.

You can also select **Edit** to update a scheduled data import from the list view. For more information about editing a scheduled data import, see Edit a scheduled data import from CMDB performance insights.

- Sources with non-custom size partition method:

  Shows the percentage of scheduled data imports of Service Graph Connector data sources in the Scheduled Data Imports [scheduled_import_set] table that use a non-custom size partition method. It also lists the total number of scheduled data imports, and the number of scheduled data imports that use a non-custom size partition method.

  To use a custom size partition method, access the record of a specific scheduled data import from the list view. Ensure that **Concurrent Import** is selected. From the **Partition Method** drop-down menu that appears, select **Custom size**. For more information about partition methods, see Schedule a data import.

  You can also select **Edit** to update a new scheduled data import from the list view. For more information about editing a scheduled data import, see Edit a scheduled data import from CMDB performance insights.

Connectors execution trends

Aggregates Service Graph Connectors with outlier connector executions, where the number of imported rows or the rate of processing is significantly higher or lower than the 30-day trend.

- Connectors with processing rate outliers:

  Shows the number of Service Graph Connectors that are considered outliers with connector execution processing rates outside the expected trend lines within the past 30 days.

- Connectors with import count outliers:

  Shows the number of Service Graph Connectors that are considered outliers with connector execution import counts outside the expected trend lines within the past 30 days.

You can drill down the cards in the Connectors execution trends tile to access the Service Graph connector execution trends window. In that windows, a Service Graph Connector is available in the connectors drop-down menu only if it has an execution record.

Click the tabs on the Service Graph connector execution trends window to view the following charts and the Connector Execution list view of executed connector import sets:

- Processing rate:

  Models the trend line of processing rates for connector executions. Shows the rate at which a connector processes rows of data over a period of time.

  There are two zones, which are the Confidence Band and the Prediction Band. Service Graph Connectors with connection executions that have processing rates

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outside of the Prediction Band are considered outliers. These zones don't appear when you select more than one Service Graph Connector.

- Import count:

  Models the trend line of rows processed for connector executions. Shows the number of rows a connector processes over a period of time.

  There are two zones, which are the Confidence Band and the Prediction Band. Service Graph Connectors with connector executions that have import row counts outside of the Prediction Band are considered outliers.

On both charts, you can select outlier and non-outlier Service Graph Connectors to see the trend lines against each other.

For more information about processing data with Service Graph Connectors, see Getting started with Service Graph Connectors.

Application services (Application Services Dashboard)

Shows a chart with a count of application services in your organization, based on records in the Application Services [cmdb_ci_service_auto] table. The chart shows the trend of total number of application services per day, for the past seven days. Use the Application Services Dashboard to monitor the adoption level and health of application services.

Note:
Some population methods for application services are available only with Service Mapping and therefore won't appear in the tile if Service Mapping isn't installed.

Select the chart to access the tile tabs and their cards with further details. Pay special attention to application services that aren't fully configured and are missing data. Reduce the number of incomplete application services by editing application services and populating any empty attributes.

Select any card to drill down to the list view of the respective application services.

The Overview tab shows the following aggregations:

- Total application services: Count of all application services.
- Population method defined: Count of application services for which a population method is specified.
- Population method not defined: Count of application services for which a population method isn't specified.
- Application services types: Chart of application services by population methods such as Dynamic CI Group and Manual, including application services without a population method (Empty). The chart includes business services that were converted to application services.
- Application services missing data: Chart of application services by key data, such as service offering and owner, that is missing.

The Application service coverage tab contains the following tiles and cards:

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- Application Servers
  - Total servers: Total number of application servers.
  - Servers not in application service: Count of application servers which aren't in any application service.
  - Servers not in an application service: Chart of application servers which aren't in any application service, by class.
- Databases
  - Total databases: Total number of databases
  - Databases not in application service: Count of databases which aren't in any application service.
  - Databases not in an application service: Chart of databases which aren't in any application service, by class.
- Hardware Servers
  - Total hardware servers: Total number of hardware servers.
  - Hardware servers not in application service: Count of hardware servers which aren't in any application service.
  - Hardware servers not in an application service: Chart of hardware servers which aren't in any application service, by class.

Note:
Application servers, hardware servers, and databases not included in application services, are counted only up to about 100,000, even if the actual number is over this limit. This number limit is set by the glide.cmdb.csdm.app_service.max_results property.

Select **Owned by**, **Support group**, or **Change group** to filter the list of application services that are included in the dashboard, by a key attribute. A filter doesn't impact counts of application services in which the respective filter attribute is missing. For example, filtering by Owner, doesn't change the count of the Missing Owner card.

Cloud vs Non-cloud resources

Charts showing counts and details for resources and application services that are hosted on various cloud services versus those that aren't. Resources and application services can be deployed on cloud services such as the Microsoft Azure Cloud, or on the local instance or other non-cloud solutions. For some ongoing operations in the organization, it might be necessary to have those details which can be difficult to obtain.

For details about the charts, see 'Cloud vs Non-cloud resources' in the CMDB Workspace store app topic.

The Application Services pie chart is available starting with CMDB Workspace v3.6.

Modify important actions in CMDB Workspace

Modify the appearance order and other properties of the important action cards that appear on the landing page of the CMDB Workspace.

Before you begin
Role required: sn_cmdb_admin

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About this task

The task cards that appear in the Important tasks tile on the landing page of the CMDB Workspace, are stored in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table. You can edit some attributes of these cards, including the setting that controls whether a specific card appears at all. Cards in the Important actions tile are available only for the CMDB Admin [sn_cmdb_admin] and the CMDB Editor [sn_cmdb_editor] user roles and each is configured per one of those roles.

There is some overlap in the task cards that appear for a CMDB Admin and for a CMDB Editor, however, the filters in those task cards are different. Typically, for CMDB Admins, the card filter also includes unassigned tasks that a CMDB Admin needs to assign.

Only editing is possible, you can't add or delete action records in this table.

Procedure

1. Navigate to **All**.
2. In the navigation filter, enter `sn_cmdb_ws_imp_action_card_config.list`.
3. In the list view of the table, edit the table row that you want to modify or click the row to open the record form.

Field	Description
Persona	The logged on user (such as CMDB Admin) for which this card appears. You can't edit this field.
Type	Tasks group that this task belongs to, such as Duplicate CIs. You can't edit this field.
Table	The table used in the card filter. You can't edit this field.
Active	Determines whether the card for this action appears in CMDB Workspace.
Order	Numeric value that determines the order of each card within the rest of the cards in the Important actions tile. Cards with lower order numbers appear before cards with higher order numbers.
Filter condition	Filters for the tasks that are included for the card.
List columns	Columns that appear in the list view when you click a card to show its associated tasks.
List groupby	Attribute to group by the card's associated tasks in the card's list view. The card's list

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Field	Description
	view appears when you click a card to show its associated tasks.

4. Click **Update**.

Add a quick link to the CMDB Workspace

For an immediate access to tools or data that you need, add your own quick link to the landing page of the CMDB Workspace.

Before you begin
Role required: sn_cmdb_admin, sn_cmdb_editor, or sn_cmdb_user

About this task
Quick links are stored in the Quick Links [sn_cmdb_ws_quick_links] table including those that are included in the base system. Only the user that added a quick link has access to that link, and can subsequently edit or delete that added link.

Procedure
1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section, click the '+' icon.
3. Enter the **URL** and **Display text** for the link and then click **Add**.

   A valid URL must start with "http:" or "https:". To link to a tool in the instance such as the CI Class Manager, enter the full URL to the tool's landing page.
4. Click **Done**.

Result
The new link is available only for the user that created the link, in the Quick links section in the landing page of the CMDB Workspace.

What to do next
Click on the Edit quick links icon to edit, delete, or reposition an added link. Then use the up and down arrows to move a link within the list, and click the Edit icon next to a link that you want to modify or delete from the list.

Configure datacenters for the Cloud vs Non-cloud resources chart

The Cloud vs Non-cloud resources chart in CMDB Workspace determines which CIs and application services are stored on a cloud and which aren't in the organization. In addition to base system classifications, you can add cloud versus non-cloud classifications that reflect specific datacenter deployments in the organization.

Before you begin
Role required: sn_cmdb_admin

About this task
The Datacenter Types [sn_cmdb_ws_datacenter_type] table stores datacenter classes with a classification of being used as a cloud storage or not in the organization. The calculations for the Cloud vs Non-cloud resources chart in the CI overview tile in CMDB Workspace, reflects on the datacenters in that table and their classifications.

CIs are counted as non-cloud mainly if either of the following conditions is met:

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- The CI is not associated with any datacenter.
- The CI is associated with a datacenter that is classified as non-cloud in the Datacenter Types table.

In the base system, the Datacenter Types table contains several common datacenters. For example, the Azure Datacenter [cmdb_ci_azure_datacenter) class is classified as 'Cloud'. Therefore, the Cloud vs Non-cloud resources chart includes in its calculations and bars the Azure Datacenter [cmdb_ci_azure_datacenter) class.

Procedure

1. Select **All**.
2. In the Filter navigator, enter `sn_cmdb_ws_datacenter_type.list` to access the Datacenter Types table.
3. Click **New** and fill out the Datacenter Type form for a datacenter that is used in the organization.

Field	Description
Datacenter class	A child class of the Logical Datacenter [cmdb_ci_logical_datacenter] class which is used in the organization.
Type	Classification that reflects whether the specified **Datacenter class** is being used as cloud storage or not.
Cloud Provider	Custom label for the cloud provider.

4. Click **Submit**.

Resume a disabled scheduled job for the Cloud vs Non-cloud resources chart

Reactivate a scheduled job to resume data collection for the Cloud vs Non-cloud resources chart in CMDB Workspace.

Before you begin

Role required: cmdb_query_builder (contained in the sn_cmdb_user, sn_cmdb_editor, sn_cmdb_admin user roles)

About this task

The Cloud vs Non-cloud resources chart in CMDB Workspace uses several scheduled jobs that gather and calculate the data for the charts. Each bar in the CI classes chart represents a pair of a CI class and a storage type (cloud, non-cloud) such as Applications/Cloud. Each bar is associated with its own scheduled job. When a scheduled job exceeds its limits of time and amount of collected data, it is automatically stopped. A job that can't complete for 3 (default) consecutive days is automatically disabled for future runs.

Use the following procedure to later resume that disabled scheduled job.

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Procedure

1. Click **All**.
2. In the Filter navigator, enter `sysauto_query_builder.list` and open the Scheduled Email of Query Builders table.
3. In the **Scheduled Email of Query Builders** list view, set **Active** to **true** for the scheduled job to resume.

Configure CI classes for the Cloud vs Non-cloud resources chart

Include or exclude pairs of *CI Class/Type* in the Cloud vs Non-cloud resources chart in CMDB Workspace.

Before you begin
Role required: sn_cmdb_admin

About this task
The CMDB Insight Query Categories [sn_cmdb_ws_insight_query_category] table contains the pairs of *CI Class/Type* for the Cloud vs Non-cloud resources chart in the CI overview tile in CMDB Workspace. The *Active* setting in a record determines if the respective *CI Class/Type* pair appears in the chart. By default, all pairs are configured to appear in the chart.

A *CI Class/Type* pair appears or doesn't appear according to its *Active* setting and regardless of the status of its associated scheduled job.

Procedure

1. Select **All**.
2. In the Filter navigator, enter `sn_cmdb_ws_insight_query_category.list` to access the CMDB Insight Query Categories table.
3. Set *Active* to **true** or **false** for a CI Class/Type pair.
   For example, set *Active* to **false** for the **Applications**/**Non-cloud** pair. This setting will exclude from the chart all CIs in the Applications class which are determined to be non-cloud.

Class-specific criteria for the Cloud vs Non-cloud resources chart

The Cloud vs Non-cloud resources chart provides counts for several key classes. The chart uses different classes and relationship criteria for each class to determine which resources count as cloud and which count as non-cloud.

The Cloud vs Non-cloud resources chart shows in the CI overview tile in the CMDB Workspace store app.

Virtual Machine Instance [cmdb_ci_vm_instance]:

- Cloud:

  Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter class (one of the configured cloud datacenters) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

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Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter class (one of the configured non-cloud datacenters)

- Total: Equals the record count in the Virtual Machine Instance [cmdb_ci_vm_instance] table (unless there are Virtual Machine Instance records without any relationships)

Server [cmdb_ci_server]:

- Cloud:

  Server [cmdb_ci_server] -> (Virtualized by::Virtualizes) -> Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter (one of the configured cloud datacenters) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Server [cmdb_ci_server] -> Virtual Machine Instance [cmdb_ci_vm_instance] -> Datacenter class (one of the configured non-cloud datacenters)

  OR

  Server [cmdb_ci_server] has no relationships with Virtual Machine Instance [cmdb_ci_vm_instance]

- Total: Equals the record count in the Server [cmdb_ci_server] table (unless there are Server records without any relationships)

Application [cmdb_ci_appl]:

- Cloud:

  Application [cmdb_ci_appl] -> (Runs on::Runs) -> Server [cmdb_ci_server]-> (Virtualized by::Virtualizes) -> Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter (one of the configured cloud datacenters) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

  OR

  Application [cmdb_ci_appl] -> (Hosted on::Hosts) -> Datacenter class (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Application [cmdb_ci_appl] -> Server [cmdb_ci_server] -> Virtual Machine Instance [cmdb_ci_vm_instance] -> Datacenter Datacenter class (one of the configured non-cloud datacenters)

  OR

  Application [cmdb_ci_appl] -> Server [cmdb_ci_server] -> no relationship with Virtual Machine Instance [cmdb_ci_vm_instance]

- Total: Equals the sum of Cloud + Non-Cloud (not the record count in the Application [cmdb_ci_appl] table)

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]:

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- Cloud:

  Kubernetes Cluster [cmdb_ci_kubernetes_cluster -> (Hosted on::Hosts) -> Datacenter (cloud logical data center) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Kubernetes Cluster [cmdb_ci_kubernetes_cluster -> Datacenter (non-cloud logical datacenter)

  OR

  Kubernetes Cluster [cmdb_ci_kubernetes_cluster -> no relationship with -> Datacenter

- Total: Equals the record count in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table (unless there are Kubernetes Cluster records without any relationships)

Database Instance [cmdb_ci_db_instance]:

- Cloud:

  Database Instance [cmdb_ci_db_instance] -> (Runs on::Runs) -> Server -> (Virtualized by::Virtualizes) -> Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Logical Datacenter (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

  OR

  Database Instance [cmdb_ci_db_instance] -> Logical Datacenter [cmdb_ci_logical_datacenter] (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Database Instance [cmdb_ci_db_instance] -> Server [cmdb_ci_server] -> Virtual Machine Instance [cmdb_ci_vm_instance] -> datacenter (non-cloud logical datacenter)

  OR

  Database Instance [cmdb_ci_db_instance] -> Server [cmdb_ci_server] with no relationship -> Virtual Machine Instance [cmdb_ci_vm_instance]

- Total: Sum of Cloud + Non-cloud (can be less than total number of records, subtracting the badly created records)

Storage Volume [cmdb_ci_storage_volume]:

- Cloud:

  cmdb_ci_storage_volume -> (Hosted on::Hosts) -> Logical Datacenter [cmdb_ci_logical_datacenter] (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  cmdb_ci_storage_volume -> Logical Datacenter [cmdb_ci_logical_datacenter] (one of the configured non-cloud datacenters)

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OR cmdb_ci_storage_volume -> no relationships with Datacenter
Cloud Object Storage [cmdb_ci_cloud_object_storage]: • Cloud: Cloud Object Storage [cmdb_ci_cloud_object_storage] -> (Hosted on::Hosts) -> Logical Datacenter [cmdb_ci_logical_datacenter] -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account] (requires CMDB CI Class Models store app) • Non-Cloud: N/A (This table can never have non cloud records)
Service Accounts [cmdb_ci_cloud_service_account]: • Cloud: datacenter_type attribute is populated with correct datacenter class • Non-Cloud: N/A (This table can never have non-cloud records)

Edit a related table from CMDB performance insights

Edit a related table on the Related Entries [cmdb_related_entry] table directly from the CMDB performance insights tool in the CMDB Workspace Insights view. Update the related table to correctly reference another CI in the Referenced field when a reference is missing from the related table.

Before you begin

Role required: sn_cmdb_admin (CMDB Admin) and any role needed to access a related table.

About this task

A record is missing a reference when the **Referenced** field for that record is empty. CMDB performance insights enables you to easily edit related tables that are missing a reference after you drill down on a slice of the Related records missing reference chart.

You can see the full list of related tables and associated referenced fields in the Related Entries [cmdb_related_entry] table.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**, and then in the CMDB Workspace menu bar, select **Insights**.
2. On the CMDB performance insights tile, select **View performance insights**.
3. Navigate to the Related records tile of the **Payloads & CIs** tab and then select a slice of the chart in the Related records missing reference by table card.
4. Select a check box next to a record and then select **Edit**.
5. Specify applicable CMDB CI references and then select **Update**.

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Related topics

Overview of CMDB

Insights view in CMDB Workspace

Edit a data source from CMDB performance insights

Edit a data source for your Service Graph Connectors to specify the data that an import set should ingest. Consider configuring a batch process to make ingestion more efficient and improve performance.

Before you begin

Role required: sn_cmdb_admin (CMDB Admin) and import_admin.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace menu bar, select **Insights**.
3. On the CMDB performance insights tile, select **View performance insights**.
4. Select the Sources with batch processing turned off card in the Service Graph connectors tab.
5. On the Data sources list view, select a check box next to a record.
6. Select **Edit**.
7. Configure the data source.
   For more information about data sources, see:
   - Create a data source
   - Data source fields
8. Select **Update**.

Edit a scheduled data import from CMDB performance insights

Edit a scheduled data import directly from CMDB performance insights for your Service Graph Connectors. Consider enabling **Concurrent Import** with a custom size partition to split incoming data into multiple import sets and transform the import sets concurrently to reduce processing time.

Before you begin

Role required: sn_cmdb_admin (CMDB Admin) and one of these roles:

- import_scheduler
- import_admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace menu bar, select **Insights**.
3. On the CMDB performance insights tile, select **View performance insights**.
4. In the Service Graph connectors tab, click the Sources with concurrent import turned off card or the Sources with non-custom size partition method card.
5. In the Scheduled Import sets list view, select a check box next to a record.
6. Select **Edit**.
7. Configure the scheduled data import.

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You may need to change your application scope to create or edit a scheduled data import from CMDB Workspace.

For more information about updating a scheduled data import, see Schedule a data import.

8. Select **Update**.

Related topics

Insights view in CMDB Workspace

Components installed with CMDB Workspace

Several types of components are installed with the activation of the CMDB Workspace (sn_cmdb_ws) plugin, including properties, tables, user roles, and scheduled jobs.ServiceNow

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

In addition, the CMDB Workspace plugin adds the CMDB Group type 'CMDB Workspace'.

Properties installed

The following properties are installed by the Configuration Management (CMDB) (com.snc.cmdb) plugin which is included in base systems.

Property	Description
sn_cmdb_ws.ci_overview.managed_by_me.enabled	Shows/hides the My CIs section of CI Overview on the CMDB Workspace landing page, for users with sn_cmdb_editor role. • Type: true | false • Default: true • Location: Add to System Properties [sys_properties] table.
sn_cmdb_ws.total_cis.enabled	Shows/hides the Total CIs section on the CMDB Workspace landing page. • Type: true | false • Default: true • Location: Add to System Properties [sys_properties] table.
sn_cmdb_ws.ms.discovery_source_not_reporting_max_days	Number of days after which if one or more discovery sources stop reporting CIs, that CI is

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Property	Description
	included in the CIs not reported by discovery sources chart in the CMDB 360 view. • Type: integer • Default: 7 • Location: Navigate to **Workspaces** > **CMDB Workspace** and then select **CMDB 360**. Select Settings and configure **Number of days since CIs were last discovered by a discovery source** in the Potential issues section. • Learn more: Configure the CMDB 360 dashboard.
sn_cmdb_ws.ms.report_max_limit	Maximum number of record that appears as list views when drilling down from the following charts: • CIs not reported by discovery sources • Data mismatch • CIs by number of discovery sources • CIs with a single source Details: • Type: integer • Default: 100,000 • Location: Navigate to **Workspaces** > **CMDB Workspace** and then select **CMDB 360**. Select Settings and configure **Maximum number of records to process** in the Global section. • Learn more: Configure the CMDB 360 dashboard.
sn_cmdb_ws.unifiedmap.map_search_filter.default_levels	Initial default number of levels from the home node, up and down the CMDB hierarchy, to show on a map. Up the hierarchy goes from all parents to their parents up to the specified level. Down the hierarchy goes from all

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Property	Description
	children to their children up to the specified level. • Type: integer • Default: 3 • Location: Add to System Properties [sys_properties] table. Editing affects all users and requires the sn_cmdb_admin user role.
sn_cmdb_ws.unifiedmap.map_search_filter.max_levels	Maximum number of levels from the home node, up and down the CMDB hierarchy, to show on a map. Up the hierarchy goes from all parents to their parents up to the specified level. Down the hierarchy goes from all children to their children up to the specified level. • Type: integer • Default: 25 • Location: System Properties [sys_properties] table Editing affects all users and requires the sn_cmdb_admin user role.
sn_cmdb_ws.list.record_count_limit	The maximum number of results that the system counts for when using conditional search to search for CIs on the Home view in CMDB Workspace. This count shows for example, at the top of the search results list. • Type: integer • Default: 100,000 • Location: Add to System Properties [sys_properties] table. • More information: CMDB Workspace store app For example, if a limit of 100,000 is reached, the count shows

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Property	Description
	"100,000 +" to indicate that counting stopped at 100,000 and that there are additional uncounted results. Increasing the value of this property directly results in greater impact on performance. However, if a precise count is needed, set this limit to a number that isn't reached by the anticipated count.

Roles installed

The following roles are installed by the Configuration Management (CMDB) (com.snc.cmdb) plugin which is included in base systems. These roles are required for access and interaction with the CMDB Workspace, and are included for completeness.

Role title [name]	Description	Contains roles
CMDB Admin [sn_cmdb_admin]	Provides full access to CMDB data, tools, and UIs within CMDB Workspace. A CMDB Admin, for example, sets policies in the CI Class Manager and application service requirements. CMDB Admin provides the highest level of access to the CMDB. CMDB Admin has read-only access to the Configuration Item [cmdb_ci] table.	• data_manager_admin • canvas_admin • sn_cmdb_editor • cmdb_ms_admin • cmdb_dedup_admin
CMDB Editor [sn_cmdb_editor]	Provides access to CMDB records within CMDB Workspace and read-only access to the Configuration Item [cmdb_ci] table. A CMDB Editor has writing privileges to CMDB Data Manager tasks and to CIs but can't change policies such as in the CMDB Data Manager or in the CI Class Manager.	• sn_cmdb_user • cmdb_ms_editor
CMDB User [sn_cmdb_user]	Provides read-only access to the CMDB data and to basic UIs such as CMDB reports and dashboards, within CMDB Workspace.	• canvas_user • data_manager_user • cmdb_ms_user
Multisource CMDB Admin [cmdb_ms_admin]	Provides full access to data, dashboard configurations, and queries related to Multisource CMDB and CMDB 360.	cmdb_ms_editor
Multisource CMDB Editor	Provides access to CMDB 360 records and enables users to create and edit CMDB 360 queries.	cmdb_ms_user

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Role title [name]	Description	Contains roles
[cmdb_ms_editor]		
Multisource CMDB User [cmdb_ms_user]	Provides read-only access to multisource data, CMDB 360 queries, and to related UIs such as CMDB 360 reports and dashboards, and Multisource Report Builder.	cmdb_read

Scheduled jobs installed

Scheduled job	Description
CMDB Workspace Collection	Updates the information in all the 7-Day Activity charts such as the CI Activity in Last 7 Days chart.
Multisource Dashboard Analytics Population	Runs daily to calculate the aggregate statistics of CMDB 360 data and populates the CMDB 360 dashboard landing page.
Multisource Dashboard Collection	Collects CMDB 360 data and then invokes the *`Multisource Dashboard Analytics Population`* scheduled job.
Multisource Dashboard Data Generator (Demo data)	Demo job that populates CMDB 360 tables with simulated data, to showcase the CMDB 360 dashboard landing page. Runs on demand.
insight – cloud non-cloud aggregate	Runs every 30 minutes to collect data for the Cloud and non-cloud resources chart.
Insight - Cloud Applications	Collects cloud data for the cmdb_ci_appl table.
Insight - Non-cloud Applications	Collects non-cloud data for the cmdb_ci_appl table.
Insight - Cloud Object Storage	Collects cloud data for the cmdb_ci_cloud_object_storage table.
Insight - Cloud Service Account	Collects cloud data for the cmdb_ci_cloud_service_account table.

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Scheduled job	Description
Insight - Cloud DB Instances	Collects cloud data for the cmdb_ci_db_instance table.
Insight - Non-cloud DB Instances	Collects non-cloud data for the cmdb_ci_db_instance table.
Insight - Cloud Kubernetes Cluster	Collects cloud data for the cmdb_ci_kubernetes_cluster table.
Insight - Non-cloud Kubernetes Cluster	Collects non-cloud data for the cmdb_ci_kubernetes_cluster table.
Insight - Cloud Servers	Collects cloud data for the cmdb_ci_server table.
Insight - Non-cloud Servers	Collects non-cloud data for the cmdb_ci_server table.
Insight - Cloud Storage Volume	Collects cloud data for the cmdb_ci_storage_volume table.
Insight - Non-cloud Storage Volume	Collects non-cloud data for the cmdb_ci_storage_volume table.
Insight - Cloud VM Instances	Collects cloud data for the cmdb_ci_vm_instance table.
Insight - Non-cloud VM Instances	Collects non-cloud data for the cmdb_ci_vm_instance table.
CMDB Workspace – Populate aggregates Daily	Runs daily to collect the latest data from the instance for cards such as the CI Summary chart in the CMDB Workspace landing page, and the following cards in the Insights view: • CIs processed by IRE • CIs used in Data Manager policies • CIs used in data attestation • Query Builder queries • Intelligent search

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Scheduled job	Description
	Populates the Base Aggregate Data [sn_cmdb_ws_base_aggregate_data] table with the collected data. Once collection completes, invokes the *CMDB Workspace Aggregates Daily Collection* scheduled job.
CMDB Workspace – Populate aggregates Monthly	Runs monthly to collect data from the instance for cards such as the following, in the Insights view: • CIs processed by IRE based on source • CIs processed by IRE Once collection completes, invokes the *CMDB Workspace Aggregates Monthly Collection* scheduled job.
CMDB Workspace Aggregates Daily Collection	A Performance Analytics job that stores the latest data generated by the *CMDB Workspace – Populate aggregates Daily* scheduled job. The stored data is then shown in respective cards in the Insights view.
CMDB Workspace Aggregates Monthly Collection	A Performance Analytics job that stores the latest data generated by the *CMDB Workspace – Populate aggregates Monthly* scheduled job. The stored data is then shown in respective cards in the Insights view.
[Demo] — CMDB Workspace Collection	Supports demo data for CMDB Workspace charts in various views such as the Home view. Installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded.
[Demo] — CMDB Workspace demo data	Activates demo data for CMDB Workspace charts in views such as the Insights view, and CMDB 360 view (if CMDB 360 is enabled). Populates the Base Aggregate Data [sn_cmdb_ws_base_aggregate_data] table with random numbers that illustrate trend lines in charts in the Home and Insights views. It then runs demo data collection scheduled jobs. Installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded.
[Demo] CMDB Workspace Aggregates Daily Collection	A Performance Analytics job that supports demo data for CMDB Workspace charts in various views such as the Insights view and which is installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded. Stores the demo data generated by the *CMDB Workspace – Populate aggregates Daily* scheduled job. The demo data is then shown in respective cards in the Insights view.

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Scheduled job	Description
[Demo] CMDB Workspace Aggregates Monthly Collection	A Performance Analytics job that supports demo data for CMDB Workspace charts in various views such as the Insights view and which is installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded. Stores the demo data generated by the *CMDB Workspace - Populate aggregates Monthly* scheduled job. The demo data is then shown in respective cards in the Insights view.
CMDB Workspace Collection On Demand With Lookback	Collects historical data (past 30 days) for some indicators such as the Integration outliers. Runs automatically during install or upgrade and isn't configured with any recurring schedule.

Tables installed

Table	Description
CMDB Group Metadata [sn_cmdb_ws_group_metadata]	CMDB group data with count of CIs in each group.
CMDB Group Query Metadata [sn_cmdb_ws_group_query_metadata]	Encoded queries with count of CIs in each encoded quer subgroup.
NLQ Sample Search [sn_cmdb_ws_nlq_sample_search]	Sample searches that appear when selecting the search box of an Intelligent Search for CMDB widget.
NLQ Sample Search Table [sn_cmdb_ws_nlq_sample_search_table]	References the actual tables associated with sample searches that appear when selecting the search box of ar Intelligent Search for CMDB widget.
NLQ Excluded Table [sn_cmdb_ws_nlq_excluded_table]	Tables with ambiguous names that should be excluded from Intelligent Search. These tables won't appear in suggestions, and other tables with similar names are give higher priority in search results.
Important Actions Configuration [sn_cmdb_ws_imp_action_card_config]	Configuration of appearance and behavior of Important action cards that appear on the landing page of the CMD Workspace. Editing in this table is accessible only to user with the sn_cmdb_admin role. Authorized users can modi attributes of an important action such as Active and Filter conditions, but can't modify the Type, Persona, and Table attributes.
Quick Links	Quick links that appear on the CMDB Workspace landing page.

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Table	Description
[sn_cmdb_ws_quick_links]	
CIs by Number of Sources [sn_cmdb_ws_ms_cis_by_number_of_sources]	CIs grouped by the number of discovery sources they we discovered by. Records appear as a list view when clickin on the CIs by number of discovery sources bar chart in th CMDB 360 view.
CIs With a Single Source [sn_cmdb_ws_ms_cis_with_single_source]	CIs reported by only one discovery source. Records appe as a list view when selecting the CIs with a single discove source chart in the CMDB 360 view.
CMDB Workspace Multisource Class Metadata [sn_cmdb_ws_ms_class_metadata]	Class configuration settings such as class selections and weights, that CMDB Admins can modify from the CMDB 3 view. Used by CMDB 360 analytics population queries to store a sample set of coverage data for the CIs by numbe sources and CIs with a single source drill-downs cards.
Multisource Data Mismatch Records [sn_cmdb_ws_ms_data_mismatch]	Data mismatch records found from attribute discrepancie from various data sources. Records appear as a list view when selecting the Data mismatch chart in the CMDB 360 view.
CMDB Workspace Multisource Data Mismatch Configurations [sn_cmdb_ws_ms_data_mismatch_config]	Data mismatch settings, such as the selection of classes, attributes, conditions, and weights, that CMDB Admins ca modify in the CMDB 360 view. Used by CMDB 360 analyt population queries to store a sample set of data mismatch records in the sn_cmdb_ws_ms_data_mismatch table.
Discovery sources not reporting CIs [sn_cmdb_ws_ms_discovery_sources_not_reporting]	Data for when one or more discovery sources stop reporting CIs after the specific X number of days (X can be set in the CMDB 360 view and is stored in the sn_cmdb_ws.ms.discovery_source_not_reporting_max_d system property). Records appear as a list view when selecting the CIs not reported by discovery sources chart the CMDB 360 view.
Multisource Workspace Settings Weight Type [sn_cmdb_ws_ms_settings_weight_type]	Weight type (automatic or manual) for data mismatch and coverage settings in CMDB 360 view.
Datacenter Types [sn_cmdb_ws_datacenter_type]	Classifications of datacenter classes which are considere cloud or non-cloud in the organization, which is used for t Cloud and non-cloud resources chart.
CMDB Insight Query Categories [sn_cmdb_ws_insight_query_category]	Class categories and their status for inclusion in the Clou and non-cloud resources chart.
CMDB Insight Data [sn_cmdb_ws_insight_data]	Legacy table for storing data for the Cloud and non-cloud resources chart. Starting with CMDB Workspace version 3.4, the CMDB Product Insight Data [sn_cmdb_ws_product_insight_data] table is used instead.

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Table	Description
Base Aggregate Data [sn_cmdb_ws_base_aggregate_data]	Aggregation data for CMDB Workspace cards and parent table to other aggregation tables. When processing for a count completes, *State* of the existing record for that count is set to **retired** and a new record for that count is created with the updated count value. Cards in CMDB Workspace views show values only for counts where *Sta* = **ready**. Read only.
Service Graph Connector [sn_cmdb_ws_service_graph_connector]	Details about all Service Graph Connectors that are currently available in the ServiceNow Store (excluding any Innovation Lab connectors). Data is used to provide a current count for the Service Graph Connectors card in th Insights view. Read only.
Rating Configuration [sn_cmdb_ws_rating_config]	Start and end values for different ratings of a category. Fo example, start and end values for low, moderate, and high adoption level ratings for the data governance category in the Insights view. Read only.
Feature Category [sn_cmdb_ws_feature_category]	Metadata of the feature card for most of the features at CMDB Workspace level. Read only.
CMDB Product Insight Data [sn_cmdb_ws_product_insight_data]	Aggregated count for each class and datacenter class, us for cards in the Insights view. Read only.
Feature Category Runtime Attributes [sn_cmdb_ws_feature_category_runtime_attribute]	Runtime attributes related to performance insights, that c be used when running various scheduled jobs. Read only.
Integration Aggregate Data [sn_cmdb_ws_integration_aggregate_data]	Integration outlier information related to performance insights. Details for each Integration with execution record which contain processing rate or rows outliers. Read only.
Partial Payload Items [sn_cmdb_ws_partial_payload_item]	Extracted partial payload information related to performar insights. Includes discovery source, error, and class, associated with each partial payload item.

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Table	Description
	Read only.
Application Service Insights Data [sn_cmdb_ws_app_svc_insight_data]	Application services details such as classification (cloud non-cloud, hybrid, or unknown) and count of CIs associat with the application service. Read only.
Table Attributes [sn_cmdb_ws_node_map_table_attributes]	Set of extended properties, per class, that appear in the Attributes pane in the contextual side panel for a selected in Unified Map. For more information, see Configure extended properties a class.
Node Map Related Items [sn_cmdb_ws_node_map_related_item]	Categorization and order of related items, per class, that appear in the Related items pane in the contextual side panel, in CI badges, and in timelines. Applies in Unified M For more information, see Configure related items.
Node Map References [sn_cmdb_ws_node_map_reference]	Reference relationships that appear as a dotted line relationship in Unified Map. For more information, see Configure map references.
Class Icons [sn_cmdb_ws_class_icon]	Maps ServiceNow platform UI Builder (UIB) icon values (fo example 'serverbox-outline') to CMDB class display name that they are used for (for example 'Network Disk') in Unifi Map.
Node Map Profiles [sn_cmdb_ws_node_map_profiles]	Class profiles that include default filters and some Unified Map settings, per class. A class profile is applied if no filte preset is in effect, to the initial map and when setting the filter preset to `Default view`. Specifying a class profile can be especially useful for Service Mapping data with the Mapped Application Servi class. For more information, see Configure class profiles.
CMDB Data Management Certification Task To Document [sn_cmdb_ws_dm_certification_task_to_document]	Mappings between certification tasks and records.
CMDB Certification Attribute Status [sn_cmdb_ws_dm_certification_attribute_status]	Flattened failed attribute status JSON. Used for reporting certification exceptions.

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Table	Description
CMDB Data Management Task Execution Context [sn_cmdb_ws_dm_task_execution_context]	Mappings between tasks and a policy's' execution contex

API Insights

The ServiceNow® API Insights workspace is an all-in-one application that enables you to track all your APIs. You can also use it to start workflows related to different stages in the application programming interface (API) life cycle.

Get started

Explore  Learn about the benefits of API Insights and how it is used.	Configure  Plan and configure your implementation.	Analyze  Administer and monitor API data
Manage  Manage API data for informed decision-making.	Reference  Get details about installed components.	

Troubleshoot and get help

- Ask questions and explore other resources for API Insights in the ServiceNow Community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring API Insights

Learn about API Insights with a sample workflow and review the benefits it can provide for different users in your organization.

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API Insights overview

API Insights is a centralized workspace for enterprise or software architects and Configuration Management Database (CMDB) administrators to analyze and take action on their organization's application programming interface (API) inventory.

API Insights users

Users

User	Description
Enterprise architect	Users with the sn_api_insights_ws.api_mgmt_architect role can access the API Insights workspace to search APIs, monitor team APIs, view managed APIs, track API activity, review API access requests, and manage API life cycle aspects, including APIs without interfaces, business applications, ownership, or product models.
Enterprise architect administrator	Users with the sn_api_insights_ws.api_mgmt_architect_admin role can access the API Insights workspace to search APIs, evaluate metrics on API usage, set parameters for creating an API, connect APIs to a business context, specify the group attribute for ownership, and associate a workflow for granting access to APIs.
CMDB administrator	Users with the sn_cmdb_admin role can configure and manage the API-related Service Graph Connectors. They can accept or reject clustering recommendations, search for and compare APIs, and adjust settings related to API data management within the CMDB. **Note:** A CMDB administrator needs additional roles such as ml_report_user and cmdb_inst_admin to access some of the features and data. Additionally, the CMDB administrator needs the following security roles to access specific widgets: • sn_si.basic or evt_mgmt_user – Required for Events and Critical alerts • sn_vul.vulnerability_read – Required for Active vulnerability items • sn_msi.msi_incident_read – Required for Security incidents • sn_si.read – Required for Incidents

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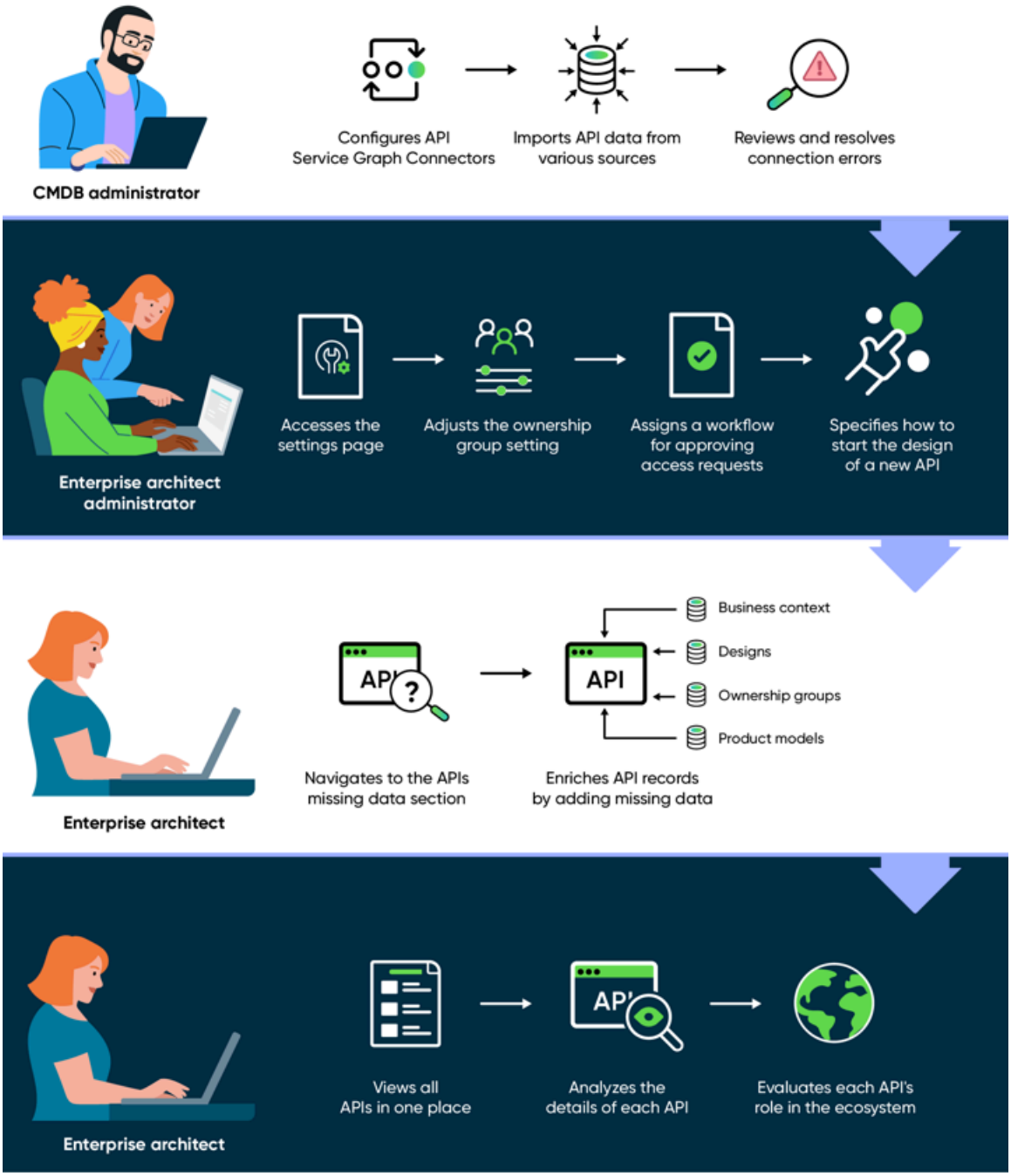
API Insights example workflow

Example workflow for the API Insights users



1. A CMDB administrator with the sn_cmdb_admin role logs in to API Insights and configures the API Service Graph Connectors to import API data from various sources. Also, reviews and resolves any connection errors to ensure a smooth data import process.
2. An enterprise architect administrator with the sn_api_insights_ws.api_mgmt_architect_admin role accesses the settings page and adjusts the ownership settings according to their preferences.
3. An enterprise architect with the sn_api_insights_ws.api_mgmt_architect role navigates to the APIs missing data section to enrich API records by adding relationships and references. This includes associating business context, assigning ownership groups, linking product models, and defining API designs.

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4. The enterprise architect explores the API page, which provides a centralized view of all APIs and views all APIs in one place. They drill down into specific APIs to analyze details such as ownership, deployment locations, consumer usage, security incidents, and alerts. Additionally, they assess how each API fits within the broader ecosystem, identifying key relationships and dependencies in the API relationship map.

API Insights benefits

Benefit	Feature	Users
Implement a system of record for enterprise-wide APIs.	Workspace to view and interact with API inventory	API Insights administrator
Achieve enterprise-wide visibility of APIs.	Automated discovery and ingestion of API data from various sources into Configuration Management Database (CMDB)	API Insights administrator
Map APIs to application services and business context.	Workflow for mapping APIs to relevant application services and business context	API Insights administrator
Integrate API data from a broad ecosystem of sources into the CMDB via Service Graph Connectors.	API data ingestion using API Service Graph Connectors into CMDB	CMDB administrator
Search for relevant APIs.	API search functionality with a user-friendly interface	API Insights administrator
Enable workflow configurations for API access requests.	Customization of API access request workflows	API Insights administrator
View the usage, security, and service mapping of each API and its components.	Detailed view of API inventory, requests according to minute, unique consumers, security data, IT Operations Management (ITOM) and IT Service Management (ITSM) data, and relationship mapping	API Insights architect API Insights administrator CMDB administrator

What to explore next

To learn more about configuring and using API Insights, see:

- Configuring API Insights
- Administering and monitoring API data with API Insights

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- Managing API data within API Insights
- Managing API access within API Insights
- Optimizing API organization with clustering recommendations in API Insights
- Managing API data connections added for Service Graph Connectors in API Insights
- API Insights reference

Configuring API Insights

Complete the configuration tasks to start using the API Insights workspace.

Configuration overview

1. Configure API Insights installation.

   As an administrator with the admin role, set up API Insights by installing the application and assigning roles to users for managing API operations.

2. Configure API Insights data and imports.

   As a CMDB administrator with the sn_cmdb_admin role, set up data model recommendations for API clustering and configure settings for importing APIs into API Insights.

3. Configure settings to monitor and organize APIs in API Insights.

   As an enterprise architect administrator with the sn_api_insights_ws.api_mgmt_architect_admin role, configure API management workflows, including automating API actions and defining settings to monitor and organize APIs in API Insights.

Configuring API Insights as a system administrator

As a user with the admin role, set up the API Insights workspace by installing the application and assigning roles to users for managing API operations.

System administrator tasks overview

1. Install API Insights.

   Install the API Insights application (sn_api_insights_ws).

2. Assign roles for API Insights users

   Assign roles for using the API Insights workspace.

Install API Insights

You can install the API Insights application (sn_api_insights_ws) if you have the admin role.The application installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application .
- Review the API Insights application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

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Role required: admin

About this task

The following items are installed with API Insights:

- Plugins
- Store applications
- Roles
- Tables

For more information, see Components installed with API Insights.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the API Insights application (sn_api_insights_ws) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.
6. Select **Install**.

Assign roles for API Insights users

Assign roles to control access to features, capabilities, and data in the API Insights application.

Before you begin

Set the application scope to API Insights using the application picker. For more information, see Application picker.

Role required: admin

About this task

Users with the sn_api_insights_ws.api_mgmt_architect_admin, sn_api_insights_ws.api_mgmt_architect, or sn_cmdb_admin roles can use the API Insights application. See Exploring API Insights.

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Procedure

Assign roles to users and groups using the ServiceNow AI Platform user administration feature.

- To assign a role to a user, see Assign a role to a user.
- To assign a role to a group, see Assign a role to a group.

Configuring settings to manage API data and imports in API Insights

As a CMDB administrator with the sn_cmdb_admin role, set up data model recommendations for API clustering and configure settings for importing APIs into the API Insights workspace.

CMDB administrator tasks overview

1. Configure data model recommendations for API clustering in API Insights

   Set recommendations for clustering related API components to align the organization's data with the desired data model.

2. Configure instance API import settings in API Insights.

   Set options to import custom and ServiceNow APIs from your instance into the CMDB.

Configure data model recommendations for API clustering in API Insights

Set recommendations for clustering API components to align the organization's data with the desired data model.

Before you begin

Role required: sn_cmdb_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Settings** tab.
3. In the Data model recommendations section, configure system-generated recommendations for clustering related API components based on your organization’s data model.

Field	Description
Proposed API clustering	Option to enable the system-generated API clustering recommendations. When selected, the system will propose clustering connections between related API components within the same API.
Cluster quality	Desired quality level for the API clustering recommendations. The cluster quality can range from 0 to 100, where a higher value represents a stronger connection between related components.

4. Select **Save**.

Configure instance API import settings in API Insights

Set options to import custom and ServiceNow APIs from your instance into the CMDB.

Before you begin

Configure the *Import ServiceNow API to API Insights* scheduled job to automatically import configured APIs from your ServiceNow instance into the API Insights workspace at regular intervals. For more information, see Scheduled jobs.

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Role required: sn_cmdb_admin

About this task

Configure API import options to bring custom and ServiceNow APIs from your ServiceNow instance into the CMDB. This feature enables you to analyze and manage ServiceNow instance APIs together with other enterprise APIs within the API Insights workspace.

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Settings** tab.
3. In the Import instance APIs section, select **Configure API import**.
4. In the Set up import section, select the options for importing scripted and outbound REST APIs, and scripted and outbound SOAP APIs into the CMDB.

API import options

Option	Description
All custom APIs	Imports all custom-developed APIs within the instance.
ServiceNow APIs	Imports predefined ServiceNow APIs within the instance.
Active in last	Imports only APIs based on recent activity, available for scripted APIs only.

   a. If you select the **ServiceNow APIs** check box, select **Select APIs** and then manage the APIs to import.

Importing ServiceNow APIs

Action	Description
Add ServiceNow APIs	On the Select ServiceNow APIs page, select **Add to import list**. Then, on the Add to import list page, select the check box for APIs from the All ServiceNow APIs list and select **Add selected**.
Remove any selected ServiceNow APIs	On the Select ServiceNow APIs page, select the check box for APIs from the Selected APIs list, and select **Remove from import list**.

   b. If you select the **Active in last** option, enter the number of days in the **Days** field to import only APIs that have been active in the specified timeframe.

5. On the Select ServiceNow APIs page, select **Done**.
6. On the Configure API import page, select **Save configuration**.

Validating API specifications in API Insights

You can access API specification validation rules to verify that your API specifications are complete, consistent, and adhere to best practices.

Validation rules identify structural issues early during import or analysis, improving overall API quality. You can manage these rules to enforce standardization across API specifications and reduce errors by checking for missing or incorrect fields before APIs are published or used in production.

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Storing API specifications

The API Specification [sn_api_insights_ws_api_specification] table stores the specification documents that describe individual APIs. Each record includes the following details to identify the API to which the specification belongs and to manage multiple versions.

API specification details

Field	Description
Name	Name of the API.
Version	Version of the API.
Type	Format and version of the API specification standard being used. For example, `openapi3.0.0` for an OpenAPI specification.
State	Current status indicating whether the API specification has been validated against the applicable rules and the validation outcome. Valid values are: • **Unprocessed**: Indicates that the API specification hasn't been validated. • **Valid**: Indicates that the API specification was validated and processed successfully or with warnings. If warnings are present, details are displayed in the **Message** field. • **Invalid**: Indicates that the API specification was validated but contains errors. Error details are displayed in the **Message** field.
Specification	Full content of the API specification file. **Note:** For OpenAPI, includes the complete OpenAPI document describing endpoints, methods, and schema.
Message	Messages are generated after processing all validation rules for the specification type. They include errors or warnings with explanations.

Validation rule structure

The Specification Validation Rule [sn_api_insights_ws_spec_validation_rule] table stores validation rules for the API specifications defined in the API Specification [sn_api_insights_ws_api_specification] table.

Note:
The sn_cmdb_editor role is required to edit or delete validation rules, and the cmdb_read role to view them.

Each validation rule contains the following key components:

Validation rule components

Component	Description
Specification	API specification for which the rule is designed.
Version	Version of the API specification the rule validates. If specified, the rule applies only to those versions. To restrict validation to specific versions, specify them

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Validation rule components (continued)

Component	Description
	in the **Version** field. Separate multiple values with commas. For example, `1.0,1.1,2.0`. **Note:** If the **Version** field is left empty, the rule runs for all installed versions of the specified API specification type.
Type	Type of validation to perform. The valid values are: • **Path**: Verifies that the specific keys are present within arrays of objects, individual objects, or both, in the designated sections of the API specification document. • **Expected value**: Validates whether the specified key matches the expected values specified in the **Value** field. This validation applies only to a single key specified in the **Key** field.
Key	Part of the specification to verify. If no expected value is provided, you can enter multiple keys in the **Key** field, separated by commas.
Value	Expected values for the key specified in the **Key** field. Separate multiple values with commas.
Severity	Severity level of the validation rule outcome, either a warning or an error. **Note:** When set to warning, the API specification remains valid if the rule isn't met, indicating it is not a failure, and only a message is displayed.
Message	Explanation of the issue when the rule is triggered.
Active	Option to activate the rule. Only active rules are triggered by the *`API Specification Validation`* scheduled job.

API specification validation process

The *`API Specification Validation`* scheduled job automatically validates unprocessed API specifications against active rules based on their specification type to ensure compliance with required standards.

The validation process includes:

1. Retrieving all active validation rules from the Specification Validation Rule [sn_api_insights_ws_spec_validation_rule] table.
2. Selecting APIs marked as unprocessed in the API Specification [sn_api_insights_ws_api_specification] table.
3. Applying relevant validation rules to each selected API based on its specification type, such as OpenAPI.
4. Verifying the presence or correctness of specific fields or their values within the API specification.
5. Updating the processing status and capturing any errors or warnings.

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Predefined rules for OpenAPI specifications

By default, the application includes the following validation rules for OpenAPI specifications:

Validate tags

Verifies that each tag in the API specification includes a `name` field. If the `name` field is missing, the system returns a warning message but marks the specification as valid.

Validate required sections

Verifies that the API specification includes the required top-level sections: `info`, `paths`, and `components`. If any of these sections are missing, the system returns an error message and marks the specification as invalid.

Validate servers section

Verifies whether the API specification includes a `servers` section that defines the server endpoints. If the `servers` section is missing, the system returns an error message and marks the specification as invalid.

These predefined rules verify critical sections such as tagging, metadata, and server definitions in OpenAPI specifications.

Configuring settings to organize APIs in API Insights

As an enterprise architect administrator with the sn_api_insights_ws.api_mgmt_architect_admin role, configure workflows for organizing APIs, including automating API actions and defining settings to enable enterprise architects manage APIs in the API Insights workspace.

Enterprise architect administrator tasks overview

1. Configure flow for automating API actions.

   Configure workflows for automating API actions within API Insights.

2. Configure settings to manage APIs in API Insights.

   Configure API management settings, including API creation tools, relationship models, ownership groups, and automated workflows, to streamline API governance and operational processes.

Configuring flows for API actions in API Insights

Configure flows in Workflow Studio for automating API actions within API Insights, streamlining processes like API access requests.

Configure flows to automate various API actions, such as granting access to APIs or processing API requests. Enterprise architect administrators with the sn_api_insights_ws.api_mgmt_architect_admin role can then select workflows that align with specific API automation tasks when they configure settings for managing APIs. See Configure settings to manage APIs in API Insights.

Predefined flow to send reminders for API access

The **API Request Reminder** subflow is available with the API Insights application that sends reminders for approving any API access requests. This flow automatically sends reminder notifications to the ownership groups specified in the flow, prompting them to review and approve pending API access requests.

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Predefined flow to grant API access

The **API Grant/Reject Access Template** subflow is available with the API Insights application that grants access to any APIs. This flow automatically that identifies the API access requests and enables to grant or reject access to any APIs.

Configuring flow for API access request automation

To manage API access requests through custom flows, it's essential to configure the flow with specific input parameters. These parameters guide the flow's behavior.

To learn about creating flows, see Getting started with flows.

When creating a flow for API access request automation, you must use specific parameters that control how the flow works.

You must include the following input parameters in the flow:

```
Input params:
request (reference from sn_api_insights_ws_request_access_task
 table) - Required
grant (string) - Required
description (string) - Optional
```

request

A required reference to a specific record in the API Requests Access Task [sn_api_insights_ws_request_access_task] table that identifies the API access request and facilitates interaction with the API Insights application.

grant

A required string input that specifies the action to be taken, such as granting or denying access.

description

An optional string input to provide additional details or context about the API access request.

Configure settings to manage APIs in API Insights

Configure API Insights settings, including API creation tools, relationship models, ownership groups, and automated workflows, to streamline API governance and operational processes.

Before you begin
Role required: sn_api_insights_ws.api_mgmt_architect_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Settings** tab.
3. In the API creation tool section, select an API creation tool from the available options.

Option	Description
None	Uses no external tool.
Digital Integration Management	Uses the Digital Integration Management ap plication (part of the Enterprise Architecture Workspace), if enabled, to initiate the API de

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Option	Description
	sign process by creating a digital interface record.
External tool	Uses a third-party tool for API creation, requiring the URL for the external tool (for example, `http://www.postman.com`) to be entered in the **External API authoring tool URL** field.

4. In the API-to-business application relationship model section, select a relationship model from the available options.

5. In the Ownership group section, set the ownership group responsible for managing the API.

6. In the Configure workflows section, select a workflow for automating an API action.

   Note:
   Workflows are created by your administrator using the Flow Designer. See Configuring flows for API actions in API Insights.

7. Select **Save**.

Administering and monitoring API data with API Insights

The Overview tab in the API Insights workspace provides a centralized overview of your organization's API landscape.

Depending on your role, the API Insights page on the Overview tab serves as a centralized hub to manage data ingestion integrations, monitor your APIs, and assess data quality. Whether you're setting up new connections, tracking API performance, or evaluating the integrity of incoming data, this page provides the tools and visibility you need. By offering real-time metrics and quality checks, it empowers teams across the organization to gain actionable insights.

You can use the page to:

- As CMDB administrators, you can administer data ingestion and align data model for your organization. See Administering data ingestion and model alignment with API Insights.
- As enterprise architects, you can monitor APIs while assessing overall data quality and identifying key issues like missing data elements. See Monitoring APIs and assessing data quality with API Insights.

Administering data ingestion and model alignment with API Insights

The Overview tab in the API Insights workspace provides a centralized view of data ingestion activities and integration health.

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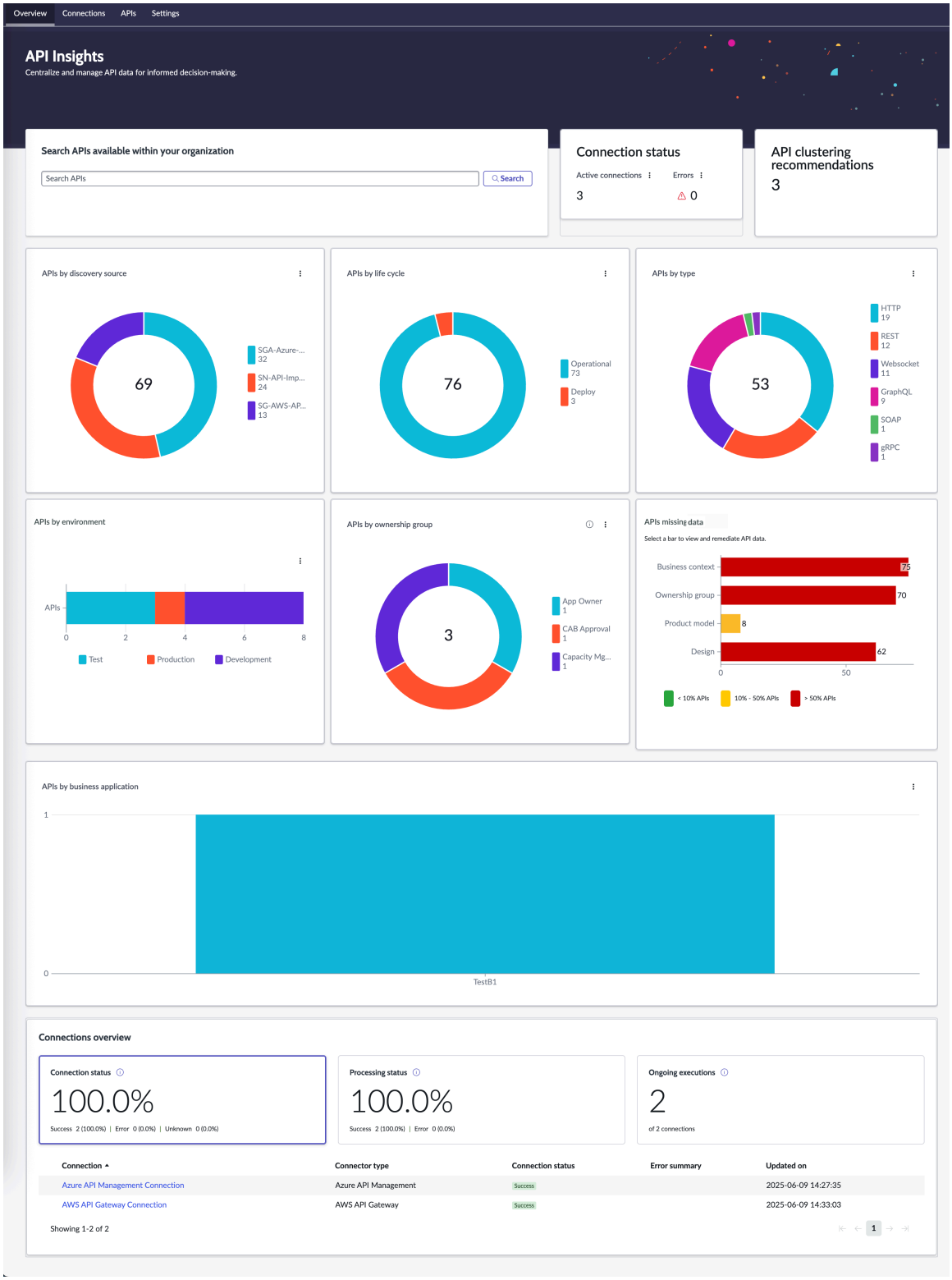

Access the API Insights Overview tab

To access the Overview tab, navigate to **Workspaces** > **API Insights**. The Overview tab opens by default.

Required roles

CMDB administrators can access the Overview tab within the API Insights workspace to monitor incoming API data, evaluate alignment with the data model, and take action on misaligned or

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incomplete data to verify consistent and accurate CMDB records. They can view and resolve errors in connections when importing API data into CMDB using Service Graph Connectors and adjust data based on clustering recommendations.

Note:
As a user with the sn_cmdb_admin role, you need additional roles such as ml_report_user and cmdb_inst_admin to access some of the features and data.

Features

Access the various cards on the Overview tab to gain insights on the API data available in your organization.

Note:
Select a segment or count on a chart to open the KPI Details page and analyze how a specific metric trends over time. To learn more about the KPI Details feature, see KPI Details.

Overview tab features for CMDB administrators

Feature	Description	Required roles
Search APIs	API search within the organization to locate specific APIs for review or management.	sn_cmdb_admin
Connection status	Total count of active API connections and processing errors. Provides insight into the status of API connections and highlights any processing issues to verify reliable data ingestion. **Active connections** Total number of installed connections with active import schedules. Select the count to view installed connections. **Errors** Total number of processing errors for installed connections.	sn_cmdb_admin and cmdb_inst_admin
API clustering recommendations	Number representing the current clustering recommendation, based on the data model recommendation settings. See Configure data model recommendations for API clustering in API Insights.	sn_cmdb_admin and ml_report_user
APIs by discovery source	Total count of discovered APIs grouped by source. Provides insight into the discovery methods of APIs across your organization.	sn_cmdb_admin
APIs by life cycle	Total count of APIs grouped by life cycle stage as Operational, Deploy, or End of Life. Provides visibility into API readiness and maintenance status across your organization.	sn_cmdb_admin

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Overview tab features for CMDB administrators (continued)

Feature	Description	Required roles
APIs by type	Total count of APIs categorized by protocol or communication type. Includes technologies such as REST, GraphQL, and SOAP, providing insight into the integration styles and interoperability across your organization.	sn_cmdb_admin
APIs by environment	Count of APIs deployed in each environment. Highlights distribution across Development, Test, and Production stages, enabling monitoring of deployment progress and assessment of risk exposure.	sn_cmdb_admin
APIs by ownership group	Total count of APIs categorized by assigned ownership group. Groups APIs by managing team or function, as defined by an enterprise architect administrator with the sn_api_insights_ws.api_mgmt_architect_admin role in settings. For more information on setting an ownership group, see Configure settings to manage APIs in API Insights.	sn_cmdb_admin
APIs missing data	Count of APIs missing key attributes, including business context, ownership group, product model, or design. Each bar represents a key attribute and indicates the number of APIs missing the attribute. Color coding indicates the severity of missing data: **Red** More than 50% of APIs are missing the attribute. **Yellow** Between 10% and 50% of APIs are missing the attribute. **Green** Less than 10% of APIs are missing the attribute. Use the visual indicator to prioritize remediation efforts based on data completeness. Select a bar in the bar chart to start the remediation process. See Identifying and remediating missing API data in API Insights.	sn_cmdb_admin
APIs by business application	Count of APIs linked to business applications. Enables tracking of API connections to business applications to improve integration after connections are established.	sn_cmdb_admin

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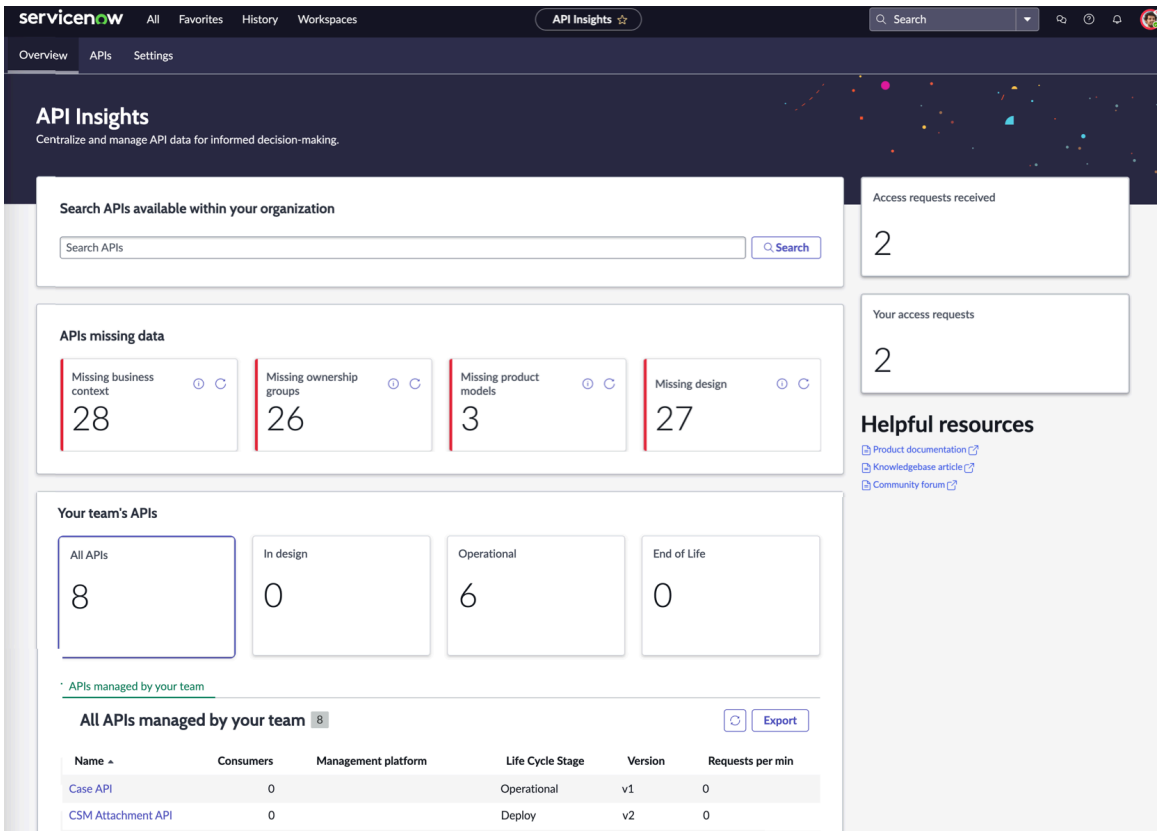
Overview tab features for CMDB administrators (continued)

Feature	Description	Required roles
Connections overview	Summary of the status and activity of API data connections using Service Graph Connectors, including counts of successful, failed, or unknown connection tests, recent import success rate, and the number of connections currently processing data imports.	sn_cmdb_admin and cmdb_inst_admin

Monitoring APIs and assessing data quality with API Insights

The Overview tab in the API Insights workspace provides a centralized view of data ingestion activities and integration health.



Access the API Insights Overview tab

To access the Overview tab, navigate to **Workspaces** > **API Insights**. The Overview tab opens by default.

Required roles

You need the sn_api_insights_ws.api_mgmt_architect or the sn_api_insights_ws.api_mgmt_architect_admin role.

Use cases

For examples of how different people in your organization would use this workspace, see these use cases.

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User	Workspace use
Enterprise architect	Search for APIs, compare APIs, request access to APIs, and address data issues.
Enterprise architect administrator	Manage API Insights settings, including API creation tools, business context relationship models, and ownership groups.

Features

Access the various cards on the Overview tab to gain insights on the API data available in your organization.

Overview tab features

Feature	Description	Required roles
Search APIs	API search within the organization to locate specific APIs for review or management.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Access requests received	Number of access requests received indicating the need for API access management.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Your access requests	Number of access requests created by the logged-in user, indicating the activity for API access management.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Helpful resources	Links to product documentation, knowledge base articles, and a community forum for additional support and information.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
APIs missing data		
Missing business context	Count of APIs with no business context assigned.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Missing ownership groups	Count of APIs with no ownership group assigned. Ownership groups enable tracking remediation and managing access requests.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Missing product models	Count of APIs with no product model assigned, Product models enable accurate reporting and	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin

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Overview tab features (continued)

Feature	Description	Required roles
	interactions with multiple versioned APIs.	
Missing design	Count of runtime APIs, available as API configuration items (CIs), with no design representation. Linking runtime APIs with design-time APIs, available as Digital Interface records, improves usability.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Your team's APIs		
All APIs	Total number of APIs managed by a team.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
In design	Number of APIs currently being designed.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Operational	Number of APIs in active use.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
End of Life	Number of APIs that are retired or decommissioned.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
APIs managed by your team		
All APIs managed by your team	Overview of the APIs managed by a team, based on the group associated with the logged-in user and the APIs linked to that group. API details include name, consumer count, management platform, life cycle stage, version, and requests per minute. Populates data corresponding to the selected card in the Your team's APIs section.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin

Managing API data within API Insights

You can use the API Insights workspace to centralize and manage API data for informed decision-making.

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Within the API Insights workspace, you can:

- View all APIs within your organization.

  Manage and monitor all APIs within your organization by reviewing their life cycle stages, identifying missing critical attributes, and accessing helpful resources to ensure proper API maintenance and governance.

- Search for an API.

  Search for an API or an API component available within your organization in the API Insights workspace.

- Compare APIs.

  Compare APIs available within your organization in the API Insights workspace.

- Connect to an API creation tool from API Insights.

  Initiate API creation directly from the API Insights workspace by connecting to an external API design tool of your choice.

- Request access.

  Request access to an API available within your organization in the API Insights workspace.

- Identify and remediate missing API data.

  Identify and remediate missing API data in the API Insights workspace by linking missing elements and verifying complete API records.

- Manage your team's API data.

  Improve the operational efficiency of the API ecosystem within your organization by creating a relationship for APIs that lack key attributes such as business context, ownership groups, product models, or designs.

- View details of an API.

  Gain insights into your organization's API performance, relationships, and governance from the API details page within the API Insights workspace.

- Manage application service relationships.

  Associate APIs with relevant configuration items (CIs) to ensure accurate mappings between APIs and the configuration items they support.

Viewing all APIs in API Insights

Manage and monitor all APIs within your organization by reviewing their life cycle stages, identifying missing critical attributes, and accessing helpful resources to ensure proper API maintenance and governance.

The All APIs page in the API Insights workspace provides a comprehensive overview of all APIs within an organization ensuring that APIs are properly maintained and aligned with the organization's standards for interfaces, ownership, and product models.

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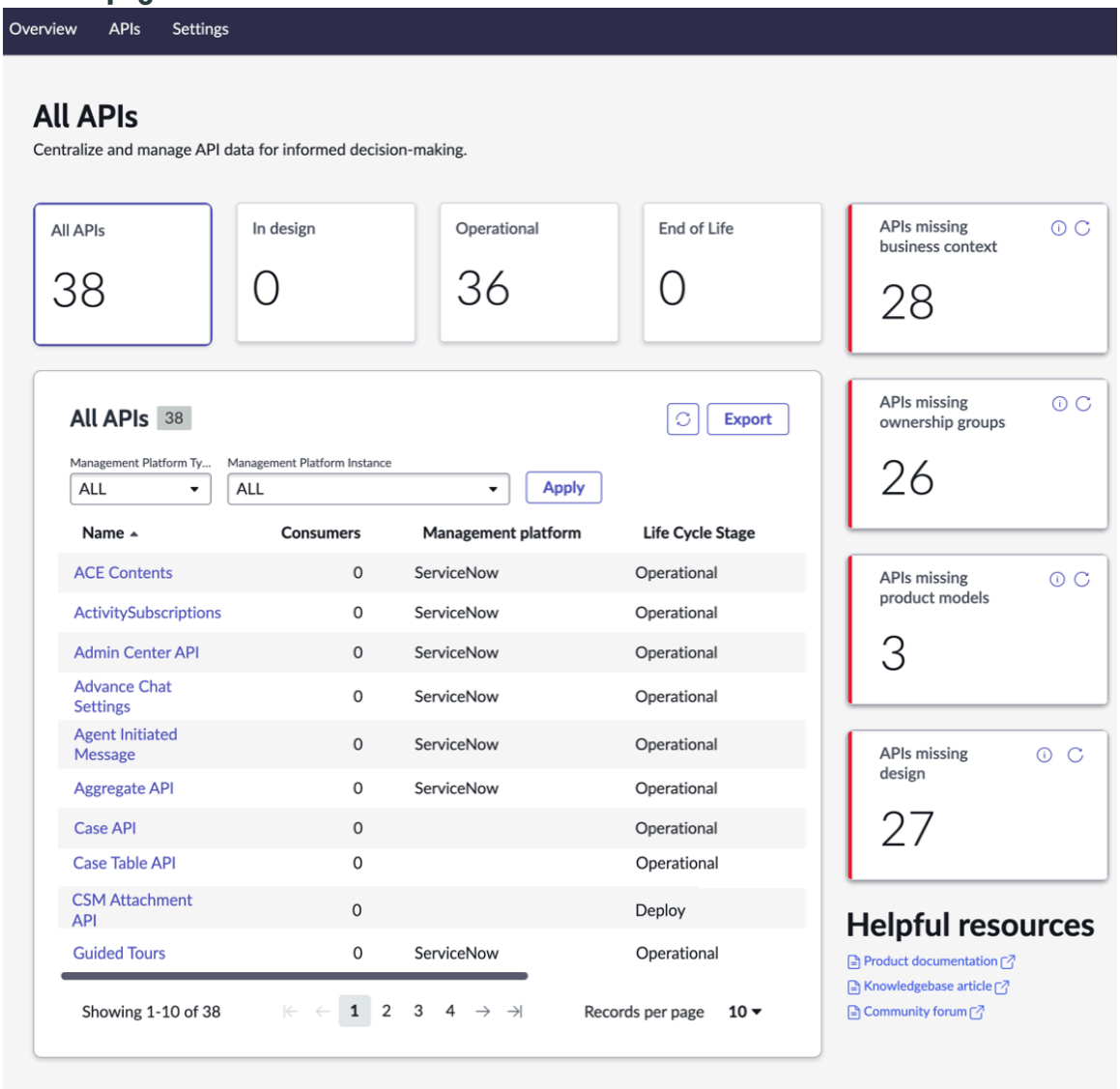
All APIs page



Accessing and using the All APIs page

To access the All APIs page, navigate to **Workspaces** > **API Insights**, and then select the **API** tab.

Viewing data

By default, the page displays the following data:

All APIs section

Displays the total number of APIs managed by the organization and categorizes them by their life cycle stage (All APIs, In design, Operational, End of Life). You can select the each card to view APIs by their life cycle stage in the API table.

API table

Lists all APIs with detailed columns for the API name, the number of consumers, management platform, life cycle stage, version, and the number of API requests processed per minute for each API listed in the table. This table provides an overview of the APIs and their status within the organization. You can select an API from the **Name** column to view API details and request access to the API managed by your team. See Request access to an API in API Insights.

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On the API table, you can select **Export** to export the APIs list as a PDF, CSV, JSON, or Microsoft Excel file. To do so, select the desired file format from the File Type list. You can download the file to your local directory or email the file by selecting a value from the Delivery Type list. After making your selections, select **Export** to complete the process.

Additionally, you can manually populate the API table on demand by selecting the refresh icon ().

You can further narrow down the API list based on platform type and instance using the Management Platform Type list to filter APIs by platform category and the Management Platform Instance list to refine results by a specific ServiceNow instance. Select **Apply** to update the list based on the selected filters. If you select **ALL** in either list, APIs from all available options are included in the table.

APIs missing data section

Highlights the APIs missing key attributes like business context, ownership groups, product models, and design helping to identify issues in API governance. You can select the numeric value displayed in each card to identify and resolve issues with API data. See Identifying and remediating missing API data in API Insights.

Helpful resources

Contains quick links to product documentation, knowledge base articles, and community forums, providing easy access to additional resources for API management.

Search for an API or an API component in API Insights

Search for an API or an API component available within your organization in the API Insights workspace.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the **Search APIs** text box on the Overview tab, enter your search phrase and select **Search**.

   Tip:
   Alternatively, after entering the search phrase, you can press the Enter key.

3. On the Search results page, select a tab to view more details.

Compare APIs in API Insights

Compare APIs available within your organization in the API Insights workspace.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the **Search APIs** text box on the Overview tab, enter your search phrase and select **Search**.
3. On the Search results page, select the **APIs** tab.

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4. Select the check boxes next to the Name column for APIs that you want to compare.

   Note:
   You can select up to three APIs to compare.

5. Select **Compare selected**.
6. On the Compare APIs page, compare the selected APIs based on version, type, business context also called as business application, managed by group, life cycle stage, and sources.

Connect to an API creation tool from API Insights

Initiate API creation directly from the API Insights workspace by connecting to an external API design tool of your choice.

Before you begin

The application administrator must configure an API creation tool. See Configure settings to manage APIs in API Insights.

Role required: sn_api_insights_ws.api_mgmt_architect

About this task

Search for an existing API in the API Insights workspace, and if no matches are found, initiate API creation directly from the workspace.

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the **Search APIs** text box on the Overview tab, enter the name or keyword of the API to search for and select **Search**.
3. On the Search results page, select the **APIs** tab to view matching APIs.
4. If no matching API is found, select **Create API** to start designing a new API.

Result

Based on the settings configured by your application administrator, the API creation tool opens, enabling you to create an API.

Request access to an API in API Insights

Request access to an API available within your organization in the API Insights workspace.

Before you begin

The application administrator must configure an ownership group and set up a workflow for managing access requests.

Role required: sn_api_insights_ws.api_mgmt_architect

About this task

Alternatively, you can request access to an API managed by your team. See Manage your team's API data in API Insights,

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the **Search APIs** text box on the Overview tab, enter your search phrase and select **Search**.
3. On the Search results page, select the **APIs** tab.

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4. Select the check box next to the **Name** column for the API for which you want to request access.

> **Note:**
> You can request access for only one API at a time.

5. Select **Request access**.
6. In the Request access dialog box, fill in the details.

Field	Description
Access type	Method used for authenticating and authorizing users or applications when interacting with an API or service. The available options are: **API Key** Provides authentication using a unique token included in the request. **Application** Grants access at the application level, authenticating the application itself. **Basic Auth** Uses a base64-encoded string of credentials sent in the request header for authentication. **Developer** Offers access for individual developers or development environments. **OAuth 2.0** Employs tokens to authorize access securely, allowing applications to act on behalf of a user. **Other** Includes custom methods of authentication and authorization.
Access duration in days	Length of time, measured in days, for which access to an API is granted before reauthorization is needed.
Justification for your access request	Reason or explanation for why access to the API is needed.

7. Select **Request**.

Result

The access request is submitted for approval based on the workflow settings configured by your application administrator.

Identifying and remediating missing API data in API Insights

Identify and remediate missing API data in the API Insights workspace by linking missing elements and verifying complete API records.

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Missing metadata can reduce the effectiveness of API discovery, life cycle tracking, and ownership accountability. Common missing elements include:

- Business context
- Ownership group
- Product model
- Design details

Resolving missing data ensures a more complete, accurate view of dependencies and ownership, improving impact assessments and service management.

The Overview tab of the API Insights workspace enables improve the usability, governance, and integration of APIs by highlighting any incomplete or missing data within the Configuration Management Database (CMDB).

Remediating missing API data by roles

The following roles can identify and resolve missing metadata in API:

- An enterprise architect with the sn_api_insights_ws.api_mgmt_architect role can access the Overview tab in the API Insights workspace to remediate missing API information using dedicated tiles for each type of missing data.
- A CMDB administrator with the sn_cmdb_admin role can access the Overview tab in the API Insights workspace and select a bar within the APIs missing attributes bar chart to identify and update missing metadata.

Monitoring key metrics

You can monitor the following missing data associated with APIs within your organization:

Missing business context

APIs not associated with any business context reduce the clarity and governance over which business areas are providing them.

Missing ownership groups

APIs without an assigned ownership group affect governance. Assigning ownership groups streamlines tracking remediations, managing access, and resolving issues quickly.

Missing product models

APIs without an assigned product model limit the ability to provide accurate reporting and interactions with versioned APIs.

Missing design

APIs with no design representation hinder their full integration into the system. Linking these APIs with their design-time counterparts (such as digital interface records) improves usability and operational efficiency.

Resolving missing API data

You can resolve missing API data by creating relationships for business context or references for ownership groups, product models, or designs, to establish connections between the API and other CIs within the CMDB.

You can establish the following relationships or references in API Insights to resolve missing API data:

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API-to-business context relationship

Links an API to a specific business context, defining the context in which the API is used and creating a relationship record in the CMDB.

API-to-ownership group reference

Links an API to a group responsible for its governance, access control, and maintenance, serving as a reference without creating a record in the CMDB.

API-to-product model reference

Links an API to a product model, providing information on the API's versioning, product line, and life cycle stage, serving as a reference without creating a record in the CMDB.

API-to-design reference

Links an API to its runtime or design-time interface, serving as a reference without creating a record in the CMDB.

Create a relationship or reference to remediate missing API data

Improve the operational efficiency of the API ecosystem within your organization by creating a relationship or reference for APIs that lack key attributes such as business context, ownership groups, product models, or designs.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect, sn_cmdb_admin

About this task

Available missing data categories include:

- Missing business context
- Missing ownership groups
- Missing product models
- Missing designs

> **Note:**
> Displayed only when the Digital Integration Management plugin (sn_apm_di) is activated.

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the Overview tab, if not already selected by default.
3. Select a missing data category to open the list of APIs missing that attribute.
   - As a user with the sn_api_insights_ws.api_mgmt_architect role, in the APIs missing data section, select the number shown for a specific missing data category.
   - As a user with the sn_cmdb_admin role, select a category bar in the APIs missing data bar chart.
4. On the APIs missing data page, select the check boxes next to the API names.
5. Resolve missing data.
   - For resolving missing business context, select **Create relationships**.
   - For resolving missing ownership groups, product model, or designs, select **Create reference**.
6. Select the check boxes next to the **Name** column for the application services.

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7. Based on the type of connection needed, establish relationships or a reference.
   - For business context, select **Create relationships**.
   - For ownership groups, product model, or designs, select **Create reference**.
8. In the dialog box that appears, select **Create**.

Manage your team's API data in API Insights

Improve the operational efficiency of the API ecosystem within your organization by creating a relationship for APIs that lack key attributes such as business context also called as business application ownership groups, product models, or designs.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights** > **Overview**.
2. In the Your team's APIs section, select a category based on the API's life cycle stage.
   - To view all the APIs managed by your team, select **All APIs**.
   - To view the APIs managed by your team that are currently in the design phase, select **In design**.
   - To view the APIs managed by your team that are active and in use, select **Operational**.
   - To view the APIs managed by your team that have reached the end of their life cycle, select **End of Life**.
3. From the **Name** column, select an API to view more details of the API.
   See Viewing API details in API Insights.
4. **Optional:** Select **Request access** to gain access to the API.

Viewing API details in API Insights

As an enterprise architect, gain insights into your organization's API performance, relationships, and governance from the API details page within the API Insights workspace.

The API details page in the API Insights workspace provides a detailed view of an API's operational status, usage, security, and relationships within CMDB.

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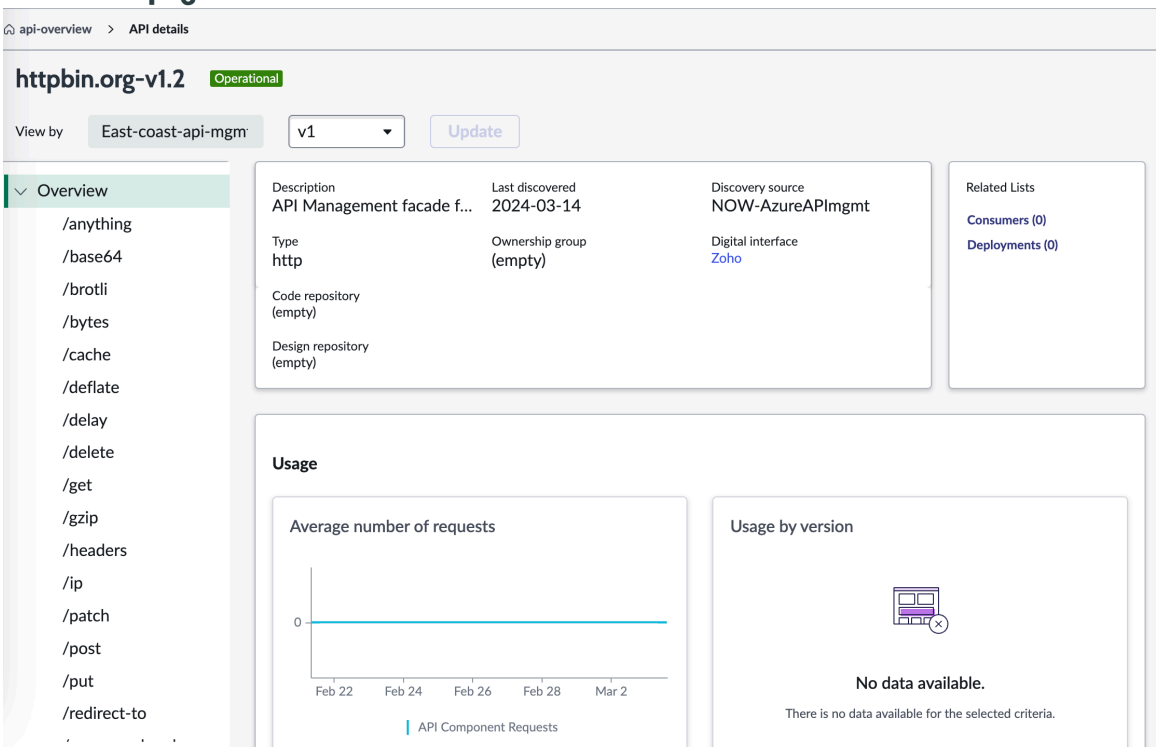
API details page



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Accessing and using the API details page

To access the API details page, navigate to **Workspaces** > **API Insights**, select the **APIs** tab, and then select an API from the **Name** column from the API table.

Viewing data

By default, the page displays the following data:

- Header region
- Metadata region
- Related lists
- Overview panel
- Usage
- Security
- Events
- Relationship map

Header region

Displays the name of the API, version information, the API's current life cycle stage, such as Operational, or End of Life.

The **View By** list enables you to toggle between different management platforms, if available, under which the API is managed.

The version selector enables the selection of different versions of the API to view and manage. Select **Update** to update the details based on the selected version.

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Note:
The **View By** list and the version selector appear only if applicable for an API.

Metadata region

Displays the following fields.

Field	Description
Description	Brief summary or purpose of the API.
Last discovered	Last date the API was discovered or updated in the CMDB.
Discovery source	Source from where the API was discovered.
Type	Type of the API whether scripted REST API, HTTP API, platform REST API, and so on.
Ownership group	Team or group responsible for managing the API.
Digital interface	Interaction method of the API within the system.

Related Lists

Displays the following fields.

Field	Description
Access requests received	Displays the number of access requests made for the API. Select the number displayed on the card to view access request details.
Consumers	Displays the number of consumers of the API.
Deployments	Indicates any active or past deployments of the API across environments.

Overview panel

Lists all the available operations (endpoints) of the API. Select an endpoint to view its details.

Usage

Displays the following fields.

Field	Description
Daily requests	Number of API component requests over time, represented as a line graph, with the x-axis showing the date range and the y-axis displaying the request count.
Requests by version (last 10 days)	API request distribution across different versions over the past 10 days.
Business applications	Number of business context also called as business application linked to the API design, as reflected in the digital interface record.

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Security

Displays the following fields.

Field	Description
Active vulnerability items	Security vulnerabilities associated with the API enabling to track and resolve potential risks.
Security incidents	Security incidents, if enabled, providing insights into security breaches or issues that might have occurred with the API.

Events

Displays the following fields.

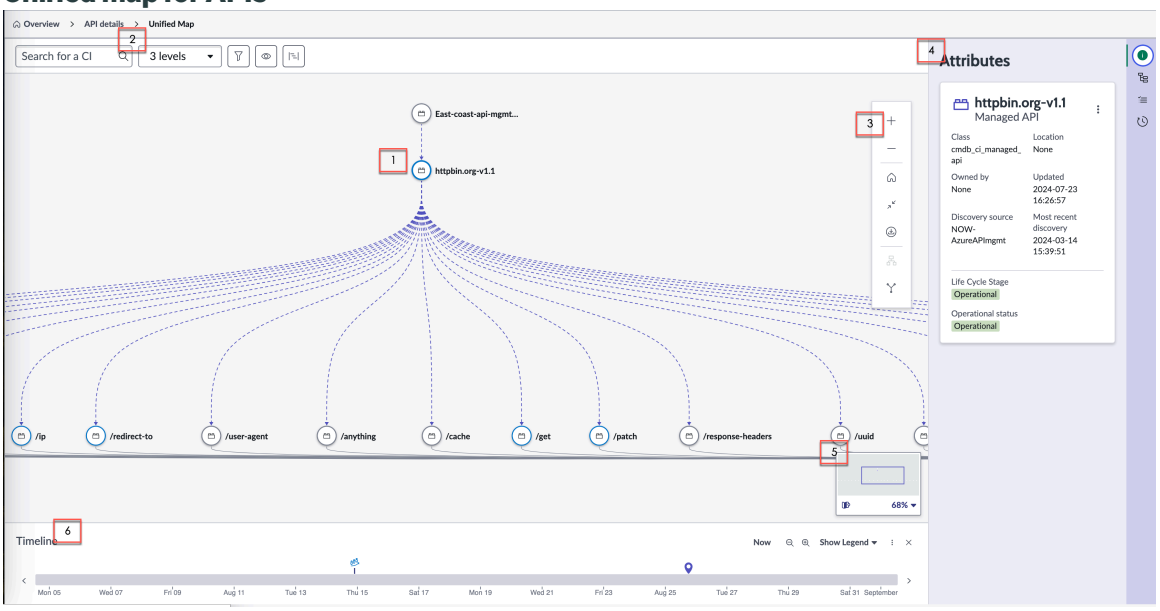
Field	Description
Critical alerts	Critical alerts from IT operations related to the API enabling identifying major issues that could affect the API's performance.
Incidents	Recorded incidents, such as outages, change requests, or problems related to the API essential for tracking operational health and remediation efforts.

Relationship map

Provides a hierarchical overview of the API relationships with its components, management platforms, business applications, and designs, making it easier to understand the API's role within the broader system architecture. In addition, provides the option to manage application service relationships. See Managing application service relationships for APIs.

A relationship map is a partial unified map similar to the one used in the CMDB Workspace. To open the unified map for APIs, select **Open full map** in the Relationship map section of the API details page. To learn more, see Unified Map.

Unified map for APIs



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Nodes on the map represent the API and its components in the CMDB and lines represent connections and relationships between API components. The connections help you, for example, to assess the impact of a change to a selected node by showing components that are connected to it through relationships and references. Products such as Change Management, Incident Management, and Event Management benefit from such information.

The map also shows the composition of application services useful with products such as Event Management and Incident Management. You can review historical changes.

The following elements are available in the unified map for APIs:

1: Map

The map displays the specified API and its connections and relationships. In the example, the `httpbin.org-v1.1` is the home node and the lines represent connections and relationships with other components. Select any node to view details like related application services, change history.

2: Content controls

- Search for and select the home node, specify the number of relationship levels for application services to display, and reload the map after making changes.
- Use filters to limit the types and relationship types that appear on the map.
- Show or hide the timeline of events (related items) for the selected API

3: Toolbox

Use the toolbox to control several visual aspects of the map, such as zoom level or layout mode.

4: Contextual side panel

- The **Attributes** panel ( ) lists attributes like location and operational status for the selected API or relationship.
- The **Application services** panel ( ) lists details of application services associated with the selected API.
- The **Related items** panel ( ) shows related items such as active incidents or active problems for the selected API.
- The **Changes** panel ( ) lists changes such as changes to operational status for the selected API.

5: Mini-map navigator

Set the zoom level or move the view to an area of interest. Select the icon to show or hide the navigator.

6: Timeline

The timeline indicates events (related items) like incidents, problems, and changes for the selected API over a specified period of time. You can use the timeline to visualize the history of changes to an API and how they affect the topology of the CMDB.

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Managing application service relationships for APIs

You can associate APIs with relevant configuration items (CIs) to ensure accurate mappings between APIs and the configuration items they support.

Application service relationships link APIs to business context and the CIs they depend on, providing clarity on dependencies and improving performance visibility. They enable you to monitor, track changes, and resolve issues more efficiently.

For APIs, application service relationships map how they interact with other CIs, enabling you to manage dependencies, ensure business continuity, and respond quickly to incidents. By understanding these relationships, you gain better control over API performance and the availability of connected CIs.

By using application service relationships, you can:

- Identify which APIs are tied to specific application services and their related CIs.
- Understand the dependencies between APIs and the CIs they support.
- Manage and monitor API performance and its impact on critical business services and CIs.

For more information, see Application services.

The available actions for handling application service relationships for APIs include:

- View application service relationships.
- Create application service relationships.
- Remove application service relationships.

View application service relationships

View existing relationships between an API and application services.

Before you begin

Role required: sn_cmdb_admin, sn_api_insights_ws.api_mgmt_architect_admin, or sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **APIs** tab.
3. Select an API from the **Name** column on the API table.
4. In the Relationship map section, select **Manage service relationships**.
5. View existing relationships between application services and the selected API on the Related application services table.

Create application service relationships

Create relationships between an API and application services.

Before you begin

Role required: sn_cmdb_admin or sn_api_insights_ws.api_mgmt_architect_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **APIs** tab.

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3. Select an API from the **Name** column on the API table.
4. In the Relationship map section, select **Manage service relationships**.
5. Select **Create relationships**.
6. Select application services to create relationships with the selected API.
7. Select **Create**.

Remove application service relationships

Remove relationships between an API and application services.

Before you begin

Role required: sn_cmdb_admin or sn_api_insights_ws.api_mgmt_architect_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **APIs** tab.
3. Select an API from the **Name** column on the API table.
4. In the Relationship map section, select **Manage service relationships**.
5. On the Related application services table, select the check box for an existing relationship.
6. Select **Remove relationships**.

Managing API access within API Insights

Manage received and sent requests by granting or rejecting API access, sending reminders, or withdrawing requests in API Insights.

You can manage API access requests by performing the following actions:

- Manage requests received for API access in API Insights.
- Manage requests sent for API access in API Insights.

Manage requests received for API access in API Insights

Manage incoming received requests for API access in API Insights.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the Access requests received section on the Overview tab, select the displayed numeric value.
3. In the **Requests received** tab, review all incoming requests.
   You can review the details such as API name, requested by, request type, duration, and the reason for the request.

> **Important:**
> The **View requests** link in the API request reminder email works only if you have the sn_api_insights_ws.api_mgmt_architect or sn_api_insights_ws.api_mgmt_architect_admin role and are part of the same group that received the email to view the requests.

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4. Select the check boxes next to the request names to select one or more access requests that you want to process.
5. Manage the received requests.
   - Select **Grant access** to approve access to the requested API.
   - Select **Reject request** to deny access to the requested API.

Result
A confirmation notification appears, indicating that the API request access flow process was initiated or completed successfully.

Manage requests sent for API access in API Insights

Manage your sent access requests by either sending a reminder or withdrawing the request in API Insights.

Before you begin
Role required: sn_api_insights_ws.api_mgmt_architect

Procedure
1. Navigate to **Workspaces** > **API Insights**.
2. In the Your access requests section on the Overview tab, select the displayed numeric value.
3. In the **Requests sent** tab, view a list of access requests you have sent.
4. Select the check boxes next to the request names to select one or more sent requests that you want to process.
5. Manage the sent requests.

Optimizing API organization with clustering recommendations in API Insights

Leverage clustering recommendations to organize and group related API components, improving the efficiency and accuracy of API management.

The API clustering recommendations feature analyzes unlinked API components and proposes clusters likely belonging to the same API. Each recommendation includes a cluster concept, size, and quality score. By accepting a recommendation, you can link the components to an existing API or create another API record, improving data organization and management.

You can:

- View API clustering recommendations.
- Accept clustering recommendations.

Viewing API clustering recommendations in API Insights

Use machine learning-based suggestions to group related API components, improving the organization and mapping of APIs within the system.

The Proposed API clustering tab of the Data recommendations page in the API Insights workspace provides machine learning-generated recommendations for API clustering.

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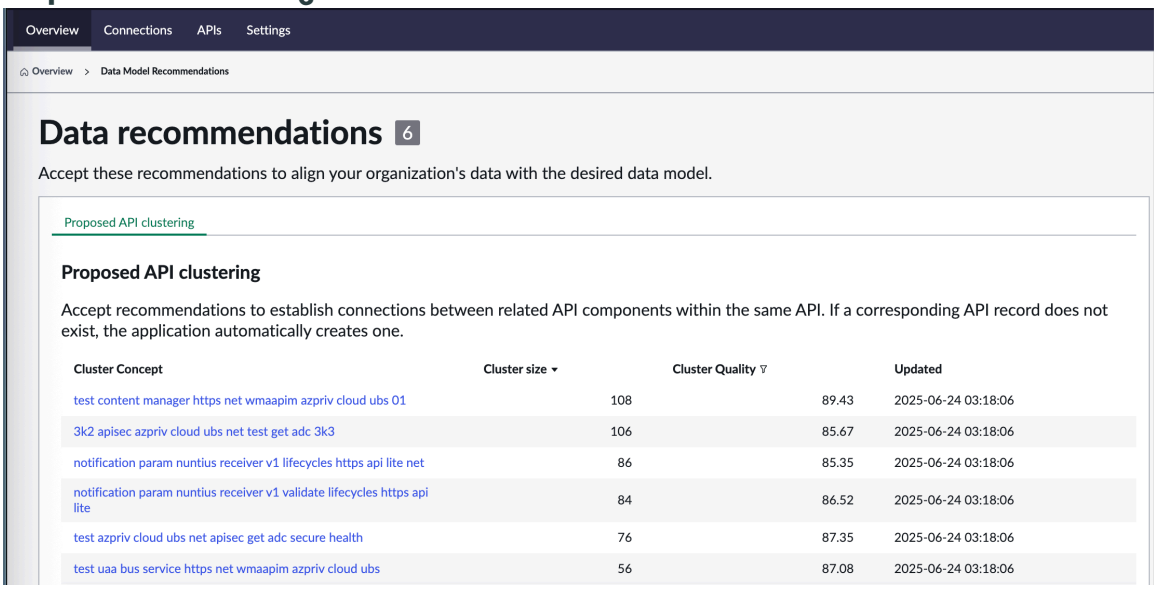
Proposed API clustering tab



Accessing the Proposed API clustering tab

To access the Proposed API clustering tab, navigate to **Workspaces** > **API Insights**. On the **Overview** tab, select the count metric in the API clustering recommendations section. The **Proposed API clustering** tab is displayed on the Data recommendations page.

Viewing data

By default, the page displays the following data:

Cluster Concept

Displays the API components that the machine learning model has grouped together based on similarities. These concepts represent the core idea or functionality that defines each cluster.

Cluster size

Indicates the total number of components within the cluster. A larger size suggests that many components are related and grouped together under the same API concept.

Cluster Quality

Reflects the confidence or strength of the relationship between components in the cluster, measured on a scale from 0 to 100. A higher quality value implies stronger relationships among the API components within the cluster.

Updated

Displays the most recent timestamp when the cluster was updated, enabling tracking the recency of the machine learning recommendations and any changes to the clusters.

Accept clustering recommendation in API Insights

Associate API components with an API record by accepting clustering recommendation in the API Insights workspace.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect

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Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. On the **Overview** tab, select the count metric displayed in the API clustering recommendations section.
3. On the **Proposed API clustering** tab, review the list of recommendations.
4. From the **Cluster Concept** column, select a cluster concept link.
5. On the Missing API page, review the list of API components that have not yet been associated with an API record.
6. Select the check boxes next to the API components to associate with an API record.

> **Note:**
> You can select one or multiple components depending on your requirement.

7. Select **Accept**.
8. Select an API record.
9. Select **Submit**.

Result
The Missing API list is refreshed with the linked components removed from the list and associated with the specified API record.

Managing API data connections added for Service Graph Connectors in API Insights

You can view the status of your API data connections, including success rates, processing status, and ongoing executions. and monitor the progress of connections added using Service Graph Connectors in API Insights.

- View the status of API data connections in API Insights.
- Monitor configuration progress of connections in API Insights.

View the status of API data connections in API Insights

View the status of your API data connections using Service Graph Connectors, including success rates, processing status, and ongoing executions.

Before you begin
Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the Connections overview section of the Overview tab, access the various cards to gain insights on the performance of Service Graph Connectors.

Connections overview

Card	Description
Connections status	Percentage of connections tested successfully based on connection status, with the count of success, error, and unknown statuses.

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Card	Description
Processing status	Percentage of connections for which all data import runs in the last import execution were successful, with the count of success and error statuses.
Ongoing executions	Number of connections where data import execution is currently in progress.

3. From the **Connection** column, select a connection.
4. On the connection record page, select a tab to view more information about the selected connection.

Connection record details

Tab	Description
Details	Connection information, such as the connection name and credentials associated with the connection.
Connection properties	Properties configured for the connection.
Data sources	Data sources associated with the connection, specifying what data is being retrieved or synchronized.
Import schedules	Scheduled imports for the connection, including parent schedule, data source, timing and frequency of data retrieval.
Errors	Error related to the connection.

Monitor configuration progress of connections in API Insights

Check progress status of API data connections in API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

About this task

Service Graph Connectors are integrations that facilitate API data ingestion into the Configuration Management Database (CMDB) from various third-party sources. To learn more, see Getting started with Service Graph Connectors.

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. On the Connection status section of the Overview tab, monitor the progress of connections configured for Service Graph Connectors that import API data.
3. To view the number of installed connections, select the count metric from **Active connections**.
4. Review the list of installed and draft connections in their respective tabs.
   See Viewing API data connections for a Service Graph Connector within API Insights.
5. **Optional:** Select **Create connection** to create a connection for importing API data.
   See Create an API data connection for a Service Graph Connector within API Insights.
6. **Optional:** Select **Explore connectors** to explore available options for onboarding and maintaining Service Graph Connectors that import API data within API Insights.
   See Exploring Service Graph Connectors for API data within API Insights.

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Viewing API data connections for a Service Graph Connector within API Insights

You can view installed and draft API data connections that were added using Service Graph Connectors within API Insights.

The following connection types are available for viewing:

- Installed connection (see View an installed connection within API Insights.)
- Draft connection (see View a draft connection within API Insights.)

View an installed connection within API Insights

View the details of an installed connection that was added using a Service Graph Connector within SGC Central.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **All connections**.
4. Select the **Installed** tab.
5. Review the list of installed API data connections.
6. Select a connection from the **Connection** column to view the details, data sources, import schedules, and errors associated with the connection.

View a draft connection within API Insights

View the details and resume setting up draft connections.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **All connections**.
4. Select the **Drafts** tab.
5. Review the list of draft connections.
6. Complete setting up the draft connections.
   - Select **Configure** to continue where a Service Graph Connector was last configured within SGC Central.
   - Select **Resume setup** to set up a single instance connector for the first time.

Create an API data connection for a Service Graph Connector within API Insights

Create an API data connection added for a Service Graph Connector within API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

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Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **Create connection**.
4. On the Create connection window, select a connector type for importing API data and then follow the playbook instructions to create a connection.

Exploring Service Graph Connectors for API data within API Insights

You can explore available options for onboarding and maintaining API data using Service Graph Connectors within API Insights.

Service Graph Connectors are integrations that facilitate data ingestion into the Configuration Management Database (CMDB) from various third-party sources. To learn more, see Getting started with Service Graph Connectors and API Service Graph Connectors.

Options for maintaining Service Graph Connectors for importing API data within API Insights include:

- Update an installed Service Graph Connector in API Insights.
- Install a Service Graph Connector with an available entitlement in API Insights.
- Install a Service Graph Connector from ServiceNow Store within API Insights.

Update an installed Service Graph Connector in API Insights

Keep a Service Graph Connector for importing API data up-to-date within API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **Explore connectors**.
4. In the Updates available section, review the updates that are available for a Service Graph Connector.
5. Update the connector.
   - Select a connector to access the connector in Application Manager and then install any updates.
   - Select **Install updates** to open Application Manager, and then view and install updates for a connector from the **Updates** tab.

   For more information, see .

Install a Service Graph Connector with an available entitlement in API Insights

Install a Service Graph Connector for importing API data that matches an entitlement available in Application Manager from within API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

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Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **Explore connectors**.
4. In the Entitlements available section, select **Explore in Application Manager**.
5. In Application Manager, review the entitlements and install a connector for API data.
   For more information, see .

Install a Service Graph Connector from ServiceNow Store within API Insights

Explore ServiceNow Store to request and use a Service Graph Connector with no available entitlements for importing API data from within API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **Explore connectors**.
4. In the Available from ServiceNow Store section, select **Explore in ServiceNow Store**.
5. On ServiceNow Store, review the list of Service Graph Connectors for importing API data and install a connector.
   For more information, see the ServiceNow Store website.

API Insights reference

Reference topics provide additional information about API Insights components.

Components installed with API Insights

Several types of components are installed with activation of the API Insights plugin, including tables, user roles, and scheduled jobs.

Roles installed

Role title [name]	Description	Contains roles
Enterprise architect administrator [sn_api_insights_ws.api_mgmt_architect_admin]	Accesses the API Insights workspace to search APIs, review data model recommendations, monitors API connections, evaluate metrics on API usage, and set parameters for data model recommendations	sn_api_insights_ws.api_mgmt_architect

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Role title [name]	Description	Contains roles
	and de-duplication tasks.	
Enterprise architect [sn_api_insights_ws.api_mgmt_architect]	Accesses the API Insights workspace to search APIs, monitor team APIs, view managed and subscribed APIs, track API activity, review API access requests, and manage API life cycle aspects, including APIs without business context, ownership, product models, or designs.	• task_editor • sn_incident_read • sn_vul.vulnerability_read • sn_cmdb_editor • sn_msi.msi_incident_read

Scheduled jobs installed

Scheduled job	Description
Gather APIs without Business App relationship	Identifies and collects APIs that do not have an associated business context also called as business application.
Import ServiceNow API to API Insights	Retrieves ServiceNow APIs from the ServiceNow registry and imports them into API Insights.
Import ServiceNow API usage to MetricBase	Collects ServiceNow API usage data and pushes it to the MetricBase application.
SyncOwnershipGroupsOfAPIVersions	Synchronizes ownership groups for API versions in API Insights.
API Specification Validation	Performs automated validation of API specifications in an instance.

Tables installed

Table	Description
APIs missing relationships [sn_api_insights_ws_apis_missing_relationships]	API records that lack a defined relationship.

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Table	Description
API Specification [sn_api_insights_ws_api_specification]	API specification details, such as OpenAPI definitions.
Importable ServiceNow APIs [sn_api_insights_ws_importable_servicenow_api]	Details of APIs imported from ServiceNow.
Open API Specifications [sn_api_insights_ws_openapi_specifications]	OpenAPI specification records for API Insights.
Push API Specification [sn_api_insights_ws_push_api_spec]	Records for pushing API specifications.
API Requests Access Task [sn_api_insights_ws_request_access_task]	Tasks related to API access requests.
Specification Validation Rule [sn_api_insights_ws_spec_validation_rule]	Validation rules that validate API specifications based on the configured rules.

Plugins installed

Plugin	Description
MetricBase (com.snc.clotho)	Collects, retains, analyzes, graphs, and acts on time-series data.

ServiceNow Store applications installed

Application	Description
@devsnc/sn-list-selector (sn_list-selector)	Enables selecting a set of values from a simple or multi-dimensional data source.
CMDB CI Class Models (sn_cmdb_ci_class)	Provides the single source for all new base-system CMDB CI class models defined by ServiceNow.
CMDB Workspace (sn_cmdb_ws)	Enables a workspace for working with the CMDB to search and explore the CMDB, understand its health, work on related tasks,

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Application	Description
	view activity, performance and feature usage, and access various management tools to support tasks in an organization.
Node map Experience Component (sn_node_map)	Enables mapping and visualizing connections between concepts.
SGC Central (sn_sgc_central)	Enables discovering, installing, and monitoring Service Graph Connectors.
Timeline component (sn_ui_timeline)	Shows events and information across a timeline to contextualize history or important information for an object.
UX Commons (sn_app_ux_commons)	Enhances component experience with common UI Builder utilities, controllers, and bundles.

API Insights properties

API Insights properties control the behavior of the application.

System properties

These system properties are available for API Insights.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for API Insights

Property	Description
sn_api_insights_ws.import_outbound_rest_api	Set the property to enable or disable the import of o Insights workspace. • Type: string • Default value: {"custom_api":false,"ser • Location: System Property [sys_properties] table
sn_api_insights_ws.import_outbound_soap_api	Set the property to enable or disable the import of o ServiceNow instance to the API Insights workspace. • Type: string • Default value: {"custom_api":false,"ser • Location: System Property [sys_properties] table
sn_api_insights_ws.import_scripted_rest_api	Set the property to enable or disable the import of s timeframe for recent activity.

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System properties for API Insights (continued)

Property	Description
	• Type: string • Default value: `{"custom_api":false,"servicenow_ap` • Location: System Property [sys_properties] table
sn_api_insights_ws.import_scripted_soap_api	Set the property to enable or disable the import of s timeframe for recent activity. • Type: string • Default value: `{"custom_api":false,"servicenow_ap` • Location: System Property [sys_properties] table
sn_api_insights_ws.ml_min_cluster_quality	Enter the minimum cluster quality to display in mach • Type: integer • Default value: `80` • Location: System Property [sys_properties] table
sn_api_insights_ws.search_api_limit	Enter the desired limit on results for API and API cor • Type: integer • Default value: `1000` • Location: System Property [sys_properties] table
sn_api_insights_ws.settings_api_to_business_app_service	Set the property to the relationship model between • Type: choice list • Default value: `CSDM` • Location: System Property [sys_properties] table
sn_api_insights_ws.settings_grant_access_workflow	Set the property to the sys ID of the workflow to be e • Type: string • Default value: `API Grant/Reject Access` • Location: System Property [sys_properties] table
sn_api_insights_ws.settings_preferred_tool	Set the preferred tool for the creation of new APIs in • Type: choice list • Default value: `Authoring tool` • Location: System Property [sys_properties] table

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System properties for API Insights (continued)

Property	Description
sn_api_insights_ws.settings_preferred_tool_url	Set the URL for the preferred API authoring tool inAP to `API Authoring Tool`. • Type: string • Default value: `http://www.postman.com` • Location: System Property [sys_properties] table
sn_api_insights_ws.settings_support_group_column	Set the column on the Configuration item [cmdb_ci] • Type: choice list • Default value: `managed_by_group` • Location: System Property [sys_properties] table
sn_api_insights_ws.show_ml_clustering_recs	Set the property to `false` to disable the clustering • Type: true | false • Default value: `true` • Location: System Property [sys_properties] table
sn_api_insights_ws.show_overview_metrics_widgets	Set the property to `true` to enable showing the Me • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table

Domain separation and API Insights

Domain separation is unsupported for API Insights. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

For more information on support levels, see Application support for domain separation.

Related topics

Domain separation for service providers

CMDB Identification and Reconciliation

The Identification and Reconciliation module provides a centralized framework for identifying and reconciling data from different data sources. It helps maintain the integrity of the CMDB and some non-CMDB tables when multiple data sources are used to create and update CI records.

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The use of multiple data sources increases the risk of introducing inconsistencies through duplicate records. To maintain the integrity of the database, it is important to correctly identify CIs and services so that new records are created only for CIs that are truly new.

The Identification and Reconciliation Engine (IRE) helps maintain the data integrity as follows:

- Prevent duplicate CIs by uniquely identifying CIs using sets of identification rules
- Reconcile CI attributes by allowing only authoritative data sources to write to the CMDB or to a supported non-CMDB table
- Reclassify CIs
- Provide a centralized framework to perform identification and reconciliation across different data sources

Data sources such as ServiceNow Event Management, Horizontal Discovery, Import Sets, Cloud Insights, Pattern Discovery, and Manual Entry, use IRE APIs to perform CI identification and reconciliation. In addition, any 3rd party data source can leverage REST/Scriptable IRE APIs to also perform CI identification and reconciliation.

Support for non-CMDB tables

IRE processes support some non-CMDB tables. You can create identification rules, reconciliation rules, and other IRE-related rules to ensure the integrity of data inserted or updated in supported non-CMDB tables. For details, see IRE support for non-CMDB tables.

Related topics

Relation qualifier

Domain separation and CMDB Identification and Reconciliation

Domain separation is supported in the CMDB Identification and Reconciliation feature. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Overview

Domain separation is enforced during the CMDB Identification and Reconciliation (IRE) process. IRE processes are domain aware and domain separation is applied to the Identification and Reconciliation rules.

For more information about domain separation, see domain separation.

How domain separation works in Identification and Reconciliation

Domain separation in the identification engine is enforced when users activate the domain separation plugin. Domain separation for IRE has two modes of operation in domain separated instances:

- Strict mode (enabled by default): In this mode, identification processes only those CIs in which the domain ID is identical to the domain of the currently logged in user. If duplicate CIs exist across domains (including parent and child domains), then those CIs aren't considered duplicate CIs because their domain IDs don't match.

- Platform domain separation mode (disabled by default): In this mode, IRE follows the platform domain separation behavior. So during identification, parent domains can access all CIs within their child domains or any of the domains it has visibility into. For more information, see Visibility domains and Contains domains.

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Platform domain separation mode is intended to be used by advanced users for very specific or advanced use cases.

Note:

Platform domain separation mode introduces some risks that are greater on upgraded instances and much lesser on zBooted instances.

Depending on how IRE processes are configured on a domain separated instance, setting IRE to use platform domain separation mode might result in unexpected and undesirable behavior if not used carefully. One of the risks is if enabling platform domain separation mode is followed by running IRE processes from a different domain than the one on which IRE processes were previously run. In this situation, CIs that were previously identified as unique, might get identified as duplicate CIs and might cause some applications to start failing.

If any application is already using IRE effectively in domain separated environment, then there's no advantage in switching to platform domain separation mode that might create some risk.

Use the glide.identification_engine.platform_domain_separation_enabled system property to switch between those two modes for IRE domain separation. By default, this property is set to **false**.

Platform domain separation mode

Set the system property glide.identification_engine.platform_domain_separation_enabled to **true** to enable the platform domain separation mode for IRE processing. With the platform domain separation mode, parent domains can access all of their child domains during IRE processing. For example, IRE can detect a matching CI in a child domain and then update that CI instead of creating a new one.

In the platform domain separation mode for IRE:

- IRE run from a parent domain can access CIs contained within their domain, child domains that are lower in the domain hierarchy, and global domain.
- IRE run from the global domain can access all CIs.
- Visibility domains and Contains domains are supported.

Note:
When platform domain separation mode is enabled, there might be a sudden increase in IRE detection of duplicate CIs.

Domain separation during the Identification Process

Domain separation during the Identification process is enforced as follows:

- Regardless of the setting of the glide.identification_engine.platform_domain_separation_enabled system property:
  - Domain IDs don't need to be explicitly sent in the input payload of the identification engine APIs. Internally, the identification engine causes the current domain ID of the user to call the identification engine APIs.
  - During matching, if no records are found and a CI is inserted, the CI domain ID is the same as the domain ID of the logged-in user's domain. When updating a CI, the CI domain ID doesn't change.

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- During matching, if duplicates are found, De-Duplication tasks created in the [reconcile_duplicate_task] table have the same domain ID as of the duplicate CIs.
- During matching, if reclassification of the CI isn't allowed, reclassification tasks are created in the [reclassification_task] table, with the same domain ID as the CI for which reclassification is needed.

- When the system property glide.identification_engine.platform_domain_separation_enabled is set to **false**:
  - Only CIs that have the same domain ID as the currently logged-in user's domain are used during matching.
  - Duplicate CIs that exist across domains (including parent and child domains) aren't considered as duplicate CIs by IRE.
- When the system property glide.identification_engine.platform_domain_separation_enabled is set to **true**:
  - Duplicate CIs that exist across domains (such as parent and child domains) are considered as duplicate CIs by IRE.
  - CIs from the logged in user domain and child domains are used during matching.

Domain separation and Identification Rules

The identification rules and identification inclusion rules used during the identification process are always defined at the global level. For example, the following tables don't have a sys_domain field:

- Identifier (cmdb_identifier)
- Identifier Entries (cmdb_identifier_entry)
- Related Entries (cmdb_related_entry)
- Identification Inclusion Rules (cmdb_ie_active_config)

Domain separation and Reconciliation Rules

The reconciliation definition rules that are used during the reconciliation process can be defined for different domains. For example, the following tables do have sys_domain, sys_overrides, sys_domain_path fields:

- Reconciliation Definition (cmdb_reconciliation_definition)
- Datasource Precedence (cmdb_datasource_precedence)
- Data Source Staleness Definitions (cmdb_datasource_staleness)

Components and process of Identification and Reconciliation

The CMDB Identification and Reconciliation functionality is supported by the Identification and Reconciliation engine (IRE), rules, and tasks. Identification rules, reconciliation rules, IRE data source rules, de-duplication tasks, and reclassification tasks determine how IRE identifies and reconciles CI.

Concepts and Components of Identification and Reconciliation

Identification

Process of uniquely identifying CIs, to determine if a CI already exists in the CMDB or if it is a newly discovered CI that must be added to the CMDB. Identification processes rely on identification rules, or on unique IDs for CIs that data sources can provide.

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Reconciliation

Process of reconciling CIs and CI attributes by allowing only designated authoritative data sources to write to the CMDB at the CI table and attribute level. The CMDB is updated in real time as records are being processed. There is no staging area to verify the reconciliation activities before they are committed. Reconciliation processes rely on reconciliation rules and IRE data source rules.

Reconciliation is required only for update operations, when the identification process identifies a CI in the CMDB that matches an incoming CI in the payload. When IRE inserts a new CI, reconciliation is not applied.

De-duplication tasks

If the instance encounters duplicate CIs during the Identification and Reconciliation process, it groups each set of duplicate CIs into a de-duplication task. Review the information in these tasks to see how it was determined that these CIs are duplicates.

Reclassification tasks

During the CI identification process, a matched CI might need to be upgraded, downgraded, or switched to another CI class. If automatic reclassification is disabled, then the system generates a reclassification task. Review the information in these tasks, and decide whether a manual reclassification of the CI is appropriate.

APIs

The Identification and Reconciliation APIs are a centralized set of APIs that can be used with different sources of data such as Discovery, Monitoring, or Import Sets. You can use it to enforce Identification and Reconciliation before data is stored in the CMDB. Data sources do not directly write to the CMDB. Instead, they call APIs first to ensure that the data being written does not introduce inconsistencies.

Identification engine APIs are accessible in scoped apps. The Configuration Management For Scoped Apps (CMDB) plugin (com.snc.cmdb.scoped) allows a scoped app in scripts to use the prefix 'sn_cmdb.IdentificationEngine.<method>' to access identification engine APIs. The Configuration Management For Scoped Apps (CMDB) plugin is activated in base systems.

- createOrUpdateCI() : A scriptable API that creates or updates a CI based on identification and reconciliation rules.
- identifyCI() : Similar to the *createOrUpdateCI* API, but does not commit the result to the database. Use this API with a given payload to find out if the identification engine will perform insert or update operations, without committing the operation.
- CreateOrUpdateCIEnhanced() : A scriptable API that provides the functionality of enhanced IRE features such as partial payload, partial commit, incomplete payload, and deduplication of payload items. You can select the enhanced features to use. However, if you enable partial payloads, then deduplication of payload items and partial commit are automatically enabled.
- identifyCIEnhanced : Similar to the *createOrUpdateCIEnahnced* API, but does not commit the result to the database. Use this API with a given payload to find out if the identification engine will perform insert or update operations, without committing the operation.
- CMDBTransformUtil : An API to be used exclusively with Import Sets to apply Identification and Reconciliation processes to data imported by Import Sets.

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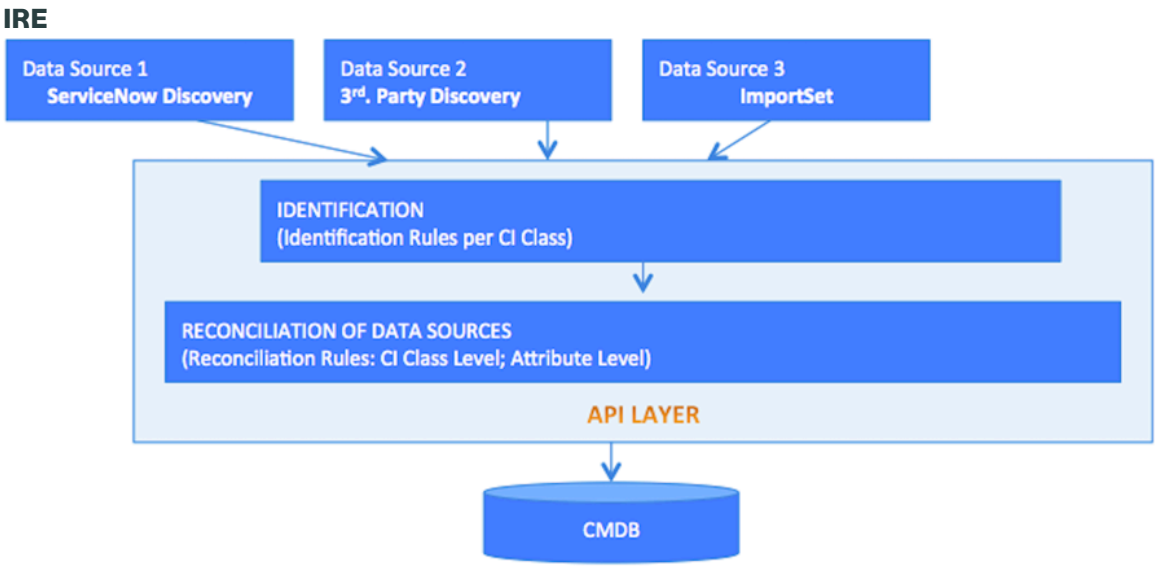
Predefined identification are included for many of the tables in the base system. You can customize these rules for your organization. When a new table is created in the CMDB, it derives identification and reconciliation rules from its parent table if these rules exist. To apply identification and reconciliation rules to a new table, create the rules either at the child level or at its parent level.

Process flow of Identification and Reconciliation



Identification and Reconciliation Engine (IRE)

Identification and Reconciliation engine (IRE) is a rule-based engine, operating as an underlying key component in Identification and Reconciliation. IRE provides a centralized framework to perform identification and reconciliation processes across different data sources. IRE uses identification rules, reconciliation rules, and IRE data source rules when processing incoming data before inserting or updating data in the CMDB. IRE processes help maintain data integrity in the CMDB.

- IRE prevents duplicate CIs by uniquely identifying CIs.
- IRE reconciles CI attributes by allowing only authoritative data sources to write to CMDB.

Identification and Reconciliation engine (IRE)

IRE is an underlying key component in Identification and Reconciliation, providing a centralized framework to perform identification and reconciliation processes across different data sources. IRE uses identification rules, reconciliation rules, and IRE data source rules when processing incoming data before inserting that data to the CMDB.

IRE processes help maintain data integrity in the CMDB.

- IRE prevents duplicate CIs by uniquely identifying CIs.
- IRE reconciles CI attributes by allowing only authoritative data sources to write to CMDB.

ServiceNow® applications such as Service Mapping, horizontal discovery, and pattern discovery, use APIs to apply identification and reconciliation processes. You can also apply IRE processes to data imported by import sets. When using other data sources including third-party data sources, you can leverage REST or scriptable IRE APIs to perform identification and reconciliation.

Additional information:

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- About properties that affect some functions of IRE: See Properties for Identification and Reconciliation.
- About using IRE APIs: See IdentificationEngine - Scoped.
- About enabling debugging and checking on issues with a payload: See How to log the payload sent to IRE and check the issues with the payload [KB0750382].
- About the steps that IRE performs illustrating how IRE works, such as validating the payload, applying reconciliation, and committing the data to the CMDB: See [CMDB - IRE] How the CMDB Identification and Reconciliation Engine works when passing a CI (as payload) to the createOrUpdateCI() [KB0750386].
- About how to run a payload through IRE: See [CMDB IRE] How to run the CI identification on demand using the payload [KB0750383].

CI identification

The CMDB identification process relies on identification rules to uniquely identify CIs. When possible, CIs can also be uniquely identified using *source_name* and *source_native_key* values provided in the *sys_object_source_info* section of the payload, and the Source [sys_object_source] table. If identification is successful using that method, then it is not necessary to apply matching algorithms that rely on identification rules, which is a slower identification method.

A unique CI identifier can be provided in the optional *sys_object_source_info* object in the IRE payload.

```
{
  "items": [
    {
      "className": "cmdb_ci_win_server",
      "values": {
        "name": "SAMLABVM52"
      },
      "sys_object_source_info": {
            "source_native_key": "16777219",
            "source_name": "SCCM",
            "source_feed": "SCCM Computer Identity",
            "source_recency_timestamp": "2019-08-26 13:00:00"
      }
     }
    ]
  }
```

Identification processes rely on CIs dependency classification to uniquely identify CIs. For example, to identify a Tomcat CI which is a dependent CI. Assuming a Windows Server CI (independent class) which is running a Tomcat application (dependent class). elying on 'config file path' to uniquely identify the Tomcat CI, isn't sufficient because the Tomcat application can run on multiple machines with identical paths. The identification engine won't be able to choose a CI to update. Dependent relationships force the identification process to first identify the Windows Server host on which the Tomcat application is running, and only then, in the context of the host, to uniquely identify the Tomcat application itself.

Payload items identification

IRE generates identifier keys for all payload items in an incoming payload and then uses those keys when trying to match partial and incoming payloads. An identifier key is based either on:

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- Combination of the *source_name* and *source_native_key* values from the *sys_object_source_info* object.
- Identification criterion attributes.

IRE stores the identifier keys associated with partial items in the CMDB IRE Partial Payloads Index [cmdb_ire_partial_payloads_index] table, and then uses those keys to try to match with identifier keys of incoming payloads.

Timestamps in key attributes

To help resolve conflicting attribute values, IRE uses timestamps in the following attributes to identify records that are older than the current record and therefore can be ignored:

- Most recent discovery (*last_discovered*) and Discovery source (*discovery_source*):

  Most recent discovery (*last_discovered*) is the timestamp of when the CI was last discovered. IRE always updates CIs' *last_discovered* and *discovery_source* attributes during payload processing, even when no other CI attributes are updated. When *last_discovered* is provided in the payload, IRE updates the CI with the provided value only if the *last_discovered* time in the payload is newer than the one in the CMDB. If *last_discovered* is not provided in the payload, IRE updates the *last_discovered* attribute with the current timestamp.

  You can use the glide.identification_engine.skip_updating_source_last_discovered_if_older and the glide.identification_engine.ire_message_listener_skip_updating_source_last_discovered_to_now system properties to modify this default behaviour.

- First discovered (*first_discovered*) is the timestamp of when the CI was first created.
  - When the CI is first created: If a value is provided in the payload, IRE inserts that value. Otherwise, IRE inserts the current timestamp.
  - In subsequent updates: If a value is provided, IRE updates the CI with the provided value. Otherwise, the attribute is not updated.

You can also use the following system properties to modify how IRE uses the *source_recency_timestamp* value in a payload to update the *last_scan* attribute in the Source [sys_object_source] table:

- glide.identification_engine.skip_updating_last_scan_if_older
- glide.identification_engine.ire_message_listener_skip_updating_last_scan_to_now

Enhanced IRE features

The CreateOrUpdateCIEnhanced() and identifyCIEnhanced scriptable APIs provides the functionality for the following enhanced IRE features, which can be enabled or disabled as needed:

Partial payloads

IRE isolates items for which data sources did not provide enough information to uniquely identify the CI and therefore processing cannot continue. Some of these items are identified as partial items, which get stored for potential later processing. Other items are identified as incomplete items, which get stored for logging purposes only.

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For example: SCCM has multiple feeds such as a disk feed and a computer feed. The disk feed might have complete information about the disk but insufficient information about the computer CI that it depends on.

API option: *partial_payloads* which is enabled by default.
When *partial_payloads* is enabled, *partial_commits* and *deduplicate_payloads* are automatically enabled regardless of their setting in options.

Partial commits

Errors in some items do not prevent committing the rest of the items in a payload. Therefore, when a payload contains items with errors, IRE still commits the remaining valid items in the payload. In this situation, some of the uncommitted items are saved as partial payloads and other uncommitted items are saved as incomplete payloads.

API option: *partial_commits* which is enabled by default.

Deduplicate payload items

IRE deduplicates duplicate items within the payload, merging those duplicates into a single payload item for processing.

API option: *deduplicate_payloads* which is enabled by default.

Generate summary

IRE generates summaries in the output payload with processing details such as the number of updates per class.

API option: *generate_summary* which is disabled by default.

Partial items

A payload item is determined to be a partial item if it doesn't contain the necessary data for unique identification and if it has one of the following errors. Unique identification requires that the payload item has the *sys_object_source_info* section with *source_name* and *source_native_key* values, or the full set of the identification criterion attributes specified for the CI class, or both.

IRE errors for a partial item:

- MISSING_MATCHING_ATTRIBUTES –– Item does not have identification criterion attributes to use at least one identifier entry for matching.
- REQUIRED_ATTRIBUTE_EMPTY –– Unable to create a CI because a required attribute is missing.
- MISSING_DEPENDENCY –– Dependent CI is missing a dependency relation which is specified in the payload.
- INSERT_NOT_ALLOWED_FOR_SOURCE –– An IRE data source rule prevents the specified data sources from creating CIs of the specified class.

For more details about IRE error messages, see IRE error messages.

If processing fails because payload items are determined to be partial items, then the partial items are saved as partial payloads in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table in JSON format for later potential processing. IRE uses identifier keys to attempt to match incoming payloads with stored partial payloads.

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If later, a data source sends the data that was missing in the partial item, IRE matches the incoming payload with the stored partial payloads. IRE then merges any matching partial payloads with the incoming payload. To resolve any conflicting attributes, IRE uses either *source_recency_timestamp* (when *source_native_key* and *source_name* are identical), or static reconciliation rules specified for the class. The result is a complete and valid payload which IRE then processes to create or update the respective CIs.

Partial payloads older than 90 days are deleted from the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table.

Sample of a partial payload:

```
Disk feed:
{
  "items": [
    {
      "className": "cmdb_ci_computer",
      "sys_object_source_info": {
            "source_native_key": "Server001",
            "source_name": "SCCM",
            "source_feed": "DISK_FEED",
            "source_recency_timestamp": "2019-08-26 13:00:00"
      }
    },
    {
      "className": "cmdb_ci_disk",
      "values": {
        "name": "disk1"
      }
    }
  ],
  "relations": [{
              "parent": 0,
              "child": 1,
              "type": "Contains::Contained by"}
              ]
}
```

The computer item in the above payload does not have any attributes and therefore IRE can't process it. However, *source_name* and `source_native_key` are provided making it a partial item. Because the computer item is partial, the disk item that depends on the computer item, is a partial item too.

Sample of a subsequent payload that completes the previous partial payload by providing the missing details:

```
Server/Computer feed:
 {
  "items": [
    {
      "className": "cmdb_ci_linux_server",
      "values": { "name": 'linux001',
                "ip_address": "100.126.38.19",
                "mac_address": "DSWER4587" },
      "sys_object_source_info": {
            "source_native_key": "Server001",
            "source_name": "SCCM",
            "source_feed": "COMPUTER_IDENTITY",
```

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```
            "source_recency_timestamp": "2019-08-26 14:00:00"
        }
    }
  ]
}
```

The computer in the partial payload and the server in the new payload match because they have identical *source_name* and *source_native_key*. Therefore, the partial payload and the new payload are merged, the operation is committed, and the partial payload is deleted from the Partial Payloads table.

There is a limit on the number of items per partial payload, which is set by the glide.identification_engine.partial_payload_items_max_size property (1000 by default). Storing associated relationships, references, and dependent items, in one partial payload, can result in reaching that limit, in which case, the payload is split into multiple partial payloads.

For more information about partial payloads, see CreateOrUpdateCIEnhanced().

Incomplete items

A payload item is determined to be an incomplete item if:

- It does not contain all the data necessary for unique identification
- It has an error that is not associated with a partial item

Unique identification is not possible if neither *source_name* and *source_native_key* within the *sys_object_source_info* object, nor the full set of identification criterion attributes specified for the CI class, is provided.

Incomplete items are saved as incomplete payloads in the CMDB IRE Incomplete Payloads [cmdb_ire_incomplete_payloads] table in JSON format. Incomplete items are stored for the purpose of logging payloads with irrecoverable errors, and are never processed again.

Adding relationships

Add relationships by using either indices, or the optional JSON internal_id element.

Use the *relations* object in the payload to add or update relationships by referring to *internal_ids* of items. Relationships can be created using main items and related items in the payload. For example:

- Relation (parent Index, child Index, Relation Type)
- Relation (parent Internal Id, child Internal Id, Relation Type)

For more information and for code samples, see CreateOrUpdateCIEnhanced().

Adding references between payload items

Add references between two payload items by using the optional JSON *internal_id* element, which uniquely identifies payload items.

Use the *referenceItems* block to add or update references. You can add references between any two items, including main items, lookup items, and related items, in a single payload.

For more information and for code samples, see CreateOrUpdateCIEnhanced().

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CI reclassification

Use the *updateWithoutUpgrade*, *updateWithoutDowngrade*, and *updateWithoutSwitch* flags in the settings block in a payload, to prevent unintentional updates to CIs' class. These flags prevent upgrading, downgrading, or switching the class of a CI that multiple data sources unintentionally might attempt while updating the same CI. For more information and for code samples, see CreateOrUpdateCIEnhanced().

Reclassification flags have precedence over any other system settings for CI reclassification during IRE processing.

Adding custom before and after scripts

Use the IntegrationHub ETL to add custom Java scripts for a data source of a CMDB integration application. Those scripts provide access to the IRE input and output payloads, while processing CMDB integrations.

Before scripts provide access to a batch of input payloads that will be sent to IRE. Using a custom before script lets you:

- Skip a payload in the batch by setting the *status* to SKIPPED. Optionally, provide a reason for skipping the payload which will appear as a comment on the respective import set row table.
- Modify the input payload.
- Write other custom logic inside the script that uses the IRE payload.

After scripts provide access to the IRE input and output payloads. Using a custom after script lets you:

- Easily compare the input and output payloads and identify the different operations that IRE performed on each CI.
- Access the sys_ids of the CIs that IRE created or updated.
- Write other custom logic inside the script that uses the IRE output payload.

Apply CI Identification and Reconciliation to Import Sets

You can apply CMDB Identification and Reconciliation processes when Import Sets are used to import CIs into the CMDB. CI identification can prevent duplicate CIs in the CMDB, which Import Sets might otherwise cause.

Populating CMDB tables using Import Sets can inadvertently result in duplicate CIs when multiple imported records are identical to an existing CI. To minimize this duplication, you can apply CMDB Identification and Reconciliation processes to Import Sets when importing new records into CMDB tables.

Transform map script

In the onBefore transform map script for an import set, add a call to the CMDBTransformUtil API, similar to the following code sample:

```
(function runTransformScript(source, map, log, target) {
// Call CMDB API to do Identification and Reconciliation of
 current row
var cmdbUtil = new CMDBTransformUtil();
cmdbUtil.setDataSource('ImportSet');
cmdbUtil.identifyAndReconcile(source, map, log);
ignore = true;
```

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```
if (cmdbUtil.hasError()) {
        var errorMessage = cmdbUtil.getError();
        log.error(errorMessage);
} else {
        log.info('IE Output Payload: ' +
 cmdbUtil.getOutputPayload());
        log.info('Imported CI: ' +
 cmdbUtil.getOutputRecordSysId());
}

})(source, map, log, target);
```

The `ignore = true` code phrase prevents Import Sets from creating the same record again after it is processed by the identification engine.

Process

The identification engine performs identification of each source record before it is inserted into the CMDB. The identification engine determines if the record is a duplicate of an existing CI, and then:

- If not duplicate: Inserts the record to the target table.
- If duplicate: Updates the existing CI in the CMDB, with data from the source record.

The CMDBTransformUtil API pre-processes the source data, then passes the input values to the identification engine with import set being the data source by default. The CMDBTransformUtil API supports a target field that is a reference field in the same manner that Import Sets supports it. The CMDBTransformUtil API also supports a source script, evaluating source scripts to determine the target value which is then passed to the identification engine. For more information, see Creating a field map.

Specify multiple target tables for an import set

You can configure each record in an import set with its own target table. Then, instead of inserting all the transformed records into a single target table, the records are inserted into the different target tables that are specified per record. For example, you might need to insert some records from the import set to the Computer class and other records to the Server class.

When importing data using Import Sets, incorporate the following steps:

- In the data source file, add a target table column. Use a string such as "MyTable" to label the column header. In each record row, enter the target table for the record, as a valid CMDB class name such as "cmdb_ci_computer".
- After you **Auto Map Matching Fields** on the Table Transform Map form, add a field map for the added target table column to establish a relationship between classes and the target tables in the CMDB.
  1. In the **Field Map** related list on the Table Transform Map form, click **New**.
  2. Set **Source field** to the header of the target table column that you added in the data source file, such as `MyTable`.
  3. Set **Target field** to **Class**.
  4. Click **Submit**.

When you configure an import set with multiple target tables as described in the steps above, the **Target table** that is specified on the Table Transform Map form is not used.

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Restrictions

The following restrictions apply:

- An import set should be associated with a single transform map. While adding a call to the CMDBTransformUtil API, ensure that still a single transform map exists for the import set.
- The CMDBTransformUtil API does not check if mandatory fields have values when used with Import Sets . Regardless of how *enforce mandatory fields* is set in the transform map, data import fails if a mandatory field does not have a value.
- CI Identification and Reconciliation cannot be applied to Import Sets for dependent CIs (CIs with dependent identification rules).

Related topics

Create a transform map

Identification rules

The CMDB identification process relies on identification rules to uniquely identify CIs.

An identification rule applies to a CI class and consists of a single CI identifier and one or more identifier entries and related entries, each with a different priority. Each identifier entry defines a unique attribute set with a specific priority and each related entry defines rules for identifying related items. Create strong identification rules that are set with the highest priority for the strongest identifier entries and related entries.

The identification process and identification rules use the CIs attributes for identification:

Unique attributes

Designated sets of criterion attribute values of a CI, that can be used to uniquely identify the CI. Unique attributes can be from the same table or from derived tables.

Required attributes

Designated attributes of a CI that cannot be empty.

Derivation across the CMDB hierarchy

If no identification rule is explicitly defined for a child class, then the child class derives its identification rule, including any associated identification entries and related entries, from its parent class. Later, an own identification rule can be explicitly defined for the child class. In that case, the identification rule that was initially derived from the parent class, including any associated identification entries and related entries, is no longer in effect at the child class. Also, you must explicitly add identification entries and related entries in the newly created identification rule at the child class.

For example: The *Hardware* class identification rule has a related entry for the *Software Instance* table. This identification rule, including its associated related entry for the *Software Instance* table, is derived by the *Computer* class. If you then create a new identification rule for the *Computer* class, it overwrites the identification rule that was derived from the *Hardware* class. Therefore, the *Hardware* class identification rule, including its associated related entry for the *Software Instance* table, is no longer in effect for the *Computer* class. If the same related entry is needed, you must explicitly add a related entry for the *Software Instance* table in the newly created identification rule for the *Computer* class.

Identification rule types

CI dependency is specified in the CI Class Manager by the dependent relationship rules for the CI's class:

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Independent CIs

CIs, such as Server CIs, which exist on their own and are not dependent on any other CIs.

Dependent CIs

CIs which depend on a relationship to another CI and can't exist on their own in the absence of the dependent relationship. For example:

- *Network Adapter* CIs can't exist meaningfully without the *Hardware* CIs that contain them.
- *Application* CIs can't exist on their own without the *Server* CI they are hosted on.

The steps for identifying dependent CIs can be different from the steps for identifying independent CIs. This difference is reflected in the differences between dependent identification rules and independent identification rules:

Independent identification rule

A rule that identifies a CI based on the CI's own attributes, independently of other CIs or relationship.

Dependent identification rule

A rule in which identifying a CI requires identifying a dependent CI first. A CI can have dependency on one or more CIs, and a dependent CI can have only a single parent CI with dependency. The relationship types between the CI and its dependent CIs are also included in the identification process. To help with the identification process of dependent CIs, create dependent relationships that define the dependency chain within CI types.

The payload used for identification of a dependent CI, can include a relationship with a qualifier chain. For such relationship, if there is a matching parent/child pair, the system compares the qualifier chain in the payload, with the qualifier chain of the CIs in the database. If there is a difference, the qualifier chain in the database is updated to match the qualifier chain in the payload for that relationship.

Identifier entries

You can configure an identifier entry to match a CI not only based on the CI's own attributes (field-based identification) but also based on the CI's related list (lookup-based identification) such as **Serial Numbers** or **Network Adapters**. The lookup table that is used for identification, needs to have a reference field that points to *cmdb_ci*.

There are three types of identifier entries:

Regular identifier entry

Based on CI's attributes that uniquely identify the CI.

Lookup identifier entry

Uses a lookup table (related table) which can be any table that has a reference to the CI that is being identified. After you select a related lookup table, you select identifier attributes from the related table that reference either the cmdb_ci table itself, or one of its descendants.

If the lookup records do not already exist, then they are inserted in the lookup table referenced in the identifier entry.

Hybrid identifier entry

A combination of both, a regular identifier entry and a lookup identifier entry.

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Example: When discovering virtual machines in a cloud environment which might contain two virtual machines with an identical set of serial numbers. A lookup identifier entry for the Hardware table such as `[Table: Serial Number, Criterion Attributes: Serial Number, Serial Number Type]` cannot uniquely identify these two virtual machines. However, a hybrid identifier entry such as `[Table: Serial Number, Criterion Attributes: Serial Number, Serial Number Type + (Name field from main Hardware table)]` can uniquely identify the two virtual machines.

Guidelines for lookup tables

Follow these guidelines when specifying a lookup table in an identifier entry.

1. Ensure that lookup tables reference the cmdb_ci table.
2. It is preferable to enforce exact count match (check box **Enforce exact count match (Lookup)**) for a stronger identification rule. During lookup identification, this option enforces matching only on exact lookup records count match. See Create or edit a CI identification rule for more details.
3. Do not create conflicting identification rules especially for lookup-based rule.

   Example: In a CI Identifier for the Hardware class, you specify a lookup-based rule for the Network Adapter class and you also define a CI Identifier for the Network Adapter class. Duplicates might potentially be created in the Network Adapter table, because there are contradicting rules to identify a unique CI in that table:

   - One rule that looks only at criterion attributes (CI identifier rule)
   - Another rule that looks at criterion attributes and referenced sys_id (lookup rule).

Example: CI with related items that needs to be inserted - sysId is available.

```
var payload = {
    items: [{
        className:'cmdb_ci_linux_server',
       related: [{
              className:'cmdb_ci_spkg',
              values: {
                name:'package1',
                version:'version1'
                }
        }],
        values: {
            sys_id:'194876usytrr65378098'
        }
}]
};
```

Related entries

You can define related entries which are rules that are based on related CIs. A related entry is based on a related table which can be any table (CMDB or non-CMDB) that has a reference to the CI that is being identified. Related entries let you create or update records on other tables in which the data is associated with the CI being identified by the identifier entries. Related entries are not used to directly identify CIs.

After you select a related table for the rule, the list in **Referenced field** is populated with fields from the related table that reference either the cmdb_ci table itself, or one of its descendants.

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A related entry for a class is derived by child classes for which no related entries are specified.

Related topics

Relation qualifier

Create or edit a CI identification rule

Identification rules are used to uniquely identify CIs in the CMDB, as part of the identification and reconciliation process. Each CMDB class can be associated with a single identification rule.

Before you begin

You can update a CI identification rule only at the class level that the rule is defined for. You can't update a derived rule.

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

In a CI identification rule, specify a CI identifier, and identifier entries and related entries that uniquely identify the CI.

Review the following before creating identification rules:

- Identification rules
- General guidelines for using CMDB Identification
- Explore predefined identification rules:
  1. Navigate to **All** > **CI Class Manager**.
  2. Select **Hierarchy** and then search and select, for example, the Hardware class.
  3. In the Hardware bar, expand **Class Info** and select **Identification Rule**.
  4. Examine all the sections and tiles with the settings of the Hardware class identification rule.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list and then select the class for which to create an identification rule.
3. In the class navigation bar, expand **Class Info** and then select **Identification Rule**.
4. Select **Edit**, **Add**, or **Replace** (for a class that has derived the CI identification rule), in the Identification Rule section to create one.
5. Fill out the form, and then select **Save**.

Field	Description
Independent/ Dependent	Designation of whether the CI identifier can identify the CI independently of other CIs, or not. **Note:** To set the rule as **Dependent**, you must specify dependent relationship rules for the selected class.
Name	Name of CI identifier.
Description	Description of the CI identifier.

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6. In the Identifier Entries section, select an existing identifier entry to edit, or select **Add** to create one.
7. In the Identifier Entry dialog box, choose an option and then select **Next**.
   Continue with one of the following three steps according to the option you selected:

Option	Description
Use attributes from main table <table>	Lets you select attributes from the currently selected table (regular identifier entry).
Use attributes from another table (Lookup table)	Lets you select attributes from any related table, other than the currently selected table (lookup identifier entry).
Use attributes from main and another table (Hybrid)	Lets you select attributes from both the currently selected table, and from another table (hybrid identifier entry).

8. **Use attributes from main table <'table'>** option: Set the options on the form and then select **Save**.

   Search On Table is preset to the currently selected table in the CI Classes list.

Field	Description
Active	Check box that specifies the identifier entry is active. At least one identifier entry in an identification rule must be active for the rule to apply.
Priority	Priority of the identifier entry. Identifier entries are applied based on priority. Rules with lower priority numbers are given higher priority. Identifier entries of identical priorities are applied randomly. You can keep gaps between the priority numbers, so you can assign the unused priority numbers to new entries without modifying the existing priority order.
Criterion Attributes	Set of attributes that uniquely identify the CI. Attributes can belong to the current class, or to a parent class. **Note:** It is possible to add reference fields as a criterion attribute. However, such fields might not always be effective: ○ Reference fields store *sys_id*s that point to a record in another table, and thus is considered a weak criterion attribute (in terms of uniqueness) for the current table. ○ The system detects and then replaces invalid values in a reference field with 'Unknown'. For example, an invalid *Model ID* value is replaced with the value 'Unknown'. Also, if several CIs end up having that same reference field set to 'Unknown', then these CIs become duplicate CIs.
Allow null attribute	When selected, then if at least one criterion attribute is not null, attempt matching with an identifier entry even if there are criterion attributes that are null. Otherwise, all criterion attributes must have values to attempt matching with an identifier entry.

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Field	Description
Allow fallback to parent's rules	Allows the identification rules of the CI's parent to be used if a match is not found for this identification rule. Applies only for dependent identification rules.
Advanced Options	A filter to narrow the set of records that will be searched for a matching CI. Available only if the *glide.identification_engine.enable_identifier_optional_condition* system property is set to **true** (**false** by default). In the base system, identifier entries of various classes are pre-configured with advanced options conditions. All these pre-configured conditions in regular identifier entries will automatically apply when you set this property to **true**. Therefore, to prevent unexpected behavior, review those predefined conditions in regular identifier entries before setting this property to **true**. For more details about this property, see Properties for Identification and Reconciliation.

Note:
If criterion attributes have only two attributes and *sys_class_name* is one of them (for example [name, sys_class_name], [ip_address, sys_class_name]), then the other attribute cannot be NULL, even if **Allow null attribute** is enabled. This restriction is due to *sys_class_name* being considered a special system matching attribute.

9. **Use attributes from another table (Lookup table)** option:

   a. Set **Search On Table** to a table other than the currently selected table in the CI Classes list. The **Search On Table** must have a reference field to *cmdb_ci*, otherwise the identifier entry is considered invalid.

   b. Set the rest of the fields as described in the previous step.

   c. **Optional:** Select **Advanced options** and enter the information for a lookup identifier (scroll down if necessary).

Advanced Option	Description
All of these conditions must be met	A filter to narrow the set of records that will be searched for a matching CI.
Enforce exact count match	For lookup identification, match a CI only on exact lookup records count match. When enforced, all lookup items for a CI in the payload must have matching records in the lookup table, that reference the same CI: i. Only matches CIs that have all the lookup items from the input payload referencing the CI in CMDB. ii. If there are multiple matches, selects the oldest created CI as the final match. When not enforced, one lookup item for a CI in the payload matching a record in the lookup table, is sufficient to consider a match:

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Advanced Option	Description
	i. Matches any CI that has at least one of the lookup items from the input payload referencing the CI in CMDB. ii. If there are multiple matches, selects the CIs with the max number of lookup items from the input payload referencing the CI in CMDB. iii. If there are still multiple matches, selects the oldest created CI as the final match.

d. Select **Save**.

10. **Use attributes from main and another table (Hybrid)** option:

a. Set the options on the **General Settings** tab as described in previous steps, and then select **Next**.

b. On the **Main Table Settings** tab, select the attributes to use from the currently selected table, and then select **Next**.
Search On Table is preset to the currently selected table in the CI Classes list.

c. On the **Lookup Table Settings** tab, select a **Search On Table** and then in **Criterion Attributes** select attributes from the specified table. **Search On Table** must have a reference field to *cmdb_ci*, otherwise the identifier entry is considered invalid.
You can select **Advanced options** and enter the information for a lookup identifier as described in the previous step (scroll down if necessary).

d. Select **Save**.

Note:
The **Allow null attribute** option in the hybrid option, is set to **false**. Therefore, all of the selected criterion attributes from both the currently selected table and the lookup table, must have a value. Also, setting optional conditions is available only for the lookup table, and is not available for the main table.

11. **Optional:** On the Related Entries section select an existing related entry to edit, or select **Add** to create one.

a. Update the Related Entry form and then select **Save**.

Related Entry form

Field	Description
Active	Check box that specifies that the related entry is active.
Related table	A related table that references the CI that is being matched.
Referenced field	A referenced field in **Related table** that should store the referenced CI. This field always references the cmdb_ci table, or a descendent of the cmdb_ci table.
Priority	Priority of the related entry for the specified **Related table**. Rules with lower priority numbers are given higher priority while matching a related item for

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Field	Description
	specific related table. Related entries for the specified related table with identical priorities are applied randomly. You can keep gaps between the priority numbers, so you can assign the unused priority numbers to new entries without modifying the existing priority order.
Criterion attributes	The set of attributes to uniquely identify the related item. Attributes can belong to the current class, or to a parent class. **Note:** It is possible to add reference fields as a criterion attribute. However, such fields might not always be effective: ▪ Reference fields store *sys_id*s that point to a record in another table, and thus is considered a weak criterion attribute (in terms of uniqueness) for the current table. ▪ The system detects and then replaces invalid values in a reference field with 'Unknown'. For example, an invalid *Model ID* value is replaced with the value 'Unknown'. Also, if several CIs end up having that same reference field set to 'Unknown', then these CIs become duplicate CIs. Click the lock icon to view, add, or remove attributes from the identification rule.
Allow null attribute	If at least one criterion attribute in the related table is not null, allow to attempt matching with an identifier entry even if there are criterion attributes which are null.
Filter conditions	Add conditions to construct a filter to narrow the set of records that will be searched for a matching related item.

Note:
If criterion attributes have only two attributes and *sys_class_name* is one of them (for example [name, sys_class_name], [ip_address, sys_class_name]), then the other attribute cannot be NULL, even if **Allow null attribute** is enabled. This restriction is due to *sys_class_name* being considered a special system matching attribute.

Example:
For example, the pre-defined **Hardware Rule** applies to the Hardware [cmdb_ci_hardware] table. It has an identifier entry with the criterion attribute **Serial Number, Serial Number Type** and its **Search on table** field is set to **Serial Number**.

The following payload snippet adds a CI to the *cmdb_ci_linux_server* class, that is a child of the *Hardware* class. It also shows how you can add related items in the payload for which you should create **Related Entries** on the CI Identifier page for the Hardware [cmdb_ci_hardware] table:

```
{
    "items": [
        {
            "className": "cmdb_ci_linux_server",
            "lookup": [
                {
```

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```
                    "className": "cmdb_serial_number",
                    "values": {
                        "serial_number": "VMware-42 21 e3 da 44
 14 5a a6-56 48 2b 0a 28 53 42 4c",
                        "serial_number_type": "system",
                        "valid": "true"
                    }
                },
                {
                    "className": "cmdb_serial_number",
                    "values": {
                        "serial_number":
 "4221E3DA-4414-5AA6-5648-2B0A2853424C",
                        "serial_number_type": "uuid",
                        "valid": "true"
                    }
                },                }
            ],

    “related": [
                {
                    "className": "cmdb_ci_ucs_chassis",
                    "values": {
                        “name": “chassis1",
                        “category": “category1",
                        “short_description": “My Chassis 1"
                    }
                },
                {
                    "className": "cmdb_ci_ucs_chassis",
                    "values": {
                        “name": "chassis2",
                        "category": "category2",
                        "short_description": "My Chassis 2"
                    }
                },    }
     ],

            "values": {
                ......
                "name": "xpolog2.lab3",
                "os_name": "Linux",
                "output": "Linux xpolog2.lab3
 2.6.32-431.el6.x86_64 #1 SMP Fri Nov 22 03:15:09 UTC 2013
 x86_64 x86_64 x86_64 GNU/Linux",
                "serial_number": "VMware-42 21 e3 da 44 14 5a
 a6-56 48 2b 0a 28 53 42 4c",
                "sys_class_name": "cmdb_ci_linux_server"
            }
        }
    ]
}
```

When the **Hardware Rule** is applied, the Serial Number [cmdb_serial_number] table is searched for a match with the values specified within the `lookup` key. Unless **Enforce exact count match (Lookup)** is checked, it is not necessary for every lookup key to return a match, as long as there

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is at least one match. If all matches reference the same CI, then that CI is considered to be the existing CI record. If no match is found, then the identification search continues to the next rule entry. If after all the rules are exhausted without finding a match, a new CI record is created in the database.

What to do next

You can optionally create an inclusion rule to narrow the scope of CIs that are included in identification.

Create an identification inclusion rule

Narrow the scope of CIs that are included in the identification process by creating an identification inclusion rule.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

During duplication detection of independent CIs, the identification and reconciliation engine (IRE) processes only the CIs that satisfy the identification inclusion rules. For example, you can set a filter to include only CIs whose state is operational. When no identification inclusion rules exist, all CIs are included in the identification process and in the CMDB Health duplicate metric calculations. In the base system, there are no predefined identification inclusion rules. Identification inclusion rules are defined at the class level.

Identification inclusion rules also indirectly impact what appears in CMDB health dashboards for duplicate CIs, in addition to any health inclusion rules.

Note:
Identification inclusion rules impact any script that calls IRE, therefore create them carefully. Identification inclusion rules can prevent the identification of certain types of CIs, affecting some features of Discovery and Service Mapping.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to display the CI Classes list.
3. Select the class for which to create an identification inclusion rule.
4. In the class navigation bar, expand **Class Info** and then select **Identification**.
5. In the Inclusion Rule (Advanced) section, select **Add** to create a rule or select **Edit** to edit an existing rule.
   In the Create Inclusion Rules dialog box, specify a criteria in the **Active record condition** field. CIs must meet this criteria to be included in the identification process and in the duplicate CMDB Health metric.
6. Select **Save**.

What to do next

Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Identification Inclusion Rules** > to see the list of all identification inclusion rules.

Related topics

Create health inclusion rule

Reconciliation rules

Reconciliation rules determine which discovery sources can update CI attributes.

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Discovery sources, such as EventManagement, ImportSet, ManualEntry, and Tivoli, are used with the createOrUpdateCI() API to simulate manual updates to CIs. Without reconciliation rules, discovery sources can overwrite each other's updates to attribute values.

There are two types of reconciliation rules:

Static reconciliation rules

Static reconciliation rules are the legacy reconciliation rules that set priorities for the various discovery sources for updating CI attributes. Static reconciliation rules specify which discovery sources can update class attributes, and the precedence order among these discovery sources.

When creating static reconciliation rules, ensure that there is a reconciliation rule for each discovery source that is authorized to update an attribute. Reconciliation rules can be defined at the parent and the child class level.

Static reconciliation rules are stored in the Reconciliation Definition [cmdb_reconciliation_definition] table.

Dynamic reconciliation rules

Dynamic reconciliation rules are based on attribute values processed by CMDB 360/Multisource CMDB rather than on discovery source priority. First, CMDB 360 processes the current payload data into the CMDB 360 data store. Then, applying a dynamic reconciliation rule, IRE selects the largest or most reported value, for example, across all discovery sources. Because dynamic reconciliation rules leverage CMDB 360, you must enable that feature to use dynamic reconciliation rules.

Creating dynamic reconciliation rules can be useful, for example, if it becomes difficult to set priority order for multiple discovery sources. Only a single dynamic reconciliation rule can exist per class attribute.

Dynamic reconciliation rules are stored in the Dynamic Reconciliation Definitions [cmdb_dynamic_reconciliation_definition] table.

Examples of static reconciliation rules

The following sample static reconciliation rules are created for the *cmdb_ci_computer* class and its *cmdb_ci_linux_server* child class:

1. Discovery is exclusively authorized to update the *name* attribute in the *cmdb_ci_computer* class.

   Because reconciliation rules are derived by child classes from parent classes, this rule also authorizes Discovery to update the *name* attribute in any child classes for the *cmdb_ci_computer* class.

2. ServiceWatch is exclusively authorized to update the *name* attribute in the *cmdb_ci_linux_server* class.
3. ServiceWatch is exclusively authorized to update all attributes in the *cmdb_ci_linux_server* class, as configured by leaving the **Attributes** field empty in the rule.

See Create a CI reconciliation rule for details about creating a static reconciliation rule that, for example, authorizes a discovery source to update a specific attribute such as *name*.

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Using reconciliation rules

As you create reconciliation rules, keep in mind the following principles which are designed for flexibility and the refinement of rules at the attributes level:

Precedence of dynamic reconciliation rules

When both, static and dynamic reconciliation rules exist for the same CI attribute, the dynamic reconciliation rule takes precedence over the static reconciliation rule.

Authorization for all attributes in a class

A static reconciliation rule lets you authorize a discovery source to update all attributes in a class. However, this authorization can be overridden for some of the attributes by rules for child classes in which specific attributes are listed.

For example, if only example rules #1 and #3 above are created, then Discovery is authorized to update the *name* attribute in the *cmdb_ci_linux_server* class. ServiceWatch is authorized to update all other attributes in the class except for the *name* attribute.

To override the authorization of Discovery to update the *name* attribute, example rule #2 above is added to specifically authorize ServiceWatch to update the attribute.

Authorization to only specific attributes in a class

To authorize a discovery source to update specific attributes in a class, create a static reconciliation rule for the discovery source, and list these attributes in the rule. A rule that grants access to specific attributes in a class overrides other static reconciliation rules with an empty attribute list that grants access to the entire class.

Example rule #1 above grants Discovery with exclusive authority to update the *name* attribute of the *cmdb_ci_computer* class. All other discovery sources are prevented from updating the *name* attribute of any CI in the *cmdb_ci_computer* class.

Child class rules overrides parent class rules

Any reconciliation rules defined for a child class override the rules defined for its parent class. This rule applies also when the child's reconciliation rule is static and the parent's rule is dynamic (dynamic reconciliation rules have precedence over static reconciliation rules when they are for same level class).

For example, rule #1 above lets Discovery update the *name* attribute in the *cmdb_ci_computer* class and all of its child classes. However, rule #2 for the *cmdb_ci_linux_server* child class, which overrides rule #1 for the parent class, explicitly authorizes ServiceWatch to update this attribute in the child class.

As a result:

- Discovery cannot update the *name* attribute of the child *cmdb_ci_linux_server* class. Only ServiceWatch is authorized to update this attribute.
- Discovery is authorized to update the *name* attribute of CI records in all other child classes of the *cmdb_ci_computer* class.

Overlapping static reconciliation rules

Static reconciliation rules that authorize different discovery sources for the same attributes of the same class can coexist and do not exclude each other.

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For example, assume the following rule is added. It is similar to example rule #1 above but authorizes a different discovery source:

ServiceWatch is authorized to update the *name* attribute in the *cmdb_ci_computer* class.

Like example rule #1 above, this new rule applies to the *name* attribute in the *cmdb_ci_computer* class so both Discovery and ServiceWatch can update the attribute. Any reconciliation rules are enforced to prevent the discovery sources from overwriting each other's updates.

For more information about reconciliation rules, see the [CMDB - Data Precedence Rules] Understanding the CMDB data precedence rules and troubleshooting [KB0756709] knowledge base article (Starting with the Paris release, reconciliation and data precedence rules are merged.

Domain separation

If Domain Separation is enabled, then you can scope reconciliation rules to specific domains. Rules of the parent domain, if not overridden, apply to CIs of child domain. All rules that are visible to a domain are applied, and a rule overriding the parent domain displays thele child domain version.

Understanding the CMDB reconciliation rules and troubleshooting [KB0756709]

Create a CI reconciliation rule

Create a static or a dynamic CI reconciliation rule.

If both, static and dynamic reconciliation rules exist for the same CI attribute, the dynamic rule has precedence.

Note:
You can't create a reconciliation rule for system fields or for Identification and Reconciliation Engine (IRE) specific fields such as the Discovery source (discovery_source) field. Also, reconciliation rules can't be dot-walked using reference fields.

Create a static reconciliation rule

A static reconciliation rule specifies class attributes that discovery sources are authorized to update, and prevents unauthorized discovery sources from overwriting the attributes' values. A static reconciliation rule also specifies the prioritization among multiple discovery sources. Without static reconciliation rules, discovery sources can overwrite each other's updates to attribute values.

Before you begin
Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task
Static reconciliation rules are used in conjunction with data refresh rules to determine reconciliation steps for a CI. These rules determine if, when, and by which discovery source a CI can be updated. If multiple discovery sources are authorized to update the same class attributes, assign a priority to each of these discovery sources to prevent them from overwriting each other's updates.

After an authorized discovery source updates an attribute, subsequent updates are accepted only from the same discovery source or from a discovery source with a higher priority. Updates from a discovery source with a lower priority are rejected, unless these two conditions are met:

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- The lower priority source is the first source updating the CI.
- The CI became stale based on data refresh rules for the CI class.

Precedence order of static reconciliation rules:

- Rule configured for a specific attribute, has precedence over rule set with **Apply to all attributes** (regardless of priority value).
- Between two rules for the same attribute or between two rules set with **Apply to all attributes**, the rule that is specific directly for the class has precedence over the derived rule.
- Between two rules for the same attribute or between two rules set with **Apply to all attributes** at the same class level, precedence is determined by rule priorities.

Information about the last discovery source that updates each attribute is stored in the Data Source History [cmdb_datasource_last_update] table, but only after enabling the reconciliation rule. Therefore, there might be unexpected updates after you enable the rule until the highest priority data source has updated the CI.

Static reconciliation rules affect reconciliation of stale CI attributes. During reconciliation, the information in the Data Source History table is considered along with the data refresh rules for the CI's class, to determine if a CI attribute is stale. A CI attribute is determined to be stale if it was not updated by the latest discovery source to update the CI, within a time period. The time period is specified by the Effective Duration time in the data refresh rule for the class for the discovery source. In this case, if another authorized discovery source, with a lower priority attempts to update the stale CI attribute, the update is allowed.

If there is a dynamic reconciliation rule for the same CI attribute as in a static reconciliation rule, the dynamic rule takes precedence.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to open the CI Classes hierarchy list.
3. Select a class for which to create a reconciliation rule.
4. In the class navigation bar, expand **Class Info** and then select **Reconciliation Rules**.
5. In the Reconciliation Rules section, select **Add** to create a rule or select an existing rule to edit.
6. Select the **Static Reconciliation Rule** tile if it appears.
   If CMDB 360/Multisource CMDB is not enabled, you can't create a dynamic reconciliation rule and the tiles to choose the rule type do not appear.
7. Fill out the fields on the **Add Data Sources & Prioritize** tab, and then select **Next**.

Field	Description
Active	Check box to activate this reconciliation rule.
Discovery Source	Discovery source that you are configuring this rule for.
Priority	Priority of **Source** within other discovery sources for the specified attributes. Smaller numbers designate higher priority. Discovery sources without a reconciliation rule are assigned the lowest priority.

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You can add multiple pairs of **Discovery Source** and **Priority**.

8. Fill out the fields on the **Select Attributes** tab, and then select **Next**.

Field	Description
Apply to all attributes	Authorizes the specified discovery sources to update all attributes of the specified class. **Note:** This rule will be overridden by any rule that applies to a specific attribute. In which case, instead of using this option, you can directly include all attributes for **Attributes**.
Attributes	Attributes, from the current or from a parent class, that the specified discovery sources are authorized to update. Available only if **Apply to all attributes** is not selected.
Update with Null	Attributes that the specified discovery sources can update with a null value. By default, authorized discovery sources cannot overwrite a non-null value with a null value. Attributes in this list, which are not in the **Attributes** list, are not included with the attributes that the discovery sources can update with a null value.

9. Fill out the fields on the **Set Filter Condition** tab, and then select **Save**.

Field	Description
Filter Condition	Conditions that CIs must meet for the rule to be applicable. For example, to apply this rule only to CIs that are associated with the Finance department, select this condition: **[Department] [is] [Finance]**.

Note:
The glide.identification_engine.enable_reconciliation_filter_before_update system property determines when filter conditions are applied. By default, those filter conditions are applied after attribute values have changed during payload processing. Set this property to **true** so that Identification and Reconciliation Engine (IRE) applies the filter conditions before attribute values change.

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What to do next

- Select the filter icon ( ) and select:
  - **Attributes**: To show only reconciliation rules for a specific attribute.
  - **Discovery sources**: To show only reconciliation rules for a specific discovery source.
- Select **Preview Rule** to see per attribute, the precedence order between any discovery sources that are authorized to update that attribute and any dynamic reconciliation rules.
- If CMDB 360/Multisource CMDB is enabled, you can:
  - Select **Preview Data** to see all attributes for a specific CI. Also, for each attribute, the current CMDB value and discovery sources reported values for the attribute.
  - Select **Recompute** to recompute CI attribute values after changing reconciliation rules.
- Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Reconciliation Definitions** to see a list view of all definitions of reconciliation rules.

Create a dynamic reconciliation rule

A dynamic reconciliation rule uses CMDB 360 data to choose a value such as the largest value that is reported, for updating a CI.

Before you begin

CMDB 360/Multisource CMDB must be enabled.

Role required: itil has read access, itil_admin (on top of itil) has full access

About this task

If the same CI attribute has both, a static reconciliation rule and a dynamic reconciliation rule, the dynamic reconciliation rule has precedence.

A dynamic reconciliation rule supports several rule types, such as largest reported value and most reported value. When applying a dynamic reconciliation rule, IRE processes the current payload and then examines the CMDB 360 data store to select a value with which to update the CMDB. Depending on the dynamic reconciliation rule type, selecting the appropriate value might not be immediately conclusive. For example, there might not be a single value that is most reported, or for some values, the last discovered timestamp isn't reported. Therefore, when necessary, IRE falls back to examining additional details such as last reported, last discovered, and last updated values to select the most appropriate value.

Note:
You can't add a dynamic reconciliation rule when creating a new child class in the CI Class Manager. You must first save the new child class and then add the dynamic reconciliation rule.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to open the CI Classes hierarchy list.
3. Select a class for which to create a reconciliation rule.
4. In the class navigation bar, expand **Class Info** and then click **Reconciliation Rules**.
5. In the Reconciliation Rules section, click **Add** to create a rule or select an existing rule to edit.
6. Select the **Dynamic Reconciliation Rule** tile.
7. On the **Select Rule** tab, select a rule type in the **Dynamic Rule Type** list field, and then click **Next**.

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8. On the **Select Attributes** tab, select the attributes for which to apply the rule.
9. Select **Next**.
   Attributes that the specified rule type can't be applied to and attributes for which a dynamic reconciliation rule already exists for, don't appear.
10. Fill out the fields on the **Set Filter Condition** tab, and then select **Save**.

Field	Description
Filter Condition	Conditions that CIs must meet for the rule to be applicable. For example, to apply a rule only to CIs that are associated with the Finance department, select this condition: **[Department] [is] [Finance]**.

What to do next

- Select the filter icon ( ) and select:
  - **Attributes**: To show only reconciliation rules for a specific attribute.
  - **Discovery sources**: To show only reconciliation rules for a specific discovery source.
- Select **Preview Rule** to see per attribute, the precedence order between any discovery sources that are authorized to update that attribute and any dynamic reconciliation rules.
- Select **Preview Data** to see all attributes for a specific CI. Also, for each attribute, the current CMDB value and discovery sources reported values for the attribute.
- Recompute CI attribute values.
- Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Reconciliation Definitions** to see a list view of all definitions of reconciliation rules.

Create a data refresh rule

Specify data refresh rules to determine if a CI is stale for a specific discovery source. Such CIs can then be updated by a lower-priority authorized discovery source.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

Data refresh rules have no impact when dynamic reconciliation rules are in effect.

Data refresh rules are used in conjunction with static reconciliation rules to determine reconciliation steps for a CI. These rules determine if, when, and by which discovery source a CI can be updated.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to display the CI Classes list.
3. Select the class for which to create a data refresh rule.
4. In the class navigation bar, expand **Class Info** and then click **Reconciliation Rules**.

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5. In the Data Refresh Rules section, click **Add** to create a rule or select an existing rule to edit.
6. Fill out the details in the Create Data Refresh Rules dialog box.

Field	Description
Discovery source	Discovery source for which staleness is evaluated.
Effective Duration	The time period that is used for the staleness test. If the fields specified in the static reconciliation rule for the CI's class weren't updated by **Discovery source** within the specified **Effective Duration** — the CI is determined to be stale for **Discovery source** and a lower priority discovery source is authorized to update the CI. When set to 0 (default), the CI is determined to be stale for **Discovery source** immediately after an update and therefor, a lower priority discovery source will always be authorized to update the CI. If you enter a value with a prefix that is valid and a suffix that is not, such as `15 x` — the valid portion of the value is used ('15'). If the entire value is invalid — the default value of 0 is used.
Active	Activates the rule.

7. Click **Save**.

Create an IRE data source rule

When using Identification and Reconciliation Engine (IRE), you can prevent a specific discovery (data) source from inserting new CIs for a specific class. Create IRE data source rules for discovery sources that you don't trust in creating CIs but continue to trust in updating those CIs that exist.

Before you begin
Role required: itil_admin

About this task
IRE data source rules have no impact when dynamic reconciliation rules are in effect.

For example, an IP scan tool that discovers network gear but does not discover servers and therefore creates server CIs without details. You can prevent such discovery source from creating specific CIs, while still permitting it to update those specific CIs if they exist. IRE data source rules are stored in the IRE Data Source Rule [cmdb_ire_data_source_rule] table.

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- Child classes derive IRE data source rules from parent classes like identification rules do.
- IRE data source rules that are specified for a child class, override any IRE data source rules derived from a parent class.

When IRE processes an insert operation that is prohibited by an IRE data source rule, the insert operation fails. This failure happens when the discovery source and CI class in the insert operation and in an IRE data source rule, match. When CreateOrUpdateCIEnhanced() is used, IRE stores the failed payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table for future potential use.

Note:
When an insert operation is not allowed by the IRE data source rule, then when using createOrUpdateCI(), the entire IRE payload fails since createOrUpdateCI() doesn't allow partial commits.

If later, a permitted discovery source attempts to insert that same CI, then IRE inserts the CI after merging it with the matching CI from the partial payloads. IRE then deletes the partial payload from the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table, and allows future updates by the discovery source specified in the rule.

IRE data source rules do not apply to lookup and related items, and only a single rule can be active for any class/discovery source pair.

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **IRE Data Source Rule**.
2. In the list view, click **New** and fill out the IRE Data Source Rule form.

Field	Description
Active	Activates the IRE data source rule.
Applies to	The class (and child classes) that the specified discovery (data) source is not allowed to create CIs of.
Data source	Discovery (data) source that is not allowed to create CIs of the specified class.
Insert Not Allowed	Disables the specified discovery (data) source from inserting new CIs from the specified class, to the CMDB.

3. Click **Submit**.

Result

If a payload item with an insert request, and in which the discovery source and the CI class match the discovery source and the CI class specified in the IRE data source rule:

1. The insert operation fails and IRE logs the following message:

   INSERT_NOT_ALLOWED_FOR_SOURCE Insert into [xyz] is blocked for data source [xyz] by IRE data source rule.

2. If using CreateOrUpdateCIEnhanced(), then IRE stores the payload item as a partial payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table.

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If later, a permitted discovery source successfully inserts a CI that matches the CI from a partial payload item:

1. The current CI is merged with the matching CI from the partial payload, applying static reconciliation rules as needed.
2. The respective partial payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table is deleted.
3. Later payloads in which the non-permitted discovery source updates the respective CI, run successfully.
4. IRE allows the discovery source, that was previously prohibited from inserting the CI, to update that same CI which now exists in the CMDB.

Detecting duplicate CIs

When the identification process encounters duplicate CIs, it groups each set of duplicate CIs into a de-duplication task for review and remediation. A large number of duplicate CIs might be due to weak identification rules. You can configure the identification engine to reconcile duplicate CIs.

During CMDB Identification, processing of duplicate CIs is determined by the properties *glide.identification_engine.skip_duplicates* (set to true by default) and *glide.identification_engine.skip_duplicates.threshold* (set to 5 by default), and on the number of duplicate CIs that are detected. You can configure these properties so duplicate CIs are automatically reconciled, skipping duplication.

- If *glide.identification_engine.skip_duplicates* is true, and the number of duplicate CIs is less than the threshold specified by *glide.identification_engine.skip_duplicates.threshold*, then the oldest of the duplicate CIs is picked as a match and gets updated. That oldest duplicate CI also becomes the main CI for that set of duplicate CIs. The rest of the duplicate CIs are tagged as duplicates by setting the cmdb_ci's *duplicate_of* to the appropriate main CI. During matching, the identification engine filters out any CI that is tagged as duplicate of any CI.
- If *glide.identification_engine.skip_duplicates* is false, then matching of duplicate CIs fails with an error, and none of the duplicate CIs are updated.

Also, the *glide.duplicate_ci_remediator.max.cis* property determines de-duplication processing for a large number of duplicate CIs. For more information, see the 'Large number of duplicate CIs' section in the Duplicate CIs remediation topic.

In either case, de-duplication tasks are always created.

Note:
For a duplicate CI, if any of the CI's attributes, other than *duplicate_of*, is updated by IRE processing, then the CI is no longer considered a duplicate CI. In that situation, the value of *duplicate_of* is cleared in the CI.

For more information about these properties, see Properties for Identification and Reconciliation.

Review de-duplication tasks

For information about reviewing and remediating de-duplicate tasks, and how the main CI is used, see Duplicate CIs remediation.

Generate and simulate payload execution using identification simulation

Identification simulation is a central location for automatically constructing a payload that is guaranteed to be complete and valid. You can then simulate the processing of the payload by the

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identification and reconciliation engine (IRE) and examine the results before actually submitting it for execution by IRE.

Use identification simulation to construct an input payload, and simulate processing of the payload by IRE. You can then examine the results, adjust identification rules if needed, and re-run the simulation of the updated payload.

Use the identification simulation to:

- Automatically construct input payload that is based on existing identification rules, hosting and containment rules.
- Simulate execution of a payload (automatically constructed by identification simulation, or manually created).
- Browse payload output and execution log messages for a simulated run.

Note:

- Identification simulation does not commit any updates to the CMDB.
- Identification simulation supports simulation of processing payloads that are provided and which contain non-CMDB tables, but doesn't support the generation of such payloads.

Automatically generate payload using identification simulation

Use identification simulation to automatically construct an input payload for a specified class. The constructed payload is complete with any required dependent CIs, correctly structured, and syntactically valid for processing by the identification and reconciliation engine (IRE).

Before you begin

Role required: admin

About this task

The payload that is constructed during identification simulation is for the specified class. For a dependent CI class, you will be prompted for information about all dependencies. After you provide the required details, identification simulation constructs the payload based on your input.

Note:
Automatically generating payloads that contain non-CMDB tables, isn't supported.

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation**, and click **Identification Simulation**.
2. In the **Start with CI Class** box click **Start**.
3. On the **Payload Information** form, in the **Data source** field, select the data source that is associated with this class update.
   For the ServiceNow Discovery data source, select `ServiceNow`.
4. Select the **Class** in the payload.
   a. In the **Criterion Attributes** area select the CI identifier attributes and then specify the values that uniquely identify a CI.
   b. In the **Additional Attributes** area specify attributes and values that matching CIs will be updated with.
5. For dependent CIs associated with dependent identification rules, fill out the **Criterion Attributes** and **Additional Attributes** sections in all **Container level** sections that display.

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6. Click **Generate Script**.
7. If any errors indicate that there are missing fields, fill in the missing fields and then click **Generate Script** again.

What to do next

- Click **Run Simulation** to simulate processing of the payload by IRE.
- Examine the results of the simulation, fine-tune the payload as needed, and combine with other payloads for other classes as desired. After finalizing the payload, use the createOrUpdateCI() API to execute the payload by IRE which will result in actual updates to the CMDB.
- Click **Copy Script** to copy the JSON script into the clipboard. You can then paste that script into a third party software or to another screen of the identification simulation.

Simulate payload processing using identification simulation

Use identification simulation to simulate the identification and reconciliation engine (IRE) process of CI identification for an input payload. Provide a valid payload, which was constructed using identification simulation or that was created manually.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation**, and click **Identification Simulation**.
2. **Optional:** To run a simulation of an existing payload:
   a. Click **Start** in the **Start with Existing Payload** tile.
   b. On the Insert JSON Payload page, select the **Data source** that is associated with this class update.
   c. **Optional:** Select **Use Enhanced Identification** to apply the identifyCIEnhanced API for enhanced CI identification, instead of using the identifyCI API.
   d. Paste the JSON payload into the empty canvas.
3. **Optional:** To construct a new payload click **Start** in the **Start with CI Class** tile.
   See Automatically generate payload using identification simulation for more information.
4. Click **Run Simulation** to simulate processing of the payload by IRE.

What to do next

1. Examine the results of the simulation in the results pane, and fine-tune the payload as needed:
   a. Click **Run #1** to display the **Context ID** and the **Run ID** of the simulated run.
   b. Click the drop down arrow next to **Run #1** to display additional details.
      - **Input**: Displays the payload for the simulation.
      - **Logs**: Displays all the logged messages that IRE generated while simulating processing of the payload, according to the specified logging level.
      - **Output**: Displays the output payload returned by IRE.
2. After finalizing the payload, use the createOrUpdateCI() API to execute the payload by IRE which will result in actual updates to the CMDB.

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Set logging level for identification simulation

Identification simulation logs each step of a simulated payload processing. You can then examine these run logs to determine if a payload was processed as expected, and if identification rules are effective. You can adjust the level of logging so it is helpful, and so that the amount of messages is not excessive or insufficient.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation**, and click **Identification Simulation**.
2. Click the **Settings** icon.
3. Select logging level for the identification and reconciliation engine (IRE) under **IE Log Level** and for the service cache under **Service Cache Log Level**.
   The logging levels are displayed in ascending order, from the minimum level to the maximum level of logging.
4. Click on the **Settings** icon again to close the **Settings** dialog box.

Examine run logs

Identification simulation provides run logs which are generated by Identification and Reconciliation Engine (IRE). You can access these run logs for payload runs, to examine results and for debugging purposes. IRE payload output logs appear in a user friendly format on a central page.

Before you begin
Role required: admin

About this task
Also, internal applications that use IRE (such as Discovery) can call an internal API to provide a URL to viewing IRE run logs.

Logging is in the context of a specific run of the identification engine, and you can filter the log list by a specific data source and time range. Up to 1000 run logs that are up to 2 months old are listed, grouped by Context IDs, and run times. You can use the glide.identification_logs.max_run_ids property to modify the 1000 limit.

You can control the logging level by using the *glide.discovery.identification.log_level* Discovery system property and setting the value to one of the following:

- Info
- Warn
- Error
- Debug
- DebugVerbose
- DebugObnoxious

Note:
IRE performs an initial verification of a payload before processing identification rules. If IRE detects any duplicate CIs based on any class identifiers, the payload is rejected and processing stops.

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Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Identification Logs**.
2. Filter the runs list as follows:
   a. **Source**: Select the data source for which to display run logs.
   b. **Time Range**: Specify a time range for which to display run logs.
   The **Runs** list displays all runs for the specified data source, during the specified time range.
3. In the **Runs** list, click a **Run #** to display its **Context ID** and **Run ID**.
   A unique Context ID is associated with each specific payload that is run. Each run of that payload, is associated with a unique Run ID. A single Context ID for a payload that is run multiple times is associated with multiple Run IDs.
4. Click the drop down arrow for a **Run #** to display additional details.
   - **Input**: Displays the payload for the run.
   - **Logs**: Displays all the logged messages that the identification engine generated while running the payload, according to the specified logging level.
   - **Output**: Displays the output payload returned by the identification engine.

IRE error messages

The Identification and Reconciliation Engine (IRE) generates the following errors and messages. Depending on settings, these messages appear in the Identification Logging pane and in the system logs.

For information about lookup-based CI identification and qualifier chains, see Create or edit a CI identification rule.

Note:
IRE performs an initial verification of a payload before processing identification rules. If IRE detects any duplicate CIs based on any class identifiers, the payload is rejected and processing stops.

For information about CMDB Identification Payload error: "FAILED TRYING TO EXECUTE ON CONNECTION", see CMDB Identification Payload error - "Insertion failed with error Error during insert of cmdb_ci...", where node logs show "FAILED TRYING TO EXECUTE ON CONNECTION" "Duplicate entry 'XXX' for key 'XXX'" knowledge base article.

Error- IDENTIFICATION_RULE_MISSING

Message	Description and Resolution
Identity Rule Missing for table [xyz]	**Description:** Identification rule is missing for a class. **Resolution:** Ensure that there is an identification rule for table [xyz], and that the rule is active.

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MISSING_MATCHING_ATTRIBUTES

Message	Description and Resolution
In payload missing minimum set of input values for criterion (matching) attributes from identify rule for table [xyz]. Add these input values in payload item 'abc'	**Description:** Missing minimum set of values for criterion attributes for an identification rule. **Resolution:** In the payload, add minimum set of values for criterion attributes for CI Identifier for table [xyz]. Open the CI Class Manager, click **Hierarchy** and select the [xyz class. Check the identification rule and the identifier entries for table [xyz.

Error- NO_CLASS_NAME_FOR_INDEPENDENT_CI

Message	Description and Resolution
Cannot have 'sys_class_name' as a key field in an Independent Identity Rule on 'xyz'	**Description:** The class attribute was added to the CI identifier which is not supported. **Resolution:** Remove the class attribute from CI Identifier for table [xyz].

Error- IDENTIFICATION_RULE_FOR_LOOKUP_MISSING

Message	Description and Resolution
Identity Rule for table [xyz] missing Lookup Rule for class [abc]	**Description:** The payload has a lookup class name, but the corresponding lookup rule is missing. **Resolution:** Add lookup identifier entry with [Search on table] as [abc] for CI Identifier for table [xyz]. For more information about this error message, see Identification error "Identity Rule for table [cmdb_ci_table_name] missing Lookup Rule for class [table_name]" [KB0786444].

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Error- IDENTIFICATION_RULE_FOR_RELATED_ITEM_MISSING

Message	Description and Resolution
Identity Rule for table [xyz] missing Related Rule for class [abc]	**Description:** The payload has a related class name, but the corresponding related rule is missing. **Resolution:** Add related entry with [Related table] as [abc] within CI Identifier for table [xyz].

Error- NO_LOOKUP_RULES_FOR_DEPENDENT_CI

Message	Description and Resolution
Cannot have Lookup Rule for a Dependent Identity Rule on 'xyz'	**Description:** Cannot have Lookup Rule for a Dependent Identity Rule. **Resolution:** Remove lookup identifier entry from dependent CI Identifier for table [xyz].

Error- INVALID_INPUT_DATA

Message	Description and Resolution
Found invalid sys_id in payload. No record with sys_id [xyz] exist in table [abc] or is a duplicate record with [duplicate_of] field set to a main CI	**Description:** The payload has a reference to an invalid sys_id. **Resolution:** Remove the referenced sys_id, or provide a valid sys_id.
In payload no data source exist. You need to provide choice value from choice field [discovery_source] in table [cmdb_ci]	**Description:** In payload no data source exists. **Resolution:** In the payload, provide a valid choice value from choice field [discovery_source] from table [cmdb_ci].
In payload invalid data source [xyz] exist. You need to provide a valid choice value from field [discovery_source] in table [cmdb_ci]	**Description:** The payload contains an invalid data source. **Resolution:**

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Message	Description and Resolution
	In the payload, provide a valid choice value from choice field [discovery_source] from table [cmdb_ci].
No such relationship with name [xyz] exist in table [cmdb_rel_type]. If out-of-box relationship for [xyz] has been removed or renamed, it should be restored	**Description:** The payload is referencing a relationship that does not exist in the [cmdb_rel_type] table. **Resolution:** Verify that the reference to the relationship is accurate. Or, if it is a new relationship, add it to the [cmdb_rel_type] table. Or, If out-of-box relationship for [xyz] has been removed or renamed, restore it.
Payload relations 'xyz' has invalid parent record index: [0]	**Description:** Payload references invalid parent indexes. **Resolution:** Check payload indexes and ensure that they are all valid.
Payload relations 'xyz' has invalid child record index: [0]	**Description:** Payload references invalid child indexes. **Resolution:** Check payload indexes and ensure that they are all valid.

Error- DUPLICATE_RELATIONSHIP_TYPES

Message	Description and Resolution
Duplicate relationship type records exists with name [xyz] in table [cmdb_rel_type] having sys_ids: [abc]	**Description:** There are duplicate records in the [rel_ci_type] table for the relationship. **Resolution:** Remove the duplicate records.

Error- DUPLICATE_PAYLOAD_RECORDS

Message	Description and Resolution
Found duplicate items in the payload (index 0 and 1), using className [xyz] and fields [abc]. Remove duplicate items from payload	**Description:**

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Message	Description and Resolution
	The payload contains two items whose criterion attributes have identical values. **Resolution:** Remove one of the duplicate items.

Error- LOCK_TIMEOUT

Message	Description and Resolution
Failed to acquire synchronization lock for xyz	**Description:** Failed to acquire the system mutex lock. **Resolution:** Increase the mutex expiration time by adding the system property **glide.identification_engine.mutex_expiration_time** and setting to an integer value that is greater than the default value (15 min).

Error- MULTIPLE_DUPLICATE_RECORDS

Message	Description and Resolution
Found duplicate records in table [xyz] using fields [abc]	**Description:** Found duplicate records in the specified table. **Resolution:** Fix the duplicate records found by the identification engine. Check de-duplication tasks for information about all duplicates.

Error- REQUIRED_ATTRIBUTE_EMPTY

Message	Description and Resolution
Missing mandatory field [xyz] in table [abc]. Add input value for mandatory field in payload	**Description:** A required attribute is missing in the payload. **Resolution:** In the payload, add input value for mandatory field [xyz] in table [abc].

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Error- MISSING_DEPENDENCY

Message	Description and Resolution
In payload no relations defined for dependent class [xyz] that matches any containment/ hosting rules: [abc]. Add appropriate relations in payload for 'def'	**Description:** No relations defined for the dependent class that matches any of its metadata rules. **Resolution:** In payload add appropriate relations for dependent class [xyz] that matches any containment/hosting rules: [abc].

Error- METADATA_RULE_MISSING

Message	Description and Resolution
No containment or hosting rules defined for dependent class [xyz]. Add containment/ hosting rules for ‘abc'	**Description:** There are no containment or hosting rules defined for dependent class. **Resolution:** Add containment or hosting rules for dependent class [xyz].

Error- MULTIPLE_DEPENDENCIES

Message	Description and Resolution
Found multiple dependent relation items [xyz] and [abc] in payload	**Description:** Multiple dependent relation items exist. **Resolution:** Remove one of the multiple dependent relation items [xyz] or [abc].
Multiple paths leading to the same destination: xyz -> abc	**Description:** Multiple paths leading to the same destination. **Resolution:** Remove duplicate relationship/ qualifier chains that might exists between xyz -> abc.

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Error- ABANDONED

Message	Description and Resolution
Abandoning processing payload item 'xyz', since its depends on payload item 'abc' has errors	**Description:** Dependent payload item has errors, so abandoning processing. **Resolution:** Resolve the error on the dependent payload item 'abc'.
Can't find matched record with sys_id [xyz] in table [abc]	**Description:** Matched sys_id does not exist in the corresponding table. **Resolution:** Check in table [abc] whether matched record is a valid record based on input payload.
Identification engine API got called recursively, aborting...	**Description:** The Identification engine API was called recursively. **Resolution:** Avoid calling the Identification engine API recursively.
Detected error while processing payload from xyz	**Description:** Error occurred during processing payload. **Resolution:** Resolve all errors mentioned in the output payload from xyz.
While processing relations encountered errors in payload item: xyz	**Description:** Payload item has errors. **Resolution:** Resolve errors in payload item 'xyz'.
Error occurred during parsing input json payload: xyz	**Description:** Error occurred during parsing JSON payload. **Resolution:** Ensure that input JSON payload has correct JSON format.

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Error- MULTI_MATCH

Message	Description and Resolution
Duplicate dependent records found having relationship [xyz] with same CI (className: [abc], sysId:[def])	**Description:** Found duplicate dependent CIs. **Resolution:** Check de-duplication tasks for information about all duplicates, and then delete duplicate records.
Found multiple relations between payload items: 'xyz' and 'abc'	**Description:** Found multiple relations between payload items. **Resolution:** Check for duplicate relationship chains and qualifier chains that might exist.
Found duplicate records in lookup table [xyz] using fields [abc] and reference field [def]	**Description:** Found duplicate records in lookup table. **Resolution:** Check de-duplication tasks for information about all duplicates, and then delete duplicate records.

Error- QUALIFICATION_LOOP

Message	Description and Resolution
Qualification chain has loop that contains relation 'xyz'	**Description:** Qualification chain has a loop. **Resolution:** Remove the loop from the qualification chain with relation ‘xyz'.

Error- TYPE_CONFLICT_IN_QUALIFICATION

Message	Description and Resolution
Invalid payload, qualification chain has multiple possible paths for payload items: 'xyz' and 'abc'	**Description:** Multiple qualification paths found. **Resolution:**

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Message	Description and Resolution
	Remove multiple possible qualification paths between items ‘xyz’ and ‘abc'.

Error- RECLASSIFICATION_NOT_ALLOWED

Message	Description and Resolution
CI Reclassification not allowed from class: [xyz] to [abc]	**Description:** CI reclassification not allowed. **Resolution:** Check reclassification tasks for information about reclassification, and check if reclassification from class: [xyz] to [abc] is valid.

Error- DUPLICATE_RELATED_PAYLOAD

Message	Description and Resolution
Found duplicate Related items (0 and 1) in the payload index 1 using fields xyz	**Description:** Duplicate Related items present. **Resolution:** Remove one of the duplicate related items present in the payload.

Error- DUPLICATE_LOOKUP_PAYLOAD

Message	Description and Resolution
Found duplicate Lookup items (0 and 1) in the payload index 1 using fields xyz	**Description:** Duplicate lookup items present. **Resolution:** Remove one of the duplicate lookup items present in the payload.

INSERT_NOT_ALLOWED_FOR_SOURCE

Message	Description and Resolution
Insert into [xyz] is blocked for data source [abc] by IRE data source rule	**Description:** An IRE data source rule is configured to prevent data source

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Message	Description and Resolution
	[abc] from inserting CIs of the [xyz] class. **Resolution:** Delete or update the appropriate IRE data source rule to let data source [abc] insert CIs of the [xyz] class. Or, wait for another permitted data source to create the same CI.

CI reclassification during IRE processing

During the Identification and Reconciliation Engine (IRE) CI identification process, a CI might need to be reclassified to a different *sys_class_name* type. By default, CIs are reclassified automatically. If automatic reclassification is disabled, then the CI is not reclassified and the system generates a reclassification task for your review.

The class of a CI can be upgraded, downgraded, or switched to a different branch in the class hierarchy. For more details about reclassification operations, see Reclassify a CI. You can use system properties and payload flags to configure the IRE behavior of CI reclassification, globally or individually per CI.

Note:
CI reclassification is possible only between two classes that have identical identification rules.

Configure automatic CI reclassification using system properties

You can use system properties to configure system-wide IRE behavior for CI reclassification. For information about CI reclassification-related properties, including access, see Properties for Identification and Reconciliation.

- The following properties enable or disable automatic reclassification updates that are specified in a payload. These properties are set to **true** in the base system, enabling processing of CI updates, including CI reclassification updates.

  To disable any automatic reclassification update, set the respective property to **false**. In that case, IRE rejects a payload (or a payload item in Enhanced IRE) with the respective reclassification updates, and creates a reclassification task.

  - *glide.class.upgrade.enabled*
  - *glide.class.downgrade.enabled*
  - *glide.class.switch.enabled*

- The following properties enable IRE to process CI updates with reclassification operations. However, depending on the property setting, IRE processes or skips the reclassification update. These properties are set to **false** in the base system, in which case IRE processes CI updates including any CI reclassifications.

  Set a property to **true** to configure IRE to process CI updates but not the CI respective reclassification update.

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- *glide.identification_engine.update_without_switch_enabled*
- *glide.identification_engine.update_without_downgrade_enabled*
- *glide.identification_engine.update_without_upgrade_enabled*

This set of properties takes precedence over the previous set of properties (glide.class.<reclassification>.enabled). For example, with the following conflicting property settings, the second property takes precedence over the first:

- *glide.class.downgrade.enabled* = **false**
- *glide.identification_engine.update_without_downgrade_enabled* = **true**

Example for IRE processing of a payload item with a switch of a CI from Linux Server to Window Server. With the following default property settings in the base system, IRE updates the attributes including the class switch:

- *glide.class.switch.enabled* = **true**
- *glide.identification_engine.update_without_switch_enabled* = **false**

However, with the following property settings, IRE updates the attributes but skips the class switch:

- *glide.class.switch.enabled* = **true**
- *glide.identification_engine.update_without_switch_enabled* = **true**

Configure automatic CI reclassification in input payloads

You can use flags which correspond to the system properties, in the input payload of the CreateOrUpdateCIEnhanced() or the createOrUpdateCI() APIs. In the payload, set these flags to **true** or **false** to temporarily override the respective system property settings, at the payload item level.

For the following payload flags that control reclassification behavior, if any is set, the setting has precedence regardless of the setting of the corresponding *glide.class.xxx.enabled* property:

- `classUpgrade`
- `classDowngrade`
- `classSwitch`

For the following payload flags that control reclassification behavior, the system checks if either the flag or its corresponding *glide.identification_engine.update_xxx_enabled* property is true to allow the update without the respective reclassification operation:

- `updateWithoutUpgrade`
- `updateWithoutDowngrade`
- `updateWithoutSwitch`

Also, you can pass payload level settings (which apply to all items within a payload), per data source, by specifying CI reclassification properties on the Robust Import Set Transformers form. For more information, see Robust import set transformer properties.

The following sample JSON payload enables automatic reclassification for the specified CI:

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```
{ items: [{className: 'cmdb_ci_server', classUpgrade:
 true, classDowngrade: true, classSwitch: true, values:
 {name: 'linux123', serial_number: '12srt567', ip_address:
 '10.2.3.4'}, }]}
```

Reclassification restriction rules

Prevent IRE from downgrading or switching a CI class during payload processing to help prevent data loss. A reclassification restriction rule prevents a CI class change for specific source and target classes, while still processing any other property updates for the CI.

You can use a reclassification restriction rule, for example, to prevent a CI class downgrade from *cmdb_ci_linux_server* (source class) to *cmdb_ci_server* (target class). Or, to prevent a CI class switch from Linux Server to Windows Server. Reclassification restriction rules can be useful when using a Service Graph Connector which might lead to a class downgrade or switch, and a potential loss of important data.

To control the application of reclassification restriction rules:

- Use the *glide.identification_engine.reclassification_restriction_rules_enabled* system property to globally enable or disable the application of active reclassification restriction rules. This property is set to **true** by default.

- Use the *skipReclassificationRestrictionRules* payload flag in an IRE payload to prevent the application of active reclassification restriction rules.

  For example, a payload with the *skipReclassificationRestrictionRules* flag:

```
{
  "items": [
    {
      "className": "cmdb_ci_server",
      "values": {
        "short_description": "Linux server description",
        "name": "Linux Server 1"
      },
      "settings": {
        "skipReclassificationRestrictionRules": "true"
      }
    }
  ]
}
```

For information about how to create a reclassification restriction rule, see Create a reclassification restriction rule.

Create a reclassification restriction rule

Reduce data loss during IRE processing by preventing a CI class change for specific source and target classes. A reclassification restriction rule affects only the *Class* attribute and does not prevent the update to the rest of the CI properties.

Before you begin
Role required: itil_admin (Itil has read privilege only)

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About this task

If during IRE processing of a payload, a CI needs to be reclassified (downgrade or switch class), IRE checks reclassification restriction rules. If any reclassification restriction rule applies to the current CI reclassification, IRE processes the CI properties update, but skips the CI reclassification.

IRE output provides specific details about any processing related to reclassification restriction rules.

A reclassification restriction rule applies only to the direction between the specified source and the target classes. The rule doesn't prevent a reclassification in the opposite direction, from the specified target class to the source class. To restrict reclassification between two classes in both directions, specify two separate reclassification restriction rules, one for each direction.

Procedure

1. Enter `cmdb_ire_reclassification_restriction.list` in the filter navigator.
2. Fill out the Reclassification Restriction form.

Field	Description
Name	Name of the reclassification restriction rule.
Source table	Current CI class.
Source inheritance	Whether to apply the reclassification restriction rule to child classes of **Source table**.
Target class	Reclassification target class.
Target inheritance	Whether to apply the reclassification restriction rule to child classes of **Target table**.
Type	CI reclassification type: **Downgrade** or **Switch**.

3. Click **Submit**.

What to do next

In the Reclassification Restrictions list view, you can activate or deactivate a reclassification restriction rule by setting its **Active** value to true or false.

View a reclassification task

Reclassification tasks are created for CIs that could not be automatically reclassified during the identification process. Review these tasks to locate the CIs and decide if to reclassify them.

About this task

The properties you use to disable automatic CI reclassification determine whether reclassification tasks are created for those CIs that couldn't be automatically reclassified:

- Using any one of the 'glide.class.<reclassification operation>.enabled' properties (such as *`glide.class.upgrade.enabled`*): Reclassification tasks are created.
- Using any one of the 'glide.identification_engine.update_without_<reclassification operation>_enabled' properties (such as *`glide.identification_engine.update_without_switch_enabled`*): Reclassification tasks aren't created.

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Before you begin
Role required: admin or itil

Procedure
1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Reclassification Tasks**.
2. Select a reclassification task.
3. Examine the details on the Reclassification Task form.

Reclassification Task form

Field	Description
Configuration item	The CI that must be reclassified.
Short description	Short description noting that CI reclassification was not allowed.
Description	Description noting the current class of the CI and the class that the CI must be changed to.
Internal payload	Payload used in the identification process.

What to do next
After examining the task details, you can locate the CI that is noted in the task **Description** and manually reclassify it. For details, see Reclassify a CI.

CMDB dependent relationship rules

Service definitions consist of CI types and relationship types. Dependent relationship rules define the dependency structure of the CI types and the relationship types in these service definitions, helping in CI identification and in the construction of business service maps.

The dependencies that are defined by these rules are used when identifying dependent CIs to prioritize the order of CI identification, and to match CIs and respective dependent CIs in a payload. Dependent relationship rules are also used by Service Mapping and can be defined for custom CI types. After defining a new CI type, you can define dependent relationship rules that specify how the new CI type is related to existing types in the CMDB.

Dependent relationship rules consist of hosting and containment rules (dependent relationship rules), each type modeling the data from a different perspective of the CI. Containment rules represent CIs' configuration hierarchy, describing which CI contains which other CIs. Hosting rules represent CIs' placement in a business definition, describing what CIs run on.

Both hosting and containment rules describe a relationship type between two CI types and the same relationship type can be used in a hosting rule and in a containment rule. It is the context in which the relationship is used that distinguishes between a containment and hosting rule.

Manage dependent relationship rules:

- To access rules at the class level, use the CI Class Manager. Navigate to **All** > **Configuration** > **CI Class Manager**.
- To access grouped rules, use the Metadata Editor. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Metadata Editor**.

The plugins that have been activated on an instance determine which hosting and containment rules exist in a base system.

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Hosting rules

Hosting rules represent all the possible valid combinations of pairs of hosting and hosted CIs in the service definition. Hosting rules are a flat set of rules that can be only one level deep, and which always involve resources, typically physical or virtual hardware. Each hosting rule is a stand-alone rule between two CI types, describing either a valid CI type that another CI type can host, or by which another CI type can be hosted. A hosting rule consists of a parent CI type, a relationship type (such as Hosted On::Hosts) and a child CI type. For example, you can have a hosting rule that specifies that the CI type 'Application' 'Runs On::Runs', the CI type 'Hardware'.

A CI can be hosted on multiple resources (such as Windows and Linux). This CI is represented by a hosting rule for the CI with each resource that the CI can be hosted on. During CI identification, the pair of CIs that are being examined, should satisfy at least one hosting rule.

Hosting rules are stored in the CMDB Metadata Hosting Rules [cmdb_metadata_hosting] table.

Containment rules

Containment rules represent the containment hierarchy for a CI type, describing valid objects that a CI type can contain in the service definition, and valid objects that can be contained by the CI type. Containment rules are chained to each other in a containment rules group, with a CI type that is the top-level (root) parent of the group. The collection of containment rules construct a hierarchy-like map of containment relationships. Containment rules are logical concepts used to represent logical CIs, for example to describe software that runs on a server. A containment rule consists of a parent CI type, a relationship type (such as 'Contained By::Contains'), and a child CI type. For example, you might have a containment rule specifying that the CI type 'Tomcat' 'Contains::Contained By' CI type 'WAR File'.

Endpoints are special containment rules that specify incoming or outgoing connections in the model, designating the CI types that data of some specified type flows in to or out from the service definition. After adding an endpoint to a containment rule, you cannot add any child rules to the endpoint rule.

Containment rules are stored in the CMDB Metadata Containment Rules [cmdb_metadata_containment] table.

Reference rules

Reference rules are used mostly by Cloud Management to represent all of the possible valid combinations of pairs of referencing and referenced CIs in the service definition.

- Reference rules are a flat set of rules that can be only one level deep.
- Reference rules always involve resources, typically virtual entities. Each reference rule is a stand-alone rule between two CI types, describing either a valid CI type that another CI type can reference, or by which another CI type can be referenced. Both the CI classes should be able to live independent of each other.
- A referencing rule consists of a parent CI type, a relationship type (such as `Provisioned From::Provisioned`) and a child CI type. For example, you can have a referencing rule that specifies that the CI type 'Virtual Machine' `Provisioned From::Provisioned`, the CI type 'Image'.
- A CI can reference multiple resources (for example, a VM Instance can have a reference relation with both the Image and the Hardware templates). This CI is represented by a referencing rule for the CI with each resource that the CI can be referenced from.

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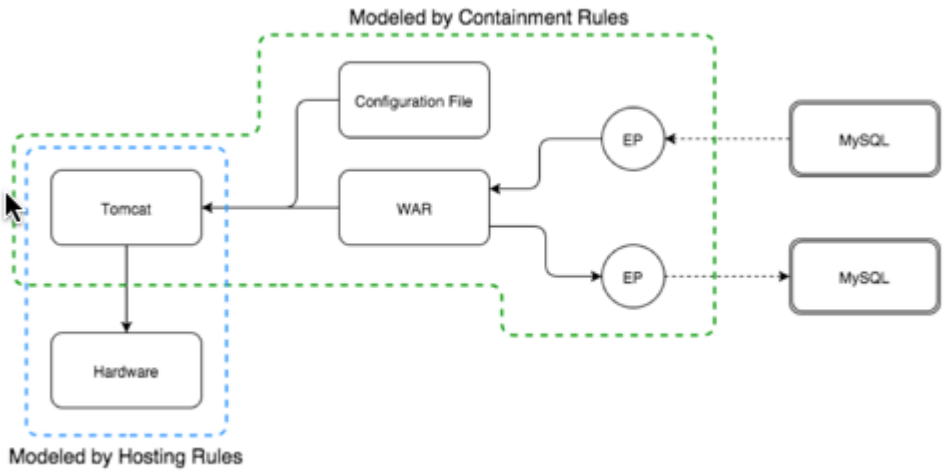
- The reference rule cannot be part of the CI identification.
- Reference rules are stored in the CMDB Metadata Reference Rules [cmdb_metadata_reference] table.

Rules requirements

The rules that you create are bound by the following requirements which narrow the relationships and ensure that only valid options are available in the drop-down lists in the Metadata Editor.

- Given a CI type that is as a child in a containment rule: Not this CI type or its children can be a top-level (root) parent of any other containment rule, and it cannot be in any hosting rule, either as a parent or as a child.
- Given a CI type that is a top-level (root) parent of a containment rule: It cannot be a child in a hosting rule (for example, you cannot be hosted on Tomcat, if Tomcat has any containment rules).
- Given a CI type that is a child in a hosting rule: It cannot be in any containment rule, either as a parent or a child.
- Given a CI type that is a parent in a hosting rule: It cannot be a child in any containment rule.
- Hosting rules cannot create loops such as Tomcat –runs_on- VMWare –runs_on- Tomcat.

Example: Hosting and containment rules model



Hosting rules that model the diagram:

Tomcat 'Runs on' Hardware.

Containment rules that model the diagram:

- Tomcat 'Contains' Configuration File
- Tomcat 'Contains' WAR
- WAR has two endpoints for JDBC with MySQL:
  - Inbound
  - Outbound

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Example: Valid set of rules

```
Tomcat Hosted Linux
Linux Hosted Computer
```

The second metadata entry triggers the third requirement, which is satisfied (it is a hosting rule, not a containment rule).

Create dependent relationship rules

Create hosting and containment rules (dependent relationship rules) for CI classes to help with correctly identifying dependent CIs during the business discovery process and service mapping. Discovery calls the identification API that applies dependent relationship rules.

You can create a basic hosting or containment rule in the CI Class Manager. Or, use the Metadata Editor to create groups of hosting and containment rules, and inbound or outbound endpoints in containment rules. The CI Class Manager and the Metadata Editor are synchronized, and you can use each of those tools to display and edit a dependent rule.

Create a dependent relationship rule for a CMDB class

Use the CI Class Manager to create a basic dependent relationship rule (hosting or containment relationship rule) for a CMDB class.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

The class for which you create dependent relationship rule, must have a dependent identification rule.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to display the CI Classes list, and select the class for which you want to create a hosting or a containment rule.
3. In the class navigation bar, click **Dependent Relationships**.
4. In the Dependent Relationships view, click **Add dependency**.
5. Fill out the details in the Add Dependent Relationship Rule dialog box.

Field	Description
Rule Type	Designation of whether this rule is a hosting rule or a containment rule.
This Class	The class that the rule applies to.
Relationship	The relationship type for the rule.
Target Class	The target class for the dependent relationship rule. The designation of this class as a child or parent class, is based on the specified **Relationship**.

6. Click **Save**.

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What to do next

You can click **Reset to derived** and then confirm the operation to delete all dependent relationship rules that were added specifically for the selected class. Only dependent relationships that are derived from a parent class, remain.

For more information about child and parent classes, see Table extension and classes.

Create or edit a collection of containment rules

Create containment rule for CIs to help with correctly identifying dependent CIs during the business discovery process and service mapping. Discovery calls the identification API that applies dependent relationship rules.

Before you begin

Role required: admin

About this task

A containment rule is a dependent relationship rule which defines a relationship between two CIs, structured as: CIType1 RelationshipType CIType2. The first CI type that you add becomes the top level CI of a containment rules group which is a chain of containment rules. The entire set of containment rules is organized as groups according to top-level CIs.

To create a containment rules group for a new CI type, you need to first add the CI Type1 of the relationship. To add a child containment rule for a CI type that exists, you need to select that CI type, and define the second portion of the relationship rule which is the relationship type and CI Type2.

To each rule within a containment rules group you can add inbound or outbound endpoints, which are noted by blue up and down arrows. After adding an endpoint, you can not add a containment rule in that branch of the containment rules hierarchy.

Procedure

1. Navigate to **All** > **Configuration** > **Metadata Editor**.
2. In the Metadata Editor, click the **Containment Rules** tab.
3. Click **Add New Rule** to add a top-level rule or point to a rule for which you want to add a child rule and click the green '+' icon that appears on the right.
4. Complete the **Add Containment Rule to <class>** form.

Field	Description
Configuration Item Type	The CI class that the rule applies to.
Relationship Type	The relationship type for the rule.
Reverse Relationship Direction	Enable to use the reverse relationship in the rule.
Always include in Service Model	Enable to always include the CIs of the specified class in the Service Map if their parent CI (based on the containment relationship) is present in the Service Map.

5. Click **Create**.
6. Add an endpoint to a child rule:

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a. Point to a child rule for which you want to add an endpoint.

b. Click the blue "+" icon that appears on the right.

c. Complete the **Add Endpoint To <class>** form.

Field	Description
Endpoint Type	The type of endpoint.
Inbound or Outbound	The direction of the endpoint.

d. Click **Create**.

Create or edit a collection of hosting rules

Create hosting rule for CIs to assist in correctly identifying dependent CIs during the business discovery process and service mapping. Discovery calls the identification API that applies dependent relationship rules.

Before you begin

A hosting rule is a dependent relationship rule which defines a relationship between two CIs, structured as: <CI Type1> <relationship type> <CI Type2>. To create a hosting rule, you need to add a CI type as <CI Type1> in the relationship rule, and then define the second portion of the relationship rule which is the relationship type and <CI Type2>. The entire set of hosting rules is organized as groups according to the top-level hosted CIs.

A hosting rule implicitly contains two rules, which are the reversal of each other. When you create the rule '<CI Type1> <relationship type> <CI Type2>', the rule '<CI Type2> <reversed relationship type> <CI Type1>' is automatically added.

Role required: admin

Procedure

1. Navigate to **All** > **Configuration** > **Metadata Editor**.
2. In the Metadata Editor, click the **Hosting Rules** tab.
3. Click **Add New Rule** to add a top-level rule or point to a rule for which you want to add a child rule and click the green '+' icon that appears on the right.
4. Complete the **Add Hosted/Hosting Rule to <class>** form.

Field	Description
Configuration Item Type	The <CI Type2> in the rule.
Relationship Type	The relationship type for the rule.
Reverse Relationship Direction	Check to reverse relationship in the rule.

5. Click **Create**.

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IRE support for non-CMDB tables

Apply Identification and Reconciliation Engine (IRE) processes to supported non-CMDB tables to ensure data integrity and health of those tables.

Starting with the Washington DC release, IRE supports some non-CMDB tables. You can use all IRE features with some non-CMDB tables after creating identification rules (CI identifiers and identifier entries) for those tables. Non-CMDB tables supported for IRE features include:

- In an application-specific scope: All non-CMDB tables
- In the global scope: Only non-CMDB tables that are preset in the base system. In the Washington DC release for example, the Location [cmn_location], Department [cmn_department], Cost Center [cmn_cost_center], Building [cmn_building], User [sys_user], and Group [sys_user_group] non-CMDB tables are supported.

You can't use the CI Class Manager to manage any IRE-related rules for non-CMDB tables. Instead, you must work directly with the respective tables in list views to create and manage those rules as described in the following procedures:

- Create an identification rule for a non-CMDB table
- Create a reconciliation rule for a non-CMDB table
- Create an IRE data source rule for non-CMDB tables
- Create a data refresh rule for a non-CMDB table
- Create an identification inclusion rule for a non-CMDB table
- Simulate payload execution using identification simulation
- Use partial payloads
- Review and remediate de-duplication tasks

You can use the following store apps with supported non-CMDB tables:

- CMDB 360 in CMDB Workspace
- IntegrationHub ETL

IRE processes are applied to supported non-CMDB tables with the following differences:

- IRE doesn't populate the *discovery_source*, *last_discovered*, and the *first_discovered* attributes if those attributes don't exist in the non-CMDB table.
- IRE uses the non-CMDB table's class name as *sys_class_name* if the table doesn't include a *sys_class_name* attribute.
- IRE payloads don't support relationships with non-CMDB tables.

Note:
Although IRE-related user interface and accompanying documentation might reference CMDB and CMDB elements, most of those references also apply to any supported non-CMDB tables.

Create an identification rule for a non-CMDB table

To use Identification and Reconciliation Engine (IRE) features with supported non-CMDB tables, you must first create identification rules that uniquely identify the table records. Each non-CMDB table can be associated with a single identification rule.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access

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About this task

Each identification rule consists of a single identifier for the table, one or more identifier entries, and one or more related entries.

Review the following topics before creating identification rules:

- Identification rules
- General guidelines for using CMDB Identification

When creating identifier entries, you can configure the **Search on table** and **Criterion attributes** fields on the Identifier Entry form to implement one of the following options:

Regular identifier entry

Lets you select attributes from the associated identifier table.

Lookup identifier entry

Lets you select attributes from any related table (Lookup table), other than the currently selected table.

Hybrid identifier entry

Lets you select attributes from both the currently main selected table, and from another table (Lookup table).

For non-CMDB tables, only independent identification rules are supported.

Procedure

1. Navigate to **All** > **Identification/Reconciliation** > **CI Identifiers**.
2. In the Identifiers list view, click **New**.
3. Fill out the Identifier form.

Field	Description
Name	Name of CI identifier.
Applies to	Supported non-CMDB table.
Independent	Must be checked to indicate that the identifier can identify a record independently of other records.

4. Click **Submit**.
5. In the Identifiers list view, locate and open the identifier that you just created.
6. On the Identifier form, select the **Identifier Entries** tab and then click **New**.
7. Fill out the Identifier Entry form.

Field	Description
Identifier	Preset with the name of the table of the associated identifier.
Search on table	Preset with the label of the table of the associated identifier. To create:

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Field	Description
	○ A regular identifier entry: Set to the identifier table and select **Criterion attributes** from that same table. ○ A lookup identifier entry: Set to another table (lookup table) and select **Criterion attributes** from that lookup table. ○ A Hybrid identifier entry: Set to another table (lookup table) and then do the following steps. ▪ Select **Criterion attributes** from the lookup table. ▪ Add **Hybrid Entry CI Criterion Attributes** from the current table using background scripts, after saving the rule. For more details, see the 'What to do next' section at the end of this task. A lookup table should have a reference to the associated identifier table.
Criterion attributes	Set of attributes that uniquely identify the record. Attributes can belong to the current class, or to a parent class. **Note:** It's possible to add reference fields as a criterion attribute. However, such fields might not always be effective: ○ Reference fields store *sys_id*s that point to a record in another table, and thus is considered a weak criterion attribute (in terms of uniqueness) for the current table. ○ The system detects and then replaces invalid values in a reference field with 'Unknown'. For example, an invalid *Model ID* value is replaced with the value 'Unknown'. Also, if several CIs end up having that same reference field set to 'Unknown', then these CIs become duplicate CIs.
Priority	Priority of applying the identifier entry. Rules with lower priority numbers are given higher priority. Identifier entries of identical priorities are applied randomly. You can keep gaps between the priority numbers, so you can assign the unused priority numbers to new entries without modifying the existing priority order.
Active	Specifies whether the identifier entry is active. At least one identifier entry in an identification rule must be active for the rule to apply.
Enforce exact count match	For lookup identification, match a record only on exact lookup records count match. When enforced, all lookup items for a record in the payload must have matching records in the lookup table that reference the same record: **a.** Only matches records that have all the lookup items from the input payload referencing the record in the table. **b.** If there are multiple matches, selects the oldest created record as the final match. When not enforced, one lookup item for a record in the payload matching a record in the lookup table, is sufficient to consider a match: **a.** Matches any record that has at least one of the lookup items from the input payload referencing the record in the table. **b.** If there are multiple matches, selects the records with the max number of lookup items from the input payload referencing the record in the table. **c.** If there are still multiple matches, selects the oldest created record as the final match.

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Field	Description
Allow null attribute	When selected, then if at least one criterion attribute isn't null, attempt matching with an identifier entry even if there are criterion attributes that are null. Otherwise, all criterion attributes must have values to attempt matching with an identifier entry.
Allow fallback to parent's rules	Allows the identification rules of the record's parent table to be used if a match isn't found for this identification rule. Applies only for dependent identification rules.
Optional condition	A filter to narrow the set of records that will be searched for a matching record. Available only if the *glide.identification_engine.enable_identifier_optional_condition* system property is set to **true** (**false** by default). In the base system, identifier entries of various classes are pre-configured with advanced options conditions. All these pre-configured conditions in regular identifier entries will automatically apply when you set this property to **true**. Therefore, to prevent unexpected behavior, review those predefined conditions in regular identifier entries before setting this property to **true**. For more details about this property, see Properties for Identification and Reconciliation.

Note:
If criterion attributes have only two attributes and *sys_class_name* is one of them (for example [name, sys_class_name], [ip_address, sys_class_name]), then the other attribute can't be NULL, even if **Allow null attribute** is enabled. This restriction is due to *sys_class_name* being considered a special system matching attribute.

8. Click **Submit**.
9. On the Identifier form, select the **Related Entries** tab and then click **New**.
10. Fill out the Related Entry form.

Related Entry form

Field	Description
Identifier	Preset with the identifier that this related entry is associated with.
Active	Check box that specifies that the related entry is active.
Related table	A related table (lookup table) that references the record that is being matched.
Referenced field	A referenced field in **Related table** with a reference to the associated identifier table.
Criterion attributes	The set of attributes to uniquely identify the related item. Attributes can belong to the current class, or to a parent class.

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Field	Description
	Note: It's possible to add reference fields as a criterion attribute. However, such fields might not always be effective: ○ Reference fields store *sys_id*s that point to a record in another table, and thus is considered a weak criterion attribute (in terms of uniqueness) for the current table. ○ The system detects and then replaces invalid values in a reference field with 'Unknown'. For example, an invalid *Model ID* value is replaced with the value 'Unknown'. Also, if several CIs end up having that same reference field set to 'Unknown', then these CIs become duplicate CIs. Click the lock icon to view, add, or remove attributes from the identification rule.
Allow null attribute	If at least one criterion attribute in the related table isn't null, allow to attempt matching with an identifier entry even if there are criterion attributes which are null.
Priority	Priority of the related entry for the specified **Related table**. Rules with lower priority numbers are given higher priority while matching a related item for a specific related table. Related entries for the specified related table with identical priorities are applied randomly. You can keep gaps between the priority numbers, so you can assign the unused priority numbers to new entries without modifying the existing priority order.
Optional condition	Filter conditions to narrow the set of records that will be searched for a matching related item.

11. Click **Submit**.

What to do next

To add criterion attributes to a **Hybrid Entry CI Criterion Attributes** field in a hybrid identifier entry, instead of using the Identifier Entry form, you must use background scripts. After saving the identification rule, navigate to **System Definitions** > **Scripts - Background**, and then enter a script that adds the attributes and click **Run script**.

Sample script:

```
var gr = new GlideRecord('cmdb_identifier_entry');
// get the identifier entry you want to update
gr.get('<identifier_entry_sys_id>');
// set the attributes you want in the hybrid rule in a comma
 separated list
// for example: 'name,serial_number'
gr.
 hybrid_entry_ci_criterion_attributes='<column_name_1>,<column_n
ame_2>,<etc.>';
gr.update();
```

This process requires the admin role.

Create a reconciliation rule for a non-CMDB table

Create a static or a dynamic CI reconciliation rule for a non-CMDB table.

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For information about static reconciliation rules, dynamic reconciliation rules, and other principals related to reconciliation rules, see Reconciliation rules.

If both, static and dynamic reconciliation rules exist for the same record attribute, the dynamic rule has precedence.

Note:
You can't create a reconciliation rule for system fields or for Identification and Reconciliation Engine (IRE) specific fields such as the Discovery source (discovery_source) field. Also, reconciliation rules can't be dot-walked using reference fields.

Create a static reconciliation rule for a non-CMDB table

A static reconciliation rule specifies class attributes that data sources are authorized to update, and prevents unauthorized data sources from overwriting the attributes' values. A static reconciliation rule also specifies the prioritization among multiple data sources. Without static reconciliation rules, data sources can overwrite each other's updates to attribute values.

Before you begin
Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task
Static reconciliation rules are used in conjunction with data refresh rules to determine reconciliation steps for a record. These rules determine if, when, and by which data source a record can be updated. If multiple data sources are authorized to update the same attributes, assign a priority to each of these data sources to prevent them from overwriting each other's updates.

After an authorized data source updates an attribute, subsequent updates are accepted only from the same data source or from a data source with a higher priority. Updates from a data source with a lower priority are rejected, unless these two conditions are met:

- The lower priority source is the first source updating the record.
- The record became stale based on data refresh rules for the class.

Precedence order of static reconciliation rules:

- Rule configured for a specific attribute, has precedence over rule set with **Apply to all attributes** (regardless of priority value).
- Between two rules for the same attribute or between two rules set with **Apply to all attributes**, the rule that is specific directly for the class has precedence over the derived rule.
- Between two rules for the same attribute or between two rules set with **Apply to all attributes** at the same class level, precedence is determined by rule priorities.

Information about the last discovery source that updates each attribute is stored in the Data Source History [cmdb_datasource_last_update] table, but only after enabling the reconciliation rule. Therefore, there might be unexpected updates after you enable the rule until the highest priority data source has updated the CI.

Static reconciliation rules affect reconciliation of stale attributes. During reconciliation, the information in the Data Source History table is considered along with the data refresh rules for the CI's class, to determine if a CI attribute is stale. A CI attribute is determined to be stale if it was not updated by the latest discovery source to update the CI, within a time period. The time period is specified by the Effective Duration time in the data refresh rule for the class for the discovery source. In this case, if another authorized discovery source, with a lower priority attempts to update the stale CI attribute, the update is allowed.

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If there is a dynamic reconciliation rule for the same record attribute as in a static reconciliation rule, the dynamic rule takes precedence.

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Reconciliation Definitions**.
2. In the Reconciliation Definitions list view, click **New**.
3. Fill out the Reconciliation Definition form.

Field	Description
Data source	The data source that you are configuring this rule for.
Priority	Priority of **Data source** within other data sources for the specified attributes. Smaller numbers designate higher priority. Data sources without a reconciliation rule are assigned the lowest priority.
Applies to	Authorizes the specified data source to update all attributes of the specified non-CMDB table. **Note:** This setting will be overridden by any setting that applies to a specific attribute. In which case, instead of using this option, you can directly include all attributes for **Attributes**.
Filter condition	Conditions that records must meet for the rule to be applicable. For example, to apply this rule only to records that are associated with the Finance department, select this condition: **[Department] [is] [Finance]**. **Note:** The glide.identification_engine.enable_reconciliation_filter_be system property determines when filter conditions are applied. By default, those filter conditions are applied after attribute values have changed during payload processing. Set this property to **true** so that Identification and Reconciliation Engine (IRE) applies the filter conditions before attribute values change.

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Field	Description
Attributes	Attributes from the current or from a parent class, that the specified data source is authorized to update. Available only if **Apply to all attributes** is not selected.
Update with null	Attributes that the specified data source can update with a null value. By default, authorized data sources cannot overwrite a non-null value with a null value. Attributes in this list, which are not in the **Attributes** list, are not included with the attributes that the data source can update with a null value.

4. Click **Submit**.

Create a dynamic reconciliation rule for a non-CMDB table

A dynamic reconciliation rule for non-CMDB table uses CMDB 360 data to choose a value such as the largest value that is reported, for updating a record.

Before you begin

CMDB 360/Multisource CMDB must be enabled.

Role required: itil has read access, itil_admin (on top of itil) has full access

About this task

If the same CI attribute has both, a static reconciliation rule and a dynamic reconciliation rule, the dynamic reconciliation rule has precedence.

A dynamic reconciliation rule supports several rule types, such as largest reported value and most reported value. When applying a dynamic reconciliation rule, IRE processes the current payload and then examines the CMDB 360 data store to select a value with which to update the CMDB. Depending on the dynamic reconciliation rule type, selecting the appropriate value might not be immediately conclusive. For example, there might not be a single value that is most reported, or for some values, the last discovered timestamp isn't reported. Therefore, when necessary, IRE falls back to examining additional details such as last reported, last discovered, and last updated values to select the most appropriate value.

Note:
You can't add a dynamic reconciliation rule when creating a new child class in the CI Class Manager. You must first save the new child class and then add the dynamic reconciliation rule.

Procedure

1. Click **All**.
2. In the Filter navigator, enter `cmdb_dynamic_reconciliation_definition.list` to open the Dynamic Reconciliation Definitions table.
3. In the Dynamic Reconciliation Definitions list view, click **New**.

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4. Fill out the Dynamic Reconciliation Definition form.

Field	Description
Name	
Attributes	Attributes for which to apply the rule. Attributes that the specified rule type can't be applied to and attributes for which a dynamic reconciliation rule already exists for, don't appear.
Filter condition	Conditions that CIs must meet for the rule to be applicable. For example, to apply a rule only to CIs that are associated with the Finance department, select this condition: **[Department] [is] [Finance]**.
Applies to	Non-CMDB table that this rule applies to.
Dynamic Rule Type	Rule type which is based on CMDB 360 data.

5. Click **Submit**.

Create a data refresh rule for a non-CMDB table

To apply Identification and Reconciliation Engine (IRE) features to supported non-CMDB tables, create data refresh rules for those tables. Data refresh rules are used to determine if a record is stale for a specific data source. Such records can then be updated by a lower-priority authorized data source.

Before you begin
Role required: itil has read access, itil_admin (on top of itil) has full access

About this task
Data refresh rules have no impact when dynamic reconciliation rules are in effect.

Data refresh rules are used in conjunction with static reconciliation rules to determine reconciliation steps for a record. These rules determine if, when, and by which data source a record can be updated.

Procedure

1. Click **All**.
2. In the Filter navigator, enter `cmdb_datasource_staleness.list` to open the Data Source Staleness Definitions table.
3. In the Data Source Staleness Definitions list view, click **New**.
4. Fill out the Data Source Staleness Definitions form.

Field	Description
Applies to	Non-CMDB class that this rule applies to.

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Field	Description
Data source	Data source for which record staleness is evaluated.
Effective Duration	The time period that is used for the staleness evaluation. If the fields specified in the static reconciliation rule for the record's class were not updated by the specified data source within the specified time period — the record is determined to be stale for that data source. If you enter a value with a prefix that is valid and a suffix that is not, such as `15 x` — the valid portion of the value is used ('15'). If the entire value is invalid — the default value of 0 is used.
Active	Activates the rule.

5. Click **Submit**.

Create an identification inclusion rule for a non-CMDB table

Narrow the scope of records that are included in the identification process of non-CMDB records by creating an identification inclusion rule.

Before you begin
Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task
During duplication detection of independent CIs, the Identification and Reconciliation Engine (IRE) processes only the records that satisfy the identification inclusion rules. For example, you can set a filter to include only records whose state is operational. When no identification inclusion rules exist, all records are included in the identification process.

In the base system, there are no predefined identification inclusion rules. Identification inclusion rules are defined at the class level.

Note:
Identification inclusion rules impact any script that calls IRE, therefore create them carefully. Identification inclusion rules can prevent the identification of certain types of records, affecting some features of Discovery and Service Mapping.

Procedure
1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Identification Inclusion Rules**.
2. In the Identification Inclusion Rules list view, click **New**.
3. Fill out the Identification Inclusion Rules form.

Field	Description
Applies to	Non-CMDB table that this rule applies to.

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Field	Description
Inclusion condition	Criteria that non-CMDB records must meet to be included in the identification process.

4. Click **Save**.

Create an IRE data source rule for non-CMDB tables

When using Identification and Reconciliation Engine (IRE), you can prevent a specific data source from inserting new records for a specific non-CMDB table. Create IRE data source rules for data sources that you don't trust in creating records but continue to trust in updating those records that exist.

Before you begin
Role required: itil_admin

About this task
IRE data source rules have no impact when dynamic reconciliation rules are in effect.

- Child classes derive IRE data source rules from parent classes like identification rules do.
- IRE data source rules that are specified for a child class, override any IRE data source rules derived from a parent class.

When IRE processes an insert operation that is prohibited by an IRE data source rule, the insert operation fails. This failure happens when the data source and record class in the insert operation and in an IRE data source rule, match. When CreateOrUpdateCIEnhanced() is used, IRE stores the failed payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table for future potential use.

Note:
When an insert operation is not allowed by the IRE data source rule, then when using createOrUpdateCI(), the entire IRE payload fails since createOrUpdateCI() doesn't allow partial commits.

If later, a permitted data source attempts to insert that same record, then IRE inserts the record after merging it with the matching record from the partial payloads. IRE then deletes the partial payload from the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table, and allows future updates by the data source specified in the rule.

IRE data source rules do not apply to lookup and related items, and only a single rule can be active for any class/data source pair.

Procedure
1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **IRE Data Source Rules**.
2. In the IRE Data Source Rules list view, click **New** and fill out the IRE Data Source Rule form.

Field	Description
Data source	Data source that is not allowed to create CIs of the specified class.
Active	Activates the IRE data source rule.

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Field	Description
Applies to	The class (and child classes) that the specified data source is not allowed to create records for.
Insert Not Allowed	Disables the specified data source from inserting new records of the specified class, to the non-CMDB table.

3. Click **Submit**.

Result

If a payload item with an insert request, and in which the data source and the record class match the data source and the record class specified in the IRE data source rule:

1. The insert operation fails and IRE logs the following message:

   INSERT_NOT_ALLOWED_FOR_SOURCE Insert into [xyz] is blocked for data source [xyz] by IRE data source rule.

2. If using CreateOrUpdateCIEnhanced(), then IRE stores the payload item as a partial payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table.

If later, a permitted data source successfully inserts a record that matches the record from a partial payload item:

1. The current record is merged with the matching record from the partial payload, applying static reconciliation rules as needed.
2. The respective partial payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table is deleted.
3. Later payloads in which the non-permitted data source updates the respective record, run successfully.
4. IRE allows the data source, that was previously prohibited from inserting the record, to update that same record which now exists in the non-CMDB table.

General guidelines for using CMDB Identification

Review the following general guidelines for using CMDB Identification effectively.

Identification rules

An independent identification rule identifies a CI based on the CI's attributes, independently of other CIs.

A dependent identification rule identifies a CI by its dependent CIs and the relationships of the identified CI with those dependent CIs. Identification with a dependent identification rule is based on the dependent CIs and the relationships and qualifiers between the identified CI and its dependent CIs. Identification then requires more time than with an independent identification rule and is prone to some identification errors. Usage of dependent rules should therefore be minimized.

CI modeling determines which type of identification rules are required for proper CI identification.

Create identification rules using the following order of importance:

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1. Independent identification rules — It is always preferable to create independent identification rules rather than dependent identification rules. When you model a CI, define the CI with a complete set of attributes that lend themselves to independent identification, eliminating the need to use additional CIs for identification.
2. Dependent identification rules — If it is necessary to create dependent identification rules, then define a single level of dependency. Two is the maximum number of dependency levels that is supported.
3. Avoid creating lookup identifier entries. The use of lookup identifier entry is highly discouraged as it can reduce performance. If unavoidable, ensure to first review class definitions and consider updates that allow usage of independent identification rules.
4. Limit the number of identifier entries within an identification rule, ideally to 1. A second identifier entry can further reduce performance, as will each additional identifier entry.
5. Create strong identification rules in which the strongest identifier entries and related entries are set with the highest priority.
6. Ensure that the identification rule is at the class level that it needs to be.

Payload

Create the payload using the following order of importance:

1. Payload size — Limit the number of CIs per payload to 500.
2. Avoid duplicate entries in the payload.

   Example: If an identification rule has a criterion attribute for the **name** field, then the following payload has duplicate items resulting in failure:

```
var payload = {
    items: [{
        className:'cmdb_ci_linux_server',
        values: {
            name:'Win Server 200',
            ram:'2048'
        }},
{
        className:'cmdb_ci_linux_server',
        values: {
            name:'Win Server 200',
            ram:'4096'
        }}]
};
```

3. Do not pass system data such as the following in the payload.

```
var payload = {
    items: [{
        className:'cmdb_ci_linux_server',
        values: {
            name:'Win Server 200',
            sys_domain:'global',
            sys_domain_path:'xyz',
            sys_updated_on:'2017-06-15 16:25:11',
            sys_mod_count:23,
        }}]
};
```

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4. Provide the minimum necessary set of criterion attributes for each payload item, according to what is specified in the corresponding identification rules.
5. When matching CIs, use CIs' sysIds if available. If provided, IRE can use the sysId to directly locate a CI without requiring any criterion attributes from the identification rule. In this case, IRE does not use the sysId in the matching process.
   - Example: Independent CI that needs to be updated — sysId is available.

```
var payload = {
    items: [{
        className:'cmdb_ci_linux_server',
        values: {
            sys_id:'194876usytrr65378098',
            ram:'2048',
        }}]
};
```

   - Example: Dependent CI that needs to be inserted. Tomcat War CI depends on Tomcat CI, and Tomcat CI depends on Linux Server CI. SysIds for the Tomcat and the Linux CIs are available.

```
var payload = {
        items: [{
            className:'cmdb_ci_app_server_tomcat_war',
            values: {
                name:'war1',
                short_description:'my description'
  }
        }, {
            className:'cmdb_ci_app_server_tomcat',
            values: {
                sys_id:'194876usytrr65378098'
            }
        }, {
            className:'cmdb_ci_linux_server',
            values: {
                sys_id:'09876tysueyt6345lakiu'
            }
        }],
        relations: [{
                    parent:1,
                    child:0,
                    type: 'Contains::Contained by'}, {
                        parent:1,
                        child:2,
                        type:'Runs on::Runs'}
                    ]
                };
```

   - Example: Dependent CI that needs to be updated — sysId is available.

```
var payload = {
        items: [{
            className:'cmdb_ci_app_server_tomcat_war',
            values: {
                sys_id:'039387euey637465sytet',
```

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```
                short_description:'my description new'
    }
        }]
                };
```

6. When inserting many CIs, all of which depend on the same CI, you should serialize your API calls. Otherwise, attempting to concurrently process many CIs can clog the system, significantly degrading overall system performance.

Properties for Identification and Reconciliation

Use the Identification and Reconciliation properties to configure the identification and reconciliation engine (IRE).

These properties are available for Identification and Reconciliation. To view and edit these properties, the admin role is required.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Properties for Identification and Reconciliation

Property	Description
Enforce the requirement that required attributes cannot be null during identification and reconciliation. glide.required.attribute.enabled	• Type: true | • Default valu • Location: **C**
Allow class upgrade during IRE identification and reconciliation. glide.class.upgrade.enabled	• Type: true | • Default valu • Location: **C** • Learn more When **false**, I reclassificatio
Allow class downgrades during IRE identification and reconciliation. glide.class.downgrade.enabled	• Type: true | • Default valu • Location: **C** • Learn more When **false**, I reclassificatio
Allow class switching during IRE identification and reconciliation. glide.class.switch.enabled	• Type: true | • Default valu

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Properties for Identification and Reconciliation (continued)

Property	Description
	• Location: **C** • Learn more When **false**, I reclassificatio
glide.identification_engine.update_without_upgrade_enabled	Enable IRE to precedence c • Type: true | • Default valu • Location: A • Learn more Depending on • **true**: IRE pr update. • **false**: IRE p
glide.identification_engine.update_without_downgrade_enabled	Enable IRE to precedence c • Type: true | • Default valu • Location: A • Learn more Depending on • **true**: IRE pr update. • **false**: IRE p
glide.identification_engine.update_without_switch_enabled	Enable IRE to precedence c • Type: true | • Default valu • Location: A • Learn more Depending on

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Properties for Identification and Reconciliation (continued)

Property	Description
	• **true**: IRE pr update. • **false**: IRE p
glide.identification_engine.reclassification_restriction_rules_enabled	Globally enab • Type: true | • Default valu • Location: A • Learn more
Allow the update of an empty field by a lower priority data source. glide.reconciliation.override.null	• Type: true | • Default valu • Location: **C**
Controls how identification processes a small set of duplicate CIs. glide.identification_engine.skip_duplicates	• Type: true | • Default valu • Other value **true** If the *gli* then olde For t to th **false** Matc • Location: **C**
Maximum number of CIs that can be in a set of duplicate CIs to allow identification to process the duplicate CIs according to the setting of *glide.identification_engine.skip_duplicates*. glide.identification_engine.skip_duplicates.threshold	If the number duplicate CIs false. • Type: integ • Default valu • Location: **C**

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Properties for Identification and Reconciliation (continued)

Property	Description
Maximum number of log runs that can be displayed when navigating to **Configuration** > **Identification Logs**. glide.identification_logs.max_run_ids	• Type: integ • Default valu • Location: **C**
glide.cache.size.service_cache	Maximum cac outbound rela discarded, re **Note:** You cann • Type: integ • Default valu • Location: A
glide.identification_engine.granular_insert_locking	Determines w Set to false if insert locks. • Type: true | • Default valu • Location: A
glide.identification_engine.batch_update_last_discovered	Controls batc identification Set to false if want to trigge • Type: true | • Default valu • Location: A
glide.identification_engine.related_items_local_cache_count	For optimizati items. • Type: integ • Default valu • Location: A

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Properties for Identification and Reconciliation (continued)

Property	Description
	Note: If there is *glide.* and the *glide.* propertie
glide.identification_engine.dependent_items_local_cache_count	For optimizati • Type: integ • Default valu • Location: A **Note:** If there is *glide.* and the *glide.* propertie
glide.identification_engine.independent_items_local_cache_count	For optimizati • Type: integ • Default valu • Location: A Setting the va performance.
glide.cmdb.logger.source.identification_engine	Enable and c identification • Type: string • Values: info • Location: A **Note:** Dependi affect ove and use t For more trou reconciliation
glide.identification_engine.partial_payload_items_max_size	Maximum nu the partial pa

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Properties for Identification and Reconciliation (continued)

Property	Description
	For example, references, a payload. Adjusting this items. • Type: integ • Default: 10 • Learn more • Location: A
glide.identification_engine.partial_items_process_limit	Maximum nu fetches only Adjusting the • Type: integ • Default: 20 • Location: A
glide.identification_engine.partial_items_process_absolute_limit	Absolute limi partial payloa Adjusting the • Type: integ • Default: 50 • Location: A
glide.identification_engine.skip_updating_source_last_discovered_if_older	Determines h attributes in t • true: If *las last_dis* the *last_* • false: Even *last_dis last_dis* **Note:** Only the • Type: true | • Default: tru • Learn more • Location: A

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Properties for Identification and Reconciliation (continued)

Property	Description
glide.identification_engine.ire_message_listener_skip_updating_source_last_discovered_to_now	If Robust Tran *ire.skip_* Robust Impor *skip_upda* • Type: true | • Default: fals • Location: A
glide.identification_engine.skip_updating_last_scan_if_older	Determines h determine wh table. • true: If *sou* *last_sca* Source [sys • false: Even than the *la* *last_sca* You can chec [sys_object_s **Note:** Only the • Type: true | • Default: tru • Learn more • Location: A
glide.identification_engine.ire_message_listener_skip_updating_last_scan_to_now	If RTE does n on the Robus *ire.skip_* • Type: true | • Default: fals • Learn more • Location: A
glide.identification_engine.platform_domain_separation_enabled	Toggles doma • false: IRE p access to c • true: IRE do enabling pa

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Properties for Identification and Reconciliation (continued)

Property	Description
	• Type: true | • Default: fals • Learn more • Location: A
glide.identification_engine.enable_identifier_optional_condition	Enables adva options let yo CI. **Note:** This prop identifier In the bas options c automati To prever entries b enter cm the 'Opti • Type: true | • Default: fals • Learn more • Location: A
glide.identification_engine.enable_reconciliation_filter_before_update	Determines w during payloa • Type: true | • Default: fals • Learn more • Location: A

Components installed with Identification and Reconciliation

Several types of components are installed with Identification and Reconciliation (included in the com.snc.cmdb plugin), including tables.

Tables installed

Table	Description
Identifier	Identification rule sets defined for different classes of CIs.

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Table	Description
[cmdb_identifier]	
Reconciliation Definition [cmdb_reconciliation_definition]	Static reconciliation rules defined for different classes of CIs at the table and field level.
Dynamic Reconciliation Definitions [cmdb_dynamic_reconciliation_definition]	Dynamic reconciliation rules defined for different attributes and classes.
Identifier Entry [cmdb_identifier_entry]	Rule entries with different priorities assigned to each identifier.
Duplicate Audit Result [duplicate_audit_result]	Duplicate audit results corresponding to a specific duplicate task. These results are generated automatically during the identification process and should not be added manually.
Remediate Duplicate Task [reconcile_duplicate_task]	Task to address duplication that is detected during the identification process. Records are generated automatically, and users should not add records manually.
Reclassification Task [reclassification_task]	Reclassification tasks that were generated during the identification process.
Data Source History [cmdb_datasource_last_update]	Information about the last data source that updated each attribute. Used to determine if a data source can update a stale CI.
Data Source Staleness Definition [cmdb_datasource_staleness]	Effective duration per data source. When effective duration is exceeded, then CMDB Health determines that the information provided by that data source is stale.
Identification Engine Context [cmdb_ie_context]	Input payload, and data source (cmdb_ci's discovery_source) that will be used as input for a specific identification engine API. Stores information about which specific identification engine API will be called (`identifyCI` or `createOrUpdateCI` API). Also stores information about enhanced IRE options used in Identification Simulation. **Note:** Internal table used by identification simulation.
Identification Engine Run [cmdb_ie_run]	Specific cmdb_ie_context record that was used to run against the identification engine. Also details about the output payload returned by APIs, such as start and end time of the run and whether the run was successful.

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Table	Description
	Note: Internal table used by identification simulation.
Identification Engine Log [cmdb_ie_log]	Identification engine logs for a specific cmdb_ie_run simulated in the identification simulation. Also details about logs level and order. **Note:** Internal table used by identification simulation.
IRE Data Source Rule [cmdb_ire_data_source_rule]	IRE data source rules.
CMDB IRE Partial Payloads [cmdb_ire_partial_payloads]	Payload items that were determined to be partial, and which might be later matched with an incoming payload. If a partial payload is matched and processed, it is deleted from the CMDB IRE Partial Payloads table. Partial payloads older than 90 days are deleted from the table. For more information about usage of this table in IRE processes, see Identification and Reconciliation engine (IRE).
CMDB IRE Partial Payloads Index [cmdb_ire_partial_payloads_index]	Identifier keys associated with partial items. IRE uses those keys to try to match with identifier keys of incoming payloads. For more information about usage of this table in IRE processes, see Identification and Reconciliation engine (IRE).
CMDB IRE Incomplete Payloads [cmdb_ire_incomplete_payloads]	Incomplete items, stored using JSON format as incomplete payloads. Incomplete items are stored for the purpose of logging payloads with irrecoverable errors, and are never processed again. The table is configured for table rotation, with duration of one day and seven table rotations. For more information about usage of this table in IRE processes, see Identification and Reconciliation engine (IRE).
IRE Output Aggregate Stats [cmdb_ire_output_aggregate_stats]	This table is populated when RTE invokes IRE, for example, when processing integrations.

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Table	Description
	Details about data inserted by Import Sets or Robust Transform Engine (RTE) to the CMDB (via IRE). Numbers of items inserted, partial items, and updated items, are stored for each type of CI, per run.
IRE Output Target Items [cmdb_ire_output_target_item]	This table is populated when RTE invokes IRE, for example, when processing integrations. Details about data inserted by Import Sets or Robust Transform Engine (RTE) to the CMDB (via IRE). Target class and the sys_id are stored per ImportSet row id, within a run. For this table to populate, RTE must pass the *`ire_output_detailed_stats`* property.
Reclassification Restrictions [cmdb_ire_reclassification_restriction]	Reclassification restriction rules. These rules prevent switch and downgrade reclassification updates for specific source and target classes. For more information, see CI reclassification during IRE processing.

User roles installed

Role	Description
cmdb_payload_admin	Automatically assigned to users with the cmdb_admin role for internal use only.

Related topics

Properties for Identification and Reconciliation

Populating the CMDB

You can populate the CMDB by using Discovery, by using the IntegrationHub ETL or Import Sets to import and integrate data from a third-party source, by integrating with an external CMDB, or by manually creating CIs.

When you populate the CMDB with information, you create a record for each configuration item in the cmdb_ci table or on one of the tables that extend that table.

Related ServiceNow® Store apps and reference information:

- CMDB schema model: A collection of class diagrams and class attributes for key CMDB classes.
- CMDB tables descriptions: Descriptions of key CMDB tables in the base system.
- CMDB CI Class Models: A ServiceNow Store app that adds class models that extend the base CMDB class hierarchy. This includes class descriptions, identification rules, identifier entries, and dependent relationships if applicable. You can then use the added classes as any other CMDB base class.

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- Discovery patterns: A ServiceNow Store app that provides a library of Discovery patterns for discovering specific devices and applications in the industry.
- Getting started with Service Graph Connectors: ServiceNow Store apps that provide pre-defined integrations for importing and integrating common third-party data into CMDB classes. Also includes the IntegrationHub ETL wizard for creating new ETL transform maps.

ITIL configuration management auto-discovery

The key to any configuration management business practice is the initial and ongoing inventory or discovery of what you own. The ServiceNow platform provides three options for auto-discovery:

- The separate and highly robust Discovery product.
- For organizations that want to leverage the discovery technologies they already have deployed (SMS, Tally NetCensus, LanDesk, and so on), the ServiceNow platform supports integrations to those technologies via web services. Scanned data can be mapped directly into the CMDB.

For further information on designing, constructing, and maintaining the CMDB, see the CMDB Design & Configuration white paper.

Discovery

The Discovery product automatically populates the CMDB. Discovery searches the network for all attached computers and devices, then populates the CMDB with information on each computer/device's configuration, provisioning, and current status. Discovery uses probes, sensors, and patterns, to collect and process data about computers, servers, printers, a variety of IP-enabled devices, and the relationships between all the items found. Discovery also reports on any software which is running, and the TCP connections between computer systems, thereby establishing their relationships. This information is sent back to the instance and is used to populate the CMDB.

For more information about Discovery see:

- ITOM Visibility
- Discovery basics

Integrate third-party data using IntegrationHub ETL

Use the IntegrationHub ETL to import and integrate data from a third party into the CMDB. Using IntegrationHub ETL, create ETL transform maps which are used for integrating data from specific data sources. IntegrationHub ETL guides you through importing source data, transforming any data if needed, and selecting target CMDB classes and attributes to map the data to. You then preview the integration results and adjust any configurations before scheduling recurring integrations.

Visit the ServiceNow Store website to view and download common integrations.

Import data from another source using Import Sets

You can import data to the CMDB using Import Sets. Import sets find files of information (in formats such as XML, Excel, or CSV), import them, and transform them onto the required table. This process can be scheduled or performed on demand.

To import relationships between CIs, use import sets to populate the table [cmdb_rel_ci] with information on the parent, the child, and the nature of the relationship. The [cmdb_rel_ci] table displays a list of all CI relationships and is useful when importing CI data.

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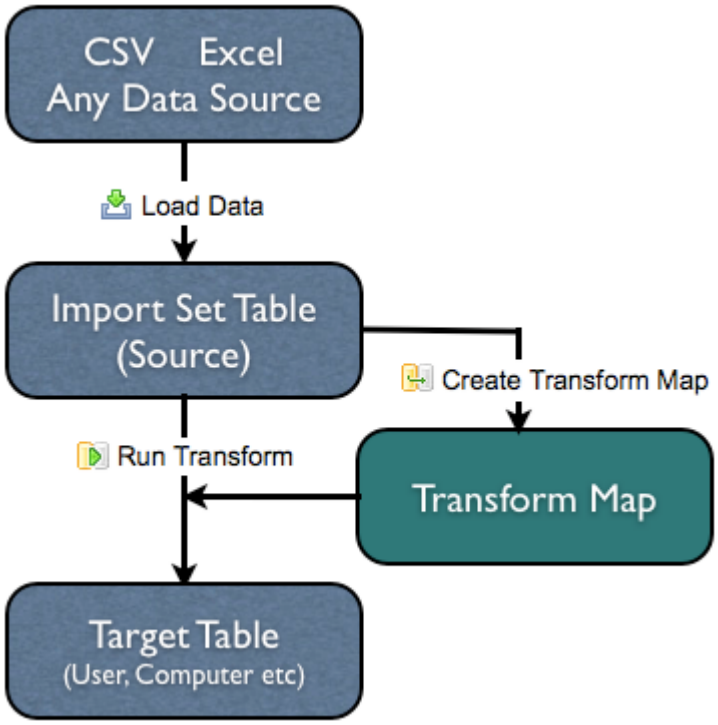
Import Sets overview



CMDB instance API

Use the CMDB instance API to populate the CMDB by creating or updating CMDB tables.

Manually create a CI

Create a single CI for a specific class. The role required is based on the settings of the class table you select for the CI.

1. Use the CI Class Manager:
   a. Navigate to **All** > **Configuration** > **CI Class Manager**.
   b. Click **Hierarchy** to display the list of CI Classes. Select the class to use for the CI.
   c. In the class navigation bar, select **CI List** and then on the CI list view, click **New**.
   d. Fill out the CI form and then click **Submit**.
2. Or, directly use a table:
   a. Navigate to **All** > **Configuration** and then elect the class to use for the CI, such as Business Services.
   b. In the navigation filter of the application navigator, enter the table label (such as 'Linux'), or the table name in the format of <table name>.list (such as 'cmdb_ci_linux_server.list'). Then, press Enter.
   c. In the list view of the table, click **New** and fill out the form fields for the table.
   d. Click **Submit**.

CMDB 360/Multisource CMDB

CMDB 360 retains complete history about discovery sources and proposed values, involved in updates of CI attributes. Use CMDB 360 data to track how the CMDB is populated by various

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discovery sources at the CI attribute level. Also, to revert CI updates from a specific discovery source, or to recompute attribute values using updated reconciliation rules.

Starting with the Utah release, the Multisource CMDB feature is part of the CMDB 360 feature. CMDB 360 provides all the functionality of Multisource CMDB and additional capabilities such as an analytics dashboard, and new query functionality. You can access all of the CMDB 360 capabilities in the CMDB 360 view in CMDB Workspace.

How CMDB 360 works

When multiple discovery sources attempt to update the same CI attribute, the Identification and Reconciliation Engine (IRE) uses reconciliation rules to select a single discovery source for the update. Without CMDB 360, details about the lower-priority discovery sources whose values were rejected, are discarded. Also, it is difficult to identify the source of an attribute value without CMDB 360.

With CMDB 360, the raw details for every discovery source and CI combination are retained for both, discovery sources that were selected for an update and all others that were not. CMDB 360 data, consisting of records for each discovery source and CI combination, is stored in the CMDB MultiSource Data [cmdb_multisource_data] table. You can examine, query, and report on the CMDB 360 data store.

You can optionally exclude classes and their descendents from collecting and processing CMDB 360 data. The CMDB MultiSource Data [cmdb_multisource_data] table doesn't contain data for those excluded classes. For more information, see Exclude classes from CMDB 360.

Note:
CMDB 360 supports non-CMDB tables. The widely used term Configuration Item (CI), can also refer to a non-CMDB table record. For information about support for non-CMDB tables, see IRE support for non-CMDB tables.

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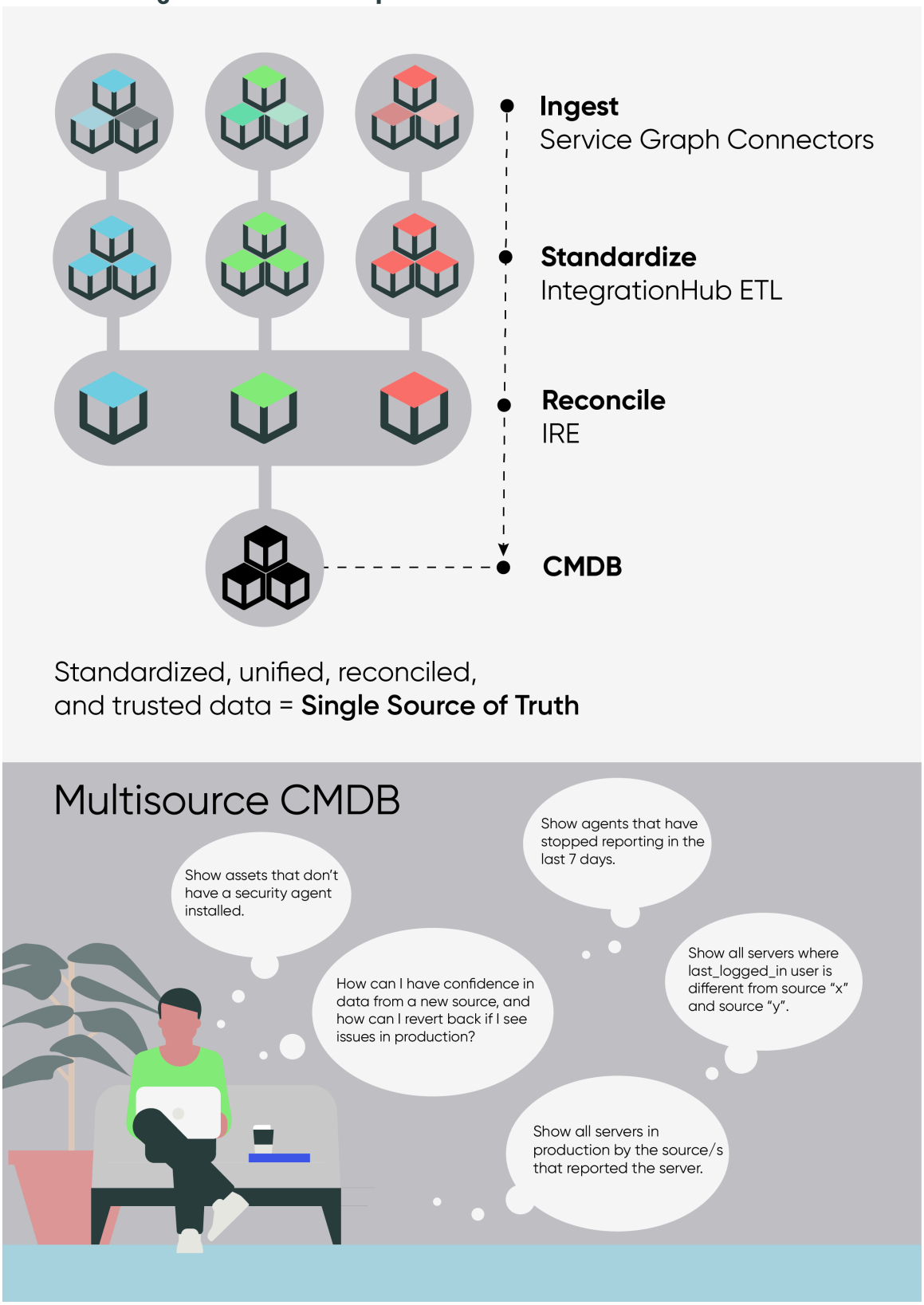
CMDB 360 insights into data source processes



After data is initially ingested from multiple data sources, several processes are applied to to standardize and reconcile the data before it is stored in the CMDB. CMDB 360 provides insights that can help you configure some of these processes.

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Using CMDB 360

Use CMDB 360 to:

- Create a dynamic reconciliation rule.
- Control CI updates at the discovery source and CI attribute level.
- Visualize discovery sources of attribute values, at the attribute level.
- Modify reconciliation rules and then recompute CMDB data, reflecting the updated reconciliation rules.
- Revert CMDB data integration from a specific discovery source, if, for example, you realize that the discovery source is not reliable. Recompute CI attribute values, while excluding the discovery source that you want to ignore.
- Validate a new discovery source by comparing its data to data from other discovery sources, which are known to be valid.
- Improve data management, data quality, and operational insights, by querying on CMDB 360 data. Use the CMDB 360 query builder in CMDB Workspace to create queries for CMDB 360 records, discovery sources, and CI records.

Enable and configure CMDB 360

- Activate the ITOM Discovery License (com.snc.itom.discovery.license) plugin.
- Navigate to **All** > **Configuration** > **CMDB 360 Properties**. Then, in the CMDB 360 Properties pane ensure that the glide.identification_engine.multisource_enabled (Enables CMDB 360) property is set to **true**.
- Optionally, Exclude classes from CMDB 360.

By default, CMDB 360 tracks discovery source information for CIs from CMDB classes and doesn't collect data for non-CMDB tables. You can independently enable or disable tracking data for CMDB and for non-CMDB classes, using these system properties:

- glide.identification_engine.multisource_cmdb_ci_enabled (Enables capturing CMDB 360 data for CIs from CMDB classes)
- glide.identification_engine.multisource_non_cmdb_ci_enabled (Enables capturing CMDB 360 data for CIs from non-CMDB classes

Report on CMDB 360 data

Use the CMDB 360 view in CMDB Workspace to gain insights into the CMDB 360 data store. Build reports that, for example, do the followings:

- Find CIs not reported by any discovery source.
- Find discovery sources populating data in your CMDB.
- Compare attribute values across discovery sources.
- Compare attribute values between CMDB and other discovery source.
- Limit reports for CMDB 360 data, to a specific application service, technical service, or a CMDB group.

See Sample Multisource CMDB queries for more details.

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Visualize CMDB 360 data

CMDB 360 is highly verbose in the user interface:

- On the Reconciliation Rules page in CI Class Manager, click the **Preview Data** tab to see per attribute, discovery sources that are authorized to update that attribute, in precedence order.
- On a CI form, click the **CMDB 360 Data Preview** related link to see per CI attribute, current value in the CMDB and incoming values from other discovery sources.

Logging

Enable logging for CMDB 360 by adding and enabling the system property glide.cmdb.logger.source.cmdb_multisource. In the Log [syslog] table, search for entries in which `source="cmdb_multisource"`.

CMDB 360 experience in CMDB Workspace

The CMDB 360 view provides aggregations and analysis of CMDB 360 data which you can use to track activities and identify potential issues of discovery sources. You can also create different types of your own queries and associated schedules and reports to explore CMDB data.

Use the CMDB 360 view in CMDB Workspace to access all of the CMDB 360 capabilities. For information about all CMDB 360 dashboard settings, see Configure the CMDB 360 dashboard.

Note:
Most cards on the CMDB 360 dashboard support non-CMDB tables in their aggregation, or can be configured to provide support. However, the CIs not reported by discovery sources card, for example, doesn't apply to non-CMDB tables. Creating queries for non-CMDB tables is also supported. For information about support for non-CMDB tables, see IRE support for non-CMDB tables.

Access

Requirements:

- Role requirement: sn_cmdb_user (CMDB user) or any role containing sn_cmdb_user
- Additional requirement: Enable and configure CMDB 360

To access the CMDB 360 view in the CMDB Workspace, navigate to **Workspaces** > **CMDB Workspace**. In the CMDB Workspace menu bar, select **CMDB 360**.

Potential issues

Cards on the Potential issues tile show details about CIs with discovery sources that are incorrectly reporting on the CIs.

CIs not reported by discovery sources

Lists CIs that are discovered by multiple discovery sources, but one or more of the discovery sources has stopped reporting within a specified number of days. The Number of days since CIs were last discovered by a discovery source dashboard setting is used in the card's aggregation.

Drill down on this card to see a list view of the CIs for the card and the specific discovery source per CI that is no longer reporting.

Example: You configure 7 days for the setting. A Linux server CI named backup-linux.sea.com is reported by these discovery sources within the specified number of days:

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- ServiceNow - today.
- ServiceWatch - 4 days ago.
- AgentClientCollector - 8 days ago.

In this scenario, the CI shows on the CIs not reported by discovery sources card, since AgentClientCollector reported over seven days ago.

Data mismatch

Lists CIs for which different discovery sources are reporting different values. Attributes are considered mismatched when different discovery sources report different values for the attribute. CIs that appear when you drill down on this card can reveal issues with the individual CI, or your reconciliation rules.

The specific records that appear in the drilled-down list view, depend on the Data mismatch dashboard settings.

In the Data mismatch records list view, select an item in a Source column to access the Multisource Data Preview page with details about all discovery sources with values for the attribute. On the Multisource Data Preview page you can use the Search Attributes box to search for specific attributes and also choose one of the following options:

- **All attributes**: Shows all attributes of the selected class, regardless of whether they have a value in the CMDB.
- **Attributes with CMDB values**: Shows only attributes of the selected class, with a value in the CMDB.
- **Attributes with multisource data**: Shows all attributes of the selected class, and for each attribute shows current CMDB value and any other discovery sources with a value for the attribute.

Regardless of the option that you choose on the Multisource Data Preview page, a discovery source value that was used for the current CMDB value – is highlighted in green. These values are identical to the CMDB value of the attribute.

Saved queries

The Saved queries card shows up to 20 of your CMDB 360 queries. You can use the card to edit and run those queries, or create new queries. Saved queries are sorted on both the card and list view by the most recently created or updated queries.

If your instance has been upgraded from an instance that contained Multisource Report Builder queries, then those queries appear on the Saved queries card.

- Click a saved query to modify or view it before running.
- Click a query's action icon and then select **Run**.
- Click **View All Queries** to see all the saved queries where you can examine or run a query.
- Click **Create Query** to create a query of one of the following types:

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- Get Records: Creates a query that you can use to explore your CMDB 360 data. It queries your CMDB 360 for CIs matching your criteria that are reported by specified discovery sources.
- Find Gap: Creates a query that you can use to analyze gaps in discovery sources reporting your CMDB 360 data. It queries discovery sources that report CIs against discovery sources that don't report those same CIs.
- Compare Attribute Values: Creates a query that you can use to identify CIs with attribute values that differ across multiple discovery sources or against the CMDB. It queries at least two discovery sources and/or the CMDB for CIs that match your criteria.

- Schedule a CMDB 360 query for a report to run that query on a regular basis. Scheduling a query enables you to create a CMDB 360 report that integrates the query results with the platform Reporting feature.

Discovery sources

Cards in the Discovery sources tile show aggregated counts for your discovery sources. This tile also includes coverage cards showing a breakdown of CIs per the number of discovery sources reporting those CIs.

Number of discovery sources

The total number of discovery sources that report CMDB 360 data.

Total CMDB 360 records

The total number of raw CMDB 360 records in the CMDB 360 data store that contains records for each discovery source report, per each CI attribute.

Reconciled CIs

The total number of unique CIs created in the CMDB after processing incoming data from all discovery sources, including after reconciling data from multiple discovery sources for the same CIs. For more information, see CMDB Identification and Reconciliation.

Discovery source overview

The distribution of CMDB 360 CIs across all reporting discovery sources.

Coverage: CIs with a single discovery source

Shows CIs that are only reported by a single discovery source, with a breakdown by the discovery source reporting those CIs.

Coverage: CIs by number of discovery sources

Shows CIs reported by multiple discovery sources, grouped by the number of discovery sources that are reporting those CIs.

You can use the following options to filter the calculated records in the CMDB 360 data store that apply to all cards in the Discovery sources tile:

- All (default): Includes records from both CMDB and non-CMDB tables.
- CMDB CI: Includes records only from CMDB classes.
- Principal Class: Includes records only from principal classes. For information about defining a class as principal and therefore including that class in the Principal Class filter, see Create a CI class.

Various settings apply only to the coverage charts. They determine the scope and type of data that is included in the coverage charts and can greatly affect the performance of the associated calculation job:

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- The 'Coverage cards' dashboard settings determine the data that the cards show in list views.
- The system properties *sn_cmdb_ws.ms.calculate_cmdb_only* and *glide.identification_engine.multisource_non_cmdb_ci_enabled* determine if both CMDB and non-CMDB or CMDB only data, is included in the coverage charts. For more information about these system properties, see Components related to CMDB 360.

  Note:
  If the *sn_cmdb_ws.ms.calculate_cmdb_only* is true or *glide.identification_engine.multisource_non_cmdb_ci_enabled* is false, then both 'All' and 'CMDB CI' filters show CMDB data only (non-CMDB data is ignored).

- The *sn_cmdb_ws.ms.report_class_ci_count_max_threshold* system property and the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table, together, determine class inclusion in the coverage charts.

  If the record count for a class (CMDB or non-CMDB) in the CMDB 360 Data [cmdb_multisource_data] table exceeds the value set by the *sn_cmdb_ws.ms.report_class_ci_count_max_threshold* system property, then a record is created in the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table and by default, the class is skipped in future calculations for the coverage charts. You can include a skipped class in the coverage charts by setting the *Override class CI records population* column of a skipped class in the *sn_cmdb_ws_ms_skip_class* table, to 'true'.

  Some classes, when included or excluded from the coverage charts, can greatly impact the overall performance of the chart calculations. For more information, see Components related to CMDB 360.

Coverage

Cards on the Coverage tile show a breakdown of CIs per the number of discovery sources reporting those CIs:

CIs with a single source

Shows CIs that are only reported by a single discovery source, with a breakdown by the discovery source reporting those CIs.

CIs by number of sources

Shows CIs reported by multiple discovery sources, grouped by the number of discovery sources that are reporting those CIs.

The following settings determine the scope and type of data that is included in the Coverage tile charts, these settings can greatly affect the performance of the Coverage tile calculation job:

- The 'Coverage cards' dashboard settings determine the data that the cards show in list views.
- The system properties *sn_cmdb_ws.ms.calculate_cmdb_only* and *glide.identification_engine.multisource_non_cmdb_ci_enabled* determine if both CMDB and non-CMDB or CMDB only data, is included in the Coverage chart. For more information about these system properties, see Components related to CMDB 360.
- Filter options filter the calculated records in the CMDB 360 data store, that apply to the Coverage charts:

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- All (default): Includes all those records for both CMDB and non-CMDB tables.
- CMDB CI: Includes only those records for CMDB classes.
- Principal Class: Includes only those records for principal classes. For information about defining a class as principal and therefore including that class in the Principal Class filter, see Create a CI class.

Note:
If the *sn_cmdb_ws.ms.calculate_cmdb_only* is true or *glide.identification_engine.multisource_non_cmdb_ci_enabled* is false, then both 'All' and 'CMDB CI' Coverage chart filters show CMDB data only (non-CMDB data is ignored).

- The *sn_cmdb_ws.ms.report_class_ci_count_max_threshold* system property and the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table, together, determine class inclusion in the Coverage chart.

  If the record count for a class (CMDB or non-CMDB) in the CMDB 360 Data [cmdb_multisource_data] table exceeds the value set by the *sn_cmdb_ws.ms.report_class_ci_count_max_threshold* system property, then a record is created in the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table and by default, the class is skipped in future calculations for the Coverage chart. You can include a skipped class in the Coverage chart by setting the *Override class CI records population* column of a skipped class in the *sn_cmdb_ws_ms_skip_class* table, to 'true'.

  Some classes, when included or excluded from the Coverage chart, can greatly impact the overall performance of the chart calculations. For more information, see Components related to CMDB 360.

In addition to the settings listed above, internal filters and excluded classes in the CMDB 360 denied classes [cmdb_multisource_deny_class] table also affect the final inclusion or not inclusion of classes. You can review the list of CI classes in the 'Coverage cards' settings to see any notes about inclusion status.

Configure the CMDB 360 dashboard

Configure settings on the CMDB 360 dashboard of the Configuration Management Database (CMDB) Workspace to determine how your CMDB 360 data is analyzed and aggregated. These settings affect the data that appears on the cards and the records shown when you drill down on those cards on your CMDB 360 dashboard.

About this task

For detailed information about CMDB 360-related components, such as system properties, scheduled jobs, and tables, that are installed with CMDB Workspace, see Components installed with CMDB Workspace.

Before you begin

Role required: cmdb_ms_admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace menu bar, select **CMDB 360**.
3. Select **Settings**.

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4. Configure Global settings.
   The **Maximum number of records to process** setting determines the maximum number of records that can show when you drill down on the cards in the CMDB 360 dashboard. If the total number of returned records is greater than the specified setting value, the dashboard trims the list view output according to this setting and the settings of individual cards.

   You can use this setting to limit the number of records that CMDB 360 must process. The setting applies to these cards:

   - CIs not reported by discovery sources
   - Data mismatch
   - CIs with a single discovery source
   - CIs by number of discovery sources

   The CMDB 360 dashboard defaults this value to 100,000.

5. Configure Potential issues settings.
   These settings affect the calculations for cards on the CMDB 360 view/Potential Issues tile and the list of CIs that appear when you drill down on those cards.

   a. Configure CIs not reported by discovery sources.
      The **Number of days since CIs were last discovered by a discovery source** setting determines the number of days used in the calculation of the CIs not reported by discovery sources card. The card shows CIs that are discoverable by multiple sources, but at least one discovery source hasn't reported on that CI in the specified number of days.

   b. Configure Data mismatch.
      These settings affect the calculation of the 'Data mismatch' card and the list of CIs that appear when you drill down the card. These settings determine which classes to use for the card and the relative weight of each of those classes in the calculations.

Setting	Description
Automatic data weights	Evenly distributes weights between the selected CI classes.
Manual data weights	Specify a custom weight for each CI class.
Select CI classes you want to include in the calculation	Specify the CI classes that you want to check for attribute mismatches. CI classes you specify also include any child classes. Attributes are considered mismatched when different discovery sources report different values for the attribute.
Show CIs where EVERY attribute doesn't match	Select to include only CIs with a mismatch between discovery sources for every attribute that you specify.
Show CIs where ANY attribute doesn't match	Select to only include CIs with a mismatch between discovery sources for any attribute you specify.
Select an attribute	Specify the attributes that you want to check for mismatches.

6. Configure Coverage settings.
   These settings affect the calculations for the coverage cards in the Coverage tilein the Discovery Sources tile on the CMDB 360 view and the list of CIs that appear when you drill

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down on these cards. These settings determine which classes to use for the coverage charts and the relative weight of each of those classes.

Setting	Description
Automatic data weights	Evenly distributes weights for the selected CI classes.
Manual data weights	Specify a custom weight for each CI class.
Select CI classes you want to include in the calculation	Specify the CI classes that you want to include in the CIs with a single source and CIs by number of sources cards. CI classes that you specify also include any child classes.

7. Select **Save**.

Create a CMDB 360 Get Records query

Create a Get Records query from the CMDB 360 dashboard of your Configuration Management Database (CMDB) Workspace to help you explore your existing CMDB 360 data.

Before you begin

Role required: sn_cmdb_user and either cmdb_ms_admin or cmdb_ms_editor

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace menu bar, select **CMDB 360**.
3. On the Saved Queries tile, click **Create Query.**
4. Click **I want to get CMDB 360 data**.
5. Select the CI classes to include in the query.
   You can click a selected class to open the condition builder. Use the condition builder to specify conditions that must be met for each class. Use **And** or **Or** to specify multiple conditions.

   Select **All Classes** if you want to include all CI classes without conditions.
6. Click **Continue**.
7. Select discovery sources to query on.
   The query retrieves CMDB 360 data that originates from the discovery sources you specify.

   You can leave the Select discovery sources prompt empty to retrieve data for all discovery sources.
8. Click **Continue**.
9. On the form, select the options:

Results Layout form

Field	Description
Show unique CMDB	Select if you want to see only unique CMDB 360 records. Records for the same CIs from different discovery sources are consolidated.

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Field	Description
360 records	
Show CI records by discovery source	Select if you want to see records for each CI and discovery source pair.
Limit results to	Limits the query results to CIs that belong to a service or CMDB group. When you select **Application Services**, **Technical Services**, or **CMDB Groups**, a prompt appears. You can use the prompt to specify the service or group that you want the query to filter for.

10. Click **Continue**.
11. Enter a name and description for your query.
12. Click **Save** .

What to do next

Run the query at least once if you want to create a schedule or report.

On the CMDB 360 Query Results page:

- If the number of results exceeds the number of results appearing on the page:
  - Click **Load More Results**: To show the next page of results. The number of results that appear on each result page is specified by the glide.identification_engine.multisource.query.batch.limit system property (100 items by default).
  - Click **Load All Results**: To show all results, up to the limit specified by the glide.identification_engine.multisource.query.max.limit system property (10000 by default).
  - Click a CMDB 360 Source link to easily access preview data of a source and see more details.
- You can click **Create Schedule** to set up a schedule that runs your query on a regular basis. Scheduling your query enables you to use the query results in reports you create.
- After creating a schedule, you can click **Create Report** to configure a report that you can manage using Reporting capabilities .
- On the Query Results page, access a record to view further details. For example, click a link in the Primary Record column, and then in the CI Details page, click **View CMDB 360 Data**.

Create a CMDB 360 Find Gap query

Create a Find Gap query from the CMDB 360 dashboard of your Configuration Management Database (CMDB) Workspace to help you find CIs that are not being reported by a discovery source.

Before you begin

Role required: sn_cmdb_user and either cmdb_ms_admin or cmdb_ms_editor

About this task

Gaps in discovery source reporting occur when at least one discovery source reports on the CI and another doesn't, enabling you to identify discovery sources that might have an issue.

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Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace menu bar, select **CMDB 360**.
3. Click **Create Query.**
4. Click **I want to find gaps in data between discovery sources**.
5. Select the CI classes that you want to check for gaps.
6. Click **Continue**.
7. Select non-reporting discovery sources.
   A non-reporting discovery source is a discovery source that doesn't report CIs as expected. Multiple non-reporting discovery sources have an OR condition with each other.
8. Select one or two reporting discovery sources.
   These discovery sources report the CI as expected and act as a baseline for identifying the gap in reporting.

   You can leave the **Select reporting discovery sources for gap tracking** prompt empty to include all discovery sources in the query.
9. Click **Continue**.
10. On the form, select the options:

Results Layout form

Field	Description
Show unique CMDB 360 records	Select if you want to see only unique CMDB 360 records. Records for the same CIs from different discovery sources are consolidated.
Show CI records by discovery source	Select if you want to see records for each CI and discovery source pair.
Limit results to	Limits the query results to CIs that belong to a service or CMDB group. When you select **Application Services**, **Technical Services**, or **CMDB Groups**, a prompt appears where you can specify the service or CMDB group that you want the query to filter for.

11. Click **Continue**.
12. Enter a name and description for your query.
13. Click **Save** .

What to do next

Run the query at least once if you want to create a schedule.

On the CMDB 360 Query Results page:

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- If the number of results exceeds the number of results appearing on the page:
  - Click **Load More Results**: To show the next page of results. The number of results that appear on each result page is specified by the glide.identification_engine.multisource.query.batch.limit system property (100 items by default).
  - Click **Load All Results**: To show all results, up to the limit specified by the glide.identification_engine.multisource.query.max.limit system property (10000 by default).
  - Click a CMDB 360 Source link to easily access preview data of a source and see more details.
- You can click **Create Schedule** to set up a schedule that runs your query on a regular basis. Scheduling your query enables you to use the query results in reports you create.
- After creating a schedule, you can click **Create Report** to configure a report that you can manage using Reporting capabilities.
- On the Query Results page, access a record to view further details.

Create a CMDB 360 Compare Attribute Values query

Create a Compare Attribute Values query from the CMDB 360 dashboard of your Configuration Management Database (CMDB) Workspace to help you find CIs with mismatched attribute values between discovery sources.

Before you begin

Role required: sn_cmdb_user and either cmdb_ms_admin or cmdb_ms_editor.

About this task

The query enables you to determine if there's an issue with how a discovery source reports a CI.

The Compare Attribute Values query compares CIs from different discovery sources for mismatched values. Mismatches occur when a discovery source reports attribute values for a CI that are different from values reported by other discovery sources or the CMDB. You can use the query to identify these CIs and reconcile the attribute values, or fix any issues with the discovery sources.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace menu bar, select **CMDB 360**.
3. Click **Create Query**.
4. Click **I want to compare attribute values between discovery sources or against the CMDB**.
5. Select a CI class that you want to compare attribute values for.
   You can click a selected class to open the condition builder. Use the condition builder to specify conditions that must be met for each class. Use **And** or **Or** to specify multiple conditions.
6. Click **Continue**.
7. On the form, select the options:

Attributes to compare form

Field	Description
Any attribute doesn't match	Select if you want to retrieve CIs where there's a mismatch with any specified attribute values between the discovery sources.

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Field	Description
Every attribute doesn't match	Select if you want to retrieve CIs where there's a mismatch with every specified attribute value between the discovery sources.
Select attributes to compare	Specify the attributes that you want to compare for mismatched values.

8. Click **Continue**.
9. Select your discovery sources that you want to compare attribute values for.

Discovery sources form

Field	Description
Compare to CMDB	Select if you want to compare the specified attribute values against your CI attributes recorded in the CMDB. When you compare against the CMDB, you only need one discovery source.
Select discovery sources	The discovery sources that you want to compare. Select at least two.
Limit results to	Limits the query results to CIs that belong to a service or CMDB group. When you select **Application Services**, **Technical Services**, or **CMDB Groups**, a prompt appears. You can use the prompt to specify the service or group that you want the query to filter for.

10. Click **Continue**.
11. Enter a name and description for your query.
12. Click **Save** .

What to do next

Run the query at least once if you want to create a schedule.

On the CMDB 360 Query Results page:

- If the number of results exceeds the number of results appearing on the page:
  - Click **Load More Results**: To show the next page of results. The number of results that appear on each result page is specified by the glide.identification_engine.multisource.query.batch.limit system property (100 items by default).
  - Click **Load All Results**: To show all results, up to the limit specified by the glide.identification_engine.multisource.query.max.limit system property (10000 by default).
  - Click a CMDB 360 Source link to easily access preview data of a source and see more details.
- You can click **Create Schedule** to set up a schedule that runs your query on a regular basis. Scheduling your query enables you to use the query results in reports you create.
- After creating a schedule, you can click **Create Report** to configure a report that you can manage using Reporting capabilities .
- On the Query Results page, access a record to view further details.

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Schedule a CMDB 360 query for a report

Set up a schedule to regularly query for CMDB 360 data. Use scheduled queries to provide CMDB 360 data to reports you create, which can provide insight into how discovery sources populate the Configuration Management Database (CMDB) and the reliability of those discovery sources.

Before you begin

Ensure that you run the CMDB 360 query at least once.

Role required: sn_cmdb_user and either cmdb_ms_admin or cmdb_ms_editor.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace menu bar, select **CMDB 360**.
3. On the Saved queries tile, create or access a CMDB 360 query.
   If you created a new query, you must run the query at least once before you can click **Create Schedule** on the query results page.
4. Select **Schedule query** on the Results Layout page of the query.
   To create a schedule for the Compare attributes values query, select **Schedule query** on the Discovery Sources page.
5. Specify a **Run** frequency and time you want to schedule the query to run.
   When you select Weekly or Monthly, you must also select a day of the week or calendar day, respectively.
6. Click **Save**.

What to do next

Create a CMDB 360 report to integrate CMDB 360 query results with platform Reporting capabilities. Each run of the query automatically updates the generated report.

Related topics

- Create a CMDB 360 Get Records query
- Create a CMDB 360 Find Gap query
- Create a CMDB 360 Compare Attribute Values query

Exclude classes from CMDB 360

Prevent CMDB 360 from collecting, storing, and analyzing data for classes for which it isn't needed. CMDB 360 processes large amounts of data. Therefore, excluding classes can help improve the performance of the Multisource Dashboard Analytics Population scheduled job and of CMDB 360 queries.

Before you begin

Role required: cmdb_ms_admin (automatically included in the CMDB Admin role)

About this task

To exclude classes from CMDB 360, you must directly manage records in the CMDB 360 denied classes [cmdb_multisource_deny_class] table. For each class that you want to exclude, add an active record for that class. Excluding a class from CMDB 360 also automatically excludes any of its descending classes. In the base system, the CMDB 360 denied classes table is populated by default with some classes, such as dscy_net_base and discovery_net_base.

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Procedure

1. Select **All** and then, in the Filter navigator, enter `cmdb_multisource_deny_class.list` to open the CMDB 360 denied classes table.
2. Select **New** and then fill out the form.
   - Select the class to exclude (with its descendents) in the field labeled **Deny this class and all extended classes from this class to store CMDB 360 data**.
   - Ensure that **Active** is selected. If **Active** isn't selected, then the specified class isn't excluded from CMDB 360.
   - Select **Submit**.

Result
Existing data for the specified class and its descending classes will be gradually removed from the CMDB 360 Data [cmdb_multisource_data] table using record cleaners, without any impact to the system.

What to do next
You can deselect **Active** or completely delete a record for a class that you want to include in CMDB 360 data collection.

Recompute CI attribute values

Modify reconciliation rules, or exclude a discovery source which is found to be invalid. Then, use the updated reconciliation rules in recomputing CI attribute values, for which those reconciliation rules or discovery source are applicable to.

Before you begin
Enable and configure CMDB 360.

If you want to recompute to apply updated reconciliation rules, then you must first update the reconciliation rules.

Role required: itil_admin or sn_cmdb_admin

About this task
CMDB 360 automatically generates a recompute task for each recompute that you submit. If you submit multiple recomputes, a recompute task is generated for each operation, but only one task runs at any given time. To list all recompute tasks, enter `cmdb_multisource_recomp_task.list` in the left navigation search box.

There is a maximum number of records that can be included in a single recompute operation. This number is specified by the system property glide.identification_engine.multisource.recompute.max.ci.limit (100,000 by default).

Note:

- Recompute skips CIs which are reported by multiple discovery sources, but with different class names.
- Recomputing CI attribute values is not supported with non-CMDB tables.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select a class from the CI Classes hierarchy list.
3. In the left-side pane, expand **Class Info**, and select **Reconciliation Rules**.

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4. On the Reconciliation Rules page, click **Recompute**.
5. Select the **Recompute Type**.
   - **Replace values from the specified discovery source with value from the discovery source next in priority, according to reconciliation rules**: Recompute attribute values for the class CIs, applying priorities specified in reconciliation rules and while excluding the specified **Discovery Source**. Records for the discovery source you are excluding, are also removed from the CMDB 360 data store.

     This operation applies to data that exists in the CMDB. If reconciliation rules remain in effect for the discovery source that you have excluded, then future data from that discovery source, can populate the CMDB.
   - **Apply updated reconciliation rules**: Recompute attribute values for the class CIs, applying the updated reconciliation rules which are now in effect.
6. Select the **Recompute Scope**.
   The scopes grow from one option to the next:
   - **Recompute only CIs of this class**: Basic scope of CIs to recompute.
   - **Recompute CIs of this and derived classes**: Expand the basic scope to include CIs from derived classes.
   - **Recompute CIs of this and derived classes, along with selected related items**: Expand the previous scope to also include CIs from specified related items. Select the related items to include in the recompute.
7. Select the **Delete action** for CIs for which the excluded discovery source, is the only discovery source.
   - **Delete record**: Delete the CI record from CMDB.
   - **Set record attributes to custom value**: Set a specified CI attribute to a custom value to remove the CI from regular operations without deleting the CI. For example, set the *`Operational status`* attribute to *`Retired`*.
8. Select **Next**.
9. On the Review page, carefully review the counts for the affected CIs to ensure that all record counts are as you expect.
10. Select **Back** to adjust any settings for the recompute.
11. Select **Recompute**.

What to do next

You can do any of the followings:

- In the status message that appears for the recompute operation, click the link to see the CMDB 360 Recompute Task for more details. The Recompute Task shows the progress and status of the recompute operation.

  You can abort the recompute by setting **Status** to **Closed Incomplete** and selecting **Update**. You can then set **Status** back to **Work in progress** to resume recompute from where it was aborted.
- Enter `cmdb_multisource_recomp_task.list` in the left navigation search box, to see the status and progress of all recompute tasks.

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Multisource Report Builder (legacy)

Improve CMDB data management by querying and reporting on Multisource CMDB data. Use the Multisource Report Builder to gain insights about how discovery sources are populating the CMDB and their reliability. You can then adjust reconciliation rules to improve the quality of CMDB data, if needed.

CMDB 360 in CMDB Workspace

Starting with the Washington DC release, the Multisource CMDB feature is part of the CMDB 360 feature which is accessible in the CMDB Workspace. Create, view, modify, schedule, create reports, and run CMDB 360 queries using the CMDB 360 query builder in the CMDB Workspace store app. Use the CMDB 360 query builder to create queries of the following types:

- Get Records: Queries your discovery sources for CIs that match your criteria.
- Find Gap: Queries for gaps in discovery sources reporting your CMDB 360 data. Queries discovery sources that report CIs against discovery sources that don't report those same CIs.
- Compare Attribute Values: Queries for CIs with attribute values that differ across multiple discovery sources or against the CMDB. Queries at least two discovery sources and/or the CMDB for CIs that match your criteria.

Legacy Multisource Report Builder

Instead of using the CMDB 360 query builder in CMDB Workspace, you can still use the legacy Multisource Report Builder as described in this topic.

After you create a Multisource query in the Multisource Report Builder, you can run the query to see the results. You can then also create a Multisource report that integrates the Multisource query results with the platform Reporting capabilities. High level steps for creating a Multisource report:

1. Create a query, then save and run it.
2. Create a schedule for the query.
3. Create a Multisource report that is based on the Multisource query.

You can create queries that find:

- All the discovery sources populating data in your CMDB.
- CIs not reported by any discovery source.
- All CIs discovered by one discovery source, but not by another discovery source.

You can create other queries that show differences in CI attribute values between multiple data sources, while being compared to the CMDB:

- Show how an attribute value is different between a discovery source and the current CMDB record. For example, find Hardware CIs with different location than what SCCM reports.
- Show how an attribute is different between SourceA, SourceB, and SourceC. For example, show all Computer CIs where RAM is different between SCCM, ServiceWatch, and CMDB.

You can show query results by CI records, Multisource CMDB data records, or discovery sources. You can also limit the report results to CIs within a specific application service, technical service, or a CMDB group.

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Create a Multisource query in the legacy Multisource Report Builder

Query the Multisource CMDB data to gain insights about how discovery sources are populating the CMDB, and then use that query to create a Multisource data report.

Before you begin

Enable and configure CMDB 360.

Role required: cmdb_ms_editor

About this task

The Multisource Report Builder page updates dynamically as you set fields. Therefore, some of the fields that are described in the steps below might not appear.

Procedure

1. Navigate to **All** > **Configuration** > **Multisource Report Builder**.
2. On the Multisource Report Builder page, select a query to edit or run, or click **New**.
3. Enter **Name** and **Description** for the query.
4. Select the **Result type** for the query.
   - **CI records**: Results show unique CIs from the Multisource CMDB data store.
   - **Multisource data records**: Results show all entries of CI/discovery source combinations from Multisource CMDB data.
   - **Discovery sources**: Results are grouped by discovery sources that match the query criteria.
5. Select **Only show difference** to show differences in CI attribute values and then select the **Type of difference**.
   - **Between CMDB record and discovery source**: Show differences in attribute values between the CMDB data and the specified discovery sources.
   - **Between discovery sources**: Show differences in attribute values between specified discovery sources based on Multisource data.
6. Select the **Class** to apply the query to, or select **All Classes** to apply the query to all classes. Use the condition builder to specify conditions that must be met for the class. Use **And** or **Or** to specify multiple conditions.
7. Use the slushbucket to select one or more **Discovery source** items to query on.
8. Set **Field to compare** to the class attributes for which to show differences. Use the OR and AND operators to compare based on multiple attributes.

   The list of attributes is a pre-populated subset of the class attributes, to which you cannot add or remove items.
9. Set **Limit results to** to limit the query results to CIs that belong to a specific application service, technical service, or a CMDB group.
10. Click **Save** and then click **Run**.

What to do next

- On the CMDB Multisource Query Results page:
  - If the number of results exceeds the number of results appearing on the page:
    - Click **Load More Results**: To show the next page of results. The number of results that appear on each result page is specified by the glide.identification_engine.multisource.query.batch.limit system property (100 items by default).

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- Click **Load All Results**: To show all results, up to the limit specified by the glide.identification_engine.multisource.query.max.limit system property (10000 by default).
- Click a Multisource CMDB value link or a CI value link to access the respective records and see more details.

  - In the Configuration Item column, click a CI link to open the CI form. In the Related Links section on the CI form, click the **Multisource Data** tab to show Multsource data, such as discovery sources, related to the CI.

- Create a schedule for the query and ensure that the schedule runs at least once. This step is required for creating a Multisource report.

> **Note:**
> Initially, after creating a query, both the **Create Schedule** and the **Create Report** buttons are grayed out. Only after saving the query, you can create and run a schedule for the query, and only then you can create a report that is based on the query.

Schedule a Multisource query

After saving and running a Multisource query, create a schedule for the query to run automatically on a set schedule. Query results are stored in a results table and you can configure email addresses for the results to be sent to or include the results in CMDB dashboards.

Before you begin

The query for the schedule must be already saved and run at least one time.

Role required: cmdb_ms_user

Procedure

1. Navigate to **All** > **Configuration** > **Multisource Report Builder**.
2. On the Multisource Report Builder page, select the query that you want to create a schedule for.
3. On the Multisource Report form, click **Create Schedule**.
4. On the Scheduled Email of Multisource Report Builders, click **New**.
5. Fill in the Scheduled Email of Multisource Report Builders form.

Field	Description
Query	Saved query that was created in Multisource Report Builder.
Users	Users to email the query results to.
Groups	User groups to email the query results to.
Run Time	Frequency and time to run the query automatically. When you set **Run** to **On Demand**, the query runs only when you run it manually.
Email addresses	More ad-hoc email addresses to email the query results to.

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Field	Description
Subject	Text that will appear as the subject of the email with the query results.
Introductory message	Text that is included in the body of the email with the query results.
Type	Type of the file with the query results, which will be attached to the email.
Zip output	Enables zipping of the results file.
Conditional	Enable a condition for running the query and specify the condition in the **Condition** field. If the specified condition isn't met, the query doesn't run.
Condition	Condition that must be met for the query to run (Java script). Appears only if **Conditional** is selected.
Omit if no records	Disable sending an email for a query run that returns no results.

Note:
When using update sets to port Multisource schedules from a non-production to a production environment, check the **Users** and **Groups** settings in the schedule. Any user or group that doesn't exist in the production environment, and which needs to receive the query results, must be re-added in either of the following ways:

- Manually created in the production environment. In this case, you must also remove the invalid user or group in the production environment (ported from non-production environment) from any schedules and add the new user or group instead.
- Explicitly ported from the non-production to production environment.

6. Click **Submit**.

What to do next

- If **Run** is set to **On Demand** in a schedule, or if you need to run a query randomly even if it has a recurring schedule, you can manually run that query as follows:
  1. Navigate to **All** > **Configuration** > **Multisource Report Schedules**.
  2. In the Scheduled Email of Multisource Report Builders list view, select the query that you want to run.
  3. On the Scheduled Email of Multisource Report Builder form, click **Execute Now**.
- Create a Multisource report for the query, that integrates the Multisource query results with the platform Reporting feature.

Create a report based on a Multisource (CMDB 360) query

After creating, saving, running, and scheduling a Multisource (CMDB 360) query, you can create a Multisource (CMDB 360) report that integrates the query results with the platform Reporting feature. You can for example, include such Multisource (CMDB 360) report in the platform CMDB dashboards.

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Before you begin
The Multisource (CMDB 360) query for the report must be already saved, have a schedule, and must have already run at least once.

Role required: cmdb_ms_user

About this task
Creating a report that is based on a Multisource (CMDB 360) query, creates a report source which you can then manage using Reporting capabilities.

> **Note:**
> If you are using the CMDB 360 view in CMDB Workspace to generate the CMDB 360 query and the report, you can skip to step 4 in the procedure below.

Procedure
1. Navigate to **All** > **Configuration** > **Multisource Report Builder**.
2. In the Multisource Report Builder list view, select the query that you want to create a schedule for.
3. On the Multisource Report form, click **Create Report**.
4. On the Create a report form, click **Save** or **Run**.

Trouble?
A report shows the results for the most recent query run. If meanwhile the query has changed, then the report shows results that are out of synchronization with the query. When you update the query, ensure to immediately run the updated query so that the report is synchronized with the query.

What to do next
To add a Multisource (CMDB 360) report to the CMDB Correctness Dashboard for example, see Add a report to a dashboard.

Sample Multisource CMDB queries
Use sample queries to create your own Multisource CMDB queries.

Discrepancy in multiple attributes between multiple discovery sources

Field	Setting
Name	Discrepancy in multiple attributes between multiple discovery sources (discovery source vs. discovery source)
Description	Find Linux servers with name containing "backup" which have discrepancy in *`Disk Capacity`* OR *`CPU Count`* OR *`Serial Number`* between discovery sources ServiceNow/ServiceWatch/SCCM/Tivoli.
Result type	Multisource data records
Only show difference	Selected
Type of difference	Between discovery sources
Class	Linux Server [cmdb_ci_linux_server]

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Discrepancy in multiple attributes between multiple discovery sources (continued)

Field	Setting
Conditions	[Name] [contains] [backup]
Discovery Source	ServiceNow/ServiceWatch/SCCM/Tivoli
Field to compare	*Disk Capacity* OR *CPU Count* OR *Serial Number*
Limit results to	All

Discrepancy in multiple attributes between CMDB record and discovery sources

Field	Setting
Name	Discrepancy in multiple attributes between multiple discovery sources (CMDB vs. discovery sources)
Description	Find Linux Servers with name containing "backup" which have discrepancy in *Disk Capacity* AND *CPU Count* AND *Fully Qualified Domain Name* for discovery sources ServiceNow/ServiceWatch/SCCM
Result type	Multisource data records
Only show difference	Selected
Type of difference	Between CMDB record and discovery source
Class	Linux Server [cmdb_ci_linux_server]
Conditions	[Name] [contains] [backup]
Discovery Source	ServiceNow/ServiceWatch/SCCM
Field to compare	*Disk Capacity* AND *CPU Count* AND *Fully Qualified Domain Name*
Limit results to	All

Servers discovered by ServiceNow but not by Tivoli

Field	Setting
Name	Missing Discovery by Tivoli
Description	Servers discovered by ServiceNow but not by Tivoli
Result type	CI records
Class	Server [cmdb_ci_server]
Discovery Source	[is] [ServiceNow] [is not] [Tivoli]
Limit results to	All

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All discovery sources for backup servers

Field	Setting
Name	Discovery Sources Backup Servers
Description	All discovery sources for backup servers
Result type	Data sources
Class	Server [cmdb_ci_server] and class condition: [Host name][starts with][backup]
Limit results to	All

All Multisource CMDB records where the reported value of Location is different between Altiris and Tivoli discovery sources

Field	Setting
Name	Compare Location-Altiris vs. Tivoli
Description	List all Multisource CMDB records where the reported value of Location is different between Altiris and Tivoli discovery sources
Result type	Multisource data records
Only show difference	Selected
Type of difference	Between discovery sources
Discovery Source	• Altiris • Tivoli
Field to compare	Location
Limit results to	All

All Multisource CMDB records for Linux Server, where the Location value is different than the reported value by Tivoli

Field	Setting
Name	Linux Server Location - Diff than Tivoli value
Description	All Multisource CMDB records for Linux Server, where the Location value is different than the value reported by Tivoli.
Result type	Multisource data records
Class	Linux Server
Only show difference	Selected
Type of difference	Between CMDB record and discovery source

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All Multisource CMDB records for Linux Server, where the Location value is different than the reported value by Tivoli (continued)

Field	Setting
Discovery Source	[is][Tivoli]
Field to compare	Location
Limit results to	All

Components related to CMDB 360

Several types of components are related to CMDB 360 (included in the com.snc.cmdb plugin), such as tables and properties.

Properties

Open the CMDB 360 Properties page by navigating to **All** > **Configuration** > **CMDB 360 Properties**. You can hover over the '?' icon for a property, to show property names.

You must have the cmdb_ms_admin role to modify property values.

Property	Description
glide.identification_engine.multisource_enabled	Enables CMDB 360. • Type: true | false • Default value: false • Location: CMDB 360 Properties page
glide.identification_engine.multisource_cmdb_ci_enabled	Enables capturing CMDB 360 data for CIs from CMDB classes (derived from the cmdb_ci class). • Type: true | false • Default value: true • Location: CMDB 360 Properties page
glide.identification_engine.multisource_non_cmdb_ci_enabled	Enables capturing CMDB 360 data for CIs from non-CMDB classes (not derived from the cmdb_ci class). For example, the Serial Number [cmdb_serial_number] class, or the Software instance [cmdb_software_instance] class.

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Property	Description
	• Type: true | false • Default value: false • Location: CMDB 360 Properties page
glide.identification_engine.multisource.query.batch.limit	Max number of items to show per query results page, in the CMDB 360 Report Builder. Changing the value of this property, might affect performance when running a query. • Type: numeric • Default value: 100 • Location: CMDB 360 Properties page
glide.identification_engine.multisource.query.max.limit	Max number of query results to show when you click **Load All Results** in the CMDB 360 Report Builder. Changing the value of this property, might affect performance when running a query. • Type: numeric • Default value: 10000 • Location: CMDB 360 Properties page
glide.identification_engine.multisource.recompute.max.ci.limit	Max number of CIs that can be included in a CMDB 360 recompute operation. • Type: numeric • Default value: 100000 • Location: CMDB 360 Properties page
glide.cmdb.logger.source.cmdb_multisource	Enable logging for CMDB 360. CMDB 360 logs are stored in the Log [syslog] table with *source* set to "cmdb_multisource".

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Property	Description
	• Type: string • Values: info, warn, error, debug, or debugVerbose • Location: Add to System Properties [sys_properties] table.

sn_cmdb_ws.ms.calculate_cmdb_only	Limits the scope of data in the Coverage tile in the CMDB 360 dashboard in CMDB Workspace, to CMDB classes only (derived from the cmdb_ci class).
	• Type: true | false
	• Default value: true
	• Values:
	  ○ True: Include data only from CMDB classes.
	  ○ False: Include data from CMDB and non-CMDB tables.
	• Location: Add to System Properties [sys_properties]

sn_cmdb_ws.ms.report_class_ci_count_max_threshold	Threshold number of multisource records that when exceeded for a class, CMDB 360 Coverage charts in CMDB Workspace stop populating data for that class (CMDB or non-CMDB tables). When the specified threshold number is reached for a class, the system creates a record in the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table causing that class to be skipped in future job runs. **Note:** Managing class inclusion in the Coverage charts, by using this system property and the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table, can greatly decrease or increase performance of the Coverage chart job.

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Property	Description
	• Type: numeric • Default value: 10 million • Location: Add to System Properties [sys_properties] • Learn more: CMDB 360 experience in CMDB Workspace

Tables

Table	Description
CMDB 360 Data [cmdb_multisource_data]	CMDB 360 data store. Contains the raw data sent by all discov
CMDB MultiSource Column Metadata [cmdb_multisource_column_metadata]	Mapping of attributes for each class to floatable columns. Used performance of queries that involve high volumes of data.
CMDB Multisource Queries [cmdb_multisource_query]	CMDB 360 query definitions created by the user in CMDB Wor the legacy Multisource Report Builder.
Query Status [cmdb_multisource_query_status]	State of execution, of queries created in CMDB Workspace or i Multisource Report Builder.
CMDB Multisource Query Results [cmdb_multisource_query_result]	Results for queries created in CMDB Workspace or in the legac Report Builder, configured with result type of CI records.
CMDB Multisource Query Result Multisource Records [cmdb_multisource_query_result_ms_record]	Results for queries created in CMDB Workspace or in the legac Report Builder, configured with result type of CMDB 360 record
CMDB Multisource Query Result Discovery Sources [cmdb_multisource_query_result_disco_source]	Results for queries created in CMDB Workspace or in the legac Report Builder, configured with result type of Discovery source
CMDB MultiSource Recompute Task CIs [cmdb_multisource_recomp_task_ci]	All Cis that are involved in a recompute operation.
CMDB Multisource Recompute Tasks [cmdb_multisource_recomp_task]	Recomputation requests and progress status.
CMDB 360 denied classes [cmdb_multisource_deny_class]	Classes that are excluded from CMDB 360 data collection and For any class with an active record, there won't be any data in t Data [cmdb_multisource_data] table.

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Table	Description
CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class]	Internally used to store records of classes for which the threshold number of multisource records, as set in the *sn_cmdb_ws.ms.report_class_ci_count_max_thi* property, has exceeded. Classes in this table are excluded from charts in CMDB Workspace. You can set the *Override class CI records popula* column for an excluded class to 'true', to include it in Coverage computations. **Note:** Managing class inclusion in the Coverage charts, by using this table and the *sn_cmdb_ws.ms.report_class_ci_count_max_* system property, can greatly decrease or increase perform Coverage chart job.

Roles

Role	Description
cmdb_ms_read	Can access and run a CMDB 360 query but can't create a query. Contains cmdb_read role.
cmdb_ms_editor	Can create and run a query, has full read and write access, but can't do Recompute. Contains cmdb_ms_read role.
cmdb_ms_admin	Can create and run a query, and can modify CMDB 360 properties. Contains cmdb_ms_write role.

CMDB data management

The integrity and health of the CMDB is essential for the various features that depend on the data in the CMDB. As the CMDB grows and infrastructures change, the CMDB can accumulate stale, duplicate, or outdated CIs and therefore no longer accurately reflect the IT infrastructure and applications in the organization.

The CMDB Data Manager is an essential tool where you can create, publish, and manage policies that reflect organizational needs for data management. The CMDB Data Manager is a comprehensive and integrated solution, which scales to large CMDBs. It supports bulk management of CI life cycle operations such as deletion, archival, and attestation. Use the CMDB Data Manager to automate and govern CI life cycle operations to help maintain the CMDB in a healthy and efficient operational state.

Managing duplicate CIs is also an important data management task that helps maintain the health of the CMDB.

Working with CMDB Data Manager

CMDB Data Manager is a policy-driven framework for bulk management of CI life cycle operations such as deletion, archival, and attestation. The CMDB Data Manager is a comprehensive and integrated solution, which scales to large CMDBs and copes with rapid changes in a cloud-based world.

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Large CMDBs can over time accumulate large amounts of stale CIs that can impact overall performance. Custom mitigating solutions can be difficult to develop and to maintain, and are also prone to errors. The CMDB Data Manager is the tool where you can create, publish, and manage policies. Create policies to automate and govern CI life cycle operations to help maintain the CMDB in a healthy and efficient operational state.

Use the CMDB Data Manager to create policies that represent your organizational processes for managing the life cycle of CIs such as:

- Retire all computers without owners, which were created more than a year ago ('Retire' policy type).
- Archive all Linux servers in the Seattle datacenter which haven't been updated for six months ('Archive' policy type).
- Delete all containers, which haven't been discovered in the past week ('Delete' policy type).
- Attest all the CIs in a specified location (Attestation policy type).
- Approve cascade-delete, archive, or retire life cycle tasks generated by dependent CI management.
- Delete orphan, stale, or irrelevant records in non-CMDB related tables. The non-CMDB Related tables in the Related Entry [cmdb_related_entry] table have references to CMDB tables. A CI in a related table can, for example, become orphan if the referenced CI in the CMDB is deleted ('Delete CMDB Related Entry' policy type).
- Certify that attributes have a specific value required for the business.

You can apply CMDB Data Manager policies only to classes that extend the Configuration Item [cmdb_ci] table.

CMDB Data Manager experience in CMDB Workspace

You can use the CMDB Workspace landing page and its views to fully administer CMDB Data Manager, access high-level analytic and counts for its policies and tasks, and review your tasks. For information about using the CMDB Data Manager in CMDB Workspace, see CMDB Data Manager experience in CMDB Workspace.

CMDB Data Manager on Core UI (UI 16)

Starting with the Washington DC release, CMDB Data Manager on Core UI (UI 16) is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported. CMDB Workspace provides the latest experience for this functionality.

CMDB Data Manager built on Core UI (UI 16) is available by navigating to **All** > **Configuration** > **CMDB Data Manager**. For information about using the CMDB Data Manager legacy build on Core UI, see CMDB Data Manager on Core UI (UI 16).

Terms

Policy

A CMDB Data Manager policy captures the overall management plan for a life-cycle event, such as CI retirement. A policy is associated with a subflow (the policy subflow) which creates the tasks (the policy tasks) for the target CIs of the policy. A policy is configured with a policy type and the policy tasks perform operations associated with that policy type, such as archiving or deleting a CI record. Also, you can configure a policy to require an approval.

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The policy type, policy subflow, and the policy tasks, are all aligned to a specific life cycle event of CIs. For example, a policy set with the delete policy type, is associated with the delete subflow, and its policy tasks handle the deletion of CIs.

A daily scheduled job processes all published CMDB Data Manager policies.

Policy subflow

The policy subflow contains the underlying logic to process a life cycle event such as retire or delete. If the policy is configured to require approval, then the policy subflow runs only after a policy task is approved.

The base system provides several common subflows, such as delete, archive, and retire, which you can use with policies. You can also create custom subflows that are needed in the organization.

Policy task

A separate task is created and assigned to each unique *`Managed By Group`* value within the set of target CIs in a policy. A policy task triggers the policy subflow, tracks the set of target CIs for the task, and handles the approval of the task, if necessary.

If a policy requires an approval, the policy tasks don't trigger the policy subflow until a member of the group assignment in the *`Managed by Group`* attribute of the target CIs, approves the tasks. If a task is rejected or if the *`Managed by Group`* attribute is empty, the task is assigned to an administrator who must manually intervene to resolve the task.

If a policy isn't configured to require an approval, then the policy tasks are automatically approved.

CI exclusion list

A set of CIs to which policies of a specified type don't apply.

Policy types

You can create policies of the following types:

Delete

Use to remove a CI from its current table with no option to restore the CI into an active state.

Retire

Use to retire a CI while keeping the CI active in list views and in processes such as CMDB Health.

Attestation

Use to assign and process attestation tasks that verify the existence of actual IT infrastructure and applications that you own. As CIs are continuously ingested into the CMDB from various data sources, attesting CIs support the integrity of the CMDB. For more information about using the Attestation policy type, see CIs attestation.

Archive

Use to remove a CI from its current table and store the CI in a separate archive table for temporary retention. Archiving a CI excludes the CI from views and from features such as maps and the relations formatter. During the retention period, you can restore CIs into active state. At the end of the retention period, archived CIs are deleted from their archive table.

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Delete CMDB Related Entry

Use to clean up any irrelevant or stale data from related tables to help keep CMDB data healthy and relevant as the state of referenced CIs change.

Related tables, such as the Serial Number [cmdb_serial_number] table, aren't part of the CMDB hierarchy but still qualify as CMDB data. Related tables don't inherent from the Configuration Item [cmdb_ci] table, but have at least one column that references a CMDB CI. Related tables are specified in the Related Entries [cmdb_related_entry] table.

Certification

Use to certify that specific attributes are of a specific value.

You can implement your Retire, Delete, and Archive policies so that they follow Common Service Data Model (CSDM) standards where for example, CIs are archived and deleted only when a CI is already in retired state. When you create these life cycle policies, the system applies processes to manage any dependent CIs that might be left behind. For more details about these processes and about verifying that the feature is enabled, see Dependent CIs management.

ServiceNow AI Platform® data archiving

The functionality that the Archive policy type in CMDB Data Manager provides, relies and extends the ServiceNow AI Platform® data archiving feature, applied specifically for CMDB CIs. While processing an Archive policy to archive CMDB CIs, CMDB Data Manager uses components and processes of ServiceNow AI Platform® data archiving in the following ways:

- The Archive Rule [sys_archive] table contains the ServiceNow AI Platform® archive rules including the *`Archive Configuration Items`* CMDB archive rule which CMDB Data Manager Archive policies use.
- Data Manager relies on the *`Archive`* scheduled job to run (every hour by default) and process CMDB Data Manager archive policies. The *`Archive`* scheduled job is stored in the Schedule Item [sys_trigger] table.
- In the ServiceNow AI Platform® table Archive Job Execution Chunks [sys_archive_run_chunk], the *`Keys`* attribute contains the sys_ids of the CMDB CIs to be archived (where Rule ID is the CMDB archive rule ID).

- Archived records are stored in the ServiceNow AI Platform® archive tables, which are prefixed by 'ar_'. In a similar way, the first time that a CMDB archive job runs, it creates an archive table for each CMDB class (prefixed by 'ar_cmdb'). Therefore, that initial CMDB archive task takes longer than subsequent CMDB archive tasks.

  For each Data Manager archive policy, the system batches the policy CIs to be archived into batches of 1000 CIs. The sys_archive_run_chunk table contains a record per each of those batches.

  CMDB archive tables, such as ar_cmdb_ci_computer, are listed under **All** > **System Archiving** > **Archive Tables**.

When using the CMDB Data Manager to archive CIs, you can also directly apply ServiceNow AI Platform® data archiving features, such as restoring archived records during a CIs retention period.

Life cycle state rules and retirement definitions

Life-cycle state rules define the retirement state for classes in your organization and support the transition of CIs through life cycle stages when using the CMDB Data Manager. After retiring CIs,

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CMDB Data Manager configures the retired CIs according to the retirement definitions specified by life-cycle rules for the CIs class. Using a Retire, Archive, or Delete CMDB Data Manager policies requires that an active life-cycle rule exist for each targeted class in the policy. You can activate life-cycle rules in the base system to apply the default definitions, customize those rules, or add life-cycle rules for classes needed in your organization.

The life cycle state of a CI affects the CIs visibility and inclusion in ongoing CMDB processes:

- A retired CI isn't excluded from any views or processes such as CMDB Health.
- An archived CI no longer exists in its active table and instead it's stored in a separate archive table. Archived CIs are no longer visible or included in processes such as list views, maps, and relations formatters. Archived CIs can be retained for a specified retention period before being deleted from the archive table. During that retention period, archived CIs can be manually restored into an active state by using the ServiceNow AI Platform® feature to restore archived records.
- A deleted CI no longer exists in the table that it belonged to and there's no way to restore it into an active state. Deleting a CI is an irreversible operation.

For more information about accessing and managing life-cycle rules, see Life-cycle rules and retirement definitions.

Configure the environment for CMDB Data Manager

Prepare your environment for using the CMDB Data Manager:

1. Some policy types such as the life cycle policies Retire, Archive, and Delete, require that an active life cycle rule exists for each targeted class in the policy. This requirement doesn't apply to all policy types. For example, this requirement doesn't apply to the Attestation policy type. If you attempt to create a policy of a policy type for which this requirement applies but isn't met, an error message appears and the operation fails.
2. You can streamline approval of policies by populating the *Manage by Group* attribute of CIs that you plan to target in policies. Use the CI Class Manager to populate that attribute for an entire class, in a single synchronization operation. For more information about this data synchronization, see Set the group for a CI or an entire class of CIs. If the *Managed by Group* attribute isn't populated for a CI, then the approval process is directed to the administrator.

CMDB Data Manager experience in CMDB Workspace

Use the CMDB Data Manager in CMDB Workspace to administer policies, CIs life-cycle and attestation tasks, view analytics about ongoing CMDB Data Manager processes, and to approve or reject assigned tasks.

CMDB Data Manager experience in CMDB Workspace

Use the CMDB Workspace landing page and its views to administer CMDB Data Manager, to access overall analytic and counts for its policies and tasks, and review your tasks:

- Use the Management view in CMDB Workspace to create and track policies, and to manage exclusion lists and retirement definitions.
- Use the Important actions tile on the CMDB Workspace landing page to access data attestation and life cycle approval tasks such as reassignment requests and unassigned overdue tasks. Drill down these task cards to see further details about the tasks.
- Use the My work tile on the CMDB Workspace landing page to access all open tasks, which are assigned to you, or to the group assigned in the *Managed by Group* attribute and which you're a member of. For CMDB administrators, any unassigned tasks are also included for

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reassignment. Review and process all tasks. Review and process attestation tasks by checking the physical existence of IT infrastructure or applications associated with the CIs in the tasks.

- Use the My Work view in CMDB Workspace to access attestation and non-attestation tasks that are assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager policies. Overdue attestation tasks appear in a separated **Overdue tasks** list.

Manage policies in CMDB Data Manager in CMDB Workspace:

- Create a CMDB Data Manager policy in CMDB Workspace
- Review CMDB Data Manager tasks in CMDB Workspace
- Review CMDB Data Manager attestation tasks
- Manage retirement definitions for CMDB Data Manager
- Manage exclusion lists for CMDB Data Manager in CMDB Workspace

Administer Data Manager in CMDB Workspace

As a CMDB administrator, you can create policies, manage CI attestation, manage CI exclusion lists, access CMDB Data Manager insights, and access subflows and settings that are used in the CMDB Data Manager.

Get started with CMDB Data Manager in CMDB Workspace

The Data Manager overview page provides a dashboard view of Data Manager tasks, and lets you get started in using the CMDB Data Manager.

Before you begin

Role required: sn_cmdb_admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. Select **Data Manager overview** in the left navigation bar.
   The Data Manager overview page provides the following cards:

   Open tasks

   Count of the open tasks created for Data Manager policies.

   Drill down the card to open a list view with details of the tasks associated with the card.

   Unassigned tasks

   Count of the open tasks created for Data Manager policies, which aren't assigned.

   Drill down the card to open a list view with details of the tasks associated with the card.

   Pending tasks

   Tasks in Pending state, such as archive tasks where archive is still being processed.

   Closed incomplete tasks

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Tasks that encountered errors while processing, resulting with the task not completing successfully. Such tasks are in a Closed Incomplete state.

Overdue tasks

Count of tasks with a due date, such as attestation tasks, whose due date has passed.

Aging tasks

A bar chart showing counts of tasks without a due date and with no activity for over the number of days specified by the *sn_cmdb_ws.glide.cmdb.data.manager.aging.policy.task.timeframe* system property (30 by default).

Policies failing evaluation

Policies whose evaluation failed at some point and are in an error state. These policies require your attention, and after resolving any issues, you can publish them again.

Workload

- Groups: Tasks that are assigned to a group.
- Individuals: Tasks that are assigned to individual users.

What to do next

- Create a CMDB Data Manager policy in CMDB Workspace.
- Manage retirement definitions for CMDB Data Manager.
- Manage exclusion lists for CMDB Data Manager in CMDB Workspace.
- View CMDB Data Manager analytics in CMDB Workspace.
- View properties and other settings for CMDB Data Manager by selecting **Settings** in the left navigation pane. For details about the system properties associated with those settings, see Components related to CMDB Data Manager.

Manage retirement definitions for CMDB Data Manager

Use CMDB Workspace to create, delete, edit, or activate a life-cycle rule to define the retirement state in your organization, for a class. Tables that are targeted in life-cycle CMDB Data Manager policies, must be associated with an active life-cycle rule. Target CIs in Retire policies, are set to match their associated class retirement definitions.

Before you begin

Role required: sn_cmdb_admin

For information about life-cycle rules used in CMDB Data Manager, see Life-cycle rules and retirement definitions.

About this task

Some life-cycle rules in the base system are inactive and you must activate any rule that you want to use with a CMDB Data Manager policy by setting its *Active* attribute to **true**. Life-cycle rules are stored in the CMDB Retirement Custom Definitions [cmdb_retirement_custom_definitions] table.

When CMDB Data manager retires a CI, ensure that any of its dependent CIs are also retired and don't remain as orphan CIs, by enabling management of dependent CIs. Orphan CIs can impact the consistency, accuracy, and integrity of the CMDB.

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- For information about enabling and managing dependent CIs, especially in the context of cascade-retire, cascade-archive, and cascade-delete, see Dependent CIs management.
- For details and definitions of independent and dependent CIs, see CMDB classifications and class dependency.

Note:

- Always be aware of the automatic derivation of retirement definitions throughout the class hierarchy. For example, an active retirement definition for the Configuration Item [cmdb_ci] class can potentially be in effect throughout the entire CMDB hierarchy (aside from classes with their own retirement definition).
- You can't deactivate (or delete) the retirement definition of the Configuration Item [cmdb_ci] class.
- Each CMDB class can be associated with only a single retirement definition.
- Regardless of where you manage retirement definitions, the definitions are used in both the Data Manager (Core UI) and Data Manager in CMDB Workspace.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select Management in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. In the Get started area on the Data Manager overview page, select **Manage retirement definitions**.
4. On the Data Manager settings page, review the Retirement definitions list view.
   a. **Optional:** Drill down to a definition and then on the Retirement definition form toggle the **Active** switch to activate or deactivate a definition.
   b. **Optional:** Edit the conditions on the definition.
   c. Select **Save definition**.
5. On the Data Manager settings page, select **Add definition**.
6. Fill out the Retirement definition form and then select **Save definition**.

Field	Description
Active	Toggles the retirement definition between being active and non-active.
Table	Table that the retirement definition applies to.
Condition builder	Condition that reflects on what retirement means in the organization. Target CIs in Retire policies that belong to the specified table, are set as specified in the retirement definition. Therefore, you can only use **AND** clauses in this definition while **OR** clauses aren't applicable.

Delete a CMDB Data Manager retirement definition

Delete a retirement definition that is no longer needed, in CMDB Workspace.

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Before you begin
The following restrictions are in effect:

- The retirement definition that you want to delete must be in an inactive mode (*Active* = **false**).
- The retirement definition for the Configuration Item [cmdb_ci] class can't be deleted.

Role required: sn_cmdb_admin, data_manager_admin

About this task

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select the **Data Manager** quick link on the Home view.
2. In the Get started area on the Data Manager overview page, select **Manage retirement definitions**.
3. On the Data Manager settings page, in the Retirement definitions tile select the retirement definition that you want to delete.
4. On the Retirement definition page, select **Delete definition**.
5. In the Deleted retirement definition dialog box, select **Delete**.

Result
After the deletion, a retirement definition for the class is derived from a parent class.

Manage exclusion lists for CMDB Data Manager in CMDB Workspace

Create and manage exclusion lists for the various policy types in CMDB Data Manager. Policies of the specified type won't target CIs and other records in the exclusion list for that policy type.

Before you begin
Role required: sn_cmdb_admin

About this task

Note:

- Regardless of where you manage exclusion lists, that same list is used in both the Data Manager (Core UI) and Data Manager in CMDB Workspace.
- The Certification policy type doesn't support exclusion lists.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select Management in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. Select **Excluded records** in the left-side bar.
   The Excluded records list view shows lists of all records currently excluded, grouped by policy type. You can expand any group to show its CIs and other records and then drill down to any record.
4. **Optional:** Remove excluded records from the exclusion list:
   a. Expand a policy type group to show its list of excluded records.
   b. In the list view, select the records that you want to remove from the exclusion list.

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c. Select **Remove from list**

d. In the Confirm removal from exclusion list dialog box, select **Confirm**.
The selected records are removed from the exclusion list and can be targeted for the policy type.

5. **Optional:** Add records to an exclusion list:

a. Select **Exclude Records** and fill out the Data Filter form.

Field	Description
Tables	Table from which to select CIs or records for the exclusion list.
Filter conditions	Use the condition builder to specify the criteria that CIs or records from the specified **Tables** must meet to be included in the exclusion list.
Related List Condition	Add a condition that is based on related lists that are associated with the records that you want to exclude.

b. Select **Apply filters** and then review the Search results list.

c. Select the records that you want to add to exclusion lists and then select **Continue**.

d. On the Select policy type page, select the policy types for which to exclude the selected records and then select **Continue**.

e. Review the details of the exclusion on the summary page and then select **Save**.

Create a CMDB Data Manager policy in CMDB Workspace

Create a CMDB Data Manager policy to automatically process CIs life cycle events such as deletion. Applying consistent and standard life cycle policies to CIs helps maintain the health of the CMDB.

Before you begin

- The life cycle policies Retire, Archive, and Delete, require that an active life-cycle rule exists for each targeted class in the policy. If you attempt to create a policy of a policy type for which this requirement applies but isn't met, an error message appears and the operation fails.
- Verify that any custom subflow that you want to associate with a policy exists:
  1. Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
  2. Select the **Data Manager** link in Management tools, in the Manage section.
  3. Select **Subflows** in the navigation bar on the left.
  4. Review the subflows on the Data Manager subflows page, and drill down to a subflow to open it in Flow Designer.
  5. Select **Create new subflow** to create a new subflow in Flow Designer.

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- To require a review and an approval for a policy task: Ensure that the *Managed By Group* attribute is populated in target CIs and that the assigned users have the privilege to approve the policy tasks.
- When Asset Management is activated, check if there's an asset record associated with that CI before retiring the CI. Check the associated asset record, if there's one, and verify that its asset state (install_status) is *Retired*.

Role required: sn_cmdb_admin

About this task

Specify for each policy a policy type, a subflow for life-cycle policies, a set of CIs to operate on as target CIs, and any other options specific to the selected policy type. Target CIs must typically be from classes extending the Configuration Item [cmdb_ci] table, and with the Delete CMDB Related Entry policy type, also tables in the Related Entries [cmdb_related_entry] table. However, the Certification policy type for example, also supports non-CMDB tables.

Set condition filters to specify the initial set of CIs that the policy applies to. You can then further narrow down the initial set of CIs by using a CI exclusion list for the policy type. During the final preview of the policy, or from a policy task, you can select individual CIs to also exclude for the policy type. In addition, for operations that require that CIs are in a retired state, retirement definitions in life-cycle state rules are enforced. The policy eventually applies to the resulting set of CIs, after applying all those filters.

Note:
CMDB Data Manager limits the number of target CIs per task to 10,000. Therefore, when a task exceeds that number, Data Manager automatically creates as many additional tasks as needed to include all the CIs for the task. For example, if you target 30,000 CIs in an attestation task, Data Manager breaks down that task into three tasks, each targeting 10,000 CIs.

For more information about life cycle state definitions and other concepts for working with the CMDB Data Manager, see Working with CMDB Data Manager.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select Management in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. Select **Policies** in the left-side bar.
   For information about the Policies page, see View CMDB Data Manager policies in CMDB Workspace.
4. Select **Create new policy**.
5. Fill out the General information form and then select **Continue**.

Field	Description
Name	Unique name for the policy.
Description	Description for the policy.
Policy Type	Life cycle event or data management action, such as Delete or Attestation, that this policy manages, indicating the type of actions to perform on target CIs.

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Field	Description
	Your **Policy Type** setting determines which fields appear in the forms that follow.
Work notes	Notes that are internal and visible only to administrators.

6. Fill out the Data Filter form.

   a. Fill out filter conditions for the target CIs and records for the policy.

Field	Description
Table	Table from which to select target CIs or records for the policy.
Filter conditions	Use the condition builder to specify the criteria that CIs from the specified **Table** must meet to be included as target CIs for the policy.
Related List Condition	Add a condition that is based on related lists that are associated with the target records for the policy.

   b. Select **Apply filters** and then review the results of the impact analysis.

   This analysis estimates the number of CIs that the policy applies to based on the policy filters, any CI exclusion lists, and the life cycle stage of CIs. For example:

   - If the policy type is retired, CIs that meet the policy filters but are already in a retired state according to the class retirement definitions, aren't targeted for the policy.
   - If the policy type is archive or delete, CIs that meet the policy filters but aren't retired according to the class retirement definitions, aren’t targeted for the policy. A filter on the *`Life Cycle Stage`* or the *`Life Cycle Stage Status`* attributes has no effect if the respective class retirement definition is based on those attributes.

   Review the lists in the following tabs:

   - **Included records**: You can select records to be excluded from the policy, and select **Exclude records**.
   - **Excluded records**: Select records to be included in the policy, and select **Include records**.

     Note:
     The Excluded records tab doesn't appear when the policy type is Certification.

   c. Select **Continue**.

7. Fill out the Assignment form and then select **Continue**.

   Set the **Assignment type** and then the **Task assignment** field that appears, to specify the type of assignment and the table columns to use for assigning the policy tasks. The drop-down

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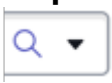
list in **Task assignment** is dynamically populated with columns in the table that the policy is created for, that reference **Assignment type** tables, as follows:

- **User Field**: Assigns policy tasks to a user in the user field specified in **Task assignment**. The drop-down list in **Task assignment** contains fields in the table set by the data filter, that reference the User [sys_user] table (such as *Attested by* and *Assigned to*).
- **User Group Field**: Assigns policy tasks to the user group in the user group field specified in **Task assignment**. The drop-down list in **Task assignment** contains fields from the table set in the data filter, that reference the Groups [sys_user_group] table (such as *Change Group* and *Support Group*).
- **Specific User**: Assigns policy tasks to the user specified in **Task assignment**. The drop-down list in **Task assignment** contains users with the *data_manager_user* role.
- **Specific User Group**: Assigns policy tasks to the user group specified in **Task assignment**. The drop-down list in **Task assignment** contains user groups that are either directly associated with the *data_manager_user* role, or contain at least one user with the *data_manager_user* role.

In the **User Group Field** and **User Field** you can use dot-walking by selecting the search icon for the field:  . In the selection dialog box, drill down lists by expanding or selecting list items that are links (usually appear in a unique text color).

8. Fill out the Options form and then select **Continue**.
   The options that appear depends on whether they are relevant to the selected policy type. Therefore, some of the following options don't appear on your form. For example, not all policy types are associated with a subflow.

Field	Description
Days to complete	Maximum number of days that policy tasks must be completed by. If notifications are enabled for certification or attestation tasks, then this number is used to calculate the milestones for sending notifications. The full time (100%) interval starts when a task is created and ends when the number of days to complete the task arrives. Notifications are sent if a task isn't closed when 50%, 70%, and 90% of that interval passes. For more information about setting those notifications, see Components related to CMDB Data Manager.
Subflow	A subflow with the actions that will run on the target CIs for the policy. The subflow typically matches the policy type. For example, if **Policy type** is set to **Delete CMDB Related Entry**, then set **Subflow** to **Delete Related Entry Configuration Item**.

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Field	Description
Needs review	Option to require a review and an approval of the policy tasks, by the group assignment in CIs' *Managed by Group* attribute or by an administrator. Otherwise, all policy tasks are approved automatically.
Retention time	The length of time for retaining archived CIs in the archive table before they're deleted. During the specified retention period, you can use the ServiceNow AI Platform® data archiving feature to restore archived CIs. **Note:** You can't use the CMDB Data Manager to re-archive a CI that was previously archived and restored.
Display fields	One or more fields that appear in list views in Data Certification tasks, that uniquely identify the records that require certification. The selected fields can't overlap fields in **Certification fields**.
Certification fields	One or more fields whose value requires verification and certification. The selected fields can't overlap fields in **Display fields**.
Allow field updates	Option to allow certification task reviewers to update field values while reviewing CIs. ○ When selected, certification task reviewers can update field values in order to certify a CI. ○ When clear, certification task reviewer can't update field values, and therefore reject CIs that aren't compliant.
Allow empty field values	Option to allow or disallow users to certify CIs with empty attributes: ○ When selected, certification task reviewers can certify or fail certification of a CI with an empty attribute. ○ When clear, certification task reviewers can fail certification of a CI with an empty attribute but aren't able to certify that CI.

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Field	Description
Instructions	Any instructions to assigned users, to help them complete the tasks.

9. Fill out the Schedule form and then select **Continue**.

Field	Description
Schedule	Recurring schedule for how often and when to run the task. The **On demand** option doesn't set any recurring schedule for running the policy. Your setting determines which other fields appear on the form.
Start time	Time in the day to start running the policy.
Day of the week	Day of the week to run the policy.
On	Day of the month to run the policy.
Start day and time	Date and time of first run of the policy.
Run after every	Interval (by days) between subsequent runs after running the policy for the first time.

10. Review the policy details on the Review form, and then select **Publish policy** to activate the policy or **Save & Exit** to save the policy as a draft.
You can later continue to configure a draft policy, and then publish it when it's ready.

Result

After you publish a policy:

- A daily scheduled job processes the published policy and policy tasks are assigned as set in the policy. If the policy is associated with a subflow, then policy tasks trigger the policy subflow. Policy execution issues are recorded in an error log with notifications sent to the CMDB Data Manager administrator.

  If the policy is configured to require an approval for its tasks, then email notifications are sent to members of the assignment group in the *`Managed by Group`* attribute of the CI. If the policy is associated with a subflow, then a policy task triggers the policy subflow only after the task is approved.

- If the policy is associated with a subflow, then after a policy task is complete, the policy subflow closes the task. For an Attestation policy (which isn't associated with a subflow), a user must process all CIs in the task and submit the task to close it.
- For Attestation policies, attestation tasks are assigned to users as specified, and those tasks appear in the CMDB Workspace when those users log in.
- For some policy types, such as Delete, the list of the target CIs is rolled up in a CSV file that is then attached to the task for tracking purposes.

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- Stale tasks are set to **Closed Cancelled** by a daily scheduled job. A task becomes stale when it's still open and not approved after at least 90 days. The number of days after which a task is considered stale is determined by the *cmdb.data.manager.stale.task.life.in.days* system property.

What to do next

- Publish a draft Data Manager policy in CMDB Workspace.
- On the Policies page, in the Published policies list view, select a policy to see policy details on a policy form. Select **View Policy** to see the settings in all of the policy form pages.
- On the Policies page, in the Published policies list view, select a policy that you want to deactivate. On a policy form select **Deactivate Policy** to temporarily prevent the policy from running.
- Click **View Open Tasks** in the Open Policy Tasks tile to track the processing of policy tasks in the CMDB Data Management Task Control list view. The Success Percent column shows the percentage of CIs in the task for which the task is completed. A CI is counted as complete in an archival task only after the archival process has been fully completed for the CI (and isn't counted as complete while the CI is initially staged for archival for example).
- Users log in to the CMDB Workspace to review and process attestation tasks assigned to them.
- Users log in to the CMDB Workspace to review and process non-attestation tasks assigned to them.

Publish a draft Data Manager policy in CMDB Workspace

If you created a draft Data Manager policy in CMDB Workspace, or imported legacy certification schedules, you can activate that draft policy by publishing it.

Before you begin

Role required: sn_cmdb_admin

Procedure

1. Navigate to **All** > **Workspaces** > **CMDB Workspace** and then select Management in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. Select Policies in the left-side bar in the Data Manager overview page.
4. Select the Draft policies list view on the Data Manager policies page.
5. Select the policy that you want to publish and then, on the policy form, select **Edit Policy**.
6. Review any policy settings by selecting the pages to review in the left-side bar.
7. Select Review in the left-side bar and then, on the Review form select:
   a. **Publish Policy** to activate the policy.
   b. **Save & Exit** to save any changes and keep the policy in draft mode.

What to do next

Deactivate a policy to temporarily prevent the policy from running:

1. On the Policies page, select the Published policies list view.
2. Select a policy that you want to deactivate.
3. On a policy form select **Deactivate Policy**.

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View CMDB Data Manager policies in CMDB Workspace

View Data Manager policies on a dashboard view, with a timeline of upcoming scheduled policies, counts, and grouped by policy status.

Before you begin

Role required: sn_cmdb_admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select Management in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. Select **Policies** in the left-side bar.

Select a tab on the Data Manager policies page:

- Published policies: Provides the following cards:

  Upcoming scheduled policies

  Timeline showing scheduled policies across time. On the timeline, you can:

  - Point to indicators to show details about a scheduled policy.
  - Zoom in or out to extend or shorten the time span of the timeline.
  - Go forward or backward in time.
  - Show or hid the timeline legend, where you can toggle the Attestation Policy switch to show or hide attestation policy indicators on the timeline.

  Policies

  Pie chart showing the breakdown of policies by policy type.

  Published policies

  List view of policies that are published. You can drill down a policy to show the policy form view with further details about the policy.

- Draft policies: Policies in draft state.
- De-activated policies: Policies that have been de-activated and therefore aren't active.
- Policies failing evaluation: Policies that are invalid and therefore require your attention.

What to do next

- Create a CMDB Data Manager policy in CMDB Workspace
- Manage retirement definitions for CMDB Data Manager

View CMDB Data Manager analytics in CMDB Workspace

The CMDB Data Manager in CMDB Workspace provides charts and counts that show the overall state of Data Manager policies in the organization. Review these details to track progress and to identify any problems that require your attention.

Before you begin

Role required: Role required: data_manager_admin or sn_cmdb_admin

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Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select Management in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. Select **Analytics** in the left navigation bar.
   The Data Manager analytics page provides the following charts:

   CIs processed by lifecycle policies

   Counts of CIs processed by each type of lifecycle policy type such as Delete and Archive, over the past six months.

   Average time to close tasks

   Average number of days it took to close tasks, by general policy type such as lifecycle and attestation, over the past six months.

   Closed complete vs closed incomplete tasks

   Number of tasks per month, that were closed complete and incomplete, over the past year.

   Policy execution time

   Number of policies per day, broken by the length of execution time, over the past month.

Review CMDB Data Manager tasks in CMDB Workspace

Review Data Manager tasks (such as life-cycle tasks) that are assigned to you, to an assignment group that you belong to, to people you manage, or to members of a group that you are the manager of. All in accordance with CMDB Data Manager policies. During the review, you can approve, cancel, reject, or reassign a task.

Before you begin

Role required: sn_cmdb_user, sn_cmdb_editor, or sn_cmdb_admin

About this task

To review attestation tasks, see Review CMDB Data Manager attestation tasks.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select **My Work** in the CMDB Workspace menu bar.
2. In the My tasks section, select the **All other tasks** tab.
3. Review the Approval tasks list view and then select the task that you want to process.
4. Review the task details on the task form.
5. **Optional:** CMDB administrators can select **Cancel task** if the task isn't needed.
   The canceled task is deleted without any further processing.
6. **Optional:** Select **Reassign** if the task isn't appropriately assigned.
   Then select **Assign to me** or **Request reassignment** as appropriate.
7. **Optional:** Select **Review records** to review the target CIs and records for the task.

   a. Select any records that you want to exclude for the task and then select **Exclude**.
   The records being excluded for the task are also being added to the exclusion list of the associated policy type. Therefore, these records will be excluded from any future tasks of the associated policy type.

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b. Select **Reassign** if the task isn't appropriately assigned.

c. Select **Reject task** to reject a task, fill in a **Reason for rejection** and then select **Save**.

(Optional) You can only reject a task that is assigned to you.

After you reject a task, the *State* of the task is set to **Closed Canceled** and *Approval* is set to **Rejected**. Also, appropriate notifications are sent to members of the group specified in the *glide.cmdb.data_manager.rejected.task.notification_group* system property. For more information about how this property is used for notifications, see Components related to CMDB Data Manager.

d. Select **Assign to me** or **Request reassignment** as appropriate.

e. Select **Approve task** to trigger the subflow associated with the policy.

CMDB Data Manager on Core UI (UI 16)

The CMDB Data Manager built on Core UI (UI 16) lets you centrally create, edit, review, publish, and track Data Manager policies and the tasks generated by the policies.

The landing page of the CMDB Data Manager (Core UI) provides a dashboard view of policies, excluded CIs, and open policy tasks. Access the open policy tasks that need attention from the management group or from the CMDB Data Manager administrator. Preview those tasks, and then approve or reject to continue the process.

Note:
Starting with the Washington DC release, CMDB Data Manager on Core UI (UI 16) is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported. CMDB Workspace provides the latest experience for this functionality.

Manage policies in the CMDB Data Manager (Core UI):

- Create a CMDB Data Manager policy
- Approve or reject a CMDB Data Manager task
- Review CMDB Data Manager attestation tasks
- Manage exclusion lists of CMDB Data Manager

To access the CMDB Data Manager (Core UI), navigate to **All** > **Configuration** > **CMDB Data Manager**.

Note:
Dependent CI management processes generate dependent CI policies for which CMDB Data Manager shows policy preview details that aren't relevant.

1. Select **View Policies** on the Policies tile on the CMDB Data Manager landing page.
2. Select **All** in the breadcrumbs string.
3. Select one of the following policies: 'Dependent CI - Deletion', 'Dependent CI - Archive', or 'Dependent CI - Retire'.
4. Select the Preview Policy tab on the policy form.

The data that appears on the Preview Policy page is irrelevant for any of those policies.

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Create a CMDB Data Manager policy

Create a policy in the CMDB Data Manager legacy build on Core UI (UI 16) to automatically process CIs life cycle event such as deletion. Applying consistent and standard life cycle policies to CIs helps maintain the health of the CMDB.

Before you begin

- The life cycle policies Retire, Archive, and Delete, require that an active life-cycle rule exists for each targeted class in the policy. If you attempt to create a policy of a policy type for which this requirement applies but isn't met, an error message appears and the operation fails.
- Ensure that any custom subflow that you want to associate with a policy, exists.
- To require a review and an approval for a policy task: Ensure that the *Managed By Group* attribute is populated in target CIs and that the assigned users have the privilege to approve the policy tasks.
- When Asset Management is activated, check if there is an asset record associated with that CI before retiring the CI. Check the associated asset record, if there is one, to ensure that the asset state (install_status) is *Retired*.

Role required:

- data_manager_admin: Full access to policies
- data_manager_user: Can read and preview policies

About this task

Specify for each policy a policy type, a life cycle subflow, and a set of CIs to operate on as target CIs. Target CIs must be from classes extending the Configuration Item [cmdb_ci] table, and with the Delete CMDB Related Entry policy type, also tables in the Related Entries [cmdb_related_entry] table.

Set condition filters to specify the initial set of CIs that the policy applies to. You can then further narrow down the initial set of CIs by using a CI exclusion list for the policy type. During the final preview of the policy, or from a policy task, you can select individual CIs to also exclude for the policy type. In addition, for operations that require that CIs are in a retired state, retirement definitions in life-cycle state rules are enforced. In these cases:

- CIs that meet the policy filters but aren't retired according to the class retirement definitions, aren’t targeted for the policy.
- A filter on the *Life Cycle Stage* or the *Life Cycle Stage Status* attributes has no effect if the respective class retirement definition is based on those attributes.

The policy eventually applies to the resulting set of CIs, after applying all those filters.

Note:
CMDB Data Manager limits the number of target CIs per task to 10,000. Therefore, when a task exceeds that number, Data Manager automatically creates as many additional tasks as needed to include all the CIs for the task. For example, if you target 30,000 CIs in an attestation task, Data Manager breaks down that task into three tasks, each targeting 10,000 CIs.

More information:

- About life cycle state definitions, see Working with CMDB Data Manager.
- About creating a policy in the CMDB Data Manager in CMDB Workspace, see Create a CMDB Data Manager policy in CMDB Workspace.

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Procedure

1. Navigate to **All** > **Configuration** > **CMDB Data Manager**.
2. On the CMDB Data Manager landing page, in the Policies tile, click **View Policies**.
3. In the CMDB Data Manager Policy and Attributes list view, click **New**.
4. Fill out the fields in the different sections on the **Define Policy** tab.

Note:
Some fields are applicable only to specific policy types. Therefore some of the following fields, might not appear for the policy type that you choose.

Field (General)	Description
Name	Unique name for the policy.
Task Assignment Group	Group to assign the task to.
Task Due In Days	Due date for completing the policy tasks such as attestation tasks.
Needs Review	Check to require a review and an approval of the policy tasks, by the group assignment in CIs' *Managed by Group* attribute or by an administrator. Otherwise, all policy tasks are approved automatically.
Policy Type	Life cycle event or data management action, such as Delete or Attestation, that this policy manages, indicating the type of actions to perform on target CIs.
User Group	Group to use as the task assignment group for the Delete CMDB Related Entry policy type. The list is a subset of user groups from the Group [sys_user_group] table, where at least one member has a data_manager_user role.
Apply Retention Time	The length of time for retaining archived CIs in the archive table before they are deleted. During the specified retention period, you can use the ServiceNow AI Platform® data archiving feature to restore archived CIs.

Field (Condition Filter)	Description
Related Entry Table	The related table to apply a Delete CMDB Related Entry policy. The list contains related tables from the Related Entry [cmdb_related_entry] table.

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Field (Condition Filter)	Description
Condition Filter	Criteria that CIs must meet to be included for the policy as target CIs. Additional filtering such as a CI exclusion list, can further narrow down the set of target CIs.

Field (Action)	Description
Subflow	A subflow with the actions that will run on the target CIs for the policy. The subflow typically matches the policy type. For example, if **Policy type** is set to **Delete CMDB Related Entry**, then set **Subflow** to **Delete Related Entry Configuration Item**. **Note:** The Attestation policy type is not associated with a subflow.

Field (Schedule)	Description
Frequency	How often to run the task.
Start Time	Time to start running the task when it is due to run.

5. **Optional:** Click **Run filter** in the Condition Filter section, to see the resulting list of CIs that match the condition filters.
6. Click **Save**.
7. Click **Preview** and wait for an impact analysis for the policy on the **Preview Policy Impact** page to complete.
   This analysis estimates the number of CIs that the policy applies to based on the policy filters, any CI exclusion lists, and the life cycle stage of CIs. For example:
   - If the policy type is retired, CIs that meet the policy filters but are already in a retired state, are not targeted for the policy.
   - If the policy type is archive or delete, CIs that meet the policy filters but are not retired, are not targeted for the policy.
8. **Optional:** Select CIs in the target CIs list that you want to also exclude for the policy type. Click **Exclude CI** and then click **Recalculate Preview** to recalculate the data on the preview page.
9. Click **Publish** to activate the policy.
   Unpublished tasks are saved as draft policies.

Result

After you publish a policy:

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- A daily scheduled job processes the published policy and policy tasks are assigned as set in the policy. If the policy is associated with a subflow, then policy tasks trigger the policy subflow. Policy execution issues are recorded in an error log with notifications sent to the CMDB Data Manager Administrator.

  If the policy is configured to require an approval for its tasks, then email notifications are sent to members of the assignment group in the *Managed by Group* attribute of the CI. If the policy is associated with a subflow, then a policy task triggers the policy subflow only after the task is approved.

- If the policy is associated with a subflow, then after a policy task is complete, the policy subflow closes the task. For an Attestation policy (which is not associated with a subflow), a user must process all CIs in the task and submit the task to close it.
- For Attestation policies, attestation tasks are assigned to users as specified, and those tasks appear in the CMDB Workspace when those users log in.
- For some policy types, such as Delete, the list of the target CIs is rolled up in a CSV file that is then attached to the task for tracking purposes.
- Stale tasks are set to **Closed Cancelled** by a daily scheduled job. A task becomes stale when it is still open and not approved after at least 90 days. The number of days after which a task is considered stale is determined by the *cmdb.data.manager.stale.task.life.in.days* system property.

What to do next

- Click **View Open Tasks** in the Open Policy Tasks tile to track the processing of policy tasks in the CMDB Data Management Task Control list view. The Success Percent column shows the percentage of CIs in the task, for which the task is completed. A CI is counted as complete in an archival task only after the archival process has been fully completed for the CI (and isn't counted as complete while the CI is just staged for archival for example).
- Users log in to the CMDB Workspace to review and process attestation tasks assigned to them.
- You can open a policy in CMDB Data Manager and click **Deactivate** to temporarily prevent the policy from running.
- Manage exclusion lists of CMDB Data Manager.

Related topics

Working with CMDB Data Manager

Approve or reject a CMDB Data Manager task

If you are an authorized approver, you might receive an email notification directing you to review a CMDB Data Manager policy task. Approve the task in the CMDB Data Manager legacy build on Core UI (UI 16), to continue its processing, or reject the task to send it to the CMDB Data Manager administrator for a more detailed review.

Before you begin

Role required:

- data_manager_admin: Full access to policy tasks and can set state to 'Work in progress' of an unassigned task.
- data_manager_user: Read access to policy tasks and can approve or reject an assigned policy task.

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About this task

Authorized approvers for a task are all users in the assignment group of the task, with the data_manager_user or data_manager_admin roles.

For information about using the more advanced CMDB Data Manager in CMDB Workspace, see CMDB Data Manager experience in CMDB Workspace.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Data Manager**.
2. On the CMDB Data Manager landing page, in the Open Policy Tasks tile, select **View Open Tasks**.
3. On the CMDB Data Management Task Control list view, select a task to review.
4. Select the **Approvers** tab in the related lists section.
5. In a record where you are the **Approver**, select the **Requested** value in the **State** column.
6. On the Approval form, set **State** to your approval choice such as **Approved** or **Rejected**.
7. Select **Update**.

Result

1. The *Approval* field of the task is set to **Approved** or **Rejected**.
2. If the task is approved, then the policy subflow is triggered to continue processing the policy tasks for the target CIs.

Edit and activate a life-cycle rule (Core UI)

Create, edit, or activate a life-cycle rule to define the retirement state in your organization, for a class. Tables that are targeted in life-cycle CMDB Data Manager policies, must be associated with an active life-cycle rule. Target CIs in Retire policies, are set to match their associated class retirement definitions.

Before you begin

Role required:

- data_manager_user has read access
- cmdb_admin and data_manager_admin have full access

About this task

Life-cycle rules in the base system are inactive and you must activate any rule that you want to use with a life-cycle CMDB Data Manager policy. To activate a life-cycle rule, set its *Active* attribute to **true**.

Each CMDB class can be associated with only a single rule. Life-cycle rules are stored in the CMDB Retirement Custom Definitions [cmdb_retirement_custom_definitions] table.

You can alternatively manage life-cycle rules in the Data Manager in CMDB Workspace. For more information, see Administer Data Manager in CMDB Workspace and Manage retirement definitions for CMDB Data Manager. Regardless of where you manage life-cycle rules and retirement definitions, those same definitions are used in both the Data Manager legacy built on Core UI (UI 16) and Data Manager in CMDB Workspace.

Note:
The retirement definition for the cmdb_ci class, can't be deactivated or deleted.

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Procedure

1. Navigate to **Configuration** > **CMDB Retirement Definitions**.
2. In the list view, select the life-cycle rule/table that you want to edit and then edit or fill out the CMDB Retirement Custom Definition form.

Field	Description
Active	Activates the life-cycle rule.
Table	The CMDB class that the life-cycle rule applies to, including any child classes of the specified class.
Retirement definition	One or more attribute conditions that together define the retirement state for the class. Target CIs in Retire policies that belong to the specified table, are set as specified in the retirement definition. Therefore, you can only use **AND** clauses in this definition while **OR** clauses aren't applicable.

3. Select **Update**.

Result
After the deletion, a retirement definition for the class is derived from a parent class.

What to do next
To delete a retirement definition (in Core UI), the retirement definition must be in an inactive mode (*Active* = **false**):

1. Navigate to **Configuration** > **CMDB Retirement Definitions**, and then select the retirement definition that you want to delete.
2. On the CMDB Retirement Custom Definition form, select **Delete**.
3. In the Delete retirement definition form, select **Delete**.

Manage exclusion lists of CMDB Data Manager

Create an exclusion list for the various policy types of the CMDB Data Manager, by using the CMDB Data Manager legacy build on Core UI (UI 16). Policies of a specific policy type will not target the CIs or other records in the exclusion list for that policy type.

Before you begin
Role required:

- data_manager_admin: Full access to CI exclusion lists
- data_manager_user: Read access and can add a CI to a CI exclusion list

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About this task

Note:
Regardless of where you manage exclusion lists, that same list is used in both, the Data Manager (Core UI) and Data Manager in CMDB Workspace. For information about managing CI exclusion lists in the more advanced CMDB Data Manager in CMDB Workspace, see CMDB Data Manager experience in CMDB Workspace.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Data Manager**.
2. On the CMDB Data Manager landing page, in the Excluded CIs tile, click **View Excluded CIs**.
3. On the Excluded CIs list view, click **Edit Exclusion List** and fill out the Specify Excluded CIs form.

Field	Description
Policy Type	Type of policy from which to exclude the specified CIs.
Condition Filter	Conditions that CIs must meet to be excluded for the specified policy type.

4. Click **Run filter**.
   All the CIs that meet the condition filters, appear in the Results section.
5. In the Results list, select any or all of the CIs that you want to exclude from the policies of the respective policy type.
6. In the Excluded CIs section, click the '+' icon to add the selected CIs to the Excluded CIs list.
7. **Optional:** In the Excluded CIs list, select CIs that you want to remove from the exclusion list, then click the trash icon.
8. Click **Save**.

Life-cycle rules and retirement definitions

Use a life-cycle rule to specify the retirement definition for a class, reflecting processes and protocols in your organization. These rules support the transition of CIs through life-cycle stages as implemented by CMDB Data Manager policies. A life-cycle rule is required for each targeted class in a Retire, Archive, or Delete CMDB Data Manager policy.

Note:
The same life-cycle rules and retirement definitions are used in both the Data Manager legacy built on Core UI (UI 16) and Data Manager in CMDB Workspace.

Usage

Life-cycle rules are used in life-cycle policies as follows:

- Setting target CIs in Retire policies, according to their associated class retirement definitions.
- Filtering out target CIs In Retire policies, that are determined to already be in a retired state according to their associated retirement definitions. Those CIs aren't targeted even if they meet the policy filter.
- Identifying CIs as being ready to be processed by an Archive or Delete policies. Archive and Delete policies can only process CIs that are in a retired state that matches their associated

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class retirement definitions. Therefore, target CIs in Archive and Delete policies, are checked against their associated class retirement definitions to verify that they are in a retired state before they can be archived or deleted.

Predefined life-cycle rules

The base system includes predefined life-cycle rules for key classes such as Hardware [cmdb_ci_hardware] and Application [cmdb_ci_appl], which are stored in the CMDB Retirement Custom Definitions [cmdb_retirement_custom_definitions] table. For example, the predefined rule for the Service [cmdb_ci_service] class defines that for a retired CI, the value of the attributes [operational status], [Phase], and [Status] is **Retired**.

Predefined retirement definitions are inactive by default (other than the cmdb_ci retirement definition which is always active), and you must activate a retirement definition that corresponds to a targeted class in a Retire, Archive, or Delete CMDB Data Manager policy. By default, the cmdb_ci retirement definition is in effect throughout the entire CMDB hierarchy due to derivation.

You can use the default definition of a predefined life-cycle rule, or customize a rule to reflect practices in your organization. You can also add life-cycle rules for additional classes. However, each CMDB class can be associated with only a single life-cycle rule.

CMDB Data Manager requirement

The Retire, Archive, and the Delete CMDB Data Manager policies require that for each of the classes that the policy applies to, there's a corresponding active life-cycle rule. After retiring a CI, CI's attributes are configured according to the life-cycle rule for the CI's class.

Derivation across the CMDB hierarchy

Life-cycle rules are derived throughout the CMDB hierarchy in the same way that other rules, such as identification rules, are derived. Child classes extended from a parent class with a life-cycle rule, derive that rule unless there’s a life-cycle rule defined at the child class level.

When there are retirement definitions for classes in different levels in the class hierarchy, then the retirement definitions that apply are those that are most specific for a class. For example, if there are retirement definitions for the Computer and the Configuration Item class, then the Computer class definitions also apply to its descendant classes. All other classes that aren't descendants of the Computer class, use the Configuration Item retirement definitions.

To create a life-cycle rule, see Manage retirement definitions in CMDB Workspace or Edit and activate a life-cycle rule (Core UI).

Duplicate CIs remediation

When the instance encounters duplicate CIs during identification and reconciliation (IRE), it groups each set of duplicate CIs into a de-duplication task for review and remediation.

De-duplication tasks

De-duplication tasks provide details about the duplication, including a list of all the duplicate CIs. Review the details of each duplicate CI in the task and the data that was used to determine that the CI is a duplicate.

To remediate a de-duplication task, you need to reconcile its set of duplicate CIs into a single CI, eliminating the duplication. From a de-duplication task, you can run the Duplicate CI Remediator wizard to remediate a single de-duplication task. Or, you can access the De-duplication dashboard in CMDB Workspace to create de-duplication templates that remediate de-duplication tasks in bulk.

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For more information about IRE processes that detect duplicate CIs and generate de-duplication tasks, see Detecting duplicate CIs.

Main CI

The main CI plays an important role in the remediation of duplicate CIs. The main CI is one of the duplicate CIs that you want to retain as an active CI after reconciling the rest of the duplicate CIs into that main CI. You can then potentially retire or delete the rest of the duplicate CIs, or assign custom values to their attributes. The first step during remediation is to select a main CI for the remediation process. During remediation, you choose which attribute values, relationships, and related items from the duplicate CIs to reconcile into the main CI. Alternatively, you can choose not to consolidate any data and retain the main CI as it is.

The *duplicate_of* attribute in duplicate CIs, is used to store a reference to the main CI. For duplicate CIs which existed in an instance that was upgraded to the New York release or later, the main CI is unknown. After upgrade, *duplicate_of* for those duplicate CIs is set to 'Unknown', indicating that the CI is a duplicate but the main CI is unknown.

Before remediation, the CIs in a duplicate CIs set are all duplicates of each other. After remediation, a set of duplicate CIs consists of one main CI, and any number of CIs, each considered a duplicate of the main CI. The *duplicate_of* attribute of the main CI is empty. The *duplicate_of* attribute for all the rest of the duplicate CIs in the set, is a reference to the main CI of the set.

Default related items list

A list of related items that is used globally in the remediation of duplicate CIs, with all de-duplication tasks. During remediation, all items from the default related items list are selected by default to be merged to the main CI. During remediation, adding or removing related items to be merged doesn't affect the default related items list. See Manage default related items list for more information.

Note:

- Merging of attributes and related items that are associated with assets is not supported. Asset related tables are not included in the default related items list and therefore they are not available for merge.
- If a scenario involves an inactive change request, the **Configuration item** field on the Change Request form is cleared. If the current value is a duplicate CI, then it isn't merged with the main CI.

De-duplication dashboard

CMDB Workspace provides a de-duplication remediation solution letting you remediate de-duplication tasks, in bulk. The De-duplication dashboard, and the de-duplication templates and libraries, let you remediate multiple de-duplication tasks, consistently, in a single operation. The De-duplication Template Library in CMDB Workspace lets you create a preconfigured de-duplication template with the remediation settings for a class. The De-duplication dashboard in CMDB Workspace lets you then run the preconfigured template on multiple de-duplication tasks for the class that is set in the template. The remediation settings in the template, are then consistently applied to the duplicate CIs of the de-duplication tasks, to remediate CI duplication.

For more information about remediating duplicate CIs in CMDB Workspace, see CI de-duplication experience in CMDB Workspace.

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Duplicate CI Remediator

A de-duplication remediation tool, that is wizard-like and that lets you reconcile a set of duplicate CIs associated with a single de-duplication task. You can choose one of the duplicate CIs to retain as an active CI, and then decide how to process the rest of the duplicate CIs. The Duplicate CI Remediator lets you set reconciliation options for attributes, relationships, and related items.

For information about using the Duplicate CI Remediator, see Remediate a de-duplication task (legacy).

Effects on related tasks (change, problem, incident)

Effect on change requests:

- When a CI is associated with a change request whose state isn't **New**, then when duplicate CI remediation processes delete the CI, the CI is removed from the change request.
- When a CI is associated with a change request whose state is **New**, then when duplicate CI remediation processes delete the CI, the CI in the change request is updated to the main CI.

The business rule *`Ready only CI when not New`* prevents change requests that aren't in the New state, from getting updated. This behavior ensures the validity and the continued processing of a change request when change request CIs are affected by duplicate remediation processing.

When a CI is associated with a problem or an incident task, those tasks remain valid after duplicate CI remediation processes run as the system merges the main CI in those tasks even if the remediation processes deleted the associated CI.

Properties that affect processing of duplicate CIs

During CMDB Identification, processing of sets of duplicate CIs is determined by:

- Property *`glide.identification_engine.skip_duplicates`* (true by default).
- Property *`glide.identification_engine.skip_duplicates.threshold`* (5 by default).
- Number of duplicate CIs in a set.

For information about how these properties affect the management of duplicate CIs, see Detecting duplicate CIs.

Special remediation scenarios

There are a few special remediation scenarios in which the remediation of duplicate CIs behaves differently:

Large number of duplicate CIs

Support for reconciliation of duplicate CIs is limited when the number of duplicate CIs exceeds a certain threshold. This threshold is based on the value of the *`glide.duplicate_ci_remediator.max.cis`* property, which is 1,000 by default. You can update this property to increase the threshold. However, this threshold never exceeds 5,000, even if you set the property to a value greater than 5,000.

When the number of duplicate CIs for a de-duplication task exceeds the threshold, the options available in the wizard are limited:

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- On the **Select Main CI** tab, only the **Recommended** list of main CIs appears, and only the **Use Main CI** option is available.
- Recommendations are based only on the oldest created, newest updated, and most recently discovered CIs.
- Reconciliation of attribute conflicts and CI relationships is not supported, and only default related items are reconciled.

Duplicate serial numbers

Duplicate CI remediation is usually applied to duplicate CMDB CIs. However, in some situations de-duplication tasks might be created for duplicate serial numbers. When remediation is applied to duplicate serial numbers, the merge of relationships from duplicate records, is not referenced and is not applied.

Large number of related items

A de-duplication task might be associated with a large number of related items which might block the remediation process as loading the task times out. To continue the remediation process in this case, you can try running remediation in a restricted mode. Add the *glide.duplicate_ci_remediator.enable_restricted_mode* system property, and set its value to **true** to show the **Use the Duplicate CI Remediator (Restricted Mode)** option in the Remediate dialog box. For more information about using this option to restrict the use of related items in de-duplication remediation and allow remediation to proceed, see Using restricted mode within the Duplicate CI Remediator [KB1542272].

Restrictions

IRE uses the *duplicate_of* field internally by populating it as part of the skip duplicate mechanism, and you should restrict manual updates of that field. For more details, see Detecting duplicate CIs.

If you do attempt to modify the value of *duplicate_of* directly on a CI form or by using a script, the following restrictions are enforced to ensure data integrity:

- A CI cannot be its own main CI (you cannot set a CI as a duplicate of itself).
- A CI and its main CI cannot be from different domains.
- The *duplicate_of* attribute of the main CI cannot reference any CI as its main CI (you cannot set a CI as a duplicate of another duplicate CI to create a chain of duplicate CIs).
  - If you attempt to set a CI as a duplicate of another duplicate CI, then the CI is set as a duplicate of the main CI of the duplicate CI you are trying to set. If the main CI of the duplicate CI you are trying to set is 'Unknown', the operation fails.

Example: Attempt to set a CI as duplicate of another duplicate CI

CIs	Attempted setting	Result (System enforced)
CI1: *duplicate_of* = empty CI2: *duplicate_of* = **CI3** CI3: Main CI	CI1: *duplicate_of* = **CI2**	CI1: *duplicate_of* = **CI3** CI2: *duplicate_of* = **CI3** CI3: Main CI

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If CI2 is a duplicate of 'Unknown', the operation fails.

- If a main CI becomes a duplicate of another CI, then it can no longer be a main CI. All CIs that were duplicates of that main CI are set as duplicates of the new main CI.

Example: Attempt to set a main CI as duplicate of another CI

CIs	Attempted setting	Result (System enforced)
CI1: *duplicate_of* = **CI4** CI2: *duplicate_of* = **CI4** CI3: *duplicate_of* = **CI4** CI4: Main CI CI5: *duplicate_of* = empty	CI4: *duplicate_of* = **CI5**	CI1: *duplicate_of* = **CI5** CI2: *duplicate_of* = **CI5** CI3: *duplicate_of* = **CI5** CI4: *duplicate_of* = **CI5** CI5: Main CI

- If a main CI becomes a duplicate of a CI within the same duplicate CI set, then the selected duplicate becomes the main CI in the duplicate CI set. The rest of the duplicate CIs in the set are set as duplicates of the new main CI.

Example: Attempt to set a main CI as duplicate of a CI within the duplicate CIs set

CIs	Attempted setting	Result (System enforced)
CI1: *duplicate_of* = **CI4** CI2: *duplicate_of* = **CI4** CI3: *duplicate_of* = **CI4** CI4: Main CI	CI4: *duplicate_of* = **CI1**	CI1: Main CI CI2: *duplicate_of* = **CI1** CI3: *duplicate_of* = **CI1** CI4: *duplicate_of* = **CI1**

- You can't delete a CI that is the main CI for a set of duplicate CIs. To delete a main CI, you must first disassociate that main CI with all of its duplicate CIs. Either delete all duplicate CIs that are associated with that main CI, or remove the reference to that main CI from all *duplicate_of* attributes in any duplicate CIs that have it.

CI de-duplication experience in CMDB Workspace

Create libraries of de-duplication templates in CMDB Workspace, to remediate de-duplication tasks in a consistent manner, and in bulk. De-duplication templates are pre-configured with all necessary settings for remediating de-duplication tasks, per class.

Use the De-duplication dashboard in CMDB Workspace to see an overview and insights about duplicate CIs in your CMDB. The De-duplication dashboard lets you create de-duplication templates and organize these templates into libraries. You can also examine de-duplication tasks and then run a pre-configured template to remedy multiple de-duplication tasks in a single operation.

More information:

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- To learn about general duplicate CI remediation concepts, restrictions, and special cases such as remediations that involve a large number of duplicate CIs, see Duplicate CIs remediation.
- To remediate a single de-duplication task using the legacy Duplicate CI Remediator, see Remediate a de-duplication task (legacy).
- To learn about Identification and Reconciliation (IRE) processes that detect duplicate CIs and other concepts related to duplication CI, see Detecting duplicate CIs.

Access

Role requirement: cmdb_dedup_admin, or any role containing cmdb_dedup_admin (such as sn_cmdb_admin).

To access the de-duplication functionality in the CMDB Workspace, navigate to **Workspaces** > **CMDB Workspace** and select **Management** in the CMDB Workspace menu bar. Then select the following links in Management tools, in the Manage section:

- **De-duplication Dashboard**
- **De-duplication Template Library**

De-duplication templates and libraries

Use a de-duplication template to apply a consistent remediation to multiple, similar, de-duplication tasks, in a single action. A de-duplication template contains the settings that are required to remediate de-duplication tasks for a class. For example, how to choose the main CI, which method to use to consolidate attributes, and what to do with the duplicate CIs (aside from the main CI) after remediation. A de-duplication template also contains conditions that de-duplication tasks are matched on. When you run a de-duplication template, the remediation settings in the template are applied to all de-duplication tasks that match the template conditions.

To be able to run a de-duplication template, the template must be in a published state (a template is initially in a draft state). You can unpublish a published template so it temporarily unavailable for use until you republish it.

Organize your de-duplication templates into libraries to group templates by categories that are meaningful in your organization and to help locate a template. For example, you can create several de-duplication templates, all of which for the same CMDB class such as *cmdb_ci_win_server*. Then, add all those templates to the 'De-duplication templates for cmdb_ci_win_server' library for easy access.

De-duplication dashboard

The De-duplication dashboard in CMDB Workspace is a central location for remediating de-duplication tasks. Use the dashboard to:

- See all de-duplication templates on a set of cards. Each card shows details about a template. On a template card, you can select **Assign task** to assign de-duplication tasks to the template, and run the template to remediate its associated de-duplication tasks.
- Select **Run all** to run all templates, each template remediating its assigned and matching de-duplication tasks.
- Select **View de-duplication tasks** to access a list view of de-duplication tasks with details such as the de-duplication template assignment. In the list view, you can select **Only show tasks that do NOT match any template conditions** to show only those de-duplication tasks that are unassigned or unmatched to any template class.

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- Select the context menu icon and then select **View template libraries** to create and manage de-duplication templates and libraries.
- Select the **Running** tab to track templates that are currently running.
- Select the **Completed** tab to check the status and details about the final state of a run, such as Completed, Cancelled, or Completed with errors.

De-duplication insights pane

The De-duplication insights pane on the right side of the De-duplication dashboard provides counts and insights related to the ongoing de-duplication processes in your organization. This pane provides the following cards and links to help you resolve issues:

- Total count of de-duplication tasks that were remediated in the past week.
- De-duplication tasks that have completed with various types of errors and therefore need your attention. Provides the **View de-duplication tasks that need your attention** link to access a list view of the associated de-duplication tasks. You can examine error messages and drill down tasks for further troubleshooting details.
- De-duplication tasks that don't match the conditions in any template and therefore can't be assigned for remediation by a template. Provides the **View de-duplication tasks that don't match** link to access a list view of the associated de-duplication tasks. You can drill down tasks for further details.
- Top 5 discovery sources that generate duplicate CIs.

Review the de-duplication templates and ensure that they're properly configured for remediating the ongoing duplicate CIs that are being generated in the CMDB by newly added data.

Create a de-duplication template

Create a de-duplication template that you can then run to apply pre-configured and consistent remediation to de-duplication tasks, in bulk. Organize your templates in libraries that make sense in your organization.

Before you begin

Role required: cmdb_dedup_admin (contained by default in sn_cmdb_admin)

About this task

By default, a newly created template is in draft mode. Therefor, after creating a template, you must publish the template to make it available for remediation.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
2. Select the **De-duplication Template Library** link in Management tools, in the Manage section.
3. **Optional:** Create a library for the new template.
   a. On the De-duplication templates page, select **Create a library**.
   b. In the Create new library dialog box, fill out the **Name** and the **Description** for the new library.
   c. Select **Create**.
4. On the De-duplication templates page, select **Create a template**.
   On the New template page, configure the different sections of the template by completing the rest of the steps.
5. **General information**: Fill out the form and then select **Next**.

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Field	Description
Name	Unique name for the template.
Class	CMDB class that this template can be applied to.
Template library	Library that the de-duplication template belongs to. Select a newly created library or any other librarySelect a library, or select the '+' icon to create a new library.

Option	Description
Automatically select all de-duplication tasks that match the selected class	Assign all de-duplication tasks that match the template class, to the template for remediation.
Add all child classes	Also assign all de-duplication tasks that match descending classes of the template class, to the template for remediation. This option is available only if the **Automatically select all de-duplication tasks that match the selected class** option is selected.

6. **Create condition**: Use a condition builder or a custom script to narrow down the list of de-duplication tasks assigned to the template, and then select **Next**.
   Use script toggle options:

   - Off: Specify conditions to filter on CIs from the template class. Only the de-duplication tasks containing CIs that match the filter will be assigned to the template.

   - On: Enter a custom script that returns a valid array of de-duplication tasks sys_ids (from the Remediate Duplicate Task [reconcile_duplicate_task] table), that are applicable to the template class. Those de-duplication tasks will then be assigned to the template.

     Note:
     Ensure that the script runtime doesn't exceed your intended runtime expectation and doesn't unexpectedly affect performance. Invalid values returned by the script are ignored.

7. **Select main CI**: Select the method for choosing the main CI from the drop-down list and then select **Next**.

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Note:

- Applying the chosen method to a set of duplicate CIs must result in exactly one CI. If during remediation, the chosen method yields no CIs or multiple CIs, then the **Newest updated** method is automatically applied regardless of your choice.
- After selecting the main CI out of the set of duplicate CIs, the main CI is separate from the rest of the duplicate CIs. From that point, 'duplicate CIs' refers to all of the initial duplicate CIs, aside from the selected main CI.

8. **Merge attributes**: Configure merging attributes from duplicate CIs into the main CI, and then select **Next**.

   a. Select the method to use for merging the attributes of duplicate CIs into the corresponding attributes of the main CI.
   For each method card on the left (such as Use latest updated CI), select attributes in the list on the right, that should be merged into the main CI using that method.

   b. Select options as appropriate.

Option	Description
Allow null value updates when merging attributes to main CIAllow null value updates from duplicate CIs to main CI	When merging duplicate CIs into the main CI, lets a null value from a duplicate CI to overwrite a non-null value in main CI.
Allow updates from duplicate CIs only when the main CI value is null	When merging duplicate CIs into the main CI: ▪ Prevents updates to main CI attributes that have non-null value. ▪ Allows updates to main CI attributes that have a null value, with a non-null value.

9. **Merge relationships**: Select an option for merging relationships from duplicate CIs into the main CI, and then select **Next**.

10. **Merge related items**: Select the method to use for merging related items associated with the duplicate CIs into the main CI, and then select **Next**.
    For information about the default list of related items used in de-duplication processes, see Manage default related items list.

11. **Duplicate CI actions**: Select what to do with the duplicate CIs after they're merged into the main CI, according to the template settings, then select **Next**.

12. **Review and test**: Access the following tabs to complete the template by reviewing and testing it.

    a. **Summary**: Review all template settings and select **Back** to modify any settings.

    b. **Test**: Select a sample de-duplication task and then select **Save and Preview Results** to save and run the template.

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c. Preview the results of the remediation test.

d. Select **Save & Exit** to save the template and return to the De-duplication templates home page.

Result

The new template is added to the specified library in draft mode and can be edited. However, a template in draft mode isn't available for remediation of de-duplication tasks until you publish it.

What to do next

- Publish a de-duplication template
- Run a template to remediate de-duplication tasks
- Remediate a single de-duplication task

Run a template to remediate de-duplication tasks

Run a de-duplication template to remediate de-duplication tasks in bulk. A de-duplication template is pre-configured with remediation settings per class. Running a de-duplication template, remediates its assigned de-duplication tasks, consistently, according to the template settings.

Before you begin

Role required: cmdb_dedup_admin (contained by default in sn_cmdb_admin)

About this task

You can run a single template to remediate its associated de-duplication tasks, or run all published templates at once, each remediating its associated tasks. Before running any templates, ensure that those templates are properly configured with their remediation settings and are properly assigned with de-duplication tasks. De-duplication tasks can be automatically assigned to a template based on the template conditions. You can also manually assign additional de-duplication tasks to a template.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
2. Select the **De-duplication Dashboard** link in Management tools, in the Manage section.
3. Select a template library in the **Ready** tab, or select **All libraries** in the libraries drop-down list (set to **All libraries** by default).
   The set of cards is filtered to show only the templates from the selected library, or to show all templates from all libraries if you select **All libraries** from the drop-down list.
4. **Optional:** On the De-duplication templates page, select **Run all** to run all de-duplication templates on their assigned de-duplication tasks.
   To assign de-duplication tasks to a template or to run a single template, continue with the following steps.
5. On the De-duplication templates page, locate the card with the template that you want to run and select **Assign tasks** in that card.
6. Select the tasks in the Available de-duplication tasks list that you want to remediate using the selected de-duplication template. Then select **Add Selected** to assign the selected tasks to the current template.

   Available de-duplication tasks lists all open de-duplication tasks, some of which can be non-compatible with the template. If you try to associate a non-compatible task, an error appears.

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Some of the tasks in the list might be assigned to another template, and you can reassign those to the current template.

The Assigned de-duplication tasks pane on the right contains two tabs:

- **All matching tasks**: Shows de-duplication tasks that match the condition of the selected template.
- **Your selected tasks**: Shows the tasks that you've assigning to the template for remediation.

The selected tasks are added to the list in the **Your selected tasks** tab in the Assigned de-duplication tasks pane on the right. The template will run for all tasks in the **Your selected tasks** list and any tasks in the **All matching tasks** list that aren't assigned to another template.

7. Select **Run template**.
   The selected template is added to the running queue.

What to do next

- Select the **Running** tab to track the progress and details of templates that you added to the running queue and are currently running. General counts for the template run appear when those counts become available. The templates are sorted by their start time, with the template with the most recent start time at the top of the list.
  - Select **Details** (accessible only after all de-duplication tasks have been calculated) to show further details about this run and to drill down to de-duplication tasks.
  - Select **Cancel** to stop a template's run. The details for the cancelled template are added in the **Completed** tab with the state of Cancel Requested. Upon completing the cancellation, the state changes to Cancelled.

  After a template run completes, its details no longer appear under the **Running** tab, but are available in the **Completed** tab. Also, the completed template is available again for running in the **Ready** tab.
- Select the **Completed** tab to view general counts per template, such as erroneous and skipped tasks, and general run time. The templates are sorted by their completion time, with the template that completed most recently at the top of the list. Select **Details** for a template to access a list view of the template's assigned de-duplication tasks. This list view shows details for each de-duplication task, such as its state (color coded) and error message if applicable. You can drill down a de-duplication task for further details.
- Select **View de-duplication tasks that need your attention** in the De-duplication tasks completed with errors card in the De-duplication insights pane on the right. The De-duplication tasks with errors list view shows de-duplication tasks that didn't complete successfully along with an error message. You can drill down de-duplication tasks in the list for more details.

Remediate a single de-duplication task

Remediate a single de-duplilcation task using a de-duplication template in CMDB Workspace, or using the legacy Duplicate CI Remediator.

Before you begin

Role required: cmdb_dedup_admin (contained by default in sn_cmdb_admin)

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
2. Select the **De-duplication Dashboard** link in Management tools, in the Manage section.
3. In the De-duplication templates section, select **View de-duplication tasks**.

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4. In the De-duplication tasks list view, select the task that you want to remediate.
5. Select **Remediate** on the task form.
6. In the Remediate dialog box, choose which method you want to use for remediation, and then select **Remediate**.

What to do next

On the task form:

- Track the progress and the details of remediation in the Activity stream until remediation is complete.
- Select the **Duplicate Audit Results** tab to see the results of the duplicate audit.

Publish or unpublish a de-duplication template

After creating a de-duplication template, you must publish the draft template to make it available to run. You might also need to unpublish a published de-duplication template so it's temporarily unavailable for de-duplication remediation, until you republish it again.

Before you begin

- A template that you want to publish must not be in a published state.
- A template that you want to unpublish must be currently published.
- If the template that you want to unpublish is currently running or in the running queue, you must wait for the run to complete or cancel the run. In the De-duplication dashboard, select the **Running** tab, locate the template that you want to unpublish, and then select **Cancel** in the template's card.

Role required: cmdb_dedup_admin (contained by default in sn_cmdb_admin)

About this task

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
2. Select the **De-duplication Template Library** link in Management tools, in the Manage section.
3. In the libraries pane locate the template that you want to publish or unpublish and then either:
   a. Publish: Ensure that all the sections of the template are complete and select **Publish**.
   b. In the Publish template dialog box, select **Publish**.
   c. Unpublish: Select **Unpublish** and in the Unpublish template dialog box, select **Unpublish**.

Result

A published template:

- Becomes available on the De-duplication templates page and can be used for remediation.
- Can't be edited or retired.

An unpublished template is set back into draft mode:

- Is no longer available on the De-duplication templates page and can't be selected for remediation.
- Can be edited or retired.

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Retire a template

Retire a template that is no longer needed for remediating de-duplication tasks.

Before you begin

The template that you want to retire must be in an unpublished state.

Role required: cmdb_dedup_admin (contained by default in sn_cmdb_admin)

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
2. Select the **De-duplication Template Library** link in Management tools, in the Manage section.
3. In the library pane, select the template that you want to retire and then select **Retire**.
4. Select the template's context menu and then select **Retire template**.
5. In the Retire template dialog box, select **Retire**.

Result

A retired template is no longer available in the De-duplication dashboard and can't be used for remediation.

Review de-duplication tasks (legacy)

Review details of de-duplication tasks, and then potentially remediate a de-duplication task.

Before you begin

Role required: itil to view, and itil_admin or cmdb_dedup_admin to remediate a de-duplication task.

About this task

Alternatively, you can use de-duplication capabilities in the CMDB Workspace. Use the De-duplication dashboard and the De-duplication Template Library to:

- Review de-duplication tasks
- Remediate de-duplication tasks in bulk by using de-duplication templates
- Gain insights into de-duplication counts and status in your organization

For more information, see CI de-duplication experience in CMDB Workspace.

If a duplicate CI is a dependent CI, then you can view the details of the dependent relationship, the Depend on CI, and any relation qualifier chain. If the dependent CI has a lookup table, then you can see the details of the respective lookup table.

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **De-duplication Tasks**.
2. Select a task.

Remediate Duplicate Task form

Field	Description
Number	Unique task number.
Assigned to	Person who is responsible for resolving the task.

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Field	Description
Short description	Description for the task.
Work notes	Details describing how the CI was identified as a duplicate. **Note:** Not available in de-duplication tasks that were created prior to the London release. This field also contains user notes about the decisions and steps of resolving the task.
Priority	Task priority.
State	State of the de-duplication task as it progresses through resolution.

3. In the related lists section, click the **Duplicate Audit Results** tab to see the list of duplicate CIs in this task.
You can click a CI to display more CI details.

Column	Description
Duplicate CI	Reference to the duplicate CI. **Note:** This field is a document ID type, which means that it can reference any record on any table. If the referenced CI is deleted as part of resolving duplicate tasks, then this field is empty.
Relationship	For a duplicate CI that is a dependent CI, this field shows the relationship between the duplicate CI and depend on CI.
Depend on CI	If the duplicate CI is a dependent CI, then this field displays the depend on CI.
Discovery source	Discovery method used for the CI.

What to do next

Analyze de-duplication tasks to determine which CIs should remain active and which of the duplicate CIs in the Duplicate Audit Results lists are stale or incorrect. Click **Remediate** to remediate a single de-duplication task.

Related topics

Relation qualifier

Document ID field

Remediate a de-duplication task (legacy)

Remediate a single de-duplication task by using the Duplicate CI Remediator wizard. Use the wizard to guide you through the duplicate CI reconciliation process or to apply a custom workflow.

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Before you begin

Review the following topics to familiarize yourself with important concepts of duplicate CI remediation:

- Duplicate CIs remediation to learn about general duplicate CI remediation concepts, restrictions, and special cases such as remediations that involve a large number of duplicate CIs.
- Properties related to remediation of duplicate CIs for information about important properties that affect processes of duplicate CI remediation. Including the glide.duplicate_ci_remediator.dry_run property that determines if the Duplicate CI Remediator actually updates the CMDB or not.

Role required: itil to read, itil_admin or cmdb_dedup_admin to write

About this task

Instead of using the legacy build of the Duplicate CI Remediator on Core UI, you can use the De-duplication dashboard, and de-duplication templates and libraries, available in CMDB Workspace. Using de-duplication capabilities in CMDB Workspace is especially useful for bulk remediation of de-duplication tasks. These capabilities let you pre-configure a de-duplication template with remediation settings, which can then be applied in a consistent manner to multiple de-duplication tasks. For more information, see CI de-duplication experience in CMDB Workspace.

As you progress through the tabs of the Duplicate CI Remediator, CIs are not updated. All updates are applied only in the final step, after you click **Remediate**.

> **Note:**
> Remediation behaves differently when remediation involves a large number of duplicate CIs or where the duplicates are serial numbers. For information about special cases in remediation, see Duplicate CIs remediation.

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **De-duplication Tasks**.
2. Open the de-duplication task that you want to remediate.
3. On the task form, select **Remediate**.
4. In the Remediate dialog box, select either of the following options:
   - **Use the Duplicate CI Remediator (Recommended)**: Use the wizard to consolidate duplicate CIs according to your configurations and settings. Follow the Duplicate CI Remediator tabs to configure the reconciliation.

     > **Note:**
     > This option is not available with non-CMDB tables.

   - **Use a custom remediation workflow**: Use an existing CMDB remediation rule or select **Add New** to create a new one.
     - On the CMDB Remediation Rule form, set **Task type** to `Remediate Duplicate Task` and select **Active**.
     - On the Workflow form, set **Table** to Remediate Duplicate Task [reconcile_duplicate_task] and **If condition matches** to `None`.
     - Ensure that the associated workflow remediates duplicate CIs.

     In the Remediate dialog box, select **Next** to start the workflow and to exit the Duplicate CI Remediator. The Remediate Duplicate Task form appears, where you can update the **State** of the task.

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- **Use the Duplicate CI Remediator (Restricted Mode)**: Appears only if the *glide.duplicate_ci_remediator.enable_restricted_mode* system property is set to **true**. You might need to use this option if remediation is blocked because loading the de-duplication task times out. This option might be relevant when there is a large number of related items associated with a de-duplication task, allowing remediation to continue with the limited features in a restricted mode. For more information about using this option to restrict the use of related items in de-duplication remediation and allow remediation to proceed, see Using restricted mode within the Duplicate CI Remediator [KB1542272].

5. On the **Select Main CI** tab in the Duplicate CI Remediator:

   a. Select the main CI for this reconciliation using either of the following lists of duplicate CIs. For any CI, you can click the **Name** link to display the CI's attributes, or click the **Related Items** link to display the number of related items.

   - **Recommended**: A subset of the **All** list, containing only system recommended main CIs. System recommendations are based on checking the duplicate CIs for the following criteria:
     - CI with most related items.
     - CI with most relationships.
     - Newest discovered CI.
     - Newest updated CI.
     - Oldest created CI.
     - Previous main CI, if one was previously selected.
   - **All**: All duplicate CIs for the de-duplication task.

   Either option lets you review a summary of the remediation settings before starting the remediation.

   b. Select one of the following options to choose whether to consolidate any attribute values, relationships, or related items from any of the duplicate CIs into the main CI:

   - **Remediate Manually**: Lets you specify which attribute values, relationships, and related items from duplicate CIs to consolidate into the main CI.
   - **Use Main CI**: Retains main CI attribute values, merges relationships, and merges only the default related items.

     Skip to step number 7 as this selection skips all configurations other than choosing the action for the duplicate CIs on the **Determine Duplicate CI Actions** page.

6. On the **Merge Attribute Values** tab review inconsistent values of each attribute.
   For each attribute, choose to retain the main CI's value, or choose a value from a duplicate CI for the main CI to be set with.
7. Select **Next**.

Column	Description
Attribute	Attribute for which there are different values.
Main CI Value	**Attribute** value in the main CI.

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Column	Description
Other Values	The number of unique **Attribute** values within the duplicate CIs.

To override the main CI attribute value with a duplicate CI value:

a. Click the **Other Values** link.

b. In the attribute dialog box, click **Unique Values** to display only unique attribute values, or **All** to display all attribute values including identical values.

c. Select a value for the main CI **Attribute** to be set with.
You can click **Reset to Original** to undo the selection of a different attribute value for the main CI.

d. Click **Select**.

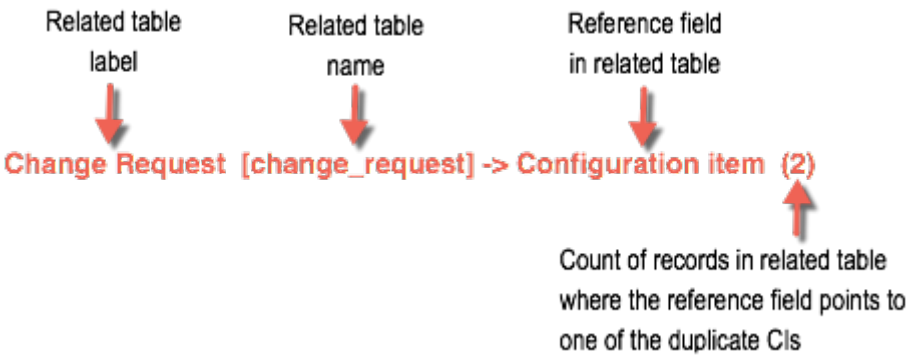
Note:
Attributes, such as system fields, discovery fields (*discovery_source*, *last_discovered*, *first_discovered*), and read-only fields (such as the asset field) do not appear in the list.

8. On the **Merge Relationships and Related Items** tab:

a. In the Merge Relationships section, select whether to merge all relationships from all duplicate CIs into the main CI.
Click **View all relationships** to display all the relationships in which a duplicate CI is a parent or a child. You can click a **Parent** or a **Child** link to display more details. Orphan and duplicate relationships of duplicate CIs are deleted if you choose to merge relationships. For more information about the CMDB Health relationship KPI, see CMDB Health KPIs and metrics.

b. In the Merge Related Items section use the slushbucket to select related items to be merged into the main CI. Click **View all related items** to display all related tables (items) and the count of references in each table to one of the duplicate CIs. You can click the links in **Main CI Related Items** and **Duplicate CIs Related Items** to display details about the related items.

Related items in the slushbucket have the following format:



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- By default, all items in the default related items list are selected to be merged.
- Related items (tables) that have no references to a duplicate CI are not listed, unless that table is included in the default related items list.
- Since asset related tables are part of the exclusion list, they are not available for merge.

See Manage default related items list for more information about configuring a default list of related items.

c. Click **Next** .

9. On the **Determine Duplicate CI Actions** tab, choose one of the following actions to perform after completing the reconciliation, then click **Next**.

- **Set attributes to custom values** (recommended): Retain all duplicate CIs. Mark the duplicate CIs as invalid by setting a specific **Attribute** to a specific **Value** for all duplicate CIs. For example, set *Operational Status* to Retired to retire the duplicate CIs.

  The *duplicate_of* attribute of the duplicate CIs is automatically set to the appropriate main CI. Also, the duplicate CIs will not be added to any de-duplication task after this task is remediated. If the identification engine is not configured to skip duplication, ensure that identification inclusion rules are configured to exclude the duplicate CIs during identification. This configuration prevents new de-duplication tasks with the same duplicate CIs from being created after remediation.

  Note:
  Discovery fields, system fields, read only fields, and date fields are excluded from the attributes list.

- **Delete**: Delete all duplicate CIs (only the main CI remains).

  Note:
  Review Roll back and delete recovery for information about reverting the deletion of CIs and related records.

10. On the **Review and Confirm** tab:

a. Review the summary of the expected updates for this duplicate CIs reconciliation. Updates are based on your selections and therefore the summary includes only the details that are applicable. This summary can include details of the relationships and related items that will be merged to the main CI, the attribute values that the main CI will be set with, and the number of CIs that will be deleted. Click **Attributes**, **Relationships**, **Related Items**, or **Duplicate CI Actions** if applicable, to display further details such as changes to attribute values.

b. Click **Remediate** to complete the reconciliation according to your reconciliation settings. Once complete, the task **State** is set to **Closed Complete**.

Result
The following relationships are deleted without being merged to the main CI:

- Relationships in which the type, child, or parent field is empty.
- Relationships for which merging to the main CI will result in cyclic relationships.
- Relationship for which merging to the main CI will result in duplicate relationships.

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What to do next

The reconciliation process runs in the background and may take a while to complete. Upon completion, the system sends a confirmation notice to the remediator of the task. Meanwhile, you can:

- **Review Identification Rules**: Review identification and inclusion rules and make any necessary updates to reduce CI duplication.
- **Check Progress**: View the task activities that are logged as the remediation progresses.
- **View Main CI**: View the main CI for this reconciliation process.

Manually create a de-duplication task

Manually create a de-duplication task when it is not automatically created. You can then use the Duplicate CI Remediator or the De-duplication dashboard in CMDB Workspace to remediate the manually created task.

In some situations, duplicate CIs are not automatically detected and de-duplication tasks are not automatically generated. Such situation happens with a class for which identification rules are not defined and the identification engine cannot be applied. However, you still want to reconcile these duplicate CIs by utilizing the Duplicate CI Remediator or the De-duplication dashboard in CMDB Workspace.

Use the CMDBDuplicateTaskUtils API to manually create a de-duplication task in which all duplicate CIs are specified. The de-duplication tasks that you create manually and the automatically created tasks, are stored in the same table ([reconcile_duplicate_task]) and are processed in the same manner.

Note:
You can manually create a de-duplication task only for CMDB CIs and a CI can be specified as a duplicate CI only in a single de-duplication task.

Manage default related items list

You can add or remove items from the default list of related items which is used in duplicate CI remediation for all de-duplication tasks.

Before you begin

Role required: itil_admin

About this task

The default related items list is used by the Duplicate CI Remediator, appearing on the **Merge Relationships and Related Items** tab. You can modify the list for only a specific task in the Duplicate CI Remediator without affecting the default global list.

The default related items list is also used by the De-duplication dashboard in CMDB Workspace for remediation.

Globally modifying the list affects the remediation of all de-duplication tasks in the Duplicate CI Remediator and in the De-duplication dashboard in CMDB Workspace.

Note:
Only related items in which the reference field points to Configuration Item [cmdb_ci] in *sys_dictionary* can be selected for the default related items list. Related items with references to any child of the Configuration Item class cannot be selected for the default related items list, but are still available for merging in the Duplicate CI Remediator for a specific task.

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Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Duplicate CI Remediator Default Related Items**.
2. On the Default Related Items List for Duplicate CI Remediator page, use the slushbucket to add or remove items from the **Selected** list.
3. Click **Save**.

Properties related to remediation of duplicate CIs

Use de-duplication properties to configure how remediation of duplicate CIs works when using the Duplicate CI Remediator or the De-duplication dashboard in CMDB Workspace.

To view and edit these properties, the admin role is required.

Although the properties below reference the Duplicate CI Remediator, these properties have an equivalent effect in duplicate CI remediation in CMDB Workspace.

Property	Description
Attributes in which *max_length* exceeds this property value (4000 by default) are excluded from the **Select Main CI**, **Merge Attribute Values**, and **Determine Duplicate CI Actions** tabs in the Duplicate CI Remediator wizard. glide.duplicate_ci_remediator.max.field_length	If the *max_length* for an attribute is equal to the prop data is truncated to the property value and the attribute • Type: integer • Default value: 4000 • Location: **Configuration** > **CMDB Properties** > **Duplic** **Note:** This property impacts the performance of de-duplic
Comma separated list of related tables in the format '<table>.<reference column>', that are excluded from merging during duplicate CI remediation. glide.duplicate_ci_remediator.related_items_blacklist	• Type: string • Default value: cert_task.cmdb_ci,cert_audit_result.configuration_iter • Location: **Configuration** > **CMDB Properties** > **Duplic**
Threshold for the number of duplicate CIs, which if exceeded, support for reconciliation in the Duplicate CI Remediator is limited (1,000 by default). glide.duplicate_ci_remediator.max.cis	• Type: integer • Default value: 1000 • Location: **Configuration** > **CMDB Properties** > **Duplic** • Learn more: See 'Large number of duplicate CIs' in Re This threshold never exceeds 5,000, even if you set the
Determines whether the Duplicate CI Remediator actually remediates CI duplication by updating records in the CMDB, or not. glide.duplicate_ci_remediator.dry_run	When set to false (default value), updates specified in th You can set this property to true and then test run throu updated. In this case, the work notes for the task descril • Type: true | false • Default value: false • Location: **Configuration** > **CMDB Properties** > **Duplic**

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Property	Description
glide.duplicate_ci_remediator.enable_restricted_mode	Enables restricted mode remediation in the Duplicate C duplication remediation and allows a blocked remediati **Mode)** option. For more information, see Using restricte • Type: true | false • Default value: false • Location: Add to System Properties [sys_properties] • Learn more: Remediate a de-duplication task (legacy) Set to **true** to enable restricted mode remediation.

Components installed for duplicate CI remediation

Tables installed to support duplicate CI remediation (included in the com.snc.cmdb plugin).

Tables installed

Table	Description
Remediate Duplicate Task [reconcile_duplicate_task]	De-duplication tasks.
Duplicate Audit Result [duplicate_audit_result]	CIs associated with each de-duplication task.
Duplicate CI Remediation [cmdb_duplicate_ci_remediation]	Input, selections on each tab, overall status of remediation, and results of each run of the Duplicate CI Remediator.
CMDB Workspace De-duplication template library [sn_cmdb_ws_reconcile_duplicate_template_library]	Library names and their descriptions.
De-duplication template suggested task [sn_cmdb_ws_reconcile_duplicate_template_suggested_task]	Mappings of de-duplication tasks to templates.

Scheduled jobs installed

Scheduled job	Description
De-duplication: Populate Duplicate Task Data	Runs daily to copy metadata, such as the identification attributes and identification rules used in generating a de-duplication task, into an easily accessible table. The metadata is stored in the Reconcile Duplicate Task Data [reconcile_duplicate_task_data] table and used for analytics for the De-duplication dashboard.

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Scheduled job	Description
De-duplication: Populate Template Task Run Records	Runs every minute to evaluate the de-duplication tasks applicable for a template according to your settings. Based on settings, assigns matching tasks and manually added tasks to the template for remediation. De-duplication tasks are remediated after you select **Run template**.
De-Duplication: Template Scheduler	Runs every minute by the template scheduler to check the capacity of the execution engine. If there is available capacity, picks any new de-duplication tasks added to the queue, for remediation. De-duplication tasks aren't remediated and remain in ready state unless this job runs periodically.
De-duplication: Populate Template Suggested and Orphan Tasks	Runs hourly to count the number of tasks that match each published template and the number of tasks that don’t match any published template. These counts then appear on various cards in the De-duplication dashboard.

CIs attestation

Verify the existence of actual IT infrastructure and applications that you own, systematically and in bulk. As CIs are continuously ingested into the CMDB from various data sources, ensure the integrity of the CMDB. Remove any stale CIs that are associated with IT infrastructure or applications that no longer exists.

Use the CMDB Data Manager in CMDB Workspace to create an Attestation policy, specifying CIs that need to be attested and the attestation frequency. Assign Attestation tasks to users that are familiar with or that manage the CIs, and who can attest or reject the IT infrastructure or applications that those CIs represent. Rejected CIs that are no longer needed can then be retired, archived, or deleted from the CMDB.

Users can go to the My Work view in CMDB Workspace to see their assigned attestation tasks, and then review and process the tasks.

Smart detection and auto-attestation

Smart detection streamlines and simplifies CI attestation. With smart detection you can auto-attest CIs that are automatically detected by discovery programs, based only on recent discovery results.

The following conditions must be met to enable smart detection:

- Discovery is enabled in your organization or Getting started with Service Graph Connectors are implemented.
- The system property *sn_cmdb_ws.attestation.smart_detection.disabled* is set to **false** (default value).

In addition, smart detection uses the following system properties as filters when creating a list of CIs that are candidates for auto-attestation. To be included as candidates for auto-attestation, CIs must be discovered:

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- Within the discovery time window specified by the *sn_cmdb_ws.attestation.smart_detection.discovery_window* system property (for example, within the last 30 days)
- By any discovery source that isn't excluded by the *sn_cmdb_ws.attestation.smart_detection.discovery_source.exclusion* system property

Then, when you review those candidate CIs, you can choose to auto-attest them.

Properties associated with Attestation

Property	Description

sn_cmdb_ws.attestation.smart_detection.disabled	Disables smart detection.
	• Type: true | false
	• Default value: false
	• Values:
	  ○ **true**: Disable smart detection.
	  ○ **false**: Enable smart detection.
	• Location: Add to System Properties [sys_properties] table.
	• Learn more: Review CMDB Data Manager attestation tasks

sn_cmdb_ws.attestation.smart_detection.discovery_source.exclusion	Comma-separated list of discovery sources that are excluded in smart detection processing. For example, a data source that is unreliable in detecting CIs. CIs discovered by discovery sources in the list, can't be candidates for auto-attestation. • Type: string • Default value: Manual Entry

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Property	Description
	• Location: System property • Learn more: Review CMDB Data Manager attestation tasks
sn_cmdb_ws.attestation.smart_detection.discovery_window	Number of days (discovery window) that smart detection uses to determine whether a CI is a candidate for auto-attestation. Only CIs that were discovered within this discovery window can be candidates for auto-attestation. • Type: integer • Default value: 30 • Location: System property • Learn more: Review CMDB Data Manager attestation tasks

Review CMDB Data Manager attestation tasks

Review attestation tasks that are assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager Attestation policies. Check the physical existence of IT infrastructure or applications associated with CIs in the attestation task and then process those CIs as appropriate.

About this task

For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included.

Before you begin

Role required:

- CMDB administrator: data_manager_admin, sn_cmdb_admin (already includes the data_manager_admin role)
- CI and service owner or manager: data_manager_user, sn_cmdb_user (already includes the data_manager_user role)

About this task

After you receive notifications about attestation tasks assigned to you, check the actual IT infrastructure or applications that you own, and then process the CIs in the task accordingly. Initially, all the CIs in the attestation task are listed in a Not Yet Reviewed list and therefore require attestation. Attested CIs are then moved to an Attested CIs list, while CIs you reject are moved to a separate Rejected CIs list. After processing all the CIs in the task, you can submit and complete the task. For general information about attestation and the flow of attestation, see CIs attestation.

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As you process the CIs in the task, details of your activities are captured in the activity stream of the task.

Attesting tasks is performed in the My Work view in the CMDB Workspace store app.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** and then select **My Work** in the CMDB Workspace menu.
   Any attestation tasks that are assigned to you or to assignment groups you belong to, appear in the **Attestation tasks** tab in the My tasks section. Attestation tasks are associated with details such as the due dates and short descriptions for those tasks. Assignment groups that you are a member of, are also listed.
2. Select a task to review from the Attestation tasks list. For a bulk review, select multiple tasks or check the box next to 'Configuration Item' to review all the tasks in the list.
3. Review details of a task:

   a. **Optional:** Administrators can select **Cancel task** if attesting the CIs in the task isn't needed. For example, if the task was created by error. The canceled task is deleted without any further processing.

   b. **Optional:** If the task isn't properly assigned, click **Reassign** and then select one of the following options.
   Depending on your selection, the task might no longer be assigned to you.

   - **To me**: If the task isn't yet assigned to a specific user and you are the owner of the CIs who can process the task.
   - (Optional) **To other user**: If you aren't the actual owner of the CIs and there is someone else that is more appropriate as the owner for the task. In the Reassign to other user dialog box, set **Assign to** to that user and enter the reason for the reassignment. Then click **Proceed**.

     For a CI owner, only users from the assignment group that the task is currently assigned to, appear. For Admins, all users with the data_manager_user role appear.
   - **Send for reassignment**: If you aren't the appropriate user for this task and the administrator needs to assign the task to someone else. In the Send for reassignment dialog box, enter the reason for the operation and then click **Submit** to send a notification to the administrator.

   c. Click **Review CIs to attest** to continue the CI attestation process.
   If the task is not assigned to anyone, it is automatically assigned to the current user.

4. **Optional:** If the Smart detection dialog box appears, click **Review** to review the CIs or **Auto-attest** to attest the detected CIs without a review.
   If you click **Cancel**, you can later click **Run auto-attestation** in the Smart detection widget.
   When reviewing the CIs to attest, the list in the Smart detection pane is filtered to CIs that are candidates for auto-attestation, letting you auto-attest all those CIs in bulk.

   a. Review the details of the CIs in the list.

   b. **Optional:** Click **Auto-attest** to automatically attest all the CIs in the list and to move them to the Attested CIs list.

   c. **Optional:** Click **Cancel auto-attestation** to leave all the CIs in the Not Yet Reviewed list and to later continue attesting those CIs regardless of smart detection.

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5. Review the CIs in the Not Yet Reviewed list.
   You can click a CI to open a dashboard with more details such as CI health, key properties, and CMDB 360 data. The details that appear on the CI dashboard depend on settings and activation of different features.
   Use the following cards on the right hand bar to get help and status:

   - Click Attestation actions () to get help on the possible actions you can take while reviewing CIs.
   - Click Attestation status () to see your progress in reviewing and attesting CIs.
   - Click Smart detection status () to see if any CIs are candidates for auto-attestation and to apply auto-attestation if applicable.

6. In the Details tab of the Attestation Review CIs pane, select the CIs that you are ready to process and select an action to apply to all selected CIs.

   - Select the CIs that you can attest their existence and click **Attest** to move them to the Attested list.

     To undo attestation, select the Attested list, select the CIs that you want to move back to the Not Yet Reviewed list and click **Unattest**. Or, select the CIs that you want to move to the Rejected list and click **Reject**.

   - Select the CIs that you can't attest their existence and click **Reject** to move them to the Rejected list. In the Confirm rejecting CIs dialog box, enter an explanation and then click **Proceed**.

     To undo rejection, select the Rejected list, select the CIs that you want to move back to the Not Yet Reviewed list and click **Unattest**. Or, select the CIs that you want to move to the Attested list and click **Attest**.

   - Select the CIs that shouldn't be included in this task and in future Data Manager attestation policies, and click **Exclude**. In the Confirm excluding CIs dialog box, enter an explanation and then click **Proceed**.

     Those excluded CIs are added to the exclusion list of CMDB Data Manager attestation policies. For more information, see Manage exclusion lists of CMDB Data Manager. Only an admin can undo this operation using the CMDB Data Manager.

   - Select any CIs that you identify as duplicates of other CIs and click **Remove duplicates from task**. In the Confirm removing duplicate CIs dialog box, enter an explanation and then click **Proceed**.

     Those duplicate CIs are removed from the attestation task and a de-duplication task is generated for them, which is similar to the de-duplication tasks created by the Identification and Reconciliation Engine (IRE). For more details about how to process and remediate de-duplication tasks, see Duplicate CIs remediation.

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Note:
Only an admin can undo this operation.

- After processing all the CIs in the task, when the Not Yet Reviewed list is empty, the **Submit** button is enabled. Click **Submit**, and then in the Submit attestation dialog box click **Submit** to close the task.

Data Certification

Data Certification manages scheduled and on-demand validations of data in CMDB and non-CMDB tables.

Information is added to the CMDB by Discovery, by importing from third-party tools, or manually. For regulatory or procedural reasons, information in the CMDB requires checks for accuracy and certification. The person or team responsible for certification can define what information requires verification and a verification schedule. The schedule then generates a checklist for verifying the data. Individuals assigned to certification tasks answer a series of questions to verify the data.

Data certification can be performed against specific fields on specific tables. Based on the certification schedule, certification tasks are automatically created and assigned. For example, you can set up a certification to validate key information fields, such as **Operating System** and **CPU count**, on all Windows servers located in Chicago. You can then assign the tasks to the appropriate team member automatically.

Domain separated systems can use the Data Certification application.

Data Certification experience in CMDB Workspace

You can use the CMDB Workspace landing page and its views to fully administer and use Data Certification, view various analytics, and handle Data Certification tasks such as:

- Create a Data Manager Certification policy.
- Convert legacy certification schedules into Data Manager Certification policies.
- Review certification tasks in CMDB Workspace.
- Review failed certification tasks in CMDB Workspace.

The Data Certification experience in CMDB Workspace doesn't provide functionality such as reset, merging of multiple Data Certification tasks, and escalation.

For more information about using Data Certification in CMDB Workspace, see Data Certification experience in CMDB Workspace.

Data Certification on Core UI (UI 16)

Data Certification experience in CMDB Workspace provides the latest Data Certification functionality. However, the legacy build of Data Certification on Core UI (UI 16) is available by navigating to **All** > **Data Certification**. For information about using the CMDB Data Manager legacy build on Core UI, see Data Certification on Core UI.

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Note:

Data Certification in CMDB Workspace and the legacy build of Data Certification on Core UI operate separately, and aren't synchronized. Therefore, any Data Certification elements, such as definitions and schedules, that you create in one of those implementations, doesn't appear and isn't included in the other implementation.

To convert data created in the legacy build of Data Certification on Core UI, into draft Certification policies in CMDB Workspace, see Convert legacy certification schedules into Data Manager Certification policies.

Data Certification experience in CMDB Workspace

Use Data Certification in CMDB Workspace to administer Data Certification, create Certification policies, manage Data Certification tasks, and view analytics about ongoing processes.

Note:
Data Certification in CMDB Workspace and the legacy build of Data Certification on Core UI operate separately, and aren't synchronized. Therefore, any Data Certification definitions, such as filters and certification schedules, that you create in one of those implementations, doesn't appear and isn't available in the other implementation.

Data Certification experience in CMDB Workspace

Use the CMDB Workspace landing page and its views to administer Data Certification:

- Use the Management view in CMDB Workspace to navigate to CMDB Data Manager to create a new Certification policy.
- Use the My work tile on the CMDB Workspace landing page to access your open and overdue Certification tasks that you need to review and process.
- Use the My Work view in CMDB Workspace to access any Data Certification tasks assigned to you under the Certification tasks section.

Manage certification tasks in CMDB Workspace:

- Review Certification tasks in CMDB Workspace
- Review failed certification tasks in CMDB Workspace

Convert legacy certification schedules into Data Manager Certification policies

Convert certification schedules created in the legacy Data Certification application (running on Core UI), into draft Data Manager Certification policies available in CMDB Workspace.

Before you begin
Role required: data_manager_admin or sn_cmdb_admin

About this task
If you have been using the legacy Data Certification application on Core UI, then any associated certification schedules aren't available in the new implementation of Data Certification in CMDB Workspace version 6.0. You can convert those definitions into draft Data Manager Certification policies. Then you can publish the converted policies in CMDB Workspace just like publishing any draft Data Manager policy.

Important things to know:

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- Legacy certification schedules that were successfully converted are automatically deactivated.
- This conversion migrates most fields from the legacy certification schedule. However, the *Assign to empty* and the *Last run date* fields aren't migrated into CMDB Workspace Data Manager tables.
- Any dot-walking settings in the legacy certification schedules used for assignments of *User Field* or *User Group Field* are preserved in this conversion.

Procedure

1. Navigate to **All** > **Workspaces** > **CMDB Workspace** and then select Management in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. On the Data Manager overview page, select **Import** on the banner at the top of the page.
   If there aren't any legacy certification schedules to import, the notification banner about importing existing policies doesn't appear.
4. In the Confirm import of certification schedule into draft policies, select **Import into draft policies**.

   a. Track progression in the Import in progress dialog box.

   b. Review the import results in the Import summary dialog box.

      If there were earlier conversion operations, the results reflect only the current conversion operation. For example, the Completed count includes only those records that were successfully converted in the current run.

      Select the links associated with the completed and skipped results to drill down to the associated records.

      Also, to see additional details, select **All** and in the Filter navigator, enter `cert_schedule.list` to open the Certification Schedules table. The *Migration Status* and the *Migration exception* columns provide details that are especially important for failed and skipped records.

   c. Select **View draft policies** to view the converted policies in the Data Manager policies page, under the Draft policies tab.

5. **Optional:** Publish a draft Data Manager policy in CMDB Workspace

Result

- If you log in while this conversion is in process, a progress message appears on the Data Manager overview page. You can select the **View details** link to open the Import in progress dialog box with details about the progress of the operation.
- The legacy certification schedules are available as draft Certification policies in Data Manager in CMDB Workspace.
- The legacy certification schedules are deactivated.
- The legacy certification tasks are unchanged and you can review and resolve them as needed.

Review certification tasks in CMDB Workspace

Review the values of record fields and CI attributes in certification tasks assigned to you, and then certify, edit, or fail the review according to your findings. For managers, tasks of direct

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reports are included, and for user group managers, tasks of members in the group are also included.

Before you begin
Role required: sn_cmdb_user, sn_cmdb_editor, or sn_cmdb_admin

About this task
If a certification task isn't properly assigned, you can reassign it to another user if you know who the appropriate reviewer is, or request an administrator to reassign the task.

Note:

- If the policy is configured to disallow empty attribute values, you will only be able to fail certification of the associated CIs, but you won't be able to certify them unless you populate the empty attributes first.
- If the policy is configured to disallow updates to field values, you won't be able to update non-compliant CIs, resulting in failing their certification.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**, then select **My Work** in the CMDB Workspace menu bar.
2. **Optional:** In the My tasks section, you can select multiple tasks to reassign tasks in bulk.

   a. Select the Certification tasks tab, then the task or tasks that you want to reassign.
      - Select **Reassign**: Reassign a task to another group or user if you aren't the appropriate user to review the field values and you know who the appropriate reviewer is.
        - **Assignment group**: Select the assignment group the user belongs to.
        - **Assign to:** Search for the appropriate reviewer to reassign this task to.
        - **Submit a reason for this action**: Enter a reason why you are reassigning the task.
      - Select the **Reassign** drop-down menu then select **Assign to me**: Assign the task that isn't assigned, to yourself, if you are the appropriate reviewer for this task.
      - Select the **Reassign** drop-down menu then select **Request reassignment**: Request to reassign the task, that is assigned to you incorrectly, to someone else. Enter a reason why the task needs to be reassigned, then select **Submit**.

   b. Select **Proceed**.

3. In the Certification tasks tab, select the certification task that you want to review.
4. Review the details of the certification task, then select **Review records to certify**.

   Note:
   You can reassign the tasks on this page, see Step 2 to review the reassignment options.

5. Select the records that you want to conclude the review for in the Review not completed tab, and then select **Certify** or **Fail**.

   You can select all the records showing on the page for bulk processing by selecting the check box in the first column header, and then selecting the **Select all <n> item/s in this list** link that appears.

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- The review conclusion of certified or failed is applied in bulk only to those certification fields in the selected records, which are still pending a review. For example, a certification field that is already marked as certified, isn't affected by selecting **Fail**. Only the unreviewed fields are marked as failed. Records whose review is concluded are moved to the Review completed tab.
- If the policy is configured to disallow empty attribute values, then CIs with empty fields won't be certified when you select **Certify**. In this situation, to certify those CIs, you must first populate the empty attributes.

The review conclusion of certified or failed is applied in bulk only to those certification fields in the selected records, which are still pending a review. For example, a certification field that is already marked as certified, isn't affected by selecting **Fail**. Only the unreviewed fields are marked as failed. Records whose review is concluded are moved to the Review completed tab.

6. Select the records that you want to review in details and then select **Review records**.

   A check mark next to a column header, denotes the fields whose values are included in this certification review (certification fields). All other columns show additional fields that are included only to help you identify records (display fields).

   When you select records (or CIs) to review, the fields (or attributes) for the selected records appear on the right, in a separate field review section. When you select a single record to review, the field values of the selected record appear. When you select multiple records to review, the field values don't appear. In that section, select the fields to apply your review results, or select **Select all fields** to apply the review results to all fields.

7. Select **Submit** when all the records have been reviewed.
   The **Submit** button isn't available until all the records in the task are reviewed and the task is complete.

What to do next

You can review the certification results in the Review completed tab, and change certification results or edit field values.

Review failed certification tasks in CMDB Workspace

Review records (and CIs) that failed the certification review and are assigned to you. Those exceptions appear in a list that is dynamically updated as certification tasks are being reviewed.

Before you begin

Role required: sn_cmdb_admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**, then select **My Work** in the CMDB Workspace menu bar.
2. In the Certification exceptions pop-up banner, select **Click here to view**.
3. Select a drop-down to expand a task to show the records and fields that failed the certification review.
4. Select the Certification Document Id of the field that you want to update.
   The Element column shows the fields that failed the review. The Certification Document Id column contains links to the respective records.
5. Review the details of fields that require updating.

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What to do next

See the Review certification tasks in CMDB Workspace topic to locate and review the respective certification task and to update incorrect field values. You can also directly access record and CI forms to update incorrect values.

Data Certification on Core UI

The legacy build of Data Certification on Core UI lets you centrally track and handle Data Certification tasks, create certification filters, and define certification schedules.

Alternatively, you can use the full functionality of Data Certification in the CMDB Workspace store app. For more information, see CMDB Data Manager experience in CMDB Workspace.

Note:

Data Certification in CMDB Workspace and the legacy build of Data Certification on Core UI operate separately, and aren't synchronized. Therefore, any Data Certification elements, such as filters and schedules, that you create in one of those implementations, doesn't appear and isn't included in the other implementation.

To convert schedules created in the legacy build of Data Certification on Core UI, into draft Certification policies in CMDB Workspace, see Convert legacy certification schedules into Data Manager Certification policies.

Activate Data Certification

Activate the Data Certification plugin to access the application. Activating this plugin also activates the Version Management plugin, which manages certification filter versions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Data Certification plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Installed With Data Certification

Activating the Data Certification plugin installs the following components.

Demo data is available with Data Certification. The demo data provides information including filters, schedules, instances, and tasks.

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Tables

Data Certification adds the following tables:

Table	Description
Certification Audit Definition [cert_audit_definition]	Stores collections of certification schedules that can be run as a single entity.
Certification Audit Definition Elements [m2m_cert_audit_def_cert_sched]	Lists the certification schedules in each certification audit definition.
Certification Audit Instance [cert_audit_instance]	Stores the certification instances associated with a specific audit definition.
Certification Element [cert_element]	Stores the data elements that are grouped into certification tasks.
Certification Filter [cert_filter]	Stores the data that requires certification using a filtering condition for the certification.
Certification Instance [cert_instance]	Stores a collection of certification tasks representing a single instance of a scheduled certification. This table extends the Audit [cert_audit] table.
Certification Schedule [cert_schedule]	Stores certification for a specific set of information on a specific table, what user or group the tasks are assigned to, and how often this certification is done.
Certification Task [cert_task]	Stores individual certification tasks. Certification Task extends the Task table.

Script Includes

Data Certification adds the following script includes:

Name	Description
CertificationAjax	Provides utilities that enable individual certification elements to be certified, rejected, or reverted.
CertificationTaskCreate	Custom code that extends the standard code for certification tasks.
CertTaskEscalationTimerPercentage	Updates time and percentage complete information for a certification.
CertificationUtilities	Provides utility functions for certification.

Client Scripts

Data Certification adds the following client scripts:

Name	Table	Description
Alert If Boxes Checked	Certification Task [cert_task]	Provides a warning if the certifier attempts to leave a record without certifying the checked elements

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Name	Table	Description
Check Table Name	Certification Schedule [cert_schedule]	Updates the table name when a different filter is selected.

UI Policies

Data Certification adds the following UI policies:

Name	Table	Description
Hide next scheduled run	Certification Schedule [cert_schedule]	Hides the *Next Scheduled Run* field when the schedule is set to run once or on demand only.
Hide Run When Not Active	Certification Schedule [cert_schedule]	Hide "run" associated fields when active is set to false.
Make table name read only	Certification Schedule [cert_schedule]	Makes the *Table* field read-only.
Hide Table field	Certification Element [cert_element]	Hides the *Table* field on the certification task form.
Make percent complete field read only	Certification Instance [cert_instance]	Makes the *Percent complete* field read only when the *State* is *Work in Progress, Closed Complete, Closed Incomplete,* or *Cancelled*.
Show Assign to fields	Certification Schedule [cert_schedule]	Shows the *Assign To* field when the assignment type is *User* and hides the *Assign To* field for all other assignment types.
Show Group field	Certification Schedule [cert_schedule]	Shows the *Assignment Group* field when the assignment type is *Group* and hides the *Assignment Group* field for all other assignment types.
Show User field	Certification Schedule [cert_schedule]	Shows the *User* field when the assignment type is *User*.
Show Assignment Fields	Certification Schedule [cert_schedule]	Shows the *Assign To Empty* option when the assignment type is *User Field* or *Group Field*.

Business Rules

Data Certification adds the following business rules:

Name	Table	Description
Adjust dates for cert tasks	Certification Instance [cert_instance]	Adjusts dates for tasks belonging to the certification instance when the dates are changed for an active certification.

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Name	Table	Description
Cancel Instance	Certification Instance [cert_instance]	Cancels all open certification tasks when an active certification is canceled.
certification audit instance events	Certification Audit Instance [cert_audit_instance]	Sends an inserted event when an active certification audit instance is created. Sends a completed event when an active certification audit instance is marked as complete or incomplete.
certification element events	Certification Element [cert_element]	Sends a failed event when an element of a certification is marked as failed.
certification instance events	Certification Instance [cert_instance]	Sends an inserted event when an instance of a certification is created. Sends a completed event when an instance of a certification is completed.
Certification Instance Rollup	Certification Task [cert_task]	Updates the *Percent complete* field on the certification instance record.
certification task events	Certification Task [cert_task]	Sends an inserted event when a task is inserted. Sends a completed event when a task is deactivated. Sends a canceled event when a task is canceled.
Certification Task Values	Certification Element [cert_element]	Updates the percent complete of the parent task when a certification element is updated.
Check Certification Audit Progress	Certification Instance [cert_instance]	Updates the completion status of the audit instance as a whole when a certification that is part of an audit is complete.
Clean Certification Views	Certification Instance [cert_instance]	Cleans all related records when a certification instance is deleted.
Copy certification schedule fields	Certification Instance [cert_instance]	Copies changes to the certification schedule to the certification instance.
Merge Certification Tasks	Certification Task [cert_task]	Merges two tasks together when a task is reassigned and there is another task for the same instance with the new user.
Prevent delete of Filter with Schedule	Certification Filter [cert_filter]	Prevents the deletion of a filter that is used in a schedule.
Reassign Notification	Certification Task [cert_task]	Sends out a notification to the new and previous assignees when a task is reassigned.
Rollup State	Certification Task [cert_task]	Updates all necessary parent items when task state is changed.
Update audit reference	Certification Task [cert_task]	Makes Data Certification records compatible with Desired State records. This rule makes sure that the *Audit* field is correctly completed when a record is inserted using Insert and Stay.

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Name	Table	Description
Update audit result	Certification Element [cert_element]	Makes Data Certification records compatible with Desired State records for reporting purposes. This rule puts certified values in the *Desired value* column when an audit is *Certified*. It also puts actual values in the *Discrepancy value* column when an audit is *Failed*.
Update follow_on_task & audit references	Certification Element [cert_element]	Makes Data Certification records compatible with Desired State records for reporting purposes. This rule makes certification tasks compatible with follow-on tasks and displays all tasks, regardless of origin.
Update next run time	Certification Schedule [cert_schedule]	Updates the *Next scheduled run* field when a schedule runs *Daily*, *Weekly*, *Monthly*, or *Periodically*.
Verify Fields	Certification Schedule [cert_schedule]	Verifies that no field is used in both *Display* and *Certification* fields when the fields of a certification schedule are changed.

Formatter

Data Certification adds the following formatter:

Formatter

Name	Description
Certification Task Elements	Enables custom user interface formatting of elements on a certification task. For example, displays the green check mark and red exclamation point to use when certifying an element.

Properties

Properties

Name	Table	Description
glide.ui.cert_task_activity.fields	System Properties [sys_properties]	Defines which journal field is the task activity field. Default: work_notes

User Roles

Data Certification adds the following user roles:

User Roles

Role	Contains Roles	Description
certification_admin	certification	Can: • Create and configure certifications • Override provided answers

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User Roles (continued)

Role	Contains Roles	Description
		• Perform certification tasks for certification task owners • Send certification task notifications to users and owners at any time • Cancel or delete certifications in any state
certification_filter_admin	certification	Can create and manage all data certification filters.
certification	none	Can update active or incomplete tasks assigned to them or to groups of which they are a member. Can also update configuration items owned by them or by groups of which they are a member. Receives email notifications when assigned certification tasks.

Events

Data Certification adds the following events. The ServiceNow system uses these events to send email notifications to task owners and managers about changes in certification records.

Name	Description
cert_audit_instance.completed	A certification audit instance has been completed.
cert_audit_instance.inserted	A certification audit instance has been inserted.
cert_element.failed	A certification element has failed certification.
cert_instance.complete	A certification instance has been completed.
cert_instance.inserted	A certification instance has been inserted.
cert_task.cancelled	A certification task has been canceled.
cert_task.completed	A certification task has been completed.
cert_task.escalate	A certification task record has been escalated.
cert_task.inserted	A new certification task has been created.
cert_task.notifications	A certification task notification has been resent to a user.
cert_task.overdue	A certification task is past its specified completion date.
cert_task.reassign	A certification task has been reassigned.
cert_task.warning	A new task escalation point has been reached.

Email Templates

Data Certification adds the following email templates:

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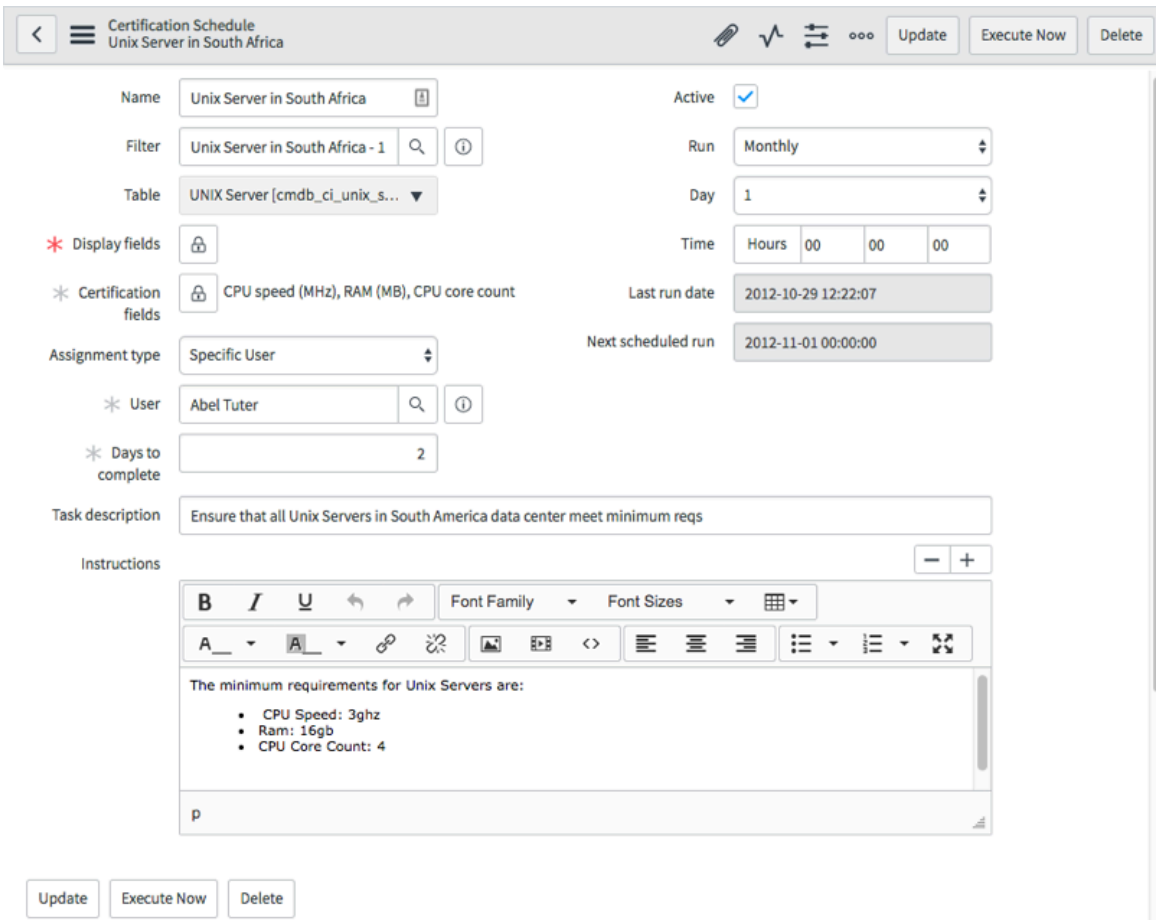
Name	Message
certification.task.cancelled	A certification task assigned to you/your group as part of the data certification and management process has been canceled.
certification.task.reminder.inserted	A certification task that has been assigned to you/your group as part of the data certification and management process requires attention.
certification.task.reminder.outstanding	A certification task that has been assigned to you/your group as part of the data certification and management process requires attention.
certification.task.reminder.overdue	A certification task that has been assigned to you/your group as part of the data certification and management process is overdue.

Certification schedules

A certification schedule defines the information that requires certification and the frequency of execution.

At each time interval specified, or on-demand, the certification schedule generates a set of certification tasks based on set conditions. Use the Preview Certification Tasks related link to preview the certification tasks generated from a certification schedule.

Certification schedule



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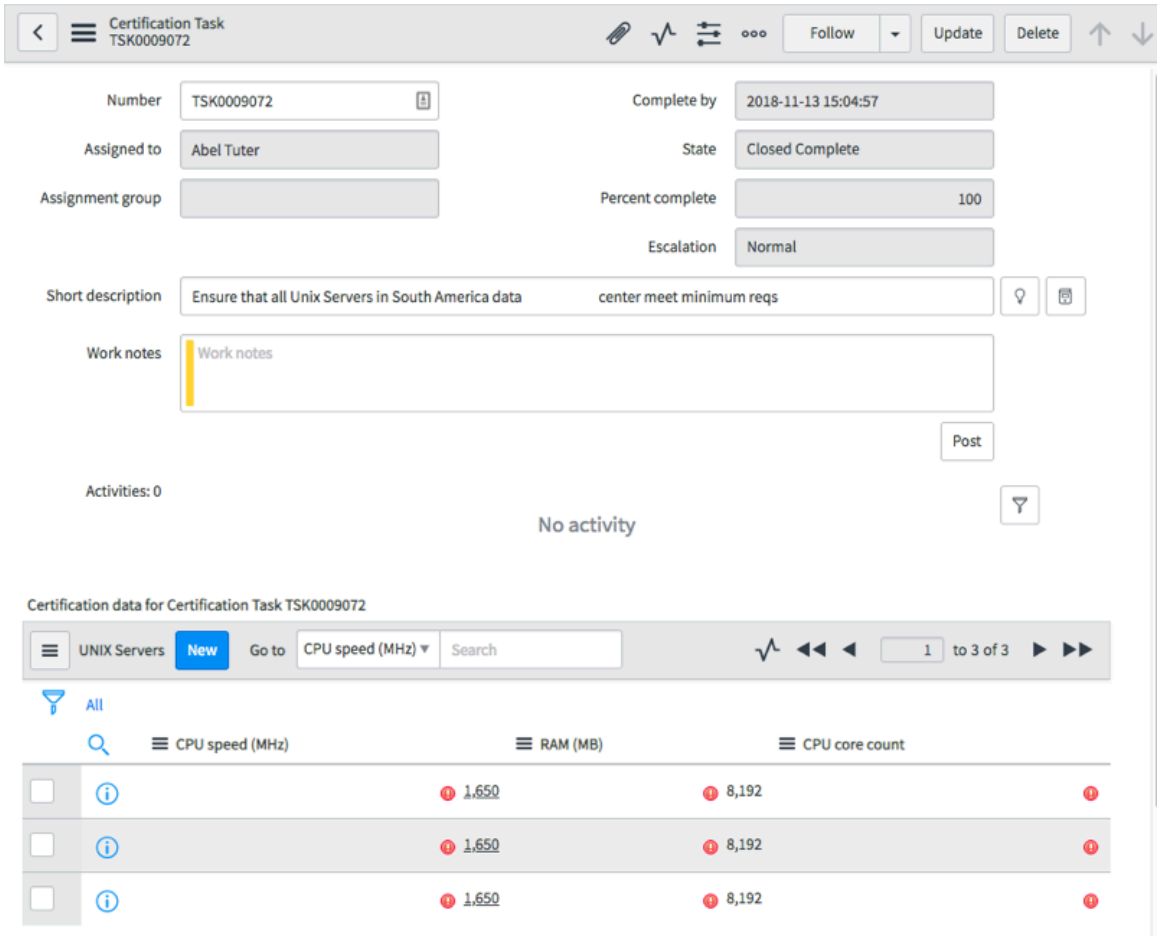
Certification tasks

A certification task represents the work of verifying the data associated with a particular record.

Task owners are responsible for performing the certification tasks. Tasks have an associated workflow that sends reminders to the task owner and, if necessary, the manager of the owner at regular intervals.

Certification task



Note:
If the message

```
Record cannot be certified until the instance is finished
 creating all certification tasks and elements. Reload the
 page to try again
```

appears, it signifies that:

- A large amount of data is present in the cmbd_ci and cmdb_ci_server tables.
- Data certification task processing is not complete (Data Certification jobs are still in process).

As directed, reload the page and wait for the processing to complete.

Clean up invalid elements

Use the **Clean up invalid elements** UI action to query and delete certification elements that reference invalid records. Each certification task has a certification schedule, and each

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certification schedule has Table and Filter fields. When you use this UI action, it performs the following processing:

1. Collects all available records from Table field in the certification schedule with filters that are available in certification schedule.
2. Collects all certification elements associated with the current certification task.
3. Deletes the certification elements that are no longer available for the data collected in the previous step.
4. After deleting invalid records, it recomputes the certification completion percentage using the following formula:

   (1 - (number of certification elements pending / total no of certification elements associated)) * 100;)

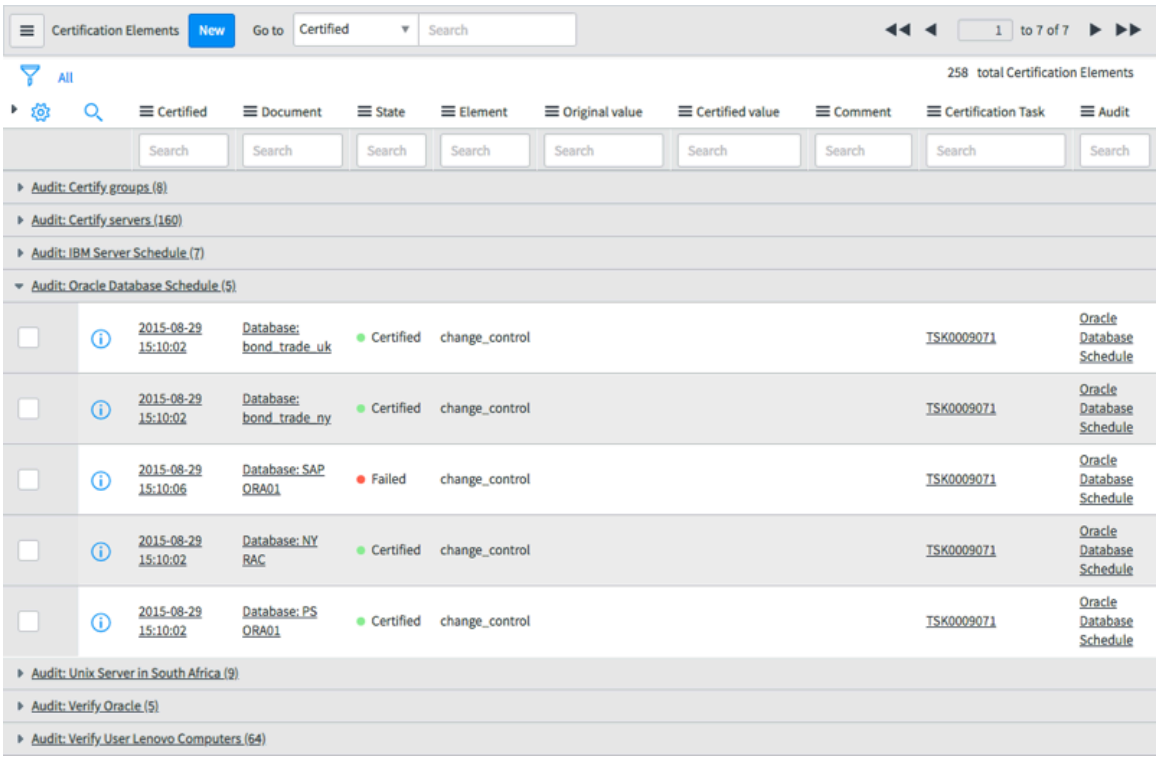
5. If there are no certification elements with a Pending status, it marks the associated certification task as Closed, and deactivates it.
6. If there are remaining certification elements with a Pending status, it activates the associated certification task and changes its status to Work in Progress.

Certification elements

Each element of each record being certified is tracked in its own certification element record.

Also tracked are the date and time when the element was certified, comments, and the original and certified values of the field. You can view elements on individual certification tasks. Or, you can directly access the Certification Elements [cert_element] table by navigating to **All** and then in the Filter box, entering `cert_element.list`.

Certification elements



Certification instances

A certification instance is the collection of certification tasks for one execution of a certification schedule.

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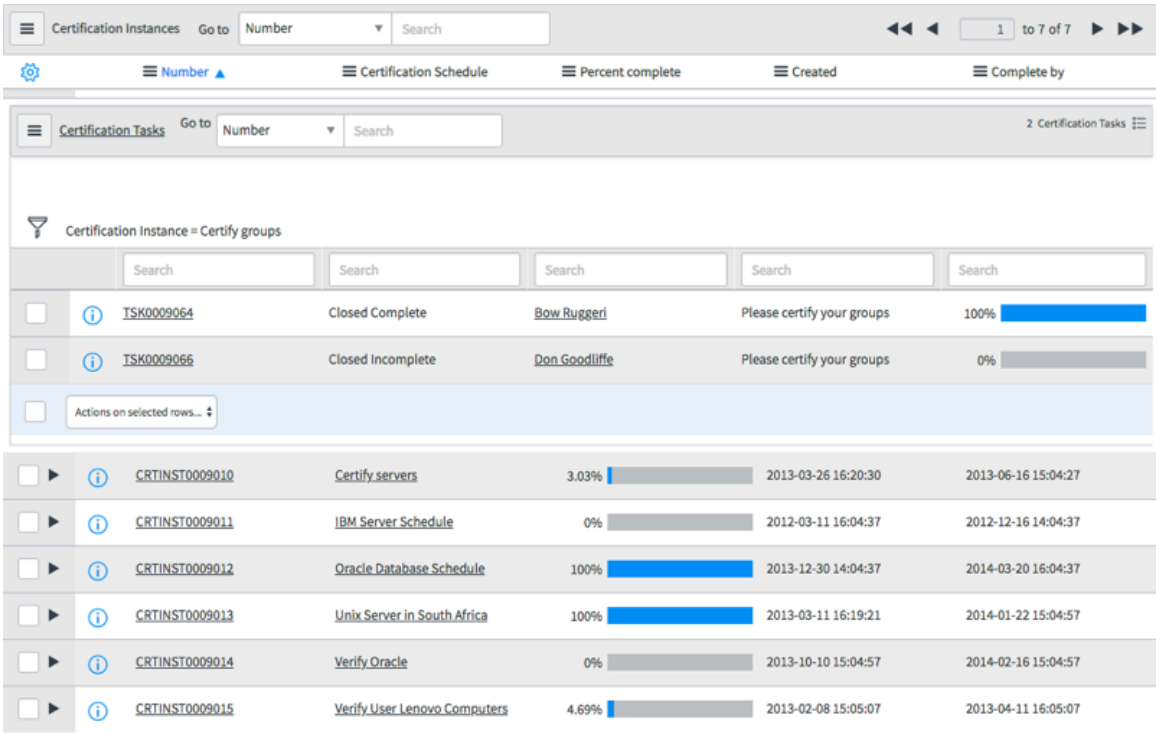
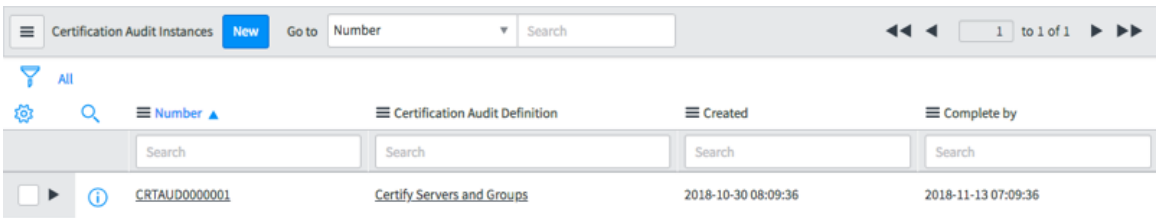
Certification instances



Certification audit instances

A certification audit instance is a collection of the certification instances and tasks generated by a single execution of the certification audit definition.

Certification audit instance



Certification audit definition

A certification audit definition is a collection of certification schedules that can be run at once.

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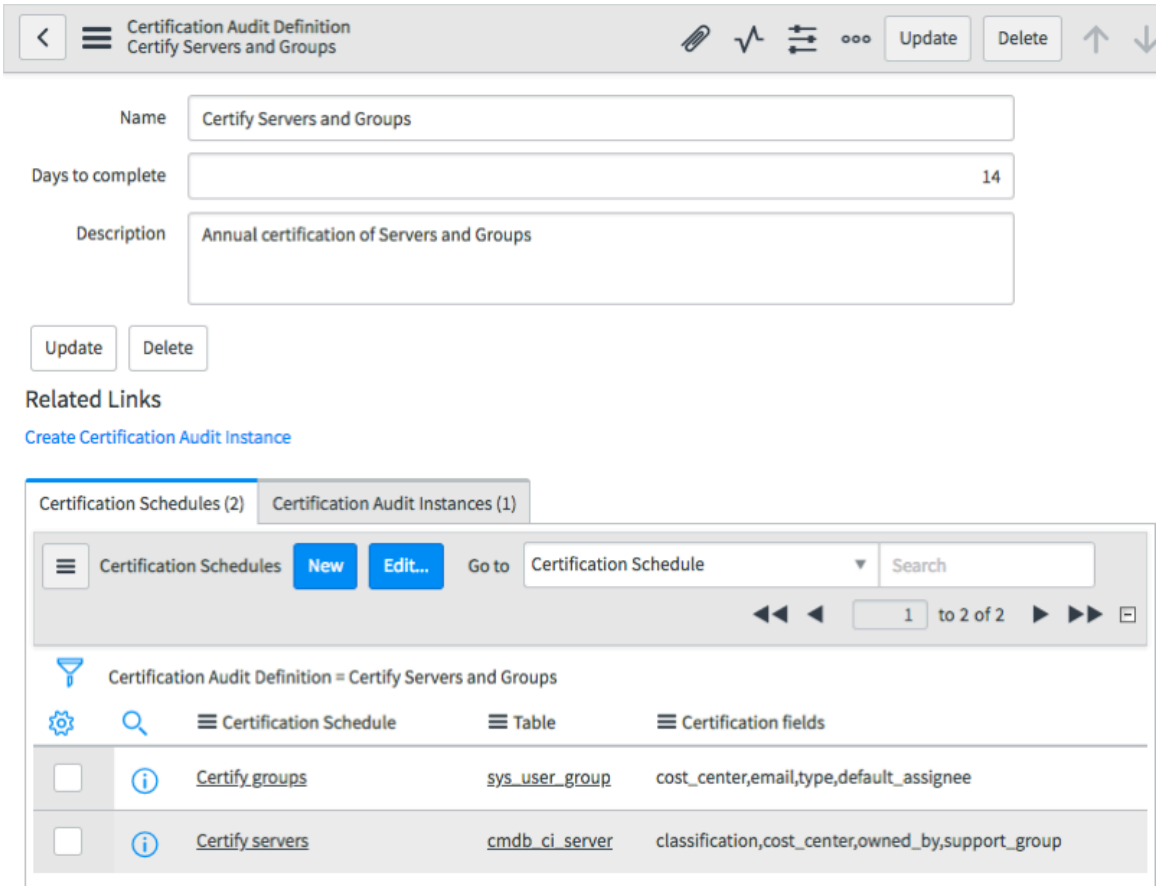
Certification audit definition



Data Certification Overview module

The Data Certification Overview module displays various data certification-related reports on the Data Certification Console homepage.

The Overview module is a type of homepage.

The different levels of access are:

Access levels per role

Role	Access
certification	• View (view overview page and refresh reports) • Review, certify, and fail certifications
certification_admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) View, customize
admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) • Edit (can edit reports)

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Data Certification Overview Module

The Overview module includes the following reports:

Data Certification Overview Module Description

report	Description	Table
30/60/90 Day Aging	Groups tasks by the number of days (*30*, *60*, *90*, and *90 and over*) since the task was opened.	Certification Task
Certification Instances	Lists all certification instances.	Certification Instance
Certification Progress Report	Groups tasks by task owner, indicating task progress as a percentage.	Certification Task
Certification Task Completed Report	Groups tasks by task owner, indicating tasks that are complete.	Certification Task
Exceptions To Date	Lists all task elements that have comments added and a state of *Failed* or *In Progress*.	Certification Element
Functional Roll Up	Lists the managers that have groups with assigned certification tasks. The report is a horizontal bar chart, grouped by status, with each bar representing a manager of an assignment group.	Certification Task
Hierarchical Roll Up	Shows the managers that have employees with assigned certification tasks (task owners). The report is a horizontal bar chart, grouped by status, with each bar representing a manager of a task owner (identified in the **Assigned to** field).	Certification Task
Upcoming Schedules	Lists all schedules that are scheduled to run within the next 30 days.	Certification Schedule

Related topics

Use the Data Certification Overview module

Use the Data Certification Overview module

View the status of data certification tasks.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Overview**.
2. Click elements within the reports to obtain more information.
   For example, click any of the colored bars in the **Functional Roll Up** bar chart and detailed information replaces the Data Certification Console screen.
3. Update some fields directly on the overview page.

Example:
For example, in the red box on the image shown, a certification schedule is being updated in the certification instances report.

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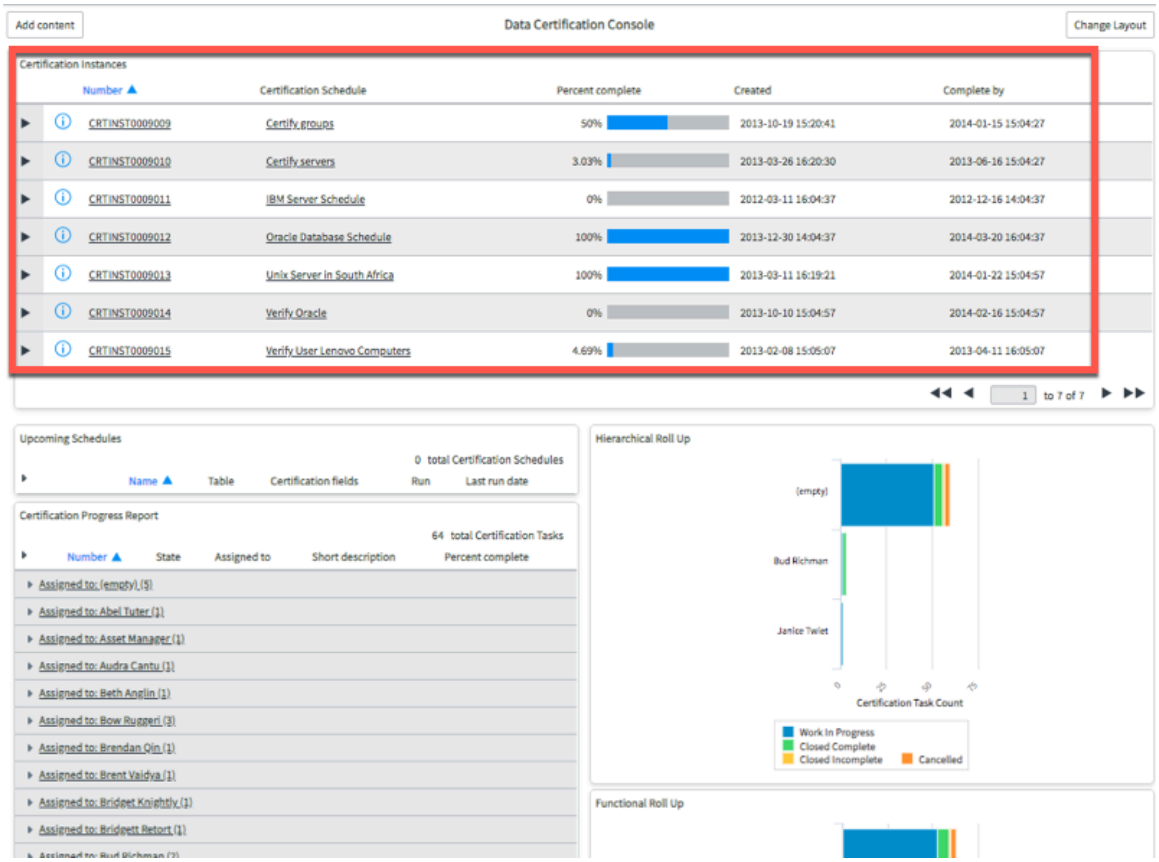
Data certification overview module



Related topics

Data Certification Overview module

Data Certification planning

Initial planning can make the certification process more successful.

By defining certification schedules and certification audit definitions, users with the certification_admin role establish when certifications are performed, who performs it, and what data must be certified.

Required Roles

Users with the certification_admin role can view filter versions. These users can create, update, and delete filters, if they have the proper access to necessary tables. In the base ServiceNow system, certification_admin users have limited system rights and do not have access to all the tables required for creating a filter. When assigning compliance resources, make sure to grant additional roles to the certification_admin user as needed. For example, this user requires roles that grant access to these tables:

- Company `[core_company]`
- Cost Center `[cmn_cost_center]`
- Schedule `[cmn_schedule]`

Planning Data Certification

Planning the data certification process requires defining:

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- The certification schedule defines certification for a particular set of information on a particular table. It also generates certification tasks to perform that certification. One certification task is generated per task owner and a certification instance record groups the tasks.
- The optional certification audit definition groups some certification schedules to be performed together and generates certification audit instances to perform them.

The following questions require answers for each certification schedule:

- What information requires certification?
- When is the due date for certification?
- Who must perform the certification?

Create a certification filter

A filter is a subset of configuration items from any ServiceNow table that is created with a standard condition builder.

Before you begin

Role required: admin

About this task

An example is a filter that selects all UNIX servers in the Australian data center.

With filters, you can:

- Create multiple versions of a filter and then select the version you want to use.
- Use one filter on multiple certification schedules.
- View the number of records that match your filter as you create the conditions.

Note:
Be sure to create certification filters before creating certification schedules.

Procedure

1. Navigate to **All** > **Data Certification** > **Certification Filters**.
2. Click **New**.
3. Fill in the form (see table).
4. Click **Submit**.

   This action saves the filter as version 1.

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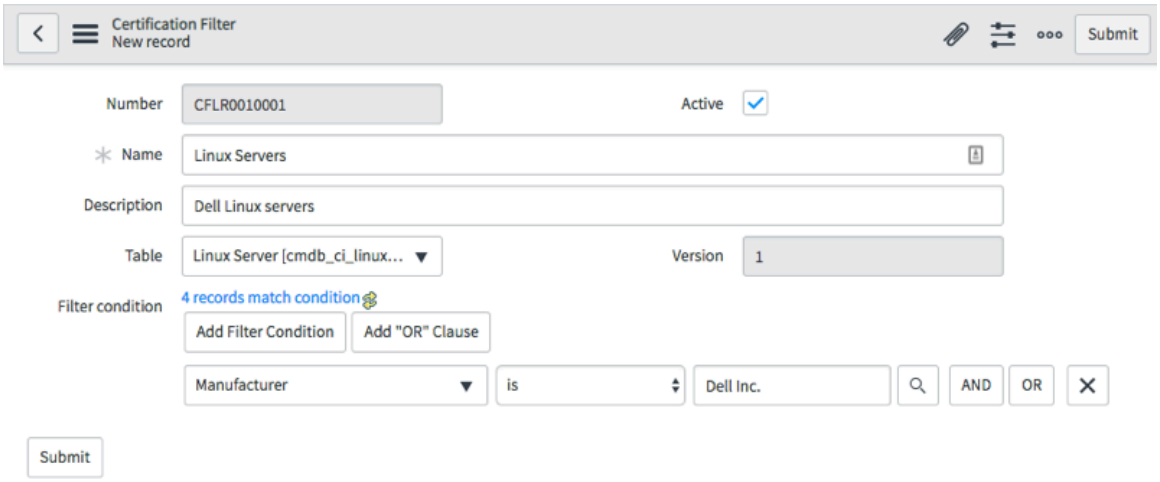
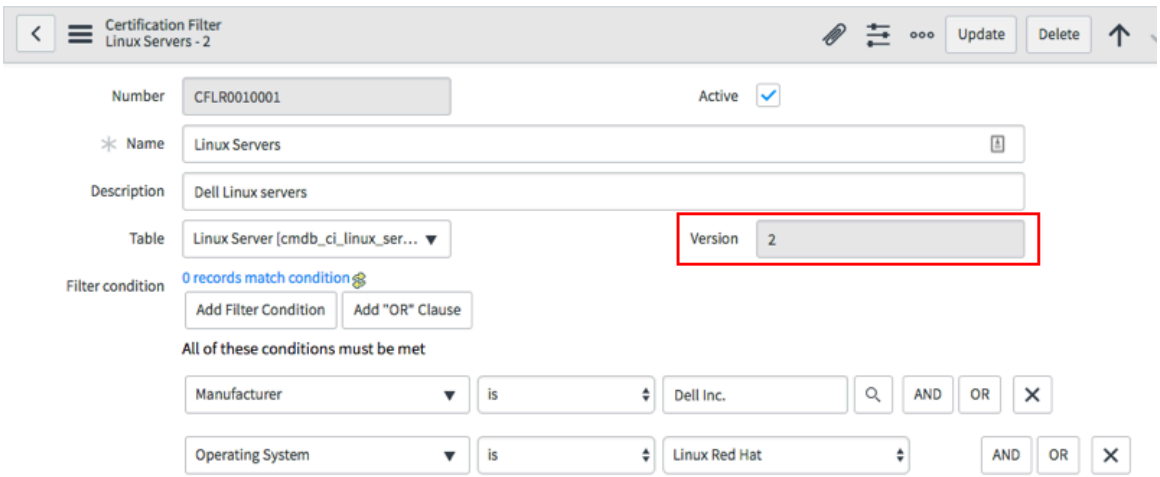
Certification filter V1



5. To create another filter version, modify the filter conditions and click **Update**.

   The system saves the new filter and increments the version number.

Certification filter V2



   By default, the Certification Filters list shows only the current version of each filter. To see all filter versions, click **All** in the breadcrumbs.

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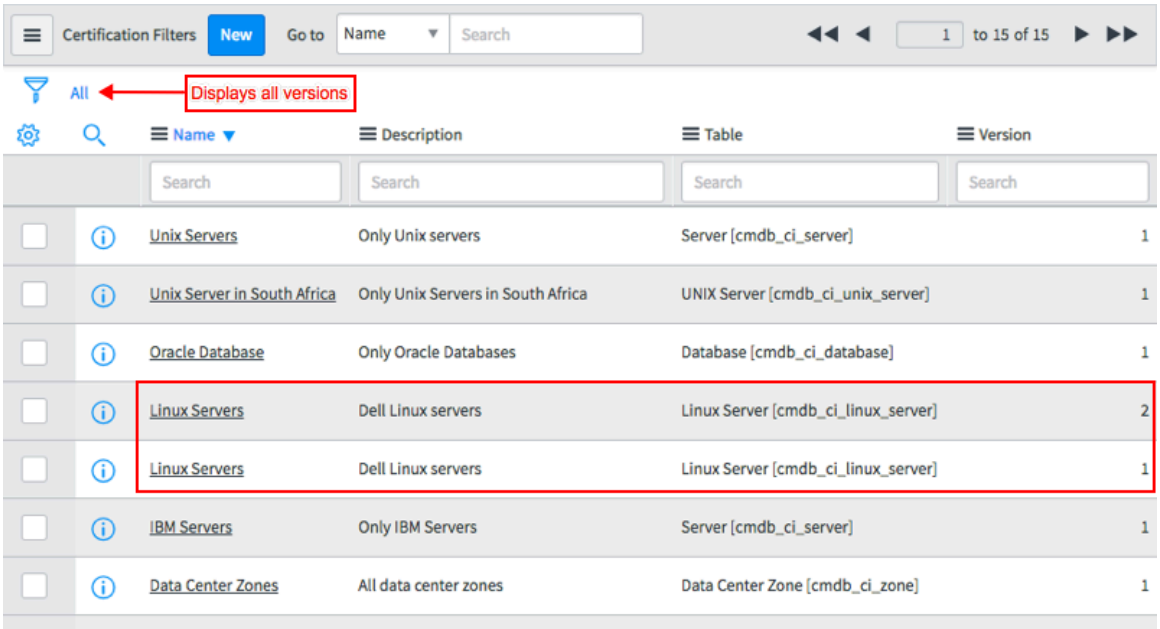
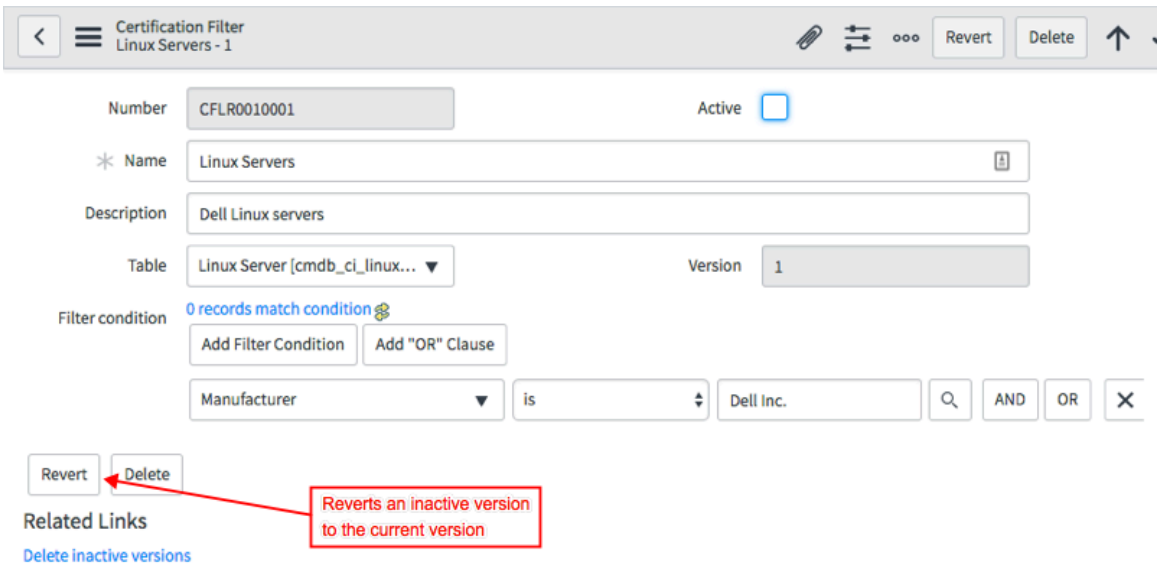
Certification Filter List



6. To make an inactive filter the current version, open the inactive filter and click **Revert**.

Certification filter revert



This action creates a new, active version of the filter and makes all previous versions inactive.

7. To delete a single filter version, open that version record and click **Delete**.
8. To delete inactive versions of a filter, click **Delete inactive versions** under **Related Links** in that filter record.

   You cannot delete a filter that is used in a schedule definition. The system displays a warning and the filter is not deleted.

Creating certification filters

Field	Description
Name	[Required] Filter name.

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Field	Description
Description	[Optional] Brief description of the filter.
Number	[Read-only] Automatically assigned filter identification number.
Table	Table containing the records to be filtered. Use of the Database View `[sys_db_view]` table is limited by version.
Active	Control to make the filter available for use from the **Filter** field on the Certification Schedule form.
Version	Current version of this filter. Any significant changes to the filter make the current version inactive. The system copies the updated filter, marks it as active, and increments the version number. The system saves all versions of the filter and makes them available to users. More than one version of a filter can be marked active.
Filter condition	Field, operator, and value to create the condition. The available options depend on the table selected. You can view the number of records that match the filter by clicking the refresh icon. **Refresh Conditions**  If the filter does not match any records, the system marks the certification instance as **Closed Complete**, with the **Percent complete** value set to **100%**.

Related topics

Data Certification planning

Define a certification schedule

A certification schedule specifies the fields to display, the fields that require certification, certification task assignments, completion requirements for task owners, frequency of schedule, and detailed instructions.

Before you begin

Role required: admin

About this task

Use the preview option to see what tasks are created before saving the schedule. If the tasks are not what you want, edit the schedule and preview the tasks again. The system creates certification tasks automatically when it executes a schedule.

To schedule a certification:

Procedure

1. Navigate to **All** > **Data Certification** > **Schedule Definitions**.
2. Click **New**
3. Fill in the fields (see table).
4. Click **Submit**.

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Defining A Certification Schedule

Field	Description
Name	A schedule name.
Filter	A certification filter for this schedule.
Table	[Read-only] The table holding the records to be certified. To change the table name, select a different **Filter** or create a new **Filter**.
Display fields	The fields displayed in the Certification Task list to provide context. These do not require certification themselves. For example, although users are not required to certify the **Name** field of a record, it displays so that users know what record they are certifying.
Certification fields	The fields to certify on this certification schedule.
Assignment type	A choice list to select how the certification schedule assigns the certification tasks. ○ **User Field**: Select a user reference field on the table being certified. As an example, select the user named in the **Managed by** field to identify the user who performs the task. This selection displays the **Assign to** and **Assign to empty** fields. If the reference field on the record is empty, the value in the **Assign to empty** field is used. ○ **Specific User**: Select a specific user to perform the tasks. This selection displays the **User** field. ○ **Group Field**: Select a group reference field on the table being certified. As an example, select the **Support group** field to identify the user who performs the task. This selection displays the **Assign to group** and **Assign to empty** fields. All members of the group from the reference field on the record are assigned to the tasks. If the reference field on the record is empty, the value in the **Assign to empty** field is used. ○ **Specific Group**: Select a specific group to perform the tasks. This selection displays the **Group** field. All members of the named group are assigned to the tasks.
User	This field appears when: ○ **Assignment type** is **Specific User**. This system assigns this user to all certification tasks for this schedule. ○ The **Assign to empty** field is set to **Create Assigned Task**, and you have selected **User Field** as the assignment type. The system assigns this user to certification tasks containing unassigned records. You can only select users with the certification role.
Assign to group	The group field that defines the group assigned to the certification tasks. This field is available only when the **Assignment type** is **Group Field**.
Group	The specific group to which certification tasks are assigned for this schedule. This field is available only when the **Assignment type** is **Specific Group**
Assign to	The user field that defines which user is assigned to the certification task. This field is available only when the **Assignment type** is **User Field**.
Assign to empty	The behavior to use if the field selected in **Assign to** or **Assign to group** is blank on the record being certified. For example, if a task must be assigned to

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Field	Description
	a manager, but no manager is identified, the value in this field determines what happens. This field appears only when the **Assignment type** is **User Field** or **Group Field**. The possible selections are: ○ **Do Not Create Task**: No task is created when the **Assign to** or **Assign to group** field is empty. ○ **Create Unassigned Task**: Create a task, but do not assign it to any user or group. The task can be manually assigned later. ○ **Create Assigned Task**: Create a task and assign it to the user or group specified. If you selected an assignment type of **User Field**, the **User** field is available. If you selected the **Group Field** type, the **Group** field is available. The schedule automatically creates certification tasks for all records that do have "Assign to" populated, regardless of which selection you make for "Assign to empty."
Days to complete	[Required] The number of days that task owners have to complete the certification tasks. When the certification schedule is part of a certification audit definition, the **Days to Complete** audit definition value overrides the value set for the certification schedule.
Active	Check box to activate this certification schedule, generating certification tasks at the scheduled date and time. Clear this check box to hide scheduling fields on the form (except **Last run date**) and not generate certification tasks.
Run	How often to run the schedule that generates certification tasks: ○ Daily ○ Weekly ○ Monthly ○ Periodically ○ Once ○ On Demand
Day	When **Run** is **Weekly**, the day of the week when the schedule runs and generates certification tasks. When **Run** is **Monthly**, the day of the month the schedule runs and generates certification tasks. If the day is **29**, **30** or **31**, the certification runs on the last day of the month for shorter months.
Repeat Interval	When **Run** is **Periodically**, the frequency that the schedule runs to generate certification tasks, entered in time, days, or both. For example, set **Days** to **10** and **Hours** to **14:00:00** to run the schedule and generate certification tasks every 10 days at 14:00.
Starting	When **Run** is **Periodically** or **Once**, the date and time the schedule runs and generates certification tasks.
Time	When **Run** is **Daily**, **Weekly**, **Monthly**, or **Once**, the time of day, on a 24-hour clock, the schedule runs and generates certification tasks.
Last run date	[Read-only] The date and time that the schedule ran last, either on its regular schedule or manually, and generated certification tasks.

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Field	Description
Next scheduled run	[Read-only] The next date and time the schedule runs and generates certification tasks.
Task Description	A description to add to the **Short Description** field of the certification task.
Instructions	An HTML field for providing instructions to the user or group performing the certification.

Related topics

Data Certification planning

Preview a certification task

Previewing certification tasks saves any changes to the Certification Schedule form and displays the tasks that are created when you execute the certification schedule.

Before you begin

Role required: admin

About this task

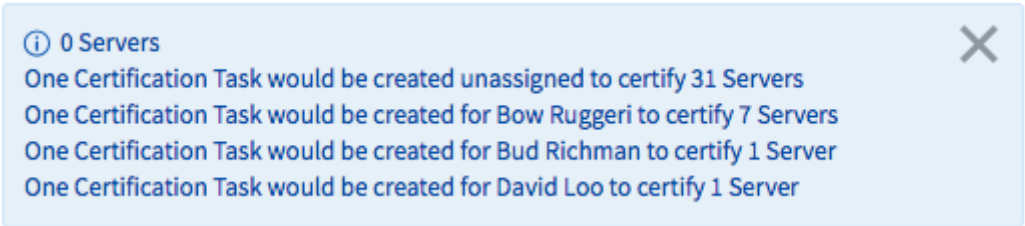
Previewing tasks is especially useful if you want to test different combinations of options in the **Assignment type**, **Assign to**, and **Assign to empty** fields.

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Schedule Definitions**.
2. Click a certification schedule **Name**.
3. In **Related Links**, click **Preview Certification Tasks**.

   The tasks to be created appear at the top of the screen.

Certification info message



Related topics

Data Certification planning

Define a certification schedule

Use a certification schedule notification

After you define a certification schedule, the system automatically sends notifications to specific users based on the information in the schedule.

Before you begin

Role required: admin

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About this task

The following notifications are sent automatically:

Certification Schedule Notifications

Time elapsed to end date	Email template name	Notification message is sent to
0% (when task is created)	certification.task.reminder.inserted	Task owner or assignment group, if specified
50%	certification.task.reminder.outstanding	Task owner or assignment group, if specified
75%	certification.task.reminder.outstanding	Task owner, assignment group, if specified, and manager of the task owner, if specified
95%	certification.task.reminder.outstanding	Task owner, assignment group, if specified, and manager of the task owner, if specified
100%	certification.task.reminder.overdue	Task owner, assignment group, if specified, and manager of the task owner, if specified

The email templates used in the notifications can be edited, for example, to change the email message text.

Executing a Certification Schedule

Executing a certification schedule generates certification tasks based on the schedule.

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Schedule Definitions**.
2. Click a certification schedule **Name**.
3. Click **Execute Now**.

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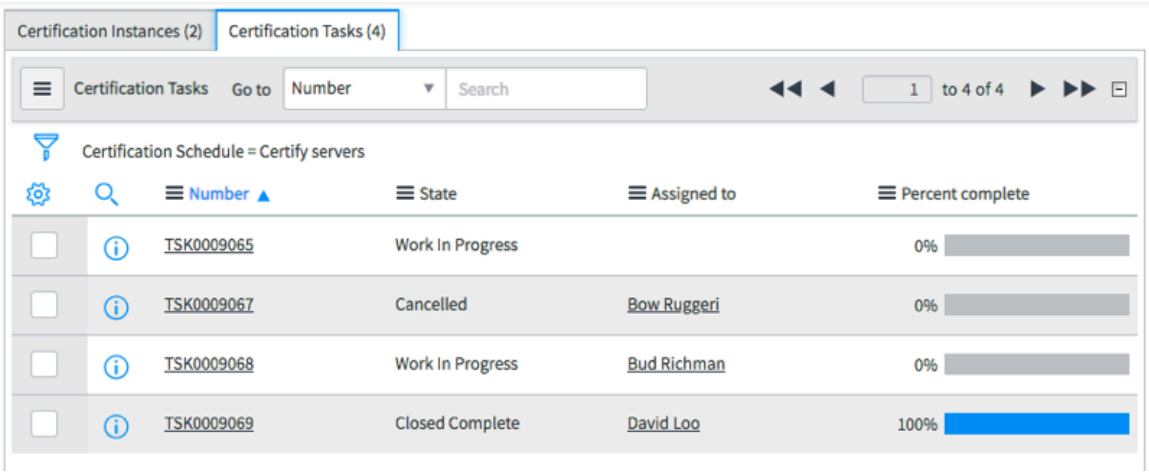
The related lists **Certification Instances** and **Certification Tasks** display the instances or tasks generated by the schedule. The amount of time it takes to generate all certification tasks depends on the size of the table selected and how many fields require certification.

Execute certification schedule



Define and create a certification audit

A certification audit is a collection of certification schedules that can be run as a single entity.

Before you begin

Role required: admin

About this task

Certification audits can be useful when there are multiple certification schedules. After creating a certification audit definition, you can generate a certification audit instance. The certification audit instance is a collection of the certification instances and tasks generated by a single execution of the certification audit definition.

Procedure

1. Navigate to **All** > **Data Certification** > **Audits** > **Audit Definitions**.
2. Click **New**.
3. Fill in the fields (see table).
4. Right-click the header bar and select **Save**.
5. In the **Certification Schedules** related list, click **Edit**.
6. In the **Collection** list on the left, select one or more schedules and click **Add**.
7. Click **Save**.
8. In **Related Links**, click **Create Certification Audit Instance**.

   The system generates an audit instance based on the certification schedules selected. All audit instances based on this audit definition are listed in the **Certification Audit Instances** related list.

Defining and Creating a Certification Audit

Field	Description
Name	The name of the audit definition.

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Field	Description
Days to Complete	The number of days that task owners have to complete the certification tasks created by this audit definition. Overrides the identical field on the certification schedule.
Description	A short description of the intended audit.

Related topics

Data Certification planning

Track a certification audit instance

You can view a list of all certification audit instances at any time.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Audits** > **Audit Instances**.
2. View the **Certification Instances** related list.

   The list contains each of the associated instances generated as part of the audit.

Related topics

Data Certification planning

Data certification performance

After the certification process has been planned, certification tasks can be performed according to defined schedules.

Users with the certification role can perform certification tasks. The certification tasks can be tracked as part of certification instances.

Related topics

Data Certification planning

Define a certification schedule

Installed With Data Certification

View and resolve certification tasks

After you execute a certification schedule manually or at a scheduled time, the ServiceNow system performs certain actions.

- Creates certification tasks for any records that meet the filter requirements in the specified table, like tasks from the Configuration Item `[cmdb_ci]` table.
- Assigns the new tasks to the user or group identified in one of these certification schedule fields:
  - Assign to
  - User
  - Assign to group
  - Group

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- Places the new tasks in the *Work in Progress* state.
- Adds the certification schedule *Short description* and *Assigned to* values to the corresponding fields on the certification task record.
- Adds the certification schedule *Days to complete* and *Complete by* date fields to the certification task record, based on when the task is created.

Note:
If the certification filter does not match any CIs, the system sets the *State* to *Closed Complete* and the *Percent complete* to *100*.

To view tasks assigned to you, navigate to **Data Certification** > **Tasks** > **My Tasks**. To resolve tasks assigned to you, see Certify an element. For more information about purpose and usage of certification tasks, see certification tasks.

The following information is tracked on the certification task record:

Certification task record

Field	Description
Number	An identification number for the certification task.
Assigned to	The user responsible for certifying the data.
Assignment group	The group responsible for certifying the data.
Complete by	[Read-only] A date field containing a deadline for the task. This field is automatically filled in based on the Days to Complete field on the certification schedule.
State	[Read-only] The current state of the certification task. The selections are: Work in Progress, Closed Incomplete, Closed Complete, and Cancelled.
Percent complete	The task progress as a percentage. This field is read-only when a task is in a Closed Incomplete, Closed Complete, or Cancelled state.
Escalation	[Read-only] The escalation level of the task. When 0–49% of the time to Complete By has elapsed, this field is set to Normal. At 50%, this field changes to Moderate and an email reminder is sent to the task owner. At 75%, this field changes to High and an email reminder are sent to the task owner and the manager of the task owner. At 95%, this field remains set to High, but a second email reminder is sent to the task owner and manager.
Short Description	A short description of the task. This field is automatically filled in with the text from the certification schedule of the Task description field.
Work notes	Information about work performed on the certification.

Certify an element

The Certification Task form contains a list of all elements to be certified.

Before you begin
Role required: admin

About this task

Note:
After you certify all the elements in a task, no elements can be reverted.

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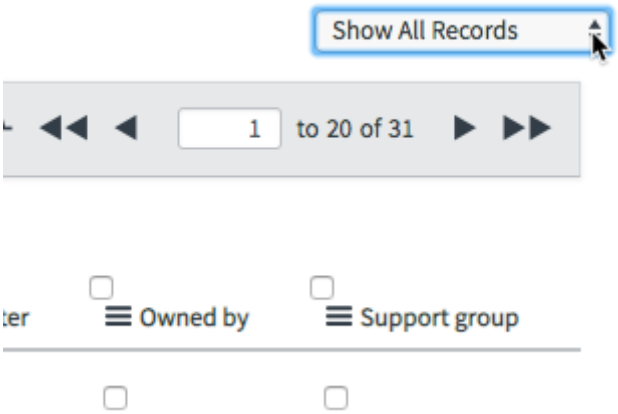
Procedure

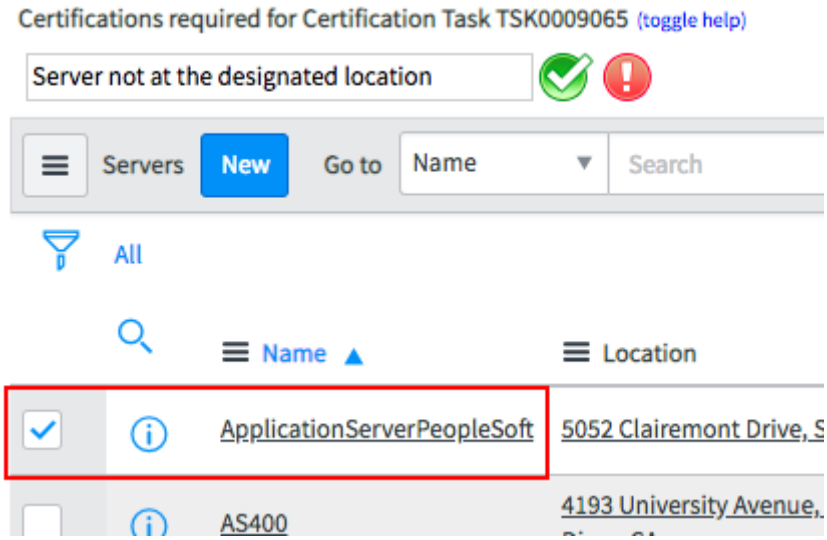
1. Navigate to **All** > **Data Certification** > **Tasks** > **My Tasks**.
2. Open a certification task with a *State* of *Work in Progress*.
3. In the upper right corner of the list, select records that require certification for this task or all records that are part of this certification task.

Certification list 3



4. Select the check box beside a certification element.
5. In *Optional comment for checked elements*, above the list, enter information that would be useful to others.

Certification list



6. Do:
   - Click the green check mark to certify the element.
   - Click the red exclamation point to fail the element.
7. To see the certified or failed element, set the view to *Show All Records*.

   A green check mark or red exclamation mark appears beside the element.

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8. Point to an icon to see any certification comments.
9. Ensure that all elements have the correct certification, either accepted or rejected.

   After you certify all elements, no elements can be reverted. When all elements of a certification task are certified or rejected, the task *State* changes to *Closed Complete*.

View an audit result

View audit results after you certify the elements.

Before you begin

Role required: admin

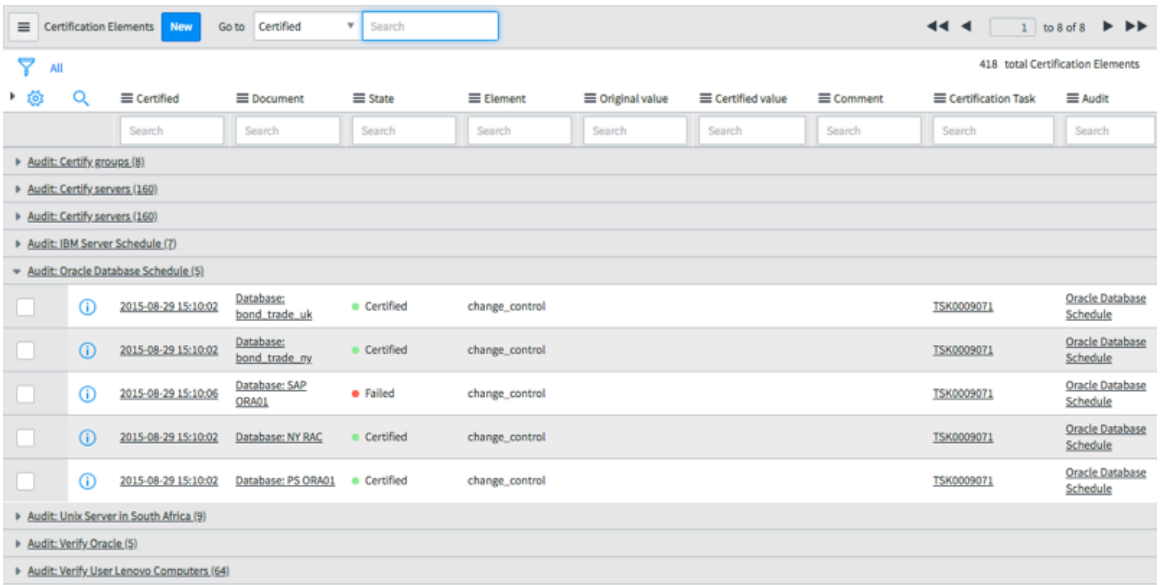
Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Audit Results**.

   The list of data certification audit results appears, grouped by certification instances. Certified configuration items show the *Original value* only. Failed CIs contain the *Certified value* and the *Original value*.

2. Click the links in the list to open any of the related records.

Data cert audit results



Export the certification list

Users with the certification_admin role can export the certifications list and save the list in Excel, CSV, XML, or PDF format. This list is useful when you have a long list of certification elements or if many different users are assigned to certify elements on a single certification schedule.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**
2. Open a task.
3. Open any column context menu in the certification data list and complete the export.

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Reset certifications

You cannot reset any element after all elements are certified.

- To reset individual certifications, right-click the element in the certification list and select **Revert Certification**.
- To reset the entire task to its starting point, click the **Reset all Certifications to Pending** related link.

Track a task with a certification instance

The Certification Tasks related list on the certification instance record provides information about associated tasks.

Before you begin

Role required: admin

About this task

The *State* field on the certification instance record is read-only and is based on the cumulative states of the certification tasks associated with the instance. The *Percent complete* column allows users with the certification_admin role to track task progress quickly. For more information, see Track Certification Tasks.

To track a certification instance:

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Instances**.
2. Click a certification instance *Number*.
3. View and edit the following fields as necessary.

Certification instance

Field	Description
Number	[Read-only] Automatically generated identification number for the instance.
Certification Schedule	The certification schedule used to create the certification instance.
State	[Read-only] Current state of the certification instance: Work in Progress, Complete, Closed Incomplete, or Cancelled. For more information, see Track Certification Tasks.
Created	[Read-only] Date and time the certification instance was created. Date is filled in automatically when the Execute Now button clicks the associated certification schedule.
Complete by	[Required] Date and time when the certification instance must be completed. The system updates this field when it executes the schedule, using the deadline specified on the instance. All certification tasks associated with the certification instance must be marked Complete, Closed Incomplete, or Cancelled before the instance is complete.
Percent complete	Percentage of the instance that has reached the Closed Complete state. This field is automatically filled in based on the Percent Complete fields on the associated certification tasks.

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Field	Description
Task Description	Information about the certification instance. This field automatically displays the text from the Task description field of the associated certification schedule.
Instructions	Field for providing instructions to the user or group performing the certification. This field is automatically filled in with information from the Instructions field on the associated certification schedule.

Cancel a certification instance

Users with the certification_admin role can cancel a certification instance.

Before you begin
Role required: admin

About this task
The instance must have a *State* of *Work in Progress*. Canceling a certification instance:

- Changes the certification instance *State* to *Cancelled*.
- Changes all associated *Work in Progress* certification tasks to *Cancelled*.

To cancel a certification instance:

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Instances**.
2. Click a certification instance *Number*.
3. Click **Cancel**.

Track a certification task

Use the certification task state to track the progress of a task.

Before you begin
Role required: admin

About this task
The available task states are *Work in Progress*, *Closed Complete*, *Closed Incomplete*, and *Cancelled*.

When the state of a certification task changes, the certification instance state also changes in the following cases:

- If any certification task is in *Work in Progress* state, the certification instance is placed in *Work in Progress* state.
- If all certification tasks are in *Cancelled* state, the certification instance is placed in *Cancelled* state.
- If all certification tasks are in *Cancelled* or *Closed Complete* state, the instance is placed in a *Closed Complete* state. For example, if three certification tasks are *Cancelled*, and one task is *Closed Complete*, the instance state is changed to *Closed Complete*.
- When one certification task is *Closed Incomplete* and the remainder of the tasks are *Cancelled* or *Closed Complete*, the instance is placed in *Closed Incomplete*.

To view the state of certification tasks:

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Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** and select **My Tasks** or **All Tasks**.
2. View the *State* column for each task.

Escalate a certification task

Users with the certification_admin role can escalate a task in the Work in Progress state. To escalate a task, the task owner identified in the Assigned to field on the task record must have an associated manager.

Before you begin
Role required: admin

About this task
Personalize the User form to see the *Manager* field.

Escalating a task:

- Sends an email message to the task owner and the manager of the task owner stating that the task has been escalated.
- Sets the manager as the new task owner.

The event that triggers the escalation is named cert_task.escalate and the email notification is named *Escalation Notification*. To edit the text of the email message that is sent, edit the *Escalation Notification* email notification directly.

For more information, see Email notifications.

To escalate a certification task from the Certification Task form:

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Select a certification task *Number*.
3. Select **Escalate**.
   If the *Escalate* button is not available, the user in the *Assigned to* field does not have an associated *Manager*.

Escalate a certification task from the certification task list

Escalate a certification task to notify the manager of the current task owner.

Before you begin
Role required: admin

To escalate a task, the task owner identified in the Assigned to field on the task record must have an associated manager.

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Select the check box to the left of a certification task *Number*, you can select multiple check boxes.

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3. From the *Actions on Selected Rows* menu below the list, select **Escalate**.
   If the *Escalate* button is not available, the user in the *Assigned to* field does not have an associated *Manager*. Select multiple tasks from the list. The menu option shows how many tasks are not eligible for escalation, such as *Escalate (4 of 6)*.

Reassign a certification task

If you have the certification_admin role, you can reassign any certification task in the *Work in Progress* state. Tasks in *Closed Complete*, *Closed Incomplete*, or *Cancelled* state cannot be reassigned. When a task is reassigned, the current task owner and the new task owner are sent a message.

Before you begin
Role required: certification_admin

About this task
The event associated with the reassignment is named cert_task.reassign and the email notification is named *Certification Task Reassignment*. To edit the text of the email message that is sent, edit the *Certification Task Reassignment* email notification directly.

For more information, see Email notifications.

To reassign a certification task:

Procedure
1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Click a certification task *Number*.
3. Enter a new name in the *Assigned to* field.

Send certification task reminders

The Certification Task Escalations workflow sends automatic email reminders.

The Certification Task Escalations workflow sends automatic email reminders to the:

- Certification task owner.
- Assignment group, if the assignment group was specified on the *Certification Task* form.
- Manager of the certification task owner, if necessary and if a manager was specified on the User form.

The reminders are based on the *Complete by* field on the certification task record. If the *Complete by* date is changed, the reminder schedule automatically adjusts to reflect the new date.

Certification task reminders

Time elapsed to end date	Email reminder is sent to	Escalate field on task record reads
50%	task owner and assignment group (if specified)	Moderate
75%	task owner, assignment group, and manager of the task owner	High
95%	task owner, assignment group, and manager of the task owner	High

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Certification task reminders (continued)

Time elapsed to end date	Email reminder is sent to	Escalate field on task record reads
100%	task owner, assignment group, and manager of the task owner	High

To set reminders for different or more intervals, edit the workflow Certification Task Escalations. In addition to the email reminders sent automatically, users with the certification_admin role can send email reminders manually at any time.

Send an email reminder from the certification task form

How to manually send email reminders from the Certification Task form.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Click a certification task *Number*.
3. Right-click the header bar and select **Resend email notifications**.

Send an email reminder from the certification task list

How to manually send email reminders from the Certification Task list.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Select the check box to the left of a certification task *Number*, you can select multiple check boxes.
3. From the *Actions on Selected Rows* menu below the list, select **Resend email notifications**.
4. Select multiple tasks from the list.
   The menu option shows how many notifications are outstanding and how many were sent, such as *Resend email notifications (15 of 18)*.

Mark a certification task as closed incomplete

Mark a task as closed incomplete if, for example, only some of the elements can be certified.

Before you begin

Role required: admin

About this task

The following users can mark a task as closed incomplete:

- Users with the certification_admin role.
- User identified in the *Assigned to* field on the certification task record.

To mark a task as closed incomplete:

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Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** and select **All Tasks**, or **My Tasks**.
2. Click a certification task *Number*.
3. In *Work Notes*, enter information about why the task could not be completed.
4. Click **Close Incomplete**.

   If at least one task on a certification instance is marked *Closed Incomplete*, the *Completed* date and *Percent complete* fields on the certification instance record are not updated. A user with the certification_admin role can:

   - Complete the incomplete task or tasks.
   - Cancel the incomplete task or tasks.

   When all tasks on the certification instance are *Closed Complete* or *Cancelled*:

   - The system sets the *Completed* date field on the certification instance record to the current date and time.
   - The *Percent complete* field on the certification instance record is set to 100 percent.

Certification tasks cancellation

Users with the certification_admin role can cancel a certification task in the Work in Progress or Closed Incomplete state.

When a certification task is cancelled, a notification email is sent to the task owner or assignment group assigned to the task. The task owner or assignment group manager is not notified.

Cancel an individual task

Cancel a particular data certification tasks in the Work in Progress state.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Find a task with a *State* of *Work in Progress*.
3. Click the task *Number*.
4. Click **Cancel**.

Cancel all tasks in an instance

Cancel data certification tasks in the Work in Progress state.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Instances**.
2. Find an instance with a *State* of *Work in Progress*.
3. Click the instance *Number*.
4. Click **Cancel**.

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All tasks in the instance with a state of *Work in Progress* are cancelled. The task owner or assignment group is notified.

The email template used for the notification is named *certification.task.cancelled*. The email templates can be edited to change the email message text, for example.

Domain separation and Data Certification

Domain separation is supported in Data Certification processing. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure data goes into the proper domain for the application's service provider use cases.
- In the application, the user interface, cache keys, reporting, rollups, aggregations, and so on, all consider domain at production run time.
- The owner of the instance needs to be able to set up the application to function normally across multiple tenants.

Use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the client must be able to see my response.

How domain separation works in Data Certification

- Data Certification has only basic domain separation. As long as the Certification Instances (CIs) or records that must be certified are correctly domain-separated and the users who must certify the CIs or records are in a domain that can view the data, Data Certification works as expected.
- Recommendation: The instance owner must be responsible for assigning Certification Tasks and Certification Instances to the correct domain. Changing the domain for these records does not change functionality, but limits the view of the records.

How to set up domain separation for Data Certification

After enabling the Domain Separation plugin, there are no additional steps required to set up domain separation for Data Certification.

- instance owners determine which CIs or records that need to be certified can be domain-separated.
- Customers can configure a domain-separated environment by assigning tasks to a domain, but if the data is already domain-separated, then only users with the right domain permissions can view the data in a certification task.

How tenant domains manage their own application data

It's not necessary to set the domain on the certification tables but it can be done if the instance owner should want that. As long as the CI's or records that must be certified are domain-separated, users with the correct domain permissions can view them.

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Domain-separated tables

- cert_instance – Changing the domain on this table does not change any functionality, nor does it change the domains of the tasks created from the table.
- cert_task – Changing the domain on this table changes the domain viewing permissions of the task.
- cert_element – It is not recommended to change the domain on these records. As long as the CIs or records to be certified are already domain-separated, cert_element records will reflect that.
- cert_filter – Changing the domain on this table changes the domain viewing and filtering of CIs or records.

Use cases

Instance owners who have multiple clients that certify the infrastructure they own can assign domains to those CIs and the Certification Tasks to restrict the view from one client to another.

Related topics

Domain separation for service providers

Components related to CMDB Data Manager

The following scheduled jobs, tables, roles, and properties, are related to CMDB Data Manager. Some of those, are installed with CMDB Workspace.

System properties

As a Data Manager Administrator (data_manager_admin) you can view CMDB Data Manager properties in CMDB Workspace.

1. Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. Select **Settings** in the left navigation bar.

Property	Description
glide.cmdb.data.manager.delete.batch.size	Size of each batch of CIs that is deleted or archived (affects performance optimization). • Type: Integer • Default value: 1000
glide.cmdb.data.manager.subflow.timeout	Threshold (in milliseconds) for subflow running time. A subflow that passes this threshold while running, is cancelled. • Type: Integer • Default value: 600,000 (10 minutes)
glide.cmdb.data_manager.default_archive_time	Number of days that it is still possible to restore archived CIs from archive tables. After the specified number of days pass, archived

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Property	Description
	CIs are permanently deleted from the archive tables. • Type: Integer • Default value: 120
cmdb.data.manager.stale.task.life.in.days	Number of days after which a task is considered stale and is set to **Closed Cancelled** by the *CMDB Data Manager - Stale Task Cleaner* daily scheduled job. Details: • Type: Integer • Default value: 90
sn_cmdb_ws.glide.cmdb.data.manager.aging.policy.task.life.days	Number of days before a Data Manager task is marked as aged. • Type: Integer • Default value: 30
sn_cmdb_ws.cmdb.dm.policy_types.due_date_notification Notifications	Notifications about certification and attestation incomplete tasks. When either is checked, the system notifies task owners as the due date for incomplete tasks is approaching. Notifications are sent when 50%, 70%, and 90% of the time to due date has passed. On the task due date, a past due notification is sent to the task owner and to the task owner's manager. Upon closing a task, sending notifications stops. For information about how the **Days to complete** setting is used to calculate when notifications are sent, see Create a CMDB Data Manager policy in CMDB Workspace.
sn_cmdb_ws.glide.cmdb.data_manager.rejected.task.notification.group Group to receive notifications for a rejected task	System identifies a user group to notify about tasks that are being rejected. By default, this property has no value, in which case, all data manager administrators are notified about rejected tasks. For information about how this property is used when reviewing and rejecting life-cycle tasks, see Review CMDB Data Manager tasks in CMDB Workspace.

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Scheduled jobs

Scheduled job	Description
CMDB Data Manager Archive/Delete Policy Processor	Processes all published polices of type Archive and Delete: • Applies policies only to CIs that are already retired. • Processes all Archive policies first, and if no errors encountered, continues to process any Delete policies.
CMDB Data Manager Retire Policy Processor	Processes all published polices of type Retire: Applies policies only to CIs that are not retired.
CMDB Data Manager - Stale Task Cleaner	Cleans up stale CMDB Data Manager tasks by setting the task to **Closed Cancelled**. The *cmdb.data.manager.stale.task.life.in.days* system property determines the number of days after which a task is considered stale (90 by default). A task becomes stale if: • The task was created at least 90 days (by default) ago and it is still open. • The approval requests are older than 90 days (by default) and the task is not yet approved.
CMDB Data Manager Delete Related Entry Policy Processor	Processes the Delete CMDB Related Entry policy by deleting the specified related tables from the Related Entry [cmdb_related_entry] table.

Tables

Table	Description
CMDB Data Management Policy [cmdb_data_management_policy]	Details about CMDB Data Manager policies.
CMDB Data Management Policy Executions [cmdb_data_management_policy_execution]	Execution records corresponding to each policy evaluation.
CMDB Data Management Policy Runtime Attributes [cmdb_data_management_policy_runtime_attributes]	Current policy metadata including status and summary.

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Table	Description
CMDB Data Management Task Control [cmdb_data_management_task]	Open policy tasks generated by published policies.
CMDB Data Management Tasks to CIs [cmdb_data_management_task_to_ci]	Associations of tasks to CIs.
CMDB Data Manager Task to Documents [cmdb_data_management_task_to_document]	Associations of task and to related items.
CMDB Data Management Attestation Tasks to CIs [sn_cmdb_ws_attestation_task_to_ci]	Associations of task and attestation CIs.
CMDB Data Management Tasks to CIs [cmdb_ci_state_management_task_to_ci]	Associations of task and CIs for 'Dependent CI Deletion' policy type.
Excluded CIs [cmdb_policy_ci_exclusion_list]	Tracks the CIs that are set to be excluded during policy evaluation.
CMDB Policy Type [cmdb_policy_type]	Policy types supported by the CMDB Data Manager.
CMDB Policy Type Categories [cmdb_policy_type_categories]	Associations of policy types to Flow Designer Categories.
CMDB Retirement Custom Definitions [cmdb_retirement_custom_definitions]	Life-cycle rules for life cycle policies (Retire/Archive/Delete). For example, custom retirement definitions.
CMDB Policy Scheduled Jobs [cmdb_policy_scheduled_job]	Policy scheduled Job details.
Dependent CI Relations Evaluation Config [cmdb_dependent_ci_extra_rels_config]	Information about CIs' extraneous relationships which is used for the delete and archive operations. Extraneous relationships are those relationships that are not in the CI's chain of dependency. For more information, see Dependent CIs management.
CMDB Dependent CI Class Exclusions [cmdb_dependent_ci_class_exclusion]	Excluded classes for dependent CI, which is used with the Archive/Retire/Delete policy types to determine which CIs are orphan dependent CIs.

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Table	Description
	For more information, see Dependent CIs management.
CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger]	Staging table for orphaned dependent CI related to the deletion or archival of the main CI that they depend on. Also used in a cascade-retire dependent CIs operation. For more information, see Dependent CIs management.
CMDB CI End Of Life Ledger [cmdb_ci_end_of_life_ledger]	CIs that are being set as retired that belong to a class that has any downstream dependencies. Used in the Dependent CI Retire policy.

Roles

Role title [name]	Description	Contains roles
CMDB Data Manager administrator [data_manager_admin]	Can access all features in the CMDB Data Manager, including: • Full access to assigned tasks. • Full access to policies. • Ability to associate subflow categories to policy type. Can create, edit, and delete policies, calculate previews, approve tasks, and manage exclusion lists.	• task_editor • data_manager_user • cmdb_query_builder_read
CMDB Data Manager user [data_manager_user]	Can view CMDB Data Manager policies in read-only mode and calculate previews. Can perform the following tasks: • View assigned tasks. • Update, approve, or reject an assigned task. • Add a CI to an exclusion list from their task.	cmdb_read

CMDB groups

A CMDB group is a collection of CIs that lets you apply CI actions collectively to all the CIs that are members in the group.

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For example, a CMDB CI Lifecycle Management API can use a CMDB group scriptable API to retrieve the group's list of CIs, and then apply a CI Lifecycle Management action collectively to all the CIs. You can also use a CMDB group with the Dynamic CI Group service population method, to populate an application service.

Group type

A CMDB group is configured with a group type.

- If a CMDB group type is set to Health, then the CIs in the group can be monitored by CMDB Health, and the aggregated health is reported for the group as a whole in the CMDB group view dashboard. For example, you can monitor health only for CIs in a specific location.
- If a CMDB group is set to CMDB Workspace, then that group appears in the Management view in the CMDB Workspace.

Create and populate a CMDB group

Depending on the group type, you can populate a CMDB group by manually adding individual CIs, selecting saved CMDB queries, or building encoded queries in the CMDB group itself. The resulting CIs from each query are added as members to the group.

Before you begin

Roles required:

- To view CMDB groups - itil
- To use a CMDB queries - cmdb_query_builder on top of itil
- To manually add CIs - itil or asset

Also, to populate a CMDB group using a CMDB query, a saved CMDB query must exist.

About this task

The system property *glide.cmdb.group.max_ci_limit* determines the maximum number of CIs that a CMDB group can contain (by default 10,000). Once the specified limit is reached, CIs can't be added to the group unless you increase the value of that property.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Groups**.
2. In the CMDB Groups pane, select **New**.
3. Fill out the form, right-select the title bar and select **Save**.

CMDB Group form

Field	Description
Group Name	A unique name for the group.
Group type	○ Default: Basic group type which can be populated by manually adding CIs, saved queries, and encoded queries. ○ Health: Sets CMDB Health to monitor the health of the group CIs and aggregate health results for the group as a whole. Can be populated only by encoded queries.

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Field	Description
	Note: Dynamic filters are not supported when populating this type of CMDB groups. ○ CMDB Workspace: Custom class group which appears in the CI Overview panel in CMDB Workspace store app. Can be populated only by encoded queries.

4. To use saved CMDB queries:
   a. Select **CMDB Group Contains Saved Queries** and then select **Add Query**.
   b. Select a query from the **Query Builder Saved Query** list.
   c. Select **Submit**.
   The returned results consists of the CIs from all the classes that are referenced in the saved query. Those CIs become members of the CMDB group.
5. To manually add CIs:
   a. Select **CMDB Group Contains Configuration Items** and then select **Edit Manual CI**.
   b. **Optional:** Add filters.
   c. Select CIs in the **Configuration Item** list and select the '**+**' icon at the bottom.
   d. In the **Group members** list, select the CIs to add to the group.
   e. Select **Save** or **Save and Exit**.
   f. In the **Save Confirmation** dialog box, select **OK**.
   g. Select **Submit**.
6. To use encoded queries:
   a. Select **CMDB Group Contains Encoded Queries** and then select **New**.
   b. Fill out the CMDB Group Contains Encoded Query form with the query conditions that filter the CIs to be included in the group.

Note:
Dynamic filters aren't supported for CMDB health-type groups, even though it's possible to add them in a condition clause.

Field	Description
Class	Class for which the encoded query applies to.
CI Overview Condition	Filter that is used in the calculation for the CI Overview chart in CMDB Workspace. Applies only if the *sn_cmdb_ws.ci_overview.enable_simple_condi*

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Field	Description
	system property is set to **true** (**false** by default). Improves performance by yielding less results when there is a large amount of data in an environment that hasn't migrated to CSDM. This condition isn't used when selecting **Show All CI**.
Condition	Filters the CIs that are included in the group. Used if **CI Overview Condition** isn't applicable.

c. Select **Submit**.

What to do next
Select **Show All CI** to show all CIs from all the result columns of the query. However, only CIs from CMDB tables are shown.

Show CI Lifecycle Management details for CMDB group CIs

Display CI Lifecycle Management operational state and CI actions that apply to the CIs that are members of a CMDB group.

Before you begin
Role required: none

About this task
If the CMDB group is based on a CMDB query, then the query runs in real-time and displays the resulting CIs. If the query does not complete successfully due to timing out or for other reasons, then appropriate error messages are displayed.

Procedure
1. Navigate to **All** > **Configuration** > **CMDB Groups**.
2. On the **CMDB Groups** page, click a CMDB group.
3. Click **Show All CI**.

Field	Description
Configuration Item	CI group member.
Class	Class of CI group member.
Operational Status	CI Lifecycle Management operational state of the CI such as 'Repair in Progress' or 'Operational'. Possible operational states are defined in the choice list of the *Operational status* field in the cmdb_ci table.
Actions	CI Lifecycle Management actions that apply to the CI such as 'Cloning' and 'Provision'. Possible actions are defined in the CMDB CI Actions [statemgmt_cmdb_actions] table.

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CMDB Compliance

CMDB Compliance is a tool set that enables administrators to certify CMDB data for correctness and fix any discrepancies found in the data.

Note:
For compliance in the context of internal business goals and objectives, and external legislation and regulations, see Exploring Policy and Compliance Management.

Certification options

CMDB Compliance offers these certification options to suit the size and requirements of your organization:

Option	Description
Desired State	Automatically compares the actual attributes and relationships of specific ServiceNow records against the desired states for those records. For example, an audit can detect a Linux database server with insufficient RAM or whose Depends on relationships with another CI is incorrect. The system then publishes any discrepancies found and automatically assigns follow-on tasks to qualified users to bring that server into compliance.
Architecture Compliance	Automatically compares the actual attributes of specific CIs, such as CPU count, RAM, or disk size against the expected attributes for those CIs. The system publishes any discrepancies found and automatically assigns remediation tasks to qualified users.

Compliance Templates and Audits

The Templates and Audits modules on the top level of the Compliance menu enable a certification_admin user to create, edit, and delete all template and audit types.

You can use Compliance Templates and Audits to evaluate records for any table in the ServiceNow system, not just those tables extending the Configuration Item `[cmdb_ci]` table. Compliance audits certify record attributes only. Compliance templates can be used in Control Test Definitions in Governance Risk and Compliance.

Compliance Activation

Compliance functionality is provided by the Certification Core (com.snc.certification_core) plugin which contains shared functionality required for certification audits.

The Certification Core (com.snc.certification_core) plugin consists of the following plugins, and is activated by default.

- Activated by default: Desired State Certification (com.snc.certification_desired_state)
- Activate: Architecture Compliance (com.snc.architecture_compliance), which automatically activates the Version Management (com.snc.version) plugin that manages certification filter and template versions.
- Activate: Data Certification (com.snc.certification_v2), which automatically activates the Version Management (com.snc.version) plugin that manages certification filter versions.

Installed with Compliance

These components are installed with the Certification Core plugin.

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Demo data is included with the Desired State and Architecture Compliance plugins.

The Certification Core plugin adds or modifies these tables.

Compliance Certification Core tables

Name	Description
Audit [cert_audit]	Contains all the data required to run an audit, including the users assigned to follow-on tasks and the run schedule.
Audit Result [cert_audit_result]	Contains the results of specific, certification audits.
Follow On Task [cert_follow_on_task]	Contains the tasks that were generated from an audit discrepancy.
Certification Template [cert_template]	Contains the definition of the desired state of the record. The template includes a filter that identifies the records to evaluate and the expected attributes and relationship values. Contains the records to certify, the expected attributes, and the expected relationship values.
Certification Condition [cert_cond]	Base table that defines the desired attribute or relationship conditions used in templates.
Certification Attribute Condition [cert_attr_cond]	Contains the conditions that define the desired CI attribute values. This table extends the Certification Condition [cert_cond] base table.
Certification CI Relationship Condition [cert_ci_rel_cond]	Contains the CI to CI relationship conditions. This table extends the Certification Condition [cert_cond] base table.
Certification User Relationship Condition [cert_user_rel_cond]	Contains the CI to user relationship conditions. This table extends the Certification Condition [cert_cond] base table.
Certification Group Relationship Condition [cert_group_rel_cond]	Contains the CI to group relationship conditions. This table extends the Certification Condition [cert_cond] base table.
Certification Related List Condition [cert_related_list_cond]	Contains the related list conditions. This table extends the Certification Condition [cert_cond] base table.
Certification Filter [cert_filter]	Contains a certification filter, including the table that contains the records to audit and the filter conditions.

User roles

The certification role is automatically assigned to all users with the itil role when the Certification Core plugin is activated or when compliance applications are upgraded. Certification core installs two business rules, both called **Add Certification Role To Manager**, that perform similar tasks on different tables. One rule checks for a manager specified on the User [sys_user] table, and the other checks for the certification role on the User Role [sys_user_has_role] table. When both a manager and the certification role are specified for a user, the system automatically grants the certification role to the manager. This functionality ensures that a certification task can be

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escalated successfully to the next level. The system grants this automatic role to the user's immediate manager only and not to others up the management chain.

Note:
When a manager has only the certification role and no other role, the manager is considered a Requester and is not counted as a subscribed user (Fulfiller).

Compliance Certification Core user roles

Name	Contains roles	Description
certification	none	Can read and update certification tasks to resolve discrepancies.
certification_filter_admin	none	Can create, read, and update certification filters.
certification_admin	certification, certification_filter_admin	Can manage the entire certification process. These users can create, edit, and delete all certification records.

UI policies

Compliance Certification Core UI policies

Name	Table	Description
Make table read only	Audit [cert_audit]	Sets the table field derived from the selected filter to read-only.
Hide Audit Type	Audit [cert_audit]	Hides the Audit type field.
Hide next scheduled run	Audit [cert_audit]	Hides the Next scheduled run date when an audit is inactive or on-demand.
Show task fields when create tasks is set to true	Audit [cert_audit]	Displays all fields related to creating tasks when the user selects the Create tasks check box.
Make name mandatory	Audit [cert_audit]	Makes Name a mandatory field.
Prevent editing of Last run date	Audit [cert_audit]	Makes Last run date field read-only.
Show User field	Audit [cert_audit]	Shows or hides fields based on the Assignment type selected. The system shows the User field when you select the following assignment types: • User Field if the Assign to empty option is Create Assigned Task. • Specific User
Show Assign to fields	Audit [cert_audit]	Shows or hides fields based on the Assignment type selected. The system shows the Assign to field when the assignment type is User Field.

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Compliance Certification Core UI policies (continued)

Name	Table	Description
Show Assignment Fields	Audit [cert_audit]	Shows or hides fields based on the Assignment type selected. The system shows the Assign to empty field when you select either of the following assignment types: • User Field • Group Field
Show Group field	Audit [cert_audit]	Shows or hides fields based on the Assignment type selected. The system shows the Group field when you select either of the following assignment types: • Specific Group • Group Field if the Assign to empty option is Create Assigned Task.
Hide "run" associated fields when active is set to false	Audit [cert_audit]	Hides these scheduling fields when the audit is inactive: • Run • Day • Time • Last scheduled run
Show script window on Scripted Audit	Audit [cert_audit]	Displays the Run this script field when the audit type is Scripted.
Make table read only	Certification Condition [cert_cond]	Sets the table field derived from the selected filter to read-only.

Script includes

Compliance Certification Core script includes

Name	Description
DesiredStateUtil	Utility functions for desired state, used to clone a template for Insert functionality.
CMDBRElationshipAjax	Tool to get all relationships for a given table.
RelationshipQueryParseAjax	Parses condition filters. This script include is the internal code used in generating the compliance conditions.
CertificationUtils	Utility functions for certification that find Next run time value, and so on.
CertTaskEscalationTimerPercentage	Utility method for setting escalation timer durations.
ConditionUtilsAjax	AJAX utilities for parsing queries into a human-readable format.

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Compliance Certification Core script includes (continued)

Name	Description
DeleteInactiveVersionsAjax	AJAX server-side script to delete all inactive versions of a record.

Client scripts

Compliance Certification Core client scripts

Name	Table	Description
Make audit type read only if not new	Certification Template [cert_template]	Sets the correct audit type for new records, and if the record is not new, sets the Audit type field to read only.
Update table name (filter)	Audit [cert_audit]	Updates the table Name field when the filter is updated.
Update table name	Audit [cert_audit]	Updates the table Name field when the template is updated.
Set table name on new	Audit [cert_audit]	Returns the table name from the template or filter.
Update table name	Certification Template [cert_template]	Updates the table Name field when a new filter is chosen and checks all existing conditions to see if they work for the new table.
Show conditions when table is set	Certification Template [cert_template]	Shows and hides conditions appropriately when the table is set.
Reset filter when audit type changes	Certification Template [cert_template]	Clears the filter and updates the lists shown when the audit type is changed.

Business rules

Compliance Certification Core business rules

Name	Table	Description
Clone condition	Certification Condition [cert_cond]	Part of certification versioning. This business rule retains the original ID when a condition is changed.
Copy audit type from audit	Audit Result [cert_audit_result]	Ensures that all audit results have the same audit type as the audit that generated them.
Copy values from template	Audit [cert_audit]	When a user selects a template, and updates the table, filter, and audit type from the template.
Delete condition	Certification Condition [cert_cond]	Part of certification versioning that deletes a condition.

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Compliance Certification Core business rules (continued)

Name	Table	Description
Prevent deletion of audit with results	Audit [cert_audit]	Prevents deletion of an audit containing results.
Prevent delete of Filter with Template	Certification Filter [cert_filter]	Prevents deletion of a filter still linked to a template or audit.
Prevent deletion of result with task	Audit Result [cert_audit_result]	Prevents deletion of an audit result with an attached task.
Prevent delete of Template with Audit	Certification Template [cert_template]	Prevents deletion of a template still being used by an audit.
Update conditions' tables	Certification Template [cert_template]	When storing template conditions, properly run all workflows and update the condition fields to contain the display version of the conditions.
Update filter version	Certification Filter [cert_filter]	Creates a version when the filter changes in any meaningful way.
Update next run time	Audit [cert_audit]	Updates the time in the Next scheduled run field when an audit is modified.
Update next run time during execution	Audit [cert_audit]	When the audit runs, update the Next scheduled run field to the next time the audit is scheduled to run.
Update table	Certification Template [cert_template]	Update the stored table to the table of the filter.
Update template version	Certification Template [cert_template]	Creates a version when the template changes in any meaningful way.

Compliance Overview module

The Compliance Overview module is a type of a homepage.

About this task

The Compliance Overview module summarizes:

- Current audit states
- Outstanding certification tasks
- Compliance discrepancies
- Upcoming audits
- General state of compliance audits for Data Certification, Desired State, Architectural Compliance, and Scripted audits

Only users with certain roles can access the Overview module. The different levels of access are:

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Access levels per role

Role	Access
certification	View (view overview page and refresh reports)
certification_admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) View, customize
admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) • Edit (can edit gauges)

Procedure

1. Navigate to **All** > **Compliance** > **Overview**.
2. Select elements within the reports to obtain more information.
   For example, select a bar in the Compliance Discrepancies chart to open a list of audit results filtered by the respective attributes.

Architecture Compliance

Architecture Compliance manages scheduled or on-demand audits of CMDB data to determine which configuration items (CI) match expected attributes. The compliance audits check servers to ensure that their physical resources, such as CPU speed or memory, comply with certain standards.

The compliance process checks servers to ensure that their resources, such as CPU speed or memory, comply with standards set by your organization. Audit reports show any discrepancies in the attributes of the target CIs, and ServiceNow automatically assigns follow-on tasks to qualified users who can remediate those discrepancies.

The administrator responsible for compliance checking creates template definitions of expected attributes and then schedules an audit to check CIs for compliance. The audit results identify CIs that pass certification and itemize the discrepancies in those CIs that fail. ServiceNow automatically generates and assigns follow-on tasks to track the process of getting the CIs back into compliance. Users with the admin role activate Architecture Compliance.

Architecture Compliance roles

To access or configure certification elements, a user must have the certification_admin role. These users can create, update, and delete filters if they have the proper access to necessary tables.

In the base system, certification_admin users have limited system rights and do not have access to all the necessary tables. When assigning compliance resources, make sure to grant additional roles to the certification_admin user as needed. For example, the certification administrator needs roles that grant access to these tables:

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- Company [core_company]
- Cost Center [cmn_cost_center]
- Schedule [cmn_schedule]

Architecture Compliance Process

Perform these tasks in this order to certify configuration items with Architecture Compliance.

1. Create a filter.

   Create a filter that defines a subset of configuration items to certify. You can create multiple versions of a filter, and then activate the version you want to use for compliance checking. Architecture compliance only supports filters on the Configuration Item [cmdb_ci] table and all tables that extend it.

2. Create a template.

   Create template conditions using values from reference fields in a related list or conditions that define the expected physical attributes of each CI in an audit. The template uses a filter to determine which configuration items the system examines based on these conditions.

3. Create and run an audit.

   Create and schedule an audit or run an audit on demand. The audit generates a set of results based on the conditions in the template you specify.

4. View audit results.

   View the audit results which display any discrepancies between the expected state, as expressed by the template conditions, and the actual state of the target configuration items.

5. Correct discrepancies.

   Correct the discrepancies the audit found by completing the follow-on tasks created by the system.

Architecture Compliance Overview module

The Architecture Compliance Overview module displays various architecture compliance reports. The Overview module is a type of homepage.

Only compliance users with certain roles can access the Overview module. The different levels of access are:

Access levels per role

Role	Access
certification	View (view overview page and refresh reports)
certification_admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) View, customize

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Access levels per role (continued)

Role	Access
admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) • Edit (can edit reports)

Using the Architecture Compliance Overview module

To use the Architecture Compliance Overview module, navigate to **Compliance** > **Architecture Compliance** > **Overview** and click elements within the gauges to obtain more information.

The available reports are:

Architecture Compliance Overview module gauges

Report	Description	Table
30/60/90 Day Task Aging	All outstanding follow-on tasks grouped by age in 30-day increments	Certification Task
Architecture Compliance Discrepancies	All audited attribute discrepancies	Audit Results
Hierarchical Task Roll Up	All follow-on tasks grouped by **Assigned to** user	Follow On Task
Outstanding Architecture Compliance Tasks	All follow-on tasks in the **Pending**, **Open**, or **Work in Progress** state	Follow On Task
Upcoming Architecture Compliance Audits	All scheduled audits	Audit

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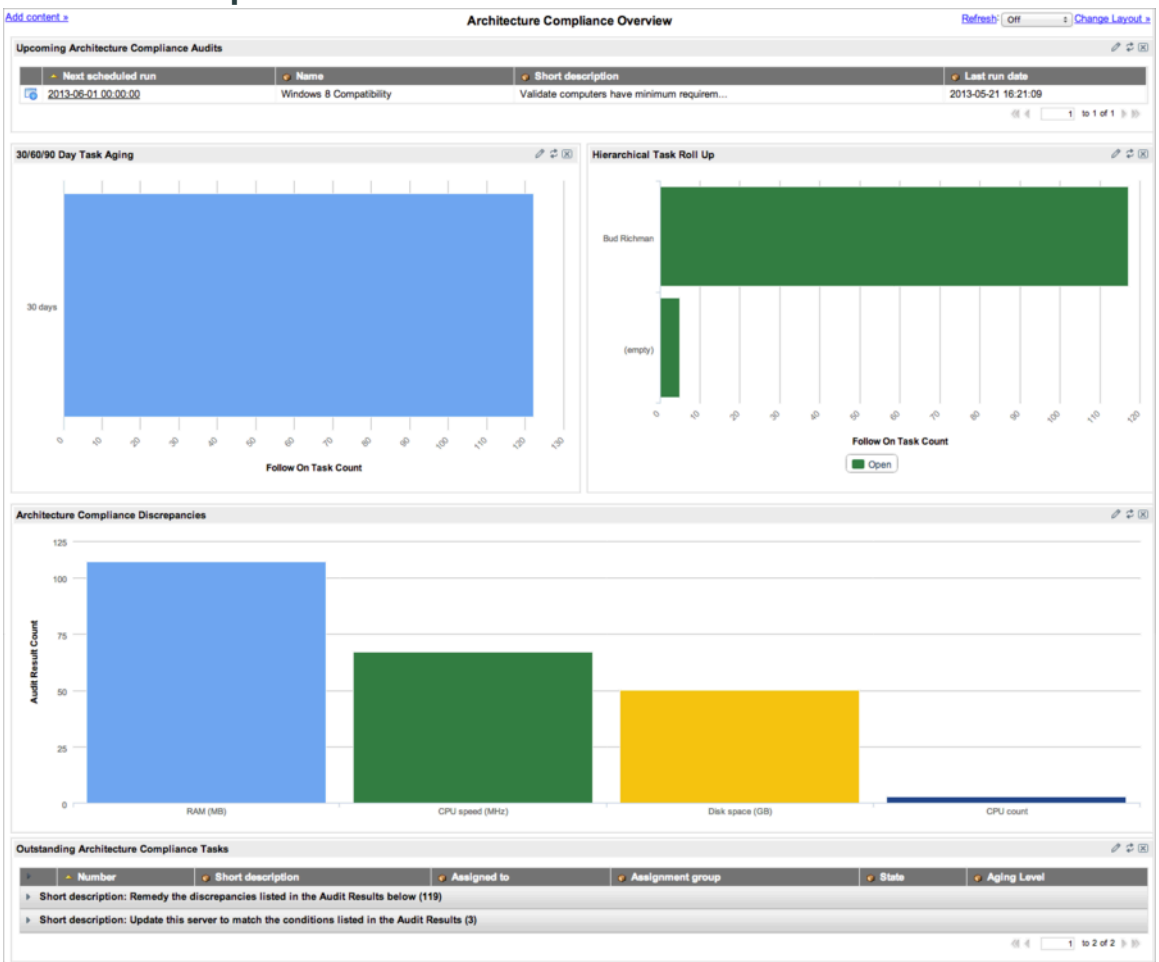
Architecture Compliance module



Desired State

Desired State performs scheduled or on-demand audits of CMDB data to determine which records match the expected attributes, CI relationships, and relationships to other records in the system.

For example, desired state can determine if a computer has a license for a particular software program. The compliance process checks configuration items (CI) to ensure that their attributes and relationships comply with standards set by your organization. Audit results show any discrepancies in the desired state of a record, and ServiceNow automatically assigns follow-on tasks to qualified users who can remediate those discrepancies.

Desired State roles

To access or configure certification elements, a user must have the certification_admin role. These users can create, update, and delete filters if they have the proper access to necessary tables.

In the base system, certification_admin users have limited system rights and do not have access to all the necessary tables. When assigning compliance resources, make sure to grant additional roles to the certification_admin user as needed. For example, the certification administrator requires roles that grant access to these tables:

- Company [`core_company`]
- Cost Center [`cmn_cost_center`]
- Schedule [`cmn_schedule`]

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Desired State process

The desired state certification process can mean checking servers to ensure that their physical resources, such as CPU speed or memory, comply with certain standards. This process also ensures that all critical business services have a manager, support group, and approval group assigned.

The administrator responsible for certification creates definitions of desired states and then schedules an audit to check CIs for compliance. The audit results identify CIs that pass certification and itemize the discrepancies in those CIs that fail. The ServiceNow system automatically generates follow-on tasks to track the process of adjusting the CIs to the desired state.

Desired state differs substantially from data certification. Data certification is a manual process to ensure that your data matches reality. Desired state examines the same data and determines when the configuration of each item is in the desired and approved state.

1. Create a certification filter: Create a filter that defines a subset of configuration items to certify. You can create multiple versions of a filter, and then activate the version you want to use for certification. You can create filters on the Configuration Item [`cmdb_ci`] table and all tables that extend it.
2. Create a template: Create a template with conditions that define the desired state of the physical attributes, related records, and relationships for a CI. The certification filter you select for the template determines which configuration items the system examines.
3. Create and run an audit: Create an audit using the template. Set the audit to run on a schedule or on demand. The audit generates a set of results based on the conditions from the template you specify. Determine usage of follow-on tasks:
   - Determine if the audit creates follow-on tasks and assignment.
   - Determine if the same follow-on task is used for the same audit failure across multiple runs. The system attribute *`glide.allow.new.cert_follow_on_task`* is set to true by default, allowing for new follow on tasks to be created for the same failure, at each audit run.
4. View audit results: View the audit results which display any discrepancies between the desired state, as specified by the template, and the actual state of the target configuration items.
5. Correct discrepancies: Correct the discrepancies the audit found by completing the follow-on tasks created by the system.

Desired State Overview module

The Desired State Overview module displays various desired state reports. The Overview module is a type of homepage.

Desired State Overview module roles

Only compliance users with certain roles can access the Overview module. The different levels of access are:

Access levels per role

Role	Access
certification	View (view overview page and refresh reports)

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Access levels per role (continued)

Role	Access
certification_admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) View, customize
admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) • Edit (can edit reports)

The different levels of access are:

- View: can view the overview page and refresh reports.
- Customize: can refresh, add, delete, and rearrange reports.
- Edit: can edit reports.

Use the Desired State Overview module

The Desired State Overview module displays various desired state reports.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **Compliance** > **Desired State** > **Overview**.
2. Move or add reports where needed.
3. Click elements within the reports to obtain more information.

   The Desired State Overview Module in the base system contains these reports:

   - Upcoming Desired State Audits: All scheduled audits.
   - Outstanding Desired State Tasks: All follow-on tasks in the **Pending**, **Open**, or **Work in Progress** state.
   - Hierarchical Task Roll Up: All follow-on tasks grouped by **Assigned to** user.

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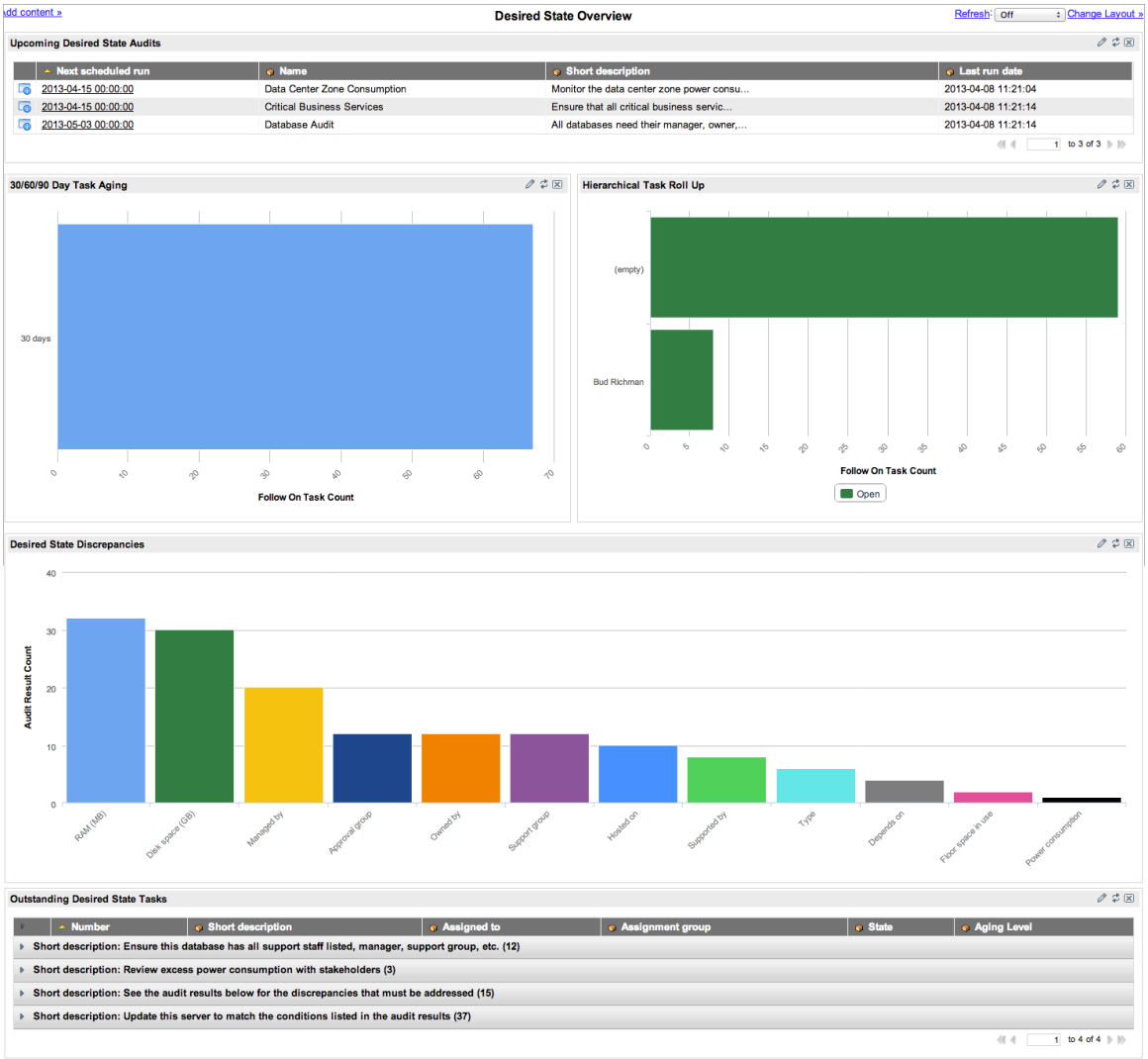
- Desired State Discrepancies: All audit discrepancies for attributes and relationships.
- 30/60/90 Day Task Aging: All outstanding follow-on tasks grouped by age in 30-day increments.



Desired State reporting

The Desired State application includes reports to assess your audit results.

These reports are available to all users whose role gives them access to the Reporting application. Users with the admin role can share these reports with specific users of groups or change the display options.

Navigate to **Reports** > **View / Run**. In the *Reports* search field, enter all or part of the report name such as `Desired State`. You can also scroll to the designated category and select one of the reports.

In addition to these reports, you can generate your own reports.

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Desired state report table

Report	Description	Category
Desired State Discrepancies	This report displays all desired state audit results that have a follow-on task that is not yet in the Closed Complete state. This report displays by column name. • Type: bar chart • Table: Audit Result [cert_audit_result]	Audit Result
Desired State Result with Stability Unstable	This report displays all audit results where the Stability field has the value Unstable. This report displays by CI and stacked by audit. • Type: bar chart • Table: Audit Result [cert_audit_result]	Audit Result
Desired State Result with Threshold Exceeded	This report displays all audit results where the Threshold field has the value Exceeded. This report displays by CI and stacks by each audit. • Type: bar chart • Table: Audit Result [cert_audit_result]	Audit Result
Upcoming Desired State Audits	This report displays the desired state audits that are scheduled to run in the next two quarters. • Type: List (tabular) report • Table: Audit [cert_audit]	Audit
30/60/90 Day Desired State Task Aging	This report displays the number of follow-on tasks that are not Closed Complete for desired state audit types. The report is grouped by aging level. • Type: Horizontal bar chart • Table: Follow On Task [cert_follow_on_task]	Follow On Task
Desired State Hierarchical Task Roll Up	This report displays similar data to the Task Aging report, but groups the results by manager. • Type: Horizontal bar chart • Table: Follow On Task [cert_follow_on_task]	Follow On Task
Outstanding Desired State Tasks	This report displays similar data to Task Aging report, but groups the results by short description. • Type: List (tabular) report • Table: Follow On Task [cert_follow_on_task]	Follow On Task

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Certification audits

A certification audit compares the actual attributes of certain ServiceNow records. This audit selects a filter, against the expected attributes, relationships, and related record values defined by template conditions or a script.

You can configure the audit to create and assign follow-on tasks to remediate any discrepancies the audit finds. Audit records use a standard ServiceNow scheduler to determine when to run. After an audit runs, the results and follow-on tasks appear in related lists in the audit record.

Users with the certification_admin role can create, update, delete, and run audits. Users with the certification role can view audits, audit results, and follow-on tasks.

Create a compliance audit

Create a compliance audit. Compliance offers two types of audits: one uses templates to define conditions and the other uses a script.

Before you begin

Role required: certification_admin

Procedure

1. Ensure that an appropriate template record was created for this audit.

   Note:
   Conditions in the template define the values to audit.

2. Use the CI Class Manager:
   a. Navigate to **All** > **Configuration** > **CI Class Manager**.
   b. Select a class from the **Class Hierarchy**.
   c. In the sidebar on the right, check **Advanced** and then click **Audit** in the **Compliance** group.
3. Or, navigate to one of these modules:
   - **All** > **Compliance** > **Audits**
   - **All** > **Compliance** > **Architecture Compliance** > **Audits**
   - **All** > **Compliance** > **Desired State** > **Audits**
   - **All** > **Compliance** > **Scripted Audits** > **Audits**
4. Click **New**.
   The system opens a new record for the audit type associated with the navigation path you selected. The **Audit type** field is read-only.
5. Complete the form using the fields described in the table below.
6. Right-click the header bar and select **Save**.

   The **Audit Results** and **Follow On Tasks** related lists appear on the form.
7. To run the audit immediately, click **Run Audit**.

   When template audits run, ServiceNow updates the date and time in the **Last run date** field and populates the related lists. For scripted audits, the **Last run date** field is not populated.
8. View the records that passed and the discrepancies found by the audit in the **Audit Results** related list.

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You can open template records and any follow-on tasks directly from this related list. Notice that the value in the **Task description** field appears as the **Short description** in the follow-on tasks.

Note:
You cannot delete audit records that have audit results or audit results that have follow-on tasks. ServiceNow disables the **Delete** option in records and lists where these dependent records exist.

Creating Audits

Field	Description
Name	Name for this audit.
Filter	Filter to use when the audit type is Scripted. This field is required for scripted audits, but is hidden for all other audit types.
Template	[Required] Template to use when this audit runs. Audit type filters the list of available templates, and only the active versions of templates are available for selection. For example, when you create an audit from Desired State, only templates of the Desired State audit type are available for selection. For the Desired State and Architecture Compliance audit types, only templates for tables that extend the Configuration Item [cmdb_ci] table are available. This field is hidden when the audit type is **Scripted**.
Table	[Read-only] Table for the template.
Create tasks	Option to create follow-on tasks for correcting discrepancies (selected). In a scripted audit, you can create the logic for either task state by using **true** to create tasks or **false** to not create tasks. By default, this check box is cleared (**false**) in a new audit record.
Assignment type	Method for assigning follow-on tasks. This field is visible only when the **Create task** check box is selected. Choices are: ○ User Field: Select a user reference field on the table being audited. For example, you choose the user identified in the **Managed by** field on the failed record to perform the tasks. This selection displays the **Assigned to** and **Assign to empty** fields. If the reference field on the record is empty, the value in the **Assign to empty** field is used. ○ Specific User: Select a specific user to perform the tasks. This selection displays the **User** field. ○ Group Field: Select a group reference field on the table being audited. For example, you choose the group identified in the **Support group** field on the failed record to perform the tasks. Tasks are assigned to all members of the group. This selection displays the **Assign to group** and **Assign to empty** fields. If the reference field on the record is empty, the value in the **Assign to empty** field is used. ○ Specific Group: Select a specific group to perform the tasks. This selection displays the **Group** field. All members of the selected group are assigned to the tasks.
User	The specific user this audit assigns to follow-on tasks. This user must have the certification role. This field is available under these conditions:

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Field	Description
	○ Assignment type is set to **Specific User**. ○ Assign to empty is set to **Create Assigned Task**, and **Assignment type** is set to **User Field**.
Assign to group	The group field that defines which group this audit assigns to the follow-on task. This field is available only when the **Assignment type** is **Group Field**.
Group	The specific group this audit assigns to follow-on tasks. This field is available only when the **Assignment type** is **Specific Group**.
Assign to	The user field that defines which user this audit assigns to the follow-on task. This field is available only when the **Assignment type** is **User Field**.
Assign to empty	The behavior to use if the field selected in **Assign to** or **Assign to group** is blank on the record being audited. For example, if a follow-on task must be assigned to a manager, but no manager is identified, the **Assign to empty** setting determines what happens. This field appears only when the **Assignment type** is **User Field** or **Group Field**. Choices are: ○ Do Not Create Task: No follow-on task is created when the **Assign to** or **Assign to group** field is empty. ○ Create Unassigned Task: Create a follow-on task, but do not assign it to any user or group. The task can be manually assigned later. ○ Create Assigned Task: Create a follow-on task and assign it to the user or group specified. If the assignment type is **User Field**, the **User** field becomes available. If the assignment type is **Group Field**, the **Group** field becomes available. The audit automatically creates follow-on tasks for all records that have **Assign to** populated, regardless of the **Assign to empty** setting.
Short description	Brief description of the purpose of the audit.
Task description	General description of the work required for the follow-on tasks for the audit. All follow-on tasks created by this audit inherit this description.
Active	Activation control for this audit record. Clear this check box to prevent this audit from running and creating follow-on tasks.
Run	How often to run the schedule that generates the audit. ○ Daily ○ Weekly ○ Monthly ○ Periodically ○ Once ○ On Demand
Day	○ If **Run** is **Weekly**, the day of the week when the audit runs. ○ If **Run** is **Monthly**, the day of the month when the audit runs. If the day is 29, 30 or 31, for shorter months the audit runs on the last day of the month.
Repeat Interval	If **Run** is **Periodically**, the frequency that the audit runs, based on a 24-hr. clock. Enter the number of days between audits and the time of day that you

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Field	Description
	want the audit to run. For example, set **Days** to **10** and **Hours** to **14:00:00** to run the audit every 10 days at 2:00pm.
Starting	If **Run** is **Periodically** or **Once**, the date and time when the audit runs.
Time	If **Run** is **Daily**, **Weekly**, **Monthly**, or **Once**, the time of day, on a 24-hour clock, when the audit runs.
Last run date	[Read-only] The last date and time the audit ran, either on its regular schedule or manually. Audit previews do not update this field.
Next scheduled run	[Read-only] The next date and time when the audit runs. The system recalculates this field when you change the schedule.
Audit type	[Read-only] The type assigned to this audit. The system selects the audit type based on the application from which the audit is created. The type can be: ○ Desired State ○ Architecture Compliance ○ Compliance ○ Scripted
Health window	Duration of the evaluation period for threshold and stability. The health window value defines the number of Health window units in an evaluation period for an audit. This value is expressed as a positive integer. The default value for this field is **7**.
Health window unit	Unit of measurement that defines the duration of a health window. The default value for this field is **Days**. Choices are: ○ Minutes ○ Hours ○ Days ○ Months
Threshold count	Sets the acceptable number of audit failures for the desired state field that can occur within the specified health window for a CI. The audit results indicate when a desired state field is within or has exceeded this threshold limit. The default value for the threshold is 5.
Stability count	Sets the acceptable number of times that audit results for a CI can switch between **Certified** and **Failed** within the specified health window. The audit results for a CI indicate whether it is stable or unstable. The default value for stability is 1.
Run this script	Audit script to run which contains the conditions that a CI need to comply with to pass the audit. This field is available only when the audit type is **Scripted**. The Audit form includes a sample script with instructions for performing the audit and generating the follow-on tasks.

Copy an audit

New audits can be created from an existing audit.

Before you begin
Role required: none

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Procedure

1. Open the audit record you want to copy.
2. Change the name or short description to distinguish this audit from the original.
3. Make any other changes you need.
4. Right-click in the header bar and select either Insert or Insert and Stay from the context menu. The system clears the **Last run date** field and inserts the record into the database.

Schedule and run an audit

The system performs audits automatically from the schedule you configure.

Users with the certification_admin or admin role can generate on-demand audits directly from the Audit form by clicking **Run Audit**. When an audit runs, ServiceNow populates the **Audit Results** related list in the form and shows follow-on tasks, if any, in the **Follow On Tasks** related list. Click **Preview Audit Results** to generate an audit preview that tests your template conditions without generating any audit results.

Certification audit results

Audit results show the records that have passed or failed an audit and itemize any discrepancies detected.

A discrepancy is considered any departure from the expected conditions defined in the template or script used for the audit. Audit results provide links to the source records and to the follow-on tasks for bringing failed records into compliance. Records that pass an audit have a single entry in the results table with a state of Certified. Records that fail an audit show all discrepancies, each with a state of Failed.

ServiceNow displays results from a certification audit in these locations:

- Audit Results list
- A related list in the Audit record
- A related list in the compliance view of a CI record

View an audit result

To generate certification results, you must first create and run an audit.

Before you begin

Role required: none

Procedure

1. Navigate to one of the following locations:
   - **Compliance** > **Desired State** > **Audit Results**
   - **Compliance** > **Architecture Compliance** > **Audit Results**
   - **Compliance** > **Scripted Audits** > **Audit Results**
   - **Data Certification** > **Schedules** > **Audit results**
2. From any audit results list, you can edit the filter to show the results for any audit type.

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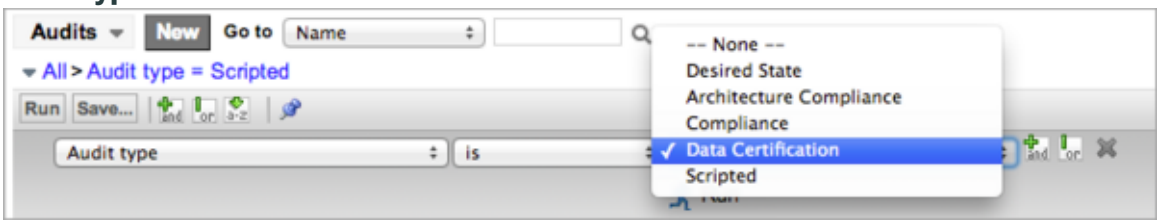
Audit Type filter



The results filter by audit type and grouped by audit number. Within the groups, results list by date, from oldest to newest.

3. You can open the audit record, the CI record, or the follow-on tasks from this list.

> **Note:**
> The **Audit type** field was set automatically when the audit result was created and cannot be changed. For scripted audits, the audit type is set when you create the audit record.

Audit results show this information:

Audit Results

Field	Description
Created	Date and time the audit ran.
Document	Record that was certified, such as a configuration item (CI).
State	Results of certification for each condition evaluated. The three possible states are: ○ *Certified* A certified record is one that passed all conditions. The instance generates only one audit result for a certified record. ○ *Failed* Records that are not certified have an audit result for each failed condition. The **Column name**, **Desired value**, **Discrepancy value**, and **Follow on task**are only populated for failed results. ○ *Pending* A pending state indicates that the audit is incomplete. Data certification audits use this state when a result is awaiting user input.
Column name	Audited field, relationship, or related list column that did not match the expected state.
Desired value	Attribute or relationship required for this record that was not found, from the condition in the expected state template. For data certification, this column is blank if the record has a state of *Failed* or *Pending*.
Discrepancy value	Actual value of the attribute that did not match the expected state. The follow-on task, if provided, tracks resolution of this discrepancy. In a list of results for the **Data Certification** audit type, this column is blank if the record has a state of *Certified* or *Pending*.
Follow on task	Link to the follow-on task generated for remediating a discrepancy.
Audit	Link to the audit record that produced the results.
Threshold	State of an audited, desired state field with a defined failure threshold. This threshold is the acceptable number of failures for a desired state field within

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Field	Description
	a specified health window and is configured in the Audit form. Possible threshold states for the results are: ○ *In Limit* ○ *Exceeded*
Stability	Stability state of a CI. Stability state is based on the number of times the audit result for a desired state field changes from Certified to Failed within a specified health window. Possible stability states are: ○ *Stable* ○ *Unstable*

Delete an audit result

While audit results can be deleted, you cannot delete an audit result that has a follow-on task associated with it.

Before you begin

Role required: none

Procedure

1. Navigate to one of these modules:
   - **Compliance** > **Desired State** > **Audit Results**
   - **Compliance** > **Architecture Compliance** > **Audit Results**
   - **Compliance** > **Scripted Audits** > **Audit Results**

   The list groups by audit name.
2. Select the check box for a result in the list, and then select **Delete** from the **Actions on selected rows** menu at the bottom of the list.

   Note:
   If the result record has a follow-on task, the **Delete** option is not available. If you select multiple records, some with and some without tasks, the system only deletes those records that do not have tasks.

3. Click a date/time link to see the results for a specific CI.

   Note:
   The **Delete** button only appears on the form if the audit result does not have a follow-on task.

4. Click **Delete**.

View an audit result in the Compliance view

After an audit has run, you can view the results and follow-on tasks from the Compliance view in the records of every CI audited.

Before you begin

Role required: none

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About this task

This view is available only for systems that use the default CI classes provided with the base ServiceNow system, such as Hardware, Software, and Computer. For information about creating views, see View Management.

Procedure

1. Navigate to **All** > **Configuration** and open the record of a CI that was included in a compliance audit.
2. Select the view to configure by performing the appropriate action for your list version.
   The Audit Results Compliance View appears.

Audit Results Compliance View List Descriptions

Lists	Description
Passed Audit Results	Lists audits for this CI that passed without discrepancies. The information includes the versions of the template and filter used. Records are grouped first by audit, and then by creation date and time.
Failed Audit Results	Lists all failed audits for this CI. The information includes the discrepancy data, the follow-on task, and the versions of the template and filter used. Records are grouped first by audit, and then by creation date and time.
Follow On Tasks	Lists all follow-on tasks generated from audit discrepancies for this CI.

3. Right-click the header bar and select **View** > **Compliance** from the context menu.

Results preview

You can preview an audit to view potential results without saving audit results or generating follow-on tasks. For example, use this feature to test template conditions for correctness without creating thousands of result records.

In an audit record, click **Preview Audit Results** under **Related Links** to show a summary of the potential audit results appears at the top of the audit record.

Previewing does not change the **Last run date** field.

Health windows

A health window is a trailing time frame in which the ServiceNow system evaluates audit results from CIs that have desired state fields defined.

The **Health window** and **Health unit** fields define each window, and ends when an audit runs. For example, an audit runs on the fifteenth of the month with a seven-day window. It evaluates the threshold values of a desired state field from the eighth to the fifteenth. When the same audit runs the next day, the system evaluates the threshold from the ninth to the 16th, and so on. The audit counts backward seven days from the current day. ServiceNow evaluates a CI threshold value for each health window, without considering the results from the previous window. As a result, the health of a CI can fail for one audit and then pass in a subsequent audit that runs in a new window.

ServiceNow evaluates stability by recording the number of times a desired state threshold value for a CI switch between **Failed** and **Certified** within the health window. In the example shown here, a 5-minute health window was set for the desired state field on a UPS unit that measures

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the remaining battery time. The threshold was set at 2, which allows the field to fail two audits in the same health window.

In the initial audit, the system evaluated the threshold value for the **Seconds on battery** field within a 5-minute window. This window ran from 13:52:51 to the time of the audit at 13:57:51. The desired state field showed In Limit for that audit and the second audit conducted less than a minute later. The next two audits were conducted within five minutes of the first audit and both showed that the threshold (set at 2) was Exceeded. A subsequent audit was conducted five minutes after the audit in which the desired state field threshold was first exceeded. Since the health window had moved forward enough units, the **Seconds on battery** field was within limits again with only one failure in the 5-minute window being evaluated.

Certification filters

A certification filter creates a subset of ServiceNow records to audit, typically from configuration items (CI) of a certain type, such as all UNIX servers in a specific datacenter.

However, you can define a filter for any ServiceNow table by using any set of system-supported conditions. Audited records identified by a filter for expected attributes or relationships, depending on the audit type.

You can create multiple versions of a filter, reactivate inactive versions, and select the version you want to use in a template or a certification schedule. Only the active versions of a filter are available for selection in template records. You can use a single filter for multiple certification templates or schedules.

Certification filters

Filter	Description
Data Certification	Validates CMDB data.
Architecture Compliance	Manages reviews of CMDB data in architecture compliance audits to determine which configuration items (CIs) match expected attributes.
Desired State	Manages reviews of CMDB data to determine which CIs match a desired state for both attributes and relationships.
Compliance	Manages reviews of records from any ServiceNow table to determine which records match an expected set of attributes and related record conditions.
IT Governance Risk and Compliance	Generates audits and tests to ensure that controls are being followed and creates tasks to track corrective actions.

Roles

In the base ServiceNow system, users with the certification_admin role have limited system rights and do not have access to the tables required for creating a filter.

When assigning compliance resources, make sure certification_admin users have any additional roles they need. For example, a user requires roles that grant access to the Company `[core_company]` table.

Compliance filter

The compliance filter for license bases uses the following fields to define entitled users or CIs.

These field values can be used independently or together to calculate compliance.

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Compliance Filter

Value	Description
Entitled company	All users or configuration items (CI) at all locations of this company, in all departments are entitled to use this software package. Compliance at this level calculates how many licenses are purchased for the company at large and how many entitled users or CIs consume them.
Entitled location	CIs and users who are assigned to this company location in any department are entitled to use this software package. Compliance at this level calculates how many licenses are purchased for this company location and how many users and CIs consume them.
Entitled department	Only the users or CIs in this department at this company location are entitled to use this software package. Compliance is calculated for a single department only.

The license form can display information about all CIs or named users who are using this software package. The form indicates when license reconciliation is necessary and displays all compliant users or CIs.

Possible compliance levels are:

Compliance

Level	Description
Non applicable	Compliance levels for all infrastructure licenses that are related to cluster licenses are set to **Non applicable** automatically. Compliance levels are calculated in the cluster license only, and not in the related infrastructure licenses.
Out of compliance	More licenses are being consumed than were purchased. There are more users or CIs using this license than the license allows, and some users or CIs are not be entitled to use this software package.
Unused	The licenses for this software package are currently unused.
Reconciliation required	CIs or users who are not entitled to use this software are consuming licenses. Licenses that require reconciliation are considered out of compliance. Reconciliation requires action to ensure that unentitled users are not using the software. Reconciliation involves uninstalling software or increasing license counts to match actual user counts.
Nearly out of compliance	For a software package to be at this compliance level, more than 95% of the licenses are in use by entitled users or CIs. License bases at this level are considered to be **In compliance**.
In compliance	This software package has unused licenses. All users or CIs using a license are entitled to use this software package.

Create a filter

You can create as many versions of a filter as necessary. You can then designate which versions are active and available for selection in Compliance template records, Governance Risk and Compliance control test definitions, or Data Certification schedule definitions.

Before you begin

Role required: none

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Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**, and:

   a. Click **Hierarchy** to display the CI Classes list.
   Select the class to create a filter for.

   b. In the class navigation bar, expand **Health**, select **Compliance**, and then click **Certification Filter**.

2. Or, navigate to one of these modules:
   - **Compliance** > **Filters**
   - **Data Certification** > **Schedules** > **Certification Filters**
3. Select an existing filter to edit, or click **New**.
4. Fill in the fields (see table below).
5. Click **Submit**.
   This action saves the filter as version 1.
6. To create another version of this filter, open the record and modify the name, table, or conditions.

   Note:
   You can change a filter Description without incrementing a version.

7. Click **Update**.

   The system saves a new version of the current filter and makes it the Active version. The previous version is marked inactive. The system displays only active filter versions for selection when you create templates or schedules.

Creating Filters

Field	Description
Number	[Read-only] Displays the automatically assigned filter identification number. All versions of a filter have the same number.
Name	[Required] Filter name.
Description	[Optional] Describes this filter. You can change the description of a filter without incrementing a version.
Table	Specifies the table containing the records to select. The template or schedule that uses this filter works on this table. For example, select the ESXi Server `[cmdb_ci_esx_server]` table to select VMware ESX servers.
Active	Makes this filter available for use from the **Filter** field on the Certification Template or Schedule Definition form. Multiple versions of a filter can be active. You can activate or deactivate a filter without incrementing the version.
Version	[Read-only] Indicates the version of this filter. Any changes to this filter, except to the description or the **Active** check box, makes it inactive. The system increments the version of the updated filter and marks it as active. The system saves all versions of the filter and makes them available for reactivation.

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Field	Description
Filter condition	Specifies the fields, operators, and values that create the filter. The available fields are based on the selected table. The condition builder shows the number of records that match the conditions. Click the refresh icon **Refresh Conditions**  to recalculate the number of matching records when you edit the conditions.

Copy a filter

New filters can be created from an existing filter.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**, and:

   a. Click **Hierarchy** to display the CI Classes list.
   Select the class to create a filter for.

   b. In the class navigation bar, expand **Health** and select **Compliance**.
   Then click **Certification Filter**.

2. Or, navigate to one of these modules:
   - **Compliance** > **Filters**
   - **Data Certification** > **Schedules** > **Certification Filters**
3. Open the filter record that you want to copy.
4. Make sure to change the filter name or description to distinguish the new filter from the original.
5. Make any other necessary changes.
6. Right-click in the header bar and select either **Insert** or **Insert and Stay** from the context menu.
   The system increments the record number and sets the version to 1 for the new record. Both the original filter and the copy are Active and appear in the record list. Showing all copies of a filter allows you to see the entire history of the filter.

Delete a certification filter

Delete certification filters that are no longer needed and no longer in use.

Before you begin
Role required: certification_admin or admin

About this task
You can't delete a certification filter that is being used in a template or a scripted audit.

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Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**, and:
   a. Select **Hierarchy** to show the CI Classes list.
   b. Select the class to delete a filter for.
   c. In the class navigation bar, expand **Health**.
   d. Select **Compliance** and then **Certification Filter**.
2. Or, navigate to one of these modules:
   - **Compliance** > **Filters**
   - **Data Certification** > **Schedules** > **Certification Filters**
3. Open the filter record you want to delete.
   a. To delete a single filter version, open that version record and click **Delete**.

      The system hides the **Delete** button for filters that are in use. If you delete the latest version of a filter that is active, the previous version of that filter is reset to Active.

   b. To delete all unused and inactive versions of a filter, open any version of that filter and click **Delete inactive versions** under **Related Links**.
4. When prompted, select **OK** to proceed.
   The system deletes unused filter versions. A message in the header bar identifies filter versions that cannot be deleted because they are used in a template or scripted audit.

Manage a filter version in a form

You can view and manage all versions of a filter from the Certification Filter form.

Before you begin

Role required: none

About this task

Versions can be displayed in a list. The default list of filters displays only the active version of each filter. To see all filter versions in the list view, select **All** in the breadcrumbs.

Procedure

1. Open any version of a filter.
   The Other Versions related list displays all other versions of this filter, both active and inactive. The system prevents you from editing either the filter version or the record number in the list view.
2. Click any version in the related list to display the record for that version.
3. To make an inactive filter the current version, open the filter, edit it if desired, and then click **Revert**.

   This action:
   - Deactivates the previous active version of the filter.
   - Copies the inactive filter.
   - Makes this new copy current and active.

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Certification follow-on tasks

The ServiceNow system can automatically generate and assign follow-on tasks to correct discrepancies detected during compliance audits.

The system attribute *glide.allow.new.cert_follow_on_task* is set to true by default, allowing for new follow on tasks to be created for the same failure, at each audit run. You can set this property to false, to configure audit to use the same follow-on task for the same audit failure across multiple runs.

You configure and assign follow-on tasks to qualified users or groups in the audit record. A user with the certification_admin role can reassign any follow-on task. The Audit Results related list in the Follow On Task form contains links to the records that failed.

Access follow-on tasks

Users with the certification role can only access follow-on tasks assigned to them but can reassign these tasks to other users.

Procedure

1. Navigate to **All** > **Compliance** > **My Follow On Tasks**.
   The list contains all active follow-on tasks assigned to the logged in user.
2. Open a task.

   The record shows the specifics of the task, the task activity, and the failed audit results.
3. Open records from the **Audit Results** related list to see each discrepancy.
4. Go to the CI named in the record and perform the work to bring it into compliance.
5. Update the **State** field in the follow-on task record and add work notes as you correct each discrepancy.

   When you change the state, the system updates the task activity appropriately.

   When the task is **Closed Complete** it no longer appears on the **My Work** list.

Manage follow-on tasks

Users with the certification_admin or admin role can see all follow-on tasks.

Before you begin

Role required: none

About this task

Tasks are pre-assigned to a user or group as specified in the audit record, but users with the certification_admin role can reassign the task.

Procedure

1. Navigate to the appropriate application:
   - **Compliance** > **Architecture Compliance** > **Follow On Tasks**
   - **Compliance** > **Desired State** > **Follow On Tasks**
   - **Compliance** > **Scripted Audits** > **Follow On Tasks**

   The list of follow-on tasks appears, filtered by audit type.
2. Open a task.

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The **Audit** and **Configuration item** fields are read-only for all users.

3. Edit the **Change group** or the **Assigned to** field if necessary.
4. Edit the **Short description** field if necessary.

   The short description is inherited from the **Task description** field in the Audit form.

5. Use the links in the **Audit Results** related list to open the individual records that failed the audit.
6. If you update the follow-on task record, be sure to add work notes.

Certification templates

Certification templates can define attributes, relationships, and reference field values that indicate what a record is expected to contain.

These values are used to perform audits on ServiceNow records. The certification filter selected in the template identifies the table and records to audit, and the template conditions set the expected state for those records. The type of audit you create determines which tables and template conditions are available.

Users with the certification_admin role can create, update, and delete templates. Users with the certification role can view template versions.

Certification template audit types

When you create a template, ServiceNow assigns an Audit type that determines which tables and conditions are available in the certification template. This value is based on the application from which the template is created. Each application lists only the templates with the associated type.

Available Condition Builders

The available condition builders for each audit type:

- *Compliance*: Runs audits on any set of ServiceNow records, not only configuration items (CI). This audit type provides the following types of conditions for any ServiceNow table:
  - *Attribute*: Sets conditions for the attributes of the records.
  - *Related List*: Runs audits on records in tables that reference the table defined in the template.
- *Architecture Compliance:* Defines the following types of conditions for tables that extend the Configuration Item [cmdb_ci] table.
  - *Attribute:* Sets conditions for physical attributes of CIs, such as memory or disk size.
  - *Related List:* Runs audits on records in tables that reference the table defined in the template.
- *Desired State*: Defines the following types of conditions for tables that extend the Configuration Item [cmdb_ci] table.
  - *Attribute*: Sets conditions for physical attributes of CIs, such as memory or disk size.
  - *CI relationship*: Defines the relationships these CIs have with other CIs. An example of a relationship is a business service, such as Outlook Web Access, that depends on a server.
  - *User relationship*: Defines the user who reviewed the log records. The only operator available with this condition builder.

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- *Group relationship*: Defines user groups who backed up this CI. The only operator available with this condition builder.
- *Related List*: Runs audits on records in tables that point toward the table defined in the template.

Certification Template Record List

The default Templates list displays only the active version of each template, but you can update the breadcrumbs to display all template versions.

- Default Templates List: The default Templates list displays only the active version of each template, filtered by **Audit type**.
- All Template Versions: To view all template versions for an audit type, click the arrow before **Active=true** to remove that condition from the breadcrumbs.



Create or edit a certification template

To create a certification template, follow these instructions.

Before you begin

Activate the Certification Core plugin to enable the Compliance functionality. See Compliance Activation for details.

Procedure

1. Ensure that you have an appropriate filter that defines the records the template evaluates.

   The template applies its conditions to these records.

2. Use the CI Class Manager to navigate to the Certification Template form:

   a. Navigate to **All** > **Configuration** > **CI Class Manager**.

   b. Click **Hierarchy** to display the CI Classes list.
   Select the class for which to create a certification template.

   c. In the class navigation bar, expand **Health** and then click **Compliance**.

3. Click **Certification Template**.
4. Or, navigate using one of these paths:
   - **All** > **Compliance** > **Architecture Compliance** > **Templates**
   - **All** > **Compliance** > **Desired State** > **Templates**
   - **All** > **Compliance** > **Templates**
   - **All** > **Audit Definitions** > **Templates**
5. Click **New** or select a certification template to edit.

   The following fields are completed automatically:

   - **Number**: Each new template has a unique number. All versions of the same template use the same number.
   - **Active**: All new templates are set to *Active*.

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- **Version**: The version of a new template is set to *1*.
- **Audit type**: The system sets the default type to *Architecture Compliance*, *Desired State*, or *Compliance*, depending on the application in which the template was created. You can select a different type when you create the template, but the field becomes read-only when you submit the record. The system uses audit types to filter record lists for appropriate data and determine which conditions are visible on the template form.

6. Complete the following mandatory fields.
   - **Name**: Enter a descriptive name for this template. The name helps identify the purpose.
   - **Filter**: Select the filter that identifies the records to be certified. You can select either active or inactive filter versions. By default, the system presents only active versions for selection. If you start typing the name of a filter, the auto-complete feature displays all versions for selection. For architecture compliance and desired state templates, only filters that use a table extended from Configuration Item [cmdb_ci] appear on the choice list. All filters appear on the choice list for a compliance template. After you select a filter, the template condition builder appears. The template operates on the table specified in the filter.
7. Enter a **Description** for this template.
8. Define certification conditions using the condition builders.

   All conditions are AND conditions. The audit type of the template determines which conditions are available.

   - **Certification Attribute Conditions**: [All audit types] Select configuration item attributes or specifications to certify, such as CPU count, memory, or disk space. Available fields in the attribute condition builder depend on the table from the filter. Typical ServiceNow conditions for attributes are available, including the *between* operator for setting numerical conditions with high and low boundary values. This operator was added specifically for desired state conditions.

     The **Show Related Fields** item supports dot-walking, allowing you to include referenced fields in a certification attribute condition. Click **Show Related Fields** or **Remove Related Fields** to add or remove referenced fields (in the form of <field> => <field>). Select a referenced field to drill down to the next level of referenced fields.

     See Dot walking.
   - **Certification CI Relationship Conditions**: [Desired State audit types] Define the CI relationships to certify, such as *Runs on* or *Depends on*.
   - **Certification User Relationship Conditions**: [Desired State audit types] Select the desired user relationship for this configuration item. The relationship provided in the base system is *Log reviewed by*.
   - **Certification Group Relationship Conditions**: [Desired State audit types] Select the desired group relationship for this configuration item. The relationship provided in the base system is *Backed up by*.
   - **Certification Related List Conditions**: [All audit types] Select field values from tables that reference the template table, or user-defined related lists which are created via custom relationships in the sys_relationship table. To create a condition that evaluates all servers in the Server [cmdb_ci_server] table for the presence of Microsoft Word 2007, as referenced in the Software Installation [cmdb_sam_sw_install] table. The resulting condition is *[Software Installation->Installed on] [Display name] [is] [Microsoft Word 2007]*.

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Check **All** to include all records in the condition requirements of the related list. If there are no records in the related list, then:

- If **All** is checked, the condition requirement is met.
- If **All** is unchecked, the requirement is not met.

Note:
By default, the condition builders for relationships display only suggested relationships. To see all possible relationships, select the **Show all relationships** check box on the right side of the form.

a. Click **Insert a new row** to insert a condition.
You cannot insert an empty condition.

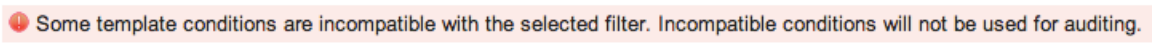
b. Click the green check mark icon to save a condition.
Make sure to save the condition before performing any other operation. Updating the form does not save the condition.

c. To delete a condition, click the red **X** beside the condition.
The system marks the condition as inactive.

d. To reactivate a condition, click the gray **X**.
If another condition for the same field exists, the system prevents reactivation and warns you of the conflict.

9. Click **Submit**.
ServiceNow saves the template as version 1.
10. To create another version of the template, change the name, edit the conditions, or select a different filter.
Updating the template description does not create a new version.

Note:
If you select a filter whose table is incompatible with the existing template conditions, the system displays a warning that the conditions cannot be applied.



11. Click **Update**.
The system saves a new version of the current template and makes it the *Active* version. The previous version is marked inactive.

Clone a Certification template

New templates can be cloned from an existing template.

Procedure

1. Open the template record to be copied.
2. Make any necessary changes.
3. Change the template name or description to distinguish it from the original.
4. Click **Clone**.

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ServiceNow increments the record number above the highest template number and sets the version of the new record to *1*. A message appears under the header bar naming the source record for the clone.Both templates are *Active* and appear in the record list. The record list allows you to see the entire history of the template.

Manage Certification template versions

You can view and manage all versions of a template from the Template form.

Procedure

1. Open any version of a template.
   The **Other Versions** related list displays all other versions of this template, both active and inactive.
2. Click any version in the related list to display the record for that version.
3. Update the template to create a new version.
   The system increments a version of the template when you edit any field except **Description** and **Active**. You can manage the template versions without returning to the list view.
4. To make an inactive template the current version, open that version, edit it if desired, and then click **Revert**.
   This action does:
   - Deactivates the previously active version of the template.
   - Copies the inactive template.
   - Makes the new copy the current, active version.
5. Select the **Audits** related list to view all audits configured to use this template.
6. Click **New** to create a new audit record with the template selection and table pre-populated.

Delete a Certification template

Certification templates can be deleted.

About this task

Only users with the certification_admin or admin role can delete template versions. You cannot delete a template version that is being used for an audit.

Procedure

1. To delete a single template version, open that version record and click **Delete**.

   The system hides the **Delete** button for templates that are in use. If you delete the latest, active version of a template, the previous version of that template is reset to *Active*.

2. To delete all unused and inactive versions of a template, open any version of that template and click **Delete inactive versions** under **Related Links**.
   This control appears on all versions, whether they are used in an audit.
3. When prompted, click **OK** to proceed.
   The system deletes only template versions that are not used in an audit. All protected versions are named in a message that appears in the header bar.

Scripted audits

A scripted audit enables users with the certification_admin role to conduct an audit from a script rather than using restrictive template conditions.

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A scripted audit uses a certification filter to select the records to audit, and then creates standard follow-on tasks for remediation of any discrepancies. Use this type of audit to query for any values or states that a script can define. A scripted audit is a specific audit type that is activated together with the Desired State plugin. ServiceNow provides a sample audit script with configuration instructions.

Create a scripted audit

A scripted audit is an audit whose conditions are defined by a script.

Procedure

1. Navigate to **All** > **Compliance** > **Scripted Audits** > **Audits**.

   An audit type of *Scripted* filters the list.

2. Click **New**.
3. Complete the form (see table).
4. Create the audit script.

   The *Run this script* field includes a sample script with instructions for performing the audit and generating the follow-on tasks. This field appears only when you access audits from the Scripted Audits module.

5. Click **Submit**.

   Sample script:

```
/*
////////////////////////////////////////////////////
/// This script works with Data Center Zones filter //
////////////////////////////////////////////////////

var desiredFloorSpaceUsage = 30;  // Value to audit against
var assignToUser = '46d44a23a9fe19810012d100cca80666';  // Beth
 Anglin
var assignToGroup = '8a5055c9c61122780043563ef53438e3'; //
 Hardware group
var taskMsg = 'See the audit results below for the
 discrepancies that must be addressed';

// API call to retrieve records based on the filter
var gr = new
 SNC.CertificationProcessing().getFilterRecords(current.filte
r);

// Loop over all records defined by the filter
while(gr.next()) {
 var sysId = gr.getValue('sys_id'); // Sys ID of audited record
 var floorSpaceInUse = gr.getValue('floor_space_in_use'); //
 Value to audit

 // Determine if certification condition passes or fails
 if (floorSpaceInUse < desiredFloorSpaceUsage) {
  var columnNameSpace = gr.floor_space_in_use.getLabel(); //
 String value of column audited against
```

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```
  // Call create Follow on Task API and save the returned
 sys_id for use in logging audit result fail
  // Params:
  // auditId - Sys id of the audit record executed
  // ciId Sys - id of the configuration item.  Empty string if
 not a cmdb ci
  // assignedTo - Sys id of user to assign task to.  Can be
 empty
  // assignmentGroup - Sys id of group to assign task to.  Can
 be empty
  // shortDescr - Short description for the Follow On Task.
 Can be empty
  // Return value: Sys id of the created follow on task
  var followOnTask = new
 SNC.CertificationProcessing().createFollowOnTask(current.sys_
id, sysId, assignToUser, '', taskMsg);

  // Call log failed result API
  // Params:
  // auditId - Sys id of audit record executed
  // auditedRecordId - Sys id of the record audited
  // followOnTask - Sys id of the follow on task associated
 with the audited record(@see auditedRecordId). Can be empty
  // columnDisplayName - Label of the column audited(ex. Disk
 space (GB)).  Can be empty
  // operatorLabel - Label of the operator used to audit the
 column(ex. is not empty, greater than). Can be empty
  // desiredValue - Desired value of the column.  Can be empty
  // discrepancyValue - Discrepancy value.  Can be empty
  // isCI - True, if audited record is a CI. False, otherwise.
  // domainToUse - Sys domain of the "cert_audit" record.  Can
 be empty
  new
 SNC.CertificationProcessing().logAuditResultFail(current.sys_
id, sysId, followOnTask, columnNameSpace, 'greater than',
 desiredFloorSpaceUsage, floorSpaceInUse, true);
 } else { // If certification condition pass, write a Audit
 Result Pass via API
  // Params:
  // auditId - Sys id of audit record executed
  // auditedRecordId - Sys id of the record audited
  // isCI - True, if audited record is a CI. False, otherwise.
 Can be empty.
  // domainToUse - Sys domain of the "cert_audit" record.  Can
 be empty.
  new
 SNC.CertificationProcessing().logAuditResultPass(current.sys_
id, sysId, true);
 }
}
*/
```

New scripted audit table.

Field	Description
Name	Name for this audit.

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Field	Description
Filter	Filter to use when the audit type is Scripted. This field is required for scripted audits, but is hidden for all other audit types.
Template	[Required] Template to use when this audit runs. Audit type filters the list of available templates and only the active versions of a template are available for selection. This field is hidden when the audit type is Scripted.
Table	[Read-only] Displays the table for the template.
Create tasks	Creates follow-on tasks for correcting discrepancies when selected. In a scripted audit, you can create the logic for either task state by using true to create a task or false if no task is created. By default, this check box is cleared (false) in a new audit record.
Assignment type	A choice list to select how the audit assigns the follow-on tasks. This field is visible only when the Create task check box is selected. Choices are: ○ User Field: elect a user reference field on the table being audited. As an example, select the user named in the Managed by field on the failed record to perform the tasks. This selection displays the Assigned to and Assign to empty fields. If the reference field on the record is empty, the value in the Assign to empty field is used. ○ Specific User: Select a specific user to perform the tasks. This selection displays the User field. ○ Group Field: Select a group reference field on the table being audited. As an example, select the Support group from the failed record to perform the tasks. This selection displays the Assign to group and Assign to empty fields. All members of the group from the reference field on the failed record are assigned to the tasks. If the reference field on the record is empty, the value in the Assign to empty field is used. ○ Specific Group: Select a specific group to perform the tasks. This selection displays the Group field. All members of the selected group are assigned to the tasks.
User	The specific user this audit assigns to follow-on tasks. This field is available under these conditions: ○ Assignment type is set to Specific User. ○ Assign to empty is set to Create Assigned Task, and Assignment type is set to User Field. **Note:** Ensure that the specified user has the certification role.
Assign to group	The group field that defines which group this audit assigns to the follow-on task. This field is available only when the Assignment type is Group Field.
Group	The specific group this audit assign to follow-on tasks. This field is available only when the Assignment type is Specific Group and you have selected Group Field as the assignment type.
Assign to	The user field that defines which user this audit assigns to the follow-on task. This field is available only when the Assignment type is User Field.
Assign to empty	The behavior to use if the field selected in Assign to or Assign to group is blank on the record being audited. For example, if a follow-on task must be assigned

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Field	Description
	to a manager, but no manager is identified, the value in this field determines what happens. This field appears only when the Assignment type is User Field or Group Field. The possible selections are: ○ Do Not Create Task: No follow-on task is created when the Assign to or Assign to group field is empty. ○ Create Unassigned Task: Create a follow-on task, but do not assign it to any user or group. The task can be manually assigned later. ○ Create Assigned Task: Create a follow-on task and assign it to the user or group specified. If you selected an assignment type of User Field, the User field becomes available. If you selected the Group Field type, the Group field becomes available. The audit automatically creates follow-on tasks for all records that have Assign to populated, regardless of which selection you make for Assign to empty.
Short description	Brief description of the purpose of the audit.
Task description	General description of the work required for the follow-on tasks created by this audit. All follow-on tasks created by this audit inherit this description.
Active	Activates this audit schedule and generates follow-on tasks at the scheduled date and time. Clear this check box to hide scheduling fields on the form (except Last run date) and not generate follow-on tasks.
Run	How often to run the schedule that generates the audit. ○ Daily ○ Weekly ○ Monthly ○ Periodically ○ Once ○ On demand
Day	○ If Run is Weekly, the day of the week when the audit runs. ○ If Run is Monthly, the day of the month when the audit runs. If the day is 29, 30 or 31, for shorter months the audit runs on the last day of the month.
Repeat Interval	If Run is Periodically, the frequency that the audit runs entered in time, days, or both. For example, set Days to 10 and Hours to 14:00:00 to run the audit every 10 days at 2:00pm.
Starting	If Run is Periodically or Once, the date and time when the audit runs.
Time	If Run is Daily, Weekly, Monthly, or Once, the time of day, on a 24-hour clock, when the audit runs.
Last run date	[Read-only] The last date and time the audit ran, either on its regular schedule or manually. Audit previews do not update this field.
Next scheduled run	[Read-only] The next date and time on which the audit runs. The system recalculates this field when you change the schedule.

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Field	Description
Audit type	[Read-only] The type assigned to this audit. The system selects the audit type based on the application from which the audit was created and can be: ○ Desired State ○ Architecture Compliance ○ Compliance ○ Scripted
Run this script	Audit script to run. This field is available only when the audit type is Scripted. The Audit form includes a sample script with instructions for performing the audit and generating the follow-on tasks. See Script Methods for a list of the methods provided and the accepted parameters.

Script methods

ServiceNow provides four methods for creating the audit script.

Script methods

Name	Description	Parameters
getFilterRecords	public GlideRecord getFilterRecords(String filterId)	filterID: The sys_id of the filter to use.
logAuditResultPass	public void logAuditResultPass(String auditId, String auditedRecordId, boolean isCI, String domainToUse)	auditId: Sys_id of audit record executed auditedRecordId: Sys_id of the record audited. isCI: True, if the audited record is a CI, false if otherwise. domainToUse: Sys_domain of the cert_audit record.
logAuditResultFail	public void logAuditResultFail(String auditId, String auditedRecordId, String followOnTask, String columnDisplayName, String operatorLabel, String desiredValue, String discrepancyValue, boolean isCI, String domainToUse)	auditId: Sys_id of audit record executed. auditedRecordId: Sys_id of the record audited. followOnTask: Sys_id of the follow-on task associated with the audited record and can be an empty string. columnDisplayName: Label of the column audited. For example, Disk space (GB).

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Script methods (continued)

Name	Description	Parameters
		operatorLabel: Label of the operator used to audit the column. For example, is not empty or greater than can be the label. desiredValue: Desired value of the column. discrepancyValue: Discrepancy value. isCI: True, if the audited record is a CI, false if otherwise. domainToUse: Sys_domain of the cert_audit record.
createFollowOnTask()	public String createFollowOnTask(String auditId, String ciId, String assignedTo, String assignmentGroup, String shortDescr)	auditId: Sys_id of the audit record executed. ciId: Sys_id of the configuration item. This string is empty when the table is not extended from the cmdb_ci table. assignedTo: Sys_id of the assigned user of the task. This string can be empty. assignmentGroup: Sys_id of the group the task is assigned to. This string can be empty. shortDescr: The text to use for the short description of the follow-on task.

Managing proposed changes

The proposed changes feature allows you to pre-configure changes to configuration items and their associated relationships. These pre-configured changes are prepared to be implemented, but do not actually happen until they are applied at a later time.

When you view a CI, the proposed changes can be displayed so that you can see what is planned.

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This feature is useful when you want to make modifications while a change process is in the approval stage, and only implement the changes after the approvals are complete. If the change is never approved, no changes to records have to be reversed. If the change is approved, a quick command applies all the proposed changes.

You can make the following proposed changes to a CI:

- Modify any field on the CI form.
- Add or delete a relationship to that CI.

To modify a relationship, you must delete the current relationship and add a new relationship. You cannot delete a proposed change.

View CI history

You can view the history of changes to a CI in a list, calendar, or timeline format.

View the proposed changes of a CI

You can view the proposed changes so that you can see what is planned for the CI.

Before you begin
Role required: personalize_form

About this task
To view any proposed changes, configure the CI form layout to display the **CMDB Scheduled Changes** field. Proposed changes are not displayed in a CI form by default.

Procedure
1. Navigate to **All** > **Change** > **Open** and open a change request.
2. In the **Affected CIs** related list, open the **Configuration Item**.
   You may also navigate directly to the CI form.
3. Right-click the form header bar.
4. Select **Configure** > **Form Layout**.
5. Move the **CMDB Scheduled Changes** field to the **Selected** pane.
6. Click **Save**.
   The CI form shows the details of any proposed changes in the **Scheduled changes** area.

Add a proposed change to a CI

Proposed changes to a CI can be made while viewing a change request or any task-related record.

Before you begin
Role required: itil

Procedure
1. In the Change Request form, go to the **Affected CIs** related list.
   If there are no CIs in the Affected CIs list, click **Edit** to add CIs that are affected by this change request.
2. Right-click the CI that you want to configure for a proposed change, and select **Proposed Change**.
3. Complete the form to make the proposed changes, and click **Save Proposed Change**.

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Click **Update** to apply the changes immediately. Click **Delete** to delete the CI.

4. To propose an addition or a removal of a CI relationship:

   a. Click the plus icon in the **Related Items** section.

   b. In the Relationships section, add or delete a relationship.
   For information about using the relationship editor, see Create or edit a CI relationship.

   c. Click **Save Propose Change**.

   d. Confirm saving the proposed change.

   Click **Update** or **Delete** to commit the changes immediately.

> **Note:**
> Use only with CI relationships. Proposing additions or removal of relationships is not valid for user relationships and group relationships.

What to do next

After the proposed changes are saved, the **Apply Proposed Changes** button appears on the Change Request form. This button lets the user commit the proposed changes to the CI. Your business processes determine the appropriate time to commit the changes. The CI retains the existing data until the proposed changes are committed. However, users can see that changes have been proposed.

Apply a proposed change to a CI

When you apply the proposed changes, all the proposed changes for that change request are applied to the configuration item. You can apply proposed changes without verification, or if verification tests of the proposed changes have failed.

Before you begin

Role required: itil

About this task

After you apply the proposed changes, the **Scheduled changes** part of the form displays **No scheduled changes found**. You can configure proposed change verification rules which you can use to verify proposed changes before applying the changes.

Procedure

1. Navigate to the **Change Request** form.
2. Click the **Apply Proposed Changes** button.
   You may have to right-click the form header and select the **Reload Form** option to see the changes.

Create or edit a proposed change verification rule

Ensure that proposed changes meet business requirements and do not introduce invalid data to the CMDB, create a rule that includes a script to verify the proposed changes.

Before you begin

Role required: asset or itil

About this task

When you configure proposed change verification rules for a CI, you have an option to verify that the proposed changes pass the verification test script in the rule. The verification test results

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are logged as passed or failed, and you can view the results. Running the verification test is not mandatory, and a failed verification test does not prevent you from applying proposed changes.

Procedure

1. Navigate to **All** > **Configuration** > **Change Verification** > **Proposed Change Verification Rules**.
2. Click **New** or select an existing rule to edit.
3. Fill in the fields, as appropriate.

Proposed Change Verification Rules form

Field	Description
Rule name	The name of this rule.
Table name	The table to which the rule applies.
Filter condition	Conditions to apply this rule to specific CIs.
Active	Check box to activate this rule.

Rule script	A verification Java script that needs to return true or false. For example:
	`validateRule()`
	`{`
	`var os = current.getValue("os");`
	`var cpu = current.getValue("cpu_count");`
	`//Use current.getValue(fieldName) to get the proposed change value, eg. var os = current.getValue("os");`
	`//Your verification code`
	`if (os != "SunOS" || cpu < 2)`
	`return false;`
	`//Return true to pass the verification and false if the verification failed`
	`return true;`
	`}`

4. Click **Submit** or **Update**.

Result

On the **Change Request** form, you can click **Verify Proposed Changes** to verify proposed changes for the affected CIs.

Verify proposed changes

Before applying proposed changes to affected CIs, use proposed change verification rules to verify that the changes meet business requirements and do not add invalid data to the CMDB.

Before you begin

Create or edit the rules used to verify proposed changes. For details, see Create or edit a proposed change verification rule.

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Role required: none

About this task
You can apply proposed changes even if they are unverified or fail a verification test.

Procedure
1. Open the **Change Request** form that affects the CI.
2. Click **Verify Proposed Changes**.
   The proposed changes are verified against any proposed change verification rules in which the CI meets the **Filter condition** criteria.
3. Review the message that appears at the top of the form after the verification process is finished.
   The message states whether the verification tests passed or failed.

What to do next
To view the details of any verification tests that were performed for the change request in the past two days, click the **Proposed Change Verification Log** related link.

Create or edit a planned change validation script

Create a custom script that checks if a change to a class was valid according to business requirements, and whether the change was planned or not. A planned change validation script is used whenever a CI change is viewed in the CI timeline or change history.

Before you begin
Role required: admin or itil

About this task
The system attempts to validate each CI change as follows:

- If a custom script exists for the CI or one of the CI parents, then the script is executed and the results are used to flag the change as valid or invalid. Parent CIs are examined in the hierarchical order.

- If a custom script does not exist for the CI or any of its parents, then a predefined validation script is used. The change is determined as a planned change if the change occurred between the **Work start** and **Work end** dates of the change request associated with the changed CI.

  However, this check is not always reliable because a user might have manually modified the CI within the work dates, which flags the change as valid even if it is invalid.

The script needs to return a boolean, true or false, which depends on meeting the test criteria in the script. You can define a separate script for each CI class, and you can define multiple planned change validation scripts for a single class. For example, to maintain different versions of the script. Only one script can be active for a CI class at any given time.

These are the parameters that uniquely characterize a change:

- The fields that were changed
- The data source that performed the change
- The time stamp of the change

To correctly determine the validity of a change, examine the parameters and apply business logic to evaluate if the validation tests are met. A planned change validation script can test any of these characteristics and determine when a change meets pre-established criteria. For example,

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the custom script can check if the mode of the CI is operational or maintenance, or who initiated the change.

Procedure

1. Navigate to **All** > **Configuration** > **Change Verification** > **Planned Change Validation Script**.
2. Click **New** or select a validation script to edit.
3. Complete the form.

Planned change validation script form

Control	Description
Active	Check box to activate this script for validating changes.
Applies to	Class that this script applies to.
Script	Script to run to validate a change. If the script does not return a boolean value, then it is configured to false.

The script has a template which displays the input variables of the script.

Template script input variables

Variable	Type	Description
current	GlideRecord	Current record that is being processed.
updatedOn	GlideDateTime	Time stamp of the change.
updatedBy	String	Entity responsible for the change.
fieldsChanged	String	Comma-separated list of the names of all fields that were changed.

Example

This sample script checks who initiated the record update. It returns true if admin initiated the record update. Otherwise, the script returns false.

```
isValidChange();

function isValidChange(/*GlideRecord current, GlideDateTime
 updatedOn, String updatedBy, String changedFields*/)
{
   //Return true if the user that updated the record has an
 admin role
   return isUserAdmin(updatedBy);
}

function isUserAdmin(userName)
{
   var grUser = new GlideRecord("sys_user");
   grUser.addQuery('name', userName);
   grUser.query();
   if(grUser.next())
   {
       var roles = new GlideRecord ("sys_user_has_role");
```

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```
        roles.addActiveQuery();
        roles.addQuery('user', grUser.sys_id);
        roles.query();
        while(roles.next())
        {
           if(roles.role.name == 'admin')
              return true;
        }
    }
    return false;
}
```

4. Click **Submit**.

Intelligent Search for CMDB

Use everyday natural language query (NLQ) in a search string to query for a set of CIs in the CMDB. Intelligent Search for CMDB, parses, resolves ambiguities, and converts your search string into a valid CMDB query. Complex search strings open fully constructed on a canvas of CMDB Query Builder where you can continue and refine, or run.

Intelligent Search for CMDB is supported only on English language instances and isn't supported when the instance preferred language is set to a language other than English.

Integration with CMDB Workspace

Intelligent Search for CMDB is integrated into Home view in the CMDB Workspace store app. For information about how to use Intelligent Search, sample search strings, and helpful tips, see CMDB Workspace store app (Intelligent Search section).

Integration with CMDB Query Builder

Intelligent Search for CMDB is integrated with the CMDB Query Builder in the ServiceNow AI Platform. This integration is controlled by the system property *glide.cmdb.query.nlq.activated*, which is set to **true** by default. Intelligent Search for CMDB lets you use natural language processing in the CMDB Query Builder to find CIs and their relationships using Intelligent Search for CMDB functions.

Using Intelligent Search for CMDB

Intelligent Search is tailored to the CMDB, searching only through the CMDB class hierarchy for tables, and for CIs and their relationships.

Use the Intelligent Search search field to construct a search string using everyday natural language. Your queries can span multiple CMDB classes and involve many CIs that are connected by different relationships. After resolving any ambiguities with table names or relationship types, Intelligent Search converts your search string into a query that the CMDB can run. The CMDB query is constructed dynamically as you type into the search box and spell checker is applied if needed. A dynamic list of relevant suggestions appears as you type, with items such as table names, matching single words or part phrases in the typed-in text.

Use Intelligent Search:

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- **Search tips**: Shows details and tips about the usage, and examples for single and multi-table search, advanced filtering, and relationships in Intelligent Search. The Relationships tab contains a link to the CMDB Implicit Relationships table.

- **Search**: Depending on whether the search string is already fully converted into a valid CMDB query and whether the search is for a single or multiple tables.

  - If the search string has no ambiguities with the table name or relationships, then the query runs and the results appear in a list view format.

    If the constructed CMDB query contains more than a single table, then the **View in Query Builder** button appears. Click the button to open the CMDB Query Builder with your query fully constructed on the Query Builder canvas. You can use the Query Builder to continue editing the query.

  - If there are any ambiguities with table names or relationship types in the search string, then the search string can't be converted into a valid CMDB query. In this case, the Refine your query dialog box appears to continue and parse your search string into a valid CMDB query. The dialog box contains suggested synonyms and labels for phrases in your search string. Use the drop-down lists to select the synonyms that match your intended search and then click **Go** to run the query.
  - If Intelligent Search is unable to convert your search string into a valid CMDB query, then clicking **Search** does not generate any query results. Instead, a feedback form appears. Fill out the form and click **Submit Feedback** to send your feedback to ServiceNow analysis.
- **Results Feedback**: Submit feedback to ServiceNow analysts, to express your assessment of the results. Choose descriptions that capture any gap between the results and your expected results, and add any helpful details.

Sample searches

When you click the search box, the drop-down list of pre-defined sample searches appears. The list consists of more common searches, or searches that are more difficult to construct such as searches that involve application services. Run any of those searches to get started.

- Sample searches are stored in the NLQ Sample Search [sn_cmdb_ws_nlq_sample_search] table
- Referenced tables are stored in the NLQ Sample Search Table [sn_cmdb_ws_nlq_sample_search_table] table

CMDB Admins (sn_cmdb_admin user role) can modify a sample search by directly editing its record in the NLQ Sample Search table. Click **All** and then in the Filter navigator, enter `sn_cmdb_ws_nlq_sample_search.list`. In the NLQ Sample Searches list view edit the record for a search that you want to modify.

Any modification to sample searches is reflected in both, the CMDB Workspace and the CMDB Query Builder.

Synonyms

The NLQ Synonym [nlq_synonym] table is pre-populated with synonyms for natural language strings for CMDB table and column names, and relationships. This table is used to match natural language search words to the CMDB query language. For example, the phrase ‘linux server’ has synonyms such as ‘Linux Server’, ‘Server’, and ‘Virtual Machine Instance’.

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For details about viewing and adding synonyms customized to your business needs, see NLQ synonyms.

CMDB Implicit Relationships

You can help Intelligent Search find more results by defining some of the relationships between classes as implicit relationships. Implicit relationships can be useful in queries that involve service offering and application services.

NLQ admins can create new implicit relationships by navigating to **All** > **NLQ** > **CMDB Implicit Relationships**.

An implicit relationship defines the relationship between two tables and includes any filters you want to apply. When creating an implicit relationship, you set the following items:

- From table (from_table): The class that acts as the parent
- Filters: Conditions that are applied to the columns of the from_table
- To table: The class that acts as the child
- Relationship: How the from_table interacts with the to_table. For example, Contains: Contained by means the from_table contains the to_table
- Skipped table: The class that is implied and not captured by the CMDB Query Builder

For example, in CMDB Query Builder, you want to see your service offerings that have had a P1 incident in the last 10 days. However, if you were to type `show me all business service offerings with p1 incidents in the last 10 days`, NLQ wouldn't understand the relationship.

Implicit relationships are stored in the NLQ CMDB Implicit Relationship [nlq_cmdb_implicit_relationship] table and are used in the CMDB Workspace and if integrated, also in CMDB Query Builder.

For more information about NLQ in the ServiceNow AI Platform, see Natural Language Query (NLQ).

Unified Map

The Unified Map feature graphically shows a hierarchical map of CIs and the relationships between them, while centered on a CI that you choose (the home node). The Unified Map feature combines some of the capabilities of Dependency Views and of Service Mapping, into a single map experience.

Unified Map is included in CMDB Workspace.

Because Unified Map shows how CIs are connected to each other, it is useful with products such as Change Management, Incident Management, and Event Management. Nodes on the map represent CIs in the CMDB hierarchy and different types of lines between the nodes represent the connections between CIs.

For example, Unified Map helps you understand the impact of a change by visually showing how CIs are connected to other CIs by relationships and references. Unified Map also shows the composition of application services which lets it be useful with products such as Event Management and Incident Management. For example, you can see all CIs that are members of the 'Revenue App' application service. You can review historical changes, and then easily filter the CIs so that only Application CIs appear.

Unified Map provides the following panels:

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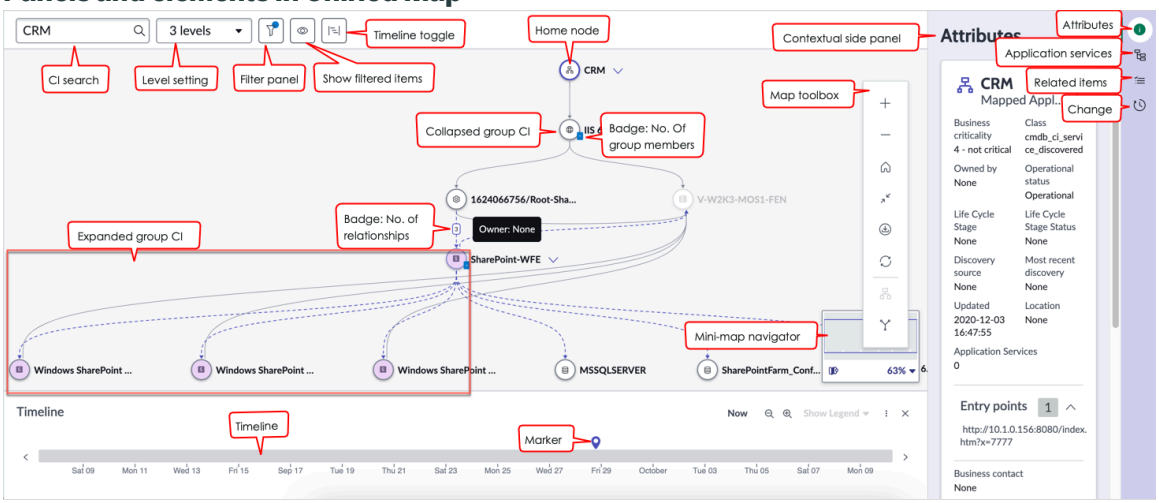
- Map pane that shows the map for a CI, and which lets you access the following utilities:
  - CI search field letting you search for the home node CI for the map
  - Filter panel letting you filter CIs and relationships that appear on the map, and create filter presets to reapply a set of filters on any map
  - Toolbox letting you modify various visual aspects, such as the layout mode, of the map
  - Mini-map navigator letting you easily move the entire map to an area of interest and set the zoom level for the map
- Timeline showing related item events for the CIs on the map, up to six months in the past and six months into the future, as of the time of viewing the timeline.
- Contextual side panel on the right where you can choose the Attributes, Application services, Related items, or Changes module. The panel shows different types of details per module and according to the selections on the map

Panels and elements in Unified Map



The map content and the details that appear in the various modules in the contextual side panel, is synchronized. The selected module in the contextual side panel determines the type of details that appear and your selection on the map determines the scope. If you select a CI on the map, then the contextual side panel shows details for that CI. For some modules, if nothing is selected on the map, the contextual side panel shows details for all the CIs on the map.

For example, if the Application services module is selected and a CI is selected on the map, then the contextual side panel shows all application services related to the selected CI. If you then select an empty space on the map so that no CI is selected — The contextual side panel shows all application services that are associated with any CI in the map.

Access

You can access the Unified Map feature from CMDB Workspace, in either of the following ways:

- Navigate to **Workspaces** > **CMDB Workspace**. Then, in the Quick Links section on the CMDB Workspace Home view, select **Unified Map**.
- Select **Open Map** on a CI form, to open a map for the respective CI as the home node of the map. By default, CIs must be in an operational state to use this capability. For more information, see Configure operational states of CIs.

Role requirements:

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- To access maps: sn_cmdb_user, sn_cmdb_editor or sn_cmdb_admin roles
- To access maps with operational application services: app_service_user, and sm_user or sm_admin
- To access maps with operational and non-operational application services: app_service_admin, and sm_user or sm_admin
- To access and view related items: itil

Map content

The map pane shows a graphical layout of CIs and their relationships including group CIs such as application services, and a timeline. You can set and change the content on the map as follows:

Home node

Use the Search box to select the CI, such as an application service CI, that you want the map to center on. That CI is the home node of the map. The home node is easily visible by its thicker border line and by a pulsating effect. The home node is the focal point of a map and all other CIs and relationship lines are drawn in the context of the home node.

Level

Select the levels drop-down list to set the map level. The map level limits the number of hierarchy levels for which to show CIs, therefore, limiting the overall size of a map. Starting with the home node, the map shows all CIs up and down the hierarchy, up to the specified level. By default, only the first three levels of CIs, directly descending from the home node, appear on the map.

Filter

Select Open filter panel ( ) to filter the data appearing on the current map, and create filter presets. Each filtering category includes only items that are relevant to the current map. The list in the CI types category, for example, includes all the CI types on the map, and you can filter in or out any of those items. A blue dot appears on the filter icon when filters are being applied.

Filtered items don't appear on the map unless you select the Show filtered items icon ( ) to expose them as grayed-out CIs and relationships.

For more information about configuring map filters, see Configure map filters.

Service Mapping

When Service Mapping is installed then application services populated by Service Mapping population methods, are included in maps. Otherwise, only application services populated by CMDB-related population methods, appear.

Without Service Mapping, any other data that Service Mapping provides for application services, such as relationships, grouping, and mapped application services data (and subclasses of that class), isn't available. Also, the Application services module in the contextual side panel, doesn't show details for CIs in the map.

If Service Mapping is installed and the *sn_sm_scoped_app.sa.unified_map.enabled* system property is enabled, you can access Unified Map from the Service Mapping Workspace. For

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more information, see Access the Unified Map feature from the Service Mapping Workspace.

Filtering by operational state of CIs

By default, non-operational CIs are filtered out of the map and only CIs in which *Life Cycle Stage* is **Operational** or empty, appear on maps. When searching for CIs in a map, those CIs that are filtered out based on operational state, aren't included in the results. Also, viewing details for a CI that is filtered out based on operational state, such as a non-operational CI, the **Open Map** button on the CI form isn't available.

An administrator can change this default behavior to show non-operational CIs, or CIs of any combination of *Life Cycle Stage* values. For more information, see Configure operational states of CIs.

Number of elements

The number of elements that a map retrieves and shows, is up to the number of elements within the specified level, without exceeding the value of the *node.map.max.edge.count* system property (250 by default, and CIs within a collapsed group CI are counted):

- If *node.map.max.edge.count* is greater than the number of elements within the specified level: Then all elements up to the specified level, show on the map.
- If *node.map.max.edge.count* is less than the number of elements within the specified level: Then any additional elements, beyond the specified level, are truncated and don't show on the map.

An administrator can modify the *node.map.max.edge.count* property, which affects the amount of data on a map and impacts performance.

Map appearance and interaction

The map initially appears using default settings. Colors used in Unified Map to highlight some field values, follow the Next Experience color themes, and dashed lines represent references between end point CIs.

You can interact with the map and change the appearance of its current content, as follows:

- Use the toolbox on the map to change map appearance:
  - Zoom in or out: Add or reduce the level of details on the map.
  - Align to home node: Move the home node to the center of the map.
  - Fit to screen: Center the map on the canvas and set the zoom level to its maximum level that enables the entire map to fit on the canvas.
  - Export map: Export the map to a PDF document on your local drive.
  - Collapse all: Collapse all group CIs that are expanded, center the map on the canvas, and set the zoom level to its maximum level that enables the entire map to fit on the canvas.
  - Switch map layout to either of the following options:
    - Unified vertical layout: Shows elements in a vertical tree pattern according to their upstream and downstream relationships. This option is the default layout for showing mapped application services.
    - Unified force layout: Shows elements in a clustered arrangement around a parent CI, regardless of upstream or downstream relationships.

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- Toggle visibility of the timeline: Show or hide the timeline underneath the map by selecting the Toggle visibility of the timeline icon (). For more information about the timeline, see Show CI related items events on a timeline.
- Point to a CI to animate the relationships between the CI and its connected CIs.
- Use the mini-map navigator on the bottom right to easily move the entire map on the canvas and set the zoom level to a specific percentage number. You can hide or show the mini-map navigator.
- Select the number badge on a group CI to expand the group and show its member CIs. The group parent and any CI members are temporarily highlighted by a light purple color (point to a group if needed). Select the badge again to collapse the group back into its group CI mode.
- Drag CI nodes on the map canvas to reposition CIs as needed.

Contextual side panel

Select one of the following modules in the contextual side panel on the right to show different types of details for CIs on the map:

- Attributes (): Shows the Attributes pane with details that are based on selections in the map. For more information about using this module, see Show attributes for a CI or a relationship in a map.
- Application services (): Cards in the Application services pane show key details, such as *Owner* and *Discovery source*, for application services. If a CI is selected on the map, then application services related to the selected CI, appear. If nothing is selected on the map, then any application service that is related to any CI on the map, appears.

  For more information about using this module, see Show application services for a CI in a map.
- Related items (): Shows related items grouped by related items categories, such as active incidents and alerts, in the Related items pane. If a CI is selected on the map, then only related items that are associated with the selected CI, appear. If nothing is selected, then all related items that are associated with any CI on the map, appear.
  - For information about using this module, see Show related items for a CI in a map.
  - For information about how administrators can configure the related items details appearing in badges, on timelines, and in cards in the Related items panel, see Configure options for the Related items module.
- Changes (): Shows CI changes in the Changes pane. If a CI is selected on the map, then only changes for the selected CI, appear. If no CI is selected, then the Changes pane doesn't show any change details.

  For more information about using this module, see Show changes for a CI in a map.

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Service maps

Mapped services, appear on the map as group CIs that you can expand and collapse to show or hide its members. Mapped services are descendents of the Application Services [cmdb_ci_service_auto] class, such as application services and dynamic CI groups. A badge on a group CI shows the number of members in the group.

Select the badge to expand the group to show all members, and then collapse the group back to hide members and to show only the group CI. In its expanded mode, point to any CI in the group to temporarily highlight all CI members by a light purple color.

Administer Unified Map

As an administrator, you can modify several settings in Unified Map to reflect how maps are used in the organization.

The Unified Map configurations in the following tasks affect all users. Users can customize some aspects of their own experience with Unified Map, but can't configure settings in these tasks.

Configure operational states of CIs

Specify the operational states that CIs can be in to be included in maps.

Before you begin

Role required: sn_cmdb_admin

About this task

Note:
This setting affects all users. Individual users cannot configure this setting. See Configure map filters and Configure options for the Related items module for settings that individual users can use to customize their personal experience with Unified Map.

By default, non-operational CIs are filtered out of maps and only CIs in which *Life Cycle Stage* is **Operational** or empty, appear.

Search results don't include those CIs that are filtered out based on operational state. Also, viewing details for a CI that is filtered out based on operational state, such as a non-operational CI, the **Open Map** button on the CI form isn't available.

Procedure

1. Navigate to **All** and then, in the Filter box in the main navigation bar, enter `sn_cmdb_ws_operational_lifecycle_for_unified_map.list` to open the *Operational life cycle modes* table.
2. Edit the default record whose *Name* is **CMDB Workspace Unified Map View**.
   a. Unlock the **Life cycle list** field.
   b. On the right side, select the **Add/Remove multiple** icon.
   c. In the Edit Members dialog box, select Life Cycle Stages values that CIs can have to be included in maps.
   d. Select **Save**.
   e. On the record form, select **Update**.

Configure related items

Add related items categories, configure what appears on individual cards in the Related items module, and configure how related items appear on timelines and in badges.

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Before you begin
Role required: sn_cmdb_admin

About this task
Note:
This setting affects all users. Individual users cannot configure this setting. See Configure map filters and Configure options for the Related items module for settings that individual users can use to customize their personal experience with Unified Map.

Related items are grouped by categories in the Related items pane in the contextual side panel, and also appear in CI badges and in timelines. The Node Map Related Item [sn_cmdb_ws_node_map_related_item] table contains the settings that determine which related items and associated details, appear. By default for example, common categories of related items, such as active incidents, are pre-configured to appear. You can add or modify records in the Node Map Related Item [sn_cmdb_ws_node_map_related_item] table to globally manage related items in maps.

Procedure
1. Navigate to **All** and then, in the Filter box in the main navigation bar, enter `sn_cmdb_ws_node_map_related_item.list` to open the Node Map Related Item table.
2. Select an existing record or select **New** and then fill out the form.

Field	Description
Name	The category label that appears in the contextual side panel when the Related items module is selected for a CI.
Table	Tables from which records for the category are retrieved.
Order	Order that the category appears within all related items categories. The list of related items categories is sorted in an ascending order. The category with the smallest order number is at the top of the list.
Active	Enables the appearance of the related item category.
Reference field	Reference attribute in the specified **Table** that references the CIs for the category. Typically set to **Configuration Item [cmdb_ci]**.

Configure related items in the Related items contextual side panel.

Related fields and conditions tab

Number field	Numeric attribute from the specified **Table** that uniquely identifies each record in the category. This attribute is used in the record links that appears in each individual card when drilling down the related item category.

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Title field	Attribute from the specified **Table** that appears as the title of each individual card when drilling down the category in the contextual side panel.
Fields	Set of attributes from the specified **Table** that appear in individual cards when drilling down the related item category. For example, when drilling down alerts, the set of attributes that appear on each individual alert card.
Sort fields	Order of appearance of the specified set of **Fields**.
Footer field	Attribute from the specified **Table** that appears at the bottom of individual cards when drilling down the related item category, regardless of the sort order specified in **Sort fields**.
Conditions	Conditions to apply to the specified **Table** that retrieve the set of records for the category.

Configure related items in badges and timelines.

Badge and timeline configuration tab

Badge and timeline icon	Icon that appears in CI badges and on timelines, for the specified related item.
Badge and timeline highlight field	Highlight configuration for applying colors to the icons in timelines and on the map.
Date field	The date field to position the event on the timeline.
End date field	Optional end date field to use for a range on the timeline.

3. Select **Submit** or **Update**.

Configure extended properties for a class

Each class has a unique set of extended properties that appear in the Unified Map Attributes panel for a CI. Many common classes are preconfigured with such properties. You can modify the default settings and globally configure extended properties for additional classes.

Before you begin

Role required: sn_cmdb_admin

About this task

Note:
This setting affects all users. Individual users cannot configure this setting. See Configure map filters and Configure options for the Related items module for settings that individual users can use to customize their personal experience with Unified Map.

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Procedure

1. Navigate to **All** and then, in the Filter box in the main navigation bar, enter `sn_cmdb_ws_node_map_table_attributes.list` to access the Table Attributes table.
2. Select an existing record or select **New** and then fill out the form.

Field	Description
CMDB Class Name	The class to which this configuration applies.
Display attributes	List of attributes that appear as extended attributes in the contextual side panel when a user selects the Properties module for a CI. The list contains attributes of the specified **CMDB Class Name** from which you can select. To unlock the field, select the Unlock Display attributes icon.

3. Select **Submit** or **Update**.

Configure map references

Map references enable connections on the map between CIs from two classes that aren't connected by a relationship.

Before you begin

Role required: sn_cmdb_admin

About this task

Note:
This setting affects all users. Individual users cannot configure this setting. See Configure map filters and Configure options for the Related items module for settings that individual users can use to customize their personal experience with Unified Map.

References connect CIs from two classes that don't have a relationship connection between them. On the map, any two CIs from the referenced class and from the referencing class, appear connected by a dotted line as if there's a relationship connection between them. For such reference connections, the relationship type is **Reference**. There are several pre-configured map references which you can modify, and you can also add additional map references.

For example, a Windows Server CI record has a map reference to records in the File System table that you want to include in a map. In that case, Server ABC (referencing CI) shows connections to C:\ and D:\ file systems (referenced CIs).

Procedure

1. Navigate to **All** and then, in the Filter box in the main navigation bar, enter `sn_cmdb_ws_node_map_reference.list` to open the Node Map References table.
2. Select an existing record or select **New** and then fill out the form.

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Field	Description
CI class	The referencing class that this configuration applies to.
Referenced CI class	Class that the specified **Reference field** references.
Reference field	Attribute in the specified **CI class** that contains the reference.
Show Reverse	Creates a map reference for the reverse reference between the specified **CI class** and **Referenced CI class**.
Active	Enables the configuration so that the map reference shows referenced CIs.

3. Select **Submit** or **Update**.

Configure class profiles

Configure profiles that set default map filters and default map orientation for a class. For example, to show Service Mapping data for the Mapped Application Service class.

Before you begin

Role required: sn_cmdb_admin

About this task

Note:
This setting affects all users. Individual users cannot configure this setting. See Configure map filters and Configure options for the Related items module for settings that individual users can use to customize their personal experience with Unified Map.

Class profiles are applied when no filter preset is used with the current map. This typically happens when you initially load a map without a filter preset or when you set the filter preset to **Default view**. Class profiles let you configure only the Layer category in the filter panel. Several common classes such as the Mapped Application Service [cmdb_ci_service_discovered] class are pre-configured with class profiles.

Procedure

1. Navigate to **All** and then, in the Filter box in the main navigation bar, enter `sn_cmdb_ws_node_map_profiles.list` to open the Node Map Profiles table.
2. Select an existing record or select **New** and then fill out the form.

Field	Description
Orientation	Orientation of the map.
CMDB CI class	Class of the home node of the map for which to apply this profile.
Layers	Filters in the Layers category, to filter elements in or out of the map.

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Field	Description
Active	Active profiles affect what the map displays.

3. Select **Submit** or **Update**.

Show a CI in a map

Select a CI as the home node that a map centers on. The home node in Unified Map is the focal point of a map. All other CIs and relationships on the map are drawn in the context of the home node.

Before you begin

Role required: See general role requirements for Unified Map

About this task

When you select a group CI as the home node, such as an application service or a dynamic CI group, the Attributes module shows the attributes of the group CI itself and cards for the CI members of the group. Each card showing details for a CI that is a group member. When you open a map for an application service CI, a badge on group CIs in the map shows the number of CI members in that group. In that case, group functionality is available letting you expand or collapse the group CIs.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section in the Home view, select **Unified Map**.
3. In the search field, search for a CI that you want to see a map for.
   The CI that you find and select, is automatically set as the home node for the map.

What to do next

You can change the map content or appearance as described in Unified Map, and you can do any of the following interactions:

- Show CI key details on the map: Point to a CI to show the CI's full name and class (or zoom into the map until those details appear), its related items details, and the direction of the CI relationships. If there are multiple related items associated with a CI, then the CI badge contains the string 'Multiple' and a badge showing the number of related items appears on the timeline. You can point to that badge on the timeline to show all related items.
- Show complete CI details: Select a CI (CI border thickens) to show its respective details in the Attributes, Application services, Related items, or Changes module panes. For group CIs, such as an application service or a dynamic CI group, the Attributes pane also shows detail cards for the CIs that are members of the group.
- Show relationship details: Select a line, which represents relationships between the CIs, to show the relationship attributes in the Contextual side panel on the right (select the Attributes module if needed). If there are multiple relationships between CIs, then a badge shows the total number of relationships, and details for all the relationships appear in the Attributes panel.
- Move a CI: Drag a CI to a different place on the map. Map elements that are connected to that CI, are automatically moved and redrawn according to the new placement of the CI.
- Change the level setting: Select the level drop-down and set the number of relationship levels from the home node, for which to show CIs on the map.
- Select a different home node: Right-click a CI. Then, in the pop-up menu, select **Set as Home node** to redraw the map with the selected CI as its home node.

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- Expand and collapse a group CI: Select the number badge (indicating the number of CI members) on a group CI to expand the group and show its CI members. Select the badge again to collapse the group and to show the group CI and its number badge. In its expanded mode, the group parent and any CI members are temporarily highlighted by a light purple color (point to a group if needed).

- Show filtered items: Select the Show filtered items icon () to expose the filtered items on the map, in a grayed-out shade. For more details about configuring map filters, see Configure map filters.

Show CI related items events on a timeline

Show related items events, such as incidents and changes, associated with the CIs on the map, across a time range.

Before you begin

Role required: See general role requirements at Unified Map

About this task

Select a CI on the map to show its related items on the timeline, or select an empty space on the map to show related items for all of the CIs on the map. Multiple related items from the same date are grouped into a badge which shows the number of related items in the group.

The time range of timelines stretches from six months in the past through six months into the future, relative to the current time. An event that occurred outside of this time range, doesn't appear on the timeline. However, such events might still appear in the corresponding Related items pane and a CI badge might show data for those related items.

A timeline uses a marker to filter out CIs that were created after the marker date, and doesn't affect related items on the timeline. Set the marker to visualize topology changes in the CMDB until a specific point in time. Maps are synchronized with their associated timelines, showing the CIs and relationships as they existed at the marker's date and time. For example, CIs that were created after the marker's date and time, don't appear on the map.

As an administrator, you can configure some properties of the timeline, such as which related items details appear on timelines. For more information about configuring timelines, see Configure related items.

Show related items events in a timeline, as follows:

Procedure

- Move to the marker to show its date setting.
- Move to a related items badge to show details about the related items for that point of time.
- Drag the marker to another date to be set as a marker.
- Zoom in or out to extend or to shrink the range of dates that show on the timeline.
- Select the More options button and then select **Replace marker**, **Clear marker**, or **Add marker** to manage the marker.
- Select **Now** to set the marker to current time.

What to do next

Select the Toggle visibility of the timeline icon () to show or hide the timeline.

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Configure map filters

Specify the type of CIs that you want to see on the current map by filtering out data using different filtering categories.

Before you begin

Role required: See general role requirements at Unified Map

About this task

Note:
This setting affects all users. Individual users cannot configure this setting. See Configure map filters and Configure options for the Related items module for settings that individual users can use to customize their personal experience with Unified Map.

Some maps might extend to be too large to be useful. After selecting the home node, you can reduce the size of a map by filtering out CIs of specific type or with specific attribute values. For example, you can filter out CIs associated with a specific discovery source or which are owned by a specific user, and which you aren't interested in.

The Map filter panel lets you filter by layer types, CI classes, and relationship types. Filter options reflect the elements that are currently on the map and represent attribute values from all elements in the map. Select or clear items to filter CIs and relationships in the map.

Note:

- Filter conditions that might filter out the home node CI might be available in the map filter panel because of other CIs on the map. However, you can't filter out the home node CI even it matches those filter conditions.
- Maps retrieve and show only up to 250 CMDB elements and any remaining elements are truncated and don't appear on the map.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section in the Home view, select **Unified Map**.
3. In the search bar, search for the CI you want as the home node for the map.
4. Select Open filter panel ( ).
5. In the Map filter panel, select or clear filters that you want to apply to the current map.
6. Close the Map filter panel.

What to do next

- Select the Show filtered items icon () to expose all filtered items as grayed-out elements, or to hide them.
- Create a filter presets to reuse a custom set of filters.

Manage filter presets

Create and save a custom set of Unified Map map filters, which you can then apply to any map to show only what you are interested in.

Before you begin

Role required: See general role requirements for Unified Map

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About this task

After you configure a custom set of map filters, you can capture those settings as a filter preset. You can then select that filter preset to apply automatically all of its filter settings to the current map.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section in the Home view, select **Unified Map**.
3. In the search bar, search for the CI you want as the home node for the map.
4. Select Open filter panel ( ).
5. In the Map filter panel, select the filters that you want to include in the filter preset.
   The filter settings are also applied to the current map.
6. Select the star-shaped icon, enter a **Preset name**, and then select **Save**.
7. Close the Map filter panel.

What to do next

- Apply a filter preset: Select the View preset list icon In the Map filter dialog box, then select a preset filter and close the Map filter panel.
- Update a filter preset: Select a filter preset in the Map filter dialog box and update the filter settings. Then select the star-shaped icon, and in the Save Preset dialog box do either of the following:
  - Select **Update preset**
  - Select **Save as new preset** and enter a filter preset name
    Select **Save**.
- Remove a filter preset: Select the filter preset in the Map filter dialog box. Without changing the preset, select the star-shaped icon, and in the Remove preset dialog box select **Remove**.

Show attributes for a CI or a relationship in a map

Open the Attributes module in Unified Map to view attributes for a CI and for relationships that are on a map.

Before you begin

Role required: See general role requirements for Unified Map

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section in the Home view, select **Unified Map**.
3. In the Search bar, search for a CI to be set as the home node for the map and then select the CI or a relationship on the map.
4. Select Attributes ( ) in the contextual side panel to access the Attributes module.
   The Attributes pane shows the following details:
   - For a non-group CI: The top section contains common key attributes, such as *`Class`* and *`Discovery source`* that appear for CIs of any class (other than Application Service CIs). The bottom section contains attributes that uniquely extend the CI's class in the CMDB hierarchy.

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- For a group CI: The top card shows attributes of the group CI and underneath, the Configuration items section contains cards showing attributes for each of the group member CIs.
- For a single relationship: A card with the attributes for the selected relationship.
- For a multi-relationship badge: A card for each of the relationships in the relationship set, showing the attributes for the relationship. The number of cards is equal to the number on the relationship badge, which is a count of the different types of relationships between the two CIs, in the same direction. Relationship connections are based on records in the CI Relationship [cmdb_rel_ci] table.

What to do next

In a CI card in the Applications pane, select the Actions menu and then select any of the following options:

- **View CI details** to open the CI form for the CI.
- **Open in new map** to open an additional map with the current CI set as the home node.
- **Set CI as home** to set the selected CI as the new home node for the map.

Select a mapped application service CI on the map to show its entry points in the Attributes pane.

Show application services for a CI in a map

Open the Application services module in Unified Map to view details of application services associated with a CI.

Before you begin

Service Mapping must be installed to show application services for a selected CI.

Role required: See general role requirements for Unified Map

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section in the Home view, select **Unified Map**.
3. In the Search bar, search for a CI to be set as the home node for the map and then select the CI on the map.
4. Select Application Services ( ) in the contextual side panel to access the Application Services module.

What to do next

- Select another CI on the map to show its related application services. Or, select an empty space on the map so that no CI is selected, to show all application services for any of the CIs on the map.
- In the Application services pane:
  - Use the Search box to search for a specific application service.
  - Select ( ) to open the filter panel, and then select a category and a sort order by which to sort the application service cards. Close the filter panel to apply your settings.
- In an individual application service card, select Application Service actions ( ) and then select:

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- **View CI details** to open the CI form for the application service CI.
- **Open in new map** to open a new map in which the application service is set as the home node.
- **Set CI as home** to set the application service as the home node on the map and redraws the map accordingly.

Some fields, such as *Business criticality*, are color-coded to denote specific values. For example, a status of Most Critical is highlighted by default with a red background.

Show changes for a CI in a map

Open the Changes module in Unified Map to view historical changes for a CI that's on the map.

Before you begin

Role required: See general role requirements for Unified Map

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section in the Home view, select **Unified Map**.
3. In the Search bar, search for a CI to be set as the home node for the map and then select the CI on the map.
4. Select Changes ( ) in the side panel to access the Changes module.

What to do next

- Select another CI on the map to show changes for.
- In the Changes pane:
  - Select Open filters ( ) and then select and configure any of the following filter types:
    - **Post types**
    - **Field changes**
    - **Flagged**
    - **Filter sets**
  - Select the Search icon ( ) and enter text in the Search Activity Stream field to find specific changes by entering terms.
  - Select the or the sorting icons to toggle between sorting the change cards in an ascending or descending order.
- Select **Show less** or **Show more** to show the minimum or the maximum level of details in a change card.
- In an individual card: Select the Flag as important icon to flag the change as important.

Show related items for a CI in a map

Open the Related Items module in Unified Map to show all related items such as active incidents or active problems, for a CI that's on the map.

Before you begin

Role required: See general role requirements for Unified Map

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Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section in the Home view, select **Unified Map**.
3. In the Search bar, search for a CI to be set as the home node for the map and then select the CI on the map.
4. Select Related items ( ) in the contextual side panel to access the Related items module. Related items are grouped by category. The categories that appear are based on the Related Items options and badges show the number of related items of the respective category, for a selected CI (or for all CIs if no CI is selected).

What to do next

- Select another CI on the map to show related items for, or select an empty space on the map so that no CI is selected, to show all related items for any of the CIs on the map.
- Select Related items user preferences ( ) in the Related items pane, to set the related item categories that you want to see in the Related items pane.
- Select a related item category (the category must contain least one item) to drill down to the individual related item cards and see key details for each related item.
- In a related item card:
  - Select the related item link to drill down to the actual related item record.
  - Open the filter panel to set a sorting category and order for the cards.

  Some details, such as *Priority* and *Risk*, are color-coded to highlight certain values. Color-codes use the default ServiceNow platform color code settings.

Configure options for the Related items module

Use the Related items module in Unified Map to set your preference for which categories of related items, such as active incidents and active problems, appear for CIs.

Before you begin

Role required: See general role requirements for Unified Map

About this task

Related items are grouped by categories in the contextual side panel when selecting the Related items module. Administrators configure which related item categories are globally available, and you can further customize these settings to reflect your own preferences.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section in the Home view, select **Unified Map**.
3. Select the Related items icon to open the Related items module.
4. In the Related items panel, select the Related items user preferences icon .
5. In the Related items Settings dialog box, select and deselect items in the Available items list to reflect which related item categories you want to show for CIs.
   Selected items are moved into the Selected item lists and when you select a CI on the map for which to show related items, those categories appear.
6. Select **Apply**.

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Dependency Views

ServiceNow® Dependency Views graphically displays an infrastructure view for a configuration item (CI) and the application or business services that it is part of and that it supports. Dependency Views indicates the status of its configuration items, and allows access to CIs related alerts, incidents, problems, changes, and services.

If Service Mapping is activated, Dependency Views maps are enhanced to display dependencies that reflect connections in service maps.

Explore	Administer	Use
• Washington DC • Domain separation and Dependency Views	• Create or modify map indicators • Create or modify map icons • Create a predefined filter • Create or modify Map Related Items • Create or modify Dependency Views menu actions • Create or edit a dependency type	• Dependency Views map • Dependency Views map menus and controls • View a Dependency Views map • Change the layout of Dependency Views map • Filter the view of a Dependency Views map • Perform actions on nodes in a Dependency Views map • Supported browsers for Dependency Views

Develop	Integration	Troubleshoot and get help
• Developer training • Developer documentation • Properties for Dependency Views • Components installed with Dependency Views	View metrics for CIs in a Dependency Views map	• Ask or answer questions in the Now Community • Search the Known Error Portal for known error articles • Contact Customer Service and Support

Supported browsers for Dependency Views

The latest version or service pack of internet browsers are required to view and manipulate Dependency Views maps.

The Dependency Views module supports the latest version or service pack of the following browsers:

- Firefox with the latest ESR
- Chrome latest version

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- Safari version 8 or later (latest is recommended)
- Microsoft Internet Explorer (IE) version 11 and Microsoft Edge.

The Dependency Views module is not supported on tablets and on mobile devices.

Domain separation and Dependency Views

Domain separation is unsupported in Dependency Views. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

How domain separation works in Dependency Views

Dependency views are generated using both Configuration Item [cmdb_ci] and CI Relationship [cmdb_rel_ci] tables. The [cmdb_ci] table is domain separated, but the [cmdb_rel_ci] table is not. You can create relationships only by selecting two CIs. They should be in the same domain for you to be able to see them.

To be successful with domain separation in Dependency Views, make sure that relevant CIs are visible for the current domain. If the instance is domain separated, ServiceNow domain separation rules apply (see Related information link below).

Tenant domains will be able to see only their domain and global CIs.

Related topics

Domain separation for service providers

Dependency Views map

ServiceNow® Dependency Views maps graphically display CIs that support application or business services and the relationships between the CIs.

The CMDB Workspace store app provides the Unified Map feature as an alternative to using Dependency Views. Unified Map combines the capabilities of Dependency Views and Service Mapping into a single map experience.

A ServiceNow service (application service or business service) is work or goods that are supported by an IT infrastructure. For example, delivering email service to an employee can require services such as email servers, web servers, and the work to configure the user's account.

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A Dependency Views map has one starting point, called the root CI or root node of the map. The root CI is surrounded by a darker frame that repaints itself with a pulsing effect drawing the attention to the root CI. The maps can show both upstream and downstream dependencies for the root CI. By default the Dependency Views map displays 3 levels, both upstream and downstream relationships. Administrators can configure the number of levels displayed. The map collapses and expands clusters to make them easier to view. By default, clusters are collapsed.

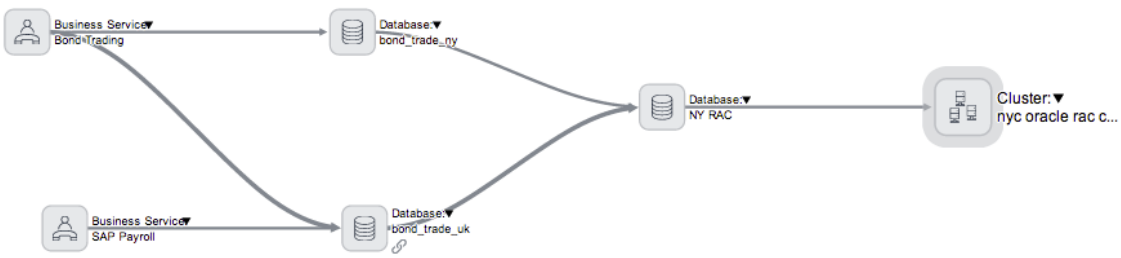
In a Dependency Views map, map indicators indicate if a CI has any active, pending issues. You can investigate the tasks that are connected to a CI to get more details. When you return to the map from another form, the system restores the last map viewed, using the default filter and layout settings. When you click the icon ( ) on a CI record or on a task record that identifies a CI, the map opens.

Many of the relationships in map are created through the discovery process. You can also create, define, and delete CI relationships in the map. You can display the map from different perspectives and open specific records that relate to configuration items. The system refreshes the map automatically to reflect changes to the CMDB.

Note:
CIs not extended from the Configuration Item [cmdb_ci] table, are not displayed in Dependency Views maps and in CI relation formatters.

The Dependency Views module is active in all instances, and includes demo data.

Dependency Views sample map



When you click the map icon [ ] on a CI record or on a task record that identify a CI, a map opens.

Roles

Users with the itil and ecmdb_admin roles can view maps and perform all actions in the map. Actions include access to the map views and saved filters, both from the lists in the map and from the **Saved Filters** module.

Dependency Views map menus and controls

Dependency Views maps contain the following menus and controls.

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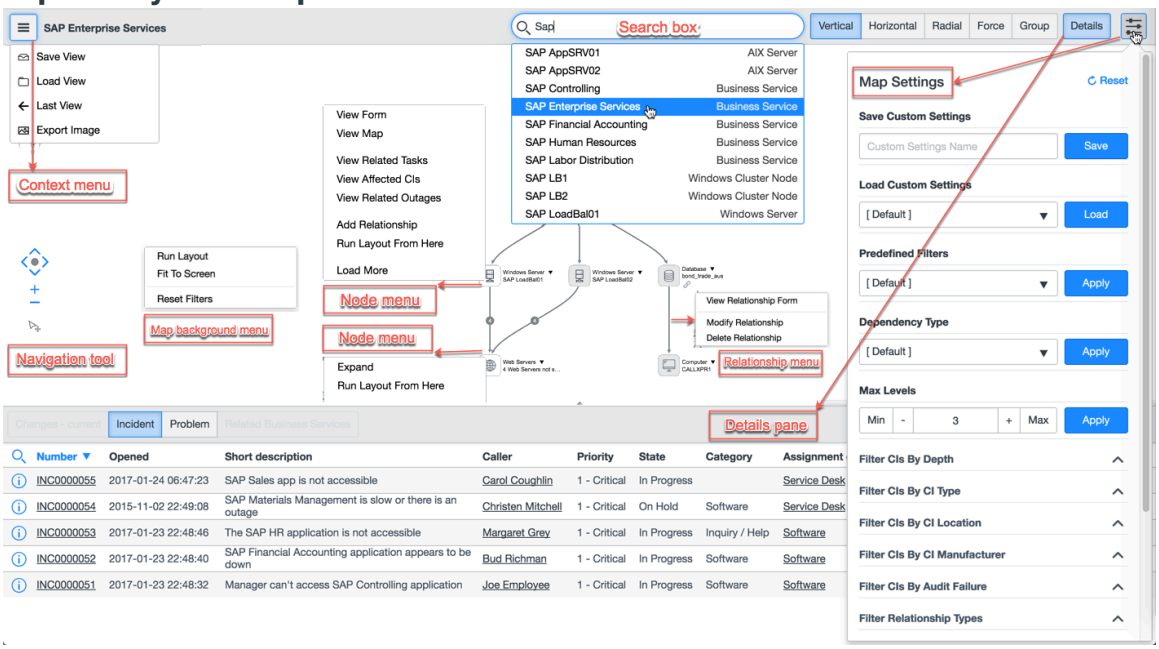
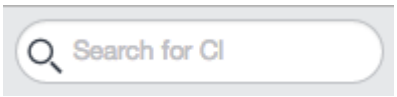
Dependency Views map



Map options

The following options are available across the top of the map.

	Menu to save, load and export views of the map.
<Root CI>	Next to the menu icon is the name of the current root node (CI) of the map.
	Enter the name of a CI, application service, or business service to load into the map. Alternatively, you can start typing to have the auto-complete feature present a list of CIs and services that match your partial value.
Vertical	Display the map in vertical view.
Horizontal	Display the map in horizontal view.
Radial	Display the map in radial view.
Force	Centers the elements around the parent CI, regardless of upstream or downstream relationships.
Group	Groups the elements according to their CI type.
Details	Displays related lists such as Problems, Changes and Related Services that are associated with the selected CI. • Click a service to highlight the CIs that are associated with that service. • Click **Related Services**, then double-click a service to display the map in the Event Management dashboard. If the Event Management plugin is active, then events and alerts are also displayed.
Settings	Set filters for the map.

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	Use the navigation tools to increase or decrease the view of the map, rearrange the icons on the map, and move the map on the page. • Use the plus sign (+) to increase magnification of the map. • Use the minus sign (-) to decrease magnification of the map. • Click the center dot to center the map on the page. • Use the direction arrows to move the page in that direction. • Use the selection tool under the navigation tool to toggle between moving the entire map or moving one CI on the map.

Map menu

The following options are available if you right-click the map background.

Run Layout	Redraws the map with the current layout option.
Fit To Screen	Resizes the map to fit all the nodes in the map window.
Reset Filters	Performs the same action as the **Filters** > **Reset** option.

Node menu

The following options are available if you right-click a node.

View Form	Displays the CMDB record of the selected CI in a new tab of the browser.
View Map	Reloads the map using the selected CI as the new root node, with the currently defined layout setting. This option does not display on the root node.
View Related Tasks	Displays all tasks or outages associated with the selected CI, including incidents, problems, change requests, and follow-on tasks. This option is always available, even if there are no tasks associated with the CI. This option does not appear on collapsed nodes.
View Affected CIs	Shows a list of all tasks that have the CI listed as an Affected CI. This option is only visible when you access the map from the map icon in a task record's Configuration item field.
View Related Outages	Displays all outages involving the selected CI. This option only appears when there is an outage associated with the CI. This option does not appear on collapsed nodes.
Add Relationship	This option displays a dotted green line that you can drag to another CI to create a relationship link. A popup dialog allows you to define the relationship type.
Expand	Displays all CIs and components within a clustered node, or virtual groups (virtual nodes that appear when *`glide.bsm.too_many_children`* is reached). This option appears only if the node is a cluster node or a virtual group node. If **Load More** was previously used, then **Expand** reverts the results of the **Load More** operation.

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	The number of additional icons to display is bound by the value of the *glide.bsm.max_nodes* property.
Collapse	Collapses all CIs and components within a cluster node back to a single node. Also, collapses a virtual group that has been expanded. This option only appears if the node has been expanded using the **Expand** menu item. If **Load More** was previously used, then **Expand** reverts the results of the **Load More** operation.
Run Layout From Here	This option re-runs the chosen layout using the current node. Use this option to get a new or clearer view on the same map.
Load More	Starting at the selected icon, loads the next level of the map, past the setting of **Max Levels**. Virtual grouping is not applied at the newly loaded level even if the criteria for virtual grouping is met. The number of additional icons to display is bound by the value of the *glide.bsm.max_nodes* property.

Relationship menu

The following options are available if you right-click a relationship link.

View Relationship Form	Opens the **CI Relationship** form. You can modify the **Parent**, **Type**, and **Child** of the relationship from this form.
Modify Relationship	Searches for and selects a new relationship for this link.
Delete Relationship	Deletes a relationship. The relationship is deleted after prompting for confirmation.

Cluster nodes in a Dependency Views map

Dependency Views maps can display cluster group nodes alongside individual CI nodes, and the child nodes of these cluster groups.

Clusters are CIs in the Cluster [cmdb_ci_cluster] table. A cluster CI is an organized set of computer CIs that work together as a single system. Each node in a cluster group represents a CI, typically a server, that can have referenced hardware, such as disks and network adapters.

Cluster nodes on a Dependency Views map can display in two modes:

- Collapsed mode: Displays only the cluster CI node without its child CI nodes. This mode avoids unnecessary clutter in large maps.
- Expanded mode: Displays the cluster CI node and all its child CI nodes.

Menu options available for a clustered node include **Collapse** and **Expand**, which allow you to control the density on the map.

By default, Dependency Views collapses all cluster groups and displays clusters in collapsed mode on the map.

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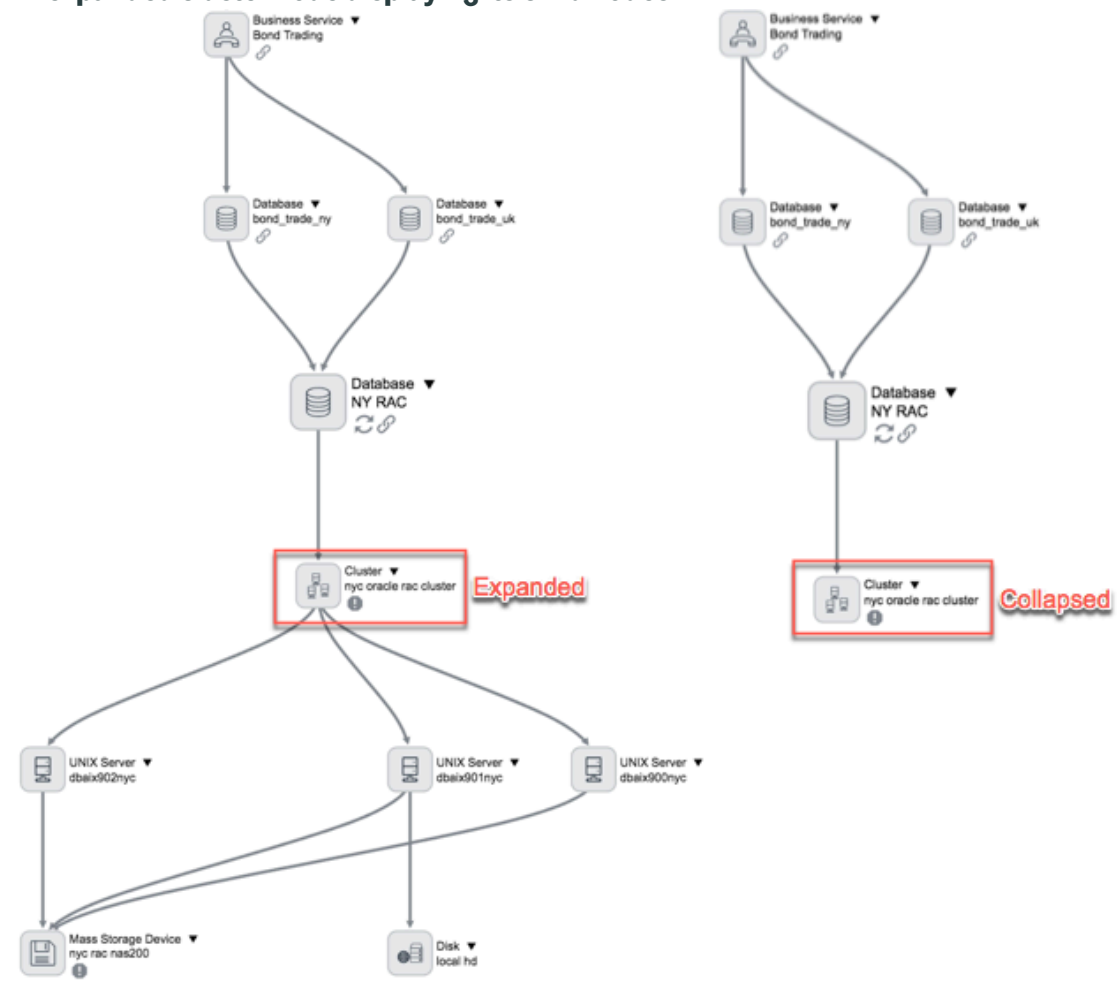
Annotation

Icons for cluster nodes and cluster group CI nodes are noted by the string "Cluster" and by a unique cluster icon. The system searches through all the component nodes in a cluster CI or collapsed node looking for tasks, outages, and trouble, such as incidents, problems, or change requests. This search evaluates only the number of levels that are displayed in the diagram.

An expanded cluster node displaying its child nodes



Virtual grouping of nodes in a Dependency Views map

To reduce the density on a map, Dependency Views automatically groups CIs of a similar CI type from the same level.

A large number of nodes can cause a Dependency Views map to become too dense to be helpful. Therefore, if the number of nodes with a similar CI type from same level, exceeds the value of the *`Maximum number of nodes (of a similar CI type and at the same level) to display before applying virtual grouping`* property, then those nodes are automatically grouped into a virtual group. A single node, the virtual group node is displayed to represent the virtual group, while all actual nodes in the virtual group (that are of a similar CI type), are hidden. Virtual group nodes represent CIs of a similar CI type but are not CIs by themselves and cannot have tasks assigned to them. The number of actual collapsed nodes in the virtual group is noted on the virtual group node.

By default, child nodes of a virtual group are not displayed. You can enable the *`Show children of virtual groups`* property to display child nodes underneath virtual groups.

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Virtual grouping is not applied at the level underneath a virtual group even if the criteria for virtual grouping is met (the number of nodes with a similar CI type from that level exceeds the preconfigured property value). However, virtual grouping can happen at the following level if that criteria is met. This behavior does not depend on any property settings, and you cannot change it.

Menu options for a virtual group include **Expand** and **Collapse**, which allow you to apply virtual grouping and display only the virtual group node, or to undo the virtual grouping and display all actual nodes.

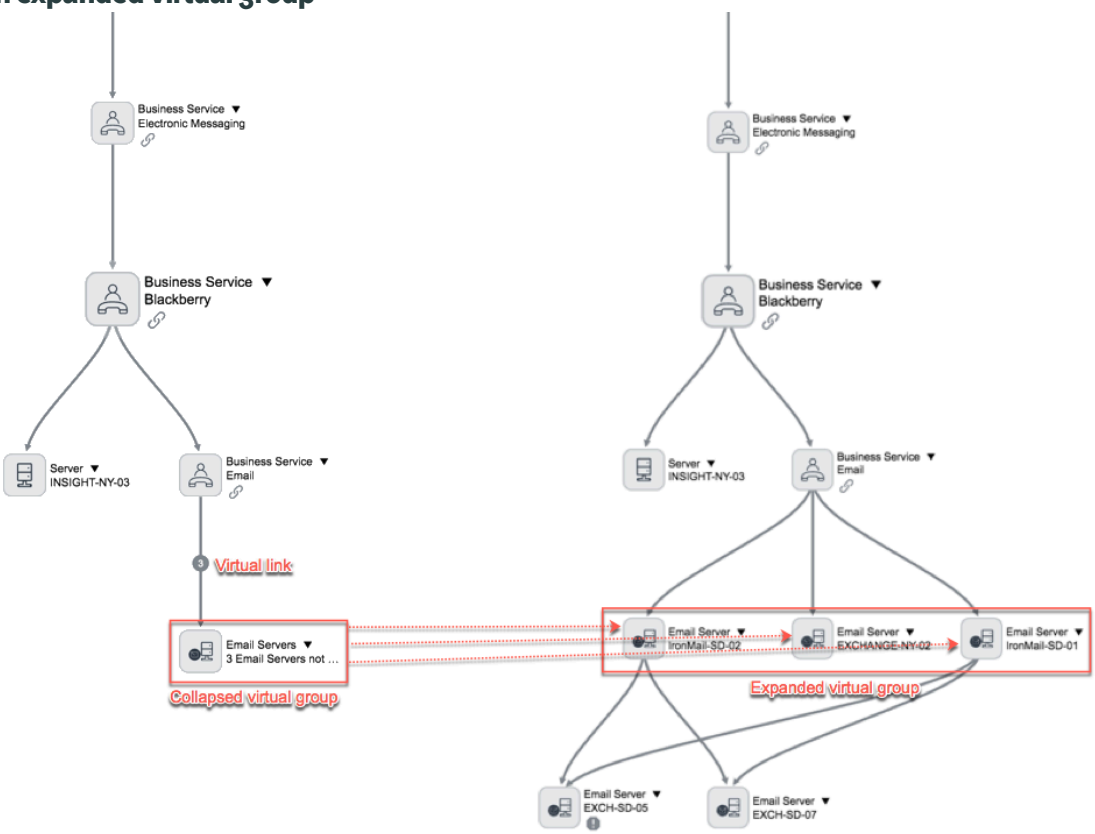
Virtual links

A virtual node is connected to other nodes with a virtual link. A virtual link denotes that there such link between at least one CI in the virtual group, to another CI node on the map.

Note:
Predefined filters do not apply to virtual groups. Therefore a virtual group displays even if it contains CIs that a predefined filter would have excluded. Upon the expansion of a virtual group, predefined filters are applied, and any or all of the CIs that were previously virtually grouped, might no longer display on the map.

Also, when using the node menu option **Load More**, virtual grouping is not applied at the newly loaded level even the criteria for virtual grouping is met.

An expanded virtual group



Related topics

Properties for Dependency Views

Use Dependency Views

Use the layout controls on a Dependency Views map to display elements in different configurations for easier management. Use the filter panel on the map to display fewer levels

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or to filter out elements you don't want to see, then save the filter for use later. Draw new relationships between elements or edit existing relationships.

View a Dependency Views map

When you display a Dependency Views map, the map is centered on the root CI and displays the layout and number of levels defined in the map properties. If Operational Intelligence is activated, then a Dependency Views map provides a mode that lets you directly access metrics information for the CIs on the map.

Before you begin

Role required: dependency_views (see general requirements)

General role requirements:

- To access a Dependency Views map from either the navigation menu, a script API, or directly from a URL, the minimum role required is the dependency_views. Some operations that are related to icons, indicators, and menu actions require the ecmdb_admin role. Some operations that are related to properties and dependency types require the admin role.
- Dependency Views enforces ACL permissions on CIs, and visually hides them and their relationship from the map if the permission requirement is not met.

About this task

The maps generated by Dependency Views are based on D3 and Angular technology, providing a modern interactive graphical interface to visualize configuration items and their relationships.

If Service Mapping is activated, Dependency Views maps are enhanced to display dependencies that reflect connections in service maps. In addition, the list of related services in the **Details** section, includes application services, and technical and manual services if Event Management is activated. All CIs that are included in a service, are displayed underneath the service node on the map.

Maps provided by Service Mapping are for application services, including comprehensive maps from the perspective of application services. For more information, see Service Mapping.

Administrators can configure the setting for the default layout of the map and number of levels displayed. When you access the map from a saved view, the map opens using the properties in the saved view, and not the default map properties.

Procedure

Navigate to **All** > **Dependency Views** and open one of these modules:

- **View Map in New Tab**: Opens the map in a new, full screen tab without the application navigator.
- **View Map**: Opens the map in the content pane of the current tab.
- **Saved Views**: Opens a view of a map that you previously saved.

  Click a number in the **Version** column, and then click the Display Dependency Views map icon ( ).

Save or load a Dependency Views map

In the **View Map** module, use the menu icon to save and load Dependency Views maps.

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Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Click the View menu icon ().
3. Select **Save View**, **Load View**, or **Last View**.

Delete a saved Dependency Views map view

Use the **Saved Views** module to delete a previously saved view.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Dependency Views** > **Saved Views**.
2. Select the check box for map view that you want to delete.
3. Select **Delete** from the **Actions on selected rows** drop-down menu.

Change the layout of Dependency Views map

You can select from different layout options for your Dependency Views map.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Select one of the following layout options from the menu across the top of the view.
   - **Vertical**: Displays the elements in a vertical tree pattern according to their upstream and downstream relationships. This is the default value for the initial display of the map.
   - **Horizontal**: Displays the elements in a horizontal tree pattern according to their upstream and downstream relationships.
   - **Radial**: Displays the elements in a radial pattern according to their upstream and downstream relationships.
   - **Force**: Centers the elements around the parent CI, regardless of upstream or downstream relationships.
   - **Group**: Groups the elements according to their CI type.
   - **Details**: Displays related alerts, incidents, problems, and related services.

     Related Services displays application services related to the CIs currently displaying in the map. If Event Management is activated then technical services and manual services are included. You can double-click a service to display the map in the Event Management dashboard.

Filter the view of a Dependency Views map

Filter a Dependency Views map to display specific types or categories of configuration items.

Before you begin
Role required: admin

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About this task

Use the filter panel to control which elements of the map are displayed and to save versions of a filter for later use.

Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Click the Map settings icon  to open map settings.

Map settings

Filter panel strips and options	Description
Save Custom Settings	Configure desired custom settings, then enter a name and click **Save**. Custom settings can be loaded by using the **Load Saved Custom Settings** option. Navigate to **Dependency Views** > **Saved Settings** > to display all saved custom settings.
Load Custom Settings	Apply previously saved custom settings to the current map.
Predefined Filters	Apply previously defined filters consisting of configuration type, CI type, and relationship filters. You can Set a predefined filter as default. This filter is applied first, before any other filters (such as **Filter CIs by Depth**) are applied.
Dependency Type	Apply a filter that runs in real time and generates a custom view of a service map for a specific CI.
Max Levels	Designate how many levels from the root CI display on the map.
Filter CIs by Depth	Designate which levels of CI display on the map.
Filter CIs by CI Type	Designate what CI types display in the map.
Filter CIs By CI Location	Designate what CI locations display in the map.
Filter CIs By CI Manufacturer	Designate what CI manufacturers display in the map.
Filter CIs By Audit Failure	Hides CIs that failed the CMDB health staleness test. This option is available only if there are any such CIs.
Filter Relationship Types	Designate what relationship types display in the map.
Map Indicators	Designate what types of tasks display and get counted in the map.
Remove Filtered Items	**Off:** Gray out filtered items on the map. **On:** Do not display filtered items on the map.

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Filter panel strips and options	Description
Run Layout Automatically	**On:** The configured layout to the map is reapplied whenever the filter is changed. **Off:** The map layout remains static when the filter is changed.
Fit to Screen Automatically	**On:** The map magnification will increase or decrease automatically to display all CIs on the map. **Off:** The map magnification remains unchanged when the map is reloaded.

3. Click a filter strip to expand or collapse it, and to set filter items.

View metrics for CIs in a Dependency Views map

Operational Intelligence processes metrics data for CIs, calculates statistics and aggregations, and detects metrics anomalies. A Dependency Views map lets you switch to metrics mode to directly access the Insights Explorer that displays metrics data for CIs on the map.

Before you begin

The Operational Intelligence (com.snc.sa.metric) plugin must be activated to enable this functionality, and metrics data needs to be processed for the CIs on the Dependency Views map.

Role required: admin

About this task

Open a Dependency Views map in metric mode which integrates a Dependency Views map with the Insights Explorer functionality that is tailored to the map. In this mode, you can access Insights Explorer functions directly from the map, to explore metrics data for the CIs on the map. All map CIs are accessible in the right hand side pane, from where you can drill into metrics data.

Procedure

1. Navigate to **All** > **Dependency Views** > **View Map** to open a map.
2. Right-click on a CI on the map and select **View Metrics** to open the Dependency View map in metrics mode.
   In the panel on the right side, the CI that you selected on the Dependency View map is selected by default, and the list of all the metrics available for that CI are displayed.
3. Click the '**<**' sign on the left of the CI to display all the CIs that you can explore metrics for.
   The Insights Explorer is scoped for exploring only the CIs that currently display on the Dependency Views map, and you cannot add or remove CIs from the list. If you use map settings or filters to filter out CIs from the map, the same filtering will apply to the list of CIs that you can explore metrics for.
4. Click on a CI in the CIs list or right-click on a CI on the Dependency Views map, to drill down to the CI's metrics.
5. Click the **Dependencies Map** tab or the **Metrics** tab to switch modes:

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a. In **Metrics** mode: The full functionality of the Insights Explorer is available, you can create metric charts by dragging metrics into the canvas.
You can modify chart settings, select different time ranges for the charts, and perform other actions as described in View metric values in the Insights Explorer.

b. In **Dependencies Map** mode: Select a CI on the map to drill down to its metrics data, drop-down the **Layout** list to choose a different layout, or modify map settings.

Perform actions on nodes in a Dependency Views map

You can view various related items for the nodes in a Dependency Views map.

About this task

If the node is a collapsed node or represents a cluster, the incidents, problems and change requests are for all the collapsed nodes.

Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Click the Node menu icon ▼ next to a node or right-click a node on the map to access the following menu items:

Node Menu

View Form	Displays the CMDB record of the selected CI in a new tab of the browser.
View Map	Reloads the view using the selected CI as the new root node, with the currently defined layout setting. This option does not display on the root node.
View Related Tasks	Displays all tasks or outages associated with the selected CI, including incidents, problems, change requests, and follow-on tasks. This option is always available, even if there are no tasks associated with the CI. This option does not appear on collapsed nodes.
View Affected CIs	Shows a list of all tasks that have the CI listed as an Affected CI. This option is only visible when you access the view from the view icon in a task record's Configuration item field.
View Related Outages	Displays all outages involving the selected CI. This option only appears when there is an outage associated with the CI. This option does not appear on collapsed nodes.
Add Relationship	This option displays a dotted green line that you can drag to another CI to create a relationship link. A popup dialog allows you to define the relationship type.
Expand	Displays all CIs and components within a cluster node or a collapsed node. This option only appears if the node is a collapsed or cluster node. The number of additional icons to display is bound by the value of the *glide.bsm.max_nodes* property.
Collapse	Collapses all CIs and components within a cluster node or a collapsed node back to a single node. This option only appears if the node has been expanded using the Expand menu item.
Run Layout From Here	This option re-runs the chosen layout using the current node. Use this option to get a new or clearer view on the same map.

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Load More	Starting at the selected icon, loads the next level of the map, past the setting of **Max Levels**. The number of additional icons to display is bound by the value of the *glide.bsm.max_nodes* property.

Export a Dependency Views map

Export a Dependency Views map to an image in PNG format.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Configure the map view as you want the image to appear.
   The exported image displays the current view of the map.
3. Click the view menu icon ().
4. Click **Export Image**.
5. Right-click the image and select **Save Image As**, **Print**, or any other menu option.

   Note:
   You can't export images from a Dependency Views map using Internet Explorer as your browser.

6. Click the "X" button to close the **Export Image** window.

View collapsed nodes in a Dependency Views map

Cluster and virtually grouped nodes can be displayed in a collapsed mode to avoid unnecessary clutter in large maps.

Procedure

1. To expand a collapsed node, right-click the CI and select **Expand** from the context menu.
2. To collapse an expanded cluster node with children, right-click the CI and select **Collapse**from the context menu.

Administer Dependency Views

Users with the admin role can control the appearance and behavior of Dependency Views by configuring map indicators, map related items, map icons, and menu actions.

Create or modify map indicators

Dependency Views maps and application service maps, use icons to display additional information for a CI by displaying its related records such as alerts, outages, incidents and problems. These icons are called map indicator.

Before you begin
Role required: admin

About this task
The default configuration includes map indicators for the following record types:

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- Open incident.
- Open alert.
- Unplanned current outage.
- Planned current outage, or an open problem.
- Current, planned, or recent change request.

You can filter out the display of affected CIs, alerts, current change requests, incidents and problems from the map settings menu.

The Affected CI's map indicator appears for CIs in two related but not identical situations. It appears for CIs for which tasks such as change request, incident, or problem were directly created for, and for any CIs that were added in those tasks (parent tasks) as Affected CIs (The CI for which a task is directly created for, is automatically added as an affected CI in that task). The state of affected CI's depends on the status of the respective parent task. For as long as the parent task is active, the associated affected CIs continue to be impacted by the task issue. In a map, the Affected CI's indicator displays for all affected CIs for as long as the parent task is active. On a map, the Affected CI tooltip displays the details of the task records in which the CI was added as an affected CI. However, the **Details** pane does not contain an Affected CI's tab, and no further details about affected CIs, or the associated tasks are displayed. After the parent task is closed, the Affected CI's indicator no longer displays for any of the tasks' affected CIs. For information about affected CIs in Change Management, see Associate CIs to a change request.

Note:
Details about affected CIs are derived from the *task* and the *cmdb_ci* tables and their extensions. Therefore, if you use custom tables to store CIs for incidents, problems and changes, it affects the details that are displayed for affected CIs.

For more information on how map indicators are used to show tasks and outages in clusters and collapsed nodes, see Cluster nodes in a Dependency Views map.

Procedure

1. Navigate to **All** > **Dependency Views** > **Map Indicators**.
2. Click **New** to create a new map indicator, or click the name of an indicator from the **Table** column to modify an existing map indicator.
3. Fill in the fields on the form, as appropriate.

Map Indicator form

Field	Description
Table	Name of the table represented by this map indicator. **Note:** The list shows only tables and database views that are in the same scope as the map indicator. Views are not supported, although included in the list.
Name	Name of the indicator.
Order	Priority order of the task. The highest priority task is the indicator with the lowest order number.
Icon	File name and path of the icon image file, which can be a system image.

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Field	Description
	○ To create a new icon, see Create or modify map icons ○ To create or use a system image see Storing images in the database.
CMDB CI field	Name of the field on the selected table that contains the configuration item.
Start field	Record property that determines the time-point on the metric chart timeline for placing records in the Insights Explorer. Possible values depend on the selected **Table**. For example, the incident indicator has values such as **Actual end**, **Actual Start**, and **Approval Set**.
Description field	Name of the field on the selected table that contains the description of the configuration item.
Description	Text to display when hovering over the indicator. Alphanumeric characters and spaces are valid for this field.
Conditions	Condition builder that specifies for which CIs to apply this indicator. For example, a CI that has a current past outage is highlighted for 5 days. You can configure a condition to designate a different timeframe for what is considered to be current.
Active in Service Map	Toggle that you can enable to make the specified table available in the Settings dialog box for application service maps. You can then toggle between displaying or not displaying the respective records on the map.
Active Dependencies	Toggle that you can enable to make the specified table available in the Settings dialog box for Dependency Views maps. You can then toggle between displaying or not displaying the respective records on the map.
Active in Metrics	Enable to make the toggle for the specified table available in the Settings dialog box for the Insights Explorer. You can then toggle between displaying or not displaying the respective records on the Insights Explorer.
Label	Text to display for the indicator on the map.
Tooltip Label	Prefix portion of the tooltip (Tooltip Label : Tooltip info).
Tooltip Info	Suffix portion of the tooltip (Tooltip Label : Tooltip info).

4. Click **Submit** to enter a new map indicator or click **Update** to modify an existing map indicator.

Result
For an indicator to appear in a Dependency Views map, a CI must meet all filter conditions, and **Active Dependencies** must be selected.

Create or modify map icons

Upload new icons or modify existing icons to customize the icon displayed for a CI in maps in Dependency Views, Service Mapping, and Event Management.

Before you begin
Role required: admin

About this task
The icons used in Dependency Views maps are listed in the Map Icons module. Records in the **Map Icons** list are arranged by CI classes, such as cmdb_ci_linux_server. The path to the default image files is https://<instance name>.service-now.com/images/app.ngbsm/<image name.svg>. For information about uploading images to the database, see Storing images in the database.

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Role required: admin or cmdb_admin roles are required to access the records in this table [ngbsm_icon] to upload new icons.

Procedure

- Navigate to **All** > **Configuration** > **CI Class Manager**, and do the following actions:
  1. Click **Hierarchy** to display the CI Classes list.
  2. Select a class to modify the icon for.
  3. In the class navigator bar, expand **Class Info** and then select **Basic Info**.
  4. On the Basic Info form, click **Icon**.
  5. In the Icons dialog box, select an icon and then click **Update**.
  6. On the **Basic Info** form, click **Update**.
- Navigate to **All** > **Dependency Views** > **Map Icons**, and do the following actions:
  1. Click **New** to create a new map icon or click the name of an existing icon in the **Label** column to modify an existing icon.
  2. On the form, fill in the fields.

Map Icons form

Field	Description
CI Type	Label or the informal name of the CI table that this icon represents in the view.
Icon	Name of the icon.
URL	Path to the icon image using the following format: `/image name.svg` Click the lock icon to enter a new path.

  3. Fill in the fields on the form, as appropriate.
  4. Click **Submit** to enter a new icon or click **Update** to modify an existing icon.

What to do next

You can modify a Dependency Views map indicator to use the new icon.

Create a predefined filter

Create filters to narrow down the CIs that are displayed on a Dependency Views map. You can create filters that are based on CIs' class, CIs' attributes, or CIs' relationships.

Before you begin

Role required: ecmdb_admin

About this task

Create a predefined filter that you can then select to determine the scope of the CIs that are displayed in a Dependency Views map. **Configuration type** filters filter by CI class, **CI filters** filter by CI attributes, and **relationship filters** filter by relationships. Only CIs that match at least one of the configuration type filters (if any exists), and at least one of the CI filters (if any exists), and at least one of the relationship type filters (if any exists) - are displayed on the map. If no filters are defined, then no filtering is applied.

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Note:
Predefined filters do not apply to virtual groups. Therefore a virtual group displays even if it contains CIs that a predefined filter would have not included. Upon the expansion of a virtual group, predefined filters are applied, and any or all of the CIs that were previously virtually grouped, might no longer display on the map.

Procedure

1. Navigate to **All** > **Dependency Views** > **Predefined Filters**.
2. On the **Predefined Filters** page, click **New**.
3. Type in a **Name** for the filter.
4. Click **Roles**, and in the **Roles** dialog box, select the roles that this filter will be available for.
5. Right-click on the page header, and click **Save**.
6. Create a configuration type filter:
   a. Click **Configuration Types**, and then click **Edit**.
   b. In the **Collection** slushbucket, select the classes that CIs must belong to in order to be displayed on the map, and move them to the **Configuration Types List**.
   c. Click **Save**.
7. Create a CI filter:
   a. Click **CI Filters**, and then click **New**.
   b. In the **CI Filters** page enter conditions to filter CIs by specific attribute values.
   c. Click **Submit**.
8. Create a relationship type filter:
   a. Click **Relationship Type**, and then click **New**.
   b. In the **Collection** slushbucket, select the relationships that CIs must have in order to be displayed on the map, and move them to the **Relationship Types List**.
   c. Click **Save**.

What to do next

After creating a predefined filter, you can apply it to a map:

1. Click the Map settings icon  to open **Map Settings**.
2. Select a filter from the **Predefined Filters** list.
3. Click **Apply**.

Related topics

Filter the view of a Dependency Views map

Set a predefined filter as default

You can set a custom predefined filter as the default predefined filter for viewing maps.

Before you begin

Role required: admin

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Procedure

1. Create the custom predefined filter to be used as the default predefined filter.
2. On the predefined filter form, click the context menu and select **Copy sys_id**.
3. Navigate to **User Administration** > **User Preferences**.
4. Click **New** and create a new user preference record using these values:
   - **Name**: ecmdb.ciview
   - **Type**: String
   - **Value**: Paste the sys_id of the custom predefined filter
   - **User**: Leave blank to create a system-wide setting
   - **Description**: Description of the predefined filter
   - **System**: Selected
5. Click **Submit**.

What to do next

In **Map Settings**, when you select the `Default` option for **Predefined Filters**, the custom predefined filter that was set, will be applied.

Related topics

Filter the view of a Dependency Views map

Create or modify Map Related Items

The Map Related Items module relates referenced CIs to one another, which allows them to be displayed in a Dependency Views map.

Before you begin

Role required: admin

About this task

The base system configuration includes the following tables and relates them to items in the Computer [cmdb_ci_computer] and Server [cmdb_ci_server] tables.

- Disk [cmdb_ci_disk]
- Network Adapter [cmdb_ci_network_adapter]
- Database [cmdb_ci_database]

Some additional referenced CIs that can be related in this manner are file systems and running processes.

In the following example, computer nodes in the map are related to network adapter nodes if the **Configuration Item** field of the adapter records reference the specific CI node. Access or create a network adapter record from the Network Adapter related list in the cmdb_ci_computer record.

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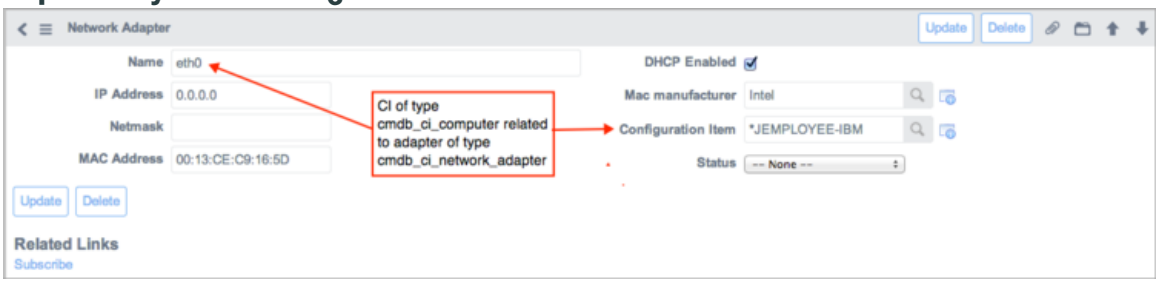
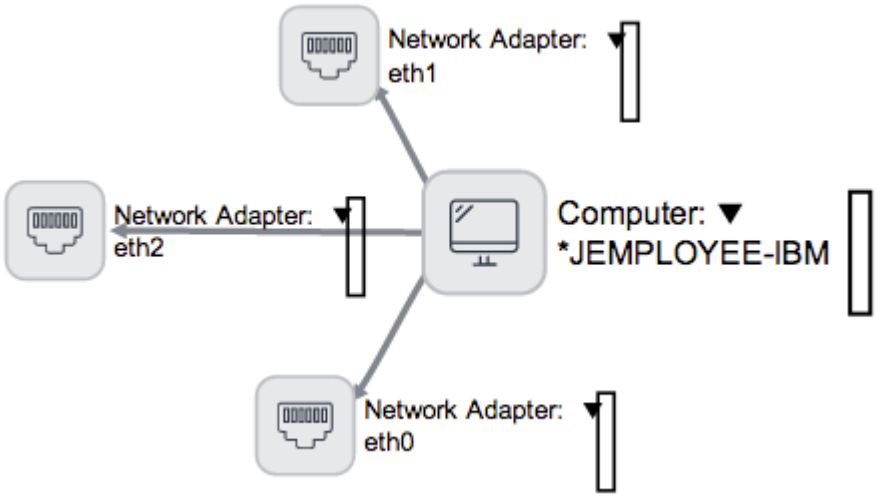
Dependency Views Configuration Item field



The Dependency Views map for the *JEMPLOYEE-IBM computer shows the network adapter attached to the computer.

Dependency Views map Related Items example



You can configure Dependency Views to display CIs that have no relationship record, but are related to other CIs by reference fields.

Procedure

1. Navigate to **All** > **Dependency Views** > **Map Related Items**.
2. Click **New** to create a new related item, or click in the row of an existing CI to modify an existing map related item.
3. On the form, fill in the fields.
   See the Related Items form table.
4. Click **Submit** to enter a new map related item or click **Update** to modify an existing map related item.

Related Items form

Control	Description
Configuration item	CI that represents the base node or a CI in a table that extends the base node table. In the base system, the configuration item that represents the base node is Computer [cmdb_ci_computer], which includes all types of workstations and servers.
Related item	Table name of the related item. Only the cmdb_ci table and tables that extend it are displayed in the choice list.

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Control	Description
Related field	Field that links this related item to the configuration item. In many cases, the appropriate value is automatically populated in the field after the first two fields are selected. Select the drop-down menu for additional options.
Active	Check box to enable or disable this record.

Create or modify Dependency Views menu actions

To modify an existing menu option, first you create a copy of the original menu action record, and then you modify the copy.

Before you begin

Role required: admin

About this task

This ensures that your instance can update the record normally during the upgrade process and allows you to quickly restore the original menu option, if necessary.

Procedure

1. To create a new menu option, navigate to **Dependency Views** > **Map Menu Actions** and click **New**.
   Fill in the fields on the form, as appropriate. See the Menu Action form table.
2. To modify an existing menu option, navigate to **Dependency Views** > **Map Menu Actions**.
3. Open the menu action you want to edit.
4. Right-click in the header and click **Insert and Stay**.
   This step creates a duplicate copy of the menu action and leaves it open for editing.
5. Change the name of the copied record to avoid confusion.
6. Modify the form fields as necessary and save the record.
7. Open the original record and disable it by clearing the **Active** check box.

Menu Action form

Control	Description
Name	Descriptive name that appears as the menu option.
Active	Check box that allows you to enable or disable this record.
Condition	Condition that triggers the display of this menu option. If the condition evaluates to **false** the menu option does not display. Script is evaluated in JavaScript in the user's browser and does not have access to all the APIs that Business Rules do. For details on available parameters, see Condition Parameters. .
Item	Map element for which the menu option displays. Valid values are: ○ **Canvas** for the menu on the map background. ○ **Node** for the menu on a CI. ○ **Relationship** for the menu on a relationship link.
Order	Physical location of the option in the menu. The option with the lowest order number appears first in the menu. All editable and custom options appear below the permanent menu options.

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Control	Description
Script	Script that is executed in the browser when the menu option is selected. Script is evaluated in JavaScript in the user's browser and does not have access to all the APIs that Business Rules do.
Type	Menu action type being created, either a menu option or a menu separator. The menu separator is a single line. When the type is a separator, the **Script** field is ignored.

Condition and script parameters for menu actions

You can use the following condition and script parameters for menu actions.

Condition parameters

Note:
The usual regular expression conventions are valid in the condition field, such as ! for NOT, && for AND, and || for OR.

The **Condition** field contains a boolean expression that evaluates to true or false. If the condition is true or if there is no condition, the specified option appears in the menu when you right-click a CI or a relationship link. When you select the option from the menu, ServiceNow executes the associated script.

Common Elements for Building a Condition

Text	Description
item	Node or reference link's data on which you performed the right-click action.
item.label	Label of the node.
item.ci_type	CI's type (table), such as `cmdb_ci_service`.
item.name	Name of CIs. CI's type name or the table label.
item.location	Location of the CI, such as New York.
item.manufacturer_name	Name of the CI's manufacturer, such as Dell Inc.
item.id	The sys_id of the CI.
item.is_selected	The item that is selected in the map.
item.level	The current default level.
item.locationId	The sys_id of the CI node's location.
item.locationName	The full address of the location.
item.manufaturerId	The sys_id of the CI's manufacturer.

Valid Conditions for Condition Parameters

Condition	Description
item.is_collapsed	The node is a collapsed node.
item.is_cluster	The node is a cluster node.

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Script parameters

Menu action scripts are executed on the client when a user clicks the menu option. You can use the same building blocks in scripts as in conditions. Menu action scripts do not function on separators. These are some additional, useful expressions for scripts:

Condition	Description
item.id	The sys_id of the CI node or relationship link.
item.source	The sys_id of the relationship's parent or child.
item.target	The sys_id of the relationship's parent or child.
item.label	The name of the CI node, such as IronMail-SD-02.
item.location	The sys_id of the CI node's location.
item.location_name	The full address of the location, such as 4616 Clairemont Drive, North Clairemont, San Diego CA.
item.manufacturer_id	The sys_id of the CI's manufacturer.

Create or edit a dependency type

Use one of the dependency types provided, or create a custom dependency type with a script that will execute in real time to generate a custom view of a Dependency Views map for a specific CI.

Before you begin
Role required: none

About this task
Create a JavaScript to customize the map. The script must comply with JavaScript syntax guidelines and the directions in the default script template, and it can call platform APIs. Use a dependency type, for example:

- To narrow down and simplify a map, leaving out CIs that are not important for a specific task.
- To include only specific CIs that are hidden by default, such as qualifiers, end-points, and entry points.
- To display virtual relationships that are calculated, and that otherwise do not exist in the CMDB.
- As a tool to plan a new topology deployment that is based on existing resources.

The following dependency types are available in the base system:

Default

The default setting in the base system. With this setting, there is no processing of the dependency map through any dependency type scripts that might filter or modify the map.

Show All Relationships

Returns all qualifiers, end points, and entry points. This dependency type is available in the base system and is disabled by default. Typically, you would enable this dependency type for debugging and tracking purposes.

The following dependency types are available with Service Mapping:

Application to Network Devices

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Returns the network devices in the network paths leading to/from the given CI.

Network Device to Applications

Returns the applicative CIs which are target or source of network paths containing the given network device. In addition, returns the hosts of those applicative CIs, and for an applicative CI that is an inclusion, its parent CI is returned too.

Physical Network Connections

Returns hosts/network devices that are physically connected to the given host or network device.

Flow Dependencies

Returns all the server to server connections that were discovered using the Netflow collector. The script builds a graph based on data in the [sa_flow_server_comm] table. This table contains pairs of services represented by an IP and a listening port that are communicating with each other. For more information, see Data collection and discovery using Netflow and Data collection and discovery using VPC Flow Logs.

Procedure

1. Navigate to **All** > **Dependency Views** > **Dependency Types**.
2. In the **Load Filter Scripts** list view, select an existing depenency type, or click **New**.
3. Enter or modify a script, adhering to the guidelines and requirements in the script template that is provided.
4. Click **Submit**.

Result

In a Dependency Views map, you can click **Dependency Type** to apply a custom script defined in a dependency type.

Related topics

Data collection and discovery using Netflow

Properties for Dependency Views

Use Dependency Views properties to configure how data appears in Dependency Views maps.

These properties are available for Dependency Views. To view and edit these properties, the admin role is required.

Properties for Dependency Views

Property	Description
Maximum number of CIs to display on a map at once. glide.bsm.max_nodes	The maximum number of nodes to retrieve from the database. If more nodes exist in the database, they are not displayed in the map. • Type: Integer • Default value: 1000 • Location: **Dependency Views** > **Map Properties**

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Properties for Dependency Views (continued)

Property	Description
Maximum level depth from the root CI that can be initially displayed in Dependency Views. glide.bsm.max_levels	Level depth is the graph distance between the root CI and a node. • Type: Integer • Default value:: 3 • **Other possible values**: 1-49 • Location: **Dependency Views** > **Map Properties**
Display the continuation of the map underneath virtual group. Virtual links are used to connect virtual groups to their child nodes. glide.bsm.show_virtual_node_children	• Type: Yes | No • Default value: No • Location: **Dependency Views** > **Map Properties**
Maximum number of child nodes to display (the rest will be collapsed). glide.bsm.too_many_children	Maximum number of nodes (of a similar CI type and at the same level) to display before applying virtual grouping. Nodes are collapsed for the map to meet this limit. • Type: Integer, valid values 1 or greater • Default value: 10 • Location: **Dependency Views** > **Map Properties**
A value of true indicates that filtered out items will be removed from the graph along with any disconnected children while a value of false indicates that the items will be dimmed in color. glide.ngbsm.filters_remove_filtered_items	• Type: Yes | No • Default value: Yes • Location: **Dependency Views** > **Map Properties**
Maximum number of relations per node. glide.bsm.max_num_rels	The maximum number of relations to retrieve from the database. If more relations exist in the database, they are not displayed in the map. • Type: Integer • Default value: 100 • Other values: 1 or greater • Location: **Dependency Views** > **Map Properties**

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Properties for Dependency Views (continued)

Property	Description
A value of true indicates that when filters are changed the graph will recalculate it layout using the currently selected layout algorithm. glide.ngbsm.filters_run_layout_automatically	• Type: Yes | No • Default value: Yes • Location: **Dependency Views** > **Map Properties**
A value of true indicates that when filters are changed the graph will be fit to the screen automatically. glide.ngbsm.filters_fit_to_screen_automatically	• Type: Yes | No • Default value: No • Location: **Dependency Views** > **Map Properties**
A value of true allows relationship lines to be drawn using smooth curves instead of straight line segments. These curves can be more taxing on the browser, setting to false may improve fluidity of animation and interaction for Dependency Views. glide.ngbsm.performance_allow_curves	• Type: Yes | No • Default value: Yes • Location: **Dependency Views** > **Map Properties**
Amount of time in milliseconds a notification stays on the screen. glide.ngbsm.notification_display_time	• Type: Integer • Default value: 5000 • Location: **Dependency Views** > **Map Properties**
The maximum amount of results displayed when searching for CIs. glide.ngbsm.search_ci_limit	• Type: Integer • Default value: 10 • Location: **Dependency Views** > **Map Properties**
The maximum amount of results displayed when searching for Relationship Types. glide.ngbsm.search_rel_type_limit	• Type: Integer • Default value: 5 • Location: **Dependency Views** > **Map Properties**
When available, the map should display the class labels for each CI. glide.ngbsm.show_class_labels	• Type: Yes | No • Default value: Yes • Location: **Dependency Views** > **Map Properties**

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Properties for Dependency Views (continued)

Property	Description
Truncate node labels to a single line and to fit available space (default). Disable to display entire labels on multiple lines and wrapped as needed. glide.ngbsm.truncate_long_labels	If *glide.ngbsm.show_class_labels* is enabled, then the class label always displays on top of the CI label, and wrapping applies to both the class and the CI labels. • Type: Yes | No • Default value: No • Location: **Dependency Views** > **Map Properties**
Minimum horizontal distance between nodes in horizontal layout. glide.bsm.layout_horizontal_spacing_x	The distance is measured in pixels between one node's center to another node's center. • Type: Integer • Default value: 200 • Location: **Dependency Views** > **Map Properties**
Minimum vertical distance between nodes in horizontal layout. glide.bsm.layout_horizontal_spacing_y	The distance is measured in pixels between one node's center to another node's center. • Type: Integer • Default value: 100 • Location: **Dependency Views** > **Map Properties**
Minimum horizontal distance between nodes in vertical layout. glide.bsm.layout_vertical_spacing_x	The distance is measured in pixels between one node's center to another node's center. • Type: Integer • Default value: 125 • Location: **Dependency Views** > **Map Properties**
Minimum vertical distance between nodes in vertical layout. glide.bsm.layout_vertical_spacing_y	The distance is measured in pixels between one node's center to another node's center.

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Properties for Dependency Views (continued)

Property	Description
	• Type: Integer • Default value: 125 • Location: **Dependency Views** > **Map Properties**

Components installed with Dependency Views

Several types of components are installed with the activation of the Next_Gen BSM (com.snc.ng_bsm) plugin, such as tables.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Tables installed

Table	Description
Available CI icons [ngbsm_ci_icons]	Stores all available CI class icons.
Icons for CI types [ngbsm_ci_type_icon]	Maps icons to CI class names.
Map Script [ngbsm_script]	Custom scripts that run in real time and generate a custom view of a map for a specific CI.
Map View [ngbsm_view]	Serialized map views saved by users.
Map Filter [ngbsm_filter]	Filters saved by users.
Menu Action [ngbsm_context_menu]	Default and custom context menu actions that appear when users right click a map.
Related Item [ngbsm_related_item]	Stores which reference fields should be treated as relationships when building the map. This allows users to include CI's that are related via a reference field instead of a relationship.
Edge Colors [bsm_edge_color]	Color definitions to use when drawing the relationships between nodes based on relationship type.
Map Indicator	Stores all map indicators.

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Table	Description
[bsm_indicator]	
BSM Saved Map [bsm_graph]	Details of maps.
BSM Map Actions [bsm_action]	Actions on the map.
BSM Map View [map_view]	Parents' predefined filters.
Map View Configuration Types [map_view_ci_type]	Configuration type filters, limiting the CI class types to be displayed, per predefined filter.
Map View Relationship Types [map_view_rel_type]	Relationship type filters, limiting the links to be displayed between CIs, per each predefined filter.
[map_viewroles]	Roles that a specific predefined filter should be applied to.
CI Filters [map_filters]	CI attribute filters, limiting the CIs to be displayed, per predefined filter.

Querying the CMDB

The CMDB Query Builder allows you to easily build complex infrastructure and service queries, that span multiple CMDB classes, non-CMDB tables, and that involve many CIs that are connected by different relationships.

The CMDB Query Builder provides a canvas into which you drag the CI classes that you want to include in a query. Then you add relationships, AND/OR operators between the CI classes, and define the relationship properties to query for. You can use saved queries to populate a CMDB group with CIs, and then use scriptable APIs to retrieve the CI list and apply actions collectively to all the CIs in the group.

There are two query types: CMDB Query and a Service Mapping query, which you can use separately or in combination to create queries such as:

- All hardware in my service offering that has Windows installed.
- All CIs of a certain type in an application service. For example, all Apaches/Web Servers/Linux servers per service.
- All virtual servers and the physical servers that host them.
- All servers that are not mapped to any application service.
- All application services and their associated servers and the cost of each server. This query helps evaluate the cost of technology for each application service.

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Starting node: The starting point of the query which is labeled as **STARTING NODE** on the Query Builder canvas. The first class that you drag to the canvas becomes automatically the starting node of the query and you cannot select a different starting node. In a complex query, the starting node must always be the only node connected to an AND/OR operator. If you try to connect a second node to an operator that the starting node is connected to, the query fails to run and a prompt to select a different starting node appears.

Additional information

- For a webinar, see CMDB Query Builder Queries and Reporting - Platform Analytics Academy blog post in the ServiceNow Community.
- For some tips and basic troubleshooting for the CMDB Query Builder, see the CMDB Query Builder [KB0681251].

Intelligent Search for CMDB integration

By default, Intelligent Search for CMDB functionality is integrated into the CMDB Query Builder. When opening the Query Builder, you can use the Intelligent Search search box which appears above the Query Builder canvas. Intelligent Search lets you use everyday natural language query (NLQ) to build a query. Intelligent Search parses, resolves any ambiguities in table names and relationship types, and then converts your search string into a valid query. The query appears fully constructed on the Query Builder canvas where you can run or continue and develop the query.

The integration of Intelligent Search for CMDB with the CMDB Query Builder is controlled by the system property *`glide.cmdb.query.nlq.activated`*, which is set to **true** by default. If you set the property to **false**, Intelligent Search for CMDB will not be available within the Query Builder.

AI Search and CMDB

NLQ Genius Results for AI Search use natural language queries to find CMDB tables that match your search without leaving a portal or workspace. For more information, see NLQ Genius Results.

Note:
AI Search is a complementary search experience that allows you to surface CMDB records in your normal flow of work, without having to access the CMDB Query Builder. It doesn't replace intelligent Search for CMDB, which is purpose-built and integrated into CMDB Query Builder.

CMDB Query

A query type that queries the infrastructure for CI classes and the relationships and references that connect them. You can optionally add the context of non-CMDB tables to a CMDB query.

You can include Application services in a CMDB query, to find, for example:

- All critical application services in your database.
- All infrastructure in a particular application service.
- All incidents for a particular CI in an application service, or all incidents for all the CIs of an application service.
- All application services with a pattern of a service connected to a database, and where the database has incidents.

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The list of available non-CMDB tables includes a subset of tables within the system, which have a reference to the Configuration Item [cmdb_ci] class or its children. The list of non-CMDB tables, includes tables such as Asset, Task, and Problem. You can use the system property glide.cmdb.query.non_cmdb.black_listed_tables to narrow down the list of non-CMDB tables to choose from.

Service Mapping Query

A query type that queries application services. The query is framed within an application service map. You define a pattern, and query for application service maps that have that pattern in their definition. The relationships in Service Mapping queries are matched by single-level direct relationships which is similar to the CMDB queries, and in addition, they are also matched by multi-level indirect relationships if they exist. A query for a relationship between two CI classes is satisfied even if the two CI classes are connected by intermediate CI classes that are not specified in the query.

Combination Query

You can combine the two query types by incorporating a saved Service Mapping query into a CMDB query. For example, create a CMDB query for Windows Servers that are connected to Tomcat WAR. Then connect the Tomcat WAR CI class to a Service Mapping query. The query changes to find Windows Servers that are connected to Tomcat WAR which is included in the services that returned by the Service Mapping query. You can inverse that query by choosing **Does Not Belong To Service**. This changes the query to find Windows Servers that are connected to Tomcat WAR that is not included in services returned by the Service Mapping query.

Relationship properties

When you connect CI classes on the canvas, the CMDB Query Builder displays the Connection Properties in the right-side bar, where you can configure the properties of the relationship, such as the relationship direction. For Service Mapping queries, you can configure whether to query for related or unrelated CIs.

Connection properties include:

- Relationship type: Query for CIs and descending classes with specific relationship types.
- Relationship direction: Which CI class is the parent and which CI class is the child in the relationship.
- Relationship level: Query only on first-level relationship or also on second-level relationships.
- No relationships: Query for CIs which have no relationship to the set class.
- References fields: A field that the parent and ancestor parent CI classes use to reference the child CI class.

Newly added relationships between CI classes may take up to 30 minutes to appear in the relationship list.

Related topics

CMDB groups

Domain separation and CMDB Query Builder

Domain separation is supported in the CMDB Query Builder. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

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Overview

How domain separation works in the CMDB Query Builder

With the CMDB Query Builder you can easily build complex infrastructure and service queries that span multiple CMDB classes, and that involve many CIs that are connected by different relationships. Domain separation is set to be on by default.

- **Saved Query**

  The user creates a query by dragging a class node from the class hierarchy and dropping it to the canvas and connecting the nodes with the relationships type.

  The user can save the created query as an XML file to the database [qb_saved_query] table in the CMDB for future use. The saved query is domain separated.

- **Query results**

  With a saved query, the user clicks **Run** and the query result is saved and displays in the platform list view.

  In the query results, the domain separation behaves in the same way as the platform list view for the CI relationship [cmdb_rel_ci] table and CMDB CI [cmdb] table. Consequently, since the CI relationship is not domain separated, all relationships of the query result display, regardless of the domains. Conversely, if the query result is CI only, since the CMDB CI is domain separated, the results display only if visible in the current domain.

Related topics

Domain separation and Configuration Management Database (CMDB)

Build a CMDB query using the CMDB Query Builder

A CMDB query type that queries the infrastructure for CI classes and optionally non-CMDB tables, and the relationships and references that connect them.

Before you begin

The Core UI plugin (com.glide.ui.ui16) must be activated.

Role required: cmdb_query_builder_read to only view and run saved queries, and cmdb_query_builder (contained for itil, itil_admin, and asset) to create and save queries, modify saved queries, and run queries. For reporting on queries, report related ACLs are required.

Authorized users can update and delete a query created by another user.

About this task

Build the query by dragging the CI classes and non-CMDB tables that you want to include in the query. Then dropping them as nodes on the canvas, and defining relationship properties between them. You can filter on the attributes of any node to narrow down the results to a specific set of CIs of that class or to a single specific CI. You can also select which property columns appear in the query results.

As you step through building a query, list options and other user interface elements of the CMDB Query Builder, are dynamically filtered as appropriate to your selections.

To learn more about using Query Builder, see the CMDB Query Builder Queries and Reporting - Platform Analytics Academy ServiceNow Community video. For a step-by-step walk through of building CMDB queries in the Query Builder, including queries with application services, see Sample queries.

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Procedure

1. Navigate to **All** > **Configuration** and click **CMDB Query Builder**.
2. On the **CMDB Query Builder** page do either of the following steps:
   - Click **Create new**. Type in a **Name**, choose **CMDB Query** as the **Query type**, and then click **Create**.
   - Click a widget of a saved query to continue building an existing query. Search saved queries first if needed.
   - Point to the upper right corner of a saved query widget, and click the **Duplicate Query** icon to edit a copy of a saved query. The default name of the new query contains the string 'copy'.
3. On the canvas, you can do any of the following operations:
   - Add CI classes to the query: On the **CMDB Classes** tab, select classes from the hierarchy list and drag them to the canvas.
   - Add an Application Service CI to the query: On the **CMDB Classes** tab, select the **Application Service** class from the hierarchy list and drag it to the canvas.

     In Application Service Properties on the right-side bar, you can select **Convert attached nodes to pattern** to query on patterns between the application service and other CMDB class nodes. When querying on a pattern, the nodes on both ends of the pattern connection, can be any number of levels apart. If **Convert attached nodes to pattern** is not selected, then the connection between the application service node and other CMDB class nodes, represent direct relationships.
   - Add non-CMDB tables to the query: Select a table from the **Non-CMDB Tables** list and drag it to the canvas.

     Note:
     A non-CMDB table cannot be the starting node in the query.
   - Add connections (relationships or patterns for application services) between two nodes on the canvas:
     a. On the first node in the connection, click the small square at the center of the right side.
     b. On the second node in the connection, click the small square at the center of the left side to create the connection.

Connection UI Notations

Notation	Description
Full line	A relationship in a CMDB query.
Red asterisk at the center of the connection line	Information such as relationship type is missing, invalidating the query.
Levels:<n> Types:<n> or a **<Reference type>** notation on the connection line	As applicable: The number of relationship levels and the number of relationship types included for the connection. Or, a reference type for a relationship that is a reference.
Dashed line	A pattern connection between an application service node and another node.

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- In Connection Properties on the right-side bar, configure relationship settings (click the connection line if necessary):

  a. In the Relationship Direction section, select the **Parent** node (the **Child** node automatically adjusts).

  b. In the Relationship Levels section, set **Level** to **First level relationships** if the CIs are directly connected. Or, **Up to 2nd level relationships** if the CIs are connected either directly or indirectly through another CI.

  c. In the Relationship Types and Related Items section, select either option:

Option	Description
No Relationships	To query for CIs with no connecting relationships, such as `All Tomcat WAR CIs which are not connected to a Windows Server`.
Add Relationship Types	To select specific or any relationship type.
Add a Related Item	To query for related CIs between the nodes.

- Configure CI reference column for a connection to a non-CMDB table: In the Connection Properties right-side bar, in the CI Reference Column section, select the column with a reference to a CI from the **Use CI reference column** list. If only one option is available, it is automatically selected.
- Configure the pattern between an application service node set with the **Convert attached nodes to pattern** option, and a non-CMDB table node: Select **Apply <table> reference filter to all nodes in the pattern** to apply the query to the application service CI itself and to the CIs within the application service.
- Add filters to a class node: Apply filters to narrow down a class query to a specific set of CIs or to a single specific CI.

  a. Point to the node to add a filter to, and then click the **Apply filters** icon that pops up above the node.

  b. In the Filters section, add attribute and related list conditions.

  c. Close the **Filters** section.
  For example: Add a filter for database location to query for databases located in Seattle.

  Click **Applied Filters** in the right-side bar to view all filters for each node on the canvas.

- Add And/Or operators to the query:

  a. Connect one node to two other nodes.

  b. Click the **And** box that appears on the connection line, to toggle between the **And**/**Or** operators.
  For example: C1 is Tomcat WAR, C2 is Linux Server, and C3 is Windows Server. Query for `All Tomcat WAR CIs which are connected either to Linux Server Or to a Windows Server`.

- Add property columns for a node, to appear in the query results:

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Note:
For a relationship, the query results include the *parent*, *child*, and *type* columns. You cannot add any other columns from the [cmdb_rel_ci] table.

a. Click **Properties** in the right-side pane.

b. Click a node once or twice, so that the Report Columns section appears in the right-side bar, and then click **Add Columns**.

c. Select properties and then click outside the properties list to close it.

- Create a combination query by integrating a Service Mapping query into a CMDB query:

  a. When building a CMDB query, click **Saved Service Queries** in the left-side bar.

  b. Select and then drag a Service Mapping query to the canvas.
  This query returns all CIs that satisfy the CMDB query, and that are included in the services returned by the embedded Service Mapping query.

- Add a search tag that can then be used as a search criteria for saved queries:

  a. Click the **Add Tags** icon at the top of the canvas.

  b. Click **Add Tag** and in the **Query Tags** dialog box enter one or more tag strings.

  c. Click the **Add Tags** icon again to close the **Query Tags** dialog box.

4. Click **Save**.

   On the **Saved Queries** tab, point to a saved query widget and click **Query Information**. Query details such as the query type, last update date, CMDB groups associated with the query, and the query schedules appear.

What to do next

- Click **Run**.

  Only the first 100 results of the query appear in the results pane.

  - Click **Load More Results** to view the next set of 100 results.
  - Click **Load All Results** to view the rest of the query results, up to the number specified by the glide.cmdb.query.max_results_limit system property (10,000 by default).

  Click a CI to open its CI form, and on the CI form click **Dashboard** to view CI health in the CI dashboard.

  Note:
  - Ensure that the glide.security.use_csrf_token property is set to true, allowing all results to appear.
  - When **Level** is set to **Up to 2nd level relationships**, the relationship type does not appear in the query results.
  - When a query is running, wait for it to complete or to time out before opening or running another query.

- Modify Query Builder settings: Click the (**Settings**) icon to open the **Query Builder Settings** dialog box.

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- Copy and share the URL of a saved query with users that have access to the CMDB Query Builder. Pasting the shared URL in a new internet browser window, directly opens the saved query in the CMDB Query Builder.
- Create reports in CMDB Query Builder.
- Create a schedule to run the query at a future time, and to email the results to interested parties.
- Export query results:

  Click the Query Results context menu and select **Export**. Even if the **Load More Results** button is visible, indicating that there are additional query results, only the results that are visible are exported.

- Export and import a CMDB query to port a query definition between instances.
- Populate a CMDB group using a saved query.
- Delete a CMDB query.

Related topics

Sample queries

Build a Service Mapping query using the CMDB Query Builder

The Service Mapping query type is a pattern consisting of classes and relationships between those classes. After you build the pattern and run the query, the query returns all the Service Mapping services that contain that pattern.

Before you begin

The Core UI plugin (com.glide.ui.ui16) must be activated.

Role required: cmdb_query_builder_read to only view and run saved queries, and cmdb_query_builder (contained for itil, itil_admin, and asset) to create and save queries, modify saved queries, and run queries.

Authorized users can update and delete a query created by another user.

About this task

Build the query by dragging the CI classes that you want to include in the query, dropping them as nodes on the canvas, and then defining relationship properties between them. For every class node in the query, you can filter on its attributes to narrow down the results to a specific set of CIs of that class or to a single specific CI. You can also select which property columns appear in the query results.

As you step through building a query, list options and other user interface elements of the CMDB Query Builder, are dynamically filtered as appropriate to your selections.

See Sample queries for a step-by-step walk through of building a Service Mapping query in the CMDB Query Builder.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. On the **CMDB Query Builder** page do either of the following:

   a. Click **Create new**.

   b. Enter a **Name**.

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c. Select **Service Mapping Query** as the **Query type**.

d. Select **Create**.

e. Select a widget of a saved query to continue building an existing query. Search saved queries first if needed.

f. Point to the upper right corner of a saved query widget.

g. Select the **Duplicate Query** icon to edit a copy of a saved query.
The new query's default name contains the string 'copy'.

3. On the canvas, you can do any of the following:
   - Add CI classes to the query: Select classes from the **CMDB Classes** hierarchy list and drag them to the canvas.
   - Add connections (relationships) between two nodes on the canvas:
     a. On the first node in the relationship, click the small square at the center of the right side.
     b. On the second node in the relationship, click the small square at the center of the left side to create the connection.
     c. In **Connection Properties** on the right-side bar, configure the following (click the connection line if necessary):
        - In the Relationship Direction section, select the **Parent** node (the **Child** node automatically adjusts).
        - In the Service Query Properties section, select **Find Related CIs** or **Find Unrelated CIs** to query for a pattern in which the two classes have or do not have relationships with each other, respectively.

          For example, `All Tomcat WAR CIs which are not connected to a Windows Server`.

     Relationship UI Notations

Notation	Description
Dashed line	A relationship in a Service Mapping query.

   - Add filters to a class node: Apply filters to narrow down a class to a specific set of CIs or to a single specific CI.

     a. Point to the node to add a filter to, and then click the **Apply filters** icon that pops up above the node.
     b. In the Filters section, add attribute and related list conditions.
     c. Close the **Filters** section.
     For example: Add a filter for business criticality to query for businesses that are 'most critical'.

     Click **Applied Filters** in the right-side bar to view all filters for each node on the canvas.

   - Add And/Or operators to the query:

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a. Connect one node to two other nodes.

b. Click the **And** box that appears on the connection line, to toggle between the **And** and the **Or** operators.

For example C1 is Tomcat WAR, C2 is Linux Server, and C3 is Windows Server. Query for all Tomcat WAR CIs which are connected either to Linux Server Or to a Windows Server.

- Add property columns for a node, to display in the query results:

> **Note:**
> For a relationship, the query results display the *parent*, *child*, and *type* columns. You cannot add any other columns from the [cmdb_rel_ci] table.

a. Click **Properties** in the right-side pane.

b. Click a node once or twice, so that the node's Report Columns section appears in the right-side bar, and then click **Add Columns**.

c. Select properties and then click outside the properties list to close it.

- Select columns and add filters that will be applied to the resulting set of services:

a. Select **Properties** in the right-side bar, and then click an empty space on the canvas to ensure that nothing is selected.

b. Click **Add Columns** at the bottom of the right-side bar and select columns to add. Click outside the columns list to close it.

c. Click the **Apply Service Mapping Query Filters** icon at the top of the canvas and add filters.

- Inverse the entire query and search for all Service Mapping services that do not include the query pattern: Click a node once or twice so that Query Properties appear in the right-side bar. In the Metadata section, toggle **Services Including This Pattern** to enable or disable the option.
- Add a search tag that can then be used as a search criteria for saved queries:

a. Click the **Add Tags** icon at the top of the canvas.

b. Click **Add Tag** and in the **Query Tags** dialog box enter one or more tag strings.

c. Click the **Add Tags** icon again to close the **Query Tags** dialog box.

4. Click **Save**.

On the **Saved Queries** tab, point to a saved query widget and click **Query Information** to view query details such as the query type, last update date, and the query schedules.

What to do next

- Click **Run**.

The query results pane displays only the first 100 results of the query.

- Click **Load More Results** to display the next set of 100 results.
- Click **Load All Results** to display the rest of the query results, up to the number specified by the glide.cmdb.query.max_results_limit system property (10,000 by default).

Click a CI to open its CI form, and on the CI form click **Dashboard** to view CI health in the CI dashboard.

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Note:
When a query is running, wait for it to complete or to time out before opening or running another query.

- Modify Query Builder settings: Click the Settings icon ( ) icon to open the **Query Builder Settings** dialog box.
- Copy and share the URL of a saved query with users that have access to the CMDB Query Builder. Pasting the shared URL in a new internet browser window, directly opens the saved query in the CMDB Query Builder.
- Create reports in CMDB Query Builder.
- Create a schedule to run the query at a future time, and to email the results to interested parties.
- Export query results:

  Export query results that are visible: Click the Query Results context menu and select **Export**. Even if the **Load More Results** button is visible, indicating that there are additional query results, only the results that are visible are exported.
- Export and import a CMDB query to port a query definition between instances.
- Populate a CMDB group using the saved query.
- Delete a CMDB query.

Related topics

Sample queries

Sample queries

Use the following sample queries to build your own CMDB queries and Service Mapping queries.

Using the CMDB Query Builder requires that the Core UI plugin (com.glide.ui.ui16) is activated.

CMDB query sample

Use this example to build a CMDB query to find all servers with a connection to a database.

Before you begin
Role required: none

Example:

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. Click **Create new**. Enter a **Name** - `All servers with a connection to a DB`. Choose **CMDB Query**, and click **Create**.
3. In the **CMDB Classes** list, locate the **Server** class, and drag it to the canvas.
4. Locate the **Database** class, and place it to the right of the **Server** class node on the canvas.
5. Click at the center of the right side of **Server**, and then at the center of the left side of **Database** to create a connection line between the two class nodes.
6. Click once or twice on the connection line until the Connection Properties panel appears in the sidebar. In the Relationship Types and Related Items section, click **Add Relationship Types** and add all the relationships from the list.

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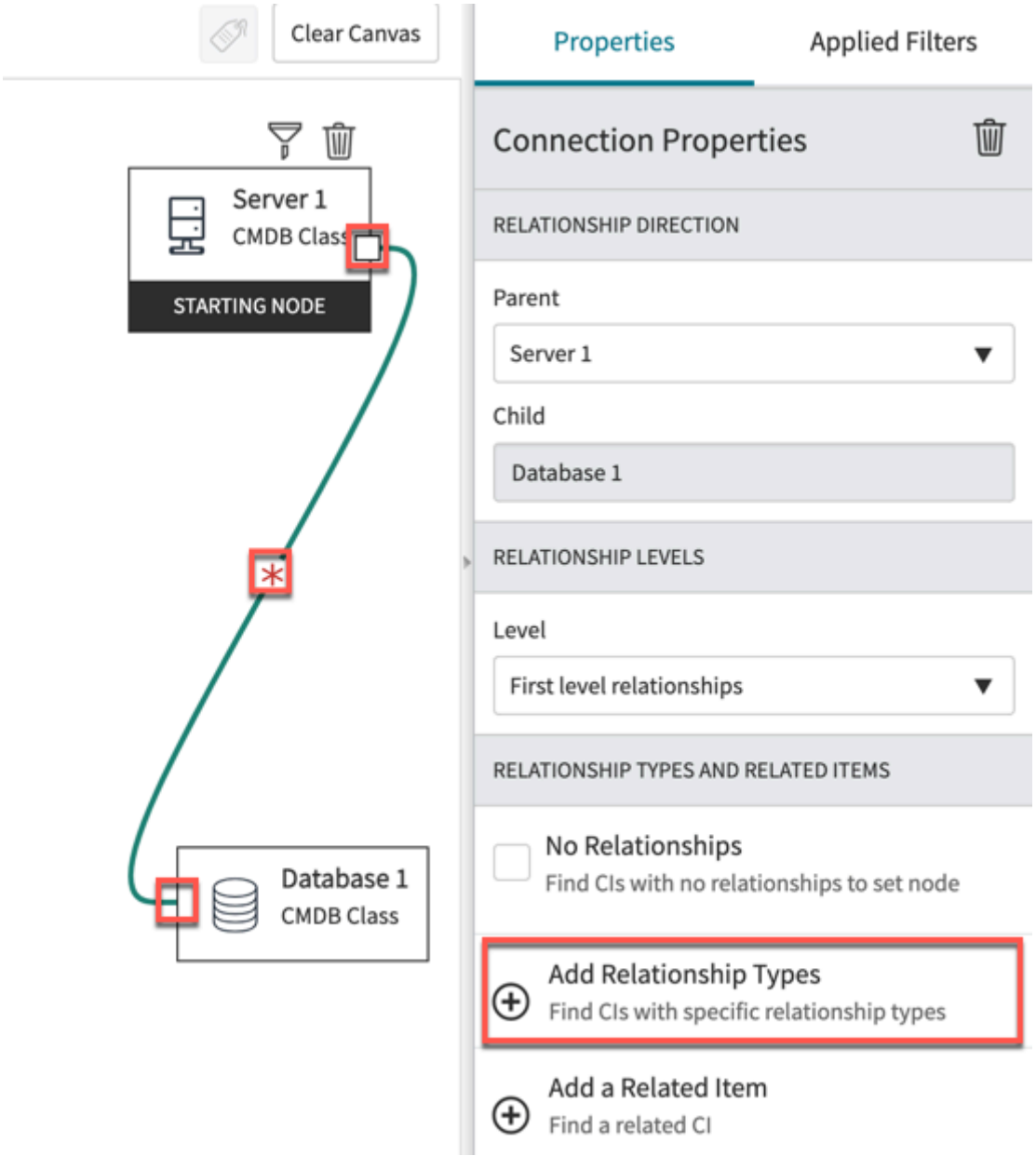

Settings in the Relationship Direction section reflect the parent-child direction in the relationship. If the Database class is the parent in the relationship, then the **Parent** and **Child** settings are switched.

7. Click **Save**, and then click **Saved Queries** on the left to see the widget for the saved query.
8. Click the query widget to return to the canvas in edit mode.
9. Click **Run** to execute the query.

   Review the query results. Each row displays the name of a server CI, the name of a database CI, and the relationship type between them.

10. Add columns to the query results:
    a. Click the **Server 1** node on the canvas once or twice so that the Server 1 Report Columns section appears in the right-side pane. Click **Add Columns**.
    b. Select **Manufacturer** and then click outside the columns list to close it.
    c. Click **Run**.

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Review the query results which now include the **Manufacturer** column.

d. Click **Save** again to save all your customization for this query.

CMDB query sample - Application service 1

Use this example to build a CMDB query to find all critical application services, and their owner.

Before you begin
Role required: none

Example:

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. Click **Create new**.
3. Enter `All critical application services` as the query **Name**. Choose **CMDB Query** and then click **Create**.
4. In the **CMDB Classes** list, locate the **Application Service** class, and then drag it to the canvas.
5. Add a filter to the application service node:
   a. Point to the application service node, and then click the **Apply filters** icon that appear.
   b. In the Filters section, add the condition **[business criticality] [is] [1 - most critical]**.
   c. Close the Filters section.
6. Add columns to the query results:
   a. In the Properties right-side bar, click **Add Columns**.
   b. Select **business criticality** and **owned by**, and then click outside the columns list to close it.
7. Click **Save**.
8. Click **Run** and then review the results. You can for example, locate any of the critical application services without an owner.

CMDB query sample - Application service 2

Use this example to build a CMDB query to find all application services, for which there is an incident or a change request, for either, the application service itself, or any CI within the service.

Before you begin
Role required: none

Example:

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. Click **Create new**.
3. Enter `Application services with incidents or change requests` as the query **Name**. Choose **CMDB Query** and then click **Create**.
4. In the **CMDB Classes** list, locate the **Application Service** class and then drag it to the canvas.
5. Click **Non-CMDB Tables**.
6. Locate the **Incidents** class in the class hierarchy, and then drag it to the canvas.
7. Locate the **Change Requests** class in the class hierarchy, and then drag it to the canvas.
8. Connect the Application Service and the Incidents nodes, and then, in the Properties right-side bar:

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a. Select **Apply Incidents reference filter to all nodes in the pattern**.

b. Set **Use CI reference column** to **Configuration item**.

9. Connect the Application Service and the Change Request node, and then, in the Properties right-side bar:

a. Select **Apply Change Request reference filter to all nodes in the pattern**.

b. Set **Use CI reference column** to **Configuration item**.

10. Click the **And** operator between the Incidents and the Change Request nodes, and switch it to **Or**.
11. Click **Save**.
12. Click **Run** and then review the results.

CMDB query sample - Application service 3

Use this example to build a CMDB query to find all hardware in my service offering that has Windows installed.

Before you begin

Role required: none

Example:

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. Click **Create new**.
3. Enter `All hardware in my service offering that has Windows installed` as the query **Name**. Choose **CMDB Query** and then click **Create**.
4. In the **CMDB Classes** list, locate the following classes, and then drag them to the canvas.
   - **Service**
   - **Service Offering**
   - **Application Service**
   - Searching for infrastructure, **Hardware**
5. Connect the Service node to the Service Offering node.

   In the Properties right-side bar, click **Add Relationship Type** and select the **Connect to::Connected by** relationship.

6. Connect the Serviced Offering node to the Application Service node.

   In the Properties right-side bar, click **Add Relationship Type** and select the **Connect to::Connected by** relationship.

7. Click the Application Service node.

   In the Properties right-side bar, select **Convert attached nodes to pattern** to include all CIs within the application service, in the query.

8. Connect the Application Service node to the Hardware node.
9. All infrastructure under Service,
10. Click **Save**.
11. Click **Run** and then review the results.

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You can click **Column options** of the Service column header, and select to **Group by Service**. Then expand a service to see all the hardware infrastructure under that service.

12. Return to the CMDB Query Builder window, to expand the query to include only infrastructure CIs on which Windows is installed.
13. Click **Non-CMDB Tables**, locate the **Software Instance** class, and drag it to the canvas.
14. Connect the Hardware node to the Software Instance node.

    In the Properties right-side bar, set **Use CI reference column** to **Installed on**.
15. Point to the Software Instance node, and click on the **Apply filters** icon that appears. In the Filters section, add the condition **[Product Name.Name] [is] [windows]**. Close the Filters section.
16. Click **Save**.
17. Click **Run** and review the new results.

Service Mapping query sample

Use this example to build a Service Mapping query to find all Linux servers in services.

Before you begin
Role required: none

Example:

1. Navigate to **All** > **Configuration** and click **CMDB Query Builder**
2. Click **Create new**. Enter a **Name** - `Linux server in services`. Choose **Service Mapping Query**, and click **Create**.
3. In the **CMDB Classes** hierarchy list, locate **Linux Server** and drag it to the canvas.
4. Click **Run**.

   Review the query results. Each row displays the name of a Service Mapping Service and the name of a Linux Server that is a member of that service.
5. On the right-side pane, click **Disable Service Including This Pattern** and then click **Run** again.

   Review the query results. Now, each row displays the name of a Service Mapping Service that does not include the specified Linux Server.

Run a partial CMDB query

You can run a partial query in the CMDB Query Builder by defining a section of a query, and then running it.

Before you begin
The Core UI plugin (com.glide.ui.ui16) must be activated.

Role required: cmdb_query_builder (contained for itil, itil_admin, and asset)

About this task
While building a query or reviewing a saved query, you can run only a section of the query. On the canvas in the CMDB Query Builder, highlight a section of the query which contains the nodes and relationships of the partial query that you want to run. You can then examine the results of the partial query, and update the query if needed.

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Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. On the CMDB Query Builder page, click a tile to open an existing query.
3. Click the selection tool under the navigation tool to switch to a section selection mode.
4. Border a section of the query:

   a. Click the mouse device on the upper left corner of the section that you want to create.

   b. Drag the mouse device to the bottom right corner of the section that you want to create.
   As you drag the mouse device, the selected section is highlight in light blue.

   c. Release the mouse device.
   The query nodes that are included in the partial query, appear with a blue border.

5. Click **Run**.
6. In the Pick Starting Node dialog box, select the starting node for the partial query, and click **Confirm**.

Result

The results of the partial query appear in the Results pane.

Delete a CMDB query

Delete a CMDB query that is no longer used or needed.

Before you begin

The query that you want to delete must be already saved.

Role required: cmdb_query_builder (contained for itil, itil_admin, and asset). Authorized users can delete a query created by another user.

Procedure

1. Navigate to **All** > **Configuration** and click **CMDB Query Builder**.
2. On the **CMDB Query Builder** page, select the Saved Queries tab and set the viewing mode to Card view ().
3. Hover over the card with the query that you want to delete.
4. Click the Delete Query (X) icon that appears in the upper right corner of the card.

Batch size for CMDB Query Builder queries

In a base system, a global batch size of 100 is allocated for every Query Builder query run. If needed, you can use a system property to override the default global batch size, or optimize the batch size value per saved query.

Queries can differ widely as they can be configured to query a wide variety of classes. Therefore, the batch size in the base system might not be optimal for every query, and some queries might time out or take a long time to complete. The optimal batch size for running queries depends on system load such as amount of data and number of relationships in your system. Contact Support for assistance in calculating the batch size for your query.

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Batch size is applicable and behaves the same in all query run scenarios, regardless of how the run was initiated:

- Query Builder user interface (ad hoc or saved query)
- Query Builder Scriptable API
- Scheduled jobs
- CMDB groups

The batch size for query runs is allocated in the following priority order:

1. The value in the *Execution Batch Size* field in the Saved Queries table, for a specific saved query. If set, this value applies only to the saved query, and has priority over the global value of 100 and the value of the glide.cmdb.query.batch_size system property.
2. The value of the system property glide.cmdb.query.batch_size, if exists, determines globally the batch size that is allocated to all query runs. If you add and set this property, the value applies to all queries, other than saved queries with *Execution Batch Size* value set.
3. A global value of 100, if the previous two options are not configured.

Modifying batch size for queries

If you are experiencing performance problems when running queries, you can modify the batch size value:

- Globally for all queries: By adding (if necessary) and setting the value of the system property glide.cmdb.query.batch_size.
- Per saved query: Set batch size for a specific saved query

Set batch size for a specific saved query

Configure a custom batch size for a CMDB Query Builder saved query that takes a long time to complete or that times out. A custom batch size overrides the global batch size in the base system and the value of the *glide.cmdb.query.batch.size* system property.

Before you begin
Role required: admin

About this task
Contact Support for assistance in calculating the batch size for your query.

Procedure

1. In the Filter navigator, enter `qb_saved_query.list` and press Enter to navigate to the Saved Queries table.
2. In the Saved Queries list view, locate the saved query for which you want to change batch size.
3. Set or modify the value in the *Execution Batch Size* field.
   Set the value to be greater than the global value in the glide.cmdb.query.batch.size property, or increase any existing value.

Navigation in CMDB Query Builder

Use the navigation tools to enlarge or shrink the query, to move the query, or to border a section of the query to run.

Using the Query Builder requires that the Core UI plugin (com.glide.ui.ui16) is activated.

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Use the buttons in the navigation tool as follows:

- Use the plus sign (+) to increase magnification of the query.
- Use the minus sign (-) to decrease magnification of the query.
- Click the center dot to center the query on the canvas.
- Use the direction arrows to move the query in that direction.
- Use the selection tool under the navigation tool to toggle between two states:
  - Moving the entire query on the canvas.
  - Bordering a section of the query, which you can then run as a partial query.

Create reports in CMDB Query Builder

Use CMDB Query Builder reports to show the results of a CMDB query or a Service Mapping query. Create a basic report, or a dynamic report that automatically updates when the results of the associated saved query change.

Create a dynamic report

After running a saved query in the CMDB Query Builder, create a dynamic report that continuously updates to show the latest query results. You can use a dynamic report as any other report created using Reporting and you can add it to Performance Analytics dashboards.

Before you begin

Ensure that the query that you want to create a dynamic report for is a saved query, and that there is a specified schedule for the query. Also, run the saved query and ensure that all query results are visible.

Role required:

- To create: cmdb_query_builder and report_user
- To view: Reporting role requirements might apply, see Administering reports for Reporting role requirements.

In a base system, the cmdb_query_builder role is contained in the itil and asset roles.

About this task

The **Create Report** button in CMDB Query Builder which is used to create a dynamic report, is activated only if:

- The query is saved
- The query has a schedule
- The entire set of query results is present after a query run

The initial dynamic report that you create, is based on the results from the initial run of the saved query. Then, on every subsequent run of the saved query, the associated report automatically updates with the latest query results.

However, if you change the query definition itself, the query and the report are no longer in sync and you must create a new report.

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Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. In the **Saved Queries** tab, select the saved query for which you want to create a report. Ensure that the query has a specified schedule.
3. Click **Run** and ensure that all query results appear.
4. Click **Load All Results** if available, to load all results.
   The **Create Report** button is enabled only if all query results are showing.
5. Click **Create Report**.
   If the CMDB Query Builder displays the query results in a new tab, then after the new tab opens with the query results, return to the CMDB Query Builder window.
6. In the Report Designer, click **Next** or **Back** to view and configure the new report in the **Data**, **Type**, **Configure**, and **Style** tabs.
   The report is pre-populated with the CMDB query results and a few other report details.
   - **Report name** is set to the name of the saved query.
   - **Source type** is set to **Data source**.
   - **Data source** is set to the table in which the query results are stored.
   - **Query Sys ID** is the ID of the latest run of the query.

   For more details about Reporting and about configuring a report in the Report Designer, see Reporting, Creating reports.
7. Click **Save** or **Run**.

Result

CMDB Query Builder creates a report source which you can attach to a report and use with dashboards. For more details about report sources, see Report sources.

What to do next

Use either of the following steps to view the new report source. The name of the new report source is set to the name of the CMDB query it was created from, and cannot be changed.

- In Query Builder, click **Saved Queries**. In the Saved Queries window, click the **Query Information** icon in the tile of the saved query. Scroll to the bottom of the information list and then click the link under **Report source**.
- Navigate to **All** > **Reports** > **Administration** > **Report Sources** and locate the new report source.

Create a basic report

After running a query in the CMDB Query Builder, you can create a basic report that is scoped to the query execution.

Before you begin

The Core UI plugin (com.glide.ui.ui16) must be activated.

Role required:

- View report: cmdb_query_builder or cmdb_query_builder_read
- Create report: cmdb_query_builder or cmdb_query_builder_read, and report_user

In a base system, the cmdb_query_builder role is contained in the itil and asset roles.

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Procedure

1. Navigate to **All** > **Configuration** and click **CMDB Query Builder**.
2. Build a query.
3. In the query results pane, click **Load More Results** or **Load All Results** to load all the results that you want to include in the basic report.
4. In the query results pane, click the column context menu and select **Bar Chart** or **Pie Chart**.

Result

The Reports application creates a basic report, which is scoped to the query results that are currently loaded and is static.

Related topics

Reporting

Build a CMDB query using the CMDB Query Builder

Build a Service Mapping query using the CMDB Query Builder

Run a partial CMDB query

Search saved queries

The CMDB Query Builder allows you to search for a specific saved query using any combination of search criteria such as the query's name, type, custom tags, and who created or updated the query.

Before you begin

To locate a saved query using a **Query Tags** search criteria, the query must have a query tag associated with it. For more information see Build a CMDB query using the CMDB Query Builder, or Build a Service Mapping query using the CMDB Query Builder.

The Core UI plugin (com.glide.ui.ui16) must be activated.

Role required: cmdb_query_builder (contained for itil, itil_admin, and asset)

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
   The Saved Queries tab shows all saved queries in tiles, and also a tile for creating a new query.
2. On the Saved Queries tab, specify a **Sort by** criteria to filter the saved queries that are showing.
3. In the **Search Saved Queries** field, enter a search string that corresponds to the **Sort by** selection and then select an item from the list that gets populated as you type.
   The drop-down list includes search strings that can be applied to the sorting criteria such as 'Query name'.
4. Refine the search by entering additional **Search Saved Queries** search strings as needed.

Create a schedule for a CMDB query

Schedule a saved CMDB query to run once at a scheduled time or on a recurring schedule, and to email the query results to specified users.

Before you begin

The Core UI plugin (com.glide.ui.ui16) must be activated and a saved CMDB query that was built in the CMDB Query Builder must exist.

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Role required: cmdb_query_builder (contained for itil and asset)

About this task

The query results are attached to the email as a file in the specified format. By default, the maximum result rows that can be attached is 10,000. This is controlled by a system property.

Procedure

1. If need to, navigate to **All** > **Configuration** > **CMDB Query Builder** and then click a saved query.
2. Click **Create Schedule** and fill out the form.

Scheduled Email of Query Builder form

Field	Description
Query	The query to run.
Users	Users who should receive query results email. To receive emails, users must have an Email address defined and have Notifications set to Enable in their user records.
Groups	Groups to email the query results to.
Zip output	Indicates whether the report should be sent as a zip file.
Active	Indicates whether to run the query according to the specified schedule.
Run	Frequency for running the query.
Time	Time of day to run the query.
Conditional	Indicates whether to display the **Condition** field, which allows you to specify conditions under which the query runs.
Omit if not records	Indicate whether to distribute email if the query returns zero results.
Email addresses	Email addresses of users who should receive the email but who are not in the system.
Subject	Text that appears in the subject line of the distribution email.
Introductory message	Additional message that is delivered with the query results.
Condition	User-created script that checks for certain conditions to be true before running the query. This field is visible only when **Conditional** is checked.

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Field	Description
Type	File format to use for the query results. **Note:** Configure the form layout to add this field to the form.

Export and import a CMDB query

Export a saved CMDB or Service Mapping query definition to an XML file which you can later import and run in the CMDB Query Builder. This process lets you port a saved query between instances, such as from a development environment to a production environment.

Before you begin

- You must save a query before you can export it.
- Domain in an exported query must be visible in both, source and destination instances.

Role required: cmdb_query_builder (contained in itil, itil_admin, and asset).

About this task

When exporting a combination query, the integrated Service Mapping query definition is included in the exported query.

For backward compatibility, you can alternatively Export and import a query as an update set.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. Export a saved query:
   a. In the **Saved Queries** tab, in either list view or card view, select a saved query.
   b. Click the **Export query** icon at the top of the Query Builder canvas.
   c. Wait for the **Query Export Complete** message to appear and then click **Download**.
   You can now access the query XML file.
3. Import a saved query:
   a. In the **Saved Queries** tab, click the **Import query** icon at the top of the CMDB Query Builder window.
   b. In Finder, select the saved query XML file and click **Open**.
   The imported query is available in the **Saved Queries** tab of the CMDB Query Builder on the instance.

Export and import a query as an update set

Export a saved query definition to an XML file as an update set, which you can later import.

Before you begin

Role required: To export — cmdb_query_builder (contained in itil and asset). To import — user with permission to import an update set.

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Domain in the exported query must be visible in both, source and destination instances.

About this task

Export a query definition as an update set which you can later import and commit. This process lets you port a query between instances, such as from a development environment to a production environment. For more information about exporting and then committing update sets using XML files, see Save an update set as a local XML file.

When exporting a combination query, the integrated Service Mapping query definition is included in the exported update set.

Procedure

1. Export a saved query:
   a. In the **Filter navigator**, enter `qb_saved_query.list`.
   b. Select **Enter** to navigate to the Saved Queries table.
   c. In the Saved Queries list view, select the query that you want to export.
   d. Select **Actions on selected rows** and then **Export query**.
   e. Wait for the **Query Exporter** to complete the export.
2. Import the exported saved query:
   a. Navigate to **System Update Sets** > **Retrieved Update Sets**.
   b. On the Retrieved Update Sets form, select **Import Update Sets from XML**.
   c. On the Import XML page, select **Choose file**.
   d. Select the exported XML file.
   e. Select **Upload**.
   f. Open the new record that was added to the Retrieved Update Sets list view.
   g. On the Retrieved Update Set form, select **Preview Update Set Batch**.
   h. Close the Batch Update Set Preview dialog box.
   i. Select **Commit Update Set Batch**.
   j. Close the Commit Update Set Batch dialog box.

Result

The imported query is added to the Query Builder saved queries on the instance.

Settings for CMDB Query Builder

Use settings to control some aspects of the CMDB Query Builder behavior.

Using the Query Builder requires that the Core UI plugin (com.glide.ui.ui16) is activated.

Open the **Query Builder Settings** dialog box:

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. On the **CMDB Query Builder** page, click the Settings icon ().
3. Click the Settings icon again to close the dialog box.

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Setting	Description
Display Relationships in Results	Display the relationship between CIs in the query results.
Display Suggested Connections	Filter the CMDB classes and the non-CMDB tables lists in the left pane to display only classes and tables that the selected node on the canvas has a relationship with. You can then drag any item from the filtered list to the canvas, and connect it to the selected node on the canvas. This setting applies only to CMDB queries.
Display Results in New Tab	Display query results in a separate browser tab titled **Query Results**.

Properties for CMDB Query Builder

Use the CMDB Query Builder properties to configure query processing.

These properties are available for CMDB Query Builder. To view and edit these properties, the admin role is required.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Properties for CMDB Query Builder

Property	Description
Limits the number of results for a scheduled query and in the results section in the Query Builder when you click **Load All Results**. glide.cmdb.query.max_results_limit	• Type: integer • Default value: 10000 • Location: **Configuration** > **CMDB Properties** > **Query Builder Properties**
Time limit (in seconds) for running one batch to get one batch of query results (100 results). glide.cmdb.query.batch_time_limit_in_sec	• Type: integer • Default value: 300 • Location: **Configuration** > **CMDB Properties** > **Query Builder Properties**
Time limit (in seconds) for running an entire query to get all results. glide.cmdb.query.query_time_limit_in_sec	• Type: integer • Default value: 1800 • Location: **Configuration** > **CMDB Properties** > **Query Builder Properties**
Exclude list of non-CMDB tables that shouldn't appear in the CMDB Query Builder when creating a CMDB query.	• Type: string • Default value: empty

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Properties for CMDB Query Builder (continued)

Property	Description
glide.cmdb.query.non_cmdb.black_listed_tables	• Other values: Comma separated list of table names (not labels). Can include '*abc' to exclude all tables containing 'abc' in their table name. • Location: **Configuration** > **CMDB Properties** > **Query Builder Properties**
glide.cmdb.query.batch_size	Batch size allocated globally when saved queries run. • Type: integer • Default value: 100 • Location: Add to System Properties [sys_properties] table.

Monitor system foundations in the CSDM and the CMDB Data Foundations Dashboards

The ServiceNow® CSDM and CMDB Data Foundations Dashboards store app contains dashboards which provide insights into the key foundational metrics of your CMDB and Common Service Data Model (CSDM). This app provides recommendations to ensure that the CMDB and CSDM are properly configured for optimal usage and to mitigate any potential risks.

Note:
CSDM and the CMDB Data Foundations Dashboards don't support domain separation.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

The CSDM and CMDB Data Foundations Dashboards store app provides dashboards that complement each other. See the respective sections for each of the following dashboards:

CMDB Data Foundations dashboard

Evaluates various configurations and customizations in the CMDB. This dashboard checks that important data is valid and properly configured, and identifies and provides visibility into potential risks in the implementation. Use the CMDB Data Foundations dashboard to prevent issues and support continuous effective functioning of the CMDB.

CSDM Data Foundations dashboard

The CSDM Data Foundations dashboard displays key CSDM metrics on a single page to assist you in getting the full benefit from your ServiceNow AI Platform® products.

The CSDM and the CMDB Data Foundations dashboards capability is provided by the com.snc.cmdb.getwell plugin, which is activated by default in base systems.

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For an introduction, watch the ServiceNow Data Foundations Dashboards for CSDM and CMDB video.

Access the dashboards

To access these dashboards, navigate to **All** > **Configuration**, and then select **CMDB Data Foundations Dashboard** or **CSDM Data Foundations Dashboard**. You can toggle between the two dashboards by clicking the change dashboard icon () on the title bar of either dashboard.

Manage performance

It might be useful to manage the performance impact of some metrics that are greatly affected by, for example, a large CMDB or a high number of non-compliant CIs. You can use any of the following methods to manage performance of those metrics to improve the overall performance of the dashboards:

Deactivate a metric

Starting with CSDM and the CMDB Data Foundations Dashboards v2.2 you can deactivate CSDM or CMDB metrics.

To improve performance, deactivate metrics that aren't needed or that require extensive resources and affect performance. The active/non-active settings for metrics are preserved across family release upgrades.

To deactivate a metric, you must access the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table where all CMDB and CSDM metrics are stored. Navigate to the list view of the table [sn_getwell_metric]. Then, locate the metric that you want to deactivate and set its **Active** column to **false**. Tiles on the dashboards that are associated with inactive metrics stop collecting data and aren't refreshed.

Limit a metric

For the following metrics, you can use metric-specific settings to limit their performance impact:

- CMDB metrics:
  - *CIs Processed via IRE*
  - *CIs with Relationships to Parent and Child*
  - *Hardware CIs with Serial Numbers*
- CSDM metrics:
  - *Application Services with 'Consumes::Consumed By' Relationship to Business Application*
  - *Application Services with Business Application Relationships*
  - *Business Application with Application Service Relationship*

The following columns in the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table are set with default values per metric, that limit performance impact and which you can fine tune. Review those settings for example, when there is a large number of non-compliant CIs for a metric. Another example is having a large CMDB where a small number of compliant CIs for a metric is already a sufficient indication of health and there is no need to process the rest of the CIs for that metric.

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- *Aggregate limit*: The maximum number or percentage of non-compliant CIs that are reported for the metric. Once that threshold is reached, counting for the metric stops for the run and the score for the metric is set to 0.
- *Fail count threshold*: The threshold of the number of consecutive metric runs that failed due to exceeding the metric's *Runtime threshold*. When that threshold is reached, the respective metric is automatically deactivated.
- *Runtime threshold*: The time threshold in seconds that is considered too long for a metric run. When exceeded, the current metric run is considered failed.

For most metrics, when the number of consecutive runs that fail because the runtime exceeds *Runtime threshold*, is greater than the *Fail count threshold*, the system automatically deactivates the metric. You can manually reactivate a deactivated metric by setting its **Active** column to **true**. An exception to the those column definitions and usage is the CMDB *CIs Processed via IRE* metric. For details, see CMDB Data Foundations dashboard.

CMDB Data Foundations dashboard

Use the CMDB Data Foundations dashboard to monitor foundational key health-related metrics in CMDB.

Requirements

- To access the CMDB Data Foundations dashboard, users must be configured with the admin, itil_admin, or asset roles. Some metrics that let you drill-down to Performance Analytics (PA) data, might require additional roles for accessing specific tables. Those roles are specified as appropriate per metric.
- The CMDB Data Foundations dashboard adds the following scheduled jobs, which must be running:
  - *CMDB Get Well Metric Collection*: Calculates and stores details for compliant CIs associated with metrics, populating the list view of the metrics. Data appears on the dashboard only after the first run of this scheduled job. Metrics' scores are stored in the CMDB Data Foundations Metric Scores [sn_getwell_cmdb_score] table. This non-PA job runs daily by default.
  - *CMDB Data Foundations PA Metric Collection*: Calculates the total non-compliant CIs associated with metrics and populates the PA widgets on the dashboard. Also, provides trending data over time for the non-compliant CIs associated with metrics. This PA job runs daily by default.
  - *CMDB Get Well CIs Processed Via IRE Metric Batch Collection*: Invoked once a day (by default) by the *CMDB Get Well Metric Collection* job and repeatedly runs in 10 minute intervals, to process as many 1,000-CIs (default) batch files as possible. After each 10-minute run, the job stops for a minute.

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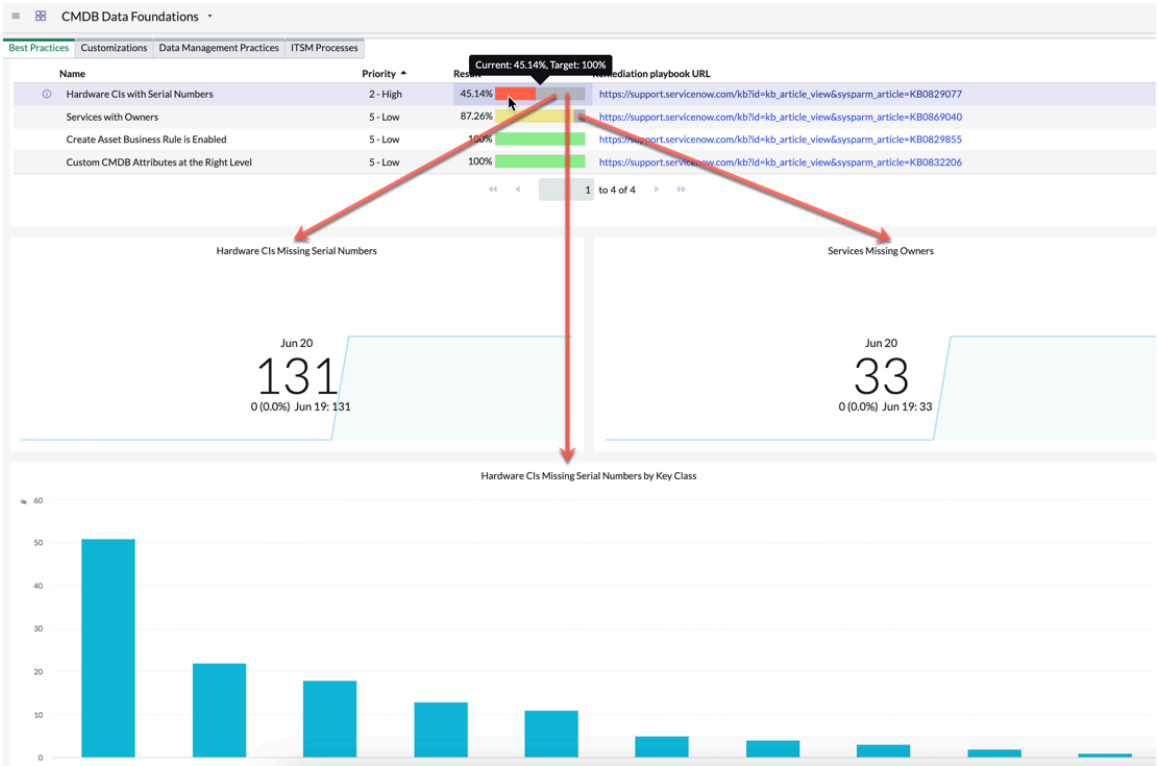
Overview



The CMDB Data Foundations dashboard provides four tabs, each grouping a distinctive set of CMDB metrics:

- **Best Practices**: Checks if usage of tables and properties is as intended for supporting the health of the CMDB. This set of metrics checks adherence of CSDM-related standards, for example, for populating services and relationships.
- **Customizations**: Checks how customizations to the CMDB are used. This set of metrics checks that customizations are not used excessively, and that they are used only when needed and are correctly applied.
- *Data Management Practices*: Checks if importing third-party data into the CMDB is properly done without compromising the integrity of the CMDB. This set of metrics checks if the imported data is properly configured and formatted to provide the foundation for CMDB functions.
- **ITSM Processes**: Check if ITSM processes leverage CMDB data.

Columns in the list view of metrics

The following columns appear in the list view of metrics:

Name

Name of metric.

Priority

Priority of an metric. The priority for an metric is a calculation of the weight of the metric and the severity of the percentage score. Priority ranges from **1- Critical** as the highest priority, to the lowest priority which is **5 - Low**. Metrics are listed in their priority order, starting with the highest priority metric (lowest priority number).

Result

Percentage number of CIs (or the measured item) which are in compliance with the metric. A bar shows the percentage of CIs (or the measured item) which

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are in compliance versus the percentage of items which are not in compliance. The portion on the bar that represents CIs (or the measured item) which are in compliance, uses the following color scheme to note the level of compliance:

- Red: 0–50% of the total CIs (or the measured item), are in compliance for the metric.
- Yellow: 50–90% of the total CIs (or the measured item), are in compliance for the metric.
- Green: Above 90% of the total CIs (or the measured item), are in compliance for the metric.

The portion on the bar that represents the percentage of items which are not in compliance for the metric, always appears in darker shade. Also, all metric percentage scores are aligned so that a higher percentage score and a smaller darker-shade portion on an metric bar, always indicate the more optimal state.

Note:
Some metrics use a lower threshold value which impacts the result that appears in the dashboard. For these metrics, if the percentage of compliant CIs is less than the lower threshold value, then the result appears as 0 for the metric.

Remediation playbook URL

Links to remediation playbook articles in Now Support. These knowledge articles provide context for the respective issue, guidelines to help remediate the issue, and other necessary details to bring CIs into compliance. Click the link and use your Now Support credentials to access the knowledge article.

Performance Analytics widgets

Most metrics are associated with Performance Analytics (PA) widgets (tiles) that provide further details about CIs that are not in compliance with the metric, correlating to the dark-shade portion of the metric bar. Drill down the tiles to access PA widgets, which are provided by the *CMDB Data Foundations PA Metric Collection* scheduled job.

On the Analytics Hub page:

- Click the **Breakdowns** context menu to see any available breakdowns.
- Ensure that the **Real-time** (

) option is selected and then click **Show Records** to see a list view of the respective CIs.

Best Practices metrics

The **Best Practices** tab contains the following metrics:

Create Asset Business Rule is Enabled

Checks for the existence of the *Create Asset on insert* business rule. If the business rule exists, the percentage score for the metric is 100. Otherwise, the percentage score is set to 0.

Custom CMDB Attributes at the Right Level

Percentage of custom attributes that should be added at a higher level in the CMDB hierarchy. For example, the custom attribute *Warranty duration* was added

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three times in the Computer class, instead of adding the attribute once at a higher level in the hierarchy, which is more efficient.

- If (total number of attributes that can be moved up > 10): Percentage is set to 0.
- Otherwise: Percentage is set to (10 – total number of attributes that can be moved up)*10.

Hardware CIs with Serial Numbers

Percentage of Computer or Network Gear CIs with a serial number versus those CIs without. The metric is based on the following conditions:

- Class is an instance of Computer or Gear
- Status = installed
- Operational status = operational
- Serial number is empty

The complete set of CIs for this metric consists of the CIs that satisfy the first three conditions. The CIs that satisfy all conditions are counted as non-compliant Computer or Network Gear CIs, which are without a serial number.

Note:
If the percentage of compliant CIs is less than 70%, then the percentage score for this metric is set to 0.

The Hardware CIs Missing Serial Numbers tile shows the total number of CIs which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

The Hardware CIs Missing Serial Number by Key Classes chart shows those CIs that are missing a Serial Number, grouped by key classes. Point to a class bar on the chart to show more details, and click a class bar to access a list view of those CIs for class.

To manage a potential performance impact, other than deactivating the metric, you can limit the performance impact by adjusting the following performance management columns for the metric in the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table. For this metric, those columns are set with the following default values:

- *Aggregate limit*: 30 (% of CIs in the metric)
- *Fail count threshold*: 3
- *Runtime threshold*: 3,600

For more information about these columns, see Performance management in Monitor system foundations in the CSDM and the CMDB Data Foundations Dashboards.

Services with Owners

Percentage of operational services in which the *owned_by* field is populated versus those operational services in which this field isn't populated.

The complete set of CIs for this metric consists of all the operational services in the Service [cmdb_ci_service] table (where *operational_status* = **Operational**).

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The percentage score for this metric is calculated as (Compliant CIs/Complete set of CIs) *100.

The Services Missing Owners tile shows the total number of CIs which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Customizations metrics

The **Customizations** tab contains the following metrics:

Base System Business Application Table Usage

Checks for the existence of a custom business application table, which is any table that extends [cmdb_ci], whose name starts with “u_” or “x_” and which contains the strings “bus” and “app”.

If such custom table exists, then is 0, and if not, the percentage is 100.

The Custom Business Application Tables tile shows any custom business application tables. Click the tile to drill down the PA widget for further details, such as the list all those tables.

Base System CMDB Relationship Types Usage

Percentage of base system relationship types versus custom relationship types that were created by users. Creating custom relationship types can interfere with the integrity of the CMDB therefore this metric can help you prevent such problems.

This metric counts records in the Relationship Type [cmdb_rel_type] table where *sys_package* is “global” and *name* is not “Manages::Managed by”. The percentage score for this metric is calculated as follows:

- If count is <= 0, then percentage is 100
- If count is > 10, then percentage is 0
- Otherwise percentage = (10 – count)*10

The Custom CMDB Relationship Types tile shows the relationships which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Those are the relationships that were not included in the base system and were custom created. Click the tile to drill down the PA widget for further details, such as the list all those relationships.

Base System Relationship Types Not Deleted or Recreated

Percentage of relationship types that exist in the base system and which were not deleted or recreated, versus those that were deleted and maybe recreated. Deleting and recreating base system relationships can interfere with the integrity of the CMDB, therefore this metric can help you prevent potential problems.

This metric counts the number of base system relationships that were deleted and possibly recreated. The percentage score for the metric is calculated as follows:

- If count is <= 0 then the percentage is set to 100
- If count is > 10 then the percentage is set to 0
- Otherwise, the percentage = (10 – count)*10

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The Base System CMDB Relationship Types Deleted and/or Recreated tile shows the relationships which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those relationships.

Custom CMDB Tables Using Standard Naming

Percentage of custom CMDB tables whose name doesn't start with the standard string “u_cmdb_ci”. The metric counts tables in the Tables [sys_db_object] table that extend from the CMDB table and whose name starts with the string “u_” (indicating that it is a custom table) but not with “u_cmdb_ci”.

The percentage score for this metric is calculated as follows:

- If count <= 0 then percent is 100
- If count > 6 then percent is 0
- If count is between 0 and 6, then percent is (1-(count/6))*100

The Custom CMDB Tables Not Using Standard Naming tile shows the tables which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those tables.

Use of Custom Attributes

Percent of custom attributes that were added to CMDB tables in the base system. Custom attributes are identified by a table name that starts with "cmdb_ci" and a column name that starts with “u_.”

The percentage score for the metric is calculated as follows:

- If (total custom attribute count > 50): Percentage is set to 0.
- If (total custom attribute count < 10): Percentage is set to 100.
- If (total custom attribute count is 10–50): Percentage is set to (total custom attribute count – 10)/(50-10)*100.

Data Management Practices metrics

The **Data Management Practices** tab contains the following metrics:

Active CIs Updated in Last 90 days

Percentage of Hardware [cmdb_ci_hardware] or Virtual Machine Instance [cmdb_ci_vm_instance] active CIs that were updated in the past 90 days versus those CIs that were not (stale CIs). The metric is based on the following conditions:

- Class is an instance of Hardware or VMware Virtual Machine Instance
- Status = installed
- Operational status = operational
- Updated >= 90 days

The complete set of CIs for this metric consists of CIs that satisfy the first three conditions. The CIs that satisfy all conditions, are counted as stale CIs of the Hardware [cmdb_ci_hardware] and Virtual Machine Instance [cmdb_ci_vm_instance] classes.

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Note:
If the percentage of compliant CIs is less than 65%, then the result displayed for this metric is set to 0.

The Active CIs Not Updated in 90 Days tile shows the total number of CIs which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

CIs Processed via IRE

Percentage of Hardware [cmdb_ci_hardware] or Virtual Machine Instance [cmdb_ci_vm_instance] CIs processed via IRE versus those CIs not processed via IRE. CIs are counted as processed via IRE if they satisfy all of the following conditions:

- Instance of Hardware [cmdb_ci_hardware] or Virtual Machine Instance [cmdb_ci_vm_instance]
- Status = installed
- Operational status = operational
- Sys_id is IN (target_sys_id FROM sys_object_source table)

The CIs that satisfy only the first three conditions but fail the forth condition, are counted as CIs not processed via IRE.

Note:
Viewing the data provided by PA for this metric, requires the additional role of admin or discovery_admin. However, the **Show Records** button on the Analytics Hub page isn't supported.

To manage a potential performance impact, other than deactivating the metric, you can limit the performance impact by adjusting the following performance management columns for the metric in the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table. For this metric, those columns are set with the following default values:

- *`Aggregate limit`*: 1,000 (Number of records in each batch file processed by the *`CMDB Get Well CIs Processed Via IRE Metric Batch Collection`* job during its 10-minute run intervals.)
- *`Fail count threshold`*: 3
- *`Runtime threshold`*: 72,000 (Daily limit of total runtime of all *`CMDB Get Well CIs Processed Via IRE Metric Batch Collection`* job runs)

For this metric, there is no trigger for automatically setting the metric score to 0. For more information about these columns, see 'Performance management' in Monitor system foundations in the CSDM and the CMDB Data Foundations Dashboards.

CIs with Names

Percentage of Hardware, VMware Virtual Machine Instance, or Application CIs with a name up to 200. The metric is based on the following conditions:

- Class is an instance of Hardware [cmdb_ci_hardware], Virtual Machine Instance [cmdb_ci_vm_instance], or Application [cmdb_ci_appl]
- Status = installed

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- Operational status = operational
- Name is empty

Non-compliant CIs are counted as the CIs that are missing a name, which are those CIs that satisfy all conditions.

The percentage score for the metric is calculated as follows:

- If count of CIs without names is > 200, percent is 0
- If count of CIs without names is < 200, percent is (200-(count of CIs without names)/200 * 100)

The CIs Missing Names tile shows the total number of CIs which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

CIs with Relationships to Parent and Child

Percentage of non-orphan CIs versus orphan CIs.

The complete set of CIs for this metric consists of CIs in records from the CI Relationship [cmdb_rel_ci] table. CIs in which [parent.sys_class_name=(empty)] OR [child.sys_class_name=(empty)], are counted as orphan CIs.

The Orphan CIs tile shows the total number of orphan CIs, correlating the darker portion of the metric bar. Select the tile to drill down to the list all those CIs.

To manage a potential performance impact, other than deactivating the metric, you can limit the performance impact by adjusting the following performance management columns for the metric in the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table. For this metric, those columns are set with the following default values:

- *`Aggregate limit`*: 1,000
- *`Fail count threshold`*: 3
- *`Runtime threshold`*: 3,600

For more information about these columns, see Performance management in Monitor system foundations in the CSDM and the CMDB Data Foundations Dashboards.

Handled Duplicate CIs

Percentage of duplicate CIs of the Hardware or VMware Virtual Machine Instance classes, that were remediated, up to 200. If the number of unhandled duplicate CIs is greater than the upper threshold of 200, then is set to 0. The metric is based on the following conditions:

- Class is an instance of the Hardware [cmdb_ci_hardware] or the Virtual Machine Instance [cmdb_ci_vm_instance] class.
- Status = installed
- Operational status = operational
- Duplicate_of in not empty

Non-compliant CIs are counted as those CIs that satisfy all conditions. Non-compliant CIs are those Hardware [cmdb_ci_hardware] or Virtual Machine

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Instance [cmdb_ci_vm_instance] duplicate CIs that were not remediated. For more information, see Duplicate CIs remediation.

The percentage score for this metric is calculated as follows:

- If count of non-compliant CIs is > 200 then percent is 0
- If count of non-compliant CIs is < 200 then percent is (200-count of non-compliant CIs)/200*100

The Unhandled Duplicate CIs tile shows the total number of CIs which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Installed Server CI Naming Reflecting Hostname

Percent of Server CIs where name reflects the host name, up to the first period in the name. The complete set of CIs for the metric are all the servers in the Server [cmdb_ci_server] table in which *install_status*=1 and *host_name* is not empty.

Examples of compliant CIs:

- Server Name is “abc”, and host name is “abc.1.2.3”
- Server Name and host name are the same

The percentage score for the metric is calculated as (Compliant CIs/Total CIs)*100.

The Installed Server CI Naming Not Reflecting Hostname tile shows the number of Server CIs which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Note:
If you need to manually refresh the Installed Server CI Naming Not Reflecting Hostname widget, then you must first run the CMDB Get Well Metric Collection job, and then run the CMDB Data Foundations PA Metric Collection job.

Managed CIs with Model Entries

Percentage of Hardware [cmdb_ci_hardware] CIs with a model ID versus those CIs without.

The complete set of CIs for this metric consists of all the CIs in the Hardware [cmdb_ci_hardware] table. Compliant CIs are those in which *model_id* is populated.

The Managed CIs Missing Model Entries tile shows the total number of CIs which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Servers with Location

Percentage of Server CIs in which *Location* is populated versus Server CIs in which *Location* isn't populated. The complete set of CIs for this metric are the Server CIs in the Server [cmdb_ci_server] table in which install_status =1 and operational_status=1. Compliant CIs are those CIs in which also location is not null.

The percentage score for the metric is calculated as (Compliant CIs/Total CIs)*100.

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The Servers Missing Location tile shows the number of Server CIs which are not in compliance with the metric. Those are the Server CIs in which *Location* is empty. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Unique Locations

Percentage of unique locations versus non-unique (duplicate) locations.

The complete set of locations for this metric consists of all the locations in the Location [cmn_location] table records, in which *name* is not null. A duplicate location is counted as a record in which *name* is not null, and the same name is used more than once.

The percentage score for the metric is calculated as (Compliant CIs/Total CIs)*100.

The Duplicate Locations tile shows the total number of CIs which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Note:
If you need to manually refresh the Installed Server CI Naming Not Reflecting Hostname widget, then you must first run the CMDB Get Well Metric Collection job, and then run the CMDB Data Foundations PA Metric Collection job.

ITSM Processes metrics

The **ITSM Processes** tab contains the following metrics:

Changes Referencing a CI

Percentage of change requests with a reference to CIs versus those change requests without. The complete set includes all change requests created in the last 90 days. Compliant records are those change requests in which the *cmdb_ci* field is not empty.

The percentage score for the metric is calculated as (Compliant change requests/ Total change requests) * 100.

The Changes Not Referencing a CI tile shows the total number of records which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those change requests.

Note:
Viewing all the data provided by Performance Analytics for this metric (when drilling down), requires the additional role of itil or sn_change_read.

Changes Relating to both a Service and a CI

Percentage of changes relating services to CIs versus those changes that don't. The complete set of CIs for this metric consists of all change request records. Compliant records are those change requests in which both, the *cmdb_ci* and the *business_service* fields, are not empty.

The Incidents Relating to Neither a Service nor a CI tile shows the total number of records which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

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Note:
Viewing all the data provided by Performance Analytics for this metric (when drilling down), requires the additional role of itil or sn_change_read. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Incidents Referencing a CI

Percentage of incidents referencing a CI versus those incidents that don't. The complete set of records includes all incidents created in the last 60 days. Compliant incidents are all those in which the *cmdb_ci* field is not empty.

The percentage score for the metric is calculated as (Compliant Incidents/Total Incidents)*100.

The Incidents Not Referencing a CI shows the total number of incidents which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those incident records.

Note:
Viewing all the data provided by Performance Analytics for this metric (when drilling down), requires the additional role of itil or sn_incident_read.

Incidents Relating to both a Service and a CI

Percentage of incidents relating to both a service and a CI versus those incidents that don't. The complete set for this metric is all incident created in the last 60 days. Compliant records are those incidents in which both, the *cmdb_ci* and the *business_service* fields, are not empty.

The percentage score for the metric is calculated as (Compliant Incidents/Total Incidents) * 100.

The Incidents Relating to Neither a Service nor a CI shows the total number of records which are not in compliance with the metric, correlating the darker-shaded portion of the metric bar. Click the tile to drill down the PA widget for further details, such as the list all those incident records.

Note:
Viewing all the data provided by Performance Analytics for this metric (when drilling down), requires the additional role of itil or sn_incident_read. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

CSDM Data Foundations dashboard

The CSDM Data Foundations dashboard displays key CSDM indicators on a single page to help you get the full benefit from your ServiceNow AI Platform products.

Access the dashboard

Use either of the following methods to open the dashboard:

Navigate to **All** > **Configuration**, and then select **CSDM Data Foundations Dashboard**.

1. In CMDB Workspace, navigate to **Workspaces** > **CMDB Workspace**.
2. Select **Management** in the CMDB Workspace menu bar.
3. Select **CSDM Data Foundations Dashboard** in the Optimize section of the Management tools.

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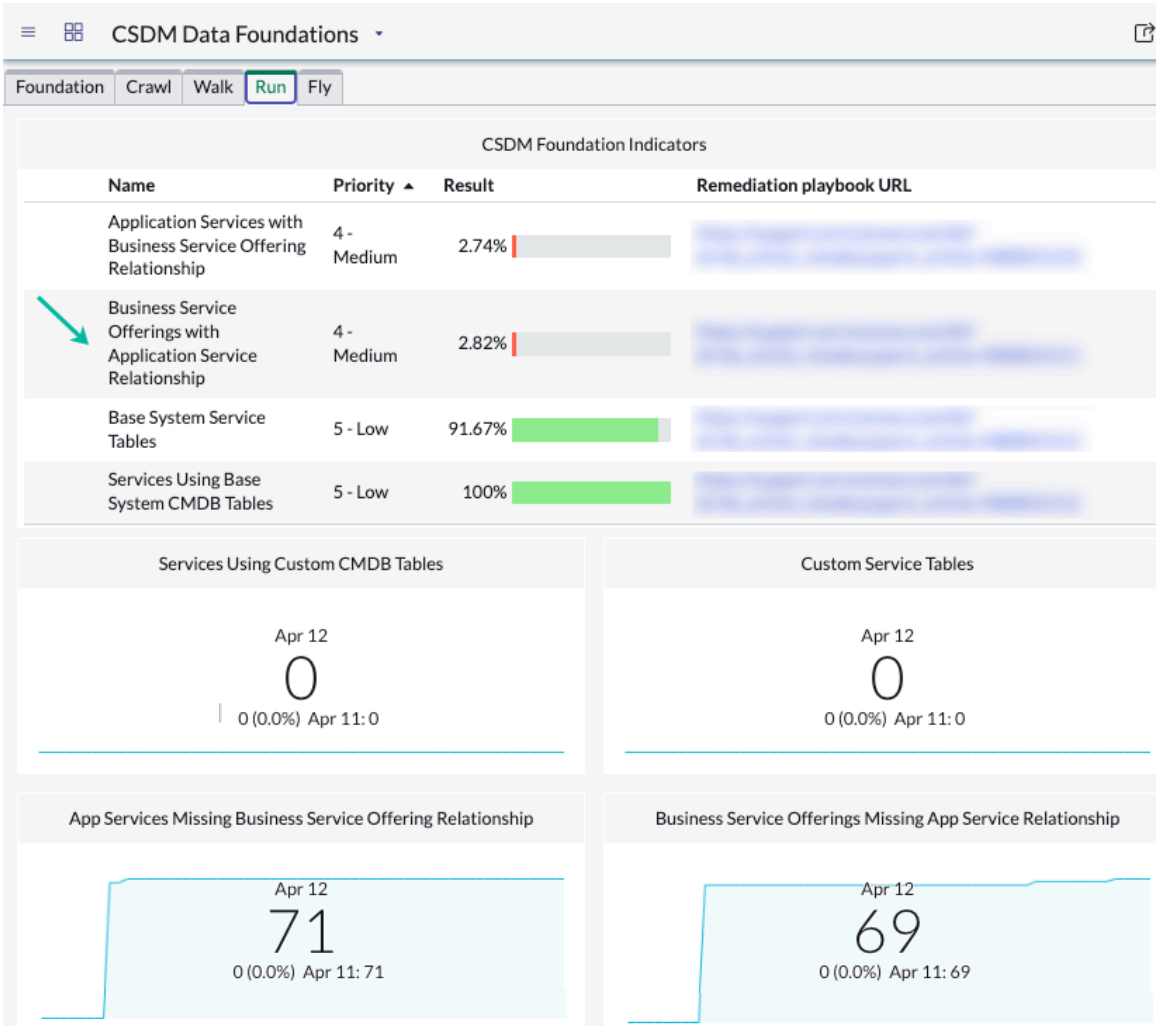
Select the change dashboard icon ( ) to toggle between the CSDM and CMDB dashboards.

Example

The reports on each tab display the data metrics that are appropriate for the maturity of your organization's CSDM implementation stage (foundation, crawl, walk, run, and fly). A label on each report identifies the metric being displayed.

In this example, a report on the **Run** tab indicates that several business service offerings don't have the required relationships to application services. With this knowledge, Service owners can add the relationships to ensure that customer service agents get complete information on the upstream impacts of applications that are down.



Tabs on the dashboard

- The Foundation domain involves tables that contain base data that is referenced from or to objects in the other CSDM domains. Foundation data is required before you can use ServiceNow products or add data to the CMDB. See 'Foundation' stage reports on the CSDM Data Foundations dashboard.
- In the Crawl stage, you work on base-system CMDB tables that are associated with IT Service Management (ITSM). See 'Crawl' stage reports on the CSDM Data Foundations dashboard.

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- In the Walk stage, you identify and populate the network infrastructure CIs and applications that your organization's technical teams support. See 'Walk' stage reports on the CSDM Data Foundations dashboard.
- In the Run stage, you set up the relationship between a technology and the business that sells and/or consumes the technology. See 'Run' stage reports on the CSDM Data Foundations dashboard.
- When you reach the Fly stage, you've accomplished all or most of the process of implementing the CSDM framework. The fly stage completes the process. See 'Fly' stage reports on the CSDM Data Foundations dashboard.

Managing performance of data collection

The system runs scheduled jobs that collect data for three CSDM metrics:

- App services that are missing a business app relationship
- Business apps that are missing an app service relationship
- App services where the relationship to business apps is not `Consumed by`

To ensure optimum performance, the system stops collecting data for some metrics when a specified number of non-compliant CIs is discovered. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

Related topics

Configure the CSDM Data Foundations dashboard

Monitor system foundations in the CSDM and the CMDB Data Foundations Dashboards

CMDB Health

Monitoring and maintaining the health of the CMDB is essential to an effective and continuous use of the product. Health indicators such as duplicate CIs, required CI fields, and audits contribute to the calculation of health scorecards at the CI, class, and CMDB level.

Note:
CMDB Health doesn't support non-CMDB tables.

The health of the CMDB data is monitored and reported for the following KPIs, each further consisting of sub metrics:

- Completeness: CIs are tested for required and recommended fields that are not populated.
- Correctness: CIs are tested against pre-defined data integrity rules such as identification rules (to detect duplicate CIs), orphan CI rules, and stale CI rules.
- Compliance: The CMDB data is audited for adherence to pre-defined certificates.
- Relationships: The health of CI relationships is tested for indicators such as orphan and duplicate relationships. And for compliance with suggested relationships, hosting and containment rules.

After CIs are tested for various health indicators, the results are aggregated at the class level, and eventually at the overall CMDB level. You can configure how health is calculated and the weight of each KPI and each metric at every level of the aggregation. For most health tests, you can configure the health tests themselves.

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CMDB Health experience in CMDB Workspace

You can use the CMDB Workspace landing page and its views to access CMDB health details that are based on CMDB Health activities and aggregations. For example:

- Use the Important actions tile on the landing page to access cards with CMDB Health-related tasks such as de-duplication tasks.
- Use the CMDB Health tile to see overall health metrics for CIs and relationships, to navigate to the CMDB Health and CMDB Relationship Health dashboards, and to drill down to more health details for specific CIs.
- Use tiles throughout the CMDB Workspace to drill down to health overviews of specific CIs.

CI remediation

CMDB Health provides a framework for configuring CI remediation. Remediation lets you proactively apply corrective actions to unhealthy CIs in a managed and standardized fashion.

Domain separation

CMDB Health is domain aware. If the domain separation plugin has been activated, then the CMDB dashboard displays health based on data, rules, and settings from the logged-on user domain. If rules and settings are not defined for a child domain, then the parent's settings are applied, recursively.

Metric tests from the global domain propagate to subdomains. However, subdomains can have their own local metric tests which override the global domain tests. Up until the San Diego release, subdomain local metric tests were applied to the subdomain CIs and also to the global domain CIs (which are visible on subdomains). Global domain CIs that failed metric tests of local subdomains, could have generated large amounts of data due to duplicated data.

Starting with the Tokyo release, CIs in the global domain are evaluated only against metric tests specified in the global domain. In subdomains, local metric tests are applied only to the CIs in that subdomain and are not applied to the global domain CIs (even though the global domain CIs are visible in the subdomain). Health results for CIs in the global domain appear on subdomains and health results on subdomains reflect this new behavior.

See Domain separation in CMDB Health for more information.

Setup

To start gathering and aggregating health data, you need to enable the CMDB Health-related jobs (CMDB Health Dashboard jobs) which are initially disabled. You also need to configure CMDB Health related system properties and health KPI and metric test rules, to customize how aggregated data is calculated and other CMDB Health behavior.

For all the details about setting up and configuring CMDB Health, see Set up and configure CMDB Health.

Domain separation in CMDB Health

This is an overview of domain separation as it pertains to CMDB Health. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Overview

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CMDB dashboards should be set up with their own set of rules to best accommodate how the user needs them. CMDB dashboard jobs adhere to those rules to produce reports. These are covered in separate sections below.

How domain separation works in CMDB Health

For dashboards to be the most effective, users should configure the dashboard accordingly. This is done by setting up the orphan, staleness, and inclusion rules to meet their needs, which then affect the reports displayed on the dashboard.

The settings and metrics define different aspects of each application because each domain can be configured differently. These rules are set up in addition to those that are included in the base system. There are different types of owners for different CIs; each domain has its own set of rules.

Metric tests from the global domain propagate to subdomains. However, subdomains can have their own local metric tests which override the global domain tests. Up until the San Diego release, subdomain local metric tests were applied to the subdomain CIs and also to the global domain CIs (which are visible on subdomains). Global domain CIs that failed metric tests of local subdomains, could have generated large amounts of data due to duplicated data.

Starting with the Tokyo release, CIs in the global domain are evaluated only against metric tests specified in the global domain. In subdomains, local metric tests are applied only to the CIs in that subdomain and are not applied to the global domain CIs (even though the global domain CIs are visible in the subdomain). Health results for CIs in the global domain appear on subdomains and health results on subdomains reflect this new behavior.

Note:
Domain separation is on by default, but each domain can be configured as needed.

Health Preferences

Configure these preferences during setup:

1. Global system properties that control CMDB Health – System properties are not domain separated. To learn more see CMDB Health system properties.

2. CMDB Health Dashboard Jobs – There is a dashboard job for each major KPI, such as Completeness. That job finds the health of the CIs across all the enabled domains. There is only one job run for all domains and jobs themselves are not domain separated.

   Users can define the frequency with which they want to run jobs; the report runs for all the domains. The more domains included in the job, the longer the job runs.

3. Health Metrics – These selections are domain-separated and adhere to the established "system overrides" logic of domain separation. Changes are made according to the domain for which the user is logged in. Base system values are defined at the global domain. The overriding domain logic means these values apply for all domains. If users want different values for a domain, they must be logged in to a specific domain and change the property from there. The new property setting applies only to that domain and any domain that inherits this domain. To learn more, see Health Metrics.

   Note:
   Regarding the Completeness, Compliance, and Correctness KPIs: Users can disable this KPI if they don't want to see that as part of the dashboard score. All these settings are domain-separated and the user can define specific properties for the domain.

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a. Weighted averages – These settings can affect all or part of the metrics in Completeness, Compliance, Correctness, and Relationship. They can be set differently for different domains.

b. Active – This setting is the most important because it affects how long the jobs run. The more domains with flags set to *Active*, the longer the jobs take. It's best to select only those domains you wish to be *Active* and render the rest as *Active* = **false**. You can set this in Health Preferences. The default settings for global domain are *Active* = **true**, but you can modify or disable specific domains the user wants to see in the dashboard. Users should consider the domain hierarchy when changing these values. If there is a large number of domains (>100) the job can take a very long time. To mitigate this, set *Active* to **false** for all the root domains, thereby disabling all the other domains in the hierarchy. If there is a rule at the top, all child domains inherit that rule.

c. *Failure Threshold*, *Create Task*, *Task Assignee Group* – All these settings can be set differently for different domains depending on what is needed in each domain.

d. Exceptions – For Relationship metrics (relationship, duplicate relations, orphan relations, stale relations) the failure threshold setting is not domain separated. The Failure Threshold for the global domain is applied to all domains. For example, even if users were to override the Failure Threshold for a domain, the global domain setting for Threshold is still applied.

e. Troubleshooting / Implementation detail – These settings are stored in the *cmdb_health_metric_pref* table, which is domain separated.

CMDB Health-related rules

See CMDB Health-related rules settings at:

- Required
- Recommended
- Orphan
- Staleness

Most of the CMDB Health-related rules are domain separated and provided by the users. Users can define different rules for different domains by logging in to each domain and adding/overriding rules in the CI Class Manager.

1. Completeness
   a. Required fields – These are based on the class schema defined in the platform's System dictionary and is fixed for all domains. These cannot be changed.
   b. Recommended fields – These are domain separated. The table used is `cmdb_recommended_fields`, which is domain separated. The user can set these up for different domains.
2. Correctness
   a. Duplicates – Duplicates are based on Identification rules, which are not domain separated, so the same rules apply to all domains.
   b. Orphan – Orphan rules are domain separated; there are different orphan rules for different domains. The table used is `cmdb_health_orphan_rule` and is domain separated.
   c. Staleness – Staleness rules are domain separated. The table used is cmdb_health_staleness_rule. The base system rule (60 days) is set for global domain so is inherited by all domains as the default rule.
3. Compliance

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Audit – Audit scores are based on the desired state or scripted audits defined in the compliance module by the user.Audits themselves are domain separated. When audit score evaluation is enabled for a domain, scores become based only on the audits visible in that domain.

Health inclusion rules:

- Health inclusion rules are domain separated. The rules are stored in the `cmdb_health_config` table which is domain separated.
- Each domain can have its specific health inclusion rules and domain-specific rules for each sub-metric.
- When a health inclusion rule is defined globally, all sub-domains inherit the rule according to the domain structure and the rule can be overridden at any domain.
- When a health inclusion rule is defined at the Configuration Item [cmdb_ci] class level, all descending classes inherit the rule and the rule can be overridden at any class level.

Health Dashboards (CMDB View/ Service View / Group View)

In general, CMDB Health dashboards are domain aware and show data according to the logged-on domain user. If a user is logged into a domain and views a health dashboard:

1. Only scores for enabled metrics in that domain display (based on the Health Preferences *`Active`* flag as discussed above).
2. All scores are based on CIs that are visible from the specific domain. (These are regular domain visibility rules: From that domain you can see CIs in global domain, the specific domain, any child domain of that domain or any domain that gets directly or indirectly contained by that domain.)
3. The dashboard view is based on domain rules defined in domain mapping, as opposed to those provided by the logged-in user. This view overrides any additional domain visibility rules that a logged-in user might have. The admin sets the basic rules, but does not set each individual domain. The admin can give specific users or user groups additional visibility to other domains and the dashboard still does not change. The dashboard strictly follows the domain rules mentioned above, based on the domain hierarchy for the domain in which the user is logged in.
4. As explained in the Health Preferences section, users can define different preference values for any domain which impact the scores reported in the dashboard. Preferences that can impact scores include **Weighted Averages**, **Failure Threshold**, and **Active**.
5. As explained in the CMDB Health Rules section, the scores reported for the metrics are based on the health rules defined for them (staleness, orphan, recommended, audit, and inclusion rules) which can be defined differently for a specific domain (in the CI Class Manager). Only the required metric and duplicate metric are based on rules that apply in all domains.
6. Service View/ Group View – These reports also largely follow the above points. Typically, these views differ from various views/filters for the Health Report. One is based off business rules, the other is based off CMDB Health groups.

Related topics

Domain separation and Configuration Management Database (CMDB)

Set up and configure CMDB Health

The data collection system is highly configurable, however, the base system is minimally configured for aggregating CMDB health data. Most importantly, the CMDB Health Dashboard

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jobs are disabled by default and data is not collected. To display valuable and meaningful data, you should review and adjust settings.

1. Review CMDB Health KPIs and metrics to learn what CMDB Health can monitor, and what needs to be configured to enable and support each metric.
2. For each KPI and associated metric that you want monitored, define the necessary rules and fulfill other needed requirements. For example, create orphan rules for detecting orphan records, if you are interested in this metric.
3. Review and adjust the threshold ranges for best, at risk, and critical states for the CMDB health metrics scorecards - see Configure CMDB Health scorecard thresholds.
4. Set metric aggregation preferences, deactivate KPI and metrics that you are not interested in reporting, set failure thresholds, and adjust weighted averages of aggregation - see Configure KPI and metrics aggregation preferences.
5. Narrow the scope of CIs that are included in health calculations - see Create health inclusion rule.
6. Enable the Health Dashboard jobs for the KPIs that you want reported - see Enable and configure a CMDB Health Dashboard job.
7. Customize the CI dashboard (optional).

CMDB Health system properties

Configure the following system properties to customize how CMDB Health is monitored and evaluated.

Role required: itil_admin

Note:
To open the System Property [sys_properties] table, enter *sys_properties.list* **in the navigation filter.**

Property	Description
Max time in minutes for which individual metric processor will run in each scheduled cycle [glide.cmdb.health.metricProcessor.maxRunningTime]	If processing of a metric exceeds the specified time, CMDB Health processing halts until the next CMDB Health job is scheduled to run. • Type: integer • Default value: 120 • Location: Navigate to **All** > **Configuration** > **Health Preference**. In the right hand-side navigator, click **System Properties**. For performance reasons, it is recommended not to set this property to a value greater than 120.

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Property	Description
	Note: If you enter an invalid value, the default value is used.

glide.cmdb.logger.use_syslog.CMDBHealth	A comma-separated list that controls the level of logging of CMDB Health jobs. Logging creates entries in the system logs to capture messages generated by the health auditing process each time they run. This logging helps debugging if there is a failure.
	
	For example, to log error and info messages, set the value to 'error,info'.
	
	• Type: String
	• Default value: error
	• Other possible values: Comma-separated list with any of the following values:
	
	  ○ info
	  ○ error
	  ○ warn
	
	  Or '*' which is equivalent to including all possible values.
	
	• Location: System Property [sys_properties] table.

glide.cmdb.health.src.cmdb_health_audit_only	When set to true, disables health results from sources other than CMDB Health audit (such as Cloud Discovery). Only results generated by CMDB Health audit appear for KPIs in the CMDB Health dashboard. For example, by default, if a CI is determined to be stale by Discovery, then that CI is counted as stale for the correctness KPI even though CMDB Health audit didn't determine that CI to be stale. However, in this case, drilling-down the stale CIs metric, still shows those CIs in which source is Cloud Discovery. • Type: true | false • Default value: false

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Property	Description

	• Location: System Property [sys_properties] table.
	• Learn more:
	  ○ CMDB Health KPIs and metrics
	  ○ Discovery for VMware vCenter

glide.cmdb.health.staleness_exclude_dependent_cis	Exclude dependent CIs for the staleness CMDB Health metric. When enabled, dependent CIs are not checked for staleness, regardless of any staleness or inclusion rules that are defined for the respective CI types. • Type: true | false • Default value: false • Location: System Property [sys_properties] table.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Enable and configure a CMDB Health Dashboard job

Enable and configure the jobs that process CMDB health tests, to start calculating CMDB health scores for the *completeness*, *compliance*, *correctness*, and *relationship* KPI. These health scores are then aggregated into the overall CMDB health report.

Before you begin

Role required: admin

About this task

In the base system, CMDB Health Dashboard jobs are disabled by default. Enable and configure the respective job for the CMDB health KPI that you want data collected and aggregated for. You can schedule a job to run on a recurring schedule, or execute it once at any time.

For more information about how CMDB Health Dashboard jobs work, see the Understanding the CMDB HealthDashboard Numbers blog post in the ServiceNow Community.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Dashboard** > **CMDB View**, and then click **CMDB Health Dashboard Jobs** .
2. Select a job that you want to enable or configure.

CMDB Health Dashboard job	Description
CMDB Health Dashboard - Completeness Score Calculation	Script for calculating the completeness KPI of CMDB health.

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CMDB Health Dashboard job	Description
CMDB Health Dashboard - Compliance Score Calculation	Script for calculating the compliance KPI of CMDB health.
CMDB Health Dashboard - Correctness Score Calculation	Script for calculating the correctness KPI of CMDB health.
CMDB Health Dashboard - Relationship Score Calculation	Script for calculating the CI relationships KPI of CMDB health.
CMDB Health Dashboard - Relationship Compliance Processor	Script for calculating compliance of relationships with suggested relationships, and with hosting and containment rules.

3. Review the default configuration, and update as necessary.

Field	Description
Name	Job name. Leave this field with the pre-populated name.
Active	Select to activate the job.
Conditional	If selected, the scripted condition must evaluate to true before the job can run.
Run	Configure the schedule for job execution, or select **On Demand** to run the job manually when needed. If **Active** is selected, then additional fields appear according to your choice. For example, **Repeat Interval** (when **Run** is set to **Periodically**), and **Time** for various settings of **Run**. Fill in the details to set precise running times.
Time zone	Local time zone.
Run this script	The job's script. **Note:** Changes to the script might result in unexpected behavior.

4. Click **Execute Now** to run the job once immediately.

Result

After you enable a CMDB Health Dashboard job, the results for the KPI are aggregated and displayed in the CMDB dashboard and CI dashboard, at the CMDB, class, and CI levels.

Related topics

CMDB Health Dashboard for Helsinki | Overview

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Configure CMDB Health scorecard thresholds

Configure the thresholds for best, at risk, and critical state definitions for the KPIs and metrics scorecards. You can configure these settings globally for the entire CMDB, or individually per class.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

Scorecard thresholds are used to determine overall metric state, and are defined by upper and lower thresholds. For example, scorecards thresholds for completeness:

- 0 - lower threshold: Best state
- Lower threshold - upper threshold: At risk state
- Upper threshold - 100: Critical state

In the base system, upper thresholds are set to 67 and lower thresholds are set to 33 for all KPIs and metrics. You can adjust scorecard thresholds to reflect the range of failures that should be used for each health state. Applying the change to a scorecard is based on the selected class in the CI Classes list:

- If the top level Configuration Item class is selected in the CI Classes list, changes to metric scorecards apply to the entire hierarchy.
- If any other class is selected in the CI Classes list, changes to metric scorecards apply to the selected class.

For CMDB groups, you can specify a separate set of scorecard thresholds, per CMDB group/KPI or metric. See Configure CMDB groups scorecard thresholds for more details.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to display the CI Classes list, and then select a class to set scorecards for.
3. In the class navigation bar, expand **Health**.
4. To configure the overall scorecard, select **Other Scorecards** and then select **Overall Scorecard**.
5. To configure a scorecard for any of the KPIs (such as Compliance), or for relationship-related metrics (such as duplicate relations):
   a. Select **configuration item** at the top of the **Hierarchy** list.
   b. Click a KPI item, **Completeness**, **Compliance**, or **Correctness**.
   c. Click the tab **CMDB Completeness Scorecard**, **CMDB Compliance Scorecard**, or **CMDB Correctness Scorecard**.
   When you select the top-level Configuration Item class, changes to threshold settings in any metric scorecard apply to the entire class hierarchy.
6. To configure a scorecard for any metric:
   a. In the CI Classes list, select the class to which the updated scorecard should apply to. Select the top level Configuration Item to apply the change to the entire hierarchy.
   b. Click the KPI that contains the metric for which you want to configure scorecard. For example, click **Completeness** to configure the Required Fields scorecard.

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c. Select the scorecard tab of the metric to configure, such as **Required Fields Scorecard**. You might need to click **New** to edit the scorecards.

7. Slide the threshold sliders, or enter specific numbers to increase or to decrease the threshold bars to fit your definitions for best, at risk, and critical levels for the scorecard.
8. Click **Save**.

Related topics

CMDB Health KPIs and metrics

CMDB Health Dashboard for Helsinki | Overview

Configure CMDB groups scorecard thresholds

Each CMDB group can have its unique set of scorecard thresholds for best, at risk, and critical state definitions for specific KPIs or metrics.

Before you begin

Role required: itil_admin (on top of itil)

About this task

Scorecard thresholds are used to determine overall metric state, and are defined by upper and lower thresholds:

- 0 - lower threshold: Best state
- Lower threshold - upper threshold: At risk state
- Upper threshold - 100: Critical state

In the base system, for all KPIs and metrics, upper thresholds are set to 67 and lower thresholds are set to 33. You can adjust scorecard thresholds for a specific CMDB group per KPI or metric, to reflect the range of failures that should be used in health reporting.

CMDB groups scorecard thresholds are stored in the [cmdb_health_scorecard_group_threshold] table.

Procedure

1. In the search box in the navigation bar, enter `cmdb_health_scorecard_group_threshold.list` and press the Enter key.
2. In the **CMDB Health Group Scorecard Thresholds** list, click **New**.
3. Fill out the form.

Field	Description
Upper threshold	Upper range of percentage of CIs failing the specified metric tests, that is used to calculate best and at risk states.
CMDB Group	The CMDB group to which this scorecard threshold setting applies to.
Lower threshold	Lower range of percentage of CIs failing the specified metric tests, that is used to calculate at risk and critical states.

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Field	Description
Metric	The metric to which the scorecard threshold setting applies to.

4. Click **Submit**.

Related topics

Configure CMDB Health scorecard thresholds

Configure KPI and metrics aggregation preferences

Metrics health scorecards are aggregated into their respective KPI, which in return are aggregated into the overall CMDB Health report. Set aggregation preferences for KPIs, and for each of their respective metrics, deactivate KPIs and metrics that you are not interested in reporting, and adjust weighted averages of aggregation.

Before you begin

To start collecting and reporting CMDB health KPIs and metrics, you must first enable and configure the CMDB health dashboard jobs.

Role required: itil_admin (on top of itil)

About this task

The completeness KPI for example, consists of the metrics *`required fields`* and *`recommended fields`*, each contributing a different weight to the sum. You can configure the proportional weight of required fields and recommended fields within completeness to be 25 and 75 respectively. You can also configure the proportional weight of completeness, compliance and correctness within the aggregated sum of the overall CMDB health.

Note:
Non-active KPI or metrics are displayed on the CMDB dashboard in faded coloring, displaying the most recent aggregations that were calculated when the KPI or metric was active.

If Domain Support - Domain Extensions is activated, then you can configure aggregation preferences per domain.

In the ServiceNow base system, the weights of KPIs have default settings, and metrics are globally set.

Procedure

1. Navigate to **All** > **Configuration** > **Health Preferences**.
2. Select **Health Metrics** on the right-hand side navigator.
3. From the **Select Metric** list select one of the KPIs such as **Completeness**, or a metric.

   For **Completeness**, **Compliance** and **Correctness**:

Field	Description
Active	Activate the KPI so it is included in the aggregated CMDB health report.
Weighted Averages	Specify the weight of each metric in the aggregated KPI health report. The sum of

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Field	Description
	weighted averages of all metrics should be 100.

For a metric:

Field	Description
Active	Activate the metric so it is included in the aggregated health report for the respective KPI.
Create Task	If a record fails the metric test, create a task with details about the failure. You can then view the task on the CI dashboard, and configure remediation for the task.
Failure Threshold	When the threshold number of CIs that fail the health metric test is reached, health processing stops for the metric for this cycle.
Task Assignee Group	An assignment group for the task.

4. Click **Save**.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Set a CI attribute to be mandatory

Configure a CI attribute as mandatory so it is included in the CMDB Health tests for the *required* metric if enabled. *Required* is a metric of the CMDB Health *completeness* KPI.

Before you begin

Role required:

- Itil_admin and personalize_dictionary: For editing the dictionary table
- itil has read access

About this task

When a field is configured as mandatory, then if the *required* metric is enabled, the CMDB health tests check whether that field is populated or not. The CMDB dashboard displays the aggregated report of the percentage of CIs for which one or more required fields is empty.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to display the CI Classes list.
   Then select the class with the field that needs to be set as mandatory.
3. In the class navigation bar, expand **Class Info** and then select **Attributes**.
   In the Attributes view, click **Added**.
4. Locate the attribute that you want to set as mandatory, and then double-click its **Mandatory** value and set it to true.

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The next time the form is opened, a field status indicator appears next to the field label, indicating that a value is mandatory.

Note:
Mandatory fields are global. The field is marked as mandatory everywhere it appears on a form. Also, mandatory fields do not appear correctly when using Service Mapping tag-based discovery. For more information, see Tag-based discovery in Service Mapping.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Make a field mandatory

Set a CI field to be recommended

Define a list of CI fields as recommended, noting that it is desirable that they are populated by a data source such as Discovery. You can then configure the CMDB completeness KPI to include recommended fields in its aggregated health reports.

Before you begin

Role required:

- Itil_admin and personalize_dictionary: For editing the dictionary table
- itil has read access

About this task

Use this procedure for fields which should not be mandatory, but that might have useful information that the CI should have. For example, a field with information that might at some point help with diagnosis. Initially, a derived class is set with the recommended fields that are defined at the parent level. You can add or remove recommended fields for a derived class, setting it with its own recommended fields, without affecting the recommended fields at the parent or sibling levels. If all recommended fields for a derived class are removed, then the derived class automatically derives the recommended fields from its parent class.

The CI Class Manager doesn't support dot-walking for selecting fields from referenced tables, as recommended. See the steps at the bottom for directly updating tables with recommended fields, where one level dot-walking is supported.

For more information about child and parent classes, see Table extension and classes.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list, and then select the class that contains the fields that need to be set as recommended.
3. In the class navigation bar, expand **Health**, select **Completeness**, and then select the Recommended Fields tab.
4. In the Recommended Fields tab, use the slushbucket to move the fields that you want to designate as recommended, from the **Available** list to the **Selected** list.
5. Click **Save**.

What to do next

You can see the list of recommended fields, per class, in the CMDB Recommended Fields [cmdb_recommended_fields] table.

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You can directly update the CMDB Recommended Fields table outside the CI Class Manager, where you can use dot-walking to designate a field from a referenced table, as recommended:

1. Select **All**.
2. In the Filter navigator, enter `cmdb_recommended_fields.list` to access the CMDB Recommended Fields table.
3. On the CMDB Recommended Field form, set **Table** to the table that you want to set with recommended fields.
4. Select **Recommended fields** and use the slushbucket to select recommended fields for the table. You can expand a reference field up to one level, and use dot-walking to select a field from a referenced table.
5. Select **Submit**.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Create or edit a CMDB Health orphan rule

Create an orphan rule to determine the percentage of orphan CIs in the CMDB. This sum is then aggregated into the correctness CMDB Health KPI, and weighed into the overall CMDB health report. Orphan rules are defined per class, and only a single orphan rule can be defined per class.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

Specify the conditions that CIs must meet to be considered an orphan CI. Specify attributes that a CI must have, relationships that a CI should not have, or both. In the relationship conditions, you can either specify that the CI has no relationships, or a set of specific relationships that the CI doesn't have.

Note:
If there is a health inclusion rule for the orphan metric, then the conditions in the health inclusion rule and the conditions in the health orphan rule, shouldn't be identical.

A health orphan rule can for example, identify a CI of the cmdb_ci_computer class as an orphan CI if the CI is not set with an owner or an asset.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list and then select the class for which to create an orphan rule.
3. In the class navigation bar, expand **Health**, select **Correctness**, and then select the Orphan Rule tab.
4. Select a rule to edit, if one exists, or select **New**, and then fill out the form.

Field	Description
Class	The class for which the orphan rule applies.
Attributes	Attribute conditions that a CI must satisfy to be considered an orphan CI. For example, the filter conditions in which both the

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Field	Description
	Assigned to and the *Owned by* fields are empty, will identify the matching CIs as orphans.
Condition	And/Or operation between the **Attributes** conditions and the **Relationship** conditions.
Relationship	The relationship conditions that a CI must fail,based on records in the CI Relationship [cmdb_rel_ci] table, in order to be considered an orphan CI. To specify that a CI must have no relationships, choose **Any Relation** and **Any Class** respectively.

5. Select **Submit** or **Update** to save the rule.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Create or edit a CMDB Health staleness rule

If the staleness metric is in effect, then staleness rules are used to determine the percentage of stale CIs in the CMDB. This sum is then aggregated into the correctness KPI, and weighs into the overall CMDB health calculation.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

The Discovery setting of certain types of CIs as stale takes precedence over a CMDB Health staleness rule defined for the CI. For more information about Discovery marking CIs as stale, see Discovery for VMware vCenter.

Staleness rules are defined per class. If a rule isn't defined for a class, then the parent's rule is automatically derived by the child class and applies for the child class. If later a staleness rule is defined at the child class level, it overwrites the staleness rule that was derived from the parent class.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list and then select the class for which to create a staleness rule.
3. In the class navigation bar, expand **Health**, select **Correctness**, and then select the Staleness Rule tab.
4. Select a staleness rule to edit or select **New**, and then fill out the Staleness Rule form.

Field	Description
Applies to	The class for which the rule applies.

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Field	Description
Effective Duration	The time period that is used for the staleness test. If the CI was not updated (based on Updated *sys_updated_on*) within the specified time period — the CI is determined to be stale. If you enter a value with a prefix that is valid and a suffix that is not, such as `15 x` — the valid portion of the value is used ('15'). If the entire value is invalid — the value is ignored and the previous valid value is used.

5. Select **Submit** or **Update** to save the rule.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Create health inclusion rule

Filter the CIs that are included in health calculations and that appear in CMDB health dashboards by defining health inclusion rules. Health inclusion rules can be specified per domain.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

Evaluation for the required, orphan, recommended, duplicate and staleness health metrics, will apply only to CIs that satisfy health inclusion rules. For example, if you want scores of the duplicate metric to appear only for server and network CIs.

Note:

- Creating health inclusion rules at the level of the base cmdb_ci table can potentially filter out health results of all classes in CMDB health dashboards.
- Applying a health inclusion rule to the duplicate metric, is supported only in the global domain.
- Due to performance issues, dot-walking in health inclusion rules for the duplicate metric is not supported.

In addition to any health inclusion rules, identification inclusion rules also indirectly impact what appears in CMDB health dashboards for duplicate CIs. The dashboard itself uses the identification engine (IRE) to identify duplicate CIs and therefore identification inclusion rules are applied.

Inheritance of health inclusion rules:

- If there are no health inclusion rules specified for a child class, then rules specified on a parent class are applied to the child class.
- If health inclusion rules are specified for a child class, then those rules take precedence over rules specified on a parent class.

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In the base system, there are no predefined health inclusion rules, in which case all CIs are included in the CMDB Health calculations.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to display the CI Classes list.
3. Select the class for which to create a health inclusion rule.
4. In the class navigation bar, expand **Health** and then click **Health Inclusion Rules**.
5. Click an existing rule to edit or click **New** and then fill out the Health Inclusion Rules form.

Field	Description
Applies to	Class this rules applies to.
Active record condition	Criteria that CIs must meet to be included in the evaluation for the specified health metrics.
Applies to metric	Metrics that the rule applies to.

6. Click **Save** or **Update**.

What to do next

You can delete a health inclusion rules that is no longer needed by selecting that rule, and then on the CMDB Health Configuration form, selecting **Delete**.

CMDB Health KPIs and metrics

The overall CMDB health score consists of three Key Performance Indicators (KPIs) which are correctness, compliance, and completeness, each further consisting of sub-metrics. Each KPI and metric is associated with a scorecard that determines its contribution to the aggregated health at the overall CMDB level, class, and CI level.

You can configure which KPIs and metrics are included in the aggregated calculation, and set their weight in the aggregation. In the base system, all KPIs and all metrics are included in the aggregated health report.

Overall

An aggregation of all three KPIs (correctness, completeness and compliance), according to their overall scorecard weight settings.

Correctness

A KPI which is an aggregation of the following metrics, according to the correctness scorecard weight settings.

Orphan

Measures the percentage of orphan CIs in the CMDB. A CI can become orphan if it was unintentionally left in the CMDB when it is no longer needed. A CI is determined to be orphan if:

- The CI satisfies the criteria in an orphan rule. This criteria checks for specific attributes that a CI must have, and for CIs that have no relationships or that don't have specific relationships.
- Data is missing for the CI in its respective table, or in one of its parents' table.

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Staleness

Measures the percentage of stale CIs in the CMDB. A CI is stale if it was not updated within the **Effective Duration** time period that is specified in the staleness rule that applies to the class.

The base system includes a default staleness rule for the Configuration Item [cmdb_ci] class, which sets the **Effective Duration** time to 60 days. This rule applies to all extended CMDB classes, and can be overridden by class specific staleness rules defined by the user. To determine CI staleness, a staleness rule for the CI's class is used if it exists, otherwise, the default staleness rule is used.

In addition, a relationship in which a stale CI is a parent or a child, is determined to be a stale relationship.

Note:

Discovery marks VMware vCenter CIs that no longer physically exist, as stale. By default, this setting takes precedence over a CMDB Health staleness rule defined for the CI. When drilling-down in the CMDB dashboard to Health Results, the **Source** for CIs determined to be stale by Discovery, is Cloud Discovery.

For the aggregated score of the correctness KPI to include only health results generated by CMDB Health, set the *glide.cmdb.health.src.cmdb_health_audit_only* system property to **true**. In which case, drilling-down to the details of stale CIs still shows those CIs in which source is Cloud Discovery. For more information, see CMDB Health system properties and Discovery for VMware vCenter.

Duplicate

Measures the percentage of duplicate CIs in the CMDB using identification rules. Only independent CIs are evaluated for duplication. In a set of duplicate CIs, the count of duplicate CIs is the total number of CIs in the set, minus one. The detailed graphs for a duplicate set of CIs display all the CIs in the set.

For more details, examples, and troubleshooting information about duplicate metric, see the CMDB Health - Duplicate Metric - algorithm [KB0726425] knowledge base article.

Completeness

A KPI which is an aggregation of the following metrics, according to the completeness scorecard weight settings.

Required

Measures the percentage of CIs in which fields that are defined as mandatory, are not populated. Missing fields are tagged as incomplete noting that for this CI some information is missing. Required fields are equivalent to the fields that are specified as mandatory in the system dictionary.

Recommended

Measures the percentage of CIs in which fields that are set as recommended, are not populated. Out-of-box, no recommended fields are specified.

You can use the Add Identifier Fields In Recommended Rules scheduled job to set criterion attributes from active identification rules, as recommended fields. You can

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use the Remove Identifier Fields In Recommended Rules scheduled job to unset criterion attributes from active identification rules, as recommended fields.

Compliance

Based on the results of actual CMDB audit runs.

Note:
Audit must be activated for the compliance KPI to show results. For more information, see Compliance Activation.

Audit

Audit compares actual values of specified fields, against expected values defined in template and scripted audits. Based on the *Last run date* of audits, CMDB Health identifies the set of the most recent complete audit run, and uses those audit results. To pass the CMDB Health audit test, a CI must be in compliance with all audits for that CI. Create a compliance-type audit, for which the results are calculated into the CMDB Health compliance KPI.

When running scripted audits, the *Last run date* is not populated. Therefore, for the compliance KPI to include the results of a scripted audit, update the script in the audit to record the audit run time.

Relationships

Measures the health of CI relationships, consisting of the following metrics which are not-configurable:

Duplicate relationships

Relationships that have identical parent and child CIs, identical relationship type, and an identical port. Duplicate relationships are displayed per relationship type. In a set of duplicate relationships, the duplicate relationship count is the total number of duplicate relationships in the set, minus one. The detailed graphs for a duplicate set of relationships display all the relationships in the set.

Orphan relationships

A relationship that is missing either a parent CI, a child CI, or both.

Stale relationships

A relationship in which the parent CI or the child CI is a stale CI.

A single relationship can fail more than one health test. For example, a duplicate relationship can also be stale.

Also reports the following relationship-related summaries:

- Relations not compliant with suggested relations
- Relations not compliant with containment rules
- Relations not compliant with hosting rules

Related topics

CMDB Health system properties

Configure KPI and metrics aggregation preferences

Configure CMDB Health scorecard thresholds

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CMDB Health dashboards

CMDB dashboards display CMDB health reports and let you configure the CMDB health KPIs and metrics that CIs are evaluated for.

Dashboard	Use
CMDB Dashboard **Configuration** > **CMDB Dashboard** > **CMDB View**	Main CMDB health dashboard: • Overall CMDB and class level aggregated CI health. Aggregation is displayed from the metric level up to the overall CMDB level. • Aggregated health for CI relationships, and its metrics. • Displays the tasks that were generated for CIs that failed a health test. • Drill down for each KPI to a detailed report of associated metrics, broken by class. • Manage the CMDB Health Dashboard jobs. Video: CMDB Health dashboard
CI Dashboard **<CI form>** > **Dashboard**	Health reports at the CI level: • Pass/fail results for each metric, per CI. • Displays incidents, changes, and other tasks affecting the CI, and business services affected by the CI.
CI Class Manager **Configuration** > **CI Class Manager**	Central location to manage CI classes and to configure CMDB health settings: • Configure scorecard thresholds of all KPIs and associated metrics. • Configure weight of KPIs and associated metrics in health aggregation. • Manage rules and definitions that are used for health tests, such as orphan rules, audit certificates, and recommended fields rule. • Explore the class hierarchy. • Update and extend a CI class. • Delete all records for a class.
CMDB Health Preferences **Configuration** > **Health Preferences**	Central location for configuring CMDB Health settings: • Configure CMDB Health preferences. • Manage the CMDB Health Dashboard jobs. • Activate and configure weighted averages for KPIs and metrics.

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Dashboard	Use
	• Set the maximum failure threshold for the KPIs. • Configure creation of tasks for failed CIs.
CMDB Service Dashboard **Configuration** > **CMDB Dashboard** > **Service View**	Main CMDB service health dashboard: • Overall service aggregated health and detailed health for CIs per service. Aggregation is displayed from the metric level up to the overall services level. • Displays the tasks that were generated for CIs in a service that failed a health test. • Drill down for each KPI to a detailed report of associated metrics, broken by class. • Manage the CMDB Health Dashboard jobs.
CMDB Group View Dashboard **Configuration** > **CMDB Dashboard** > **Group View**	Main CMDB groups (whose type is Health) dashboard: • Overall CMDB health groups aggregated health and detailed health for CIs in the group. Aggregation is displayed from the CI level up to the overall group level. • Drill down for each KPI to a detailed report of associated metrics, broken by class. • Manage the CMDB Health Dashboard jobs.

View CMDB health reports

The CMDB dashboard serves as a central location to view aggregated health reports for your CMDB at a glance which helps you understand the CMDB health status. Also, it provides functions to address health issues, and improve CMDB health.

The CMDB dashboard requires some configuration before it can display meaningful data. Once CMDB Health is configured and the CMDB Health Dashboard Jobs are enabled, the dashboard displays data that is automatically collected and calculated on a recurring schedule. The CMDB dashboard uses the Performance Analytics framework for dashboards and employs some of the capabilities it provides. The CMDB dashboard is domain aware.

Using the CMDB dashboard requires the asset or itil role.

For information, see:

- Sharing responsive dashboards (**Sharing**), see Share a responsive dashboard.

  Note:
  Only users with the itil role can view a CMDB dashboard which has been shared.

- How score cards in CMDB Health dashboards are calculated, see CMDB Health Dashboard Score Card Explained [KB0829828].

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Access and configuration

Access the CMDB dashboard by navigating to **Configuration** > **CMDB Dashboard** > **CMDB View**. On the CMDB dashboard:

- Click **CMDB Health Dashboard Jobs** to enable and manage the jobs that monitor and collect health data for CIs and CI relationships.
- Click the default **CMDB Dashboard - CMDB View** dashboard to list additional CMDB drill-in dashboards.

The CMDB dashboard has two viewing modes. Click **CI Health** or **Relationship Health** to toggle between them.

CMDB Health view

The CMDB Health view is the default view for the CMDB dashboard which contains:

- Scorecards detailing the overall health of CIs in your CMDB, per health KPI and metric
- Useful reports showing a breakdown of any duplicate, orphan, or stale CIs by class
- Widgets that list the top 10 incident, alert, and change generating CIs in the CMDB

All the default widgets in the CI Class view can be filtered using the CMDB class hierarchy tree. Initially, the class hierarchy filter is set to the root class, Configuration Item (All). Click **All** to select a different class, filtering all widgets on the dashboard to display data only for the selected class and its child classes.

In each scorecard widget, the horizontal bar in the center and the % number are correlated, displaying the aggregated health summary for the KPI. Health results of associated metrics are displayed underneath, each contributing according to the configuration of the metric scorecard, and its threshold.

Except for the Overall health scorecard, you can drill into any widget in the CI Class view:

- In a scorecard widget: Click the large aggregated percent number or the health bar to drill into a more detailed dashboard for that KPI.
- In a charts widget: Click a bar to display a list of all the records that the bar represents.
- In lists: Click the ‘i’ icon to view a list of all the tasks or alerts related to the CI.

For more details about the CMDB Health dashboard, see the CMDB Health Dashboard Score Card Explained knowledge base article.

Relationship Health view

The Relationship Health view displays various scorecards for health indicators of CI relationships in your CMDB. It contains charts detailing any duplicate, orphan or stale relationships, broken down by relationship type. You can drill down these charts for further details.

Changing the CI Class selection while in the Relationship view has no effect on the data displayed in this view.

Color codes

Both, the CI class view and the relationship view, use color codes when displaying aggregated health status. The status definitions are based on each scorecard’s threshold limits that are defined in the CI Class Manager.

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Color code	Definition	Default threshold setting
Green	Best	Less than or equal to 33
Orange	At risk	More than 33 and less than or equal to 67
Red	Critical	More than 67
Gray	Incomplete	N/A

Note:

The icon indicates that the maximum failure threshold for the scorecard has been reached. The tests for the metric are halted for this cycle, and all associated aggregated summaries are 0%. Review the scorecard rules which might be ineffective, or the CMDB might be in an unstable state.

Dashboard layout configuration

The CMDB dashboard uses some of the capabilities that Performance Analytics provides for responsive dashboards. You can, for example, add or remove widgets from the layout.

For information about adding a widget (**Add Widgets**) and changing other layout settings such as adding a tab (**Create Tab**) to the dashboard, see Edit a dashboard. The drop-down that appears when adding a widget, includes CMDB-related widgets that are used in CMDB dashboards and other system widgets which are typically not relevant in CMDB reports.

Domain separation

If the Domain Support — Domain Extensions Installer plugin is activated, then the CMDB dashboard is domain aware:

- The CMDB dashboard aggregates and reports health failures and scores based on user's domain visibility of CIs. If domain visibility lets a user see a CI, then the audit rule in that user's domain applies to that CI, whether the CI is in the user's domain or in a contained domain. If a CI fails health tests from different user domains, then separate failure records are created.
- Users can configure KPI and metric settings specific to the needs in their domain. So different domains can have different settings such as active/inactive, and thresholds.
- A child domain derives its immediate parent's domain health configurations if the child domain does not configure its own. A child domain can override parent's configurations by modifying them.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Working with responsive dashboards

View services health reports

The CMDB service dashboard serves as a central location to view aggregated health reports for services at a glance. Also, it lets you drill into a service to perform remediation actions that address health issues, and that improve CMDB health. The CMDB service dashboard uses the Performance Analytics framework for dashboards and employs the capabilities it provides.

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Requirements

- The Event Management and Service Mapping Core plugin must be activated.
- Role required: asset or itil.

Configuration

The CMDB service dashboard requires some configuration before it can display meaningful data, using the same settings as the CMDB dashboard. The CMDB service dashboard uses the settings for the *Business Service*, *Manual Service*, and *Technical Service* classes. For each CI that is included in a service, the rule settings of its respective class are applied. You can customize these settings in the CI Class Manager, and on the CMDB Health Preferences page. Once CMDB Health is configured and the CMDB Health Dashboard Jobs are enabled, the CMDB service dashboard displays data that is automatically collected and calculated on a recurring schedule.

Note:
The CMDB service dashboard doesn't include all services from the Service [cmdb_ci_service] table. Only services from the cmdb_ci_service_auto table and its descendants (cmdb_ci_service_discovered, cmdb_ci_service_manual, cmdb_ci_query_based_service), are included.

The glide.cmdb.services_hierarchy_limit system property limits the number of service CIs that appear in the CMDB service dashboard. This limit applies to any child class of the Application Services [cmdb_ci_service_auto] class and is set to 10,000 by default.

Domain separation

CMDB Health is domain aware. If domain separation has been activated, then the CMDB service dashboard displays health based on data, rules, and settings from the logged-on user domain. If rules and settings are not defined for a child domain, then the parent's settings are applied, recursively.

Access

Access the CMDB service dashboard by navigating to **Configuration** > **CMDB Dashboard** > **Service View**.

Report details

The CMDB service dashboard displays aggregated health for services, and also details for individual services. For a specific service, the CMDB service dashboard displays aggregated health for all the CIs in that service, including the service CI itself. Also it provides useful reports about service classes such as the *Business Service* class. You can drill down those reports to display further details of duplicate, orphan, or stale CIs per service and lists of the top 10 incident, alert, and change generating CIs in the service.

All default widgets can be filtered using the CMDB service hierarchy tree. Initially, the service hierarchy filter is set to **Business Service**. Click **Business Service** to expand it and to select a different class, filtering all widgets on the dashboard to display data only for the selected class, its child classes, or services of that class.

In each scorecard widget, the horizontal bar in the center and the % number are correlated, displaying the aggregated health summary for the KPI. Health results of associated metrics are displayed underneath, each contributing according to the weight configuration of the metric scorecard, and its threshold.

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With the exception of the Overall health scorecard, you can drill into any widget in the service dashboard:

- In a scorecard widget: Click the large aggregated percent number or the health bar to drill into a more detailed dashboard for that KPI.
- In a charts widget: Click a bar to display a list of all the records that the bar represents.
- In lists: Click the 'i' icon to view a list of all the tasks or alerts related to the CI.

Color codes

The CMDB service dashboard uses color codes when displaying aggregated health status. The status definitions are based on the threshold limits for each scorecard, defined in the CI Class Manager.

Color code	Definition	Default threshold setting
Green	Best	Less than or equal to 33
Orange	At risk	More than 33 and less than or equal to 67
Red	Critical	More than 67
Gray	Incomplete	N/A

The  icon indicates that the maximum failure threshold for the scorecard has been reached. The tests for the metric are halted for this cycle, and all associated aggregated summaries display 0%.

Related topics

View CMDB health reports

View CMDB groups health reports

View CMDB groups health reports

The CMDB group view dashboard serves as a central location to view aggregated health reports for CMDB groups at a glance. Also, it lets you drill into a CMDB group to perform remediation actions that address health issues, and that improve CMDB health. The CMDB group view dashboard uses the Performance Analytics framework for dashboards and employs the capabilities it provides.

Configuration

The CMDB group view dashboard requires some configuration before it can display meaningful data, using the same settings as the CMDB dashboard. For each CI that is included in a CMDB group, the rule settings of its respective class are applied. You can customize these settings in the CI Class Manager, and on the CMDB Health Preferences page. Once CMDB Health is configured and the CMDB Health Dashboard Jobs are enabled, the CMDB group view dashboard displays data that is automatically collected and calculated on a recurring schedule.

CMDB Health is domain aware. If domain separation has been activated, then the CMDB group view dashboard displays health based on data, rules, and settings from the logged-on user domain. If rules and settings are not defined for a child domain, then the parent's settings are applied, recursively.

Role required: asset or itil.

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Access

Access the CMDB group view dashboard by navigating to **Configuration** > **CMDB Dashboard** > **Group View**. Then, select a CMDB group from the **CMDB Health Group List** drop-down list.

Report details

For each CMDB group, the CMDB group view dashboard displays aggregated health for all the CIs in that group. You can drill down those reports to display further details of duplicate, orphan, or stale CIs per CMDB group. In each scorecard widget, the horizontal bar in the center and the % number are correlated, displaying the aggregated health summary for the KPI. Health results of associated metrics are displayed underneath, each contributing according to the weight configuration of the metric scorecard, and its threshold.

With the exception of the Overall health scorecard, you can drill into any widget in the CMDB group view dashboard:

- In a scorecard widget: Click the large aggregated percent number or the health bar to drill into a more detailed dashboard for that KPI.
- In a chart widget: Click a bar to display a list of all the records that the bar represents.
- In lists: Click the 'i' icon to view a list of all the tasks or alerts related to the CI.

Color codes

The CMDB group view dashboard uses color codes when displaying aggregated health status. The status definitions are based on the threshold limits for each scorecard, defined in the CI Class Manager.

Color code	Definition	Default threshold setting
Green	Best	Less than or equal to 33
Orange	At risk	More than 33 and less than or equal to 67
Red	Critical	More than 67
Gray	Incomplete	N/A

The  icon indicates that the maximum failure threshold for the scorecard has been reached. The tests for the metric are halted for this cycle, and all associated aggregated summaries display 0%.

Related topics

Configure CMDB groups scorecard thresholds

View CMDB health reports

View services health reports

View CI health

The CI dashboard is a central location displaying health report for an individual CI, history of changes to the CI in a timeline view, and the relation formatter. The CI dashboard also displays incidents, changes, and other tasks affecting the CI, and business services affected by the CI. You can access the CI dashboard from a CI form, or from the CMDB dashboard.

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Before you begin
Role required: asset or itil

About this task
The health scores are based on settings of CMDB Health KPIs and metrics. The report is calculated in real-time from data stored in health-related tables which the CMDB Dashboard jobs update on a recurring schedule. The completeness and correctness KPIs are always up to date, but for other KPIs, it is possible that updates to the CMDB are not reflected because one of the dashboard jobs hasn't run yet, as follows:

- Compliance: Depends on audit cycles and on the 'CMDB Health Dashboard - Compliance Score Calculation' job.
- Relationships: Depends on the 'CMDB Health Dashboard - Correctness Score Calculation' job.

To ensure that the latest updates to these KPIs are reflected on the CI dashboard, navigate to the respective dashboard job, and click **Execute Now**.

Procedure
1. Go to a dashboard in one of the following ways:
   - On a CI form click **Dashboard**.
   - Use the class hierarchy:
     a. Navigate to **CMDB Dashboard** > **CMDB Health**.
     b. Click **CMDB Dashboard - All** to display the class hierarchy. Enter a search string.
     c. Select a CI from the **Configuration Items** group.

     The search results are grouped by **Classes** and **Configuration Items** that match the search string.
2.

Result
Various widgets in the report display CI's health with the following color codes:

- Green: The CI passed the health test (for example, it is not a duplicate).
- Red: The CI failed the health test (for example, it is a duplicate)
- Grey: The CI was not tested for this metric, because the threshold was not set for the CI (class) in the CI module.

The report displays the change history for the CI in a timeline format, that you can zoom in or out to select a time period for which to display details for. Use the related lists tabs **Change**, **Incident**, **Task**, **Business Services**, and **Alerts** to further drill into additional details.

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Note:

Missing rules or other class definitions can prevent some health scores from being evaluated for a CI. The results in the CI dashboard in these situations, are described below:

Duplicate

- If no identification rules ([cmdb_identifier]) are defined for the CI's class or its ancestors: A notification to that effect appears.
- If only dependent identification rules are defined: `Not applicable` notification appears.

Orphan

- If the CI is excluded by health inclusion rules: `Not applicable` notification appears.
- If no orphan rules ([cmdb_health_orphan_rule]) are defined for the CI's class or its ancestors: A notification about missing a rule appears.

Staleness

- If the CI is excluded by health inclusion rules: `Not applicable` notification appears.
- If no staleness rules ([cmdb_health_staleness_rule]) are defined for the CI's class or its ancestors: A notification about missing a rule appears.

Audit

- If no audits ([cert_audit]) are defined for the CI (CI dashboard checks only desired states and scripted audits): `Not applicable` notification appears.
- If there are audits defined for the CI but the audits did not run: `Not applicable` notification appears.

Related topics

Enable and configure a CMDB Health Dashboard job

Timeline of CI changes

CI relations formatter

Customize the CI dashboard

You can add, remove or re-arrange content on the CI dashboard to display the CI health statistics that are important to you.

Role required: itil_admin

On a CI form click **Dashboard** and customize the CI dashboard as follows:

- Drag a tile near its upper edge and drag it to a different location on the dashboard to rearrange the current layout.
- Click the X in the upper right side of a widget to hide the widget.
- Click the + sign in the upper left corner of the dashboard to add content. In the **Add content** dialog box, select the content to add and the location to place it.

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- Click the gear icon in a widget tile to edit widget settings such as title and height.
- Click **Reset to Default** to revert to the base system settings.

View CI relationships health

View aggregated orphan, stale, and duplicate CI relationships in the CMDB dashboard. You can configure the relationship scorecards, but you cannot configure the underlying relationship KPI health tests.

Before you begin

The CMDB Health Dashboard - Relationship Compliance Processor dashboard job must run to generate data for these reports.
Role required: itil or asset

About this task

CMDB Health measures CI relationship health using a separate KPI and metrics.

Orphan relationship

A relationship that is missing parent, child, or relationship type.

Duplicate relationship

Relationships that have identical parent, child, and relationship type.

Stale relationship

A relationship in which one of the CIs is stale. For a stale CI — its associated relationships are also stale.

In addition, the following relationship compliance reports are available:

Relationships not compliant with all relationship rules

Relationships that do not comply with any relationship governance rule, including suggested relationships and dependent relationship rules.

Relationships not compliant with suggested relationships

Suggested CI relationships are used as rules to test if relationships comply with specified suggested relationships.

Relationships not compliant with containment rules

Containment rules are used to test if relationships comply with specified containment relationships.

Relationships not compliant with hosting rules

Hosting rules are used to test if relationships comply with specified hosting relationships.

For each of the compliance reports, testing a relationship requires a rule (suggested relationship, hosting rule, or containment rule) in which the parent and child CI classes match the parent and child CI classes in the tested relationship. If the relationship types in the rule and in the tested relationship do not match, then the relationship is not in compliance. If an applicable rule is not found, then the relationship is considered to be in compliance. Rules apply to the classes specified in the rule, and also to descendant classes. Therefore, when testing a relationship, rules that apply to ascendant parents of the CIs in the tested relationship are used. If there are multiple rules that match the parent and the child CI classes of the tested relationship, then the tested relationship needs to satisfy only one of these rules to be in compliance.

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Procedure

1. Navigate to **All** > **Configuration** > **CMDB Dashboard** > **CMDB View**.
2. Select the **Relationship Health** tab.
3. Scroll to the bottom of the page to examine the relationship compliance reports.
   Report results are grouped by relationship type, and you can drill down for further details:
   - Point to a relationship type to display its label and the % of relationships that are not in compliance.
   - Click on a relationship type to drill down to a detailed list of all the relations of that type that are not compliant. Click on a specific relationship to display more details such as the failure description. The **Failure Description** field lists only a single rule that the relationship did not comply with, even if there are additional rules that the relationship fails to comply with.

What to do next

For troubleshooting information, see the How to identify and delete duplicate CMDB CI Relationship records, or ones that have orphan or missing parent/child relationships [KB0780988] knowledge base article.

Related topics

Enable and configure a CMDB Health Dashboard job

Create CMDB remediation rule

A CMDB remediation rule is associated with a task that was created for a failed CMDB health test. A CMDB remediation rule is applied automatically or manually to execute a remediation workflow that can, for example, delete stale CIs.

Before you begin

You must first create and publish a remediation workflow that addresses the CI issue, stored in the Workflow [wf_workflow] table. The workflow can be a regular workflow or an Orchestration workflow, and must adhere to the following requirements:

- The table in the workflow must match the task type in the remediation rule.
- The workflow isn't configured with any filter conditions by setting **If condition matches** to `None`, so that the filters of the CMDB remediation rule will apply.

For more information about Flow Designer (previously Workflow), see Flow Designer.

Role required: itil_admin (on top of itil)

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Remediations**.
2. Select **New** and then fill out the CMDB Remediation Rule form.

Field	Description
Name	Remediation name.
Task type	Type of CMDB health-related tasks to apply the remediation to.
Task filter	Filters tasks to apply remediation to. Also applies dot-walking on CI fields so that

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Field	Description
	remediation is applied to tasks associated with matching CIs.
Execution	○ Manual: Remediation is applied manually. ○ Automatic: The workflow is applied once, upon the creation of a task that matches the **Task type** and **Task filter**.
Active	Allowing the workflow to run.
Workflow	The CMDB remediation workflow (regular or Orchestration) that will execute automatically or manually, depending on the **Execution** setting. You can click the **Lookup using list** icon, and then click **New** to create a new workflow.

3. Select **Submit**.

Result

If **Execution** is set to Automatic, then the business rule *`Run remediations for CMDBHealth task`* applies the remediation workflow to CIs that match the Task filter. If **Execution** is set to Manual, then you can manually apply the remediation workflow defined in the rule.

Related topics

Dot-Walking

Apply CMDB remediation

Manually initiate a workflow to remediate a CI that failed a CMDB health test. For example, you can remediate CIs that are orphan or stale.

Before you begin

Role required: itil_admin

To manually apply a CMDB remediation, a CMDB remediation rule must exist, in which **Execution** is set to **Manual**.

About this task

Except for the duplicate and audit health metrics, you can choose to create tasks for health test failures for a metric.
To remediate failures of the duplicate metric, use de-duplication tasks.

For all metrics except for audit, each CI that failed a metric test is associated with a single task. Because a CI can fail multiple audits, a single CI can be associated with multiple audit tasks. The first of those tasks is in the **Task** field, and any additional tasks are in the **Additional Tasks** field. To remediate failures of the audit metric, refer to the audit tasks for the audits that the CI failed.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Dashboard**, and then click **CMDB View**, **Service View**, or **Group View**.
2. Click on one of the bars in a bar chart on the page.

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Or, click on a metric tile that is associated with the remediation that you want to apply, and then in a detailed report click on a bar in a bar chart. For example, to remediate an orphan CI, click the **Completeness** tile.

3. In the **Task** column in the **CMDB Health Results** list, select the task that is associated with the CI that you want to remediate. Point to the information icon ( ) for a result record to display the CMDB Health Results dialog box with more details about the health test.
The CMDB Health Results list contains records only for the CIs that failed a metric test.

Field	Column
CI	The CI associated with the test results.
Class Name	The CI's class.
Description	Details about the reasons for the CI failing the metric test.
Last Evaluated On	Time that the CI was evaluated for the metric, and which resulted in failure.
Metric	The CMDB Health metric associated with this test result.
Source	Source of the health test failure: ○ CMDB Health Audit: Corresponds to the dashboard ○ Cloud discovery
Task	The task associated with the health test failure. For the audit metric, if there are multiple failures, then only the first task is listed.
Additional Tasks	If there are multiple tasks related to the audit metric, contains all tasks other than the first which is in the **Task** field.
Active	Used internally in combination with the **To Delete** field to determine the correct results set that this failure belongs to.
To Delete	Used internally in combination with the **Active** field to determine the correct results set that this failure belongs to.

4. On the task form, click **Remediate**.
5. In the **Run Remediations** dialog box, select the remediation rule that you want to apply.
The list of remediation rules is based on the type of health metric (such as orphan, stale), and on the filter defined in the rule.
6. Click **Execute**.

Related topics

Create CMDB remediation rule

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Components installed with CMDB Health

Several types of components are installed with CMDB Health (included in the com.snc.cmdb plugin), such as tables, properties, and scheduled jobs.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Properties installed

Property	Description
glide.cmdb.services_hierarchy_limit	Maximum number of service CIs that can appear in the CMDB service dashboard. This limit applies to any child class of the Application Services [cmdb_ci_service_auto] class. • Type: integer • Default: 10,000 • Range: 0-100,000 • Location: Add to System Properties [sys_properties] table. • Learn more: View services health reports

Scheduled jobs installed

Scheduled job	Description
CMDB Health Dashboard - Completeness Score Calculation	Script for calculating the completeness KPI of CMDB health.
CMDB Health Dashboard - Compliance Score Calculation	Script for calculating the compliance KPI of CMDB health.
CMDB Health Dashboard - Correctness Score Calculation	Script for calculating the correctness KPI of CMDB health.
CMDB Health Dashboard - Relationship Score Calculation	Script for calculating the CI relationships KPI of CMDB health.

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Scheduled job	Description
CMDB Health Dashboard - Relationship Compliance Processor	Script for calculating compliance of relationships with suggested relationships, and with hosting and containment rules.
Add Identifier Fields In Recommended Rules	Sets all criterion attributes from all active identifier entries from all active identification rules, as recommended fields. These added recommended fields are then checked by the CMDB Health Dashboard - Completeness Score Calculation scheduled job when evaluating the recommended health metric.
Remove Identifier Fields In Recommended Rules	Identifies any recommended field that is a criterion attribute in any active identifier entry in any active identification rule. Then removes the recommended setting for that field.

Tables installed

Table	Description
CMDB Health Metric [cmdb_health_metric]	Details such as if a KPI or metric is enabled, maximum failure threshold, and other settings for all CMDB Health KPIs and metrics.
CMDB Health Result [cmdb_health_result]	Results from the most recent CMDB Health processing cycle.
CMDB Health Scorecard [cmdb_health_scorecard]	Current and historic health scores. Status of historic score records is 'Historic', and of latest score records is 'Complete'.
CMDB Health Orphan Rule [cmdb_health_orphan_rule]	Rules for calculating orphan records per class.
CMDB Recommended Fields [cmdb_recommended_fields]	Recommended fields per class.
CMDB Health Metric Status [cmdb_health_metric_status]	Internal table that tracks the status of each KPI and metric that is being processed. Includes status, processing time, and processing start date. State for a KPI or metric changes from 'In Progress' to either of: • Complete • MaxFailures • Daily Processing Time Out Processing of a timed out KPI or metric continues on the following day.

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Table	Description
CMDB Health Processor Status [cmdb_health_processor_status]	Internal table that tracks the processing progress of each KPI and metric. Contains a list of tables that are processed for each KPI and metric, and processing status. Classes are processed sequentially, changing status from Draft -> In Progress -> Complete.
CMDB Relationship All Rules Health Results [cmdb_health_result_rel_all]	Stores results about relationship health, to be used by the All Relationships report.

CMDB Health process tracking

Use the following information to track and resolve issues with the CMDB Health processes.

Logging

By default, only error messages are logged to the syslog table, with the source name CmdbHealth. To enable logging of 'info' and 'warning' messages (which are typically logged at the start and end of each processing cycle), update the system property glide.cmdb.logger.use_syslog.CMDBHealth. For information about using this property, see CMDB Health system properties.

Processing status

If scheduled jobs are enabled, but data is not displaying on the CMDB dashboard, you can check the processing status in the CMDB Health Metric Status [cmdb_health_metric_status] table. Depending on the status of the *inactive* metric, decide how to proceed.

Initially, the state of all metrics is 'In Progress'.

Possible final states of a metric:

Complete

All classes are processed and the number of failures is under the maximum failures threshold.

Max Failures

The number of failures for this metric reached the maximum failures threshold. Processing has been aborted and will start over in the next run.

Daily Time Out Pause

The processor reached the processing time limit. Processing is paused and will resume in the next run.

At the end of a processing cycle, the final state of a KPI depends on the final state of its associated metrics. Possible final state of a KPI:

Complete

All associated metrics are in Complete state and score calculation is complete.

Incomplete

Score is not calculated because one of the associated metrics reached its maximum failure thresholds.

Daily Time Out Pause

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Timed out because one of the associated metrics has reached its processing time limit.

Processing time

If processing of a metric times out, you can find out which class takes too long to process. Use this information to find out if any validation rules are weak.

The progress of each metric is tracked in the CMDB Health Processor Status table [cmdb_health_processor_status]. Status for classes that have been processed for a metric is Complete, and for classes that are yet to be processed is Draft. By looking at the update time for each class, you can calculate the length of processing time for each class.

Orphan records due to broken hierarchy

Orphan rules might detect an orphan CI, which you are not able to access and delete. Or, there might be a mismatch between the list view that displays the orphan records, and the total number of records. These findings are due to records being deleted in the database from only one table in the CMDB hierarchy.

These CI records are not accessible via GlideRecord and must be deleted directly from the database. Therefore, in this case, to delete an orphan CI from the database you must contact Support to get help.

Orphan test results provide the details of where exactly the hierarchy is broken. For example, the message "This cmdb_ci_linux_server CI [91054fc24f22520053d6e1d18110c713] is missing record in cmdb_ci_computer table" means that a record of that sys_id must be deleted from the CMDB, cmdb_ci, cmdb_ci_hardware, cmdb_ci_server, and the cmdb_ci_linux_server tables (the Computer class is between the Hardware and the Server classes in the hierarchy.)

Scripted audits Skipped

An error message is logged if the results from a scripted audit are not included in the compliance KPI. The reason can be that the script in the audit was not updated to populate its **Last ran date** field. Without a **Last ran date** value, CMDB Health is unable to identify these run results as part of a recent complete audit run, and skips those results.

CMDB Health process status: failure threshold reached

The CMDB dashboard displays the string ‘failure threshold reached' when the number of CIs that are failing the metric tests, reaches the failure threshold set for the metric.

CMDB Health stops processing for this metric in the current cycle, and therefore there is no aggregated health score for the metric. Processing will be attempted again in the next cycle. Also, status in the CMDB Health Metric Status [cmdb_health_metric_status] table is set to *`Max Failures`* for this metric.

When the health score of a metric cannot be evaluated, then the processing status of the respective KPI (for example, correctness) is set to *`Incomplete`*. The CMDB dashboard displays the string *`Incomplete score`* for the respective KPI and for the CMDB Health overall score. Also, aggregated health scores for the metric are not available for any class in the CMDB hierarchy.

Review and adjust the following definitions as needed:

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- Review and refine the rules defined for the metric which has reached max failures. If a rule associated with the metric is too generic, resulting in large number of failures, attempt to refine it as follows:

  - Completeness:

    Review the mandatory fields for the associated classes and remove those that aren't critical for the health score. Also, review the recommended fields that are causing failures and remove those that aren't critical for the health score.

    For more information see Set a CI attribute to be mandatory and Set a CI field to be recommended.

  - Compliance:

    Review the audit failures from the audit jobs and adjust the audits to reduce the number of failures. For more information, see CMDB Health KPIs and metrics.

  - Correctness:

    - Orphan: Review the orphan rules and adjust them to remove excessive orphan failures. For more information, see Create or edit a CMDB Health orphan rule.
    - Staleness: Review the effective duration for the classes that are causing failures and adjust the duration to reduce the number of failures. For more information, see Create or edit a CMDB Health staleness rule.
    - Duplicate: Review the de-duplication tasks and remediate the tasks to remove duplicate CIs and to avoid creating failure records. For more information, see Remediate a de-duplication task (legacy).

- Increase the failure threshold for the metric that is failing and check if processing for this metric completes successfully in the next cycle. Increasing the failure threshold beyond 500K might reduce overall performance.

CMDB Health process status: incomplete score

The CMDB dashboard displays the string 'incomplete score' for a metric when it fails to calculate the score for the metric.

'Incomplete score' is displayed when:

- The number of CIs that are failing the tests of one of its sub-metric, reaches the failure threshold set for the metric. In this situation, the processing status for the respective parent metric (for example, correctness) is set to 'incomplete' in the CMDB Health Metric Status [cmdb_health_metric_status] table. Processing for the failing metric in the current cycle stops, and therefore there are no aggregated health scores for the sub-metric, the parent parent metric, or the overall CMDB Health.

  To remediate, you need to resolve the underlying cause of CIs failing the sub-metric tests. See CMDB Health process status: failure threshold reached for more information about resolving the failures of the sub-metric.

- An error is encountered while processing the sub-metric.

  To remediate, examine the system logs to determine the cause of the error. After fixing the cause of the problem, restart processing by manually executing the respective parent metric dashboard job.

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CI Class Manager

Use the CI Class Manager to centrally view, create, or edit basic class definitions, and class settings for identification, reconciliation, and CMDB Health. To access the CI Class Manager, navigate to **All** > **Configuration** > **CI Class Manager**.

Note:
CI Class Manager doesn't support working with non-CMDB tables. For more details, see IRE support for non-CMDB tables.

Class Basics

- Create a class
- View class basic information
- Class columns
- Add a suggested relationship
- Display all CIs for a class
- Dependency Views map icons for a class
- Delete CIs
- Update the list of classes in the Principal Class filter

CMDB Health

- Create a compliance audit
- Create a certification filter
- Create a certification template
- CMDB Health orphan rule
- CMDB Health staleness rules
- Set a CI field to be recommended
- Set a CI attribute to be mandatory
- CMDB health scorecard thresholds
- Health inclusion rules

IRE

- Identification:
  - CI identification rules
  - Identification inclusion rules
- Reconciliation:
  - CI reconciliation rules
  - Data refresh rules
- Dependencies:

  Dependent relationship rules (hosting and containment)

Service Mapping

- Entry point types for Service Mapping
- CI types for Service Mapping and Discovery

CMDB CI Lifecycle Management (legacy)

From the time of its creation to the time that it is no longer needed, a CMDB CI would typically transition through several operational states while undergoing various operations. CI LIfecycle Management provides the mechanism to define states and actions for a CI and lets you apply appropriate actions based on a CI's state to tailor the management of CI lifecycle to business needs.

The CMDB Data Manager is now a more comprehensive and integrated solution for managing CI life cycle operations such as deletion and archival, in bulk. For information about the CMDB Data Manager, see Working with CMDB Data Manager.

Terms associated with CI Lifecycle Management:

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Operational states

A set of states that a CI can be at such as 'Operational' or 'Repair in Progress'. A CI can be associated with only a single operational state at any given time. The choices for operational states are based on the *operational_status* field in the [cmdb_ci] table. There are several operational states that are defined in the base system such as 'Retired' and 'Repair in Progress'. You can modify this list to reflect operational states that are relevant in your business.

Note:
By default, Service Mapping is configured to ignore all host CIs for which the value of Operational status *[operational_status]* is not **1** (Operational) or the value of status *[install_status]* is **100** (absent). For additional information about this behavior, see Preparing customized ServiceNow deployments to work with Service Mapping [KB0647574] in the HI Knowledge Base.

CI Lifecycle Management allows multiple operators and automations to simultaneously set different operational states of a CI. Since a CI cannot be associated with multiple operational states, it is important to configure each operational state with a priority. These priorities are then used in such situation to determine which of the operational states is the cumulative operational state.

CI actions

A set of actions that can be applied to a CI during its lifetime. You can define CI actions that are relevant in your business.

Compatible CI Actions

CI Lifecycle Management allows a CI to have multiple active CI actions simultaneously, however they must be specifically defined as compatible. By default, there are no two actions for a CI that are compatible with each other. You can change this behavior by specifying pairs of actions that are compatible and thus allowed to be applied simultaneously to a CI. For example, you can specify that the ‘Patching’ and the ‘Provisioning’ CI actions are compatible making it possible to apply both simultaneously to a CI.

Not Allowed CI Actions

By default, any CI action can be applied to any CI. You can restrict this behavior by defining a rule that an action is not allowed for a CI when it is in a specific operational state. For example, you can define a Not Allowed CI Action in which it is not allowed to apply the 'Provisioning' action to a Linux Server that is in a 'Non-Operational' state.

Not Allowed Operational Transitions

By default, transitions are allowed from any operational state to another. You can restrict this behavior by defining a rule that for a specified CI, a transition from a certain operational state to another operational state is not allowed. For example, you can define that for a Linux Server it is not allowed to transition from 'Repair in progress' to 'Non-Operational'.

Requestor

A requestor can be a workflow or a non-workflow operator that is trying to set operational states and apply CI actions. Each requestor has an associated requestor ID that is a GUID and that can be an active workflow context or a non-workflow registered operator ID.

Lease time

A time period that each requestor (especially non-workflow operators) can provide, during which a specified CI action is allowed to be active for a specified CI.

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CMDB CI Lifecycle Management provides a set of APIs to manage CI operational states and CI actions. And the UI where you define a set of rules to restrict certain operational state transitions and to restrict actions based on operational states. It also provides a mechanism to audit CI operational state and CI actions during the entire CI lifecycle.

Providers such as automation, workflows, or Change Management can use CI Lifecycle Management as a mechanism to manage CI operational states and apply CI actions. By default, the behavior of CI Lifecycle Management has no restrictions on some operations, and full restrictions on other operations. The CI Lifecycle Management UI lets you modify this default behavior by specifying Not Allowed CI Actions, Compatible CI Actions, and Not Allowed Operational Transitions that restricts some operations and enables for others.

With CI Lifecycle Management you can:

- Manage CI operational states and CI actions throughout the entire CI lifecycle.
- Manage CI operational state transitions.
- Restrict certain operational state transitions.
- Associate certain actions for certain CI types that are in specific operational state.
- Restrict IT Service Management applications based on CI operational state.
- Audit CI operational states and CI actions during the entire CI lifecycle.

Lifecycle management APIs

CI Lifecycle Management provides a set of APIs to manage CI operational state and CI actions during the entire CI lifecycle. All restrictions and allowances specified by rules in the UI are enforced when state management APIs run, and if an API attempts to perform a restricted operation, the operation is blocked and an error is logged.

Registering requestors

When using the lifecycle management APIs to apply CI actions, requestors are required to be registered and to obtain a requestor ID which is unique within the lifecycle management tables. To register and to obtain a requestor ID, non-workflow users should call the *registerOperator* API. Workflow users can use the active Workflow context as the requestor ID, and they do not need to explicitly call *registerOperator*.

After completing the CI lifecycle operations, the requestor should call the *unregisterOperator* API to unregister. All the state management records associated with that specific requestor ID are then marked as inactive or they are removed by the *CI Lifecycle Management – Restore Internal State Management Tables* scheduled job.

Integration with Incident Management and Problem Management

A base instance includes the pre-defined CI action *CreateTask* used for creating a task for a CI. New instances have a pre-defined Not Allowed CI Action, specifying that the 'CreateTask' action is not allowed for any CI with a **Retired** operational state. This restriction is integrated with Incident Management and with Problem Management to prevent the creation of incident or problem tasks for retired CIs. The 'CreateTask' CI action is used as a reference qualifier to the *Configuration Item* field of the Incident/Problem tables. In a new incident or problem, CIs in which *Operational Status* is 'Retired' – are filtered out from the *Configuration Item* list on the form. For more information about reference qualifiers, see Reference qualifiers .

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Integration with Asset Management

In a base system, a CI's *Operational Status* field and the *Status*/*Hardware Status* (if its hardware) fields are kept synchronized if one of the two fields' values is **Retired**. When *Operational Status* of a CI is set to **Retired**, then the *Status*/*Hardware Status* field is automatically set to **Retired**. In the opposite direction, when the *Status*/*Hardware Status* field of a CI is set to **Retired**, *Operational Status* is automatically set to **Retired** too.

- When an *Operational Status* field changes from **Retired** to another status, the CI's *Status*/*Hardware Status* field is set to **Installed**.
- When a CI's *Status*/*Hardware Status* field changes from **Retired** to another status, the *Operational Status* field is automatically set to **Non-Operational**.

  The change of state from 'Retired' to another state is seldom, and by default, the state is changed to 'Non-Operational'. However, this might not be the intended state for the record. Therefore, it important that administrators review and manage the state appropriately in this case.

Whenever CI's *Status*/*Hardware Status* changes, it is synchronized to the CI's corresponding *Asset State* field, and vice versa — keeping the CI's *Operational Status* and the CI's corresponding *Asset State* synchronized.

For more information about mapping *Asset State* and *Substate* fields to a CI's *Status*/*Hardware Status* (if its hardware) field, see Map asset state and CI hardware status. And for more information about retiring assets, see Retire assets.

Get started with CI Lifecycle Management

Follow these high level steps to get started and to track activities of the CI Lifecycle Management module of the CMDB application.

Before you begin

Role required: none

Procedure

1. Activate the base system CI Lifecycle Management - Restore Internal State Management Tables scheduled job that continuously checks and maintains data integrity of all internal CI Lifecycle Management tables.
2. Define CI actions.
3. Define compatible CI actions rules.
   Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **CMDB CI Actions** to display currently active/inactive CI actions in the CMDB.
4. Define not-allowed CI actions rules.
5. Define not-allowed operational state transitions rules.
6. Define new operational states by modifying the *operational_status* field in the [cmdb_ci] table in the system dictionary.
   Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **View Internal Operational States** to display available operational states set by each requestor.
7. Set priority for operational states.
8. Call APIs to apply CI actions.
   Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **CMDB CI Actions** to display which actions were submitted and thier active/inactive state in the CMDB.

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9. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **View CI State Registered Users** to display currently registered operators that were registered via the *registerOperator* API.
10. Review Renew Lease tasks and extend leases as needed.
    Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **Renew Lease Tasks**.

    These tasks are created automatically by the *CI Lifecycle Management - Restore Internal State Management Tables* scheduled job for CI action records in which the lease for a valid requester has expired. The Requestor should use the lifecycle management API *ExtendCIActionLease* to extend the lease. Otherwise, if the lease remains expired for a specified grace period, the *CI Lifecycle Management - Restore Internal State Management Tables* scheduled job marks the respective CI action record as 'inactive'.

    The grace period for expired lease time is configurable by the system property *glide.cmdb.statemgmt.max_lease_expired_days*.
11. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **State Management Logs** to display logs of CI Lifecycle Management operations.

Lifecycle management APIs

CI Lifecycle Management provides a set of state management APIs for manipulating CI operational states, and applying CI actions.

State management APIs adhere to restrictions and allowances specified by Not Allowed CI Actions, Compatible CI Actions, and Not Allowed Operational Transitions. If an API attempts to perform a restricted operation, the operation is blocked, an error is logged, and a task is automatically created if appropriate.

Lifecycle management APIs can set operational states and CI actions to CMDB groups by utilizing lifecycle management bulk APIs.

Registration APIs

- registerOperator() - Method to register operator with state management for non-workflow user.
- unregisterOperator(String requestorId) - Method to unregister operator for non-workflow users.
- isValidRequestor(String requestorId) - Method to determine if the specified requestor is a valid active workflow user or a registered user.
- isLeaseExpired(String requestorId, String ciSysId, String ciActionName) - Method to check if registered user lease expired.
- extendCIActionLease(String requestorId, String ciSysId, String ciActionName, String leaseTime) - Method to extend CI Action Lease time, for registered users. If previous lease already expired, extend lease from now.

Operational State APIs

- setBulkCIOperationalState(String requestorId, String sysIdList, String opsLabel, String opsStateListOld) - Method to set Operational State for an array of CIs.
- getOperationalState(String ciSysId) - Method to get CI Operational State.

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CI Actions APIs

- addBulkCIAction(String requestorId, String sysIdList, String ciActionName, String ciActionListOld, String leaseTime) - Method to add CI Action for an array of CIs.
- removeBulkCIAction(String requestorId, String sysIdList, String ciActionName) - Method to remove a CI Action for a list of CIs.
- getCIActions(String ciSysId) - Method to get CI Actions.

Not Allowed Action Based on Operational State API

isNotAllowedAction (String ciType, String opsLabel, String actionName) - Method to check if a specific CI action is not allowed for specific Operational State on a CI Type.

Not Allowed Operational State Transition API

isNotAllowedOpsTransition(String ciType, String opsLabel, String transitionOpsLabel) - Method to check if specific operational state transition is not allowed on a CI Type.

Compatible Action API

isCompatibleCIAction(String actionName, String otherActionName)- Method to check if two specific actions are compatible with each other.

Example: Using state management APIs

```
// 1. Register Operator with State Mgmt
var output =
 SNC.StateManagementScriptableApi.registerOperator();
var jsonUntil = new JSON();
var result = jsonUntil.decode(output);
var requestorId = result.requestorId;

// Get list of sys_ids to update
var sys_ids;

// 2. Set list of sys_ids's Operational State to 'Repair in
 Progress'
output =
 SNC.StateManagementScriptableApi.setBulkCIOperationalState(requ
estorId, sys_ids,'Repair in Progress');
gs.print(output);

// 3. Set list of sys_ids's CI Action State to 'Patching'
output =
 SNC.StateManagementScriptableApi.addBulkCIAction(requestorId,
 sys_ids, 'Patching');
gs.print(output);
```

Components installed by CI Lifecycle Management

Several types of components are installed by CI Lifecycle Management (included in the com.snc.cmdb plugin), including tables, scheduled jobs, and properties.

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Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Scheduled jobs installed

Scheduled job	Description
CI Lifecycle Management - Restore Internal State Management Tables	Continuously checks and maintains the data integrity of all internal CI Lifecycle Management tables.
Update life cycle from legacy	Updates CIs *Life cycle stage* and *Life cycle status* fields when legacy status fields change.
Update legacy from CSDM"	Updates CIs legacy status fields when life cycle changes.

Tables installed

Table	Description
CI State Registered Users [statemgmt_register_users]	All currently active registered users that were created via the *registerOperator* API. You cannot manually add new records to this table.
CI Actions [statemgmt_ci_actions]	A set of CI actions that can be applied to a CI during its lifetime.
CMDB CI Actions [statemgmt_cmdb_actions]	Active/inactive CI actions set by a specific requestor for a specific CI. You cannot manually add new records to this table.
Compatible CI Actions [statemgmt_compat_actions]	Set of rules that define pairs of CI actions that are compatible for a CI and can be applied simultaneously.
Not Allowed CI Actions [statemgmt_not_allow_actions]	Set of rules that define specific actions that are not allowed for a CI when its in a specific operational state.
Internal Operational States [statemgmt_ops_state]	Internal operational states set by a specific active requestor for a specific CI. You cannot manually add new records to this table.
Renew Lease Task [statemgmt_renew_lease_task]	Set of tasks that were automatically created to renew the lease of CI actions whose lease has expired. You cannot manually add new records to this table.
Operational State Priorities [statemgmt_ops_state_pri]	Priorities of operational states which determine precedence when multiple operational states are set for same CIs by different requestors.
Not Allowed Operational Transitions	Set of rules that define specific operational state transitions that are not allowed.

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Table	Description
[statemgmt_not_allow_ops]	

Properties installed

Property	Description
glide.cmdb.statemgmt.max_lease_expired_days	Maximum number of days that lease expiration can be set with for CI Actions. • Type: integer • Default value: 15 • Location: System Property [sys_properties] table.
glide.cmdb.statemgmt.max_bulk_count	Maximum number of CIs that CI Lifecycle Management can process in a bulk update operation. • Type: integer • Default value: 1000 • Location: System Property [sys_properties] table.

Activate the CI Lifecycle Management scheduled job

When starting to use the CI Lifecycle Management module, ensure to activate the *CI Lifecycle Management - Restore Internal State Management Tables* scheduled job which is disabled by default. This scheduled job continuously checks and maintains the data integrity of all internal CI Lifecycle Management tables.

Before you begin

Role required: none

About this task

When CI Lifecycle Management operations do not complete properly, for example due to a failure of the requestor or a requestor whose lease has expired, the integrity of tables related to CI Lifecycle Management might be compromised. The *CI Lifecycle Management - Restore Internal State Management Tables* scheduled job scans tables related to CI Lifecycle Management, and does the following:

- De-activates or removes all internal lifecycle management records with invalid requestors, and closes any corresponding Renew Lease Tasks if present.
- Detects records associated with a valid requestor whose lease has expired, and automatically creates a Renew Lease Task to notify the user and to provide details for extending the lease. If the requestor takes no action and the lease remains expired for a specified grace period (default 15 days), automatically de-activates the corresponding CI action record, and closes any corresponding Renew Lease Task if present.

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Procedure

1. Navigate to **System Definition**, and click **Scheduled Jobs**.
2. Search for the *CI Lifecycle Management - Restore Internal State Management Tables* job.
3. In the respective **Active** column, double-click the value *false*, and select *true*.
4. Click the **Save** icon.

Define a CI action

Define a CI Lifecycle Management CI action that can be later applied to CIs.

Before you begin
Role required: none

About this task
You can view a list of all the actions that are currently applied to CIs by navigating to **Configuration** and clicking **CMDB CI Actions**.

Procedure

1. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **CI Actions**.
2. On the CI Actions page, select **New**.
3. Enter **Name** and **Description**.
4. Select **Submit**.

Define compatible CI actions

Allow a CMDB CI Lifecycle Management operation in which two specified CI actions can be applied simultaneously to a CI.

Before you begin
Role required: none

About this task
By default, it is not allowed to apply more than a single action to a CI. You can change that behavior by defining pairs of CI actions as compatible and therefore these actions can be applied simultaneously to a CI. For example you can specify that Provisioning and Patching are compatible CI actions, which lets you apply both to a CI at the same time.

Procedure

1. Navigate to **All** > **Configuration** > **Compatible CI Actions**.
2. On the **Compatible CI Actions** page click **New** and fill out the form.

Compatible CI Actions

Field	Description
Action	First action in the compatibility actions pair.
Compatible Action	Second action in the compatibility actions pair.

Result
An API can successfully apply the two specified actions simultaneously to a CI.

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Define a not-allowed CI action

Define a restriction for CI Lifecycle Management in which a specified action is not allowed for a CI that is in a specified operational state.

Before you begin
Role required: none

About this task
By default, there are no restrictions in the CMDB CI Lifecycle Management on applying CI actions. You can restrict this behavior by not allowing a specified action to be applied to a CI when it is in a specified operational state. For example, you can define a restriction in which the provisioning action cannot be applied to a Linux Server that is in a non-operational state.

Procedure
1. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **Not Allowed CI Actions**.
2. Click **New** on the **Not Allowed CI Actions** page, and fill out the form.

Field	Description
Not Allowed Action	The action that is being restricted.
CI Type	The CI type for which the restriction applies to. To apply a rule to all CIs, select Configuration Item.
Operational State	The operational state that the CI must be at in order to apply the restriction.

3. Click **Submit**.

Result
If an API attempts to apply the specified action to the specified CIs, while it is in the specified operational state, the operation fails and an error is logged.

Set priority for an operational state

CI Lifecycle Management allows multiple operators or automations to simultaneously set different operational states for a CI. A CI can have only a single operational state, so in this case, the cumulative operational state of the CI is set to the one with the highest priority. It is recommended that you specify a priority for each operational state that you define so that a cumulative state can be correctly calculated.

Before you begin
Role required: none

About this task

Procedure
1. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **Operational State Priority**.
2. On the **Operational State Priority** page, click the operational state for which you want to set or update priority.
3. Enter a **Priority** and click **Update**.
   Smaller numbers represent higher priority.

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Define a non-allowed operational transition

Define a restriction for CI Lifecycle Management in which a specified CI cannot transition from one operational state to another.

Before you begin
Role required: none

About this task
By default, CI Lifecycle Management has no restrictions for transitioning CIs from one operational state to another. You can restrict this behavior by defining transitions that are not allowed for a specified CI. For example, you can define a restriction on transitioning a Linux server from non-operational state to repair in progress state.

Procedure
1. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **Not Allowed Operational Transitions**.
2. On the **Not Allowed Operational Transitions** page, click **New** and fill out the form.

Field	Description
CI Type	The CI type for which the restriction applies.
Not Allowed Transition	The CI state into which transitioning is restricted.
Operational State	The operational state that the CI must be in for the restriction to apply.

Result
If an API attempts to transition a CI that is in the specified operational state to a state that is not allowed, the operation fails and an error is logged.

View CMDB benchmarks

CMDB calculates several CMDB Health benchmarks which then display in the Benchmarks dashboard. These benchmarks are based on various CMDB Health metrics, displaying monthly averages, trends, comparisons to industry averages of your ServiceNow peers, and global benchmarks.

Before you begin
Role required: none

The CMDB Health Dashboard jobs must be enabled and health data must be collected. Also, navigate to **Benchmarks** > **Setup** and ensure that the CMDB KPIs are enabled under **IT Operations Management**.

About this task
CMDB provides the following benchmarks:

- % of non-compliant CIs
- % of duplicate CIs
- % of stale CIs

For an instance, each of these benchmarks is the calculated monthly average for the corresponding CMDB Health metric. Calculating a monthly average requires that there is a metric result value for each day of the month. Therefore, each day on which the respective

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Health Dashboard job did not run, is assumed with the aggregated result from the run that is most recent to that day. The monthly average is then calculated based on the sum of all the daily aggregated results for the metric in that month, divided by the number of days of the month. For a CMDB Health Dashboard job that ran multiple times in a single day, only the results of the last run in that day are used for the monthly average calculation.

Note:
The frequency of CMDB Health Dashboard job executions depend on whether the job is enabled, its schedule and on manual runs.

Global averages are based on the sum of monthly averages of all peer instances, divided by the number of instances (aside from instances for which the monthly average is 0).

Procedure

1. Navigate to **Benchmarks** > **Dashboard**.
2. Click the icon and select **IT Operations Management**.
3. Click **ALL** or **CMDB**.
4. Click on a CMDB benchmark to drill down to trend data, and other benchmark details.

Related topics

CMDB Health

Benchmarks

Benchmarks dashboard

CMDB APIs (CMDB SDK)

Use CMDB APIs to create, update, and read operations on the CMDB. Domain separation is supported in CMDB APIs.

CMDB APIs (CMDB SDK)

Use the following CMDB APIs to create, update, and read operations on the CMDB:

- CMDBGroupAPI - Scoped
- CMDBTransformUtil - Global
- CMDBUtil - Global
- IdentificationEngineScriptableApi
- IdentificationEngine - Scoped

Domain separation in CMDB APIs

Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

CMDB APIs are used for accessing the CMDB from a script. CMDB stores the CI and relation information; CMDB is domain separated.

CMDB APIs support the following operations:

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- Create a new CI:

  This operation goes through the Identification and Reconciliation Engine which supports domain separation when creating a CI. The domain of the caller is used for this operation.

- Update an existing CI:

  This operation goes through the Identification and Reconciliation Engine which supports domain separation when creating a CI. The domain of the caller is used for this operation.

- Create/Delete relations:

  The cmdb_rel_ci table is not domain separated.

- Query CMDB CI/Query CMDB table:

  Results are filtered by the domain(s) visible to the caller.

- Query CMDB metadata table:

  Metadata information is not domain separated.

Setting up domain separation for CMDB APIs

If domain separation is enabled for CMDB, then it is also available for CMDB APIs.

Data separation

Data is stored and domain separated in CMDB. There is no additional work needed from the CMDB API perspective.

Configuring a domain-separated environment

The configuration is done at the CMDB level.

If a domain column is present for base system application tables

See the Domain separation in CMDB Health topic.

Tenant domains and application data

There is no application-specific data to manage with CMDB.

Related topics

Domain separation and Configuration Management Database (CMDB)

Quick start tests for Configuration Management Database (CMDB) (CMDB)

Validate that Configuration Management Database (CMDB) still works after you make any configuration change such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Configuration Management Database (CMDB) quick start tests require activating the Configuration Management (CMDB) plugin (com.snc.cmdb) and the CMDB - ATF Tests plugin (com.snc.cmdb.atf).

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CMDB BSM: Dependency Views test suite

Test suite to check functionality of Dependency Views APIs.

Test	Description	Release version
CMDB BSM: Dependency Views	Test functionality of Dependency Views APIs. These APIs retrieve Dependency Views map and associated map items such as context menu items, for a given CI sys_id and using itil user role.	New York

CMDB HEALTH: CI Health Dashboard test suite

Test suite to check whether CMDB CI Health Dashboard is functional at a basic level.

Test	Description	Release version
CMDB HEALTH: Health Job Status	Checks whether any CMDB Health dashboard jobs, which were started 30 or more days ago, are still in progress.	New York
CMDB HEALTH: CMDB Health Completeness/ Recommended	Checks whether the CI dashboard is functional for the recommended metric (included in the CMDB Health completeness KPI). This test validates: • Creation of a health inclusion rule for the recommend metric. • Creation of a recommended field that satisfies the health inclusion rule. • Validate that the health inclusion rule is correctly applied to a test record with missing data in the recommended field.	New York

CMDB IRE: Identification Reconciliation Engine test suite

Test suite to check Identification and Reconciliation Engine (IRE) functionality.

Test	Description	Release version
CMDB IRE: IRE Validation	Validate CI identifiers and reconciliation definitions	Madrid

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CMDB IRE: Identification Reconciliation Engine test suite

Test suite to check Identification and Reconciliation Engine (IRE) functionality.

(continued)

Test	Description	Release version
	and check indexes for CI identifiers.	
CMDB IRE: Reconciliation Rule	Check operations on a reconciliation rule, in CI Class Manager, using itil and itil_admin roles. Operations include create, edit, and delete a reconciliation rule. Also, check for active and not active setting, and derived rules.	Paris
CMDB IRE: Identification Rule	Check operations on an identification rule, in CI Class Manager, using itil and itil_admin roles. Operations include create, edit, and delete an identification rule. Also, check for active and not active setting, and derived rules.	Paris

CMDB QB: Query Builder test suite

Test suite to verify CMDB Query Builder functions such as create query, read query, and execute query using two related user roles - cmdb_query_builder and cmdb_query_builder_read.

Test	Description	Release version
CMDB QB: Query Builder - cmdb_query_builder Role	Verify that cmdb_query_builder user role can save queries, and access and run all saved queries, in CMDB Query Builder.	New York
CMDB QB: Query Builder - cmdb_query_builder_read Role	Verify that cmdb_query_builder_read user role can access and run all saved queries, and cannot save any query, in CMDB Query Builder.	New York

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CMDB REL: Relationship Editor and Formatter test suite

Test suite to verify functionality of Relationship Editor and Relationship Formatter.

Test	Description	Release version
CMDB REL EDITOR:Relationship Editor	Check addition of relations to a CI and deletion of relations from a CI using itil user role.	New York
CMDB REL FORMATTER:Relationship Formatter	Check accuracy of CI information, relationship types, relationships, associated records such as change tickets, and settings such as CMDB views (relationship filters), displayed for a specific CI in relationship formatter using itil user role.	New York

CMDB SDK: SDK REST API test suite

Test suite to verify functionality of CMDB SDK Rest APIs.

Test	Description	Release version
CMDB SDK: Query CMDB Metadata	Test querying CMDB metadata.	New York
CMDB SDK: Create a relation for a CI using REST APIs	Test creation of a relationship for a CI in the CMDB using the CMDB REST APIs.	New York
CMDB SDK: Delete a relation for a CI using REST APIs	Test deletion of a relationship for a CI using CMDB REST APIs.	New York
CMDB SDK: Create a CI using REST API	Test creation of a CI using CMDB REST APIs.	New York
CMDB SDK: Query CMDB using REST APIs	Test querying the CMDB using CMDB REST APIs.	New York
CMDB SDK: Update a CI using REST APIs	Test updating of a CI using CMDB REST APIs.	New York
CMDB SDK: Query for a CI using REST APIs	Test querying a CI using CMDB REST APIs.	New York

Related topics

Quick start tests

Useful related lists in CI forms

By default, the forms that display manageable configuration items (CI) - computers, printers, network gear, uninterruptible power supplies (UPS), and power distribution units (PDU) - provide a number of related lists for the form.

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The following related lists are common to all forms for manageable CIs.

- Network Adapters - Displays all the NICs installed on a CI.
- CI IPs - Displays all the IP addresses on this CI:
  - Computers (workstations, laptops using various macOS and Windows operating systems)
  - Windows servers
  - Linux servers
  - AIX servers
  - Solaris servers
  - Devices discovered through SNMP.
- DNS Names for CIs - Displays all the DNS names on a CI.

The IP version information appears in all IP address related lists and forms.

Note:
Since all paths here click into the **IP Address to DNS Names** list that associates an IP address with a DNS name, this part of the common flow was not added to the tree structure.

Discovery source

A table called Source [sys_object_source] stores information identifying the source of a discovery (by ServiceNow Discovery or another product), the ID of that source, and the date/time of the last scan. To view this information, configure a CI form and add the **Sources** related list.

This table is populated automatically when the Discovery plugin is enabled.

Table form views

When you view a table definition form, you can open the context menu, and select a form view in which to display the table. The default view for a table is the Default view. For any class that is an extension of the CMDB table, you can select the CI Definition view which provides additional access to related tables and information.

The CI Definition form view is a centralized location from which you can configure and view a table. In addition to the information that the default view displays, the CI Definition form view provides the following controls.

Control	Description
Icon tab	View and create new NG-BSM icons for CI types
CI Identifier tab	View and create new CI identifiers
Reconciliation Definitions tab	View and create new data source definitions
Inclusion related link	Links to the Metadata Editor

To access these additional controls on the CI Definition form view, you need to first create a new table that is derived from the CMDB table, and then view it using the CI Definition form.

Related topics

Create a CI class

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Platform Analytics Solution for Configuration Management (CMDB)

Platform Analytics Solutions contain preconfigured dashboards. These dashboards contain actionable data visualizations that help you improve your business processes and practices.

Platform Analytics data visualizations use Performance Analytics indicator data to show you data over time, helping you analyze your business processes and identify areas of improvement. With Platform Analytics Solutions, you can get value from Performance Analytics for your application with minimal setup. You can always create your own objects as well.

Important:
Set up and test Platform Analytics Solutions on a non-production instance before enabling them in production.

To enable the solutions for Configuration Management (CMDB), an admin can navigate to **Performance Analytics** > **Guided Setup**. Click **Get Started** then scroll to the section for Configuration Management (CMDB). The guided setup takes you through the entire setup and configuration process.

Related topics

Platform Analytics Solutions

Activate your Performance Analytics subscription

Common Service Data Model

The CSDM is the data framework that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB ensure that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

About the CSDM

The CSDM is the data model standard for all products that use the Configuration Management Database (CMDB).

- The CSDM guidelines ensure unified data access for ServiceNow AI Platform products.
- The CSDM gives you clear direct prescriptive guidelines for service modeling within the CMDB.
- CSDM terms and definitions ensure consistent and accurate service reporting.
- The CSDM data model supports multiple configuration strategies and includes guidelines for using base-system tables and relationships.
- You can use the CMDB query builder to create reports showing CMDB configuration items (CIs) and their relationships.

You will find additional information about the CSDM on the Community Forum. Also, see CSDM in a nutshell.

Playlist of all videos

Expert guidance to assess and improve your CSDM implementation — the CSDM Assessment

The CSDM Assessment provides Impact Customers with leading practices and prescriptive guidance on the CSDM and how it supports processes on the ServiceNow AI Platform. To help your organization plan for and implement CSDM, the assessment includes interactions

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with ServiceNow CSDM experts and personalized content. See Common Service Data Model Assessment Accelerators.

CSDM documentation

Explore



See how the CSDM framework ensures that your data resides in the appropriate CMDB tables for maximum value from your ServiceNow AI Platform applications.

Implement the framework



Following the CSDM framework ensures that you meet your primary goal of consistent accuracy in reporting and analytics so you can effectively manage your digital environment.

Manage the framework



The CSDM is the data framework that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB ensure that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

Reference



Reference topics provide detailed descriptions of tables, properties, forms, and roles that are used in the CSDM framework.

Key principles that guided the design and development of the CSDM framework

The framework is intended to help you avoid errors in implementation and to ensure that your ServiceNow AI Platform products generate accurate, complete, and consistent reports. The following principles guided the development of the CSDM framework.

Use simplified concepts

Represent concepts in a simple, distinct manner to eliminate duplicates and confusion over data sources.

Design for reporting and analytics

A prime objective of CSDM is to support consistent analysis.

Prescribe the data relationships

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Tell users in a clear direct way which relationships and references to use to link CSDM tables.

Share the data model across products

The CSDM identifies a data model that is shared across products to simplify concepts and collaboration. Collaborating with other product teams achieves the best shared design.

Use clear definitions

Use agreed-upon CSDM definitions wherever a table, reference, or attribute is used.

Share base-system tables

zBoot must provide shared base-system CSDM tables by default.

Consistent data integrations

To ensure data integrity, use prescribed technologies when integrating external data sources

Speed adoption

For each new release, provide automation and guidance for CSDM that accelerates upgrading and minimizes issues.

Enable data governance and process

The presence of data within the model provides little value without governance and effective process to manage the truth and validity of the data.

Provide practical user documentation

Each product team that references CSDM objects should provide documented guidance on use and/or value of the objects. Links to product-specific guidance appear in Applying the CSDM guidelines to your product.

Exploring the CSDM framework

See how the CSDM framework ensures that your data resides in the appropriate CMDB tables for maximum value from your ServiceNow AI Platform applications.

CSDM overview

The CSDM is the data framework that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB ensure that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

Join the ServiceNow CSDM Community to learn more.

Definitions of CSDM terms

See CSDM terms.

CSDM conceptual model

This illustration identifies each CSDM domain and the several roles and user types that work together to manage your ServiceNow applications and services. Each domain is associated with one or more products, services, or service types.

See Common Service Data Model — conceptual model for a full description.

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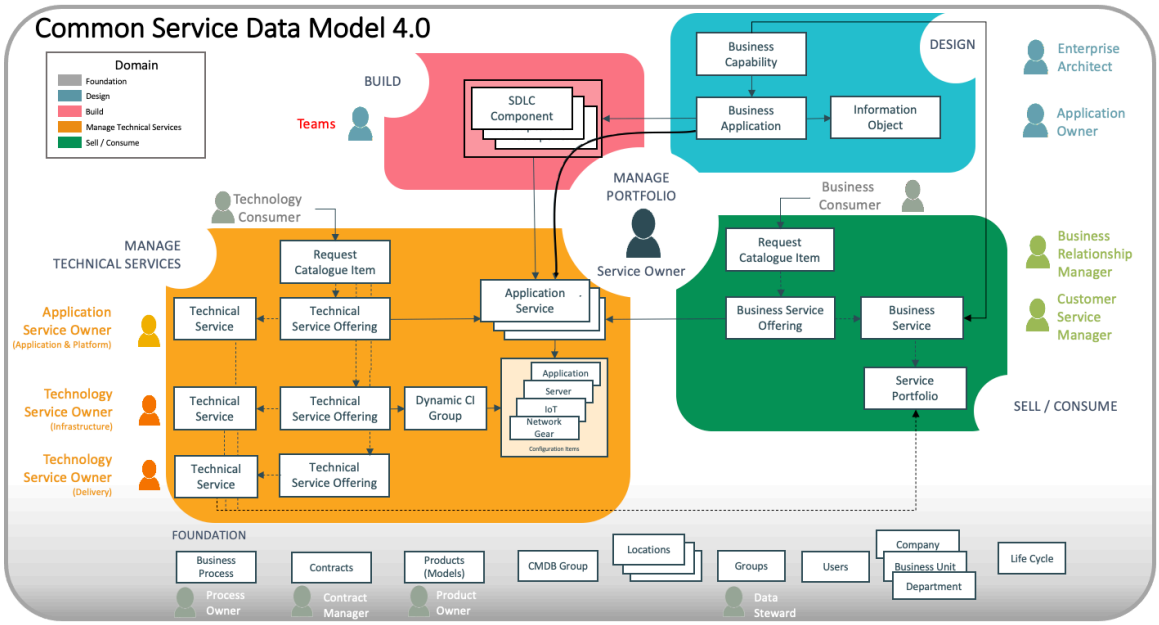

CSDM benefits

Benefit	Value and associated features
Rationalization — Determine how well an enterprise application is performing	Identify insights from operational activities related to services (visualize aggregated information across all your services and supporting operations). Application Portfolio Management (APM) and IT Business Management (ITBM)
Outage reduction — Identify affected business services quickly	Prioritize critical events based on service-related information. IT Service Management (ITSM) and Event Management
Reporting — Consistent and reliable information about your services and digital products	Understand Services, their makeup and accountabilities. IT Service Management (ITSM)
Alignment — Align business processes to reduce risk and assure compliance	Understand Service Health (availability, CSAT, Performance, Vulnerabilities, IPC stats) Governance, Risk, and Compliance (GRC)

CSDM videos in the ServiceNow Community

Playlist of all videos

Common Service Data Model — conceptual model

The CSDM is the data framework that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB ensure that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

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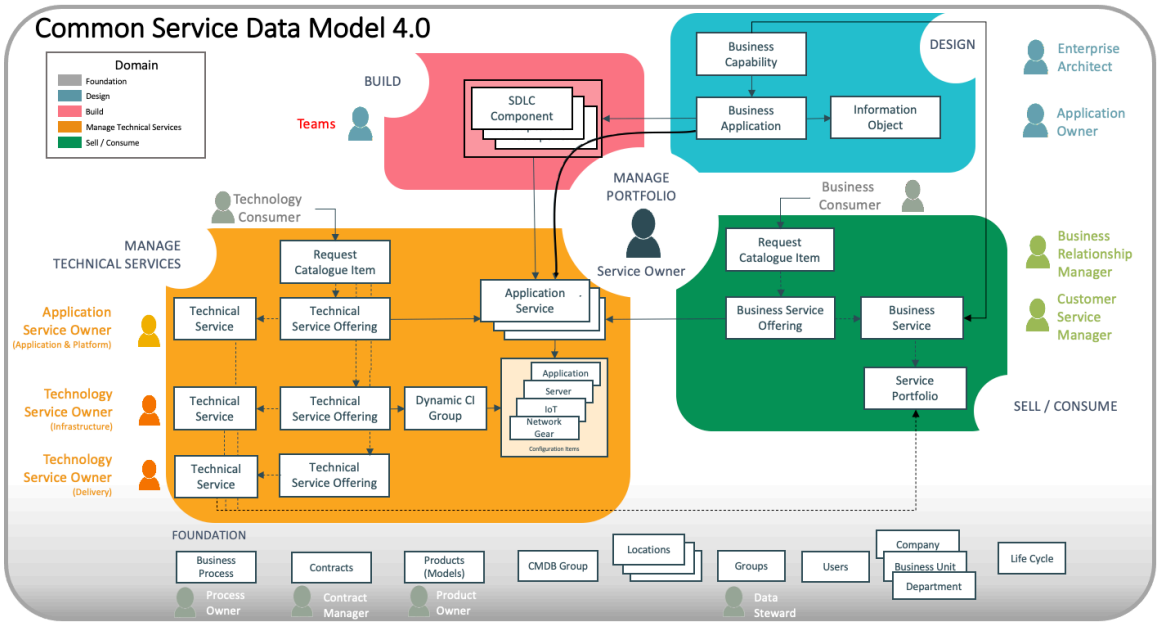
CSDM domains: Details

Each domain is associated with one or more products, services, or service types, each of which you can extend as needed. Every box in the diagram (except Request Catalog Item) represents CIs in the CMDB. Roles and user types appear next to their area of responsibility.



BUILD

Development details on the enterprise applications (digital products) to be deployed and used by the business. These are not operational CIs.

DESIGN

Details on the design and planning of digital products. These are not operational CIs.

MANAGE TECHNICAL SERVICES

— Deployed instances of digital products and their related and discoverable components.
— Documentation of the services that provide and support the deployed instances.
— Tables used by ITOM products

SELL/CONSUME

— The portfolio and request catalog of business service offerings that depend on the deployed digital products.
— Tables used by Service Portfolio Management (SPM) and Customer Service Management (CSM).

FOUNDATION

Tables that contain base data that is referenced from or to objects in the other CSDM domains. Foundation data is required before you can use ServiceNow products or add data to the CMDB.

Foundation domain

The Foundation domain involves tables that contain base data that is referenced from or to objects in the other CSDM domains. Foundation data is required before you can use ServiceNow products or add data to the CMDB. See Foundation domain of the CSDM framework

Design domain

The Design domain supports the design and planning of digital products. CIs in the Design domain aren't operational, so you can't select them for Incident Management, Problem Management, or Change Management. Enterprise architects and application owners are the typical users of tables in this domain. See Design domain of the CSDM framework.

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Build domain

The Build domain involves the tables that are used in the build effort (systems development life cycle — SDLC or Agile Development) of digital products like DevOps. The tables represent the logical development details of the enterprise applications (digital products) to be deployed and used by the business. These are not operational CIs. See Build domain of the CSDM framework.

Manage Technical Services domain

The Manage Technical Services domain involves the tables used by IT Operations Management (ITOM) products such as Service Mapping and Discovery. These are deployed instances of digital products and their related and discoverable components and documentation of the services that provide and support the deployed instances. See Manage Technical Services domain of the CSDM framework.

Sell / Consume domain

The Sell/Consume domain involves the tables used by Service Portfolio Management (Service Portfolio Management) and Customer Service Management (CSM). This is the portfolio and request catalog of business service offerings that depend on the deployed digital products. See Sell/Consume domain of the CSDM framework.

Manage Portfolio domain

The Manage Portfolio domain is a layer on top of the CSDM conceptual model that interacts with the other CSDM domains. The typical user, a service owner, might be responsible for services in more than one domain. See Manage Portfolio domain of the CSDM framework.

Services and service types

A service enables you to achieve the outcomes that you want with minimal risks and without ownership of specific costs and risks. This definition is consistent with the base definition of "service" in ITIL v3 and IT4IT. Services typically have three components: the interaction, the offering, and the service system.

The ServiceNow AI Platform includes the following base-system service types that you can extend to align with the service types in your organization.

Application services (Application Service table [cmdb_ci_service_auto])

Application services are logical representations of a deployed application stack. Because application services are logical in nature, they should use the Logical life-cycle value pairs. Application services follow the same life cycle guidance as any other logical CI.

- An application service is an operational CI and a unique instance of an application.
- Used in Incident, Problem, and Change.
- Can be created for each region and each environment (Development, QA, and Production).
- Can be created via manual mapping, service mapping with entry point, and dynamic query.

For more information about leaf nodes and structured hierarchies, see Design domain of the CSDM framework.

Business services (cmdb_ci_service_business)

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A business service is a service type that is published to business users. A business service typically implements one or more business capabilities.

Usually, business users order business services. Business users can select the desired offering and service commitment levels via the Service Catalog. For example, procurement, shipping, and finance.

- A business service is an operational CI.
- A business service must be a one-level service and not a hierarchy of business services.
- A business service can be used for impact in Incident, Problem, and Change and for approvals for Change.
- A business service must be focused on the consumer or seller.

See Sell/Consume domain of the CSDM framework.

Technical services (cmdb_ci_service_technical)

Technical services are the systems associated with the admins of CIs in the Manage Technical Services domain: Application service owners, Technical service owners, and Technology service owners). Technical services are typically lower-level leaf nodes of one or more business services or application services in a structured hierarchy.

- Technical services are operational CIs.
- A technical service must be a one-level service and not a hierarchy of technical services.
- Technical services are used for impact in Incident, Problem, and Change. Also used for approvals for Change.
- Technical services must be provider-focused and include the technology provided for the business to consume or sell.

See Manage Technical Services domain of the CSDM framework.

CSDM videos in the ServiceNow Community

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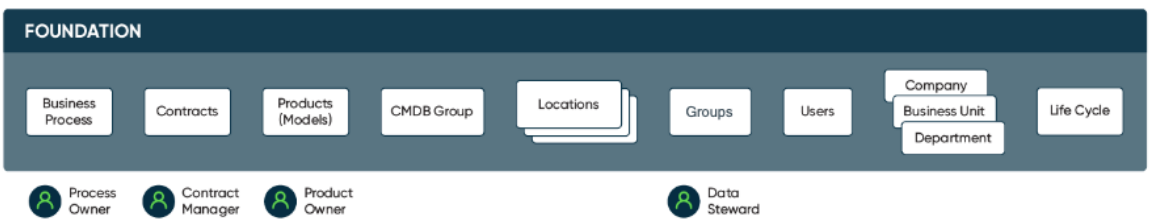
Foundation domain of the CSDM framework

The Foundation domain involves tables that contain base data that is referenced from or to objects in the other CSDM domains. Foundation data is required before you can use ServiceNow products or add data to the CMDB.

The tables in the Foundation domain aren't used in Configuration Management Database (CMDB) relationships. Instead, the tables contain critical referential data. Typical users of the domain are process owners, data stewards, product owners, and contract managers.



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Business process

A business process has a well-defined start and finish. Examples of business processes in the banking industry are the customer onboarding process and the credit check process. Each business process can have levels of criticality and impact. Business processes are stored in the cmdb_ci_business_process table.

In a parent-child relationship, business processes can be identified by using the parent attribute as a reference to a parent business process.

The business process is a manually-maintained CI that can identify declared and determined criticality as well as impact to confidentiality, integrity, and availability. Business processes can be reviewed monthly, quarterly, semi-annually, or annually. In addition, the next review date can be recorded. For further information, see Business process management and Create a business process.

Contracts

A contract is a binding agreement between two parties. In the ServiceNow AI Platform, contracts contain detailed information such as the contract number, start and end dates, active status, terms and conditions statements, documents, renewal information, and financial terms.

- A contract is not a CI. Contracts use contract model types from the Product Models module. Contracts are stored in the [ast_contract] table.
- Use the Contract Management application to manage and track contracts. See Contract Management application.
- In the Service Level Management application, contracts group together SLAs that relate to a single vendor or customer, as well as the CIs, locations, groups, users, and child contracts that are related to the contract. For more information, see Define a service contract.
- Service contracts used by Vendor Management Workspace can support hardware CIs as part of an SLA.
- In the Customer Service Management product, service contracts define the type of support that customers receive. A contract can include an account and contact or a consumer and the specific assets that are covered. A contract can also include multiple service entitlements and SLAs. See Define a service contract in Customer Service Management.

Products and product models

A product model is a specific version or configuration of a product used to manage and track applications on the ServiceNow AI Platform. Product models identify the product owner, team, product status, compatibility with other products, reference to product catalog, and reference objects in the various stages of a product's life cycle. For more information, see Product catalog.

Additionally, you can identify the products reaching end-of-life as defined by third party providers or internal product owners. You can also bundle other products as components to represent the set of products that your organization develops, sells, or uses.

Product models are extended into seven base types: application model (version agnostic), software model (version specific),contract model, facility model, hardware model, consumable model, service model. Products might be bundled to create a collection or group of products, for example a FlashBlade server (hardware model), or a 24/7 support service (service model).

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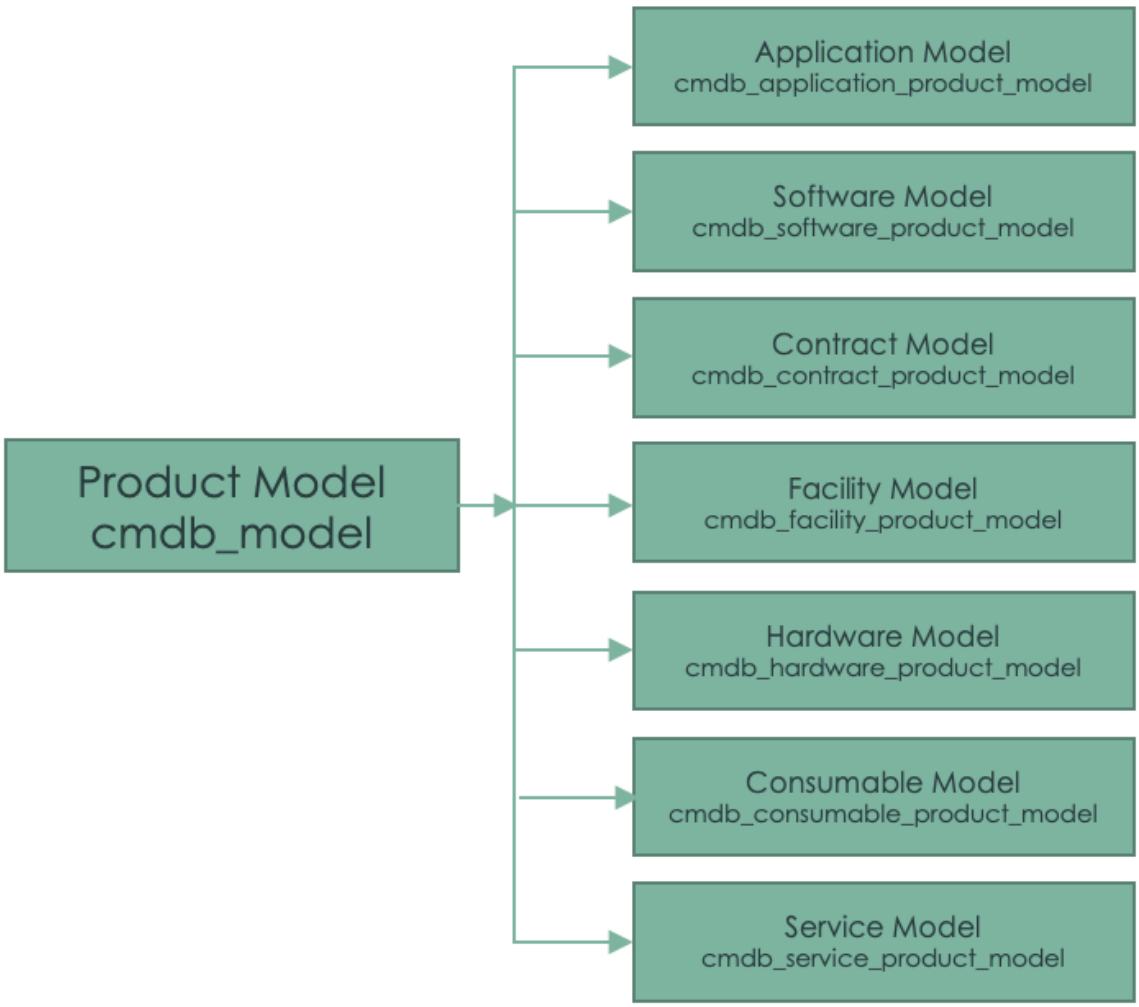

Product models are stored in the [cmdb_model] table or the extended tables aligned to the seven base types. The product model tables are not CIs. Configuration items can use the **Model ID** attribute to reference product models. For example, a service offering CI might reference a particular service model that other service offerings of the same type also reference.

Application, service, and software class instance CIs aren't created through Discovery, so their **Model ID [model_id]** values might not refer to product model records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. See Auto-generate product models for logical CIs.

CMDB group

A CMDB group is a collection of CIs (but is not, itself, a CI). A group is based on the results of saved Query Builder queries, encoded queries, or manual entries. You can apply an action to all members of a group at one time.

You can work with a CMDB group across the ServiceNow AI Platform.

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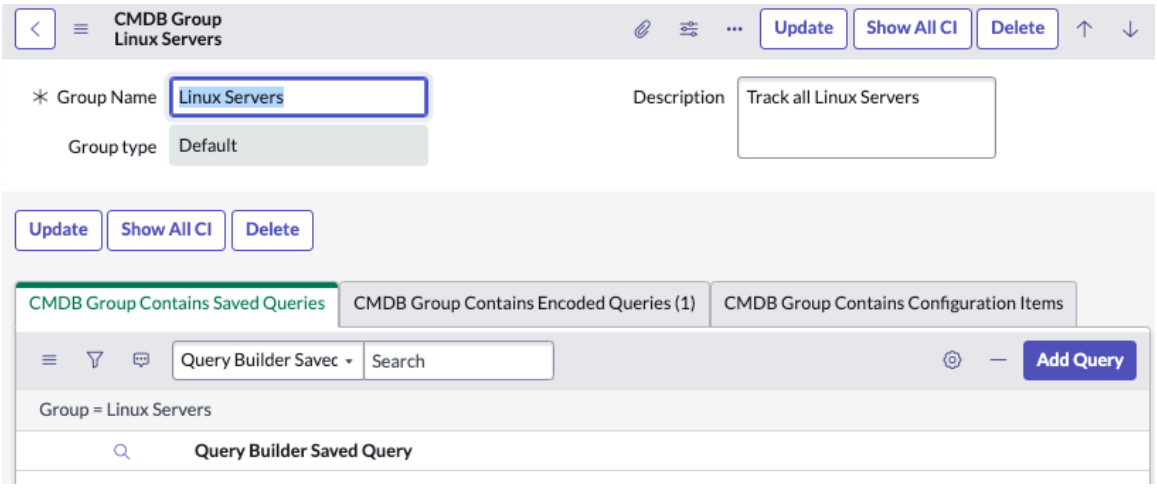

- For the CSDM, the Dynamic CI Group references a CMDB group to provide a list of CIs based on a common criteria.
- CMDB groups are stored in the table [cmdb_group].
- The CMDB group can potentially replace the spreadsheets that you might be using to group your CIs.

For additional information, see CMDB groups.

Life-cycle states

Life-cycle states track the life cycles for products, assets, contracts, CIs, locations, and other objects. Using the standard CSDM life-cycle values consistently helps you to effectively track objects through their transitions over time. Reporting can therefore accurately reflect the actual states of CIs: usage, availability, end of support, and so on.

See the ServiceNow Community video: CSDM V4 product and life cycle discussion

The standard CSDM life-cycle value pair covers all phases of a product instance life cycle.

- A *`Life cycle stage`* is one of the broad phases that a CI moves through, from inception or procurement to retirement and end of life.
- *`Life cycle stage status`* is the specific status of a CI within its current life cycle stage.

For example, a hardware CI in the **Operational** stage might change status over time from **In Use** to **In Maintenance** to **End of Support**. A different hardware CI might go from **In Use** to **End of Support** without ever having been in **In Maintenance** status.

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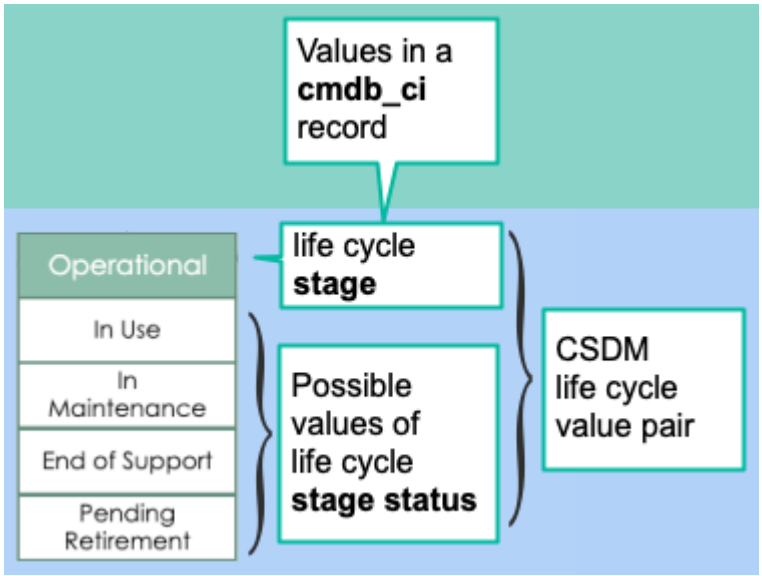

When you enable the CSDM framework, you can start using the *Life Cycle Stage* and *Life Cycle Stage Status* fields to track an asset's life cycle. To use the fields, follow the procedure described in Second activation step — Activate the CSDM plugin. The following life-cycle processes can use life-cycle fields:

- Product life cycle
- Hardware life cycle
- Logical life cycle
- Document life cycle
- Location life cycle

Legacy life-cycle statuses are auto-updated

The following legacy statuses are automatically mapped to the *Life Cycle Stage* and *Life Cycle Stage Status* fields when you follow the procedure described in Second activation step — Activate the CSDM plugin.

Important:
Legacy fields are not deleted after you implement the *Life Cycle Stage* and *Life Cycle Stage Status* fields.

- Product Model Status
- Asset State
- Asset Substate
- Contract Status
- CI Install Status
- CI Operational Status
- CI Hardware Status
- CI Hardware Substatus

Map your existing life-cycle values to CSDM life-cycle states

Use the Life Cycle Mapping module (**CSDM** > **Life Cycle Mapping**) to specify how your existing life-cycle values should be converted to CSDM life-cycle value pairs. The mapping ensures

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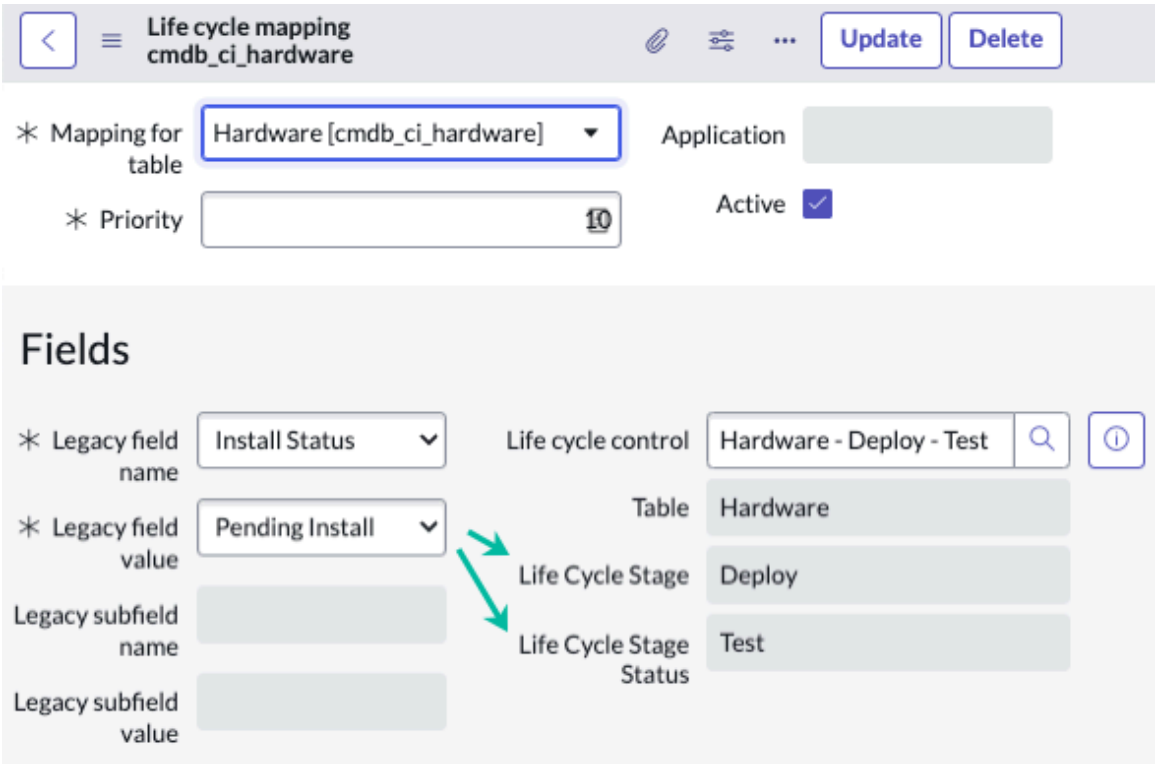
ServiceNow AI Platform products "see" legacy CIs in your environment. In this example, the existing **Pending Install** value of the **Install Status** attribute for hardware CIs will always map to the **Deploy/Test** life-cycle value pairs in the CMDB. See Specify how to map legacy life-cycle states to CMDB states and Activate life cycle migration.



Common data

Common data elements are not configuration items. Common data is shared and used throughout the ServiceNow AI Platform. Common data includes organizational structure (Company, Business Unit, Department), locations, groups, and users. Many ServiceNow AI Platform products depend on common data to provide business value.

Planning your common data is essential to the effective implementation of ServiceNow AI Platform products and features. Consider the following issues:

- Do you have a trusted source for the data?
- Do you have multiple data sources?
- How often does the data change?
- Do you have the depth of data that the CIs require?
- Who maintains the data?

Common data is stored in the following tables:

- Company: [core_company]
- Business unit: [business_unit]
- Department: [cmn_department]
- Location: [cmn_location]
- Groups: [sys_user_group]
- Users: [sys_user]

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Location management

Data that comes from multiple sources and federated integrations is difficult to maintain. The following attributes have been added to the location (cmn_location) table to simplify management:

- **Source**: The origin of the location record.
- **Location type**: The position of the location record in the hierarchy of locations. You can use the following options to create a hierarchy of location data to suit your requirements: Region, County, State/Province, City, Site, Building/Structure, Floor, and Room.
- **Managed by group**: The group that governs or manages this location record.
- **Validation** (duplicate and primary): Flag duplicate records and manually filter locations that are not be displayed.
- **Life cycle stage** and **Life cycle stage status**: See Life-cycle states.

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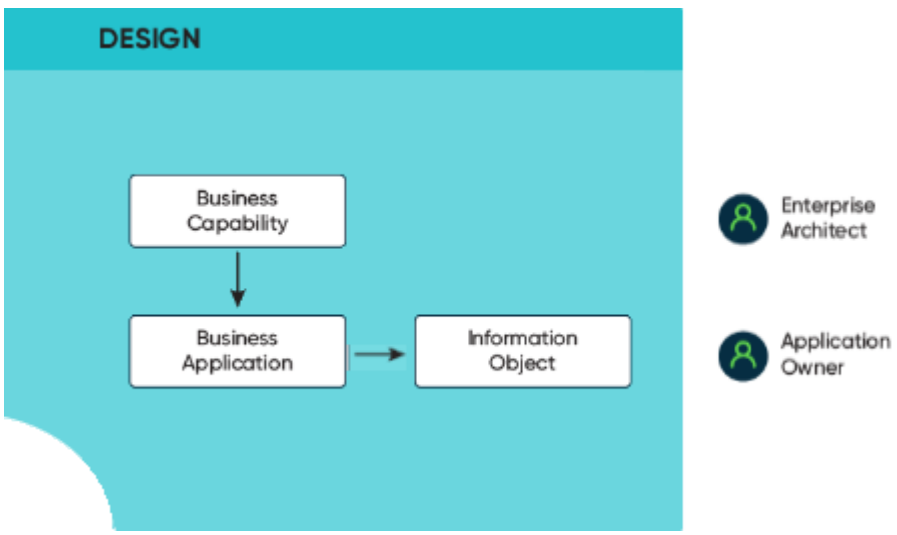
Design domain of the CSDM framework

The Design domain supports the design and planning of digital products. CIs in the Design domain aren't operational, so you can't select them for Incident Management, Problem Management, or Change Management. Enterprise architects and application owners are the typical users of tables in this domain.

Tables used in the Design domain

The Design domain includes the tables used by Application Portfolio Management (APM). You use APM to rationalize and manage your business applications, but you're not required to use APM to benefit from the data in these tables.

- Business capability table [cmdb_ci_business_capability]
- Business application table [cmdb_ci_business_app]
- Information object table [cmdb_ci_information_object]



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Relationships between CIs that support decision making

An accurate service model that includes the following relationships can serve as the foundation for strategically aligned architectural decisions. The relationships enable you to determine the risks involved in using particular business capabilities. In addition, they enable you to assess services based on their relationships to business capabilities and business applications.

Relationship between a business capability and its supporting business applications

This relationship supports visualization and reporting.

- A business capability is a high-level capability that supports a business model or fulfills a mission for your organization.

  A business capability typically describes a specific task that achieves one or more business outcomes. Business capabilities are often listed as verbs (for example, manage financials or provide IT support services). You can use business capabilities to rationalize and prioritize the cost of business applications and business services.

- A business application represents the software and infrastructure that provides a business function (for example, the titles catalog). Business applications are not strictly required, but they are strongly recommended because they increase productivity and perform other business functions such as accounts payables, accounts receivables, and general ledger. You can use APM to add any business application for which you must track costs, usage, business value, functionality, and risks.

Relationship between a business application and the application services

The relationship connects the record of the business application that is used in planning and design with where and how it's realized operationally, represented by application services. The relationship accounts for each use of a business application in the development, test, and production environments (dev, test, and prod application service instances). Often there are multiple production deployments. For example, a large retailer uses a business application that runs a cash register in each of its 1,000 stores. There are therefore 1,000 production instances of the application service — one per store — for that one business application. See the "CSDM in a nutshell" video for additional discussion of the relationship.

Business capabilities represented in a hierarchy

You can represent business capabilities in a hierarchy of a parent business capability and one or more lower-level (child) capabilities. Child capabilities (leaf nodes) are represented by numeric values: 1.0 for the parent and 2.0 through 6.0 for the leaf nodes. If you add, update, or delete a capability at a leaf node, be sure to update the levels of all the capabilities for the leaf nodes in that hierarchy, as applicable. If a business capability hierarchy requires more than six levels, divide the structure into multiple business capabilities.

Use the Business Capability form to create, modify, and extend business capabilities.

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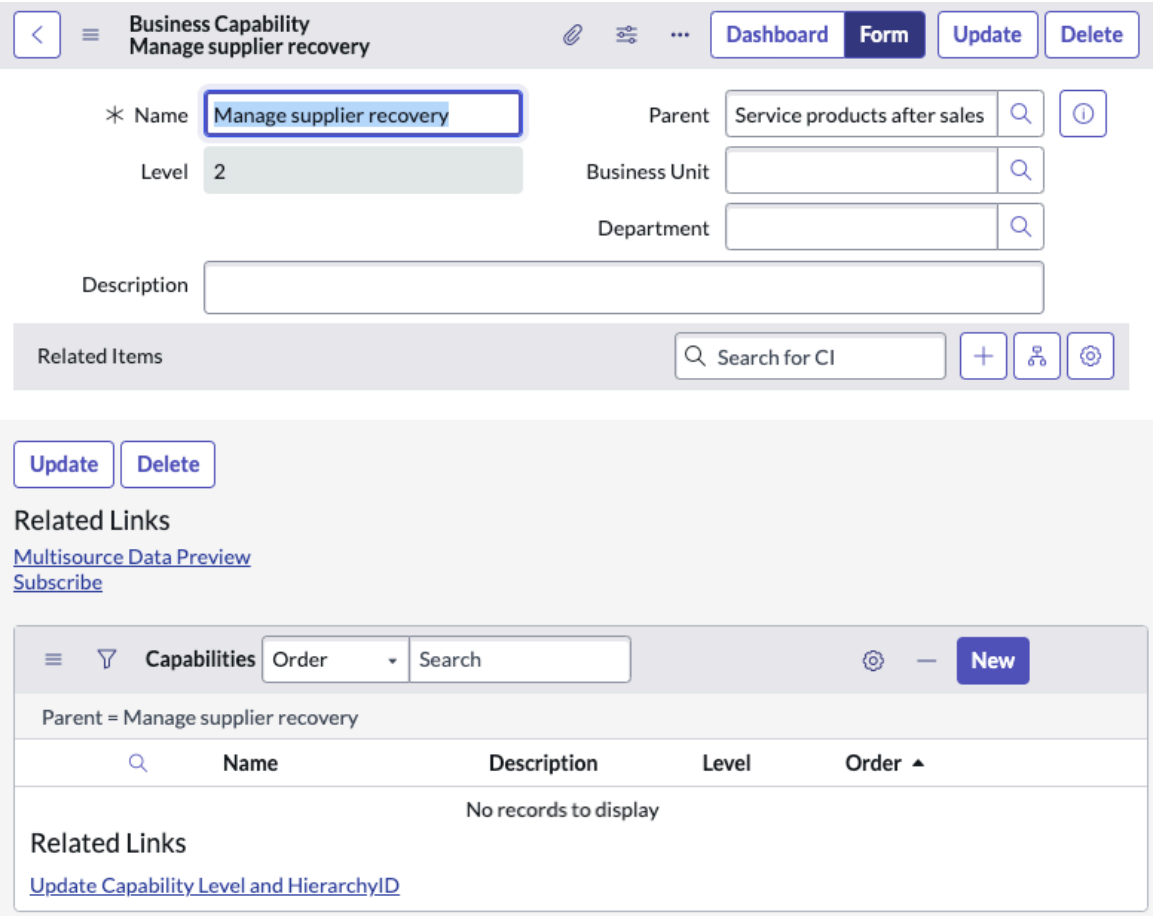

To update capabilities, select the **Update Capability Level and HierarchyID** related link. Follow these guidelines when you update capabilities to ensure that the capability map reflects the change:

- If the parent capability is updated in the hierarchy, the levels of all its leaf node capabilities are recalculated.
- The total number of leaf node levels in a hierarchy can't exceed six.
- When adding a capability, the hierarchy level is automatically assigned based on the parent capability level.
- You can delete only leaf node-level capabilities or capabilities without leaf node levels.
- Don't create circular relationships. For instance, when creating a parent capability, a leaf node capability can't be its parent.

Adding a Business application

A business application is a manually managed CI class. You must therefore manually create required relationships to CIs (for example, with instances of the application services in use). Creating relationships also enables you to relate business applications to infrastructure CIs such as databases and web servers. If needed, you can integrate or connect two or more business applications to establish their relationship.

A business application can span the following entities:

- Environments (for example, Development, Test, or Production).
- Geographies (for example, the Americas, the Asia Pacific Japan (APJ)
- Regions (for example, Europe, the Middle East, and Africa [EMEA]).

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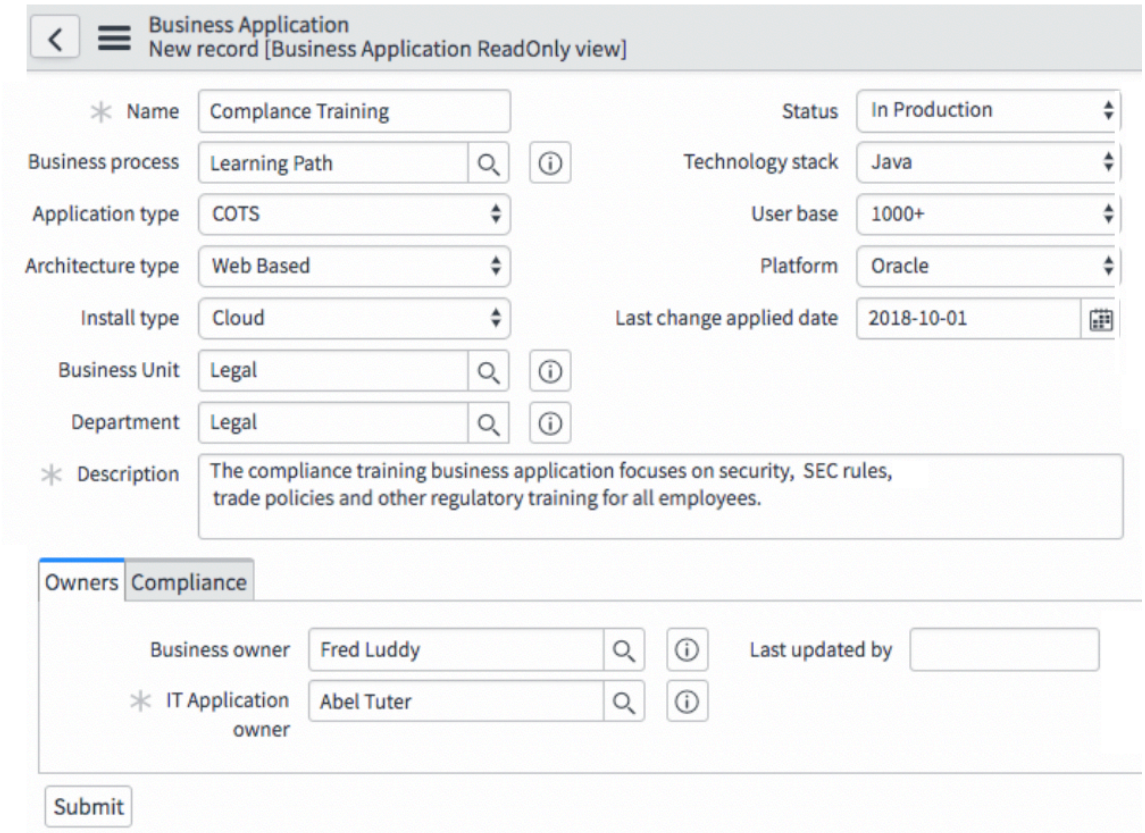
Use either of the following methods to add a business application:

- Import the list of applications from a spreadsheet or third-party tool. To import data, define a data source and a transform map and then run or schedule an import.
- Use the Business Application form.



Information object

- An information object is a CI that displays and describes the information (or type of data) that the application receives from the database. Information objects are part of the information portfolio and are referenced by the business application.
- Information objects are mapped to the information object table [cmdb_ci_information_object].
- You can use the information object table to identify the types of data that a business application uses, including highly sensitive data such as:
  - Personally Identifiable Information (PII)
  - Payment Card Industry Data Security Standard (PCI DSS) data
  - Health Insurance Portability and Accountability Act (HIPAA) data

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Build domain of the CSDM framework

The Build domain involves the tables that are used in the build effort (systems development life cycle — SDLC or Agile Development) of digital products like DevOps. The tables represent the

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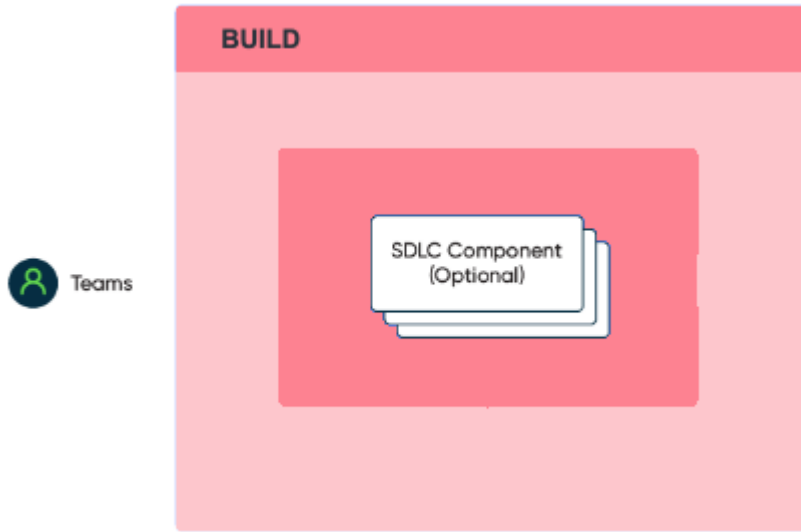
logical development details of the enterprise applications (digital products) to be deployed and used by the business. These are not operational CIs.

SDLC component CI records in the SDLC Component table [cmdb_ci_sdlc_component] enable the DevOps product to provide enhanced capabilities for visualizing and managing your application development pipeline.

Records in the table are not operational and are not direct targets of the ITSM Incident Management, Problem Management, or Change Management processes. You therefore are not required to configure SDLC component records.

The tables in the build domain reference the logical development details of the enterprise applications to be deployed and used by the business. A common persona in this domain is Teams. The SDLC Component table is available through the CMDB schema version 1.33.



SDLC component

An SDLC component is a CI that represents a unique development effort of code. It represents parts of a larger business application or digital product broken down into its individually developed components. In other words, the SDLC component is a software element of a larger application or technology.

Types of SDLC components:

- Application: An application service is a deployed instance of the SDLC application component. Examples include micro services and APIs. The build team typically builds application services on behalf of the Service Owner (as described in Manage Portfolio domain of the CSDM framework.
- Infrastructure: Any infrastructure CI that represents a snapshot of its configuration details is a deployed instance of the SDLC infrastructure component. Examples include database and security configurations.

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Manage Technical Services domain of the CSDM framework

The Manage Technical Services domain involves the tables used by IT Operations Management (ITOM) products such as Service Mapping and Discovery. These are deployed instances of

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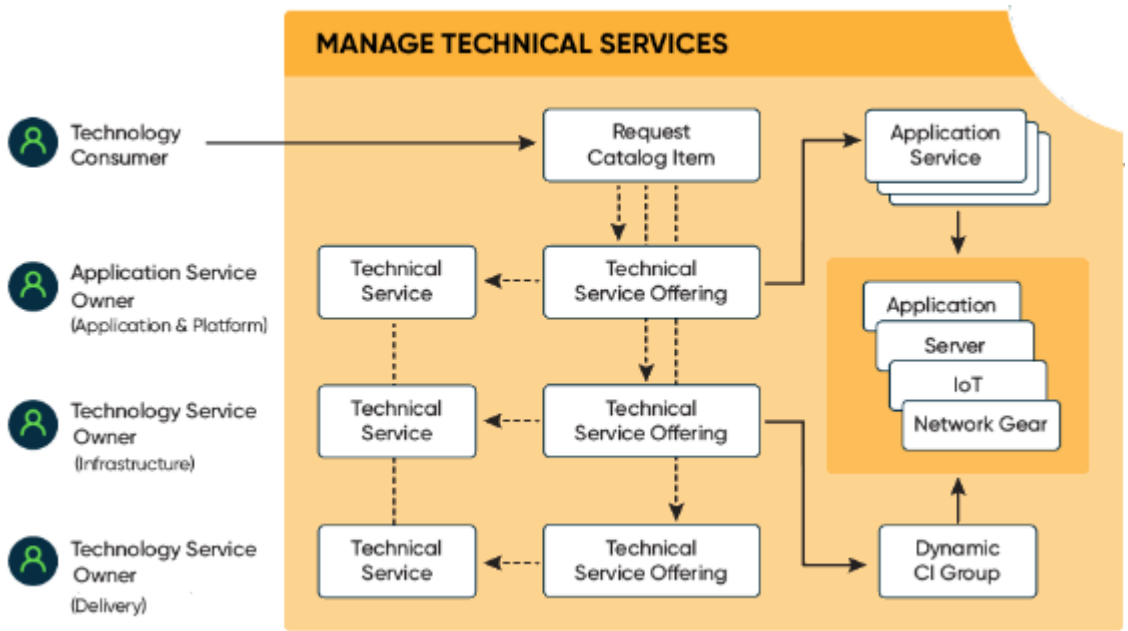
digital products and their related and discoverable components and documentation of the services that provide and support the deployed instances.

The CIs in this domain are discovered items such as installed applications, servers, and network components. The Manage Technical Services domain also represents the portfolio of technical services in use. These services are operational, which means that you can select them for ITSM Incident Management, Problem Management, or Change Management.

Typical users are application service owners (for the application and platform) and technology service owners (for the infrastructure and delivery). Technology consumers can request technical service offerings through the request catalog. Catalogs are described in detail in Service Catalog.



The tables in the Manage Technical Services domain represent the technology that your business sells or consumes in the provider view. While you aren't required to use Service Mapping and Discovery to populate the tables, those products accelerate the process and minimize errors. They also enable you to manage CIs and their relationships. The domain includes the following tables:

- Technical service table [cmdb_ci_service_technical]
- Technical services in Event Management use the Dynamic CI group table [cmdb_ci_query_based_service].
- Request catalog
- Technical service offering table [service_offering]
- Dynamic CI group table [cmdb_ci_query_based_service]
- Mapped Application Service table [cmdb_ci_service_discovered] (included in the base system)

Technical services

Technical services are associated with service owners and are typically layered under one or more business or application services. A technical service may have one or more technical service offerings.

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Technical service users can view and manage the technologies that you provide to the business. Event Management enables you to monitor service performance. You can also use Event Management to identify health issues for related infrastructure CIs and application services.

Technical services can be managed as part of the Service Portfolio in the Sell/Consume domain (that is, a Service Portfolio hierarchy can be referenced from a Technical Service). This allows for a more complete hierarchy and management of both Technical Services and Business Services within the Service Portfolio Management workspace and related workspaces. You can make better decisions when you know how spend on technical services can improve performance and reliability of your business services.

Note:
Business services and technical services connect to the spm_service_portfolio through the spm_taxonomy_node. See Service Portfolio Management taxonomy.

Technical service offerings

Technology consumers can request technical service offerings (SO) through the request catalog. Catalogs are described in detail in Service Catalog. The consumer can typically select the following features and options:

- Level of performance
- Location or geography
- Environment
- Pricing
- Availability
- Capability
- Support group (for incident)
- Technical approval group (for change)
- Packaging options (commitments)

Technical service offerings typically have the following components:

One or more service commitments

A service commitment defines the service delivery obligations agreed to between the consumer and the provider. Service commitments uniquely define the level of service in terms of availability, criticality, scope, pricing, and other factors. For example, an organization may offer two levels of support for an application service:

- Support for a production-level offering: Provides a high level of availability and criticality for production instances. Includes a 24/7, 5-minute response time guarantee (24 hours per day seven days per week).
- Support for a non-production-level offering: Limited availability and criticality for non-production instances. Includes a 60-minute response time guarantee between 8:00 a.m. and 5:00 p.m., Monday through Friday.

A service offering subscription that records which users have access to an offering

Technical service offerings that are mapped to the [service_offering] table are classified as “technical service" and are derived from the service. The technical service offering is based on how the parent serves a specific technical need. Every operational technical service should have at least one technical service offering.

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Each CI associated through a Dynamic CI Group can be related to only one Technical Service or Technical Service Offering. Conflicts can result when one service includes multiple offerings with different SLAs, OLAs, Support Groups, and commitments.

Dynamic CI groups

A dynamic CI group is comprised of CIs that result from a CMDB Groups query. For example, you can create a dynamic CI group based on location: "all web servers in Detroit" or "all Oracle databases in Mumbai".

Note:
Dynamic CI groups contain only CIs and can't contain other CI groups.

Dynamic CI group are mapped to the [cmdb_ci_query_based_service] table and are classified as either application service or technical service, as applicable. You might want to use dynamic CI groups in the following situations:

Query-based application service

You don’t have Service Mapping enabled yet, but you have 12 servers and three database instances in MyAppServiceProd. You can replace your spreadsheets with a dynamic CI group as an application service.

See Populate an application service using the Dynamic CI Group method.

Managed group of Infrastructure CIs

The web servers in Detroit are managed by the DetroitRockCity Technical Service Offering. Instead of manually creating relationships from Technical Service Offerings to Infrastructure CIs, use a Dynamic CI group. A single relationship from your Technical Service Offering CI (DetroitRockCity) to your dynamic CI Group (web servers in Detroit) gives you the visibility you need.

A way to manage patches for your CIs

In Change Management, you can select the dynamic CI group for the CIs you need to update and use a business rule to auto-populate the **Affected CI** field.

Application services

An application service is a logical representation of a deployed system or an application stack. Using application services, you can view maps and change history for services. For example, the Event Management application can monitor service performance and identify health issues for application services.

Application services can be internal, like an organization's email system or customer-facing, like an organization's website. For example, creating financial reports through a web-based application requires a computer, web server, application server, databases, middleware, and network infrastructure. The applications and hosts are configured to offer the service of financial reporting. An application service represents an instance of such a business application or system in the development, test, or production environment.

Application services are the entry points for the Service Mapping feature. Application services underpin a business or technical service and are mapped to the CMDB Application Service table [cmdb_ci_service_auto] for common reporting.

Application services are key relationship entities for IT Service Management (ITSM), IT Operations Management (ITOM), Strategic Portfolio Management (SPM), and Customer Service Management (CSM).

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Application services include relationships between business applications, business services, technical services, applications, and infrastructure CIs. You can expose an application service by using the related business or technical service offering.

The table that an application service maps to depends on the method used to create it:

Methods mapped to tables

Method used to create the application service	Mapped to table
Top Down Discovery (Service Mapping)	cmdb_ci_service_discovered
Dynamic CI Group (Query-based)	cmdb_ci_query_based_service
Tags	cmdb_ci_service_tags
Manual (using the Create an Application Service form)	cmdb_ci_service_discovered

- For more information about application services and the methods you can use to create them, see Application services and Create an application service.
- You can specify required attributes for application services. See Specifying attributes and relationships for Application Services and Modify the attributes and relationships required for application services.
- You can set a relationship between an application service and the components of other CSDM domains. See Service Mapping.

Applications

An application is any program or module that defines behavior and performs a specific function. Applications are typically discoverable instances and provide a specific set of functions for one or more services.

- The application table and extended tables contain uniquely discovered instances of code in use on the host.
- Applications are considered infrastructure CIs.
- The instance is limited to the applications on a single host. This limitation ensures that applications are uniquely identified during discovery.
- There's a one-to-many (and not a one-to-one) relationship between the application and the application service. A single installed application, such as a database instance, may support multiple application services depending on the configuration and the use of the applications.

Note:
The application table [cmdb_ci_appl] isn't an inventory or portfolio of your applications. Don't make the mistake of storing managed application details in the application table. Those details (inventory or application portfolio objects) belong in the business application table (as documented in Design domain of the CSDM framework).

Infrastructure CIs

Infrastructure CIs are managed physical and logical components. A CI can be a single module, such as a server, database, or a router or a complete system such as a web server, database, or infrastructure.

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The underlying infrastructure components or CIs can be complicated. The complexity increases as data structures are layered on top of physical CIs. For that reason, you should work with a business relationship manager or enterprise architect to define your business capabilities and business applications.

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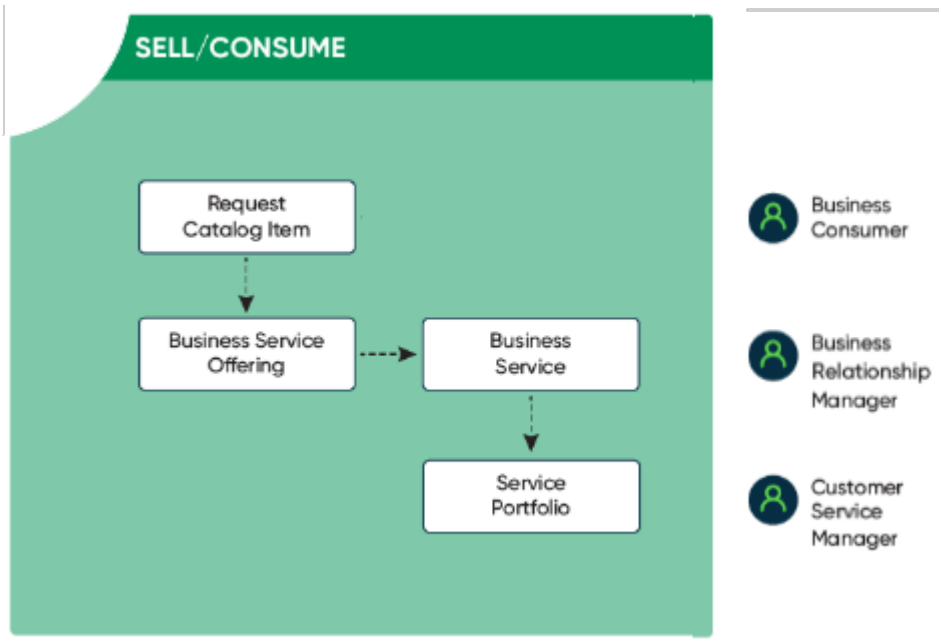
Sell/Consume domain of the CSDM framework

The Sell/Consume domain represents the portfolio of business services that may sell or consume elements of the Manage Technical Services domain. The Sell/Consume domain involves the tables used by Service Portfolio Management (Service Portfolio Management) and Customer Service Management (CSM). This is the portfolio and request catalog of business service offerings that depend on the deployed digital products.

Typical users are the business relationship manager and the customer service manager. Business consumers can request business services through the request catalog. Catalogs are described in detail in Service Catalog. You're not required to use Service Portfolio Management or CSM to use the referenced tables, however those products enable you to manage workflows and report service-related data.



The Sell/Consume domain includes the following tables:

- Business service offering table [service_offering].
- The Business Service table [cmdb_ci_service_business] extends the core Service table [cmdb_ci_service].

  Note:
  Before the Business Service table was added, all Business Services existed in the Service table. In the future, all Business Services might migrate from core cmdb_ci_service to cmdb_ci_service_business. Until then, both tables operate identically.

- Service portfolio table [spm_service_portfolio]. The Service portfolio table is not a CMDB table.

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You can select the tables in the Sell/Consume domain to use with Incident Management and Change Management.

Business service offerings

Business service offerings are the starting point for configuring Service Portfolio Management. Business service offerings inherit from Business Services. Business service offerings consist of one or more service commitments that define the level of service in terms of availability, scope, pricing, and other factors. For example, an organization might offer two levels of desktop support:

- A silver offering of upgrades and virus protection.
- A gold offering with the silver commitments plus a response time guarantee of 30 minutes between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday.

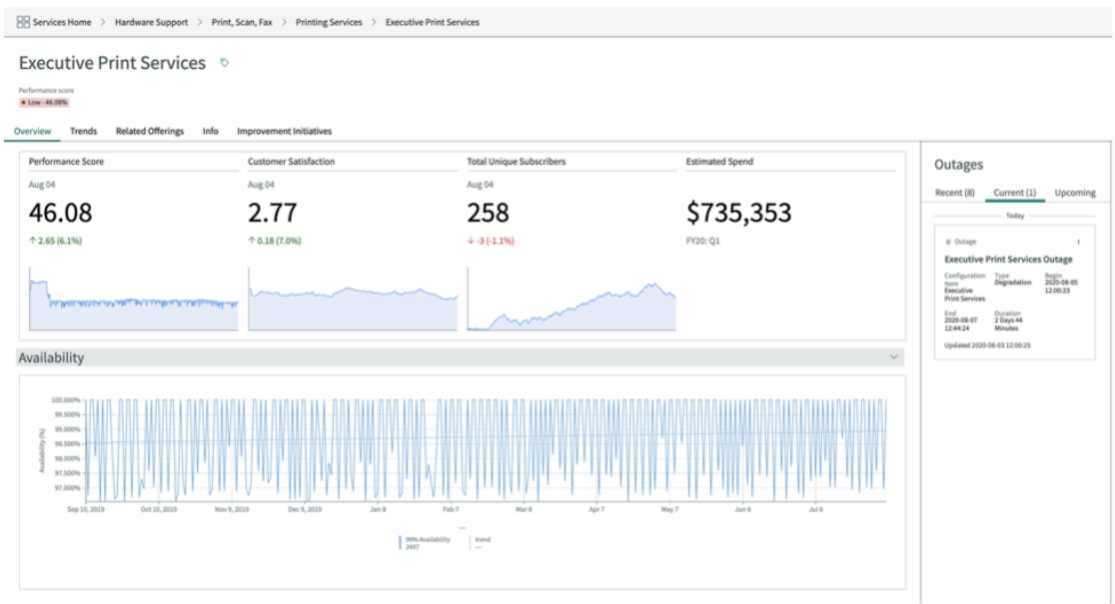
Note:
Business services and technical services connect to the spm_service_portfolio through the spm_taxonomy_node. See Service Portfolio Management taxonomy.

Business service offerings have the following characteristics:

- Business service offerings tailor the service by capability, availability, pricing, and packaging options. You can use the service offering to set different levels of performance and features for a particular service.
- Business service offering commitments define the agreed-upon service delivery obligations.
- Business service offering subscriptions record which users have access to an offering.
- Business service offerings are the CMDB records that identify the specific business area and the entity where the service is delivered. Some business services and service offerings depend on the application service.
- Business service offerings are derived from the service and are refined depending on how the parent serves a particular business need.

Note:
You should configure at least one service offering for each operational business service or technical service.

You can view your business service offerings in the Digital Portfolio Management (DPM).



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Business service offerings typically have different service-level agreements (SLAs) depending on their commitments. Without a business service offering, SLAs remain at a process level only. For example, the SLA stays at a P1 incident or a minor change, and doesn't refer to the affected service offering.

You can represent business services and business service offerings as catalog items in the service catalog to make them available for consumers.

Business services

A business service is associated with business users and is typically layered beneath one or more business capabilities. A business service can contain one or more business service offerings.

Business consumers can use the request catalog to order business services, business service offerings, and service commitment levels. Catalogs are described in detail in Service Catalog. Business services are mapped to the [cmdb_ci_service_business] table and are classified as "business services."

Service portfolios

A service portfolio is a hierarchical collection of business services, products, projects, or applications. A portfolio can represent a strategic business objective and enables you to manage all included items as a group (for example, life cycles). Items are organized into the following categories:

- Objective (business intent)
- Capability
- Organization (for example, enterprise resource planning [ERP] or financial management)
- Geography (location)

Request catalogs

A request catalog enables consumers to order and manage business and technical products, services, service commitment options, and offerings (for example, the Human Resources [HR] service catalog). Catalogs contain catalog items and are the starting point for consumers to access available services.

Catalog Item

A catalog item is an item or a service that a consumer can request from the catalog. A service can contain multiple catalog items (for example, the employee onboarding catalog). Catalog items are listed on the service portal and are available to the users that need them (either through subscription or job responsibility). Each catalog item is linked to one service offering.

CSDM videos in the ServiceNow Community

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Manage Portfolio domain of the CSDM framework

The Manage Portfolio domain is a layer on top of the CSDM conceptual model that interacts with the other CSDM domains. The typical user, a service owner, might be responsible for services in more than one domain.

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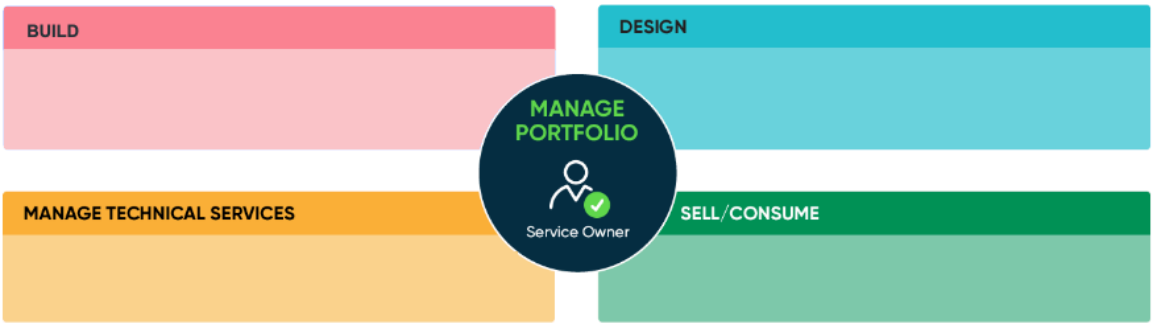

For example, in the Sell/Consume domain, the service owner for Human Resources (HR) might be financially responsible for the business application that provides HR services. The service owner might also need to manage the HR application instances (known as application services or systems) and might also be accountable for the impact the application has on the business.

Because of these additional responsibilities, CSDM enables service owners to oversee business applications and their deployed instances. This visibility enables service owners to perform their duties and meet their responsibilities.

CSDM videos in the ServiceNow Community

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Implementing the CSDM framework in stages

Following the CSDM framework ensures that you meet your primary goal of consistent accuracy in reporting and analytics so you can effectively manage your digital environment.

Improve your CSDM implementation

The CSDM Assessment provides Impact Customers with leading practices and prescriptive guidance on the CSDM and how it supports processes on the ServiceNow AI Platform. To help your organization plan for and implement CSDM, the assessment includes interactions with ServiceNow CSDM experts and personalized content. See Common Service Data Model Assessment Accelerators.

Activating CSDM

First activation step — Map existing life cycle data to CSDM standards

You can align life-cycle values for each product instance on the asset, CI, and IBI tables. A one-time process moves legacy data for asset and CI across the platform to standard CSDM life-cycle values. Business rules then ensure identical IBI, asset, and CI life cycle data for each product instance.

Second activation step — Activate the CSDM plugin

Activate the CSDM plugin so you can begin implementing the framework.

Third activation step — Migrate existing data to the CSDM framework

You complete several tasks to ensure that your existing application data migrates successfully to the required tables in the CMDB.

Implementing the CSDM framework

It's best to use a staged approach when you implement the CSDM framework. Each implementation stage involves particular information types and provides specific benefits. Because each stage builds on the preceding stage, we use an analogy to the way a person develops: foundation, crawl, walk, run, and, eventually, fly.

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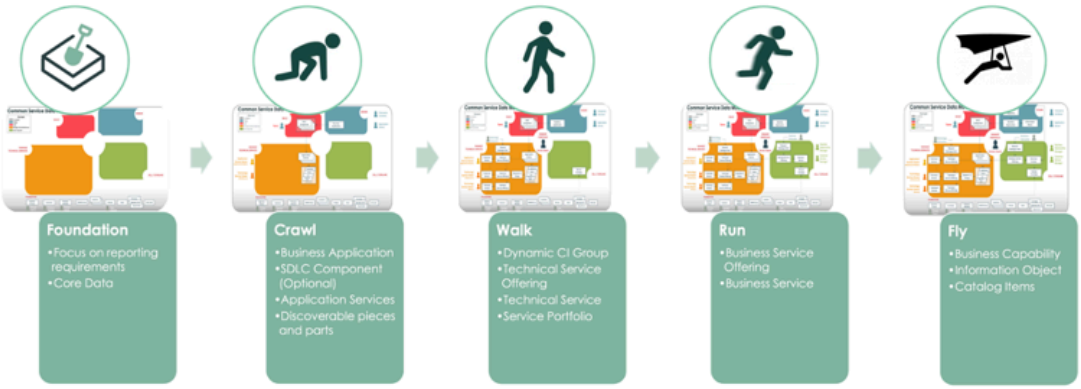

Note:
Business applications reference information objects in the information portfolio. You might need to implement the Information Object table [cmdb_ci_information_object] earlier than the Fly stage. Your business requirements determine the right stage for implementing the table.

CSDM implementation stages — Foundation

In the Foundation stage of implementing the CSDM framework, you prepare the referential data that enables accurate reporting to support good business decisions. Use the base-system tables when you begin implementing the CSDM to derive the highest value from your ServiceNow products and the ServiceNow AI Platform.

CSDM implementation stages — Crawl

In the Crawl stage, you work on base-system CMDB tables that are associated with IT Service Management (ITSM).

CSDM implementation stages — Walk

In the Walk stage, you identify and populate the network infrastructure CIs and applications that your organization's technical teams support.

CSDM implementation stages — Run

In the Run stage, you set up the relationship between a technology and the business that sells and/or consumes the technology.

CSDM implementation stages — Fly

When you reach the Fly stage, you've accomplished all or most of the process of implementing the CSDM framework. The fly stage completes the process.

Key guidelines for you to follow

- When linking CSDM tables, use only the relationships that are designed in the model.
- Collaborate on the shared data model with other product teams. Also, when you extend CSDM and related functionality, be sure to follow the provided guidance. Following the guidance and collaborating with other product teams helps you achieve the best design.
- Use agreed-upon CSDM definitions whenever you use a table, reference, or attribute.
- Use the provided CSDM base tables.
- Use the recommended technologies when you integrate external data sources. The specified process ensures data integrity and integration consistency.
- Follow the provided guidance for setting up and using ServiceNow AI Platform products.

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Configure the CSDM Data Foundations dashboard

Use the CSDM Data Foundations dashboard to monitor and evaluate key foundational metrics of the CSDM framework.

Before you begin

For an introduction to the dashboard, see CSDM Data Foundations dashboard.

- Before you use the dashboard for the first time, populate the CSDM metrics: Navigate to **All** > **System Scheduler** > **Scheduled Jobs** and run the *CSDM Get Well Metric Collection* job.
- The CSDM Data Foundations dashboard adds the following scheduled jobs that must be running:
  - *CSDM Get Well Metric Collection*: Calculates and stores details for compliant CIs associated with metrics. Data appears on the dashboard only after the first run of this scheduled job. metrics' scores are stored in the CSDM Data Foundations Metric Scores [sn_getwell_csdm_score] table. The job runs daily by default.
  - *CSDM Data Foundations PA Metric Collection*: Calculates the total count of non-compliant CIs that are associated with each metric. It also provides trending data over time for the non-compliant CIs associated with metrics.
- Role required: app_service_admin, app_service_user, asset, cmdb_read, itil_admin, portfolio_admin, service_viewer, or technology_service_owner

Procedure

1. Navigate to **All** > **CSDM** > **Configuration** > **CSDM Data Foundations Dashboard**.
2. Select a tab.

   The reports on each tab display the data metrics that are appropriate for the maturity of your organization's CSDM implementation stage (foundation, crawl, walk, run, and fly).

3. Review the reports.

   Note the percentages and color-coding in the **Result** column for each metric.

   - If the percentage is 100%, the CSDM framework has the information it needs. You don't need to do anything else.
   - Otherwise, required information is missing and additional actions are required. Continue with step 5.

   Note the metrics on the **Foundation** tab:

   Named Product Models with Product Owners

   Shows cmdb_model records that meet the following conditions:

   - **Status** = in production
   - **Name** and **Owner** is not empty

   Configuration Item Status Values

   Shows the percentage of CIs with default status values.

   - 80%: At least 1 to 5 CIs have custom status values.
   - 60%: 6 to 10 CIs have custom status values.
   - 40%: 11 to 15 CIs have custom status values.
   - 20%: 16 or more CIs have custom status values.

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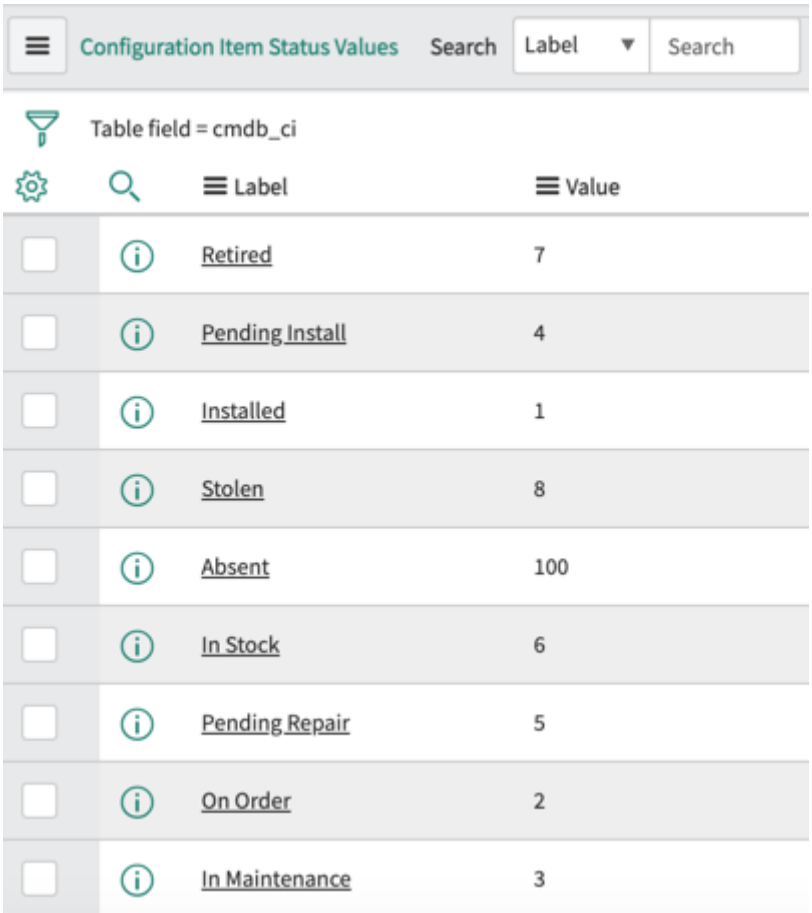
To view the default base-system status values, enter *sn_getwell_oob_status_table_field.list* in the navigator **Filter** text box. The Configuration Item Status Values form displays the list of elements and associated tables. Select a table name to see the list of default labels and values.



Business Units with Companies

Shows business unit records where the **Company** field is not empty.

Locations with Parents.

Shows cmdb_ci records that meet the following conditions:

- **Status** = installed
- **Operational status** = operational
- **Location** and **Location.parent** is not empty

4. Select the tiles associated with the foundational metrics to access Performance Analytics widgets.

   Performance Analytics widgets are provided by the *CSDM PA Metric Collection* scheduled job. These widgets provide trending data over time for the non-compliant CIs associated with the metric.

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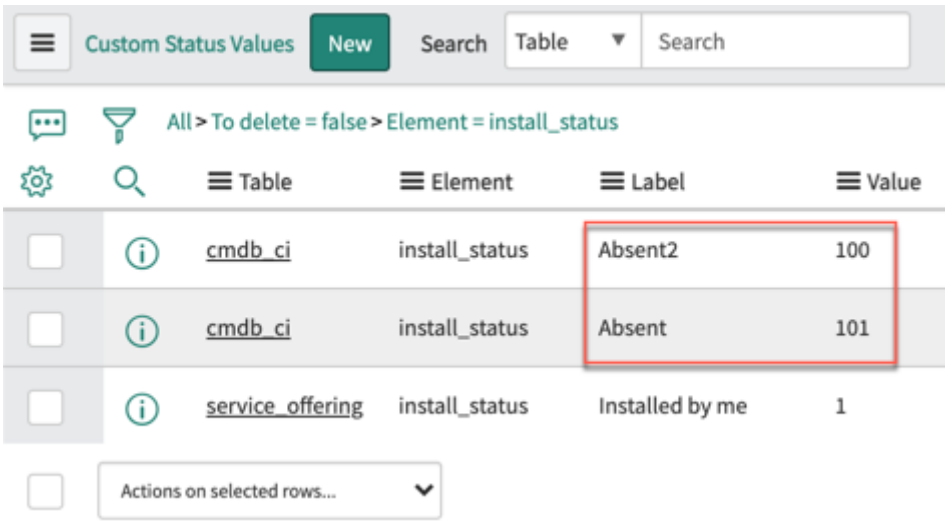
- Ensure that the real-time option is selected (

and then select **Show Records** to view the list of CIs.
- Select the **Breakdowns** context menu to view available breakdowns.

5. Scroll to the list of CIs in the **Custom Status Values** related list.

   The charts show the number of custom values that have been defined for each element. Select a chart to view custom values that have been defined for the element. This example shows custom label-value combinations for the install_status element.



6. Select a CI to drill down to the form view.

   The form view provides the required information. If you don't see the form, you may not have sufficient access privileges. Contact your ServiceNow administrator.

7. When you're finished using the form, select **Update** or **Delete** to return to the list view.
8. Navigate to return to the CSDM Data Foundations dashboard.

Result

The key foundational metric results are available for you to review and analyze.

First activation step — Map existing life cycle data to CSDM standards

You can align life-cycle values for each product instance on the asset, CI, and IBI tables. A one-time process moves legacy data for asset and CI across the platform to standard CSDM life-cycle values. Business rules then ensure identical IBI, asset, and CI life cycle data for each product instance.

After you migrate existing data, you will continue to use only standard life-cycle states when creating or updating CIs to gain the following benefits:

- To handle alerts appropriately, Event Management and Operational Intelligence need to know whether a CI is in maintenance life-cycle status.
- To report cost data effectively, Cloud Insights needs to know the state of a CI.
- To generate consistent tasks and workflows, Audit and Compliance need to use standard life cycle values.

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You must activate life cycle migration to migrate legacy life cycle values to the CSDM standard fields and values.

Life Cycle Mapping table

The base system contains the Life Cycle Mapping [life_cycle_mapping] table, which is pre-populated with widely used legacy life cycle mappings. Each mapping record specifies how to map a legacy life-cycle field's value, based on its table, to the standard CSDM values.

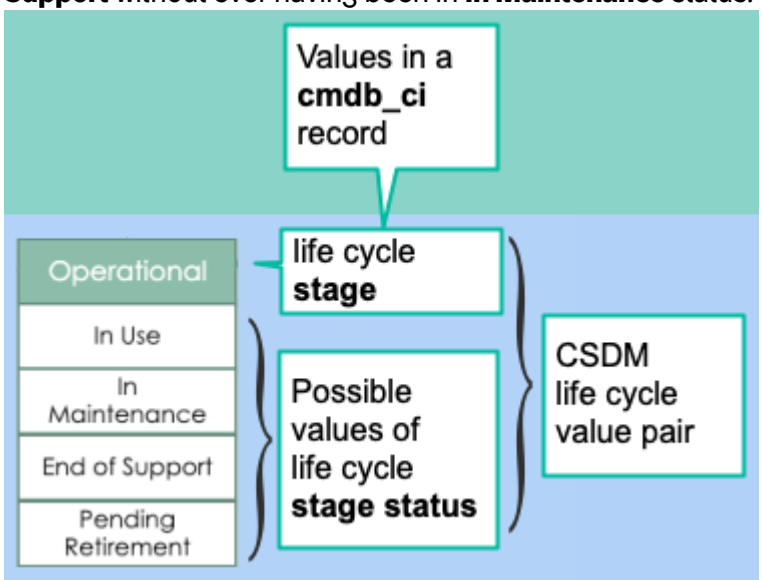
- *Life cycle stage* (life_cycle_stage): The broad life cycle phases that a CI moves through, from inception or procurement to retirement and end of life.
- *Life cycle status* (life_cycle_stage_status): The specific status of a CI within its current life cycle stage.

The table typically contains multiple record entries per class, each entry for a specific legacy life cycle and life-cycle value pair. When there are multiple record entries for a class, the entries are prioritized by importance and likelihood for containing meaningful values for the mapping process.

The standard CSDM life-cycle value pair covers all phases of a product instance life cycle.

- A *Life cycle stage* is one of the broad phases that a CI moves through, from inception or procurement to retirement and end of life.
- *Life cycle stage status* is the specific status of a CI within its current life cycle stage.

For example, a hardware CI in the **Operational** stage might change status over time from **In Use** to **In Maintenance** to **End of Support**. A different hardware CI might go from **In Use** to **End of Support** without ever having been in **In Maintenance** status.



Custom life cycle values

In an upgrade scenario, life cycle migration checks for custom legacy life-cycle values that were added in the system. For each custom value, the system adds a record to the Life Cycle Mapping [life_cycle_mapping] table. Those mapping records, however, are incomplete and inactive.

Before you activate life cycle migration, you must edit and activate those records to supply the desired life cycle control to use for mapping.

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Specify how to map legacy life-cycle states to CMDB states

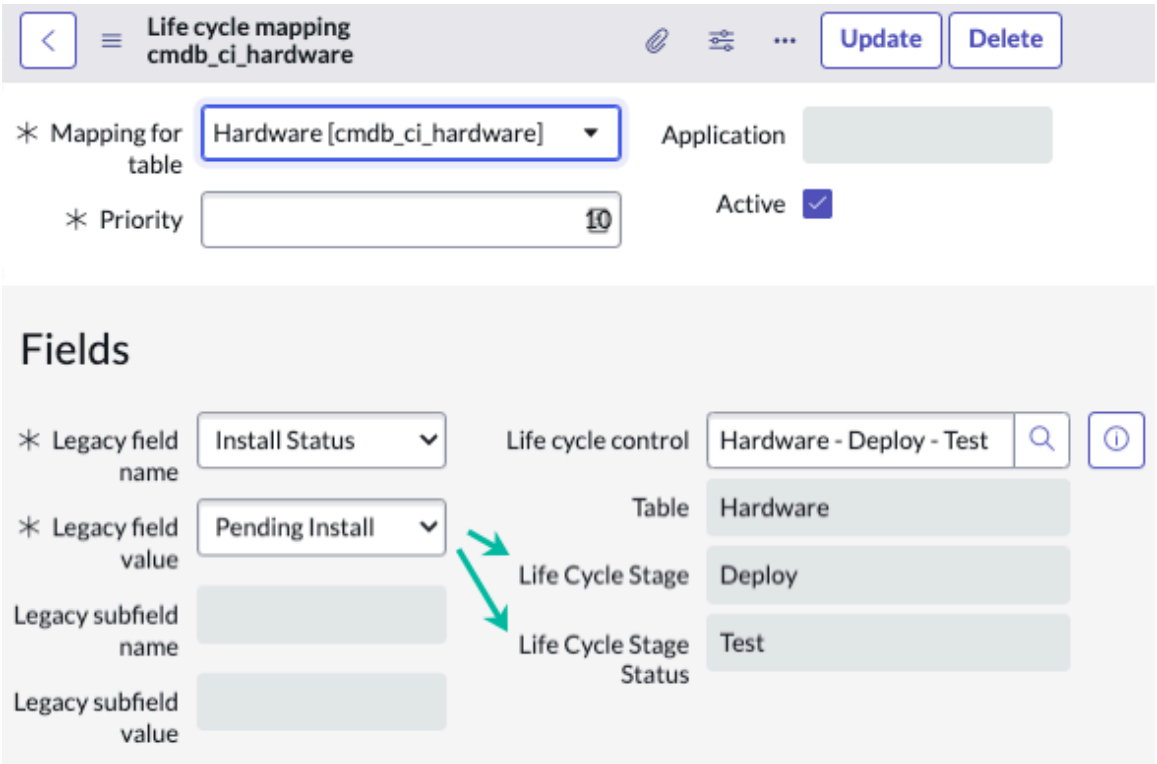
Use the Life Cycle Mapping module to specify how existing legacy status values should be converted to CSDM life-cycle value pairs. You map both asset and CI legacy status values to life-cycle values.

Before you begin

Role required: itil_admin or asset_admin

About this task

In this example, your existing data uses a life-cycle attribute named **Install Status** for hardware CIs. You use the Life cycle mapping form to map the existing **Pending Install** value of the **Install Status** attribute to the **Deploy/Test** life-cycle state in the CMDB.



Procedure

1. Navigate to **All** > **CSDM** > **Life Cycle Mapping**.
2. On the Life cycle mappings list view, select **New** and then fill in the Life cycle mapping form.

   The fields on the form are described in Life cycle mapping form.

   Important:
   If you map more than one legacy status value set to any single life-cycle value pair, then select the **Reverse sync** option in the next step.

3. Skip this step if you map only one legacy status value set to a life-cycle value pair.

   The **Priority** value on the life cycle mapping table is used when a record update triggers the "legacy-to-life-cycle" sync, and multiple legacy value states on the record match with mapping rules. Of the multiple values, the highest priority (lowest numerical value) entry is used to set the life-cycle value pairs. If the highest priority entry can't be used, the system uses the next record in priority. The **Reverse sync** field does not appear on the form by default, but you can add it if needed.

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Priority is not used if reverse sync is active because there should be a maximum of one reverse-sync choice for each life-cycle value per class.

Note:
Use of reverse sync results in some loss of fidelity over time. As time goes on, the lower priority values will become less common (unless you have a process that sets that value directly).

4. Select **Submit**.
5. Repeat the process and, when you have mapped all existing life-cycle states, migrate them to the CMDB.
   For instructions, see Activate life cycle migration.

Activate life cycle migration

Activate life cycle migration to migrate your mapped legacy custom life-cycle settings to the CSDM standard life-cycle values. The migration script migrates both existing and to incoming data.

Before you begin

Before you activate life cycle migration, navigate to **CSDM** > **Life Cycle Mapping**. Review the pre-populated mappings in the **Life Cycle Mappings** list view:

- Adjust and add any mappings as needed for your environment.
- Review mappings for any custom legacy life cycle values. Those mappings are incomplete and you must provide the desired standard life cycle control to map to.
- Ensure that all mappings are configured with a life cycle control.
- Ensure that all mappings are activated.

Role required: itil_admin or asset_admin

Procedure

1. Navigate to **CSDM** > **Life Cycle Mapping**.
2. On the **Life Cycle Mappings** list view, click **Activate**.
   Activation can complete only if all mapping records are set to active and are configured with a life cycle control, and all mapping records for custom legacy values are fully configured.

Result

The script performs the following activities:

- One-time bulk mapping of legacy values to the *Life cycle stage* and *Life cycle status* fields. The mappings are based on the mapping records in the Life Cycle Mapping table, which contain values, source, and target fields.

- Change the default false setting for the *csdm.lifecycle.migration.activated* system property to true. The change activates the *Update life cycle from legacy* business rule. Future insert or update CI operations will trigger the rule to populate the standard *Life cycle stage* and *Life cycle status* fields to ensure that life cycle standards are used continually and consistently.

  For example, when creating a hardware CI, and setting the legacy *Status* and *Operational status* fields. After saving, the new life cycle standard fields are automatically populated with the matching life cycle standard values based on the corresponding record entry in the Life Cycle Mapping table. If you modify legacy values, the

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standard fields are automatically updated based on another matching record in the Life Cycle Mapping table.

- Because life cycle migration is a one-time process, the **Activate** button is disabled.

What to do next

After the data has migrated successfully, you can start managing data following the CSDM model:

1. Activate the CSDM Activation (com.snc.cmdb.csdm.activation) plugin.
2. Use the CMDB Data Manager to centrally govern the life cycle of CIs, in bulk, and in a standard and consistent way.

Second activation step — Activate the CSDM plugin

Activate the CSDM plugin so you can begin implementing the framework.

Before you begin

Important:
Before you activate the CSDM plugin, you must map your existing life cycle data to standard CSDM attributes. The mapping enables you to track assets effectively through their life cycle transitions with the CMDB Data Manager. For instructions, see Migrate to CSDM life cycle standards.

- Role required: itil and itil_admin

Procedure

Activate the CSDM Activation plugin: *com.snc.cmdb.csdm.activation*.
For more information, see Activate a plugin.

Third activation step — Migrate existing data to the CSDM framework

You complete several tasks to ensure that your existing application data migrates successfully to the required tables in the CMDB.

Before you begin

Role required: admin

About this task

Keep the following points in mind:

- Some CSDM tables have been introduced recently so you might not be familiar with them. See the documentation for your ServiceNow product to learn about unfamiliar tables.
- You can continue to use customized or non-conforming CMDB tables. If you do so, however, you may not get the full benefit of your ServiceNow products.
- Be sure to use the migration tools that are described in CSDM migration tools.

Manage the attributes that you are using. Rationalize your custom attributes. Use the following guidelines to decide whether you really need to keep all customizations:

- Best Practice: The custom attribute doesn't have a related base-system attribute but you need to use it.
- Keep: The custom attribute doesn't have a related base-system attribute but it's required for a unique use case.

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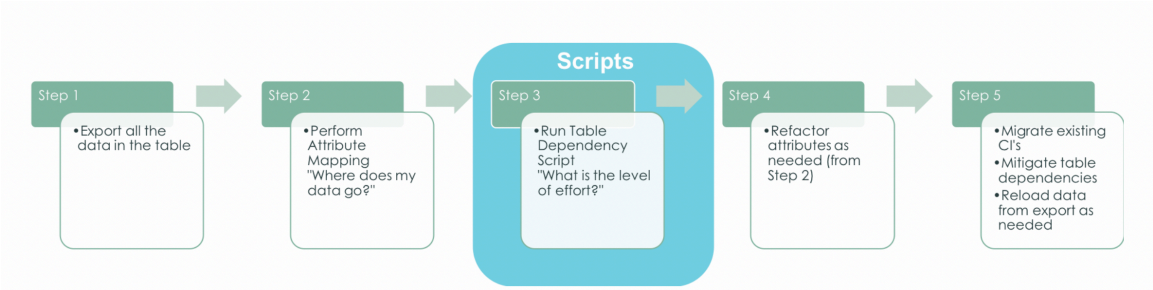
- Refactor: The custom attribute does have a base-system attribute or a capability that can be migrated.
- Do Not Need: The customization is no longer needed. Delete the attributes that you don’t use or use only rarely. Consider deleting attributes if there’s a better way to address a use case.

Consider related dependencies. Moving configuration items (CIs) to a new table doesn't automatically move related dependencies. To identify related dependencies, use the scripts described in Migrating into CSDM identifying table dependencies (available on the ServiceNow Community).

Important:
The script doesn't move your data or their dependencies. It only identifies the dependencies. You refactor data and dependencies as part of the migration.

After running the scripts and evaluating the data, you will have a better idea of the effort required to migrate your data. Decide whether you need all referenced reports, rules, and scripts. Then decide what you want to migrate and make a migration plan.

Migration workflow



Procedure

1. Back up your data.
   Export your data (with all attributes) to Excel and keep the file in a secure location. Have a contingency plan in case issues arise.
2. Map the attributes.
   Identify the table where the data should go. Make sure that destination table has the required base-system attributes. Rationalize your custom attributes. Decide which customizations you will keep.
3. Move CIs from existing classes to CMDB classes.

   Note:
   Don’t forget about non-conforming tables and their dependencies. You could have hundreds of reports, business rules, scripts, table references, and more that need the data in your non-conforming tables.

   Moving CIs to a new table does not automatically move reports, business rules, and so on. As described in the following steps, the fix script identifies dependencies that you need to refactor. You can download the fix script from the ServiceNow Community.
4. Refactor the attributes.
   Solidify the data model and get the data ready for migration.

   Make sure you have completed the attribute mapping-related tasks described in earlier steps. Follow the guidelines and refactor your data as needed.
5. Migrate the data.

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Note:
Make sure that you have a valid and recent backup. Make another backup if necessary. During migration, you lose all customized or base-system attributes that are not in the same table hierarchy.

Keep these points in mind as you proceed:

- Migrate your CIs to the new class to move the CI and all its related objects, incidents, and changes to the new table.
- Start with a few CIs and increase the number when you feel comfortable.

6. Remediate your table dependencies:
   a. Modify reports to use the new table.
   b. Migrate business rules and scripts as needed.
   c. Update table references as needed.
7. Reload data into the new attributes using the backup that you made earlier.
8. Validate all data and dependencies.

Result

You've successfully migrated your application to the CSDM framework, and your data is in the required CMDB locations.

CSDM migration tools

Migration tools simplify the process of migrating your data to the CSDM framework.

Data migration script

Use the fix script from the ServiceNow Community to identify table dependencies. See Migrating into CSDM identifying table dependencies.

CMDB Data Foundations dashboard

Navigate to **All** > **Configuration** and then select **CMDB Data Foundations Dashboard**.

- CMDB dashboard: Each tab provides key metrics that evaluate configuration and customizations in the CMDB.
- The metrics provide visible results of evaluation. Color codes and weighted priority help with planning.
- Each metric includes a link to a remediation playbook with background and plays for remediation.

See Monitor system foundations in the CSDM and the CMDB Data Foundations Dashboards.

CSDM Data Foundations dashboard

Navigate to **All** > **Configuration** and then select **CSDM Data Foundations Dashboard**.

The CSDM dashboard focuses on key data elements to support you in implementing the CSDM framework. The reports on each tab display the data metrics that are appropriate for the maturity of your organization's CSDM implementation stage (foundation, crawl, walk, run, and fly). See CSDM Data Foundations dashboard.

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CSDM implementation stages — Foundation

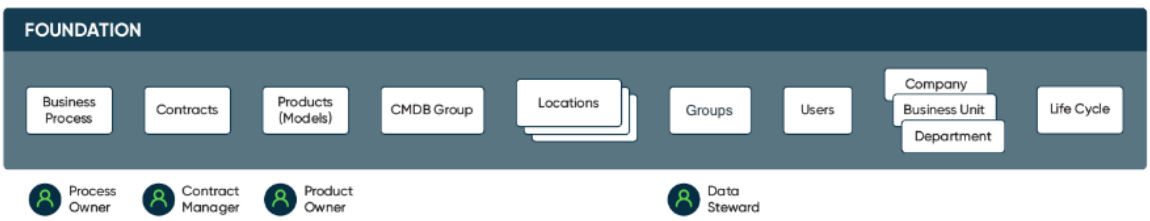
In the Foundation stage of implementing the CSDM framework, you prepare the referential data that enables accurate reporting to support good business decisions. Use the base-system tables when you begin implementing the CSDM to derive the highest value from your ServiceNow products and the ServiceNow AI Platform.

Benefits of preparing the data in the Foundation stage

The basis of any good data model is the foundational data that is referenced throughout the model.

- The base-system tables act as the foundation for many ServiceNow products.
- The tables help your company align with reporting requirements early to expedite the value you get from the CSDM. You can reduce or eliminate costly rework tasks needed to align with reporting requirements.

Tables that you work on during the Foundation stage



Business Process table [cmdb_ci_business_process]

A business process has a well-defined start and finish. Examples of business processes in the banking industry are the customer onboarding process and the credit check process. Each business process can have levels of criticality and impact. Business processes are stored in the cmdb_ci_business_process table.

Contract table [ast_contract]

The Contract table identifies binding agreements between two parties. When you populate services provided by vendors into the CMDB, consider the role that contracts play when evaluating service level agreements (SLAs).

Product model table [model_id]

The Product model table [model_id] identifies the unique types of products your organization develops or consumes. When you group assets and CIs by product model, you unify and relate CIs that are part of the same digital product and portfolios of products. Grouping assets and CIs by product model can help you plan projects, monitor costs, and rationalize your data. Discovery can populate hardware product models after they're operational, but other types of product models require planning from product owners.

Use the *`CSDM Product Model Assignment`* job to auto-generate a product model record (application model, service model, or software model) for each logical CI that is not yet associated with a product model. Product models are ideal for associating CIs that are parts of a single digital product. See Auto-generate product models for logical CIs.

CMDB Group table [cmdb_ci_query_based_service]

The CMDB Group table identifies a collection of CIs based on the results of saved Query Builder queries, encoded queries, or manual entries. CMDB groups are critical elements of Dynamic CI groups and the strategic management of CIs.

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Decide early how you want to report CI information and how you want to monitor CIs. These decisions affect how you create CMDB groups.

Location table [cmn_location]

The Location table uniquely identifies geographic locations. You can create a hierarchy of location data using the *Parent* attribute. The hierarchy might include entries that match your reporting requirements. For example, you could populate the location table as follows

Your organization's location attributes



To include more detail in reports, you could extend the Location table to include floors, rooms, and even datacenters. With hierarchy capabilities, trusted source data, and your requirements in hand, you can create locations that support your future reporting needs.

Group table [sys_user_group]

The Group table identifies sets of users that share a common purpose. Groups may perform tasks such as approving change requests, resolving incidents, receiving email notifications, or performing work order tasks. Groups also use the referential data in the CMDB to identify how CIs are managed (for example, the Managed by group) and supported (for example, the Support group). Any business rules, assignment rules, system roles, or attributes that refer to a group automatically apply to all group members.

User table [sys_user]

The User table identifies the persons and applications that have access to your ServiceNow instance. You can organize users into groups that are associated with the Company, Business Unit, and Department tables.

Organizational structure

Organization structure tables identify internal business structures and external customers, manufacturers, and vendors.

Company table [core_company]

The Company table is populated with the legal entities of companies. Entities can be either internal (your organization) or external. You can use the Parent attribute to build a hierarchy. Consider the legal entities that you need for reporting when the CMDB is populated.

- Internal entries should focus on a hierarchy of legal entities rather than a hierarchy of business units within a legal entity.
- External entries are identified by a True or False flag. The Customer flag identifies your external customers.

  The Manufacturer flag identifies companies that create products that you consume. An internal organization might be a manufacturer.

- The Vendor flag identifies organizations that provide products that you purchase. An internal organization might be a vendor.

Business Unit table [business_unit]

The hierarchy of your business is populated in the Business Unit table with a reference to the parent company. A business unit is a part of your organization that is responsible for specific operations, such as

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finance, human resources (HR), or IT. A hierarchy within a business unit is common. For large multinational organizations, you may have business units that identify independent regional operations and the specific operations within the region.

Department table [cmn_department]

The Department table includes a finer level of detail about a business unit. The Department table gives you another way to categorize users, groups, assets, and CIs.

Life-cycle tables

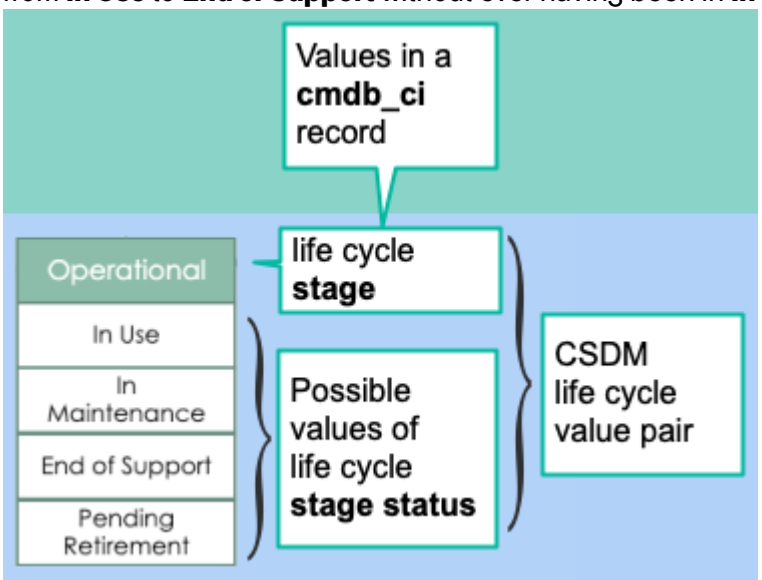
Life-cycle states track the life cycles for products, assets, contracts, CIs, locations, and other objects. Using the standard life-cycle values consistently helps you to track objects through their transitions over time. Reporting can therefore accurately reflect the actual states of CIs: usage, availability, end of support, and so on.

Note:
Based on the type of item, the [life_cycle_control] table specifies which life cycle stage values are available for each life cycle stage.

The standard CSDM life-cycle value pair covers all phases of a product instance life cycle.

- A *`Life cycle stage`* is one of the broad phases that a CI moves through, from inception or procurement to retirement and end of life.
- *`Life cycle stage status`* is the specific status of a CI within its current life cycle stage.

For example, a hardware CI in the **Operational** stage might change status over time from **In Use** to **In Maintenance** to **End of Support**. A different hardware CI might go from **In Use** to **End of Support** without ever having been in **In Maintenance** status.



When you enable the CSDM framework, you can start using the *`Life Cycle Stage`* and *`Life Cycle Stage Status`* fields to track an asset's life cycle. To use the fields, follow the procedure described in Second activation step — Activate the CSDM plugin. The following assets can use life-cycle states:

- Product life cycle
- Hardware life cycle

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- Logical life cycle
- Document life cycle
- Location life cycle

Watch the ServiceNow Community video: CSDM V4 product and life cycle discussion

CSDM implementation stages — Crawl

In the Crawl stage, you work on base-system CMDB tables that are associated with IT Service Management (ITSM).

Benefits of the operations that you perform in the Crawl stage

- The operations provide the minimum CMDB support requirements for Incident Management and Change Management.
- Setting up APM is faster because your business application data is in the right place in the CMDB.
- The operations build the foundation for using DevOps because your SDLC component data is populated and ready to relate to your applications.
- Service Mapping is ready to use for mapping entry points because your application service data is populated.
- The operations build the foundation for using TPM risk details, a capability of APM.

  The operations prepare you to manage and monitor the life cycles and versions of the underlying technologies of the business applications in your enterprise.

  The data enables you to identify outdated or at-risk software using APM, Service Mapping and Software Asset Management (SAM) Professional.

Tables that you work on during the Crawl stage

Important:
Future products and product enhancements depend on the data that you prepare in each of the tables.

During this stage, you work on the following base-system CMDB tables:

- Business Application table [cmdb_ci_business_app]
- Mapped Application Service table [cmdb_ci_service_discovered]
- Application table [cmdb_ci_appl] (discoverable)
- Server/host (discoverable)

Note:
Some of the classes that you implement in this stage are logical CIs. Logical CIs aren't created through Discovery, so their **Model ID** values might not refer to product model (application model, service model, or software model) records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. See Auto-generate product models for logical CIs.

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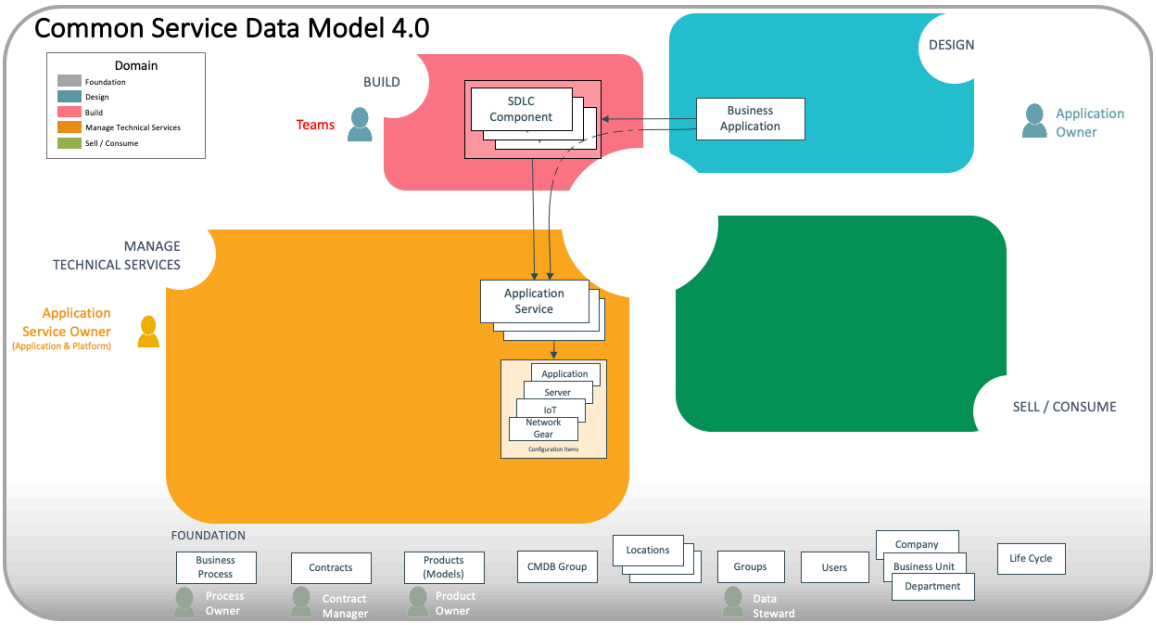

Start by focusing on applications and the application-related data in these areas and tables:

Business Application table [cmdb_ci_business_app]

A business application is a base-system CMDB table that stores your inventory, application portfolio, and their metadata.

Because this table is not an operational configuration item (CI), it is not used by ITSM Incident Management, Problem Management, or Change Management processes.

SDLC Component table [cmdb_ci_sdlc_component]

SDLC component CI records in the SDLC Component table [cmdb_ci_sdlc_component] enable the DevOps product to provide enhanced capabilities for visualizing and managing your application development pipeline.

This table represents the software part or element of a larger whole for applications and infrastructure. Related material may serve as representative of developmental details. It can be used if you need to identify the stratification of a business application or digital product.

Note:
This is not an operational CI and cannot be used in incident, problem, and change.

Application Service table [cmdb_ci_service_auto]

The application service is typically the system that the caller identifies when they report an issue with an application.

A mapped application service is a base-system CMDB table that identifies the related business application in use. The application service ties all the elements of the CSDM together where applications are present.

You may have several application services representing each deployment based on the environment (development, QA, production) and location or geography (North America, Asia Pacific).

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Because application services are logical in nature, they should use the Logical life-cycle value pairs. Application services follow the same life cycle guidance as any other logical CI.

Application table [cmdb_ci_appl]

An application is a base-system CMDB table that represents the discoverable instance of an application: code related to a process in use on a host. This table isn't an inventory of your applications. Because of the high level of complexity involved, don't try to manually populate the application table. Discovery creates and maintains this table.

> **Important:**
> The application table [cmdb_ci_appl] isn't an inventory or portfolio of your applications. Don't make the mistake of storing managed application details in the application table. Those details (inventory or application portfolio objects) belong in the business application table (as documented in Design domain of the CSDM framework).

The application may be identified as the root cause of an incident. However, if you're not using Event Management, the application may not be the initial cause.

If you're using Discovery, applications are automatically related to their host, which provides an impact hierarchy from server-to-host applications.

CSDM implementation stages — Walk

In the Walk stage, you identify and populate the network infrastructure CIs and applications that your organization's technical teams support.

Benefits of the operations that you perform in the Walk stage

Managing discovered infrastructure CIs

The operations facilitate managing the discovered infrastructure CIs. You might manually managing the metadata on these CIs, such as support group and technical approval group. By identifying the technical service offering that manages these CIs, you can:

- Configure ServiceNow to populate and synchronize this metadata onto the related child objects.
- Eliminate the manual effort of maintaining the metadata on thousands of CIs.

View supported CIs

The operations establish a view of the CIs that your organization's technical teams support.

You can see the specific support assignments, which you can change as needed based on your support structure, operational-level agreements (OLAs), and commitments.

Also, this view enables you to formalize for your process for supporting applications and technology owners.

Prepare for Service Portfolio Management

The operations build the foundation for using Service Portfolio Management (Service Portfolio Management).

You can start using Service Portfolio Management more quickly because your service data are in the right place.

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Use the request catalog

The operations enable you to order technology service offerings through the request catalog. You can also automate ordering some offerings to enhance the request workflow and update or create related CIs. Catalogs are described in detail in Service Catalog.

Note:
The request catalog is not a CMDB table.

Prepare for ITOM) products

The operations build the foundation for Information Technology Operations Management (ITOM) products, such as Service Mapping and Discovery.

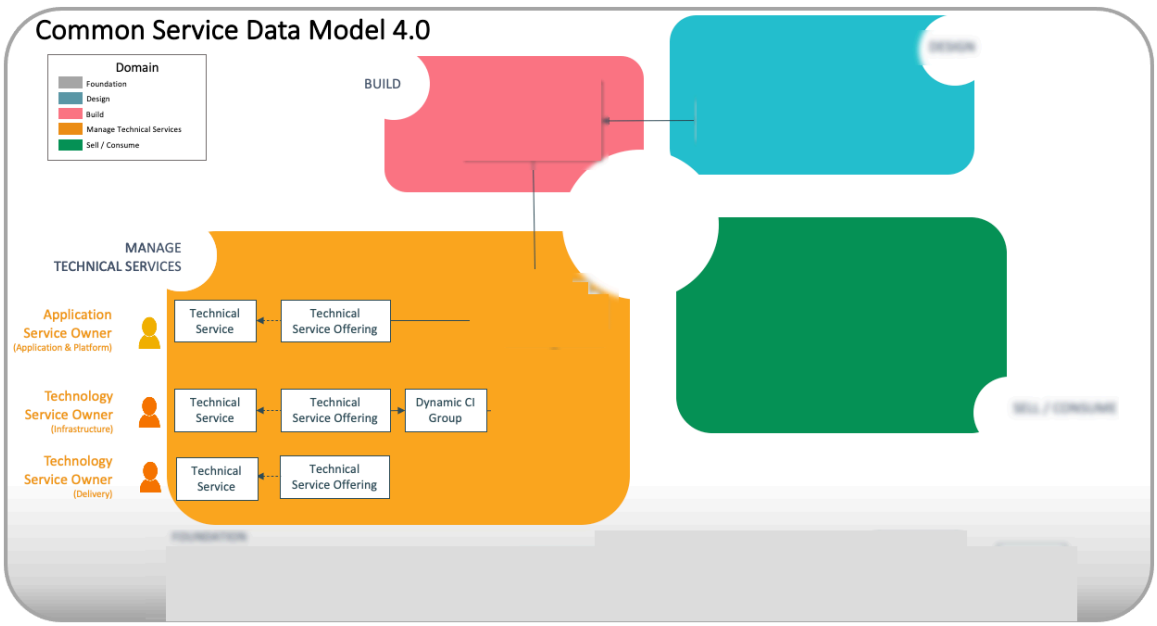
Enable Automation

The operations enable more automated methods of grouping CIs for identification and management by Technical Service Offerings.

Tables that you work on during the Walk stage

The walk stage includes base-system CMDB tables that identify the technology provider.

Note:
Some of the classes that you implement in this stage are logical CIs. Logical CIs aren't created through Discovery, so their **Model ID** values might not refer to product model (application model, service model, or software model) records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. See Auto-generate product models for logical CIs.



Technical service table [cmdb_ci_service_technical], or [cmdb_query_based_services] for Event Management

The Technical service table has a service classification of "technical service". This base-system CMDB table identifies the provider of the technology that your business consumes.

Technology service offering table [service_offering]

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A Technical service offering is a service offering with a service classification of "technical service". Technical service offerings may be further divided as follows:

- Location and geography
- Environment (production or non-production)
- Pricing
- Availability
- Support group (for Incident Management)
- Technical approval group (for Change Management)
- Packaging options (commitments)

The technical service offering comes from the service, based on how the parent serves a specific technical need. Every operational technical service must be associated with at least one technical service offering.

Note:
Not all technical service offerings have to be related to applications or infrastructure CIs. Managed Service Providers may provide technical service offerings.

Dynamic CI group table [cmdb_ci_query_based_service]

A Dynamic CI group is a collection of CIs based on the results of saved Query Builder queries, encoded queries, or manual entries. Query Builder is described in Querying the CMDB. For more information about Dynamic CI groups and how you can use them, see Manage Technical Services domain of the CSDM framework.

CSDM implementation stages — Run

In the Run stage, you set up the relationship between a technology and the business that sells and/or consumes the technology.

ITSM considerations during the Run stage

When you use ITSM, you must understand the impact that a technology can have on your business. For example, your business may:

- Consume the technology.
- Sell the technology (as is the case with Customer Service Management).
- Both sell the technology and consume it.

Benefits of the operations that you perform in the Run stage

- Run-stage operations ensure impact assessment for Incident Management and Change Management. Within an incident or change, you can identify the impacted business, assuming relationships exist between the selected CI and the impacted businesses.
- Run-stage operations provide a foundation for using Service Portfolio Management in the Digital Portfolio Management (DPM). Service owners can monitor service portfolios and understand service-related information including service trends, improvement initiatives, service performance, and outage monitoring.
- Run-stage operations provide a foundation for ITSM capabilities. This foundation populates the related “Subscribe by” table on a service offering to identify the business and subscribers affected. Business service offerings can identify subscribers by user, company, location, department, and group.

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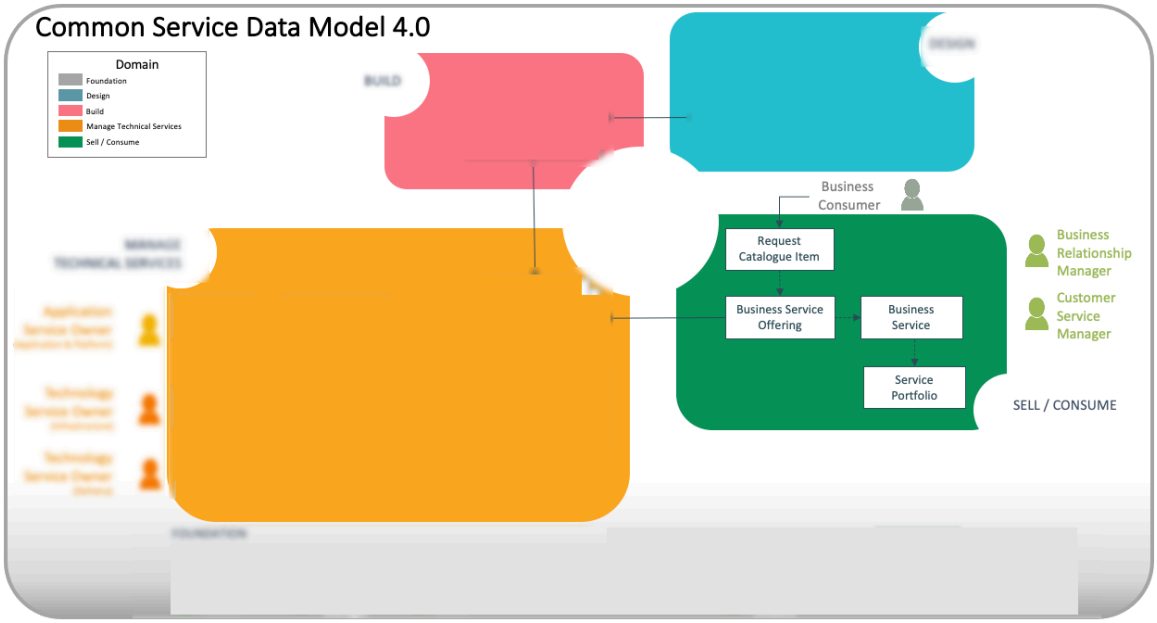
Tables that you work on during the Run stage



Note:
Some of the classes that you implement in this stage are logical CIs. Logical CIs aren't created through Discovery, so their **Model ID** values might not refer to product model (application model, service model, or software model) records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. See Auto-generate product models for logical CIs.

Business service portfolio table [service_portfolio]

Note:
The Business service portfolio is not a CMDB table.

A business service portfolio is not a CMDB table. A business service portfolio is a hierarchical collection of business services (products and services) that define a business objective.

Business service table [cmdb_ci_service_business]

The business service table is a base-system CMDB table. This table identifies a business objective that uses (and depends on) the infrastructure that technology uses.

This dependency means that the business service must sell or consume that infrastructure.

Business service offering table [service_offering] (service offering classified as a "business service")

Business service offerings are the starting point for configuring Service Portfolio Management. Business service offerings consist of one or more service commitments. These service commitments uniquely define the level of service in terms of availability, scope, pricing, and other factors.

The business service offering comes from the service. The business service offering is fine-tuned based on how the parent serves a specific technical need.

Every business service should have at least one business service offering.

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Request catalog

A catalog (sometimes called a request catalog or service request catalog) is a set of business and technical products, services, service commitment options, and offerings that users can order on a self-service basis. You can manage a catalog to present your available products and services to users as catalog items. Catalogs are described in detail in Service Catalog.

CSDM implementation stages — Fly

When you reach the Fly stage, you've accomplished all or most of the process of implementing the CSDM framework. The fly stage completes the process.

Benefits of the operations that you perform in the Fly stage

The Fly stage is a foundation for using APM capabilities

You can use APM capabilities to rationalize your business applications. Ask questions such as the following:

- Are you spending too much on your business capabilities?
- Are you spending too little on your business capabilities?
- Should you increase the amount you spend on emerging business capabilities?

The Fly stage is a foundation for using APM with Service Portfolio Management capabilities

You can use APM with Service Portfolio Management capabilities to rationalize your business services and related offerings. Ask questions such as the following:

- Are you spending too much or too little on services?
- Are you spending too little or too little on services?
- Are they the right services compared to emerging capabilities?

The Fly stage is a foundation for using ITSM capabilities

Starting with the New York release, you can use the request catalog to relate a service offering to a catalog item. You can also enhance the request workflow to automatically populate the “Subscribe by” table. Catalogs are described in detail in Service Catalog.

Note:
The request catalog is not a CMDB table.

The Fly stage can hep you to manage business services

If your environment has a combination of CIs from each of the CSDM domains, this stage provides away to manage business services.

The Fly stage is a way to identify the types of data that may be contained in or used by your business applications

The information object table helps you see what's in your information portfolio.

Tables that you work on during the Fly stage

You reach the fly stage after you have accomplished all or most of the earlier stages.

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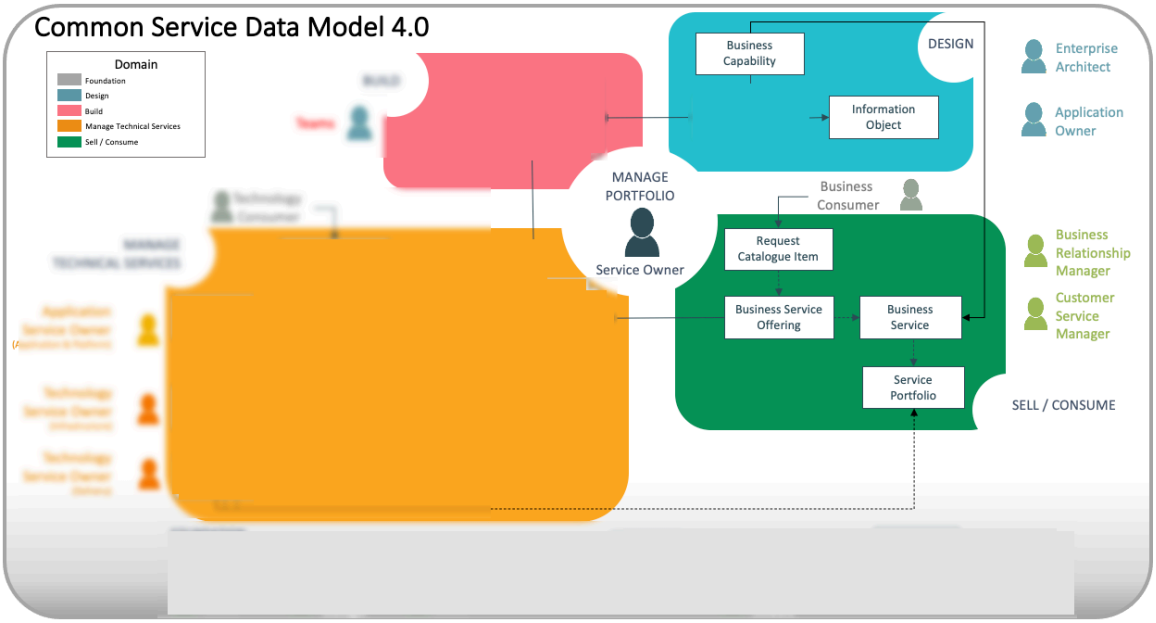

Note:
Some of the classes that you implement in this stage are logical CIs. Logical CIs aren't created through Discovery, so their **Model ID** values might not refer to product model (application model, service model, or software model) records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. See Auto-generate product models for logical CIs.

The fly stage completes the remaining aspects of CSDM framework:

Business capability table [cmdb_ci_business_capability]

A business capability is a high-level capability that supports a business model or fulfills a mission for your organization.

Information object table [cmdb_ci_information_object]

You capture asset information as information objects. You can connect the information objects to your business applications to create an application portfolio that you can use at any time.

You can use the Information Object table to identify the types of data that a business application uses, including highly sensitive data such as:

- Personally Identifiable Information (PII)
- Payment Card Industry Data Security Standard (PCI DSS) data
- Health Insurance Portability and Accountability Act (HIPAA) data

Information objects are part of the information portfolio. The information portfolio links to the following data:

- Data Domains: Total number of records in the Data Domain table [sn_apm_data_domain].
- Information Objects: Total number of records in the Information Object table [cmdb_ci_information_object].
- Database Instances: Total number of records in the Database Instance table [cmdb_ci_db_instance].
- Database Catalogs: Total number of records in the Database Catalog table [cmdb_ci_db_catalog].

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Important:
You might need to implement the Information object table [cmdb_ci_information_object] as part of an earlier stage. Your business requirements determine the right stage for implementing the table.

Request catalog

Users request services through the request catalog. The request catalog is not a CMDB table. Catalogs are described in detail in Service Catalog.

The fly stage includes these components:

- Business service portfolio table [service_portfolio]
- Business service table [cmdb_ci_service_business]; (service classified as a "business service")
- Business service offering table [service_offering]; (service offering classified as a "business service")

Auto-generate product models for logical CIs

Use the *CSDM Product Model Assignment* job to auto-generate a product model record (application model, service model, or software model) for each logical CI that is not yet associated with a product model. Product models are ideal for associating CIs that are parts of a single digital product.

Before you begin

Users with read access to modified CI records can view the new product models.

Role required: admin

About this task

Application, service, and software class instance CIs are not created through Discovery, so their **Model ID [model_id]** values might not refer to product model records. To assist you in migrating to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. The *CSDM Product Model Assignment* job operates on the following classes and uses the name of the class instance as the name of the new product model.

- Service Offering
- Technical Service
- Application Service: The script adds the version (as it relates to the Business Application) to the associated software model name. For example, the software model for the MyAppService application service CI might be **MyAppService - version: 2.1**.
- Business Service
- Business Application

The *CSDM Product Model Assignment* job calls the *CSDMModelUtil* script. The script performs these actions for each instance of the supported CSDM classes that does not refer to a product model:

1. Create a new application model, service model, or software model record with the same name as the CI. If the requisite info for generating the name value does not appear in the CI, the script uses the default value that you specified.
2. For the CI, add a reference to the new product model in the **Model ID [model_id]** field.

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Operation of the script:

- The script observes the access rules of the CMDB admin that runs the script.
- If an auto-generated product model record for a class instance CI would be identical to an existing record, then the existing record is used for that CI.
- If your data includes CIs with identical names (this is actually an error), then the resulting model_id values might conflict. Validate the resulting model_ids after running the script.

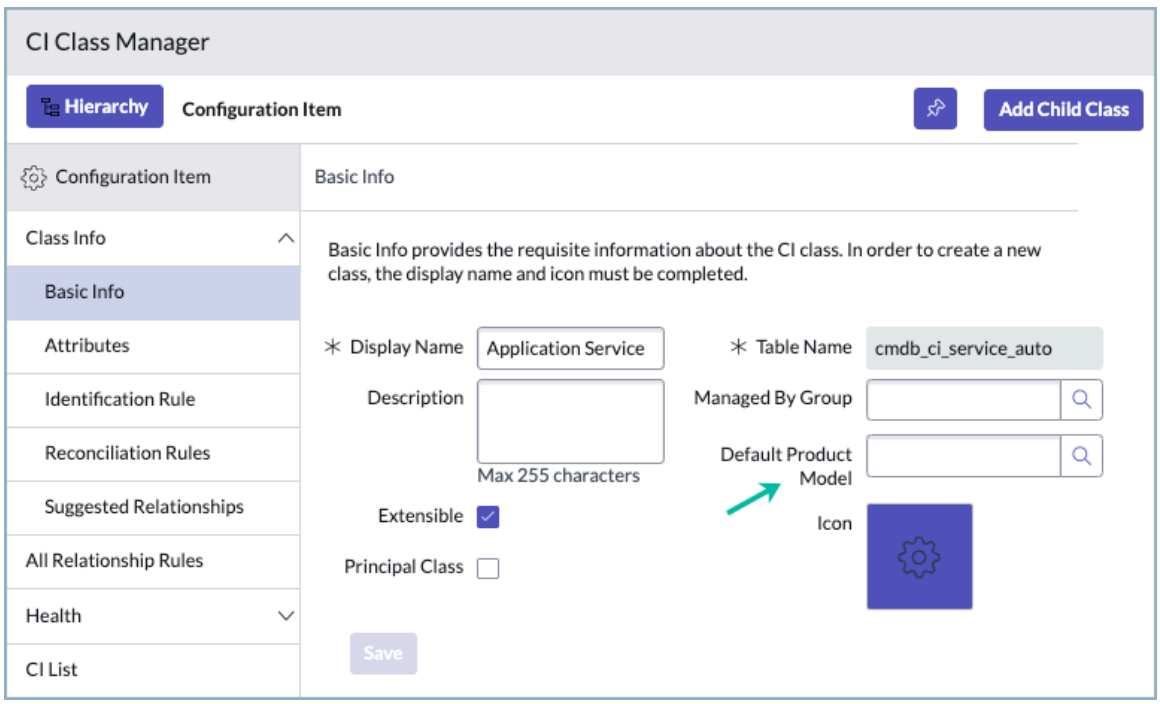
Procedure

1. Specify the default name to use if the name / version values of a CI are insufficient to auto-generate the name for the new product model.

   a. Navigate to **Configuration** > **CI Class Manager** and then select **Open Hierarchy**.

   b. Navigate to each of the supported classes in turn (Application Service, Business Service, and so on).

   c. On the **Basic Info** page for the class, enter the appropriate name in the **Default Product Model** field.



2. Run the *CSDM Product Model Assignment* job.

   a. Navigate to **System Scheduler** > **Scheduled Jobs** > **Scheduled Jobs**.

   b. Search for and open the *CSDM Product Model Assignment* job.

   c. Select **Execute Now**.
   The script runs and generates the product models.

3. Review the created product models to ensure that the new **Model ID [model_id]** values are correct.

   Use:

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- **All** > **Product Catalog** > **Product Models** > **Application Models**
- **All** > **Product Catalog** > **Product Models** > **Service Models**
- **All** > **Product Catalog** > **Product Models** > **Software Models**

4. Run the job whenever you want to create product model settings for new class instances.

Managing the CSDM framework

The CSDM is the data framework that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB ensure that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

CSDM modules

Navigate to the modules that assist you in implementing and managing the CSDM domains and their components.

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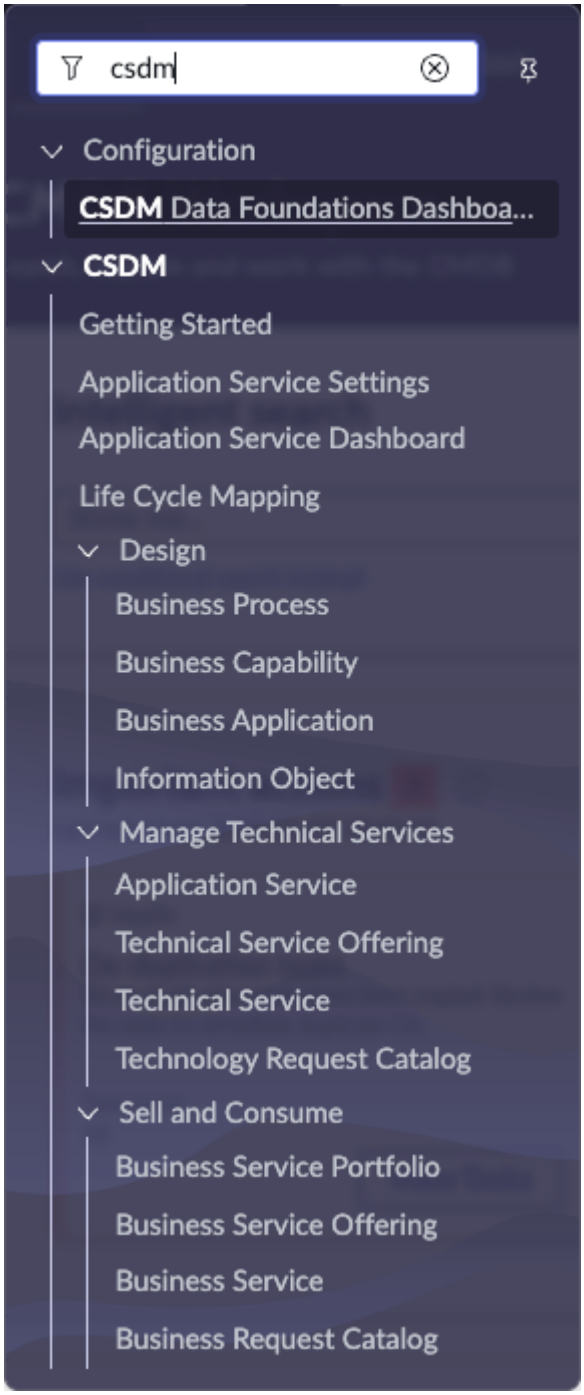

CSDM Data Foundations Dashboard

The CSDM Data Foundations dashboard displays key CSDM indicators on a single page to help you get the full benefit from your ServiceNow AI Platform products. See CSDM Data Foundations dashboard.

Getting Started

Select **Getting Started** to open the library of CSDM user documentation — the documentation you are viewing now.

Application Service Settings

Use the Application Service Settings module to specify the attributes and relationships that are required when a user creates an application service. See Specifying attributes and relationships for Application Services.

Application Service Dashboard

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The Application services dashboard enables you to monitor and manage application services to ensure that application services are fully configured and are populated in the CMDB. See Monitoring and managing application services.

Life Cycle Mapping

Use the Life Cycle Mapping module to specify how existing legacy status values should be converted to CSDM life-cycle value pairs. You map both asset and CI legacy status values to life-cycle values. See First activation step — Map existing life cycle data to CSDM standards.

Design

Work in the tables that are referenced in the Design domain of the CSDM. See Design domain of the CSDM framework.

Manage Technical Services

Work in the tables that are referenced in the Manage Technical Services domain of the CSDM. See Manage Technical Services domain of the CSDM framework.

Sell and Consume

Work in the tables that are referenced in the Sell/Consume domain of the CSDM. See Sell/Consume domain of the CSDM framework.

Synchronize data for 'Managed by' and 'Change' groups

Synchronizing group assignment attributes

Set the group for a CI or an entire class of CIs

Synchronize data using a technical service offering

CSDM Data Foundations dashboard

The CSDM Data Foundations dashboard displays key CSDM indicators on a single page to help you get the full benefit from your ServiceNow AI Platform products.

Access the dashboard

Use either of the following methods to open the dashboard:

Navigate to **All** > **Configuration**, and then select **CSDM Data Foundations Dashboard**.

1. In CMDB Workspace, navigate to **Workspaces** > **CMDB Workspace**.
2. Select **Management** in the CMDB Workspace menu bar.
3. Select **CSDM Data Foundations Dashboard** in the Optimize section of the Management tools.

Select the change dashboard icon () to toggle between the CSDM and CMDB dashboards.

Example

The reports on each tab display the data metrics that are appropriate for the maturity of your organization's CSDM implementation stage (foundation, crawl, walk, run, and fly). A label on each report identifies the metric being displayed.

In this example, a report on the **Run** tab indicates that several business service offerings don't have the required relationships to application services. With this knowledge, Service owners can add the relationships to ensure that customer service agents get complete information on the upstream impacts of applications that are down.

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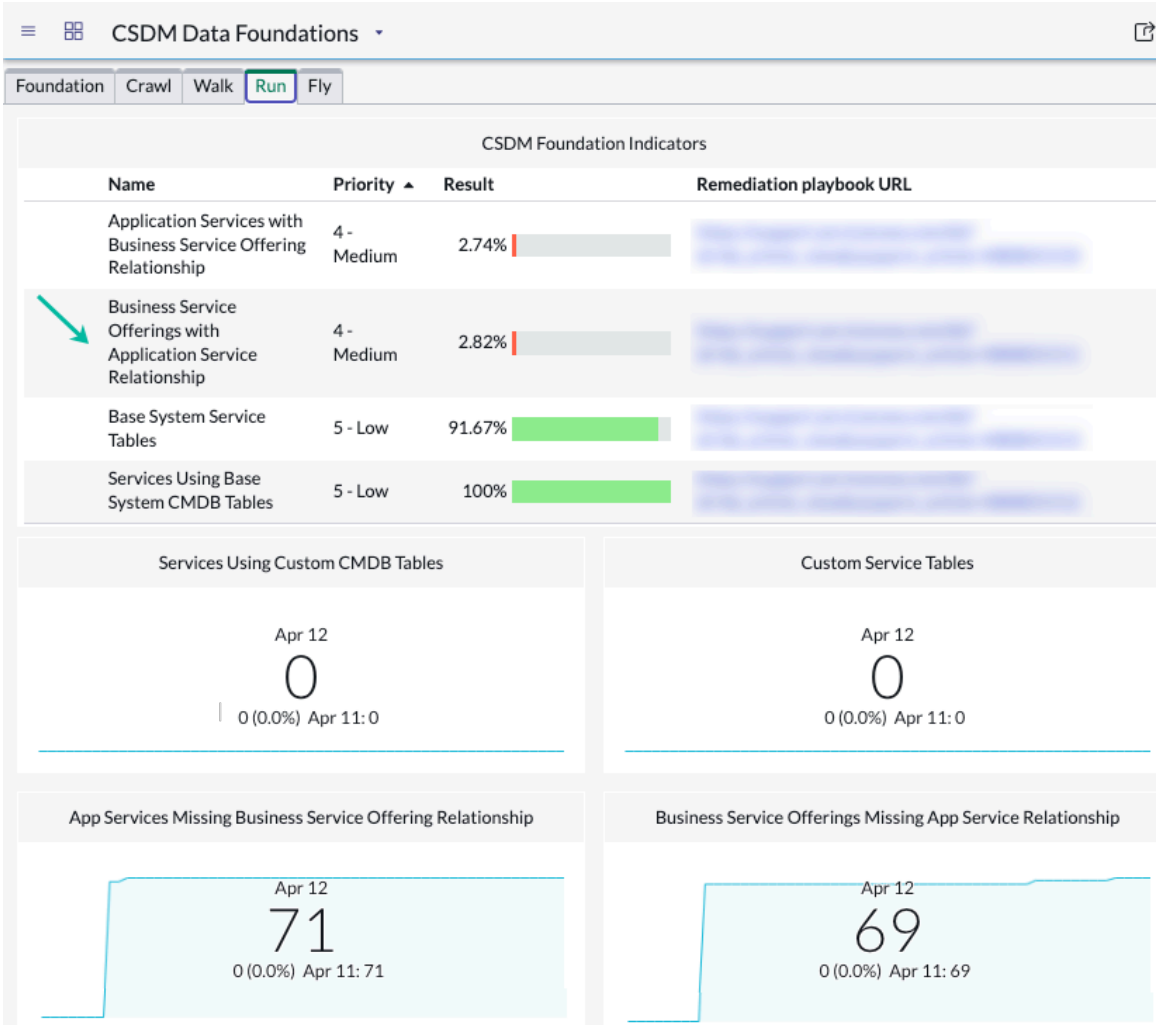

Tabs on the dashboard

- The Foundation domain involves tables that contain base data that is referenced from or to objects in the other CSDM domains. Foundation data is required before you can use ServiceNow products or add data to the CMDB. See 'Foundation' stage reports on the CSDM Data Foundations dashboard.
- In the Crawl stage, you work on base-system CMDB tables that are associated with IT Service Management (ITSM). See 'Crawl' stage reports on the CSDM Data Foundations dashboard.
- In the Walk stage, you identify and populate the network infrastructure CIs and applications that your organization's technical teams support. See 'Walk' stage reports on the CSDM Data Foundations dashboard.
- In the Run stage, you set up the relationship between a technology and the business that sells and/or consumes the technology. See 'Run' stage reports on the CSDM Data Foundations dashboard.
- When you reach the Fly stage, you've accomplished all or most of the process of implementing the CSDM framework. The fly stage completes the process. See 'Fly' stage reports on the CSDM Data Foundations dashboard.

Managing performance of data collection

The system runs scheduled jobs that collect data for three CSDM metrics:

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- App services that are missing a business app relationship
- Business apps that are missing an app service relationship
- App services where the relationship to business apps is not `Consumed by`

To ensure optimum performance, the system stops collecting data for some metrics when a specified number of non-compliant CIs is discovered. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

Related topics

Configure the CSDM Data Foundations dashboard

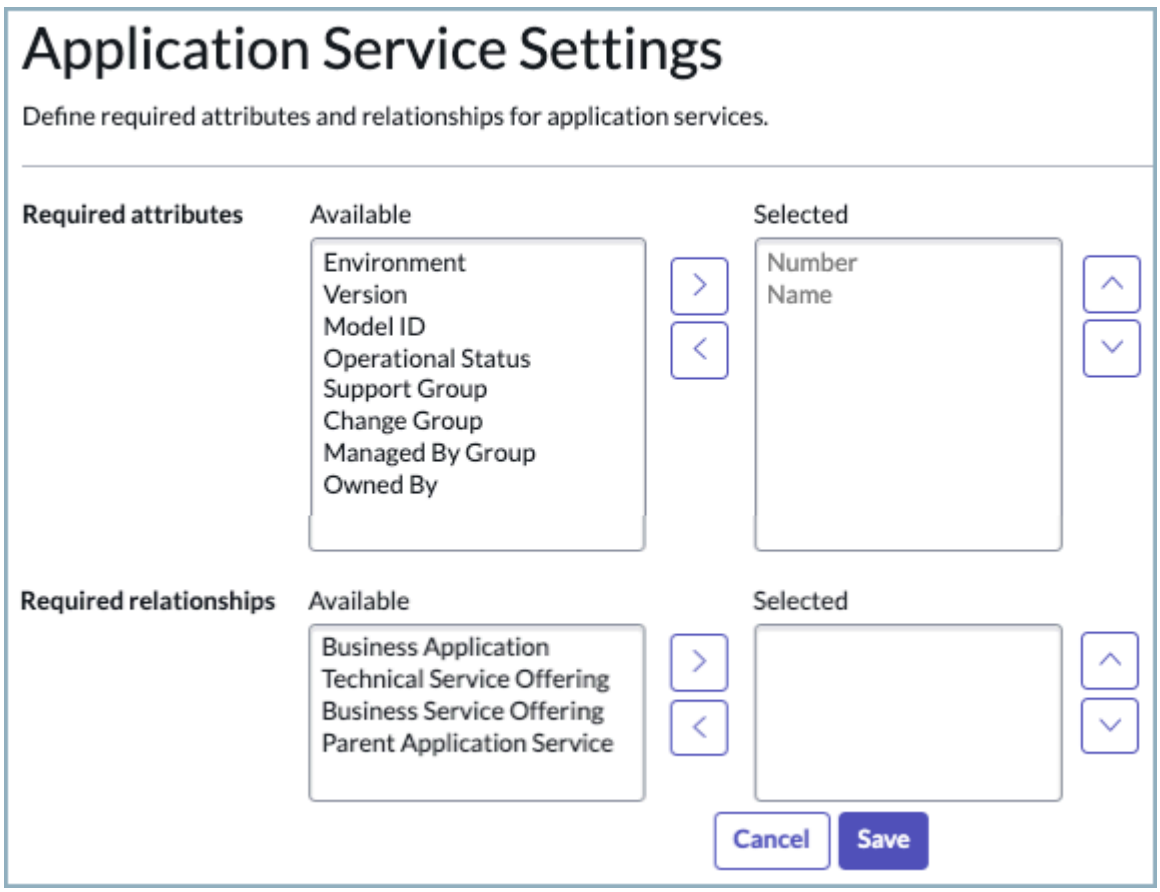
Monitor system foundations in the CSDM and the CMDB Data Foundations Dashboards

Specifying attributes and relationships for Application Services

Use the Application Service Settings module to specify the attributes and relationships that are required when a user creates an application service.

Configuring the Application Service Settings

Navigate to **CSDM** > **Application Service Settings** to access the form. For instructions, see Modify the attributes and relationships required for application services.



Monitoring and managing application services

The Application services dashboard enables you to monitor and manage application services to ensure that application services are fully configured and are populated in the CMDB.

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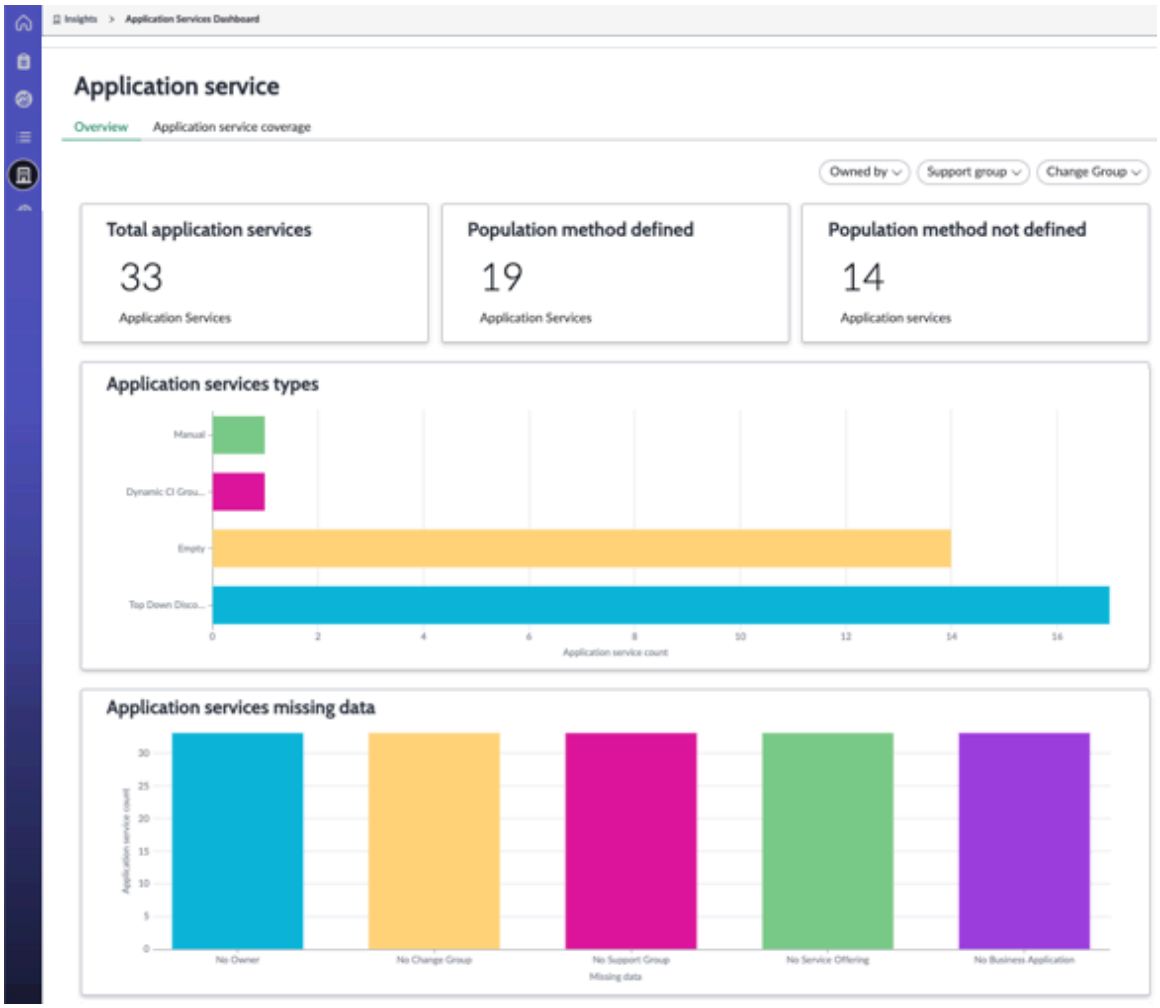
Viewing application service reports

A report on the dashboard, for example, can direct you to an application service that is not configured with a service population method so you can repair it. For more information, see Monitor the health of application services in the Application Service Dashboard.

You have two options:

View the Application Service dashboard on CMDB Insights

To view the dashboard in the Insights view, select **CMDB Workspace**, select the Insights icon ( ), and then select the **Application services** tile. See Insights view in CMDB Workspace.



View the Application Service dashboard

To view the dashboard, navigate to **All** > **CSDM** > **Application Service Dashboard**.

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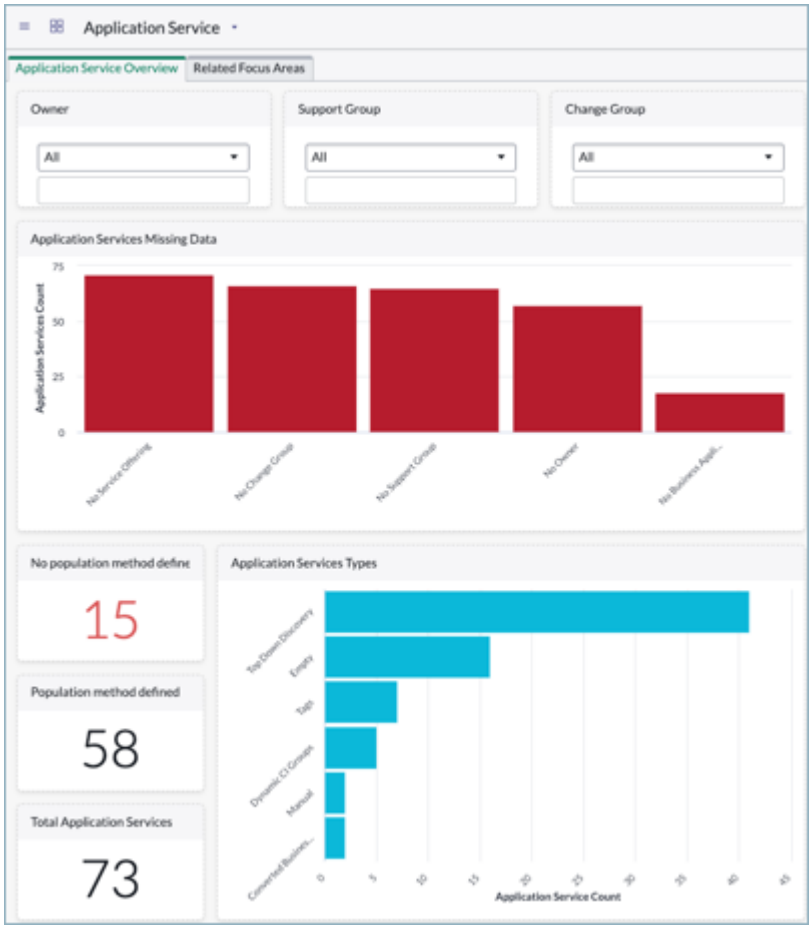

Synchronizing group assignment attributes

To empower a particular user group to manage a collection of CIs or CI classes, set group assignment attributes through the technical service offering or the CI Class Manager. The operation synchronizes the group attribute data across all CIs that belong to the specified CI class or groups of CIs.

Methods for synchronizing group assignment attributes

- Synchronize data using a technical service offering: Directly set the **Support group**, **Change group**, or **Managed by group** attributes in a technical service offering. The settings are applied to CIs that are associated with the technical service offering.
- Set the group for a CI or an entire class of CIs: Set the **Managed by group** attribute for a specific class in the CI Class Manager. All CIs within the class will have their **Managed by group** field populated based on the value specified in the CI Class Manager. With this method, the **Managed by group** setting is applied only to the CIs that aren't associated with a technical service offering. For CIs that are managed by a technical service offering, the **Managed by group** field is first synchronized with its dynamic CI group. This field is then synchronized with the CIs that are part of that dynamic CI group, overwriting the entry from the CI Class Manager.
- Use Support Group and Change Group: By using dynamic CI groups, data synchronization enables you to manage data that cannot be discovered. The values in the **Support Group** and **Change Group** (previously labeled **Assignment Group**) fields in the cmdb_ci table are synchronized with their related dynamic CI groups and with all the CIs that are contained as part of that dynamic CI group object.

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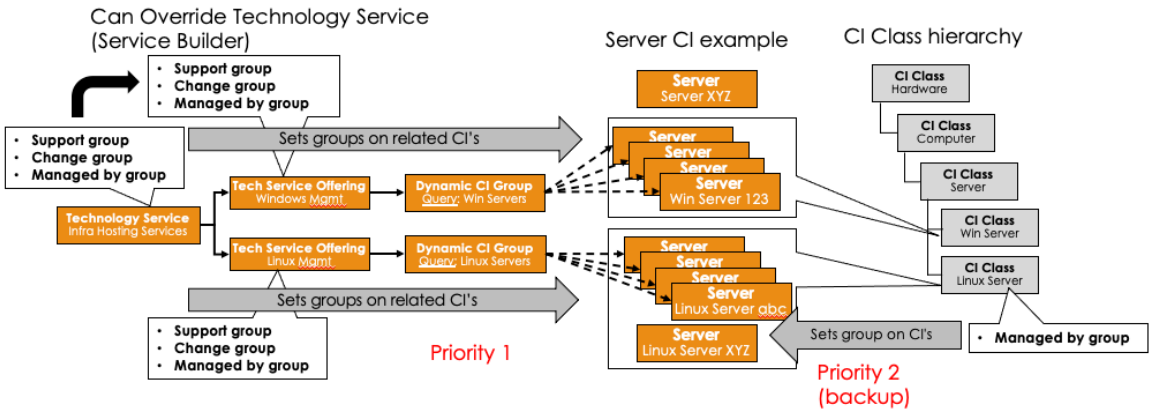
Team data synchronization



Related topics

CI Class Manager

Set the group for a CI or an entire class of CIs

Synchronize group assignment attributes on entire CI classes and individual CIs using the CI Class Manager.

Before you begin

Role required: itil and itil_admin

About this task

Set the **Managed by group** attribute for a specific class in the CI Class Manager. All CIs within the class will have their **Managed by group** field populated based on the value specified in the CI Class Manager. With this method, the **Managed by group** setting is applied only to the CIs that aren't associated with a technical service offering. For CIs that are managed by a technical service offering, the **Managed by group** field is first synchronized with its dynamic CI group. This field is then synchronized with the CIs that are part of that dynamic CI group, overwriting the entry from the CI Class Manager.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to expand the CI Classes list, select a class to display details for, and then select **Basic Info**.
3. Specify the value in the **Managed by Group** attribute and select **Save**.
4. To verify the change, select **CI List**.
   The change should be applied to the **Managed by Group** attribute of all CIs of this class unless they are associated with a technical service offering. The change is applied only to the CIs in the class and not to the sub classes under a CI.

Example:

As an itil_admin, you can define a user group that can manage all CIs belonging to a specific class by following these steps:

1. Navigate to the CI Class Manager and select the **Linux Server** class in the list.
2. Select **Basic Info** and, in the Managed By Group attribute, select **sys_user_group** and then select **Save**.
3. To verify that the attribute was updated, select **CI List** and navigate to the Linux Server class. You will see that the **Managed By Group** attribute has been updated to **sys_user_group**.

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Synchronize data using a technical service offering

Synchronize group assignment attributes on entire CI classes and individual CIs that use a technical service offering.

Before you begin

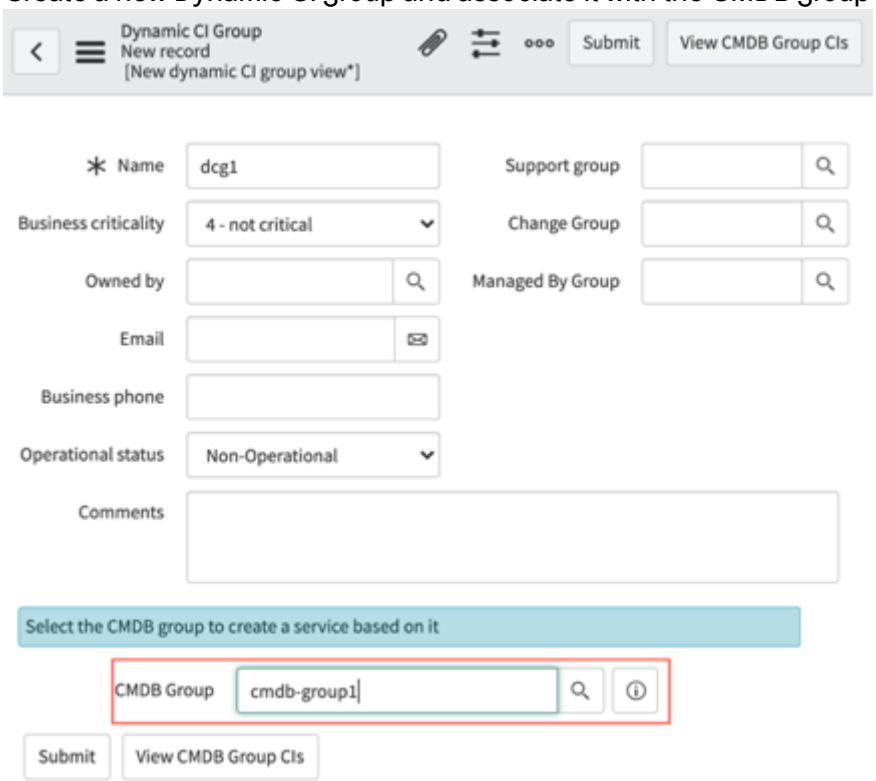
Role required: itil and itil_admin

About this task

Directly set the **Support group**, **Change group**, or **Managed by group** attributes in a technical service offering. The settings are applied to CIs that are associated with the technical service offering.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Groups** and create a new CMDB group.
   See CMDB groups for details.
2. Navigate to **All** > **Configuration** > **Dynamic CI Groups**.
3. Create a new Dynamic CI group and associate it with the CMDB group that you created.



   See Manage Technical Services domain of the CSDM framework for more information on Dynamic CI groups.

4. Navigate to **All** > **CSDM** > **Technical Service Offering** and create a new technical service offering.
   See Manage Technical Services domain of the CSDM framework for more information on technical service offerings.
5. Navigate to the **CI Relationships** table and select **New** and enter the following values:
   - **Parent**: Select the technical service offering you created.
   - **Child**: Select the Dynamic CI group you created.

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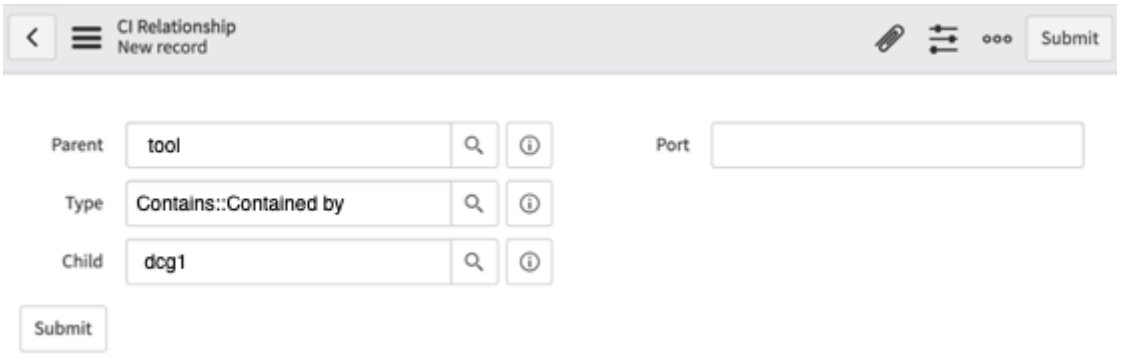
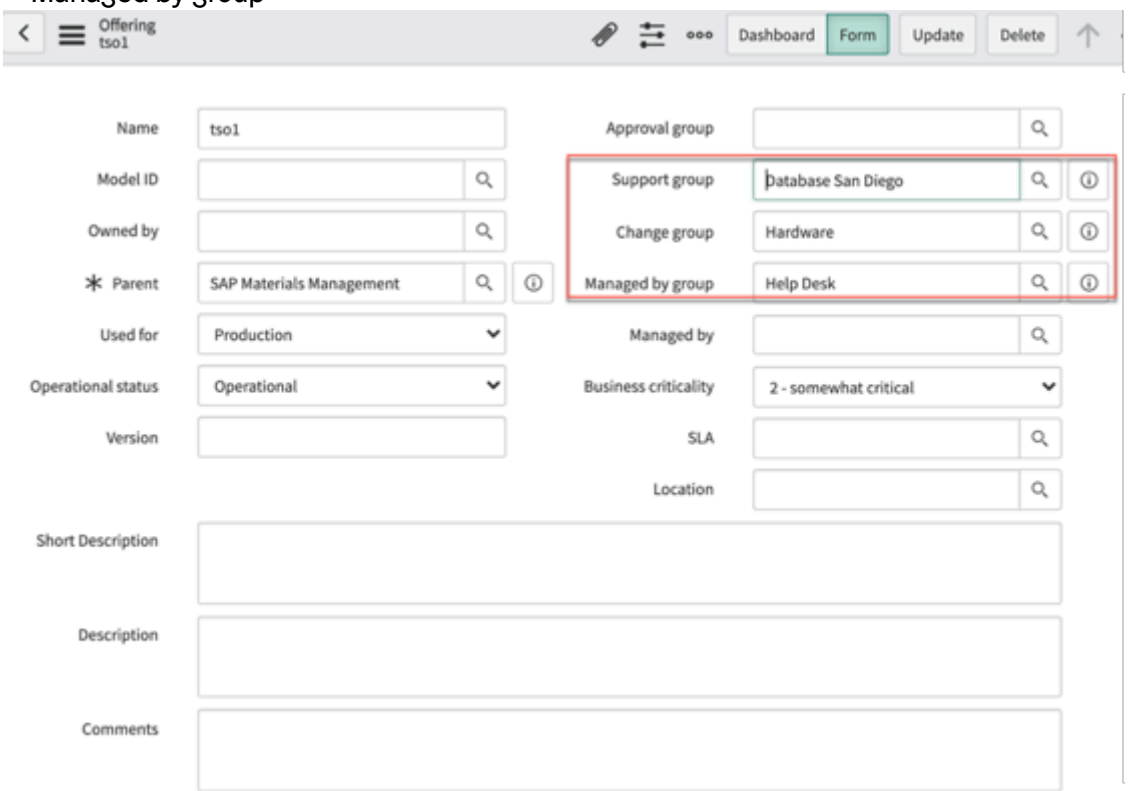


6. Select **Submit**.
   You have created a relationship between the technical service offering and the Dynamic CI group.
7. Navigate to **All** > **CSDM** > **Technical Service Offering** and open the technical service offering that you created.
8. Enter values in the following fields:
   - Support group
   - Change group
   - Managed by group



9. Right-click the header and select **Save**.
   A message confirms that data synchronization has been enabled for the fields.

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10. The values that you specified are applied to the related Dynamic CI group and all associated CIs.

Note:

- If a new CI is added to the class, the data will be synchronized only after the scheduled CSDM Data Sync job is completed. If you need to synchronize the data immediately, navigate to **Scheduled Jobs** > **CSDM Data Sync** and select **Execute**.
- The **Managed by Group** field might be populated in both the CI Class Manager and the technical service offering. In this case, the value specified in the **Managed by Group** field in the technical service offering takes precedence.

Applying the CSDM guidelines to your product

The "Product view" topics describe how several ServiceNow products benefit from your use of the Common Service Data Model (CSDM) framework.

Products and features that benefit when following the CSDM guidelines

The following topics identify the specific CMDB tables that the products update and obtain data from. The topics provide practical instructions for implementing the CSDM guidelines.

Change Management

Applying CSDM guidelines to Change Management

Customer Service Management

Customer Service Management product view

Digital Portfolio Management

Apply the CSDM guidelines to Digital Portfolio Management

Enterprise Architecture (EA) (formerly Application Portfolio Management)

Applying the CSDM guidelines to Enterprise Architecture

Incident Management

Applying CSDM guidelines to Incident Management

Install Base Management

Common Service Data Model framework for Install Base Management

ITOM AIOps

ITOM AIOps and CSDM reference

ITOM Visibility

Applying the CSDM guidelines to ITOM Visibility

Operational Technology

Implementing the CSDM framework for Operational Technology

Problem Management

Applying the CSDM guidelines to Problem Management

RPA Hub

Applying the CSDM guidelines to RPA Hub

Service Catalog

Applying the CSDM guidelines to Service Catalog

Service Portfolio Management

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Applying the CSDM guidelines to Service Portfolio Management

The topics include the following information:

- Brief overview of the function and benefits of the product.
- Use case and examples.
- CSDM tables managed by the product.
- CSDM tables used by the product.
- Mention of other ServiceNow products that add value to the product.
- Mention of other ServiceNow products that benefit from the product.

Note:
A CSDM use case might have one or more data types. Other ServiceNow products may also manage these data types. The use cases don't describe all possible product dependencies.

The product view topics do not address the following information:

- Implementing the ServiceNow product.
- Configuring systems that are not included in the base system. Such systems might be referred to in this product view, but they are out-of-scope.
- Using other ServiceNow products, such as IT Service Management (ITSM), Strategic Portfolio Management (SPM), and IT Operations Management (ITOM).

CSDM videos in the ServiceNow Community

Playlist of all CSDM videos

Problem Management product view

Problem Management helps identify the cause of an error in the IT infrastructure, reported as occurrences of related incidents. The goal of this product view is to help you to understand how Problem Management key entities work with the core CSDM framework.

With Problem Management you can perform the following actions:

- Document the root cause of an error and resolve it permanently.
- Create known error articles from a problem to provide guidance and help deflect incidents.
- Collaborate on problem tasks with other teams to identify the root cause using a drag-and-drop functionality on visual task boards.

The Problem Management form references the following CSDM elements (attributes and related views).

1. Service — References the [cmdb_ci_service_business] table.

   Note:
   Earlier releases labeled this attribute *`Business Service`*.

2. Service Offering — References the [service_offering] table to see the service offerings affected by the problem in the Service Offerings related list [task_service_offering].
3. Configuration Items — References the [cmdb_ci] table
4. Affected/Causal CIs — Related list [task_ci] table
5. Impacted Services — Related list [task_cmdb_ci_service] table

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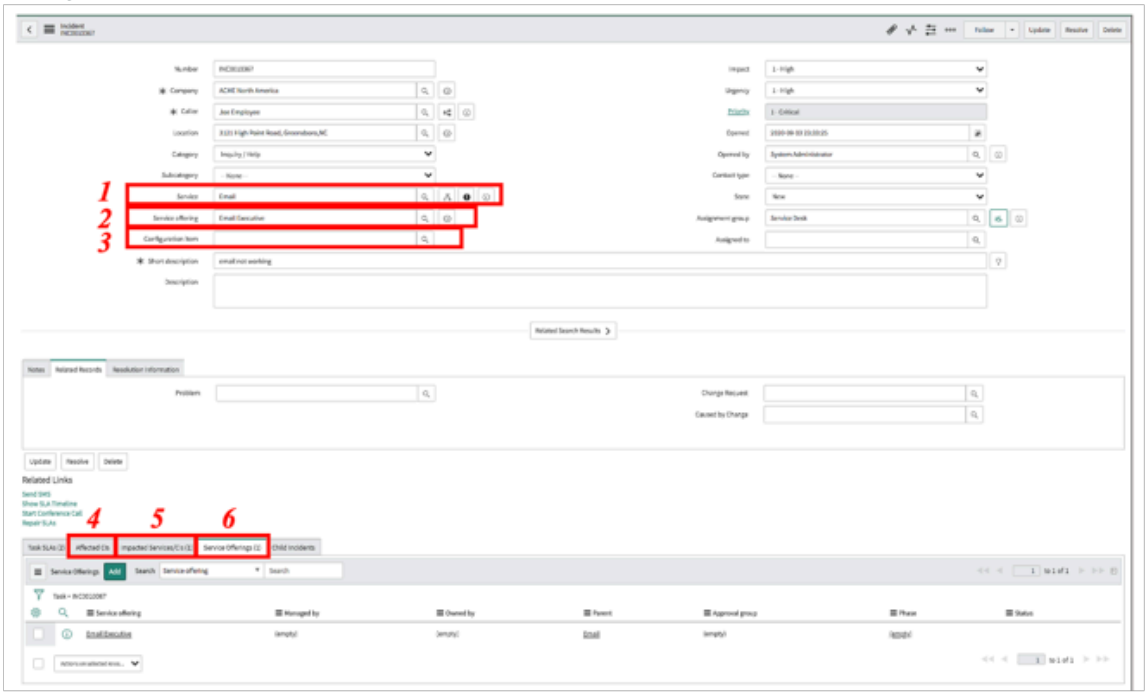
Change Request form



Problem Management and CSDM tables

Problem Management manages and uses CSDM tables. Several ServiceNow products benefit from and add value to Problem Management.

CSDM tables used by Problem Management

1. Application Service table [cmdb_ci_discovered_service]: Application Service or any infrastructure CI
2. Configuration Item tables [cmdb_ci*]
3. Business Service [cmdb_ci_service_business] table and Technical service [cmdb_ci_service_technical] table: Use the service classification attribute to identify business services and technical services.
4. Service Offering table [service_offering]: Utilized as a choice list attribute to filter types of service offerings like Business Service, Technical Service, and Application Service.

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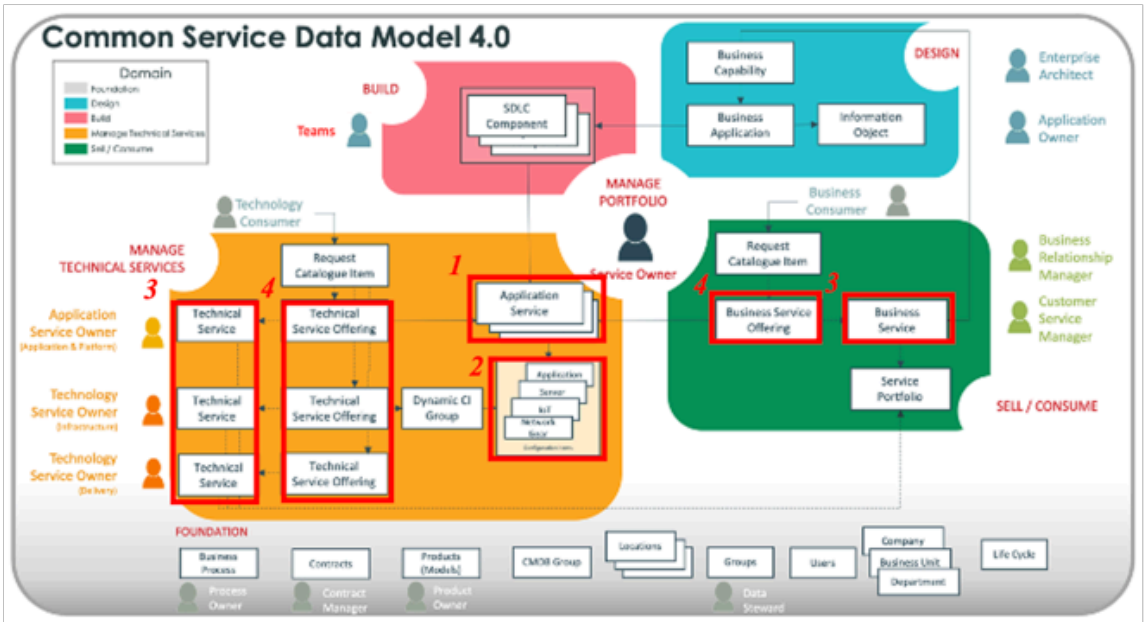

Products that add value to Problem Management

When you use Problem Management with one of the following ServiceNow products, you increase the value you get from Problem Management.

- Discovery provides details about the hardware and software CIs you are using.
- Service Portfolio Management provides life-cycle information for a service.
- Asset Management provides the related product model. Software Asset Management (SAM Foundation) and Hardware Asset Management (HAM) provide life-cycle data for Technology Portfolio Management.
- Security Management provides initial information to containment, eradication, and recovery of security related problems.
- Risk Management provides IT risk and financial risk information.

Products that benefit from APM

- IT Service Management (ITSM): Services have the context of the business and applications, along with the information and technologies layered beneath them.
- Information Technology Operations Management (ITOM): Understands the business context for the application services along with the hardware and software being managed.
- Governance, Risk, and Compliance (GRC): Auditors can leverage the business applications and related Information Objects. This helps auditors understand the design-time data sensitivity for scoping audits, measuring risks, and managing audit activities.
- Asset Management: Manages the software and hardware life cycles for business applications and business services.

Problem Management use case

The Problem Management use case is described in this section.

Problem Management is used to prevent problems and the occurrence of resulting incidents. It also aims at eliminating recurring incidents and minimizing the impact of incidents that cannot be prevented. With Problem Management, you can capture information on affected configuration items (CIs), with type as asset, in a problem to keep a record of the updated, repaired, swapped, or retired configuration items. By keeping track of the assets, you can identify the location of the

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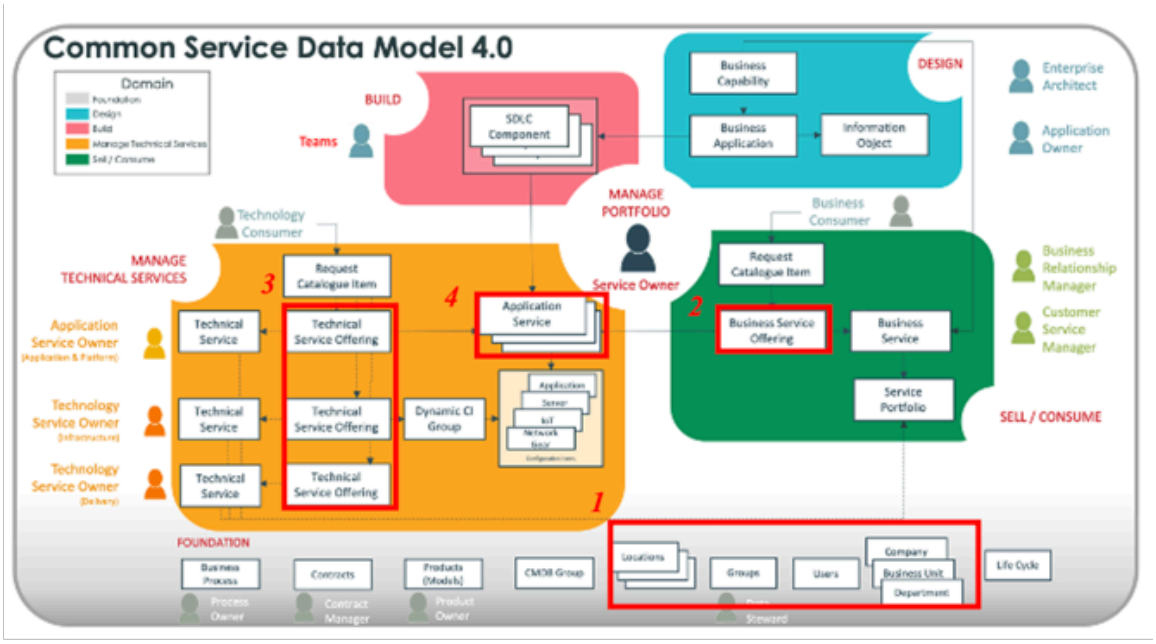
assets, their usage and when the assets were changed. Using Problem Management, you to monitor and manage the assets in your company using a systematic approach.

If a configuration item (CI) has resulted in a problem, use the dependency view to identify other configuration items (CIs) affected by the CI that caused the problem. You can then associate affected configuration items (CIs) with a problem record to find out how the problem affects other CIs with dependent relationships.

Key features of the Problem Management use case

The CMDB, when used by the CSDM framework, provides value to Problem Management in the following ways:

- Understand the impact of the problem on services and service offerings.
- Dynamically route problems.
- Identify one or more impacted services to address the problem.



The CSDM data elements used in Problem Management are:

1. Subscription: Related lists on service offerings that identify who has access to the offering and thus may be impacted in an outage. A problem can identify impact using the subscribed by tables. The related lists are as follows:
   - Service Subscriptions by Company [service_subscribe_company]
   - Service Subscriptions by Department [service_subscribe_department]
   - Service Subscriptions by Group [service_subscribe_sys_user_grp]
   - Service Subscriptions by Location [service_subscribe_location]
   - Service Subscriptions by User [service_subscribe_sys_user]
2. Business service offering may be used by problems to provide the business approver based on approval_group and business_criticality. A business service may have multiple offerings, each with a different criticality.
3. Technical service offering may be used by problems to provide the technical approver approval_group and technical assignment group on the attribute assignment_group.

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4. Application service may be used to provide prod and non-prod (DEV, QA, UAT, etc.) environments. Non-prod environments may be filtered out if desired. The legacy **used_for** attribute maps to the **environment** attribute. You should use the **environment** attribute.

   Note:
   Some service offerings may identify the environment of the offering as well.

Results of the Problem Management use case

The CSDM framework provides Problem Management context for problems on what CIs may be involved.

To determine the impact and root cause, compete the following steps:

1. Populate the Configuration Item attribute on the Problem form, configuration_item, with the CI item or service affected.
2. (Optional) Use the Service and Service Offering attributes on the Problem form to help narrow down the list of configuration items to choose from. This feature is not available with the base system and needs additional configuration.
3. (Optional) Use the Affected CI related list to identify the CIs that may have caused the problem.

Problem Management considerations

Consider these points while implementing the CSDM framework.

- Application Service: An application service is a service type that is a logical representation of a deployed application stack.
- Using application service for a problem: Some of the scenarios where the application service can be used for a problem include:
  - The problem is for an application issue: In this scenario the application service may be populated in the configuration_item attribute on the Problem form representing the unique deployment of an application stack. For example, the application service of MyApp 3.0 Prod has been reported as being unavailable.
  - The problem on an infrastructure CI is impacting devices. In this scenario the application service may be populated on the problem's Impacted Services related list, task_cmdb_ci_service, to identify the Application Service as one of the impacted services. For example, the Server Acme42 may be impacting my Application Service of MyApp 3.0 Prod and other related services.

Service Catalog product view

The Service Catalog lets you create other catalogs (such as the Request Catalog and the Product Catalog) that provide self-service opportunities in the channel you want to use, such as the self-service portal, the mobile app, or the Virtual Agent (conventional interface). The goal of this product view is to help you to understand how Service Catalog key entities work with the core CSDM framework.

You can create catalog items that can be used submit requests such as service and product offerings. You can also standardize request fulfillment to ensure the accuracy and availability of the items in the catalogs.

In addition to offerings that are fulfilled using Request Management application for IT, you can use Service Catalog Record Producers to submit requests or tickets in non-IT applications such as HR, Legal, Facilities and any record in any custom application.

For implementation details, see Service Catalog.

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Service Catalog and CSDM tables

Service Catalog manages and uses CSDM tables. Several ServiceNow products benefit from and add value to Service Catalog.

CSDM tables managed by the Service Catalog

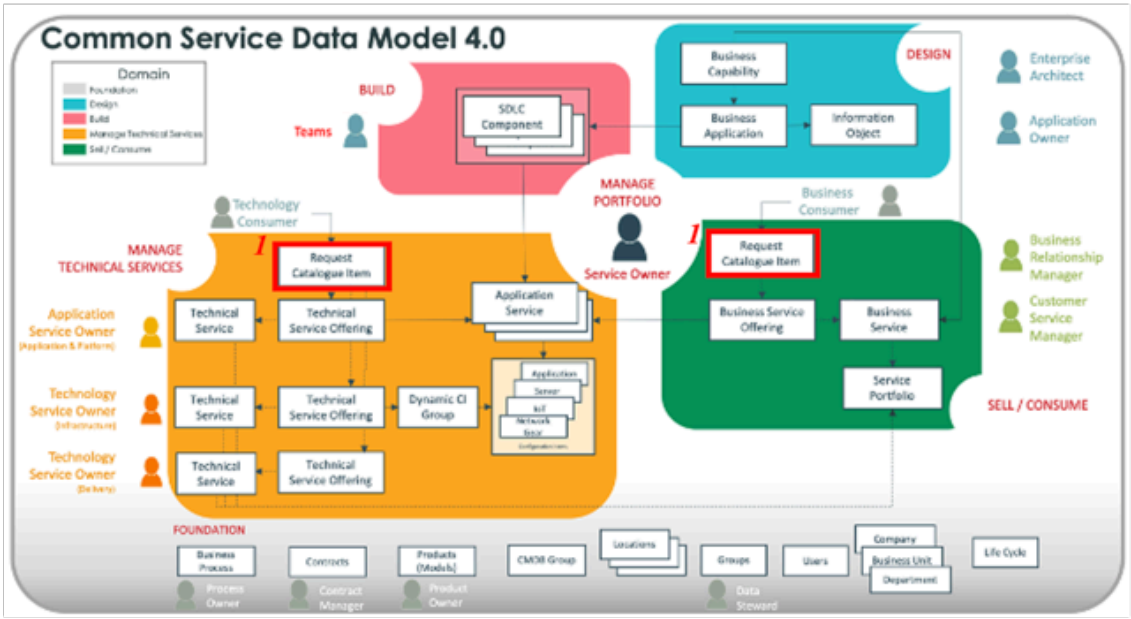
The Service Catalog primarily manages business services in the Sell/Consume domain. Technical Services are also viewed from the Operate domain of Event Management.

The Service Catalog manages the Catalog Item table [sc_cat_item]. The Catalog Item table creates requests in Request Management. The requests usually have an automated, semi-automated, or business workflow for fulfilling the request, which can consist of approvals and tasks. When part of Service Portfolio Management, the CIs are associated with service offerings. When you link a catalog item, you can track request activity for all catalog items associated with a service offering. An offering can have multiple catalog items.

The CIs can include:

- PC Hardware Item (pc_hardware_cat_item): Submits hardware asset requests included in Asset Management workflows.
- PC Software Item (pc_software_cat_item): Submits software asset requests included in Asset Management workflows.
- Record Producer (sc_cat_item_producer): Submits requests or generates records other than Request Management tables for services that aren't serviced by Request Management (for example, HR Cases, Facilities Requests, or Legal Requests).

CSDM tables managed by the Service Catalog



CSDM tables used by the Service Catalog

1. Configuration Item tables [cmdb_ci*]
2. Service Offering table [sc_cat_item_subscribe]
3. Application Service table [cmdb_ci_discovered_service]
4. Product Model tables [cmdb_model]

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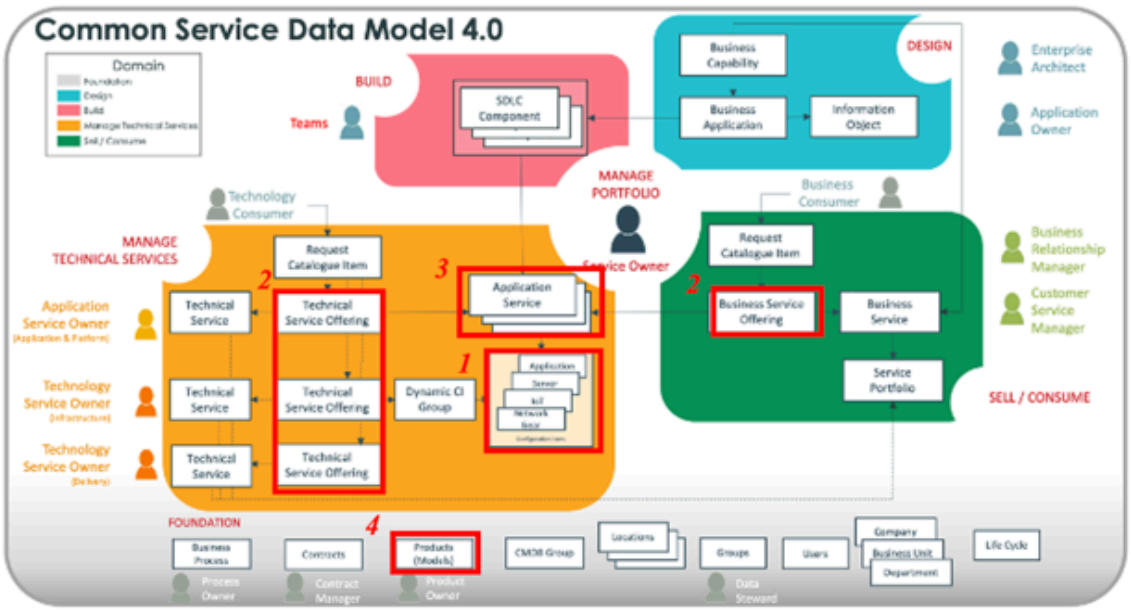
Note:
The following legacy CMDB relationships that once provided access to catalog items are no longer supported. To provide access, use the new relationships listed in the table.

Relationship tables

CMDB table	Catalog item relationship table	New relationship to use instead
User (sys_user)	sc_cat_item_user_mtom, sc_cat_item_user_no_mtom	User criteria
Group (sys_user_group)	sc_cat_item_group_mtom, sc_cat_item_group_no_mtom	User criteria
Department (cmn_department)	sc_cat_item_dept_mtom, sc_cat_item_dept_no_mtom	User criteria
Location (smn_location)	sc_cat_item_location_mtom, sc_cat_item_location_no_mtom	User criteria
Company (core_company)	sc_cat_item_company_mtom, sc_cat_item_company_no_mtom	User criteria

CSDM tables used by the Service Catalog



Products that benefit from the Service Catalog

Service Portfolio Management (Service Portfolio Management)

Ties catalog items to service offerings. Lets service owners create and maintain catalog items more easily, and gives more visibility into the service offerings.

Hardware Asset Management and Software Asset Management

Self-service catalog lets you order an asset and track service delivery.

Human Resources (HR)

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Exposes the creator (Record Producer) of HR cases and displays the Record Producer in the relevant self-service catalogs (for example, Portal, Mobile, and Virtual Agent).

Customer Service Management (CSM)

Exposes the creator (Record Producer) of customer service cases and displays the Record Producer in the relevant self-service catalogs (for example, Self-service Portal, Mobile, and Virtual Agent).

Service Catalog use case

You can create customized catalogs where you can request items such as a specific service or product. With this use case, CSDM provides Service Catalog connection to the service offerings and services.

Service Catalog use case

Catalogs contain catalog items and are the starting points for accessing available services. Request Catalogs and Product Catalogs are two of the customized catalogs you can create from the Service Catalog. For details, see Service Catalog.

- A Request Catalog is a list of business and technical products, services, service commitment options, and offerings that you can order.
- A Product Catalog is a set of information about individual models. A model is a specific version or configuration of an asset. Asset managers use the Product Catalog as a centralized repository for model information.

Key features of the Service Catalog use case

Digital Portfolio Management (DPM) uses the CSDM framework to navigate the Service Portfolio. You can then use the Service Portfolio to locate the services and their related service offerings, catalog items, dependents, dependencies, metric roll-ups, costs and initiatives. The associated metrics are aggregated using the CSDM framework with the related tables.

Catalog items

A catalog item is an item or a service that you can request from the catalog. A service can contain multiple catalog items. Catalog items are listed on the catalog portal and are available to the users who need them (either through subscription or job responsibility). Each catalog item is linked to one service offering.

The Catalog Item form includes the following tabs.

- Item Details: Description of the catalog item.
- Process Engine: The defined process used to fulfill the catalog Item request.
- Picture: Picture used to represent the catalog item when it appears in the catalog.
- Pricing: Pricing details for the catalog item.
- Portal Settings: Provides specific settings on how you interact with the catalog item in the catalog portal.

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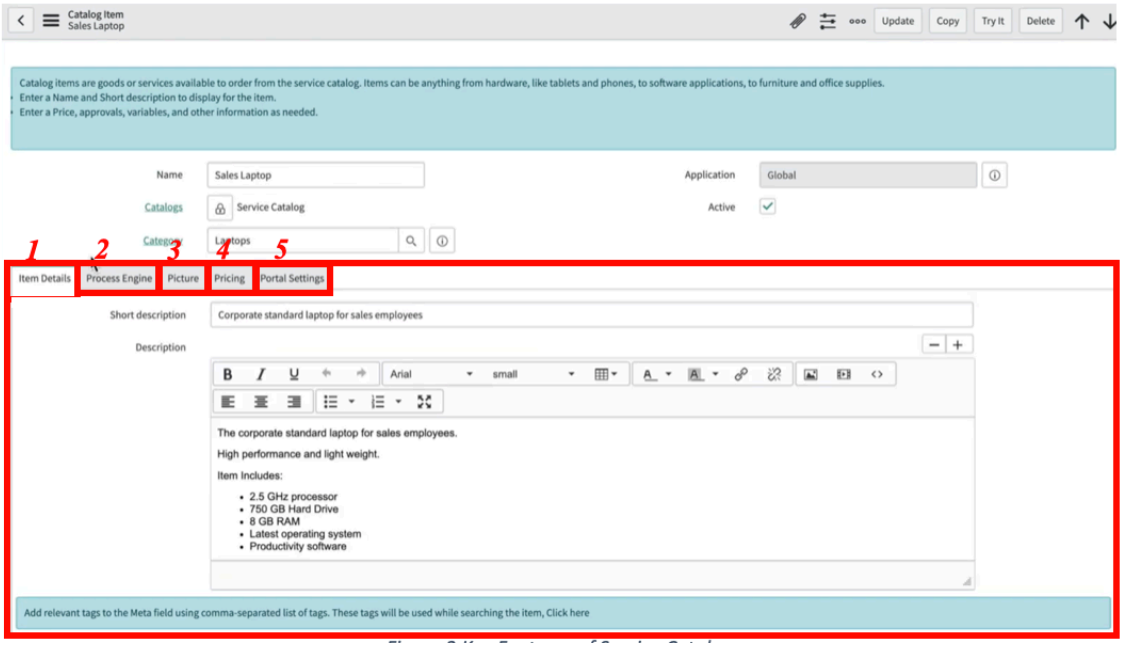
Catalog Item form



Product Catalog use case

Use the Product Catalog to specify information about a product model. Product models are specific versions or configurations of an asset. Asset managers use the Product Catalog as a centralized repository for model information.

A detailed and well-maintained Product Catalog can coordinate with the Service Catalog, asset, procurement, request, contract, and vendor information. Models published to the Product Catalog are automatically published to the Service Catalog. The Service Catalog includes information about goods (models) and services. If the model is available from multiple vendors, a model can be listed more than once. Models are included with Asset Management.

Key features of the Product Catalog use case

This use case lets you include hardware and software product information as items in the Product Catalog.

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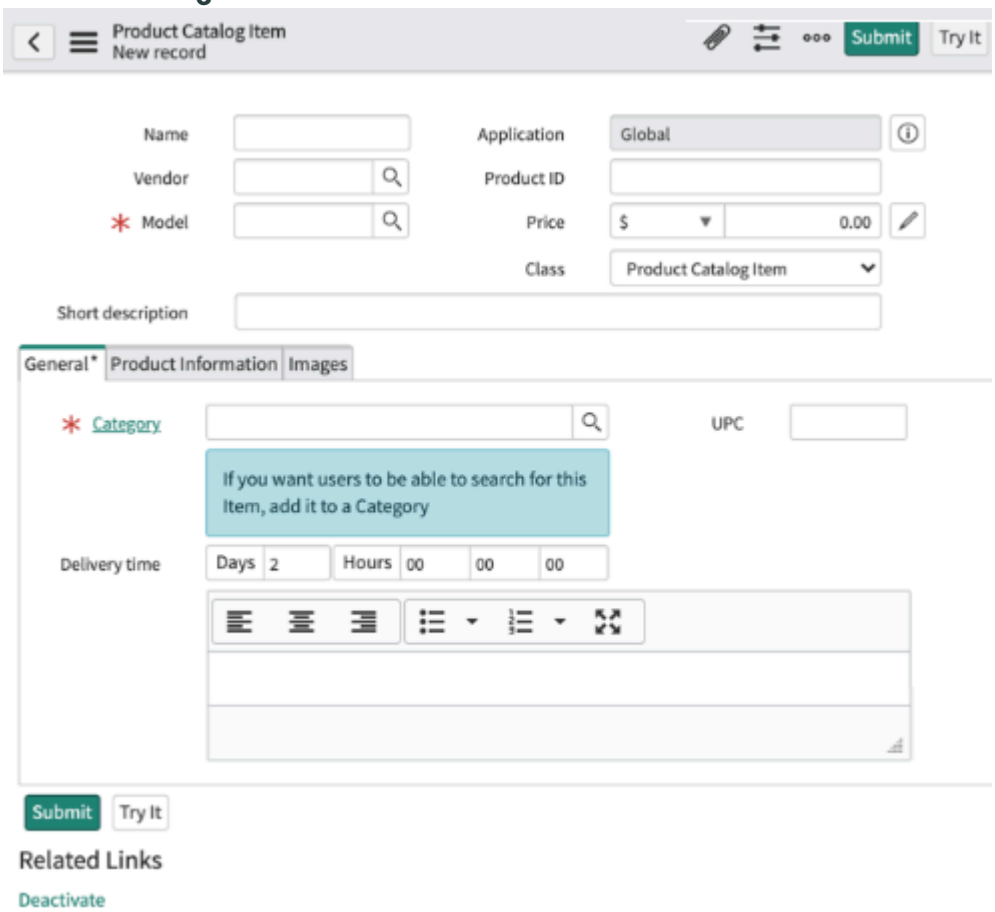
Product Catalog items



Results of Product Catalog use case

The CSDM framework ensures that product models are available in the catalog and that there are processes defined to consume the models.

Service Catalog considerations

Consider these points while implementing the CSDM framework.

- The Product Catalog builds on the Service Catalog. Product catalogs specify the product models that are available for use. Product-specific attributes are captured in each catalog item. You can create product catalogs for each type of products in your portfolio.
- You can create catalog types that reflect the types of offered products and services.

CSDM reference

Reference topics provide detailed descriptions of tables, properties, forms, and roles that are used in the CSDM framework.

Basics

CSDM terms

CI relationships in the CSDM

How CSDM concepts map to CMDB tables

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Life cycles

Document life cycle

Hardware life cycle

Location life cycle

Logical life cycle

Product life cycle

CSDM terms

Most ServiceNow products and ServiceNow AI Platform applications align closely with the Common Service Data Model. This table defines terms as they are used across the ServiceNow AI Platform and products.

Common CSDM terms

Term	Definition	Notes
Application	Any deployed program, module, or group of programs that is designed to provide specific functionality on a computer infrastructure.	Defines behavior and has specific functionality associated with it. Applications are typically discoverable functionality, like Apache Web Server.
Application service	A service type that is a logical representation of a deployed application stack.	Examples of application services are hosting, data backup, and recovery. **Note:** Applications and application services do not have a one-to-one relationship. An application service can include multiple applications. An application can be included in multiple application services.
Asset	An item whose financial value is tracked.	Many assets are CIs and vice versa, but that is not always the case. Assets have a life cycle with financial considerations, for example, Microsoft 365.
Business Application	Represents all software and infrastructure environments (dev, test, prod) that are configured to provide functionality.	Used to increase productivity and perform other business functions accurately. For example, Dell Online.
Business capability	High-level capability that an organization requires to execute its business model or fulfill its mission.	Typically described in the context of performing one or more specific tasks to achieve business outcomes. For example, demand management or financial planning.
Business service	A business service is a service type that is published to business users. A business service	Usually, business users order business services. Business users can select the desired offering and service commitment levels via the Service

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Common CSDM terms (continued)

Term	Definition	Notes
	typically implements one or more business capabilities.	Catalog. For example, procurement, shipping, and finance. • A business service is an operational CI. • A business service must be a one-level service and not a hierarchy of business services. • A business service can be used for impact in Incident, Problem, and Change and for approvals for Change. • A business service must be focused on the consumer or seller.
Configuration item (CI)	Physical and logical components of an infrastructure that are currently or soon will be under configuration management.	Might be a single module such as a server, database, or router or a more complex item, such as a complete system. For example, a web server, database, or infrastructure.
Operating model	An abstract and ideally visual representation (model) of how an organization delivers value to its customers or beneficiaries.	Typically represents the various elements of how an organization operates. It usually incorporates strategy positions such as the innovation model, degree of intelligent automation, industry alignment, provider delivery models, and the business expectations of IT.
Portfolio	Collection of services, products, projects, or applications.	Used to manage like items together for a business. Portfolios may be grouped by objective, capabilities, organization, like projects, or services.
Service	Means of delivering value to customers by facilitating outcomes that users want to achieve without the ownership of specific costs and risks.	Typically has three aspects: • Interaction • Offering • Service system ServiceNow provides three base service types: • Business • Technical • Application You can extend the base types to align with the service types in your organization.
Service catalog	Provides consumable view of available products, services, service commitment options, and offerings.	Helps manage which services a user may have access to. Also, catalogs are the starting point for access to available services. For example, IT services catalog.

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Common CSDM terms (continued)

Term	Definition	Notes
Service commitment	Defines the service delivery obligations agreed to between the consumer and the provider.	Often manifested in the form of contracts such as service level agreements, operational level agreements, and underpinning contracts. Service commitments include specific performance characteristics that differentiate one offering from another.
Service offering	A stratification of a service into capability, availability, pricing, and packaging options.	Different levels of performance and features for a given service can be made available. For example, ITSM Standard and ITSM Pro.
Technical service	A service type that is published to service owners and typically underpins a business or application service.	Typically orderable by service owners. Service owners are able to select the desired offering and service commitment levels via the Service Catalog. For example, computers, storage, and networks).

CI relationships in the CSDM

For configuration management to be most effective, establish relationships between the objects and configuration items (CIs) in the conceptual CSDM.

Required CSDM relationships

- Most features and products, such as the Technology Portfolio Management risk assessment and Application Portfolio Management (APM), depend on the relationships.
- The relationships commonly created as part of Service Mapping and Discovery are the standard for infrastructure CIs. If you map the elements manually, be sure to consider how Discovery would have treated them.
- Not all objects in the CSDM conceptual model are CMDB tables, and not all the objects have relationships. You may need to create some of the following required relationships.

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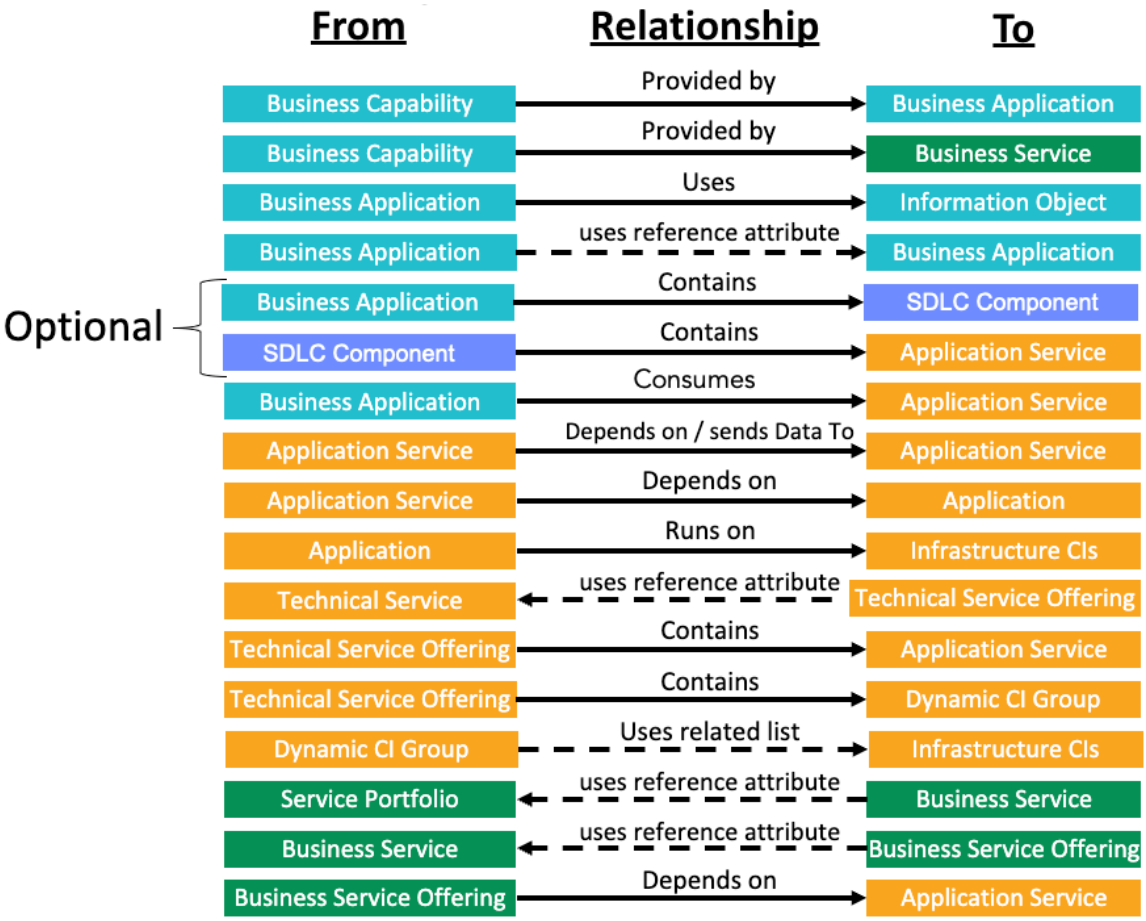

Note:
Business services and technical services connect to the spm_service_portfolio through the spm_taxonomy_node. See Service Portfolio Management taxonomy.

Creating relationships between CIs

See CI relationships in the CMDB for information on creating relationships between CIs.

Resources in the ServiceNow Community

For an extended explanation of the business application reference attribute's role in managing platforms from a CSDM perspective, see this article in the ServiceNow community.

Playlist of all videos

How CSDM concepts map to CMDB tables

The objects in the conceptual CSDM framework must map to the physical model objects (CIs and CI class tables) in the CMDB.

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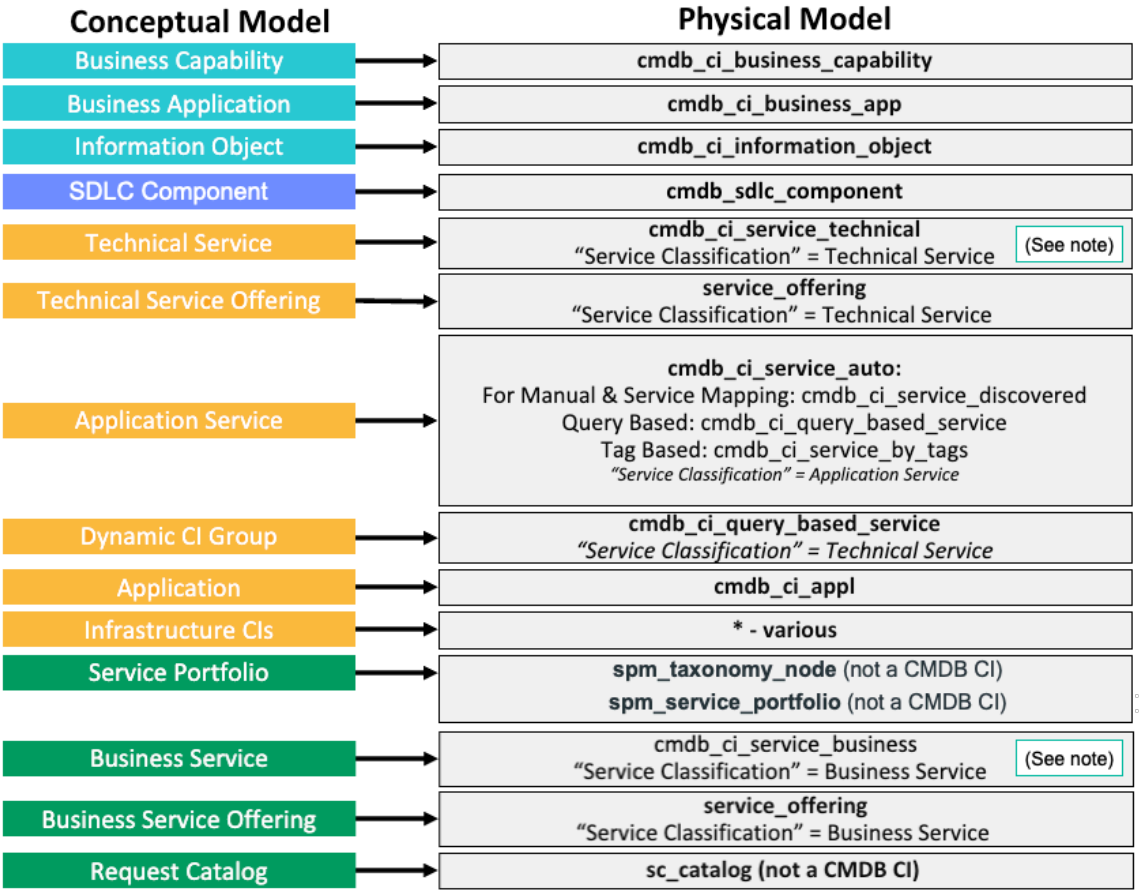

Note:
Business services and technical services connect to the spm_service_portfolio through the spm_taxonomy_node. See Service Portfolio Management taxonomy.

CSDM videos in the ServiceNow Community

Playlist of all videos

'Foundation' stage reports on the CSDM Data Foundations dashboard

Foundation domain reports on the CSDM Data Foundations dashboard

Reports on the Foundation tab

In this example, a report on the **Foundation** tab indicates that most named product models don't have associate product owners. Without this data, you might not be able, for example, to identify products that are reaching end-of-life. For details, see Products and product models.

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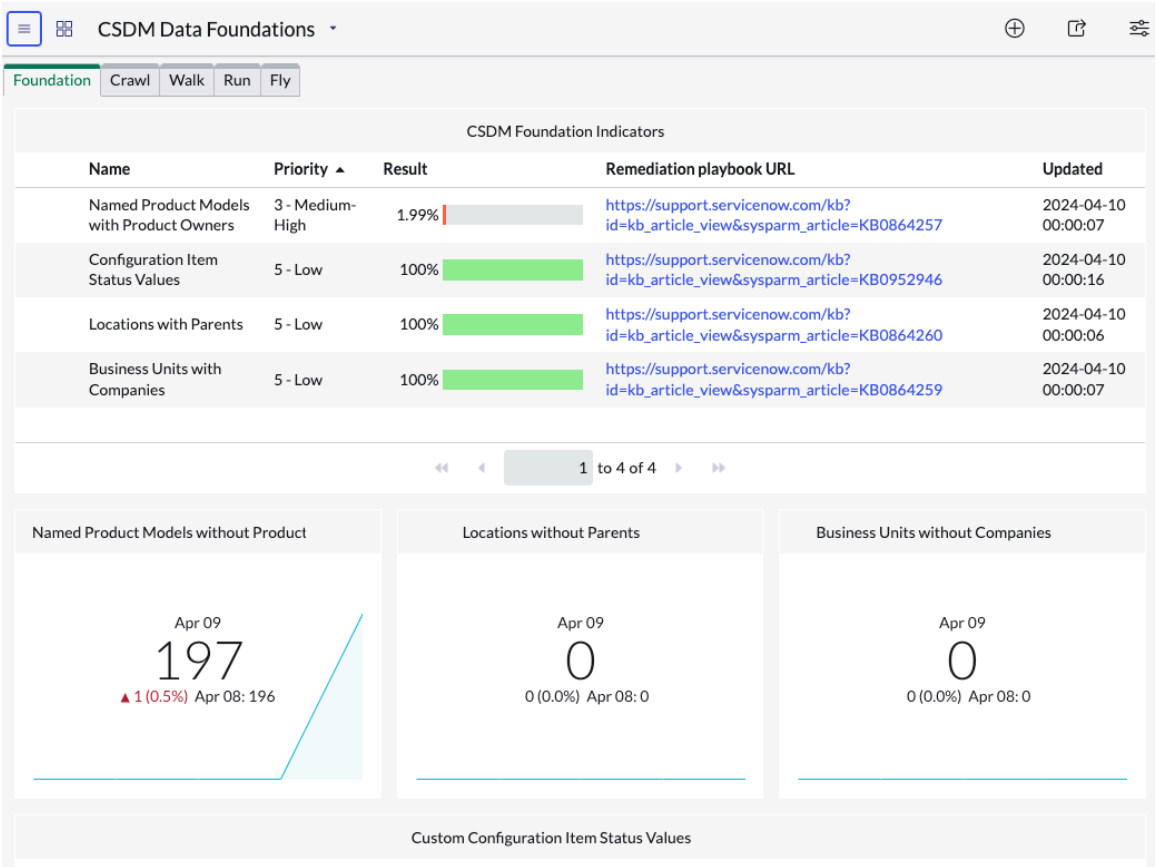

CSDM Foundation Indicators report

- The **Priority** value is the product of the weight of the metric and the severity of the actual score. Priority ranges from 1 — Critical (the highest priority), to 5 — Low (the lowest priority).
- The **Result** column displays a color-coded bar showing the percentage of CIs or the measured item that are in compliance for the key foundational metric.
  - Red: 0–50% are in compliance.
  - Yellow: 50–90% are in compliance.
  - Green: More than 90% are in compliance.

  To ensure optimum performance, the system stops collecting data for some metrics when they reach a specified number of non-compliant CIs. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.
- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.

Named product models without product

For details, see Products and product models.

Locations without parents

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You can create a hierarchy of location data using the *Parent* attribute to match your reporting requirements. Missing parent locations break the structure. See Location table [cmn_location].

Business units without companies

The hierarchy of your business is populated in the Business Unit table with a reference to the parent company. A business unit is a part of your organization that is responsible for specific operations, such as finance, human resources (HR), or IT. A hierarchy within a business unit is common. For large multinational organizations, you may have business units that identify independent regional operations and the specific operations within the region.

Related topics

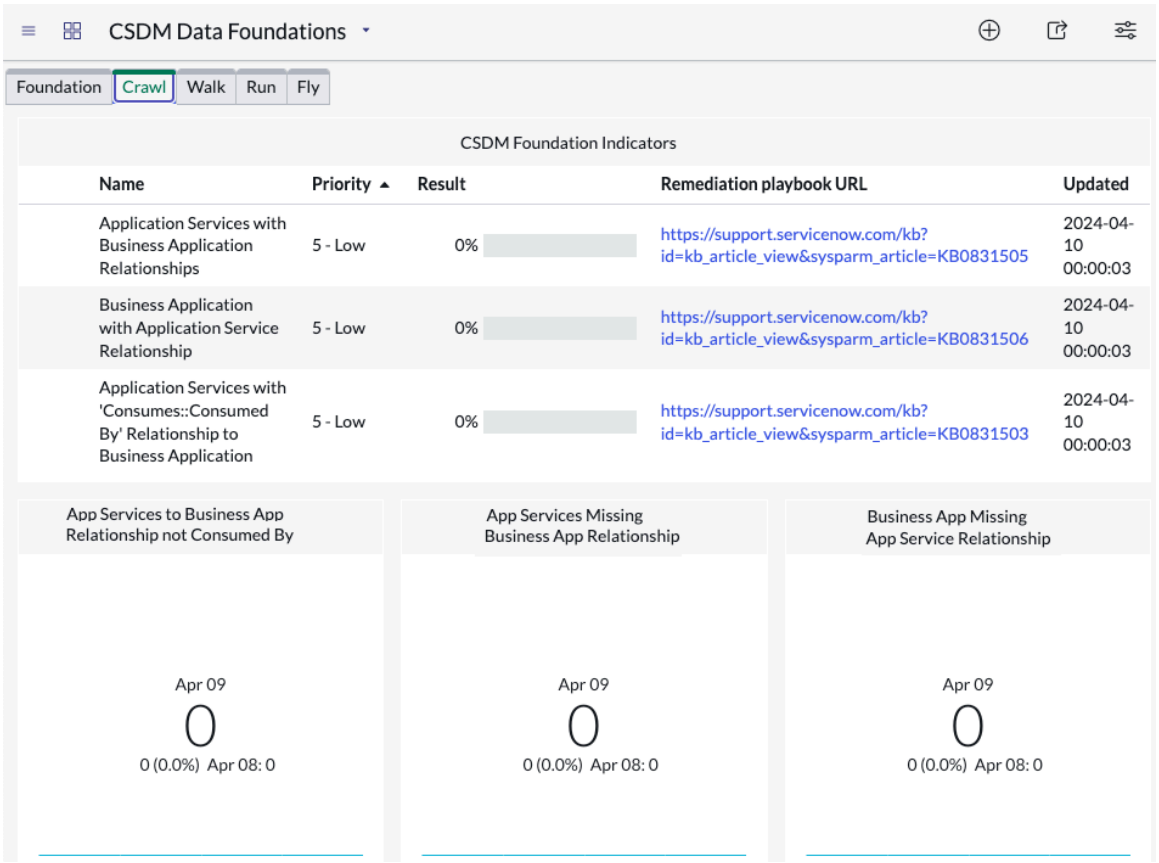
CSDM Data Foundations dashboard

'Crawl' stage reports on the CSDM Data Foundations dashboard

Crawl stage reports on the CSDM Data Foundations dashboard

Reports on the Crawl tab

In this example, a report on the **Crawl** tab indicates that there are application services that are not associated with a business application.



CSDM Foundation Indicators report

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  To ensure optimum performance, the system stops collecting data for some metrics when they reach a specified number of non-compliant CIs. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.
- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.

App service to business app not Consumed by

The report identifies incorrect relationships.

App services missing business app relationship

Percent of CIs missing an important relationship. The application service is a base-system CMDB table that should map to the related business application in use. Because the application service is typically the system that a caller identifies when they report an issue with an application, the relationship is requires if you are to identify the affected business application. For more information, see Monitor the health of application services on the Application Service Dashboard.

Business apps missing app service relationship

Percent of CIs missing an important relationship.

Managing performance of data collection

The system runs scheduled jobs that collect data for three CSDM metrics:

- App services that are missing a business app relationship
- Business apps that are missing an app service relationship
- App services where the relationship to business apps is not `Consumed by`

To ensure optimum performance, the system stops collecting data for some metrics when a specified number of non-compliant CIs is discovered. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

Related topics

CSDM Data Foundations dashboard

'Walk' stage reports on the CSDM Data Foundations dashboard

Walk stage reports on the CSDM Data Foundations dashboard

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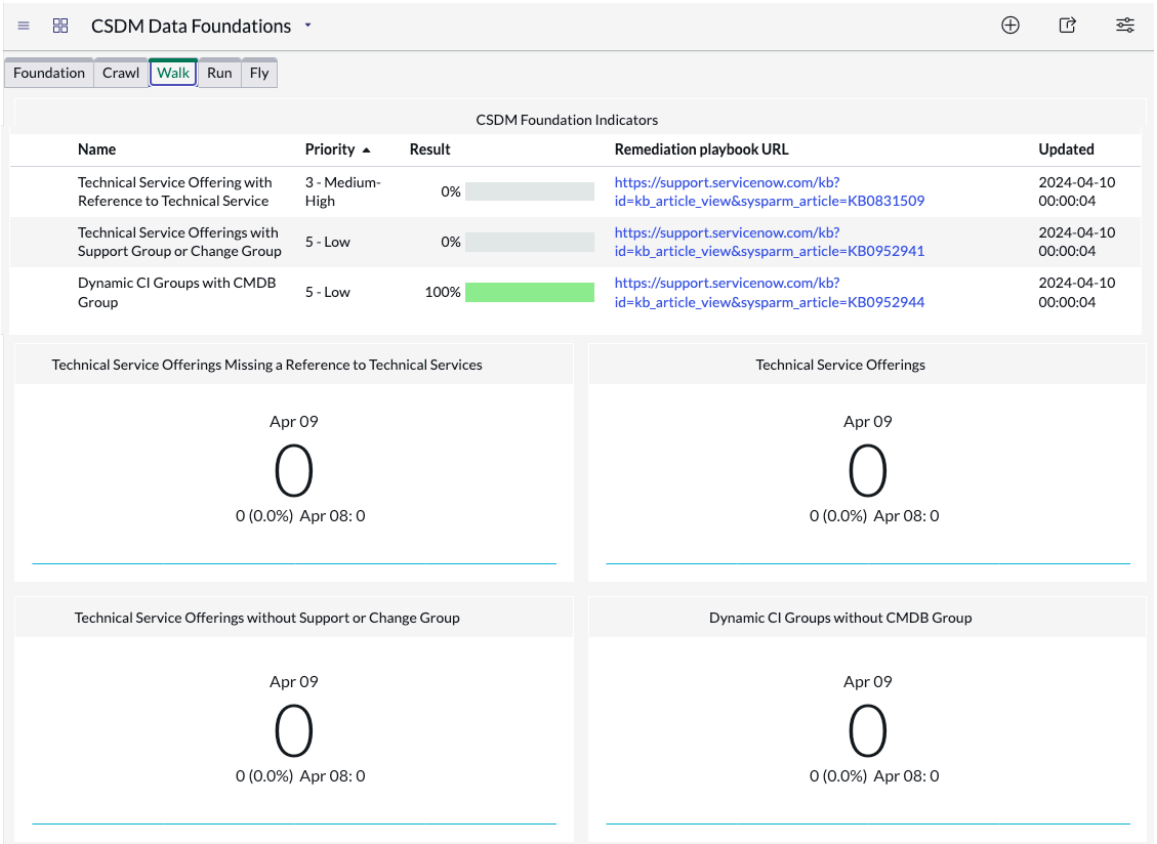
Reports on the Walk tab

In this example, a report on the **Walk** tab indicates that there are technical service offerings that are not associated with a support group. This indicates a risk that downtimes will take longer to remedy.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.



CSDM Foundation Indicators report

- The **Priority** value is the product of the weight of the metric and the severity of the actual score. Priority ranges from 1 — Critical (the highest priority), to 5 — Low (the lowest priority).
- The **Result** column displays a color-coded bar showing the percentage of CIs or the measured item that are in compliance for the key foundational metric.
  - Red: 0–50% are in compliance.
  - Yellow: 50–90% are in compliance.
  - Green: More than 90% are in compliance.

  To ensure optimum performance, the system stops collecting data for some metrics when they reach a specified number of non-compliant CIs. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.
- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

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Related topics

CSDM Data Foundations dashboard

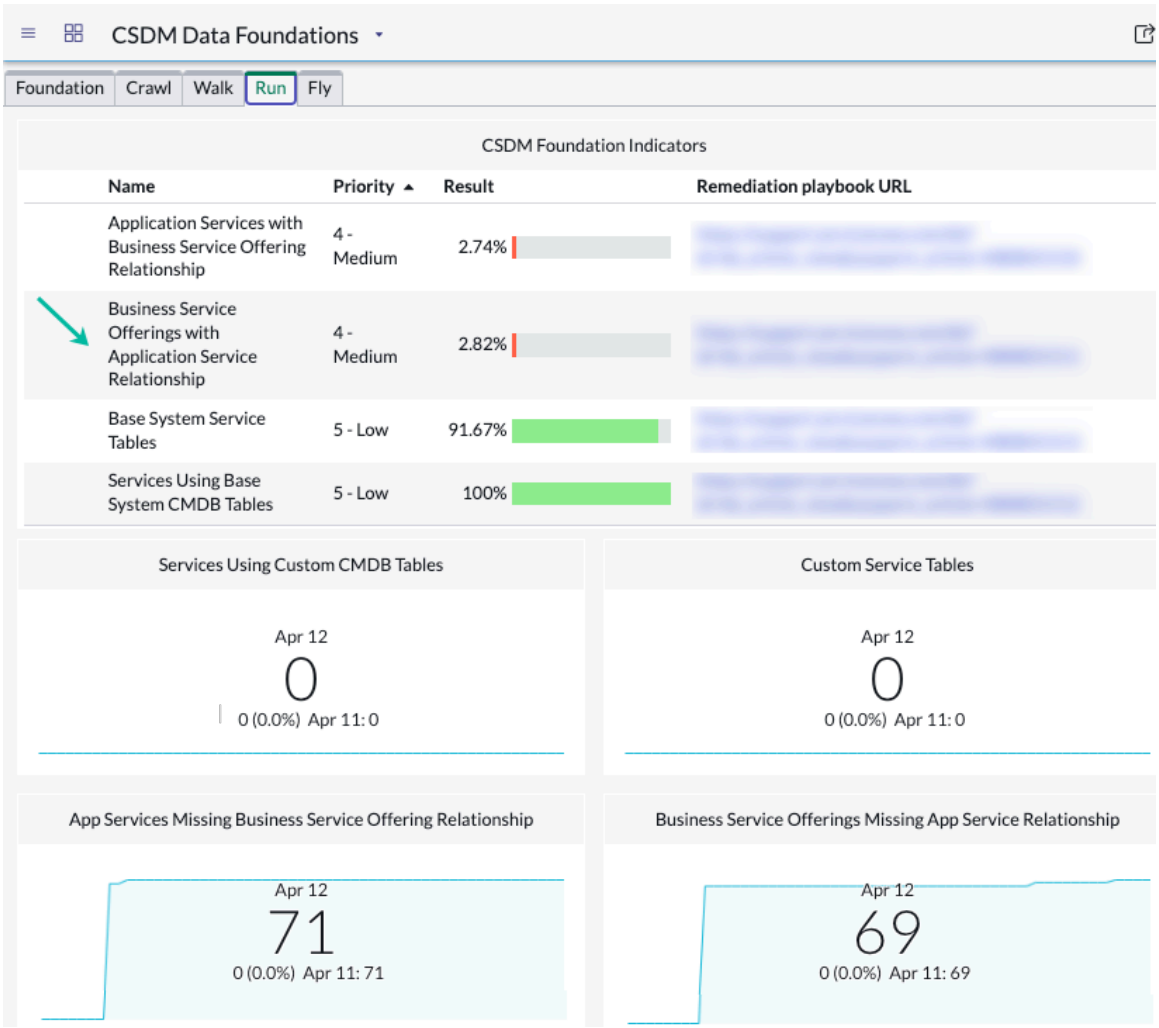
'Run' stage reports on the CSDM Data Foundations dashboard

Run stage reports on the CSDM Data Foundations dashboard

Reports on the Run tab

In this example, a report on the **Run** tab indicates that several business service offerings don't have the required relationships to application services. With this knowledge, Service owners can add the relationships to ensure that customer service agents get complete information on the upstream impacts of applications that are down.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.



CSDM Foundation Indicators report

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  - Green: More than 90% are in compliance.

  To ensure optimum performance, the system stops collecting data for some metrics when they reach a specified number of non-compliant CIs. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

Managing performance of data collection

The system runs scheduled jobs that collect data for three CSDM metrics:

- App services that are missing a business app relationship
- Business apps that are missing an app service relationship
- App services where the relationship to business apps is not `Consumed by`

To ensure optimum performance, the system stops collecting data for some metrics when a specified number of non-compliant CIs is discovered. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

Related topics

CSDM Data Foundations dashboard

'Fly' stage reports on the CSDM Data Foundations dashboard

Fly stage reports on the CSDM Data Foundations dashboard

Reports on the Fly tab

In this example, a report on the **Fly** tab indicates that there are information objects that are not associated with a business application.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.

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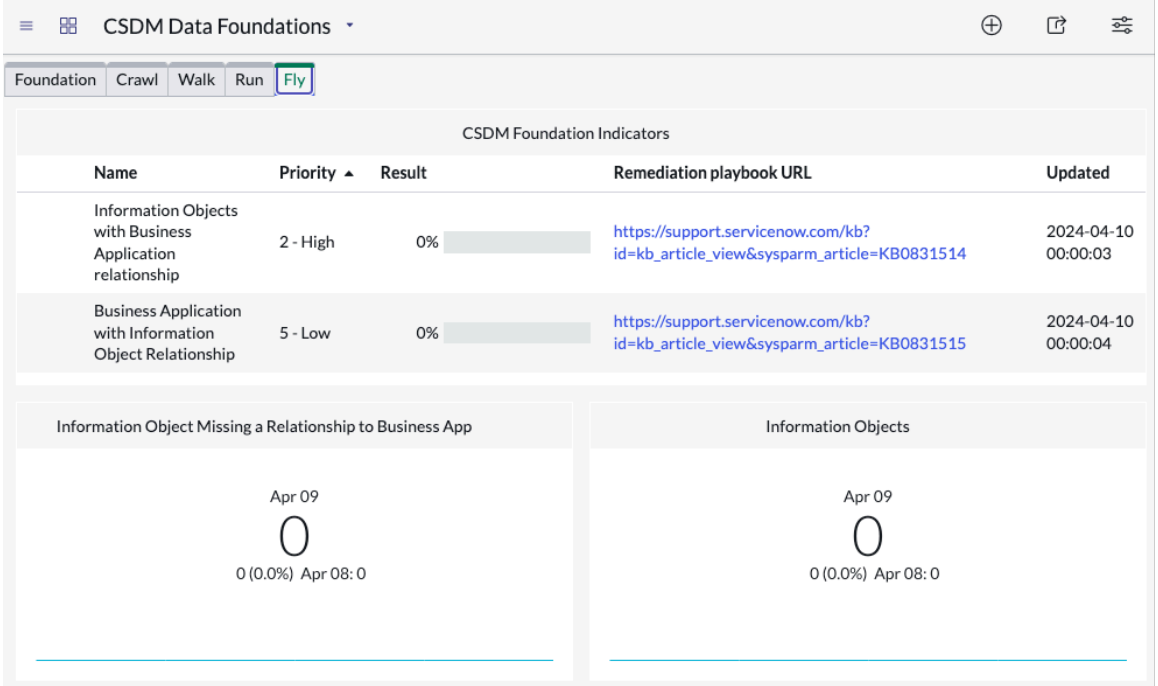

CSDM Foundation Indicators report

- The **Priority** value is the product of the weight of the metric and the severity of the actual score. Priority ranges from 1 — Critical (the highest priority), to 5 — Low (the lowest priority).
- The **Result** column displays a color-coded bar showing the percentage of CIs or the measured item that are in compliance for the key foundational metric.
  - Red: 0–50% are in compliance.
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  To ensure optimum performance, the system stops collecting data for some metrics when they reach a specified number of non-compliant CIs. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.
- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

Note:
Starting with the CSDM Data Foundations dashboard v2.2, the following metrics no longer appear on the **Fly** tab:

- Information objects missing an app service relationship
- Catalog request items related to service offerings

Related topics

CSDM Data Foundations dashboard

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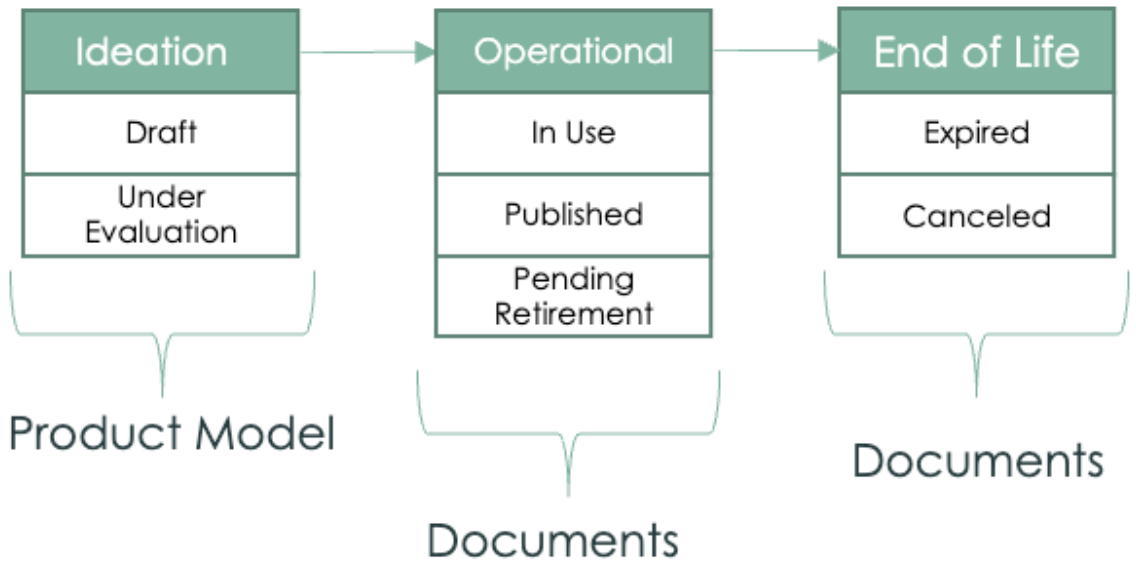
Document life cycle

The CSDM framework provides standard fields and values that you can use to track the life cycle of an asset or a CI. The document life-cycle states represent the overall life cycle of document assets (contracts) and CIs (business process) as related to their products.

Document life-cycle states

A life-cycle state is the combination life-cycle stage and life-cycle status of an asset or CI over the life cycle. For example, a document CI in the **Operational** stage might change status over time from **In Use** to **Published** to **Pending Retirement**. A different document CI in the **Operational** stage might go from the **In Use** status directly to **Pending Retirement** status without ever having been in the **Published** status.



The stage and status values for documents are visible only in tables related to documents in Contract Management and the CMDB.

Note:
Based on the type of item, the [life_cycle_control] table specifies which life cycle stage values are available for each life cycle stage.

For additional information on how you can benefit from implementing life-cycle value pairs for CMDB entities, see the 'life-cycle value pair' section in the 'Foundation domain' topic.

CSDM videos in the ServiceNow Community

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Hardware life cycle

The CSDM framework provides standard fields and values that you can use to track the life cycle of an asset or a CI. The hardware life-cycle states represent the overall life cycle of hardware assets and CIs as related to their products.

Hardware life-cycle states

Hardware assets are physical items that are stocked, for example servers, monitors, and keyboards. A life-cycle state is the combination life-cycle stage and life-cycle status of an asset or CI over the life cycle. The stages and statuses for the hardware life-cycle process are visible only in hardware-related tables in Asset Management and CMDB.

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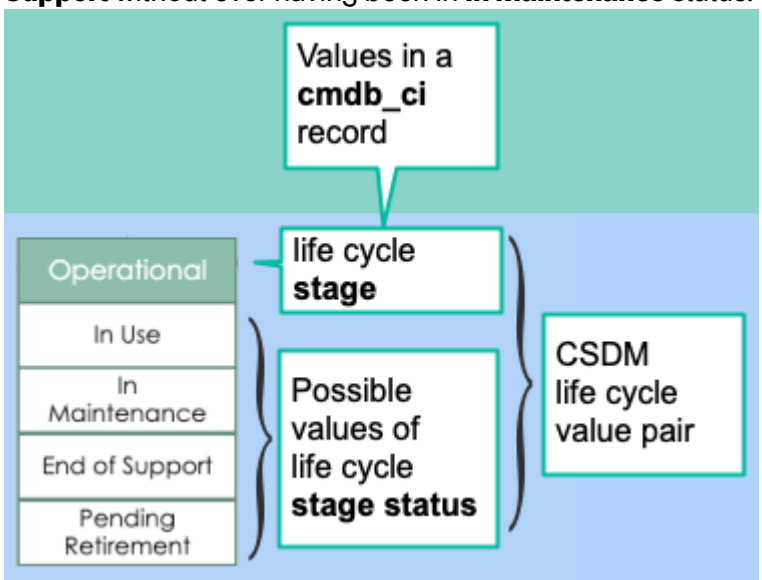
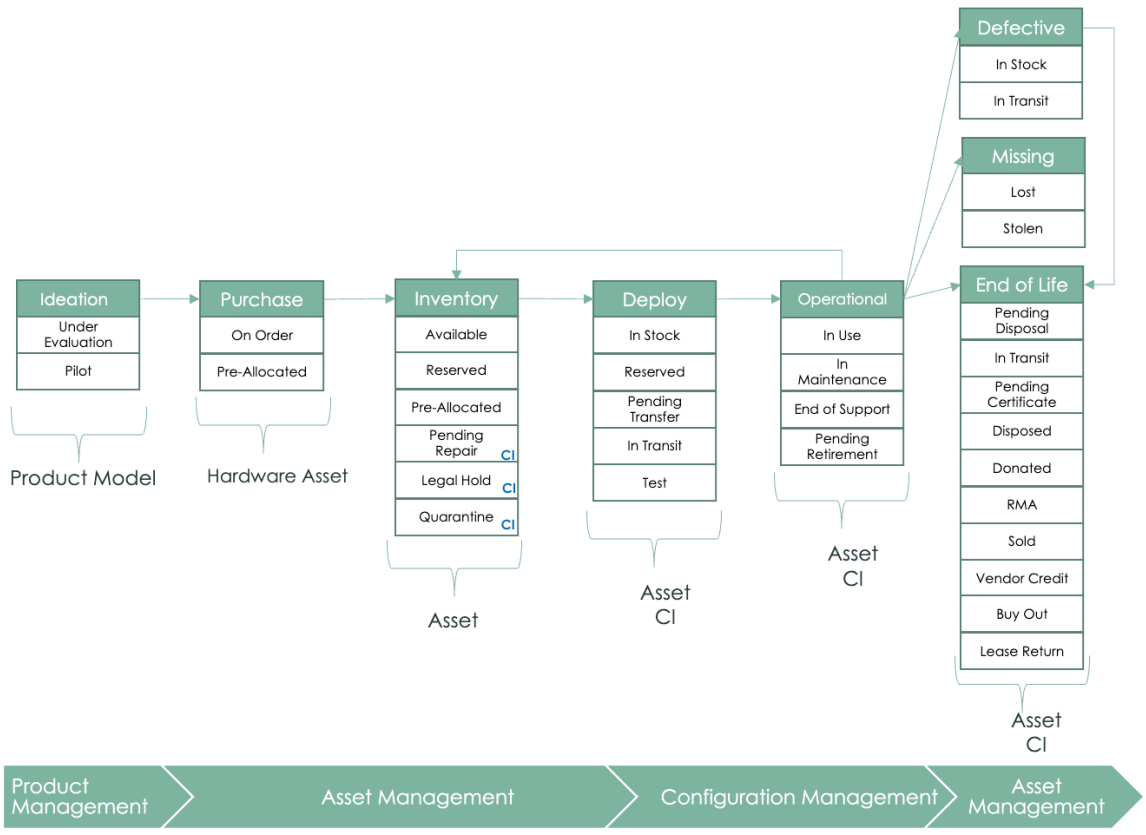
The standard CSDM life-cycle value pair covers all phases of a product instance life cycle.

- A *Life cycle stage* is one of the broad phases that a CI moves through, from inception or procurement to retirement and end of life.
- *Life cycle stage status* is the specific status of a CI within its current life cycle stage.

For example, a hardware CI in the **Operational** stage might change status over time from **In Use** to **In Maintenance** to **End of Support**. A different hardware CI might go from **In Use** to **End of Support** without ever having been in **In Maintenance** status.



Note:
Based on the type of item, the [life_cycle_control] table specifies which life cycle stage values are available for each life cycle stage.



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For additional information on how you can benefit from implementing life-cycle value pairs for CMDB entities, see the 'life-cycle value pair' section in the 'Foundation domain' topic.

Holistic life cycle: CMDB hardware tables (from cmdb_ci)

CMDB hardware tables	CMDB hardware table name
Accessory	cmdb_ci_acc
Communication Device	cmdb_ci_comm
Computer Peripheral	cmdb_ci_peripheral
Computer Room AC	cmdb_ci_crac
Display Hardware	cmdb_ci_display_hardware
Facility Hardware	cmdb_ci_facility_hardware
Hardware	cmdb_ci_hardware
Imaging Hardware	cmdb_ci_imaging_hardware
IP Device	cmdb_ci_ip_device
Monitoring Equipment	cmdb_ci_monitoring_hardware
Network Adaptor	cmdb_ci_network_adaptor
Printing Hardware	cmdb_ci_printing_hardware
Rack	cmdb_ci_rack
Storage Device	cmdb_ci_storage_device

Example hardware classes

View attributes, identification rule, and other important schema structures for the CMDB Computer [cmdb_ci_computer] class. See Hardware [cmdb_ci_hardware] class.

How retiring an application service might affect a hardware CI

An application service is the logical representation of the underlying hardware and software CIs that work together to implement a business application or system. The application service represents an instance of the business application or system.

Hardware and software CIs are managed using the physical life cycle states. Because an application service is a logical representation, it is managed as using the logical life-cycle states. The physical hardware CIs that are part of the service map under an application service have their own life cycle, but they are related through the application services as a specific set of dependencies or decomposition.

Example 1: A hardware CI is not retired when the application service is retired

When an application service is retired, the associated hardware might not be retired. For example, the hardware might remain idle, unrelated to any application service, until it is reallocated for use by a new application service.

Example 2: A hardware CI is shared by multiple application services

In the common scenario of a shared database, multiple application services (each with a unique database schema) share a single database service. The database service runs on a single physical host.

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When one of the application services is retired, the database service and host cannot be retired. All of the other application services still depend on the database service that is running on the host.

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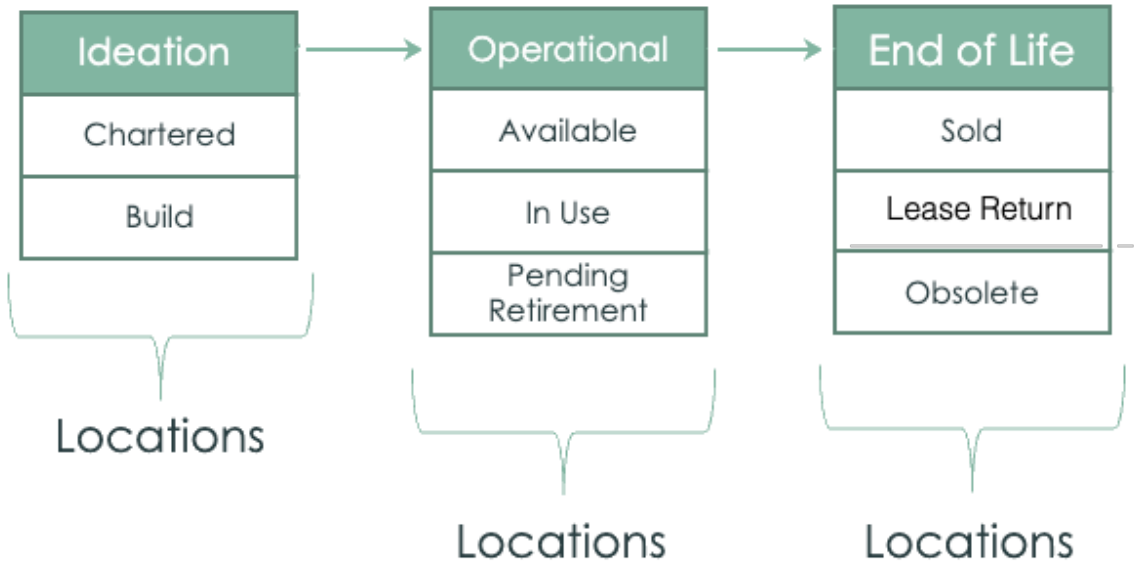
Location life cycle

The CSDM framework provides standard fields and values that you can use to track the life cycle of an asset or a CI. The location life-cycle states represent the overall life cycle of a location within common data.

Location life-cycle states

A life-cycle state is the combination life-cycle stage and life-cycle status of an asset or CI over the life cycle. For example, a location CI in the **Operational** stage might change status over time from **In Use** to **Pending Retirement**. A different location CI in the **Operational** stage might go from the **Available** status directly to **Pending Retirement** status without ever having been in the **In Use** status.



The stage and status values for locations are visible only in the common data locations table.

Note:
Based on the type of item, the [life_cycle_control] table specifies which life cycle stage values are available for each life cycle stage.

For additional information on how you can benefit from implementing life-cycle value pairs for CMDB entities, see the 'life-cycle value pair' section in the 'Foundation domain' topic.

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Logical life cycle

The CSDM framework provides standard fields and values that you can use to track the life cycle of an asset or a CI. The logical life-cycle states represent the overall life cycle of logical assets and CIs as related to their products.

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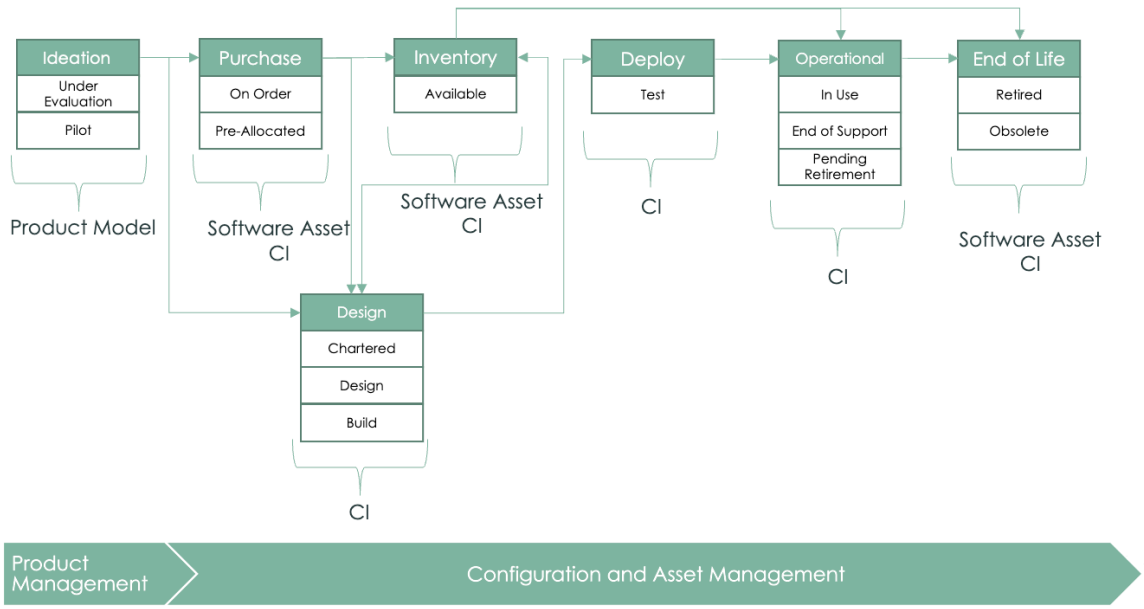
Logical life-cycle states

A logical or software asset includes items like applications, services, and licenses.

A life-cycle state is the combination life-cycle stage and life-cycle status of an asset or CI over the life cycle. For example, a logical CI in the **Operational** stage might change status over time from **In Use** to **Pending Retirement** to **End of Support**. A different logical CI in the **Operational** stage might go from **In Use** status directly to **End of Support** status without ever having been in the **Pending Retirement** status.

Note:
A CI may be in the **Operational** stage, but might no longer be supported by the vendor or publisher or third-party. That doesn't mean, however, that it can be or should be retired.



The stage and status values logical items are visible only in tables related to logical items in Asset Management and the CMDB.

Note:
Based on the type of item, the [life_cycle_control] table specifies which life cycle stage values are available for each life cycle stage.

For additional information on how you can benefit from implementing life-cycle value pairs for CMDB entities, see the 'life-cycle value pair' section in the 'Foundation domain' topic.

Application service life cycles

Because application services are logical in nature, they should use the Logical life-cycle value pairs. Application services follow the same life cycle guidance as any other logical CI.

Holistic Life cycle: CMDB Logical Tables (from cmdb_ci)

Logical life cycle tables

CMDB Logical table	Table name
Application Cluster	cmdb_ci_application_cluster
Batch Job	cmdb_ci_batch_job

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Logical life cycle tables (continued)

CMDB Logical table	Table name
Business Application	cmdb_ci_business_app
Business Capability	cmdb_ci_business_capability
Business Process	cmdb_ci_business_process
CIM Profiles	cmdb_CIM_profile
Cloud Key Pair	cmdb_ci_cloud_keu_pair
Cloud Mgmt Subnet	cmdb_ci_subnet
Cloud Resouce Base	cmdb ci resource base
Cluster	cmdb_ci_cluster
Cluster Node	cmdb_cil_cluster_node
Cluster Resource	cmdb ci cluster resource
Cluster Virtual IP	cmdb_ci_cluster_vip
Configuration File	cmdb_ci_config_file
Database	cmdb_ci_database
Database Catalog	cmdb_ci_db_catalog
Datastore Disk	cmdb_ci_vcenter_datastore_disk
Disk Partition	cmdb_ci_disk_partition
DNS Name	cmdb_ci_dns_name
DRS VM Config	cmdb_ci_drs_vm_config
Endpoint	cmdb_ci_endpoint
Environment	cmdb_ci_environment
Fiber Channel Port	cmdb_ci_fc_port
Information Object	cmdb_ci_information_object
IP Address	cmdb_ci_ip_address
IP Network	cmdb_ci_ip_network
IP Phone	cmdb_ci_ip_phone
IP Service Instance	cmdb_ci_ip_ service
Load Balancer Interface	cmdb_ci_lb_interface
Load Balancer Pool	cmdb_ci_lb_pool
Load Balancer Pool Member	cmdb_ci_lb_pool_member
Load Balancer Service	cmdb_ci_lb_ service
Load Balancer VLAN	cmdb_ci_lb _vlan
Logical Partition	cmdb_ci_lpar
Memory Module	cmdb_ci_memory_module
Network Appliance Hostname	cmdb_ci_net_app_host

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Logical life cycle tables (continued)

CMDB Logical table	Table name
Network Hostname	cmdb_ci_network_host
Network Traffic	cmdb_ci_net_traffic
Operating System Level Virtualization Container	cmdb_ci_oslv_container
Operating System Level Virtualization Image	cmdb_ci_osiv_image
Operating System Level Virtualization Image TAg	cmdb_ci_oslv_image_tag
Operating System Level Virtualization Local Image	cmdb_ci _oslv _local_image
Package	cmdb_ci_os_packages
Patch	cmdb_ci_patches
Port	cmdb_ci_port
Print Queue	cmdb_ci_print_queue
Qualifier	cmdb_ci_qualifier
SAN Connection	cmdb_ci_san_connection
SAN Endpoint	cmdb_ci_san_endpoint
SAN Fabric	cmdb ci san fabric
SAN Zone	cmdb_ci_san_zone
SAN Zone Alias	cmdb_ci_san_zone_alias
SAN Zone Alias Member	cmdb_ci_san_zone_alias_member
SAN Zone Member	cmdb_ci_san_zone_member
SAN Zone Set	cmdb_ci_san_zone_set
Service	cmdb_ci_service
Storage Area Network	cmdb_ci_san
Storage Controller	cmdb_ci_storage_controller
Storage Export	cmdb_ci_storage_export
Storage File Share	cmdb_ci_storage_fileshare
Storage HBA	cmdb_ci_storage_hba
Storage Pool	cmdb_ci_storage_pool
Storage Pool Member	cmdb_ci_storage_pool_member
Storage Volume	cmdb_ci _storage_volume
Tomcat Connector	cmdb_ci_tomcat_connector
UPS Bypass	cmdb_ci_ups_bypass
UPS Alarm	cmdb_ci_ups_alarm
UPS Input	cmdb_ci_ups_input
UPS Output	cmdb_ci_ups_output
Veritas Disk Group	cmdb_ci_veritas_disk_group

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Logical life cycle tables (continued)

CMDB Logical table	Table name
Virtual Machine Object	cmdb_ci_vm_object
Virtual Private Cloud	cmdb_ci_vpc
Virtual Private Network	cmdb_ci_vpn
Websphere Cell	cmdb_ci_websphere_cell

CSDM videos in the ServiceNow Community

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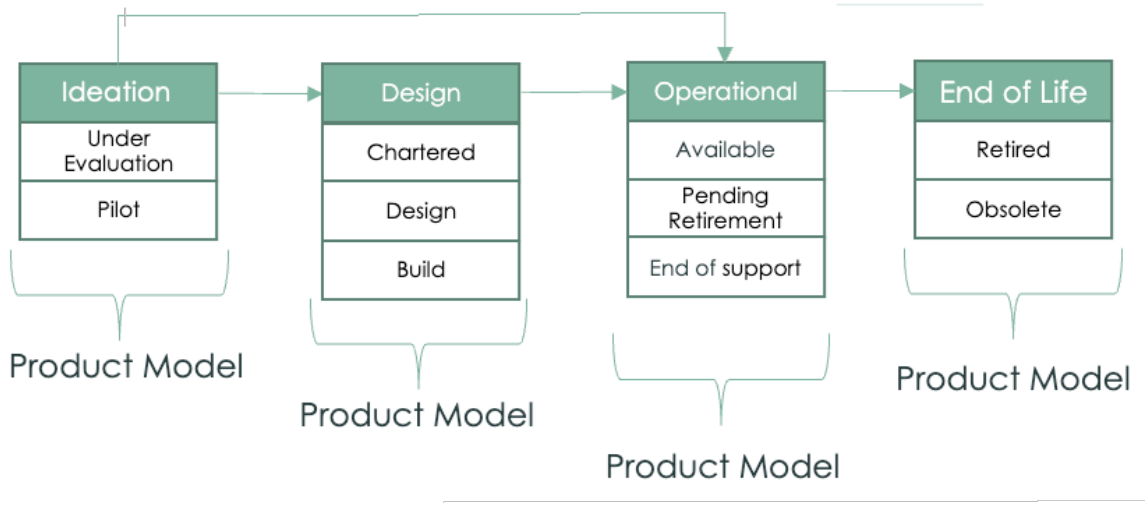
Product life cycle

The CSDM framework provides standard fields and values that you can use to track the life cycle of an asset or a CI. The product life-cycle states represent the overall life cycle of a product model, a specific version, or a product configuration.

Product life-cycle states

A life-cycle state is the combination life cycle stage and life cycle stage status of an asset or CI over the life cycle. For example, a product CI in the **Operational** stage might change status over time from **Available** to **Pending Retirement** to **End of Support**. A different product CI in the **Operational** stage might go from the **Available** status directly to the **End of Support** status without ever having been in the *`Pending Retirement`* status.



Note:
Based on the type of item, the [life_cycle_control] table specifies which life cycle stage values are available for each life cycle stage.

For additional details on products, see Products and product models.

For additional information on how you can benefit from implementing life-cycle value pairs for CMDB entities, see the 'life-cycle value pair' section in the 'Foundation domain' topic.

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Life cycle mapping form

Use the Life Cycle Mapping module to specify how existing legacy status values should be converted to CSDM life-cycle value pairs. You map both asset and CI legacy status values to life-cycle values.

Fields on the Life cycle mapping form

Field	Description
Mapping for table	Legacy CMDB table and descending tables that this mapping applies to. Applies to a descending table unless there is a mapping configured specifically to the descending table.
Priority	Priority of applying this mapping definition for the table. Priority is used when the life_cycle_mapping table contains multiple entries for a class. The highest priority entry is used first when searching for meaningful legacy values. If the first entry can't be used, the next record in priority is used. Lower numerical values indicate higher priority.
Active	Denotes whether to apply this mapping definition. Deactivation results in lower-priority mappings being used or setting standard life cycle fields to **TBD**.
Legacy field name	Legacy field in the specified *`Mapping for table`* that is currently being used to store a life cycle stage. The value should be used as the source for the life cycle mapping.
Legacy field value	Legacy value in the specified *`Mapping for table`* that is currently being used store life cycle status. The value should be used as the source for the life cycle mapping.
Legacy subfield name	Legacy field in the specified *`Mapping for table`* that is also used for life cycle management.
Legacy subfield value	Additional legacy value in the specified *`Mapping for table`* that is also used for life cycle management.

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Field	Description
Life cycle control	Class and life cycle stage and status, that are used as the authoritative source of valid combinations for life cycle mapping.
Table	Standard life cycle table to map the specified **Mapping for table** to. Setting is based on the selection in **Life cycle control**.
Lifecycle stage	Standard life cycle stage to map the specified **Legacy field name** to. Setting is based on the selection in **Life cycle control**. If there is no match in the life_cycle_mapping table, value is set to **TBD**.
Lifecycle stage status	Standard life cycle stage value to map the specified **Legacy field value** to. Setting is based on the selection in **Life cycle control**. If there is no match in the life_cycle_mapping table, value is set to **TBD**.

Application services

Understand application services, learn about different application service types and how multiple ServiceNow® business units and products use them.

What application services are

Warning:
To ensure optimal performance and functionality of your instance, it is best practice to limit the number of application services to 100,000. Exceeding this number might lead to performance issues. If you need to exceed this limit, contact your account representative for assistance.

An application service is a set of interconnected applications and hosts which are configured to offer a service to the organization. Application services can be internal, like an organization email system or customer-facing, like an organization website. For example, creating financial reports through a web-based application requires a computer, web server, application server, databases, middleware, and network infrastructure. These applications and hosts are all configured to offer the service of financial reporting. In development environments, an application service represents an instance of a business application or system.

ServiceNow applications refer to devices and applications that comprise an application service as configuration items (CIs). The various CIs and the relationships between them, that comprise an application service, are stored in the Configuration Management Database (CMDB).

Each application service contains an entry point as the top-level CI. An entry point is a point where clients access an application service. Typically, it is a URL, or a combination of the IP address and port for application services in enterprise deployments. For cloud-based deployments, an entry point can be a URL to a cloud resource like an AWS gateway.

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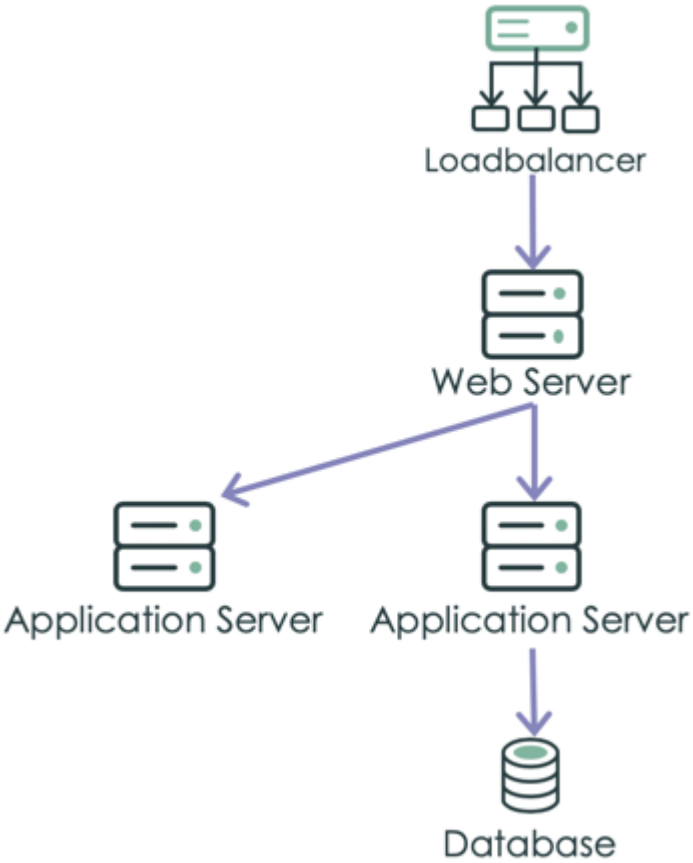
Application service



The Common Service Data Model (CSDM) helps you streamline service types and service offerings. You can add relationships between application services and other service-related objects in the CSDM: Business Application, Technical Service Offerings, or Business Service Offerings.

There are the following types of application services:

Discovered

Service Mapping discovers application services using patterns and by following traffic connections.

Pattern-based discovery creates precise and complete application services that represent the service-centric view of the IT infrastructure. It creates a high-fidelity map that is well suited to managing mission-critical application services.

In addition, it provides visibility of cloud-native services such as compute, load balancers, and API gateways. You can use service entry points such as AWS S3 buckets, AWS and Microsoft Azure API gateways, AWS Lambda functions, and Microsoft Azure functions to map services. It can also detect Lambda to Lambda calls and Lambda to RDS connections to build dynamic service maps.

Top-down method maps VMs on-premises and in public clouds. However, it requires these VMs to be fully discovered for the top-down discovery to determine which applications are running in the VM. If a VM isn't fully discovered, use the tag-based method to bridge the gap (see later in this document). Tag-based mapping also maps containers, that you cannot map using the top-down discovery.

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Discovered application services have the service classification of application service. They are stored in the Mapped Application Service [cmdb_ci_service_discovered] table.

Dynamic CI Group

Dynamic CI groups which act as application services. The members of the CMDB groups that is associated with the dynamic CI group, populates the application service. A dynamic CI group is a dynamic grouping of CIs, based on some common criteria such as the location of all web servers in Detroit or all Oracle databases in Boston. After creating a dynamic CI group, it can be used as a group offering in IT Service Management.

If created from the Application Service wizard, the service classification is application service, and if created from the legacy Event Management UI or Service Mapping UI, the classification is technical service. Application services of the Dynamic CI Group type are stored in the Dynamic CI Group [cmdb_ci_query_based_service] table.

Tag-based

A tag is a label that consists of a key-value pair. Your organization may use tags to categorize its assets, to enhance query and reporting capabilities. Discovery and Cloud Provisioning and Governance can discover tags used by all major cloud providers and container ecosystems. Once the tags are discovered, Service Mapping can create application services based on these tags. For example, you can use tags to map all application services your organization uses in the production environment in the EMEA region.

Tag-based application services have the service classification of application service. They are stored in the Tag-based Application Service [cmdb_ci_service_by_tags] table.

Created Manually

With manual mapping, application owners manually document the applications, IT infrastructure, and relationships that support each application service. This methodology is the best fit for configuration items that are not fully discoverable due to security access issues. For example, IPS devices which support an intrusion prevention service for the security business unit.

Try to avoid manual mapping wherever possible. It's incredibly time consuming to map services manually, and often the information needed for mapping is not available due to evolving technology and a lack of processes that track and document the infrastructure dependencies needed for application context. And, whenever subsequent changes are made to the application service topology, the service map must be manually updated.

Manually created application services have the service classification of application service. Application services of the created manually type are stored in the Mapped Application Service [cmdb_ci_service_discovered] table.

Dynamic

A dynamic application service includes only CIs that are part of CI relationships stored in the CMDB CI Relationship [cmdb_rel_ci] table.

You can't edit a dynamic application service by directly adding or removing CIs from it. Dynamic application services are updated automatically to reflect any change to CI relationships in the CMDB CI Relationship [cmdb_rel_ci] table. When you add a relationship to a CI that is contained in a dynamic application service, then that

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service automatically updates to reflect the addition of the relationship and the associated new CI. In a similar manner, a dynamic application service automatically updates upon the removal of a relationship and its associated CI from a CI within the service.

One way to create dynamic application services, is by converting legacy business services or legacy manual services (created with Event Management, for example) into application services of the dynamic type.

Dynamic application services have the service classification of application service. Dynamic application services are stored in Calculated Application Services [cmdb_ci_service_calculated] table.

Who uses application services

Application services provide foundation for operation of the following business units and products of the ServiceNow AI Platform:

- ITOM Health gathers alerts from infrastructure events captured by third-party monitoring tools. It then uses IT-related information gathered by Discovery to map alerts to configuration items. Based on the collected information, then provides dashboards showing a consolidated view of all service-impact events.
- ITOM Optimization gives you tools to provision private and public cloud infrastructure and services and to achieve consistent management and cost visibility. The Cloud Cost Management application, available in the ServiceNow Store , helps you to analyze the full range of costs associated with cloud assets so you can identify and take action on opportunities to save money and optimize operations.
- IT Service Management users rely on the application services reflecting the IT infrastructure to manage and deliver services to their customers.
- Customer Service Management users efficiently diagnose and resolve issues related to the IT infrastructure in the context of application services.
- Software Asset Management users understand the software running in your IT environment and track configurations that impact software license consumption across your IT environments and datacenters.
- Strategic Portfolio Management users utilize data collected for application services to gain a comprehensive understanding of the applications used in your organization.
- Security Operations users view security incidents to find out which application services are at risk. They also use this information to prioritize and resolve threats based on the impact they pose to their organization.

How to create application services

Depending on the needs of your organization, you can deploy different methods of creating and populating application services.

Important:
You can use the top-down and manual methods for the same application service. You cannot combine any other methods for creating or populating the same application service.

Analyze the IT infrastructure and service deployment in your organization to pick the optimal method of creating and populating application services.

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Choosing the right method for your deployment

Method	When to use	Additional considerations
Top-down discovery Service Mapping performs top-down discovery of application services. Service Mapping uses patterns to discover and map CIs. A pattern is a sequence of steps whose purpose is to detect attributes of a CI and its outbound connections. This method creates precise and complete application services that reliably represent the service-aware view of your organization's IT infrastructure Tag-based discovery in Service Mapping is a complimentary method that enriches the results of top-down discovery.	Use this method to discover industry-recognized or customized second-tier and third-tier applications. Such applications may include load-balancing solutions, application or web servers with database connections.	Pattern-based mapping requires configuring credentials, users, and user permissions to let Service Mapping access applications inside your organization private network. This process may take time and effort.
Tag-based If your organization uses tags for asset management, you can use these tags to map application services. Discovery and Cloud Provisioning and Governance discover tags assigned to CIs, and populate the CMDB with this data. Service Mapping uses the tag-related data from the CMDB to map services. Tag-based service mapping complements top-down service mapping. It provides visibility of containers and also maps VMs that aren't fully discovered, which top-down service mapping is unable to do. However, while tag-based mapping associates tagged components with specific application services, it doesn't map the connections between these components—This is another reason why tag-based mapping complements	Map resources on cloud workloads like IaaS/Paas/FaaS/CaaS as well as on container workloads using Kubernetes, OpenShift, or AWS ECS. Also, map resources in the Site Reliability Engineering (SRE) or Customer Reliability Engineering (CRE) deployments. Using tag-based method, you can map container resources in your deployments. Typically, you use this method to discover applications on cloud virtualizations or PaaS deployments.	Unlike other mapping methods, tag-based mapping doesn't require configuring credentials or providing users with elevated rights. Tag-based application services may not include relevant CIs, if these CIs don't have correct tags assigned to them.

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Choosing the right method for your deployment (continued)

Method	When to use	Additional considerations
rather than replaces top-down service mapping.		
Ingesting Application Performance Management (APM) maps from integrated Dynatrace or AppDynamics deployments Create application services using the integration with AppDynamics application model and Dynatrace monitoring platform available on ServiceNow Store.	Use this integration to create application services based on APM maps from Dynatrace or AppDynamics. You are able to use application services created by this method for monitoring Health.	Analyze discovered resources in the CMDB before ingesting from 3rd party to avoid creating duplicate CIs.
Populate an application service using the Dynamic CI Group method Based on CMDB groups, whose members populate the application service.	Use this method as a simple and fast way to create dynamic CI groups for deployments including Microsoft Active Directory, Microsoft Exchange or other DNS-related services. Dynamic CI Groups are especially useful if only a list of resource is available, without configuration details or credentials. Using a CMDB group lets you use CMDB Health to monitor health, and use a CMDB Query Builder saved query to filter for the CIs included in the application service.	There is no map view for application services created using this method. You can only view CIs belonging to such an application service as a list. Need to ensure that the CMDB group accurately filters for the CIs that should be included in the application service.
Application service API Create an automation for creating application services in bulk. Use this method, if your organization has performed cross-organization mapping and analysis and collected some information about services. Application services created using APIs belong to the manual type are stored in the Mapped Application Service [cmdb_ci_service_discovered] table.	Use this method for environments that require tracing of DevOps Continuous Integration/Continuous Deployment (CI/CD) process. You can import third-party service maps into manual application services individually or in bulk. For example, see the Digital Guidebook: Importing 3rd-party service maps into ServiceNow Service Mapping.	Be familiar with the exact service structure: sys_id of each CI comprising the service and the hierarchy that the CIs form. This method requires knowledge of the scripting infrastructure that your organization uses.

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Choosing the right method for your deployment (continued)

Method	When to use	Additional considerations
Populate an application service using the Manual method Create a manual application service with one CI only: the entry point. To populate a manually created application service, add other CIs manually as described in Manually add CIs to an application service. Alternatively, create and populate manual application services by converting business services created in the CMDB and stored in [cmdb_ci_service].	Use the manual method if you can't use other methods of creating or populating application services. Create application services manually for intrusion prevention.	This method doesn't require any preexisting setup or object configuration. You can include CIs of any class in manually created application services. Manually created application services reflect some changes to CIs, like CI attributes. However, they do not automatically reflect changes to CI relationships.
Populate an application service using the Dynamic Service method Application services that automatically update to reflect any change to CI relationships in the CMDB CI Relationship [cmdb_rel_ci] table. To conform with Common Service Data Model, you can also convert legacy services to dynamic application services. Those legacy services are stored in the [cmdb_ci_service] or [cmdb_ci_service_manual] CMDB tables: • Convert business services to application services • Convert legacy manual services into dynamic application services	Use this method to transform legacy business services into application services that other ServiceNow products can utilize. For example, dynamic application services can be used for service monitoring and change management.	You can't edit a dynamic application service by adding or removing CIs from it. The system automatically modifies an application service of the dynamic type when you modify relevant relationships for CIs that are part of that application service.
From CSV file Service Mapping extracts information from this file and creates potential application services referred to as service candidates. Use this method, if your organization has	If necessary, you can import service candidates from multiple CSV files.	Organize all the collected information in a specific order in a CSV file, precisely as described in the documentation.

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Choosing the right method for your deployment (continued)

Method	When to use	Additional considerations
performed cross-organization mapping and analysis and collected some information about services.		

To comply with CSDM, convert manual services created using IT Operations Management Event Management and stored in [cmdb_ci_service_manual] as covered in Convert manual services to application services or Convert manual services to application services using API. Converted services become application services of the manual type stored in the Mapped Application Service [cmdb_ci_service_discovered] table.

Domain separation

Domain separation, if deployed, impacts an application service as follows:

- When creating an application service, the application service is assigned to the user's domain.
- When manually adding a CI to an application service, you can choose only CIs that belong to the service domain.
- When using the createOrUpdateService - POST REST API for creating or updating an application service, the process stops if one of the CIs referenced in the API belongs to a different domain than the application service itself.
- When converting business services into application services, the newly created application service belongs to the same domain as the original business service. The application service comprises only CIs belonging to the same domain as the application service itself.

Create an application service

Create an application service to adhere to CSDM standards and to standardize the organization, maintenance, and monitoring of services in your organization.

Before you begin

Role required: Depending on the population method used:

- Dynamic CI Group: app_service_admin
- Manual: app_service_admin
- Dynamic Service: app_service_admin
- Top Down Discovery: sm_admin
- Tags: sm_admin

About this task

Warning:
To ensure optimal performance and functionality of your instance, it is best practice to limit the number of application services to 100,000. Exceeding this number might lead to performance issues. If you need to exceed this limit, contact your account representative for assistance.

An application service is a set of interconnected applications and hosts which are configured to offer a service to the organization. Application services can be internal, like an organization email system or customer-facing, like an organization website.

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An application service has an entry point, which lets users access the application service. If you are at the planning stage and do not know what the entry points are for an application service, you can create the application service without entry points. Such an application service is referred to as an empty application service, to which you can add entry points at any later time.

All application services created in the Application Service wizard, are set with the *`application service`* service classification.

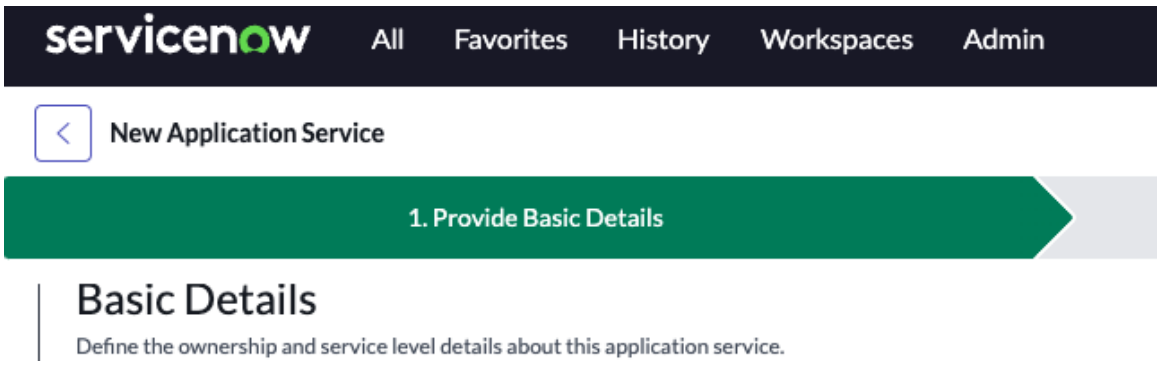
Service Mapping, if activated, can automatically discover and map application services as described in Application service mapping. A discovered application service contains the CIs and the connections between them that Service Mapping discovered and mapped.

You can also create an application service by using the createOrUpdateService - POST REST API.

Procedure

1. Navigate to **All** > **CSDM** > **Manage Technical Services** > **Application Service**.
2. In the Application Services list view, click **New** to open the Application Service wizard.
3. In the **Provide Basic Details** tab:

   a. Fill out the fields for Basic Details.



Field	Description
Number	Pre-populated unique ID for the application service.
Name	Unique application service name which is not in use by any other type of application service. Use self-explanatory names such as `mailing service` or `printing service`.
Environment	The environment of the offering such as production, development, or test, as identified by some service offerings. Used by Incident Management and Change Management.
Version	The application service configuration version.

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Field	Description
Model ID	A product model such as a software model where end of life data is stored.
Operational Status	Operational status of the application service, such as **Ready** or **Retired**.
Support Group	Used by Incident Management as the group managing the contract covering the asset.
Change Group	Used by ITSM for routing of change and change-related tasks.
Managed By Group	Group responsible for managing the data.
Owned By	User who is familiar with the infrastructure and applications making up the service. This user is the application service Subject Matter Expert (SME) who provides information necessary for a successful creation of an application service. If the owner name is not listed, create a user with the sm_app_owner role, as the owner. Alternatively, you can choose a user with the sm_admin role.

Note:
See Teams related list for details about the automatic synchronization between the assignment group fields and the *Teams* related list.

b. In the Set Relationships section, add relationships between the application service and other components in the CSDM domain.

c. Click the **Business Application**, **Technical Service Offering**, **Business Service Offering**, or the **Parent Application Service** tab, and add items to the respective **Selected** list.

- The technical service offering list includes records in the Service Offering [service_offering] table, in which the *Service classification* attribute is **Technical Service**.
- The business service offering list includes records in the Service Offering [service_offering] table, in which the *Service classification* attribute is **Business Service**.
- The parent application service list includes application service records from the Application Service [cmdb_ci_service_auto] table. Adding a parent application service relationship creates hierarchies and dependencies of application services in deployments such as:
  - Platform host and platform application deployments
  - Micro service deployments in which one or more micro services identified as an application service, is part of a larger application service deployment
  - Shared technical service dependencies

d. Click **Next**.

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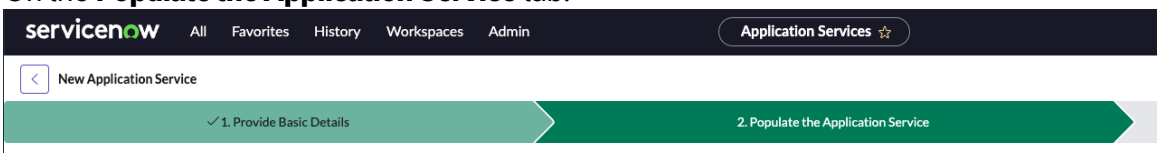
For information about CSDM relationships, see CI relationships in the CSDM.

Also, some fields and relationships are noted as required on the page. To change which fields and which relationships are required, see Modify the attributes and relationships required for application services.

4. On the **Populate the Application Service** tab:



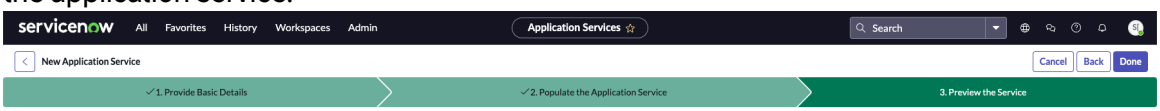
   a. Click **Choose a Method** or click **Next** to skip selecting a service population method.

   b. On the Choose a Method page, select a **Service Population Method**, and then follow the respective link to complete the specific population method:
      - **Top Down Discovery**: Populate application services using top-down discovery
      - **Dynamic CI Group**: Populate an application service using the Dynamic CI Group method.
      - **Tags**: Populate application services using tags
      - **Manual**: Populate an application service using the Manual method
      - **Dynamic Service**: Populate an application service using the Dynamic Service method

      Note:
      The **Top Down Discovery** and the **Tags** options are available only if Service Mapping is installed.

   c. To add another method to populate the application service, click **Add Method** on the Service Population Methods page.
      Or, click **Next**.
      - You can add any combination of the **Top Down Discovery** and the **Manual** methods. However, if you select the **Dynamic CI Group**, **Tags**, or the **Dynamic Service** method, the **Add Method** button is grayed out and you cannot add additional methods.
      - You can click a card for a Converted Business Service method to see details about the service conversion, such as the conversion type. For more information, see Convert business services to application services.

5. On the **Preview the Service** tab, review and verify the summaries for creating and populating the application service.



   a. Review **Relationships**.

   b. You can click **Edit Relationships** to modify the relationships to other CSDM objects.

   c. Review **Population Methods Summary**.

   d. You can click **Edit Methods** to modify the selection methods.

   e. Click **Done**.

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Result

The application service is created, and you can access the new application service by navigating to application services list views:

- **CSDM** > **Manage Technical Services** > **Application Service**: Contains application service CIs from any class extending the Application Service [cmdb_ci_service_auto] class, except alert groups. The list view includes the tag-based, discovered, manual, dynamic CI groups, converted, dynamic, and empty application service types.
- **Configuration** > **Application Services** > **Application Services**: Contains application service CIs from any class extending the Application Service [cmdb_ci_service_auto] class, except alert groups. The list view includes the tag-based, discovered, manual, dynamic CI groups, converted, dynamic, and empty application service types.
- **Service Mapping** > **Services** > **Application Services**: Contains application service CIs from the Mapped Application Service [cmdb_ci_service_discovered] class. The list view includes the top-down (discovered) and empty application service types.

What to do next

- If the service population method is **Dynamic CI Group**:
  - Click **View CMDB Group CI's** to list all the CIs in the CMDB group that is associated with the application service.
  - Click **View Service CI's** to list all the CIs in the application service.

  Both lists of CIs are identical, unless the CMDB group contains more than 10,000 CIs. In this case, **View CMDB Group CI's** shows all the CIs in the CMDB group, and **View Service CI's** shows only the 10,000 CIs that are members of the application service.
- If the service population method is **Tags**, **Top Down Discovery**, or **Manual**, and click **View Map** to view the application service map where you can:
  - Link application services
  - View CI attributes in an application service map
  - View the change history of application services
  - Compare two versions of an application service
- Click **Advanced**, and then on the Advanced Details page, click **Additional Info**, **Questionnaire**, **Reject Messages**, or **Worknotes**, to add details.

Populate application services using top-down discovery

Use top-down discovery to populate an application service. This discovery method deploys discovery patterns to find configuration items (CIs) belonging to the service and connections between these CIs. Pattern-based discovery creates precise and complete application services that reliably represent the service-aware view of your organization's IT infrastructure.

Before you begin

- Top-Down Discovery is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.
- Verify that Service Mapping is set up properly.
- Ensure you know which entry point to use for this application service and which attributes you must be able to define for this entry point. Learn about Entry point attributes available with Service Mapping.

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For information about the different types of application services and the different methods you can use to populate application services, including using top-down discovery, see Application services.

Role required: sm_admin

About this task

A pattern is a sequence of commands whose purpose it is to detect attributes of a CI and its outbound connections. Service Mapping and Discovery share a set of preconfigured patterns that cover most of the commonly used devices and applications.

Service Mapping starts pattern-based top-down discovery process from the entry point you define.

An entry point is a point where clients access an application service. Usually, it is either a URL or a combination of the IP address and port. Service Mapping starts the mapping process from this point. For example, to map your electronic mailing application service, define an IP address or host name of the email server as an entry point.

Entry points vary depending on the nature of the application service. Service Mapping comes with a wide range of preconfigured entry point types that cover many commonly used applications.

Procedure

1. From the **Service Population Method** list in the Choose a Method window, select **Top-Down Discovery**.
2. From the **Application Type** list, select the CI class of the application that serves as the entry point for this application service.
   Entry point parameters depend on the type you select.
3. Define attributes for the selected entry point as described in Entry point attributes.
4. **Optional:** Add free-text comment that may provide useful information for handling this application service later.
5. Click **Save**.

What to do next

Complete the generic procedure Create an application service.

Related topics

Discovery patterns used by ITOM Visibility

Populate an application service using the Dynamic CI Group method

The Dynamic CI Group method for populating an application service, automatically generates a dynamic CI group. The members of the CMDB group that the dynamic CI group is based on, populates the application service. The application service continuously synchronizes with the CMDB group to reflect any changes in membership in the CMDB group.

Before you begin

The Dynamic CI Group is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.

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Note:

- The number of CIs in an application service that is populated by the Dynamic CI Group method, is limited to 10,000, even if the associated CMDB group has more than 10,000 CIs.
- A CMDB group can be used to populate only a single application service. For more information about populating and using CMDB groups, see CMDB groups.
- A dynamic CI group contains CIs but can't contain other groups.

For information about the different types of application services and the different methods you can use to populate application services, including Dynamic CI Group, see Application services.

Role required: app_service_admin

Procedure

1. In the Choose a Method page, select **Dynamic CI Group** as the **Service Population Method**.
2. Fill out the fields that appear, which are specific to the Dynamic CI Group service population method.

Field	Description
Service Population Method	The method used for populating the application service with CIs. Set to **Dynamic CI Group**.
CMDB Table	Notes the Dynamic CI Group [cmdb_ci_query_based_service] table, in which application services created by the Dynamic CI Group method, are stored.
Group Name	The CMDB group whose members become members the application service. **Note:** CIs from a class that extends the *cmdb_ci_service* class (Services), are automatically filtered out and are not added to the application service.

3. Click **Save**.

Result

The alert impact on dynamic CI groups is calculated on the following CIs:

- All CIs that are part of the dynamic CI's CMDB group.
- Children of current CIs with a relationship of: *Runs on::Runs*
- CIs related to either the current CIs or their children, with a relationship of: *Virtualized by::Virtualizes*

For more information, see alert impact calculation.

What to do next

Complete the generic procedure Create an application service.

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Populate application services using tags

Use tags that help categorize and organize configuration items (CIs) in your organization to populate application services. Tag-based mapping doesn't require configuring credentials or providing users with elevated rights. Tag-based population method requires the Service Mapping feature of ITOM Visibility.

Before you begin

1. Analyze the tag usage in your organization and make a list of all tags and their purposes. Use the Key Value [cmdb_key_value] table to see the tags in the CMDB.
2. If necessary, assign tags to CIs that you want to include in application services.
3. Tags is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.
4. Analyze the tag usage in your organization and make a list of all tags and their purposes. Use the Key Value [cmdb_key_value] table to see the tags in the CMDB.
5. If necessary, assign tags to CIs that you want to include in an application service.

Role required: sm_admin

About this task

A tag is a label that consists of a key-value pair. Your organization may use tags to categorize its assets, to enhance query and reporting capabilities. Discovery and Cloud Provisioning and Governance can discover tags used by all major cloud providers and container ecosystems. Once the tags are discovered, Service Mapping can create application services based on these tags. For example, you can use tags to map all application services your organization uses in the production environment in the Europe, the Middle East and Africa (EMEA) region.

If you have configured tag-based service families and tag categories, you can use these tag definitions for populating an application service. Part of defining a tag-based service family is defining a tag category, which contains tag keys. If necessary, you can also define tag values to narrow the criteria used for populating application services. Based on the tag definitions for the tag-based service family, Service Mapping creates service candidates - suggested application services. When you use the tag-based service families to populate an application service, you must select the relevant service candidate.

Alternatively, you can define tag keys and their values while choosing the tag-based population method for a new application service. Define up to three tag keys and tag values for the population criteria. CIs that have discovered tag keys and tag values, become part of an application service.

For information about the different types of application services and the different methods you can use to populate application services, including using tags, see Application services.

Note:
Service Mapping includes CIs that are part of CI relationships even if these CIs do not have tags assigned to them. For more information, see Tag-based discovery in Service Mapping.

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Procedure

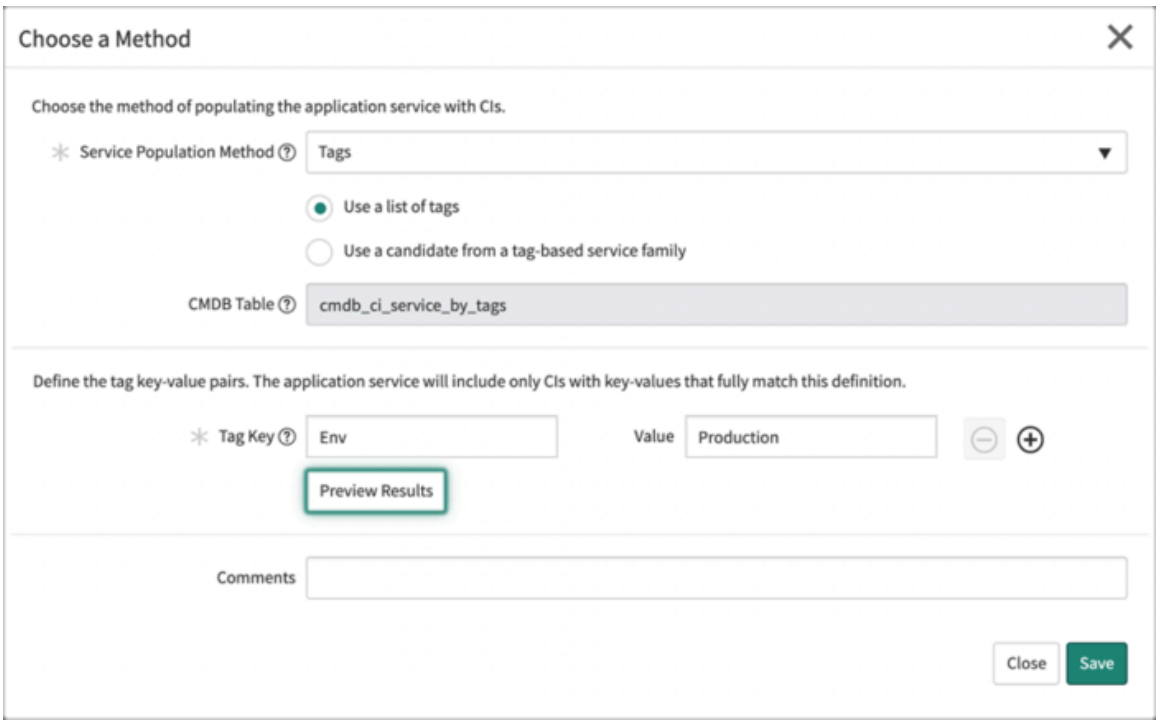
1. From the **Service Population Method** list in the Choose a Method window, select **Tags**.
2. To define new tag criteria, perform the following steps:

   a. Select **Use a list of tags**.

   b. Enter the tag key and its respective tag value.
   Matching tag keys that exist in the system, appear in the auto-fill options.

   > **Important:**
   > Tag-based mapping is not case-sensitive; same key names and key values spelled with upper and lower case are identified as the same.

   c. **Optional:** Click the plus icon and add another tag key and tag value.



   d. Click **Preview Result** to see the list of CIs that match the defined criteria, and if necessary, refine the tag definitions.

   > **Note:**
   > You can add no more than three tag key-value pairs for one application service.

3. To use tag definitions from a preconfigured tag-based service family, perform the following steps:

   a. Select **Use a candidate from a tag-based service family**.

   b. **Optional:** To see the tag definitions for this tag-based service family, click the **Preview** button 

   c. From the **Tag-Based Service Family** list, select the relevant family.

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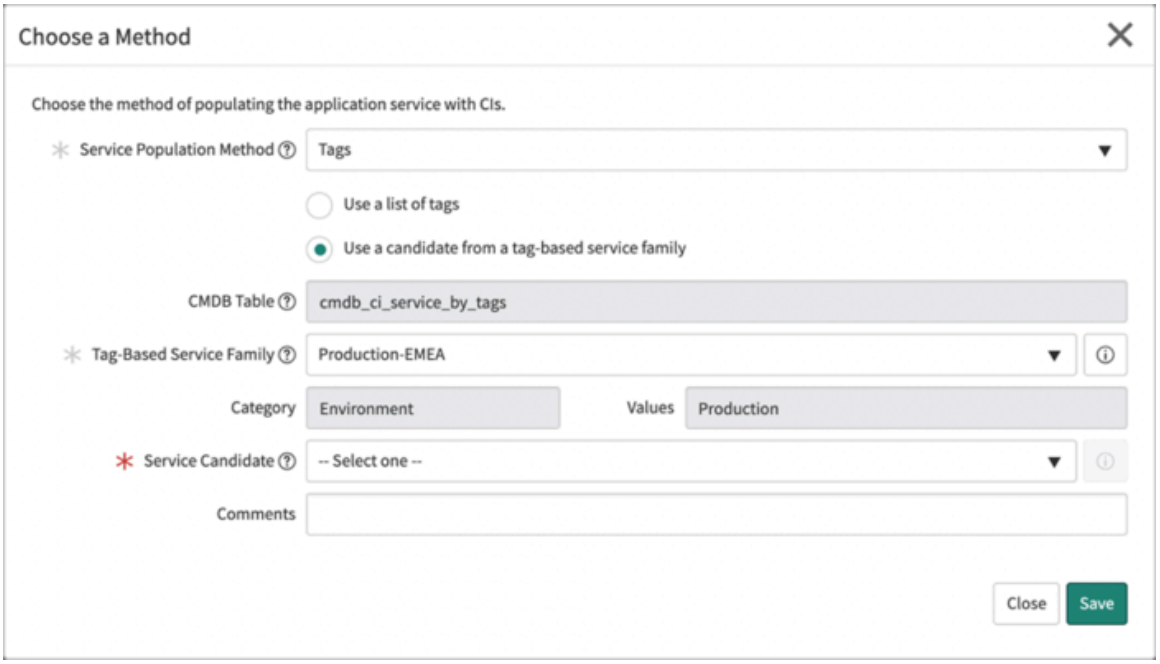
d. Review the tag categories and values assigned to the service family.



e. From the **Service Candidate** list, select the relevant candidate.

f. Optional: To review the service candidate form, click the **Preview** button .

4. **Optional:** Add free-text comment that may provide useful information for handling this application service later.
5. Click **Save**.

What to do next

Complete the generic procedure Create an application service.

Populate an application service using the Manual method

The Manual method for populating an application service, is based on selecting an entry point CI, which lets users access the application service. To populate the application service, you then manually add CIs to the new application service.

Before you begin

Role required: app_service_admin

About this task

Manual is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.

For information about the different types of application services and the different methods you can use to populate application services, including Manual, see Application services.

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Procedure

1. In the Choose a Method page, select **Manual** as the **Service Population Method**.
2. Fill out the fields that appear, which are specific to the Manual service population method.

Field	Description
Service Population Method	Manual
CMDB Table	Notes the Mapped Application Service [cmdb_ci_service_discovered] table, in which application services, created by the Manual service population method, are stored.
Class	The class from which to choose the entry point **CI** for the application service.
CI	The CI from the specified **Class**, to be the entry point for the application service. **Note:** To eliminate the possibility of delayed results when searching for a specific CI, make your search as specific as possible. A search with *<name> might take a long time and return a large data set.

3. Click **Save**.

What to do next

1. Complete the generic procedure Create an application service.
2. Manually add CIs to populate the application service.

Populate an application service using the Dynamic Service method

The Dynamic Service method for populating an application service generates a dynamic application service. A dynamic application service automatically updates to reflect any changes to CI relationships in the CMDB CI Relationship [cmdb_rel_ci] table.

Before you begin

The Dynamic Service is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.

New dynamic application services initially don't contain any CIs (unless they were converted from legacy business services or legacy manual services). Dynamic application services get automatically populated when they're connected to other CIs with CMDB relationships. Entry points are automatically created when a relationship between a dynamic application service CI and other CIs is created.

For information about the different types of application services and the different methods you can use to populate application services, including Dynamic Service, see Application services.

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Role required: app_service_admin

Procedure

1. In the Choose a Method page, select **Dynamic Service** as the **Service Population Method**.
2. Fill out the fields that appear, which are specific to the Dynamic Service service population method.

Field	Description
Service Population Method	The method used for populating the application service with CIs. Set to **Dynamic Service**.
CMDB Table	Notes the Calculated Application Services [cmdb_ci_service_calculated] table, in which application services created by the Dynamic Service method, are stored.
Levels	The number of levels of related CIs to include in the application service.

3. Click **Save**.

What to do next
Complete the generic procedure Create an application service.

Monitor the health of application services on the Application Service Dashboard

Monitor the health state of application services in the Application Service Dashboard. With that information, you can reduce the number of incomplete application services by populating them and adding missing data. To use application services effectively, ensure that application services are fully configured and are populated.

Before you begin
Role required: itil_admin or app_service_admin

About this task
Edit the application services that are reported as missing important details. For example, if an application service is not configured with a service population method, configure a service population method for the application service.

The data that appears in the Application Service Dashboard is calculated on a 24-hour cycle during night hours.

Instead of using the legacy Application Service Dashboard that CSDM provides, you can use the latest Application Service Dashboard in the Insights view in CMDB Workspace. The Application services tile in the Insights view provides similar insights as the legacy dashboard, but with a better user experience.

Procedure

1. Navigate to **All** > **CSDM** > **Application Service Dashboard**.
2. View counts on the **Application Service Overview** tab, which indicate basic configurations of application services that are incomplete.

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- Count of all application services, complete and incomplete (Total Application Services).
- Count of application services configured with a service population method (Population method defined).
- Count of application services missing a service population method (No population method defined). Data for the tags and top down discovery methods appear only if Service Mapping is installed.
- Breakdown of application services by their missing essential data such as an Owner, a Change Group, or a Business Service.
- Application services without relationships to technical service offerings or to business service offerings.
- Breakdown of application services by service population methods, including business services that were converted to application services.

3. View counts on the **Related Focus Areas** tab, which indicate other potentially incomplete configurations of application services.

   - Total number of application servers, and from those, the number of application servers which are not in any application service. Also, the breakdown of these application servers by class.
   - Total number of databases, and from those, the number of databases which are not in any application service. Also, the breakdown of these databases by class.
   - Total number of hardware servers, and from those, the number of hardware servers which are not in any application service. Also, the breakdown of these servers by class.

   Note:
   Application servers, hardware servers, and databases, not included in application services, are counted only up to about 100,000, even if the actual count is greater than this limit. This number limit is determined by the value of the glide.cmdb.csdm.app_service.max_results property.

4. **Optional:** Filter the count results in either the **Application Service Overview** or the **Related Focus Areas** tab by specific application service properties.
   You can filter by the Owner, Change Group, or the Support Group properties. A filter does not impact counts of application services in which the respective filter property is missing. For example, filtering by Owner, doesn't change the count of Missing Owner.
5. **Optional:** Select a widget in either the **Application Service Overview** or the **Related Focus Areas** tab to drill down to the respective CI list view.
   For example, click the No population method defined widget to see the CI list view of application services in which no population method is defined.
6. **Optional:** Edit the coloring rules that determine the threshold for displaying counts in red. This applies only to the widgets for application services that are not fully configured, such as the No population method defined widget.
   a. Click the **Add Widgets** ('+') icon.
   b. Point to the banner of a widget and click the **Edit Content** icon.
   c. In the Edit Report window, click the **Style** tab and then click **Edit coloring rules**.
   d. See Create coloring rules for multilevel pivot table reports to complete this edit, and for more details.
   Role required for this step is report_admin or admin.

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What to do next
After identifying any application services that are missing important details, edit the application services to add the missing details.

1. Navigate to **CSDM** > **Manage Technical Services** > **Application Services**.
2. In the Application Services list view, select an application service to edit.
3. Add the missing details.

   For details about configuring an application service, see Create application service.

Modify the attributes and relationships required for application services

Modify the lists of attributes and relationships that are required when creating application services.

Before you begin
Role required: itil_admin

About this task
In application service settings, the lists of required attributes and required relationships determine which of those items are required when creating application services. By default, the list of required attributes contains the required *Name* and *Number* attributes. Also by default, no relationships are required.

You can choose from predefined lists of allowed required attributes and relationships. To change the requirement status of an attribute, remove it from or add it to the list of required attributes. You can also add *Business Application*, *Technical Service Offering*, or *Business Service Offering* to the list of required relationships.

Procedure
1. Navigate to **All** > **CSDM** > **Application Service Settings**.
2. Review the list of **Available** items in the Required attributes and Required relationships lists and then add items to the **Selected** list.
3. Click **Save**.

Result
Next time that you create an application service, the required attributes and relationships are visibly noted in the Basic Details section on the Create an Application Service page.

Convert business services to application services

Unify the way you manage services in the organization by converting manually created records in the Service [cmdb_ci_service] table into application services. Conversion lets you streamline the different types of services in your organization, leverage ITOM Visibility capabilities, and align with the Common Service Data Model (CSDM). The conversion is irreversible: You can't transform application services back into business services.

Using application services has benefits such as:

- Viewing service maps and change history of services.
- Easily seeing the service context by providing a flat list of all CIs in the application service.
- Monitoring service health. If Event Management is deployed, you can monitor service performance and identify health issues for application services.

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- In Change Management, the list of impacted services on a change request form is more accurate because the list includes only application services.
- Applying Customer Service Management tools to open and manage cases at the service level.

Discovery doesn't run on converted application services, because converted services are manual. However, if after the conversion you add **Discoverable by Service Mapping** entry points to the application service, then Service Mapping starts discovering such this application service.

Choosing between application services of the manually created and dynamic type

You can convert business services into application services of the manually created type or of the dynamic type. You can edit manually created application services by adding or removing CIs at any time. The system does not update manually created services automatically. If there are changes to CIs making up a manually created application service, the service does not automatically reflect it.

Dynamic services are updated automatically to reflect any change to CI relationships stored in the CMDB CI Relationship [cmdb_rel_ci] table. When you add a relationship to a CI that is contained in a dynamic service, then that service automatically updates to reflect the addition of the relationship and the associated new CI. In a similar manner, a dynamic service automatically updates upon the removal of a relationship and its associated CI from a CI within the service.

To learn more about different types of application services, see application services.

Conversion process

During conversion, the following changes and processes occur:

- The service record is moved from the Service [cmdb_ci_service] table into the Mapped Application Service [cmdb_ci_service_discovered] table by changing the record class.
- The application service is set with all the original business service attributes such as name, owner, and operational status.
- The system adds related items from the business service to the converted application service, up to the specified level.
- The system queries the CMDB for the latest CI changes.
- Event Management, if activated, applies CI impact rules to CIs that are associated with alerts and that are part of the application service. Event Management deploys CI impact rules for alert monitoring.
- You can edit a converted application service of the manually created type by navigating to **CSDM** > **Manage Technical Services** > **Application Service**. Then select a converted application service. The service population method for a converted application service, is set to **Converted Business Service**. For more information about editing application services, see Create an application service.

> **Note:**
> You can't edit a dynamic application service by adding or removing CIs from it. The system automatically modifies an application service of the dynamic type when you modify relevant relationships for CIs that are part of that application service.

Non-compliant CIs

A conversion might involve adding CIs of the following CI types, which cannot be added to an application service:

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- cmdb_ci_file_system
- cmdb_ci_network_adapter
- cmdb_ci_storage_device
- cmdb_ci_disk_partition
- cmdb_ci_memory_module
- cmdb_ci_ip_address
- cmdb_ci_storage_pool_member
- dscy_net_base
- cmdb_ci_storage_export
- cmdb_ci_endpoint
- cmdb_ci_translation_rule
- cmdb_ci_qualifier
- cmdb_ci_application_cluster
- cmdb_ci_config_file

If the original business service contains related items belonging to these CI types, then the system does not add such CIs or connections coming from them. If necessary, you can prevent CIs of other CI types from being added to application services by modifying the Manual CI Inclusions / Exclusions [svc_manual_ci_exclusions_inclusions.list] table.

Domain separation

In environments with domain separation, only CIs belonging to the same domain as the application service are added to the application service. If there is a domain hierarchy, CIs must belong to the same child domain as the application service.

Convert business services to application services in bulk

Convert a subset of business services to application services, in bulk and automatically rather than one at a time. Individually select the business services for the conversion, and then convert them into application services.

Before you begin

Role required: app_service_admin, ecmdb_admin, or itil_admin

About this task

Use bulk conversion to convert legacy business services to application services. For the bulk conversion, individually select the business services from the Services list view, typically up to 100 business services in a single conversion. You can create multiple bulk conversion records, each with a different set of business services. However, do not include a business service in more than one bulk conversion.

Note:
You can't undo this conversion operation.

Procedure

1. Navigate to **All** > **Configuration** > **Services**.
2. In the Services list view, select the services that you want to include in the conversion.
3. In the Actions on selected rows drop down list, select **Bulk Convert Application Services**.

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4. Fill out the Bulk Convert Services form.

Field	Description
Name	Pre-populated with "Application Service Conversion: <time stamp>".
Select configuration items	List of services included in the conversion. You can unlock the list and select services to remove from the list. Or, use the Select target record search box to search and add services to the list, by service names.
Levels	The number of levels of related CIs to include in the converted application service.
Update service when CMDB updates	Select this check box to convert the business service into an application service of the dynamic type.

5. Select **Start Conversion**.

What to do next

- Check the status of a conversion: On the Bulk Convert Services form, scroll to the Bulk Convert Services Entries section to see the status (such as Ready or Completed) of a conversion.
- Track the progress of a conversion as it runs: In the navigation filter, enter `cmdb_convert_bulk_services.list` and press the Enter key to see the list of conversions, and their progress.
- (Optional) On a change request form, view affected dynamic services. For example, after you add an affected CI that is associated with a dynamic service:
  1. Navigate to **Change** > **Open**.
  2. Select a new change request to add affected CIs to.
  3. On the Change Request form, scroll to the Related Links section.
  4. Click the **Affected CIs** tab and then click **Add** to add an affected CI to the change request.
  5. Open the form context menu and select **Refresh Impacted Services**.
  6. Click the **Impacted Services/CIs** tab to see any dynamic services that are associated with the affected CI and that are impacted by the change request.

  For more information about affected CIs on a change request, see Associated CIs on a change request.

Convert an individual business service to an application service

Manually convert a specific business service to an application service.

Before you begin

Review the original business service to evaluate it.

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- Make sure that all CIs and CI relations are relevant for the future application service. If necessary, change the CI relations in the CMDB.
- Make sure that the original business service doesn't contain more than 5000 CI relations. Application services that contain more than 5000 CI relations cause mapping and monitoring performance issues.
- Decide how many levels of CI relations you are going to use during conversion.

Warning:
The conversion is irreversible: You can't transform application services back into business services.

Role required: app_service_admin

Procedure

1. Navigate to **All** > **Configuration** > **Business Services**.
2. Select the business service that you want to convert to an application service.
3. Click **Convert to Application Service**.
   The Converting to Application Service dialog box opens.
4. Select a number from the **Up to** list, as the number of levels of related CIs to include in the conversion.
   The maximum number of levels is eight.
5. Select **Update service when CMDB updates** to convert the business service into an application service of the dynamic type.
6. Click **OK**.

Result
The system adds the CIs from the business service to the converted application service.

What to do next
Open the map for the newly converted application services.

Make sure that the application services aren't too large:

- Service Mapping doesn't offer to view CI list instead of a map for an application service.
- There is no discovery message indicating that the application service is too large: *`The map does not display the entire service, because it is too large. The number of CI connections exceeded the allowed maximum.`*

If the service is too large, perform the following actions:

- Review the converted application service to identify CI relations irrelevant or redundant for this service. Remove such CI relations in the CMDB.
- Decide how many levels of related CIs you must include into this application service. If necessary, change the number of levels used in conversion to reduce the service size.

Related topics

Application services

Convert legacy manual services into dynamic application services

Unify the way that you manage services in your organization by converting legacy manual services into dynamic application services. Conversion lets you streamline the different types

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of services in your organization, leverage ITOM capabilities, and align with the Common Service Data Model (CSDM).

Before you begin

Role required: app_service_admin

About this task

Note:
Converting a legacy manual service to a dynamic application service is irreversible. Once converted, you can't revert it back to a legacy manual service. However, you can convert a dynamic application service to a manual application service.

You can't edit a dynamic application service directly. If you remove a CI from the map, it reappears once the service is recalculated. To ensure permanent changes, update the CI relationships in the CMDB CI Relationship [cmdb_rel_ci] table.

During conversion, the following changes and processes occur:

- A change to the record class moves the service record from the Service [cmdb_ci_service] or the Manual Service [cmdb_ci_service_manual] table to the [cmdb_ci_service_calculated] table.
- The dynamic application service is configured with all the original attributes of the legacy manual service such as name, owner, and operational status.
- Related items from the legacy manual service are added to the converted dynamic application service, up to three levels by default.
- All connections created between CIs in the dynamic application service are endpoint CIs with the relationship *`uses`*, *`implement`*, or *`application flow`*.
- Event Management, if activated, applies CI impact rules to CIs that are associated with alerts and that are part of the application service. Event Management deploys CI impact rules for alert monitoring.

A conversion might involve adding non-compliant CIs, which can't be added to an application service:

- cmdb_ci_file_system
- cmdb_ci_network_adapter
- cmdb_ci_storage_device
- cmdb_ci_disk_partition
- cmdb_ci_memory_module
- cmdb_ci_ip_address
- cmdb_ci_storage_pool_member
- dscy_net_base
- cmdb_ci_storage_export
- cmdb_ci_endpoint
- cmdb_ci_translation_rule
- cmdb_ci_qualifier
- cmdb_ci_application_cluster
- cmdb_ci_config_file

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If the original manual service contains related items belonging to these CI types, then these CIs or connections coming from them aren't added to the dynamic service. If necessary, you can prevent other CI types from being added to application services by modifying the Manual CI Inclusions/Exclusions [svc_manual_ci_exclusions_inclusions.list] table.

Procedure

1. Navigate to **All** > **Configuration** > **Application Services** > **Application Services**.
2. Confirm that the view is set to the default view.
   a. Select the List controls icon for the list view.
   b. Select **View** and then select **Default view**.
3. Open the legacy manual service that you want to convert to a dynamic application service.
4. In the Related Links section on the service form, select **Convert to Dynamic Service**.

Manually add CIs to an application service

Add configuration items (CIs) to manually created application services or to services discovered by Service Mapping. You can edit discovered and manually created application services.

Before you begin

- Verify that the CI type for the CI that you are planning to add, exists. If necessary, create the CI type as described in Create CI types for Service Mapping and Discovery.
- Add CIs to the CMDB for the device or application that you want to add, if necessary. See Populate the CMDB for more information.

Role required: app_service_admin or sm_admin

About this task

Adding a CI to an application service requires creating a relationship between the new CI and a CI in the application service. You can add CIs to an application service that was created manually, by either:

- Adding a method to populate the application service.

  Navigate to **CSDM** > **Manage Technical Services** > **Application Service**. Select an application service and then use the **Populate the Application Service** tab to choose a method to populate the application service. For more details, see Create an application service.

- Using the application service service map as described in the steps below.

  The default relationship type of the added connection in this case is *Depends on::Used by*. You can modify this default relationship type by changing the value of the Components installed with application services property.

Important:
You cannot fine-tune or edit tag-based and dynamic services from the map.

Information about the CI in application service, to which you are connecting a new CI, is updated in the CMDB. This information includes the type of the relationship between the CIs. If other application services use the same applicative flow, the CMDB recognizes it and adds the CI you added manually to these application services by analogy. For example, you manually added an IBM WebSphere Message Broker to an IBM WebSphere HTTP Listener in the Bank Customer Portal service. The system also adds this IBM WebSphere Message Broker to the same HTTP

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Listener in the Bank Internal Portal service, because it uses this HTTP Listener. The same logic applies when you remove a CI you added manually: The system removes it from all application services where you either manually added it or the system added it by analogy.

You can manually connect a CI only to actual CIs existing in the CMDB, not to a visualization of other items on the map such as clusters or boundaries. Also, you cannot add CIs of these CI types to an application service:

- cmdb_ci_file_system
- cmdb_ci_network_adapter
- cmdb_ci_storage_device
- cmdb_ci_disk_partition
- cmdb_ci_memory_module
- cmdb_ci_ip_address
- cmdb_ci_storage_pool_member
- dscy_net_base
- cmdb_ci_storage_export
- cmdb_ci_endpoint
- cmdb_ci_translation_rule
- cmdb_ci_qualifier
- cmdb_ci_application_cluster
- cmdb_ci_config_file

If necessary, you can prevent CIs of other CI types from being added to application services by modifying the Manual CI Inclusions / Exclusions [svc_manual_ci_exclusions_inclusions.list] table.

In environments with domain separation, only CIs belonging to the same domain as the application service are added to the application service. If there is a domain hierarchy, CIs must belong to the same child domain as the application service.

If working with an application service discovered by Service Mapping, manually add a CI:

- To indicate that an application service contains a device or application, which Service Mapping cannot discover. For example, add an A/C unit to the Production Floor service.
- To add a temporary placeholder for a CI, which Service Mapping did not discover. In this case you are planning to perform necessary troubleshooting to ensure that Service Mapping discovers this CI in the future. For example, add an IBM WebSphere Message Broker to the Bank Customer Portal service.
- To create an application service that combines entry points and CIs automatically discovered by Service Mapping with entry points and CIs from the CMDB. After you manually add an entry point, you can update the application service with CIs from the CMDB based on the relationships defined there.

For additional information related to Service Mapping, see Pattern customization and Enable traffic-based discovery for CI types or specific CIs.

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Procedure

1. Open the application service map.
   a. Navigate to **All** > **CSDM** > **Manage Technical Services** > **Application Service**.
   b. Select the needed application service.
   c. On the application service page, select **View Map**.
2. If needed, click **Edit** to ensure that the map is in Edit mode.

   If Service Mapping is deployed, then in Edit mode, the Discovery Messages section appears below the map.
3. To connect a CI to another CI on the map, right-click the CI to which you want to connect the new CI, and then select **Add a CI**.
4. In the Add A CI dialog box, specify the CI to add:

Field	Description
CI Type	Select the CI type (CI class) for the CI you are adding. Every CI belongs to a CI type which contains a set of attributes configured for this kind of CI, for example, *cmdb_ci_appl* for applications.
CI Name	Select the CI from the list of CIs of the selected CI type. **Note:** To eliminate the possibility of delayed results when searching for a specific CI, make your search as specific as possible. A search with *<name> might take a long time and return a large data set.

   The CI type list includes only allowed CI types. For example, you cannot add an application cluster.
5. Click **Submit**.
   The manually added CI appears on the map.

   Note: When you manually add a CI, which is an application, as a child to a service that already includes its parent application CI, the newly added child application CI is hidden inside the inclusion. Click the plus (+) symbol next to the parent application CI to see the child application CI.
6. **Optional:** If Service Mapping is activated, add a discoverable outgoing connection for the manually added CI:
   a. Right-click the manually added CI.
   b. Select **Manually add a connection**.

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Note:
If you do not see the **Manually add a connection** option in the right-click menu, check that you are logged in with the user that belongs to the same domain as the application service.

c. Configure attributes for the entry point as described in Entry points attributes.

d. Click **Submit**.
Discovery and Service Mapping attempt to discover this CI. If successful, the CI appears on the map. Otherwise, a warning icon (⚠) appears.

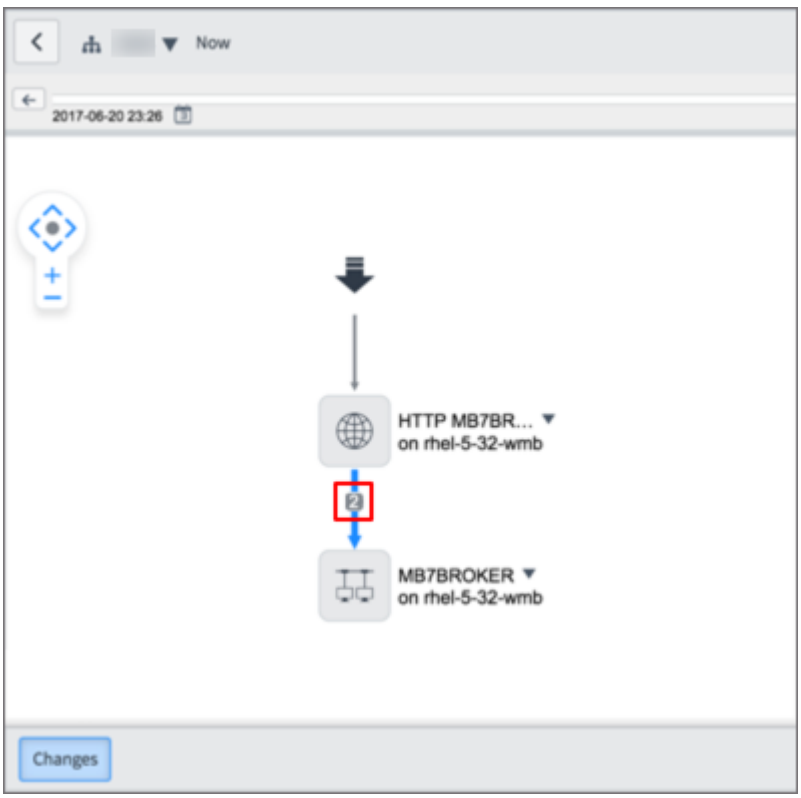
7. **Optional:** If Service Mapping is activated and you want Service Mapping to automatically discover a CI, which you previously added manually:

a. Customize the relevant pattern or fine-tune traffic-based discovery to enable Service Mapping to discover the CI.

b. Navigate to the relevant application service map.

c. Click **Run discovery**.

d. After the discovery process finishes, verify that Service Mapping discovered the CI by checking the connector leading to the CI.
If Service Mapping discovered the CI, then two connectors, a manual and automatically discovered, appear for the CI.



e. Right-click the CI you added manually.
In the example, it is IBM WebSphere Message Broker.

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f. Select **Remove manually added CI**.
The map shows the CI with only one connector leading to it. If this CI had any manually added connections, they are removed together with the manually added CI.

Related topics

Link application services

addCI()

Manually update an application service with changes from the CMDB

Ensure that an application service is up-to-date and reflects all the latest changes to its configuration items (CIs). Regularly update application services to reflect any changes to CIs and their relationships in the CMDB.

Before you begin

Role required: app_service_admin

About this task

There is no mechanism or an API that automatically updates application services that were created manually. Also, you may need to manually update application services discovered by Service Mapping, if they contain manually added CIs. You can only update application services which contain manually created entry points and which are not discovered by Service Mapping.

An example of a change is deleting CIs from the CMDB or connecting two CIs one of which is part of an application service. In the first case, your application service may show a CI that no longer exists. In the second case, on the contrary, the application service omits a CI.

An update might involve adding CIs of the following CI types, which cannot be added to an application service:

- cmdb_ci_file_system
- cmdb_ci_network_adapter
- cmdb_ci_storage_device
- cmdb_ci_disk_partition
- cmdb_ci_memory_module
- cmdb_ci_ip_address
- cmdb_ci_storage_pool_member
- dscy_net_base
- cmdb_ci_storage_export
- cmdb_ci_endpoint
- cmdb_ci_translation_rule
- cmdb_ci_qualifier
- cmdb_ci_application_cluster
- cmdb_ci_config_file

If necessary, you can prevent CIs of other CI types from being added to application services by modifying the Manual CI Inclusions / Exclusions [svc_manual_ci_exclusions_inclusions.list] table.

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Also, the system can connect a CI from the application service only to actual CIs that exist in the CMDB, not a visualization of other items on the map like clusters or boundaries.

The maximum number of CI connections added to application services during this operation is controlled by the sa.service.max_ci_service_population property. By default, the value is 1,000 (one thousand connections). Increasing the number of CI connections may cause performance issues. To adjust the maximum number of added CI connections, add the sa.service.max_ci_service_population property, as described in Add a system property.

In environments with domain separation, only CIs belonging to the same domain as the application service are added into the application service. If there is a domain hierarchy, CIs must belong to the same child domain.

You can also update application services by using APIs.

Procedure

1. Navigate to **All** > **CSDM** > **Manage Technical Services** > **Application Service**.
2. On the Application Services list view, select the application service that you want to update.
3. Click **Advanced** and then click **Advanced Configurations**.
4. On the Additional Info page, click the **Update with changes from CMDB** related link.
5. Select a number in the **Up to** list to limit the number of levels of related items to be updated. If the specified number is higher than the number of levels of related items that already exist in the application service, then the system adds the missing CIs and their connections.

> **Warning:**
> Specifying a lower number than the number of levels that already exist in the application service, does not result in the removal of CIs from the application service.

6. Click **OK**.

Result

- The system updates the application service with the changes from the CMDB and shows them on the map.
- After the update process is complete, the application service form opens.

Link application services

You can manually link two application services by adding a reference to one application service into another application service. The service that contains the reference, becomes a dependent service. The service that you include as a reference is a contained service. You can link application services to create dependencies for impact monitoring in Event Management.

Before you begin

You can edit discovered and manually created application services.

> **Important:**
> You cannot fine-tune or edit tag-based and dynamic services from the map.

Ensure that you know the name and the service type of the application service, to which you want to add a reference.

Role required: app_service_admin or sm_admin

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About this task

To create a link, add a reference to the relevant application service as an outgoing connection of the relevant CI inside another application service. For example, you can add the UK Portal application service as a link to the Online Store application service. In this case, the Online Store service becomes dependent on the UK Portal service that it contains. The Online Store service reflects discovery errors for its contained service in the Edit map mode, as well as alerts in Event Management.

Example of linked application services



When you link an application service to another application service, the information about the CI, to which you linked the service, is updated in the CMDB. The CMDB recognizes other application services that use the same applicative flow, and adds the contained application service to these application services by analogy. The same logic applies when you remove a contained application service: The system removes it from all application services where you either manually linked this service or the system linked this service by analogy.

When using Service Mapping, you may want to link application services to create:

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- A dependency between two application services.
- A placeholder for a map branch that Service Mapping failed to discover. If you create or customize a pattern to discover the configuration item (CI) serving as an entry point for the contained application service, Service Mapping can discover this contained service.
- An indication that an application service contains a branch, which Service Mapping cannot discover.

You can add an application service as a contained service to as many application service as necessary.

Procedure

1. Navigate to **Service Mapping** > **Application Services**.
2. Click **View map** next to the relevant application service.
3. If needed, click **Edit** to ensure that the map is in Edit mode.
4. Right-click the CI to which you want to link an application service as a reference.
5. Select **Add A CI**.
6. In the Add a CI dialog box, select the application service you want to add as a contained service:

Field	Description
CI Type	Select the relevant service type from this list: ○ `Tag-Based Application Service` ○ `Mapped Application Service` for discovered or manually created application services ○ `Calculated Application Service` for dynamic services ○ `Dynamic CI Group`
CI Name	Select the name of the application service that you want to link as a contained service.

7. Click **Submit**.
   The icon for the contained service appears on the map.

Related topics

Application services

View dependent application services in classic Service Mapping

View contained application services in classic Service Mapping

Group application services

Organize application services by groups to perform actions simultaneously on multiple services, and to control user access to services. You can use Event Management to track service health by service groups.

Before you begin

Role required: sm_admin or app_service_admin

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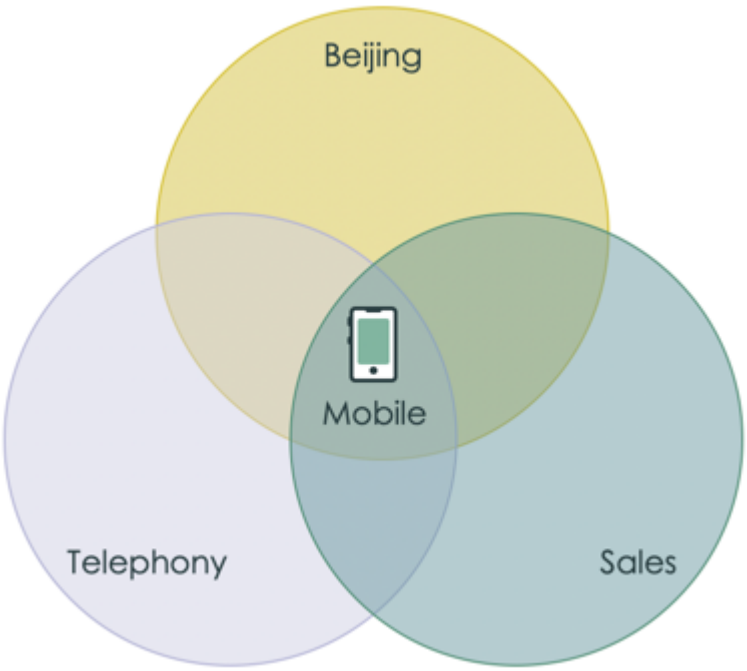
About this task

Typically, enterprises have hundreds of services which makes it impractical to manage them individually. Service groups can make service lists much shorter and easier to manage, especially in large organizations or service providers.

How you group application services depends on the user and on service provisioning policies in your enterprise. The relation between application services in groups is purely logical and the same application service can belong to multiple groups. For example, the Mobile service can be part of the following service groups: Sales, Beijing, and Telephony.

Example of an application service belonging to different groups



You can embed a service group within another service group to create a hierarchy of service groups. If users have access to a parent service group, they automatically have access to all its child groups. By default, all new services are assigned to the **All** service group that lets all users view and manage application services. When you assign a role to a service group, the users with this role can access application services in this service group and in the **All** service group. To enable users with this role to access other services, assign this role to the respective service group. Do not assign user roles directly to the **All** service group.

If Service Mapping is activated, service groups can contain a mixture of manually created application services and application services discovered by Service Mapping.

You can use ServiceNow AI Platform Notifications to alert users if the service group severity changes to critical. The overall severity of the group is determined by the highest alert severity within the group.

Procedure

1. Navigate to **All** > **Configuration** > **Application Services** > **Service Groups**.
2. Click **New**.
3. Enter the name of the new application service group in the **Name** field.
4. To embed this group in another group, enter the name of the other group in the **Parent Group** field.
5. Right-click the form header and click **Save**.

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6. Add an application service to the newly created service group.

   a. In the Service Group Members section, click **New**.

   b. In the **Name** field, enter the name of the application service.
   If you are using Event Management, you can also enter an alert group name.

   c. Click **Submit**.

7. Alternatively, add an application service to a group from the application service form.
   a. Navigate to **All** > **Configuration** > **Application Services** > **Application Services**.
   b. Select the application service you want to add to a service group.
   c. In the **Service Group Members** section, double-click **Insert a new row**.
   d. Enter the name of the service group to which you want to add the selected application service.
   e. Click the **OK** icon ( ).
   f. Click **Update**.

Control user access to application services

Assign user roles to service groups to grant users access to application services in your organization. Your organization may restrict access to some services for security or secrecy reasons.

Before you begin

Make sure that you have performed the user provisioning tasks for the users you want to grant access:

1. Add users to user groups .
2. Create new roles .
3. Assign roles to users or user groups .

Also, make sure that you have created service groups as described in Group application services.

Role required: app_service_admin or sm_admin

About this task

In the base system, the following roles provide access to application services:

app_service_admin

Creates and modifies application services, creates service groups, views, and edits application service maps.

app_service_user

Views maps for operational application services and retrieves service content using the getContent - GET REST API. The itil role that serves as the basic helpdesk technician role contains the app_service_user role.

Service Mapping provides these preconfigured roles:

sm_admin

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Sets up the Service Mapping application. Maps, fixes, and maintains application services. Also performs advanced configuration and customization of the product. Assign this role to application administrators.

sm_user

Views maps for operational application services to plan change or migration, as well as analyze the continuity and availability of services. Assign this role to application users.

sm_app_owner

Provides information necessary for successful mapping of an application service. Once a service is mapped, this user reviews the results and either approves it or suggests changes. Assign the sm_app_owner role to users who own application services and are familiar with the infrastructure and applications that make up the services.

Note:
Users with the itil role only can view all application services.

Event Management provides these preconfigured roles:

evt_mgmt_admin

Has read and write access to all Event Management features to configure Event Management.

evt_mgmt_operator

In addition to the evt_mgmt_user permissions, can also activate operations on alerts such as acknowledge, close, open incident, and run remediations.

evt_mgmt_user

Has read access to all Event Management features. Has write access to alerts to manage the alert life. Has the itil role to be able to manage incidents that are created from alerts.

evt_mgmt_integration

Has create access to the Event [em_event] and Registered Nodes [em_registered_nodes] tables to integrate with external event sources.

Typically, enterprises have hundreds of services which makes it impractical to manage them individually. Service groups can make service lists much shorter and easier to manage, especially in large organizations or service providers. In a hierarchy of service groups, access to a parent service group automatically grants access to all the child service groups.

Users inherit permissions from roles that are assigned to them. You can assign some roles directly to service groups to allow all users with this role to access all application services belonging to this group. However, most enterprises choose to organize their roles as a hierarchy. It helps to manage roles across multiple ServiceNow applications. For example, the Service Mapping administrator [sm_admin] can be part of a broader administrator role like administrator [admin]. You can add users to user groups and then assign roles to the user groups to give permissions of this role simultaneously to all the group users.

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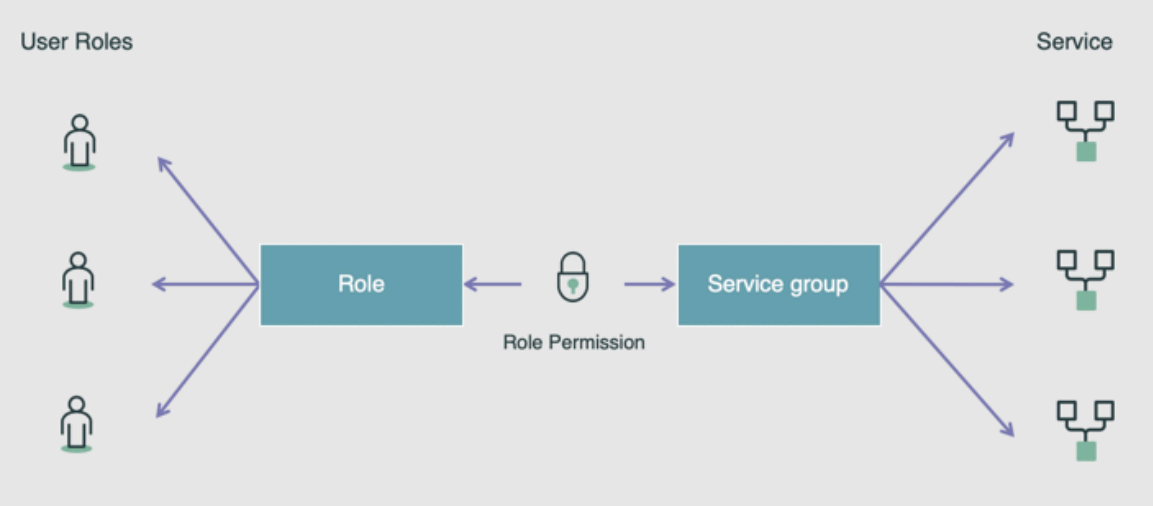
Assigning a role to an application service group



By default, all new services are assigned to the **All** service group that lets all users view and manage application services. When you assign a role to a service group, the users with this role can access application services in this service group and in the **All** service group. To enable users with this role to access other services, assign this role to the respective service group. Do not assign user roles directly to the **All** service group.

Procedure

1. Navigate to either of the following:
   - **Configuration** > **Application Services** > **Service Group Responsibilities**.
   - If Service Mapping is activated: **Service Mapping** > **Services** > **Service Group Responsibilities**.
   - If Event Management is activated: **Event Management** > **Services** > **Service Group Responsibilities**.
2. Click **New** and fill out the Application Service Group Responsibilities form.

Field	Description
Application Service Group	Service group to which you want to assign a role.
Role	Role you want to assign to the selected service group. For example, financial_services_admin.

3. Click **Submit**.

Example:

To manage access to services that contain sensitive financial information in your organization:

1. Organize the services into the Financial Services group.
2. Create a new user role, financial services administrator [financial_services_admin] role, that contains the [app_service_admin] role.
3. Assign the Financial Services administrator role to the Financial Services group.

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As a result, only users with the Financial Services administrator role can access application services belonging to the Financial Services group.

View an application service map in base system

An application service map provides a visualization of data for the CIs comprising an application service, and the relationships and connections between these CIs.

Before you begin

Role required: app_service_user to view the map in View mode, and app_service_admin to modify services in Edit mode.

About this task

When you create an application service, the system generates an associated application service map. The system then updates the map to reflect any changes to the application service. This map consists of icons representing CIs and arrows that represent the connections between them.

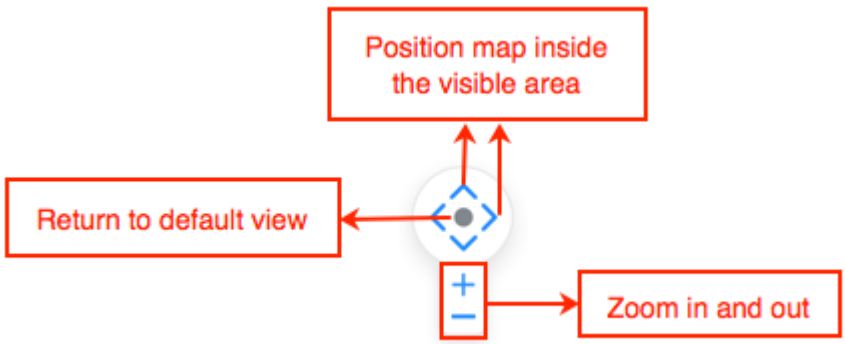
If Service Mapping is deployed, see Application service maps and View CI connection attributes in an application service map for more details.

To open an application service map, navigate to **CSDM** > **Manage Technical Services** > **Application Service**, select an application service, and then click **View map**.

Perform any of the following operations in the application service map.

Procedure

- Select on the windows bar to navigate to a different application service.
- Use the navigation tools to increase or decrease the view of the map and to move the map on the page.
  You can also click anywhere on the map area and drag a segment of the map into the visible area.



- View changes: You can view changes and change records associated with the application service as a whole or with any of its CIs, within a time range.

  For more information, see View the change history of application services.

  Records under the **Change** tab underneath the map, which are associated with a selected CI or connection, are highlighted. If you select a change record under the **Change** tab, then the associated CI icon appears yellow on the map.

- View attributes: When you select a device, application, or connector on the map, it appears in blue and its attributes appear in the Properties pane on the right of the map.

  When nothing is selected on the map, the details of the application service itself appear on the Properties pane.

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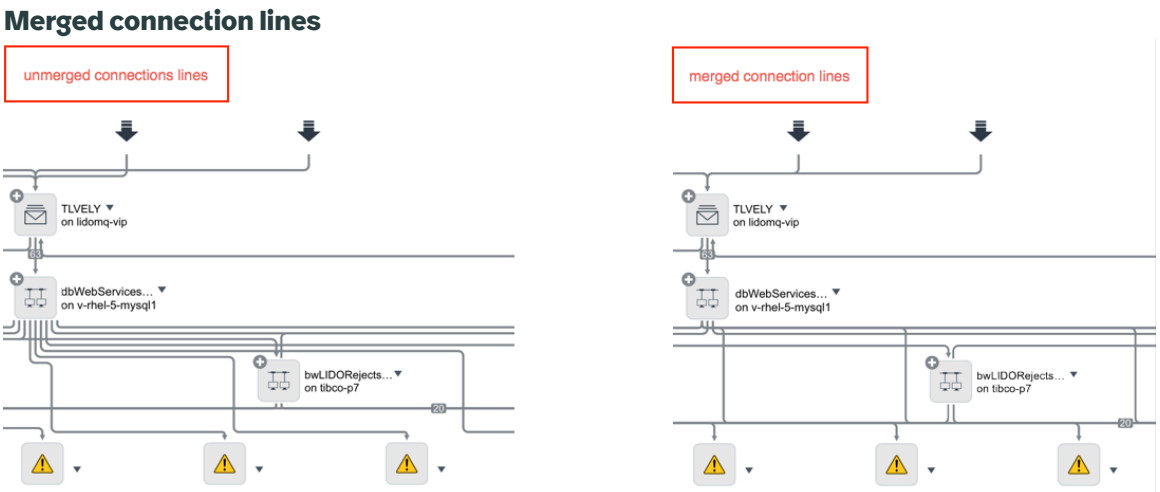
Open the CI's form for further details by clicking **Detailed Properties** at the bottom of the Properties pane.

- Select **Edit** to add or remove CIs from the map or **View** to switch the map mode.
- Select  for **Additional actions**:
  - Set **Group CIs on map**: Simplify maps by grouping 10 or more CIs belonging to the same type and hosted on servers sharing prefix and domain name.
  - Set **Spanning tree view**: Simplify the map by organizing CIs into a tree structure and hiding some connection lines. This option is especially useful for very large maps.
  - **Map Indicators**: Show additional information for a CI or for the application service itself by displaying related records such as alerts, outages, incidents, and problems. For each indicator that is enabled, the corresponding indicator icon appears next to CIs with associated records, and the corresponding tab appears underneath the map. If a record is associated with the application service itself, the indicator appears next to the application service name.

    For information about managing map indicators, see Create or modify map indicators. For more general information, see Event Management Map Indicators (Video).
  - **Export to PDF**: Export the map to a .PDF file which you can then share as needed. After the PDF file is ready, click  to download the PDF file to your local drive.
- View the details of a connection.

  By default, connection lines for the same CI on an application service map, are merged. This merge reduces clutter on the map and helps to make the map more readable. For a merged connection line, you can view details for all the underlying connection lines.



  - To view the source and target CIs of a connection, right-click a connection line.

    If spanning tree view is enabled:

    1. Select the CI whose connections you want to view to show all the concealed connections for the CI.
    2. Right-click one of the connection lines.
  - To view properties of a connection, click a connection line. For manually added connections, Endpoint Type is Manual Endpoint.

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- To view properties of a connection within a merged connection:
  1. Right-click the merged connection line.
  2. Select one of the connections.
  3. Select **Select edge**.

What to do next

You can change the details that appear in the Properties pane by updating the form view 'Form view and section', as described in Configuring the form layout.

Related topics

Spanning tree view property

View CI attributes in an application service map in classic Service Mapping

An application service map displays attributes for each configuration item (CI) that is part of the application service, as well as for the application service itself. The attributes come from the CMDB.

Before you begin

Role required: sm_admin or sm_user

About this task

You can view the following information for each CI:

Name label

The CI name. This attribute is either preconfigured on the CI or configured during CI installation.

Basic attributes

A summary of the most important CI attributes.

Detailed attributes

A complete list of all attributes collected for the CI.

Each CI type (CI class) has different attributes. For example, the Linux Server type has different attributes than the SQL Instance type.

If Service Mapping is deployed, the way CIs appear on the map depends on the view you select for the map. Attributes available for viewing also depend on the Service Mapping setup. For more information, see description of components installed with Service Mapping.

Procedure

1. Open the application service map.
   a. Navigate to **All** > **CSDM** > **Manage Technical Services** > **Application Service**.
   b. Select the needed application service.
   c. On the application service page, select **View Map**.
2. If needed, click **Edit** to ensure that the map is in Edit mode.

   If Service Mapping is deployed, then in Edit mode, the Discovery Messages section appears below the map.
3. To see the full name of a CI whose name has been shortened on the map, point to the CI.

   A tooltip displays the full CI name.

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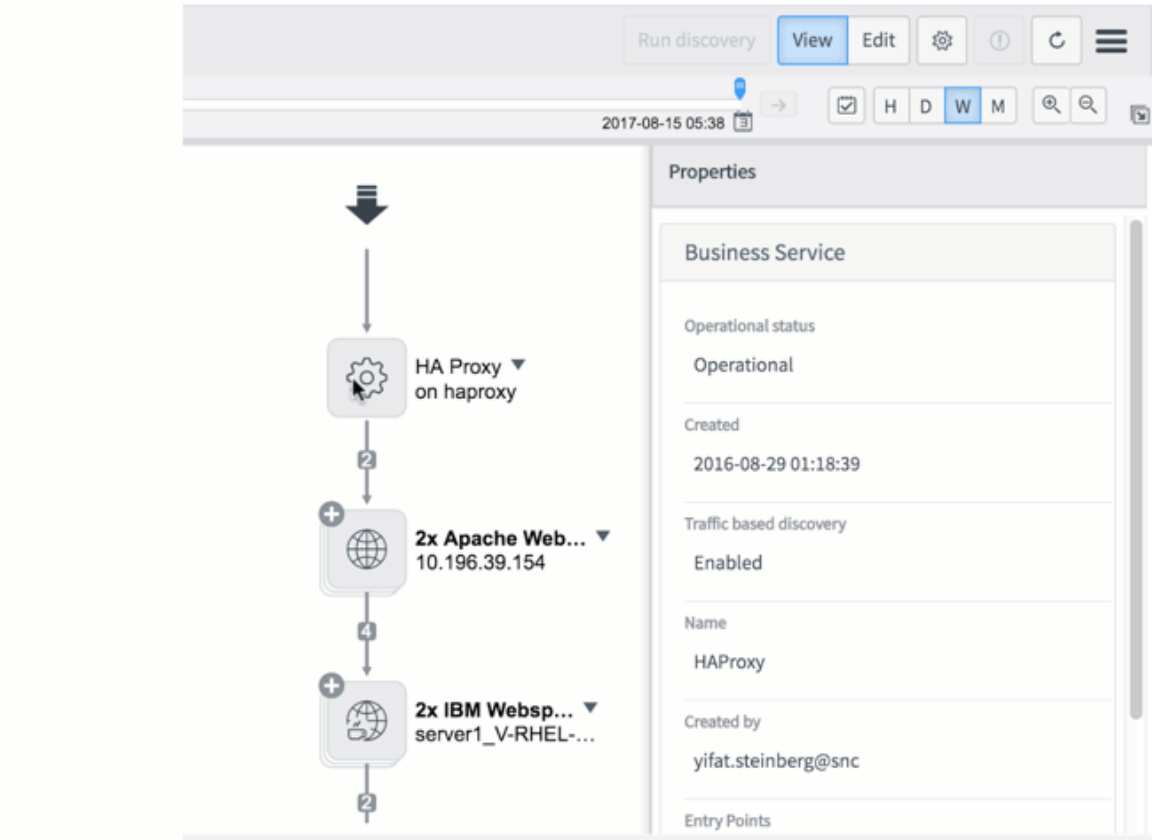
4. Click a CI to see its details in the **Properties** pane.

   The attributes of applications and the servers that host them appear separately.



5. To view more detailed attributes for the CI, click **Detailed properties** at the bottom of the Properties pane.
6. **Optional:** To view configuration files associated with a CI in environments where Service Mapping or Discovery are enabled and tracking changes to CI configuration files is enabled):
   - Review the list of files under **Tracked Files** in the **Properties** pane. Click the file name to open the actual file.
   - Click the **Affected CIs** tab and view the list of configuration files. Click the file name to open the actual file.

View the change history of application services in classic Service Mapping

You can view the changes made to an application service as a whole and to the individual configuration items (CIs) comprising the service. Change history is useful for maintenance, planning, or troubleshooting procedures.

Before you begin

Role required: admin, sm_admin, sm_user, app_service_admin, or app_service_user

About this task

Details about changes to an application service and to its CIs are stored in the CMDB. Typically, these changes reflect adding or removing CIs from an application service, upgrading or updating CIs, or modifying CI configuration files. The system gathers this data by querying CMDB tables and then creating the change history view. In deployments where Service Mapping is activated, the type of change information Service Mapping queries depends on discovery patterns that Service Mapping uses to discover CIs.

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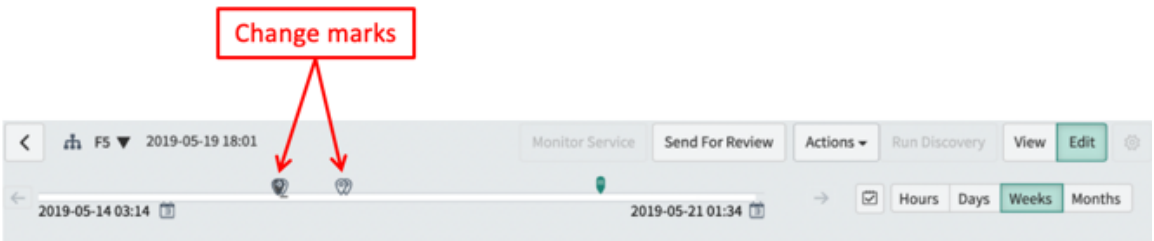
Changes to configuration files are associated with CIs to which these files belong. Maps show configuration file changes as changes to related CIs.

While you can see change records for a specific CI in the context of application services, you can also see detailed history of a specific CI separate from its application service as described in History Timeline.

If the ServiceNow AI Platform is configured to validate changes, all changes are evaluated and rendered as valid or not. If a change is valid, its change record on the application service map is marked as approved. For more information about configuring the platform for change validation, see Managing proposed changes.

Changes to the application service appear on the history timeline.



The type of change mark depends on the nature of changes that it represents:

Light gray balloon ( )

Unapproved change that does not influence the application service behavior. For example, a change in a network path or adding a node to a cluster.

Dark gray balloon ( )

Unapproved change that changes the application service behavior.

Green balloon ( )

An approved change in deployments where the ServiceNow AI Platform is configured to validate changes.

Double balloon ( )

Multiple separate changes that happened a short time from each other.

You can mark times on the history scale by creating baselines to quickly return to the marked view.

Procedure

1. Open the application service map.
   a. Navigate to **All** > **CSDM** > **Manage Technical Services** > **Application Service**.
   b. Select the needed application service.
   c. On the application service page, select **View Map**.
2. Review change records created for this application service on the **Changes** tab at the bottom of the page.

   If Service Mapping is deployed, then in Edit mode, the Discovery Messages section appears below the map.
3. On the history timeline, set the time range of changes that you want to view.

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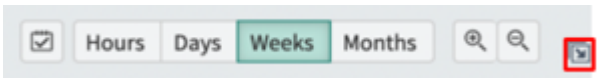
The map shows the history view of the application service for the time you selected.

Note:
The **Change** tab shows all change records, even the ones which are filtered out of the history view.

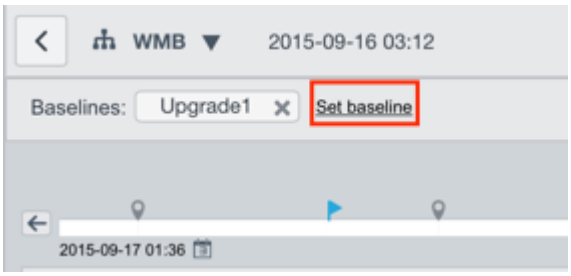
4. To mark a time on the time scale, set a baseline:

   a. Click the **Compare** icon.

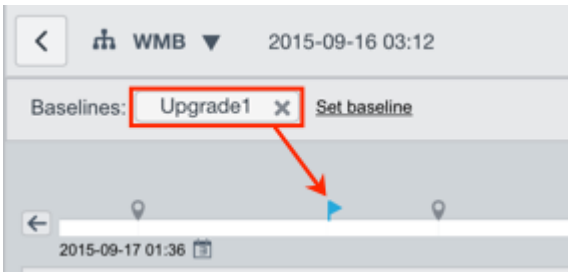


   b. Navigate to the time you want to mark as a baseline on the history scale.

   c. Click **Set baseline**.

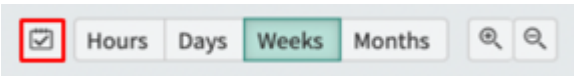


   d. Enter the name of the baseline and click **OK**.
   The new baseline appears as a button above the history scale and as a blue flag on the history scale.



5. View the change history.

6. To exit the history view and see the current status of the application service, click the current icon.



Related topics

View an application service map in base system

Compare two versions of an application service in classic Service Mapping

Modify tracking changes in configuration files

Fine-tune tracking changes for the change history

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Compare two versions of an application service in classic Service Mapping

You can see a summary of application service changes at a glance by comparing two versions of an application service. This feature is useful for checking the application service status before and after a certain change or problem.

Before you begin

Role required: admin, app_service_admin, app_service_user, sm_admin, or sm_user

About this task

Specify two points in time for which to compare the two versions of an application service. You can use the change indicators on the timeline to specify one point in time that is before and another that is after a change for which to see the details. For example, if you know that the application service started to fail at a certain time, you can compare two versions of the application service, one before and one after the problem started. This comparison lets you see the summary of changes that possibly led to the problems.

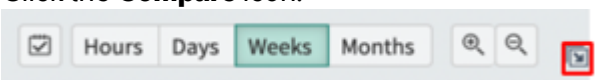
Service Mapping, if deployed, tracks and shows all changes to a CI including configuration files associated with a CI. When you compare two versions of an application service, you can see changes made to configuration files as changes to CIs. You can also compare two versions of a configuration file to see the actual changes in the files, during the time range specified for the comparison.

Procedure

1. Open the application service map.
   a. Navigate to **All** > **CSDM** > **Manage Technical Services** > **Application Service**.
   b. Select the needed application service.
   c. On the application service page, select **View Map**.
2. If needed, click **Edit** to ensure that the map is in Edit mode.

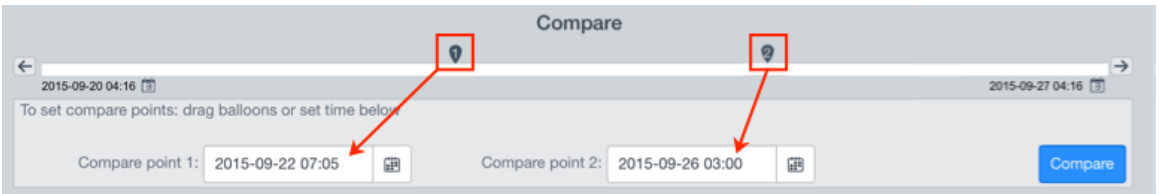
   If Service Mapping is deployed, then in Edit mode, the Discovery Messages section appears below the map.
3. On the history timeline, set the time range of changes that you want to view.
   The map shows the history view of the application service for the time you selected.

   Note:
   The **Change** tab shows all change records, even the ones which are filtered out of the history view.
4. Click the **Compare** icon.



5. Set **Compare point 1** and **Compare point 2** as the two points in time for the comparison.

   You can drag the pointers on the history scale to set corresponding time points.



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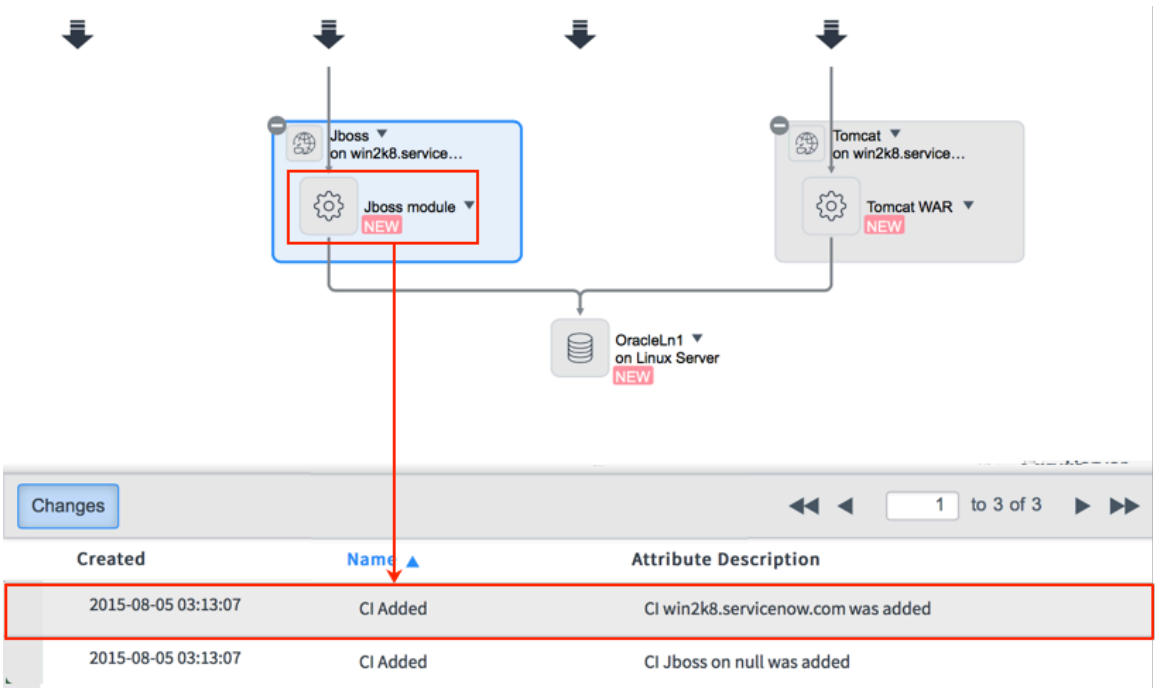
If the history scale does not include the time set for comparison, then its corresponding pointer appears next to the compare point in yellow:



Note:
If there are no changes to the service during the time interval specified by **Compare point 1** and **Compare point 2**, then no change details are displayed.

6. Click **Compare**.
   The comparison view opens in a separate tab.
7. Select a marked CI to see the relevant change record on the **Changes** tab.



8. **Optional:** If Service Mapping is deployed, you can compare two versions of a configuration file that appears on the map as Updated:

   a. Select the CI that is associated with the updated configuration file.

   b. In the **Properties** pane, click the link to the updated file.

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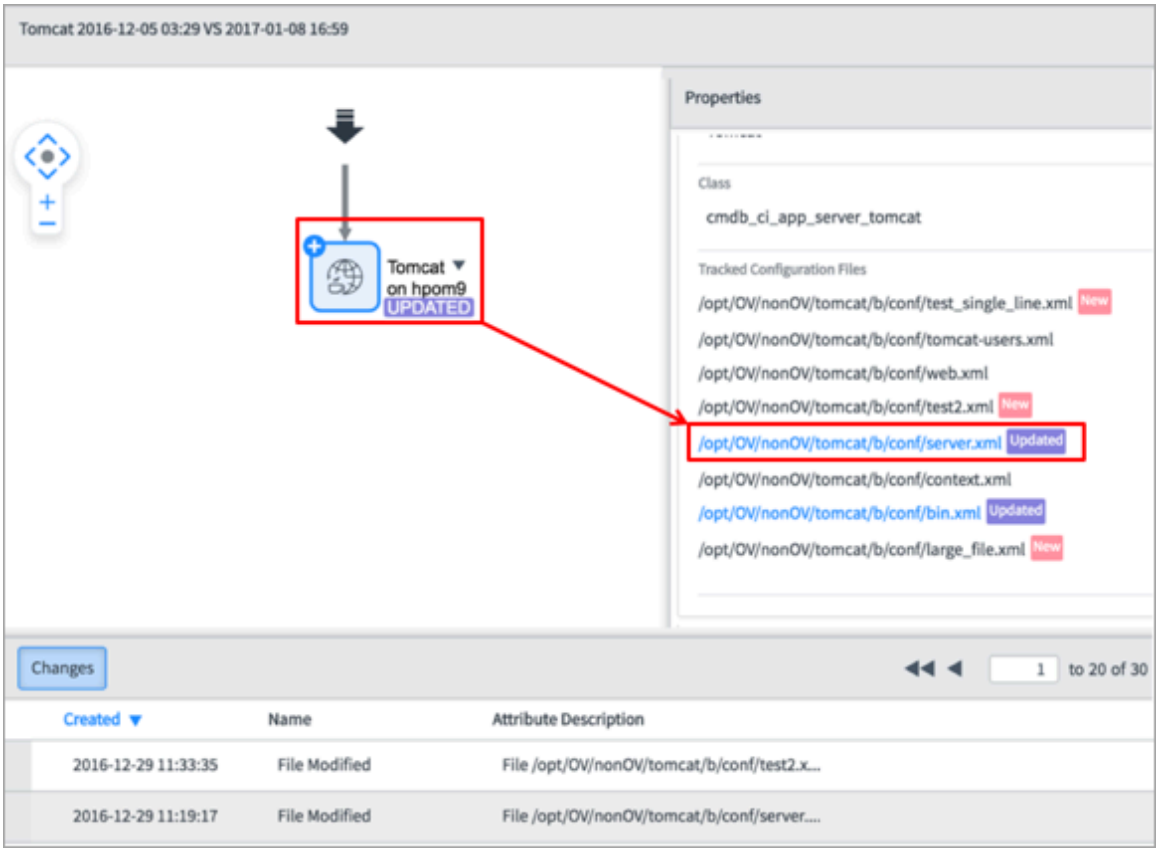

The **Tracked Configuration Files Version Compare** tab opens showing two versions of the configuration file side by side.

c. Review actual changes.

(Optional) Highlight colors indicate the type of change:

- Purple — Updated line
- Pink — New line
- Gray — Deleted line

d. Navigate between the changes using the arrows in the upper right corner.

e. Close the **Tracked Configuration Files Version Compare** tab when finished.

9. Close the comparison view when finished.

Related topics

View the change history of application services in classic Service Mapping

Compare versions of CI configuration files

Use application services APIs

Application services provide APIs that let you perform operations such as creating and updating an application service, populating it with CIs from the CMDB, and retrieving details from an existing application service.

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Role required: app_service_admin

An application service is a set of interconnected applications and hosts which are configured to offer a service to the organization. Application services can be internal, like an organization email system or customer-facing, like an organization website.

Create an application service

Using the createOrUpdateService - POST REST API to create an application service suits your organization if the ServiceNow CMDB already contains the CIs making up the service. Typically, it is the case when you have manually added CIs directly into the CMDB, or used the Discovery application to discover CIs and store information about them in the CMDB. You can also use this API to create an application service containing CIs discovered using non-ServiceNow applications.

By default, when an application service is created, all CI connections are of the *Depends on::Used by* relationship type. You can modify this default type by changing the value of the sa.it_service.manual_ci_rel_type property.

Before creating an application service, ensure that:

- The CMDB contains all the CIs comprising the application service.
- You have the sys_id of each CI comprised in the application service you want to create.
- You understand the hierarchy that the CIs form.

The Mapped Application Service [cmdb_ci_service_discovered] table contains every application service including services you create using APIs.

You can also manually create an application service using the user interface as described in Create an application service.

Retrieve content from an application service

Use the getContent - GET REST API to retrieve a list of CIs and the relationships between them, for an application service that was created manually.

Additional APIs

The following JavaScript APIs are also available:

- addCI(): Add a CI to a manually created an application service.

  For restrictions on the CIs being added and other details about adding a CI to an application service, see Manually add CIs to an application service.

- addManualConnection(): Add a manually created connection to an application service.

- migrateManualToApplicationService(): Convert a manual service to an application service.

- populateApplicationService(): Populate an application service with CIs and relationships from the designated entry point.

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- removeCI() : Remove a manually created CI from an application service.
- removeManualConnection() : Remove a manually created connection and the connected CI from an application service.

Related topics

Application Service API

Components installed with application services

Several types of components are installed with activation of the Application Service [com.snc.cmdb.it_service] plugin, including tables, user roles, and scheduled jobs.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application .

Roles installed

Role title [name]	Description	Contains roles
[app_service_user]	Views maps for operational application services and retrieves service content using the getContent - GET REST API. The itil role that serves as the basic helpdesk technician role contains the app_service_user role.	None
[app_service_admin]	Creates and modifies application services, creates service groups, views, and edits application service maps.	itil

Tables installed

Table	Description
BaseLines [sa_baselines]	Storing points in the time defined as baselines for application services.
Business Service User preferences [sa_business_service_user_prefs]	User preferences associated with a specific application service.
Menu Action [sa_context_menu]	Data on configurable menu options for CIs in the application service map.
Hash [sa_hash]	Internal table which contains counters and hashes on various types of updates related to application services.
Entry Point	Maps entry points to application services.

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Table	Description
[sa_m2m_service_entry_point]	
Discovered Service Notification [sa_notification]	Internal table which contains data on notifications between different parts of the software. Mostly used after activating Service Mapping.
Service Group Members [sa_service_group_member]	Maps service groups to application service members.
Business Service Group Responsibilities [sa_service_group_responsibilities]	Data on users having access to application service groups.
Checkpoint Attribute Description [checkpoint_attribute_description]	Links between history timeline changes and service model internal entities (checkpoints). Used in lists of history of changes in application service maps.
Application Service [cmdb_ci_service_auto]	Services that can be monitored by the system, which in the base system, includes only application services. If Service Mapping is activated, there can also be records for dynamic CI groups. If Event Management is activated, there can be records for alert groups.
Mapped Application Service [cmdb_ci_service_discovered]	Application service CIs. For each application service, there is a container CI record that models the application service.
Bulk Convert Services [cmdb_convert_bulk_services]	All bulk conversions of business services to application services (current and past), along with the conversion progress which is refreshed every 10 seconds.
Application Services Action Results [csdm_dashboard_action_report_result]	Results for the 'Application Services Missing Data' report in the Application Service Dashboard.
Application Services Types Results [csdm_dashboard_type_report_result]	Results for the 'Application Services by Type' report in the Application Service Dashboard.
Application Services Dashboard Results [csdm_dashboard_reports_result]	Results for the '<Application Servers | Databases | Hardware Servers> Not in an Application Service' reports in the Application Service Dashboard.
Manual CI Inclusions / Exclusions [svc_manual_ci_exclusions_inclusions.list]	Contains CI classes included or excluded from application services during population of manual or dynamic application services. Service population happens when • Manually adding CIs to an application service • Converting a business service to an application service

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Table	Description
	• Creating or updating an application service using APIs • Manually updating an application service with changes from the CMDB In the base system, the following CI classes are excluded: • cmdb_ci_file_system • cmdb_ci_network_adapter • cmdb_ci_storage_device • cmdb_ci_disk_partition • cmdb_ci_memory_module • cmdb_ci_ip_address • cmdb_ci_storage_pool_member • dscy_net_base • cmdb_ci_storage_export • cmdb_ci_endpoint • cmdb_ci_translation_rule • cmdb_ci_qualifier • cmdb_ci_application_cluster • cmdb_ci_config_file CIs of any CI class that is not configured for exclusion in this table can be added to application services. This table supports the functionality that was earlier supported using the following deprecated property: sa.mapping.user.manual.citype.blacklist.

Properties installed

To access application services properties, navigate to **All** > **Configuration** > **Application Services** > **Properties**. The role required for modifying property values, is app_service_admin.

If Service Mapping is deployed, see Properties installed with Service Mapping for additional application service properties.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

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Property	Usage
The sys_id of the default relation type to be added between source and target when adding CI manually to application service sa.it_service.manual_ci_rel_type	• Type: string • Default value: 5599a965c0a8010e00da3b58b113d70e (Depends on::Used by) • Learn more: Manually add CIs to an application service
Coefficient of aggregation interval. 0 value means no aggregation is performed on history timeline. The purpose of this property is to decrease number of changes in history timeline by increasing the interval allowed between changes sa.history.aggr_interval_coef	• Type: integer • Default value: 1
A list of comma delimited CI types that are excluded when using the 'Convert to Application Service' and 'Populating Application Service from CIs in the CMDB' operations. Example: cmdb_ci_service,cmdb_ci_endpoint,cmdb_ci_hardware sa.mapping.user.manual.citype.blacklist	This property is deprecated in Tokyo. This exclusion list applies when: • Manually adding CIs to an application service • Converting a business service to an application service • Creating or updating an application service using APIs • Manually updating an application service with changes from the CMDB • Type: string • Default value: None
Sync Service Mapping operations with Service Modeling sa.service_modeling.use	• Type: true|false • Default value: true
Enable limitation of application service maps drawing by number of nodes and edges. sa.map.LIMIT_MAX_GRAPH_SIZE	Limit the number of nodes and edges on application service maps. • Type: true|false • Default value: true Setting this property to false may reduce performance in maps of large services.

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Property	Usage
Maximal number of displayable nodes on application service map. Maps with larger values will not be displayed. sa.map.MAX_NODES_FOR_LAYOUT	The max number of nodes displayed on an application service map. If the number of nodes exceeds the specified number, the map does not appear and an error message appears. • Type: integer • Default value: 5000
Global flag to allow or disable spanning tree view for maps. true (default) - allows but not forces spanning tree view on maps. sa.map.ALLOW_SPANNING_TREE_VIEW	Enable spanning tree view for application service maps. • Type: true|false • Default value: true
Maximal number of displayable edges on application service map before spanning tree view applied. sa.map.MAX_EDGES_FOR_FULL_LAYOUT	The max number of edges displayed on an application service map, before applying spanning tree view. • Type: integer • Default value: 1000
Maximal number of displayable edges on application service map. Maps with larger values will not be displayed. sa.map.MAX_EDGES_FOR_LAYOUT	Max number of edges displayed on an application service map. If the number of edges exceeds the specified number, the map does not appear and an error message appears. • Type: integer • Default value: 100000 Increasing the default value may reduce performance in maps for large services.
Maximal degree of node on application service map for large map mode. Maps with smaller degrees will be displayed in regular mode. Maps with larger degrees will apply more edges merging for more compact view. sa.map.LIMIT_GRAPH_DEGREE	• Type: integer • Default value: 1000 Increasing the default value may reduce performance in maps for large services.
Limit of amount of services that displayed on Services Tree on maps. Then this limit reached, Services Tree will be blocked. sa.service_tree.MAX_ITEMS_TO_DISPLAY	• Type: integer • Default value: 7000

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Property	Usage
Maximal amount of connection properties to be shown at once when connection line selected on service map. If selected line contains more connections than defined here, then properties panel will have notification about cut-off connections. sa.map.max_connections_in_properties_panel	• Type: integer • Default value: 50
Enable grouping of CIs on map. sa.map.enable_auto_grouping	• Type: true|false • Default value: true
Minimal number of CIs on a map to apply CI grouping. Relevant only if CI grouping is enabled on the map. The following CIs are not counted: discovered clusters, internal CIs inside inclusion boxes, entry points, error nodes, host CIs or CIs that are not hosted on other CIs. sa.map.min_nodes_for_auto_grouping	• Type: integer • Default value: 10

Render full labels on CIs on map. Applicable to all CI labels (CI name, host name, cluster label, etc.) Enabling this will disable labels truncation, and labels will most probably overlap with other map elements. Not applicable to network/storage path maps.
 	
sncCommonMap.RENDER_FULL_LABELS
	The default value of disabled, means none.
	• Type: choice list
	• Default value: Disabled
	• Other possible values:
	  ○ Exported PDF only: pdf
	  ○ Map and PDF views: all

Maximal width of CI node labels in pixels. Relevant for any kind of labels (CI name, host name, cluster label etc.) This size also modifies horizontal space between CI elements. Applied to map view and exported PDF view. Not applicable to network/storage path maps.
 	
sncCommonMap.NODE_LABEL_WIDTH
	• Type: integer
	• Default value: 95
	• **Other possible values**:
	  ○ Min value: 20
	  ○ Max value: 1000

glide.cmdb.csdm.app_service.max_results	Max number of items that are calculated in the '<Application Servers | Databases | Hardware Servers> Not in an Application Service' report in the Application Service Dashboard. • Type: integer • Default value: 100000 • Location: Add to System Properties [sys_properties] table.

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Property	Usage
sa.service.max_ci_service_population	The maximum number of CI connections added to application services during the following operations: Converting manual services created in Event Management into application services and updating application services with changes from the CMDB. • Type: integer • Default value: 1,000 • Location: Add to System Properties [sys_properties] table. Increasing the default value may cause performance issues.
sa.service.population.stop_expansion_under_ci_classes	List of application service CI classes. If an application service belongs to a CI class that extends one of the CI classes in the list, the system does not insert CIs under this application service CI during Manually updating an application service with changes from the CMDB. • Type: string • Default value: cmdb_ci_service_discovered • Location: System Property [sys_properties] table.

Integrating third-party data into CMDB

Import and integrate third-party data into Configuration Management Database (CMDB) classes.

Available methods

Use the combination of the following data integration methods to integrate third-party data into CMDB.

Integration Commons for CMDB	IntegrationHub ETL	Service Graph Connectors
Framework that provides a set of common operations and functionalities for integrations.	ETL transform maps for integrations.	Connectors for bringing in third-party data correctly and quickly.

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API Service Graph Connectors



Connectors for bringing in API data correctly and quickly.

Enhanced integration solutions

Simplify integration and resolve issues with the following enhanced integration solutions.

Service Graph Connector Central



A CMDB Workspace view for managing the full life cycle of creating, editing, monitoring, and debugging Service Graph Connector connections.

Related applications and features

CMDB schema model

A collection of class diagrams and class attributes for key CMDB classes.

CMDB tables descriptions

Descriptions of key CMDB tables in the base system.

CMDB CI Class Models

A ServiceNow Store app that adds class models that extend the base CMDB class hierarchy. The hierarchy includes class descriptions, identification rules, identifier entries, and dependent relationships, if applicable. You can then use the added classes as any other CMDB base class.

Populating the CMDB

Options for populating the CMDB.

Discovery patterns

A ServiceNow Store app that provides a library of discovery patterns for discovering specific devices and applications in the industry.

CMDB Identification and Reconciliation

A centralized framework for identifying and reconciling data from different data sources that helps maintain the integrity of the CMDB when multiple data sources are used to create and update configuration item (CI) records.

Integration Commons for CMDB

The Integration Commons for CMDB (sn_cmdb_int_util) store app contains the CMDB Integrations Dashboard and a set of Robust Transform Engine (RTE) transforms and script includes.

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Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Dependencies

CMDB and CSDM Data Foundations Dashboards v2.3.5 or later versions (see Monitor system foundations in the CSDM and the CMDB Data Foundations Dashboards)

Using the CMDB Integrations Dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed Service Graph Connectors and any custom integrations created in IntegrationHub ETL.

See CMDB Integrations Dashboard for more information.

Using RTE transforms

The Integration Commons for CMDB (com.snc.cmdb.integration_util) plugin provides the Integration Commons functionality. You can use the transforms and script includes to standardize the values stored in the CMDB by different data integrations or by changes. The attributes that are included in the Integration Commons for CMDB store app are attributes that the Identification and Reconciliation Engine (IRE) requires for identification or attributes that could be used to derive classes.

The transforms are common operation types and template scripts available as templated operations. A templated operation is a transform that controls the logic for the transform. The result is that there can be only a single output. When a transform returns multiple values, then those values are concatenated by a triple pipe (|||). You then must use the split transform to retrieve the values that you're interested in. The inputs are either a single field or a list of fields. For all but one transform, the inputs are assumed to be a fixed list of fields as described for each of the following individual transform.

Note:
The RTE transforms are included in the Integration Commons for CMDB store app and are available in the IntegrationHub ETL store app. For more information on RTE transforms, see RTE operation types included within the Integration Commons for CMDB app and RTE transforms template scripts included within the Integration Commons for CMDB app.

ServiceNow Service Graph Connectors that are available at the ServiceNow Store, have dependencies on the transforms and script includes in the Integration Commons for CMDB store app. Therefore, when you install such CMDB integration, the Integration Commons for CMDB store app is automatically installed too.

You can also configure the Application Dependency Mapping (ADM) adapter to populate running processes, TCP connections, and applications into CMDB. For more information, see Configuring the ADM adapter for Service Graph Connectors.

Important:
After upgrades and deployments of new applications or integrations, run quick start tests to verify that Integration Commons for CMDB works as expected. See Quick start tests for Integration Commons for CMDB for more information.

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Related topics

- Configuring the ADM adapter for Service Graph Connectors
- Accessing the connection details of Service Graph Connectors
- Managing CMDB data deletion
- Partition size computation for parallel loading in Integration Commons for CMDB
- Quick start tests for Integration Commons for CMDB

CMDB Integrations Dashboard

You can use the CMDB Integrations Dashboard that provides a central view of status, processing results, and processing errors of all installed Service Graph Connectors and any custom integrations created in IntegrationHub ETL run.

The CMDB Integrations Dashboard is available with the Integration Commons for CMDB (sn_cmdb_int_util) store app. On the dashboard, you can see metrics for all Service Graph Connector runs, or filter the view to a specific connector, a specific time duration, or a specific connector run.

Learn more about the CMDB Integrations Dashboard from the following video.

CMDB Integrations Dashboard overview

Access CMDB Integrations Dashboard

Access the CMDB Integrations Dashboard provided with the Integration Commons for CMDB store app for maintaining data consistency and accuracy across multiple data sources.

Before you begin

Role required: None

Procedure

1. Navigate to **Self-Service** > **Dashboards**.
2. On the Dashboards view, select **CMDB Integrations Dashboard** and do any of the following actions:
   - Select the **CMDB Execution Status** tab to see metrics such as the total number of integrations and processed rows, integration runs actively running, daily statistics, and details about the classes that were updated.
   - Select the **CMDB Integration Errors** tab to see metrics such as number of import and integration errors, and number of erroneous imported records.
   - Point to the score on the various tiles to drill down to the list views for the associated records. Point to the charts to show more details for the chart.
   - Narrow down the scope of the integration runs included in the metrics on the dashboard by configuring filters on the right-hand side of the dashboard. Set any of the following filters and then select **Apply**. The filter settings apply to any metric with a filter icon in its upper left corner.

Filters

Filter	Description
Import Date	Select **All** or a time period, such as **Last 7 days**, from which to include integration runs in metrics.

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Filter	Description
CMDB Applications	Select **All**, or a CMDB application, such as **SCCM**, or a custom integration, from which to include integration runs in metrics.
CMDB Import	Select **All**, or a specific integration run to include in metrics.

RTE operation types included within the Integration Commons for CMDB app

The Robust Transform Engine (RTE) operation types are common operation methods for use in ETL without having to write your own complex data transformations.

The following operation types are available in the Integration Commons for CMDB app.

Concatenation

Combines the values from input fields into a single string, joining them on the optional *joining_string* field.

Details	
Table	RTE Entity Concatenation Operation [sys_rte_eb_concat_operation]
Input field	*source_sys_rte_eb_fields* Input is a set of fields and constants.
Output field	*target_sys_rte_eb_field* Output is the combined value of the provided fields as a single string.
Additional fields	*joining_string* (optional)

Example

Input	joining_string	Result
"input_1", "input_2", "input_3"	", "	"input_1, input_2, input_3"

Convert to Boolean

Converts the incoming value to a Boolean.

Details	
Table	RTE Entity Convert to Boolean Operation [sys_rte_eb_to_boolean_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_field*

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Details	
	Output is `true` when input is `true` or `1`, otherwise output is `false`. (case insensitive)

Example

Input	Result
input_1	false
true	true
1	true
0	false
11	false

Convert to Date

Attempts to convert the incoming value to a GlideDateTime value by applying the date_format to the incoming value.

Details	
Table	RTE Entity Convert to Date Operation [sys_rte_eb_to_date_operation]
Input field	*source_sys_rte_eb_field* Input is a data timestamp value with date format.
Output field	*target_sys_rte_eb_field* Output is the date timestamp in the specified date format. Attempts to directly convert using GlideDateTime if the date_format is incorrect. Returns an empty value if unable to parse at all.

Example

Input	Result
"2018/09/20 11:21:00 AM EST" with date_format "yyyy/MM/dd hh:mm:ss a z"	"2018-09-20 16:21:00"
"2018/09/20 01:21:00 PM EST" with date_format "yyyy/MM/dd hh:mm:ss a z"	"2018-09-20 18:21:00"
"09/20/18" with date_format "yyyy/MM/dd hh:mm:ss a z"	""0018-09-20 00:00:0"

Convert to Numeric

Converts the incoming value to a number.

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Details	
Table	RTE Entity Convert to Numeric Operation [sys_rte_eb_to_numeric_operation]
Input field	*source_sys_rte_eb_field* Input is a value.
Output field	*target_sys_rte_eb_field* Output is a numeric value. If the input value is non-numeric the output is empty.

Example

Input	Result
input_1	null
1.23	1.23
1.00	1
two	null

Copy

Copies the value of the source field to all the target fields.

Details	
Table	RTE Entity Copy Operation [sys_rte_eb_copy_operation]
Input field	*source_sys_rte_eb_field* Input is a value.
Output field	*target_sys_rte_eb_fields* Output is the copied source field value.
Additional field	*overwrite_existing_value* (optional, Boolean): If `true`, then the values of the target fields are replaced. Otherwise, any non-empty value isn't overwritten.

Extract First Numeric

Sets the target field as the first numeric value found in the source field.

Details	
Table	RTE Extract Numeric Operation [sys_rte_eb_extract_numeric_operation]
Input field	*source_sys_rte_eb_field* Input is a value.

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Details	
Output field	*target_sys_rte_eb_field* Output is the numeric value found in the input.
Additional fields	• *decimal_places* (optional, number)#: Forces the output to have a specified number of decimal places. • *remainder_target_field* (optional, reference to field): Set to the trimmed remainder of the source field, after removing the first numeric value.

Example

Input	Result
100 mb	100
100.123 mb	100.123
100.123 mb with *decimal_places*=2	100.12
100 mb with *decimal_places*=2	100.00
100 mb with *remainder_target_field*	mb

Glide Lookup Operation

Performs a lookup in the database on the target table specified in the *target_table* field.

Details	
Table	RTE Glide Lookup Operation [sys_rte_eb_glide_lookup_operation]
Input field	*source_sys_rte_eb_fields* The database table for lookup.
Output field	*target_sys_rte_eb_fields* The resulting data based on the lookup operation.
Additional fields	• *target_table* • *glide_matching_fields* (string): Comma-separated list of column names in the target table. For each input field in source_sys_rte_eb_fields, there must be an equal number of values in glide_matching_fields. • *glide_target_fields* (string): Comma-separated list of column names in the target table. For each target field in target_sys_rte_eb_fields, there must be an equal number of values in glide_target_fields.

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Example

Input	Result
• Input Field 1: 100 South Charles Street, Baltimore • Input Field 2: MD • Target Table: Location (cmn_location) • Glide Matching Fields: street,state • Glide Target Fields: sys_id	Output Field 1: 25ab9c4d0a0a0bb300f7dabdc0ca7c1c

Multiple Input Script

Runs a script with multiple inputs setting the *target_sys_rte_eb_field* field as the output for that script.

Details	
Table	RTE Entity Multiple Input Script Operation [sys_rte_eb_multi_in_script_operation]
Input field	*source_sys_rte_eb_fields* Input is a script.
Output field	*target_sys_rte_eb_field* Output is the result of the input script.
Additional Fields	• *script* (script) • *use_unique_input_sets*(Boolean): When `true`, only unique input values are included in the data batch for IRE processing. Otherwise, all input object's field values are included.

Example for using *use_unique_input_sets*, with a script function that takes `record_type` and `operating_system` as input and returns `record_with_os`:

Examples

Record	record_type	operating_system
1	computer	Windows XP
2	computer	Linux
3	computer	Windows XP

If use_unique_inputs_sets is set to `true`, then the script processes only two values (`computer + Windows XP` and `computer + Linux`). If `use_unique_inputs_sets` is set to `false`, then each of the three values is individually processed (`computer + Windows XP`, `computer + Linux`, and `computer + Windows XP`).

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Sample script:

```
(function(batch, output) {
                for (var i = 0; i < batch.length; i++) {
                        // batch[i] is the unique set of
 inputs/individual record
                        // batch[i].<field> gives access to the
 field value
                        var in0 = gs.nil(batch[i].record_type) ?
 '' : batch[i].record_type;
                        var in1 =
 gs.nil(batch[i].operating_system) ? '' :
 batch[i].operating_system;
                        // output[i] is the output for the
 specific combination of inputs/individual record
                        output[i] = in0 + "_" + in1;
                    }
                }
            })(batch, output);
```

Multiple Input/Output Script

Runs a script with multiple inputs setting the target fields specified in the *target_sys_rte_eb_fields* field as the multiple outputs for that script.

Details	
Table	RTE Entity Multiple Input/Output Script Operation [sys_rte_eb_multiple_input_output_script_operation]
Input field	*source_sys_rte_eb_fields* Input is a script.
Output field	*target_sys_rte_eb_fields* Output is the result of the input script.
Additional Fields	*script* (script)

Sample script:

```
(function(batch, output) {
                for (var i = 0; i < batch.length; i++) {
                        var userId = (batch[i].user_id);
                        var userIdParts = userId.split(".");
                        output[i].first_name = userIdParts[0];
                        output[i].last_name = userIdParts[1];
                    }
                }
            })(batch, output);
```

Regex Replace

Replaces each substring of the input string that matches the regular expression pattern specified in the *match_regex* field with the string specified in the *replacement_regex* field.

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Details	
Table	RTE Entity Regular Expression Replace Operation [sys_rte_eb_regex_replace_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the replaced string.
Additional fields	• *match_regex* (string, regular expression) • *replacement_regex* (string)

Example

Input	Result
"String&With(Special)$Characters" with match_regex="[^0-9a-zA-Z]+" and replacement_regex=" "	"String With Special Characters"

Replace

Replaces each substring of the input string that matches the string specified in the *match_string* field with the string specified in the *replacement_string* field.

Details	
Table	RTE Entity Replace Operation [sys_rte_eb_replace_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the replaced string.
Additional fields	• *match_string* (string) • *replacement_string* (string)

Example

Input	Result
"Original String" with match_string = "Original" and replacement_string= "Replacement"	"Replacement String"

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Round Numeric

Rounds off the input numeric value to the nearest whole number.#Non-numbers are truncated.

Details	
Table	RTE Entity Round Numeric Operation [sys_rte_eb_round_numeric_operation]
Input field	*source_sys_rte_eb_field* Input is a numeric value.
Output field	*target_sys_rte_eb_field* Output is a whole number.
Additional fields	• *match_string* (string) • *replacement_string* (string)

Example

Input	Result
"1.5"	"2"
"1.4"	"1"
"i'm a string"	""

Script Operation

Runs a script with an input and sets the *target_sys_rte_eb_field* field as the output for that script.

Note:
The Script operation type has been largely superseded by the Multi Input Script Operation and is included for backwards compatibility with the existing configurations.

Details	
Table	RTE Entity Script Operation [sys_rte_eb_script_operation]
Input field	*source_sys_rte_eb_field* Input is a script.
Output field	*target_sys_rte_eb_field* Output is the result of the input script.

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Details	
Additional fields	• *script*(script) • *use_unique_input_sets* (Boolean): When `true`, only unique input values are included in the data batch for IRE processing. Otherwise, all input object's field values are included. For an example and for more details, see the Multiple Input Script transform.

The source field is included in the 'batch' variable as the JavaScript field 'input'.

```
(function(batch, output) {
                for (var i = 0; i < batch.length; i++) {
                        // batch[i] is the unique set of
 inputs/individual record
                        // batch[i].input gives access to the
 field value
                        var in0 = gs.nil(batch[i].input) ? '' :
 batch[i].input;
                        // output[i] is the output for the
 specific combination of inputs/individual record
                        output[i] = in0 + " modified by script";
                    }
                }
            })(batch, output);
```

Example:

```
/* Example Script
 (function(batch, output) {
    for (var i = 0; i < batch.length; i++) {
        //step1: access the input variables
        var a = batch[i].input; //Value of the source field.

        //step2: Your script/code goes here.
        var b = a + 1;
        //step3: set the output for each elements
        output[i] = b;
    }
 })(batch, output);
*/
```

Set

Sets the *target_sys_rte_eb_field* field value to the string provided in the *set_value* field.

Details	
Table	RTE Entity Set Operation [sys_rte_eb_set_operation]
Output field	*target_sys_rte_eb_field* Output is the value associated with the *set_value* field.

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Details	
Additional fields	• *set_value* (string) • *overwrite_existing_value* (optional, Boolean)#: When true, the current value of the target field is overwritten. Otherwise, a non-empty value isn't replaced.

Set Min/Max

Sets the target field to either the maximum or minimum of the values from all input fields.

Details	
Table	RTE Entity Min/Max Operation [sys_rte_eb_min_max_operation]
Input field	*source_sys_rte_eb_fields* Input is a set of values.
Output field	*target_sys_rte_eb_field* Output is the maximum or minimum value based on the *min_max* value.
Additional fields	• *data_type* (choice list with values as STRING, NUMERIC, and DATE) • *min_max* (choice list with values as MIN and MAX)

Examples

Input	Output
"2", "-1", "0"	2
"a", "b"	c
"2", "-1", "0"	-1
"a", "b"	a

Split

Splits the string included in the *source_sys_rte_eb_field* input value at the separator specified in the *splitting_string* field and assigns the resulting array of strings to the *target_sys_rte_eb_field* field, in order.

Details	
Table	RTE Entity Split Operation [sys_rte_eb_split_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_fields*

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Details	
	Output is list of substrings.
Additional fields	*splitting_string* (string)

Example

Input	Result
"value1||value2||value3", splitting_string:"||" with target_sys_rte_eb_fields {target1,target2,target3}	target1 : value1, target2 : value2, target3 : value3
"value1||value2||value3", splitting_string:"||" with target_sys_rte_eb_fields {target1}	target1 : value1
"value1", splitting_string:"||" with target_sys_rte_eb_fields {target1,target2,target3}	target1 : value1, target2 : <null>, target3 : <null>

Trim

Removes any whitespaces at the beginning and at the end of the string included in the *source_sys_rte_eb_field* input value and assigns the result to the *target_sys_rte_eb_field* field.#This transform is equivalent to the Java String trim() Method.

Details	
Table	RTE Entity Trim Operation [sys_rte_eb_trim_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the input string value but without any leading and trailing spaces.

Example

Input	Result
" value 1 "	"value 1"

Uppercase

Changes all characters of the *source_sys_rte_eb_field* input value to upper case and assigns the result to the *target_sys_rte_eb_field* field.

Details	
Table	RTE Entity Upper Case Operation [sys_rte_eb_upper_case_operation]
Input field	*source_sys_rte_eb_field*

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Details	
	Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the upper case string value.

Example

Input	Result
"value1"	"VALUE1"

Uppercase Trim

Combines both the Uppercase and the Trim transforms.

Details	
Table	RTE Entity Upper Case Trim Operation [sys_rte_eb_upper_case_trim_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the upper case string value without any whitespaces at the beginning and end.

Example

Input	Result
"##value1##"	"VALUE1"

RTE transforms template scripts included within the Integration Commons for CMDB app

The Robust Transform Engine (RTE) transforms are templated operations included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

The following script-based RTE transforms are available in the Integration Commons for CMDB app.

CI Lookup Operation

Use to get the value of a field on an existing configuration item (CI) in the CMDB by the source native key.

Details	
Table	Robust Transform Engine CI Lookup Operation [sn_cmdb_int_util_ci_lookup_operation]
Input field	*source_sys_rte_eb_field*

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Details	
	Input in order is: **1.** Discovery Source **2.** Source Native Key **3.** CI Field The operation queries the Source [sys_object_source] table for the discovery source and the associated source native key, and then returns the CI Field value of the matching record in the target table and the associated target sys ID.
Output field	*target_sys_rte_eb_field* Output is the value of the field name on the CI matched by the source native key lookup or an empty string if there is no match.

The Source [sys_object_source] table is queried using the discovery source and source native key ordering by the last scan. The table iterates through the results of the query and queries the target table by the target sys ID until a valid CI is found. After a valid CI is found, the operation returns the value of the CI Field on the matching CI.

Example

Discovery Source	Source Native Key	CI Field	Result
ServiceNow	ServiceNow||| COMPUTER-NAME||| Computer-01	name	Computer-01

Cleanse Company

Use to cleanse hardware manufacturer name and add the record to the Company [core_company] table to populate a reference, when the manufacturer is not linked to a model or software (cpu_manufacturer).

Details	
Table	Robust Transform Engine Entity Cleanse Company Operation [sn_cmdb_int_util_cleanse_company_operation]
Input field	*source_sys_rte_eb_field* Input is a company/manufacturer name.
Output field	*target_sys_rte_eb_field* Output is the resulting sys_id and name of the company in core_company, concatenated by triple pipe (|||).
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareModelUtil().cleanseComp*

If a matching record does not exist, then a new record is created in core_company so the return always includes a sys_id and name (unless the input is empty or invalid). The name is cleansed

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and a fuzzy lookup is done via the CmdbIntegrationCompanyModelUtil script include before the MakeAndModelJS platform API is called.

Example

Input	Result
SERVICENOW	93d4ecfac0a8000b6294d71b733977fb||| ServiceNow

Cleanse Hardware Model

Use to create, cleanse, or lookup a hardware model to create a reference (model_id).

Details	
Table	Robust Transform Engine Entity Cleanse Hardware Model Operation [sn_cmdb_int_util_cleanse_hardware_model_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The manufacturer name **2.** The model name If either value is provided by itself, then the operation only processes what is found.
Output field	*target_sys_rte_eb_field* Output is the resulting sys_id and name of the company in core_company, and sys_id and name of the model in cmdb_model - all concatenated by triple pipe (|||).
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareModelUtil().cleanseMode model_in)*

For either the manufacturer or model, if a matching record does not exist then a new record is created so the return always includes sys_ids and names for both records (unless the input is empty or invalid).

The manufacturer name is processed like the Cleanse Company transform and then the manufacturer name and model name are sent to the MakeAndModelJS platform API.

Example

Manufacturer Name	Model Name	Result
ServiceNow Incorporated	SERVICENOW	93d4ecfac0a8000b6294d71b733977fb||| ServiceNow||| ba29cb303710200044e0bfc8bcbe5d6d |||ServiceNow

Cleanse Hardware Model with Model Number

Use to create, cleanse, or lookup a hardware model to create a reference (model_id).

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Details	
Table	Robust Transform Engine Entity Cleanse Hardware Model With Model Number Operatio [sn_cmdb_int_util_cleanse_hardware_model_number_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The manufacturer name **2.** The model name **3.** The model number **4.** CI Class **Note:** The `CI Class` field is an optional input field, and when included, the *MakeAndModelJS* platform API gets the model record by querying the product model class from the Model Category [cmdb_model_category] table. Else, the API gets the model record from the Hardware Models [cmdb_hardware_product_model] table only. If either value is provided by itself, then the operation only processes what is found.
Output field	*target_sys_rte_eb_field* Output is the resulting sys_id and name of the company in core_company, and sys_id and name of the model in cmdb_model - all concatenated by triple pipe (|||).
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareModelUtil().cleanseMode* *model_in)*

For either the manufacturer or model, if a matching record does not exist then a new record is created so the return always includes sys_ids and names for both records (unless the input is empty or invalid).

The manufacturer name is processed like the Cleanse Company transform and then the manufacturer name, model name, and model number are sent to the *MakeAndModelJS* platform API.

Example

Manufacturer Name	Model Name	Model Number	Result
ServiceNow Incorporated	SERVICENOW	BC0AA8000C56	93d4ecfac0a8000b6294d71b733977fb ServiceNow||| ba29cb303710200044e0bfc8bcbe5d6 |||ServiceNow

Cleanse IP Address

Use when a field provides an IP address.

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Details	
Table	Robust Transform Engine Entity Cleanse IP Operation [sn_cmdb_int_util_cleanse_ip_operation]
Input fields	*source_sys_rte_eb_field* Input is the IP address to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting IP address, which can be empty.
Script include function	*sn_cmdb_int_util.CmdbIntegrationNetworkUtil().cleanseIpAddress(*

The IP address is tested for both IPv4 and IPv6 structures along with some known derivations (an IPv4 with spaces instead of periods). If a result is found, then it is formatted and returned.

Examples

Ip	Ip Results
192.160.89.1	192.160.89.1
192.160.89.1,54.21.12.311	192.160.89.1
192 160 89 1 54 21 12 311	192.160.89.1
192-160-89-1	192.160.89.1
2001:0db8:0000:0000:0000:ff00:0042:8329	2001:0db8:0000:0000:0000:ff00:0042:8329
junk	
175912537	10.124.54.89
-1	
0	

Cleanse IP Version

Use when the source of data does not provide an IP version or when the IP version might be unreliable.

Details	
Table	Robust Transform Engine Entity Cleanse IP Version Operation [sn_cmdb_int_util_cleanse_ip_version_operation]
Input fields	*source_sys_rte_eb_field* Input is the IP address to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting cmdb_ci_ip_address.ip_version lookup key (either 4, 6, or empty).

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Details	
Script include function	*sn_cmdb_int_util.CmdbIntegrationNetworkUtil().deriveIpVersion(i*

The input IP address value is checked for either proper IPv4 or IPv6 structure, otherwise the return is empty. This function provides no IP cleansing.

Example

Input	Result
192.160.89.1	4

Cleanse MAC Address

Use when a field provides a MAC address.

Details	
Table	Robust Transform Engine Entity Cleanse MAC Operation [sn_cmdb_int_util_cleanse_mac_operation]
Input fields	*source_sys_rte_eb_field* Input is the MAC address to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting MAC address which can be empty.
Script include function	*sn_cmdb_int_util.CmdbIntegrationNetworkUtil().cleanseMacAddress*

The MAC address is tested for proper structure along with some known derivations (for example, a MAC address with spaces instead of colons). If a result is found, then it is formatted and returned.

Example

Input	Result
00 0A 95 9D 68 16	00:0a:95:9d:68:16

Cleanse Operating System

Use to extract, cleanse, and format an operating system name, when the source provides an operating system value.

Details	
Table	Robust Transform Engine Entity Cleanse OS Operation [sn_cmdb_int_util_cleanse_os_operation]
Input fields	*source_sys_rte_eb_field*

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Details	
	Input is the operating system name to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting operating system name. The resulting operating system name is also written to the cmdb_ci_computer.os list field.
Script include function	*sn_cmdb_int_util.CmdbIntegrationOsUtil().cleanseAndInsertOs(inp*

Most of the current cleansing is centered on Microsoft operating system values aside from common cleansing such as fixing casing.

Examples

Operating System	Operating System Results
Windows Server 2003 R2 64 bit Edition Service Pack 2	Windows Server 2003 R2
Windows 2003	Windows 2003
Windows Vista 64 bit Edition	Windows Vista
Windows 2000 Professional Service Pack 4	Windows 2000 Professional
Windows XP Service Pack 2-3	Windows XP
Microsoft Windows Server 2003 R2 64 bit Edition Service Pack 2	Windows Server 2003 R2
Microsoft Windows 2003	Windows 2003
Microsoft Windows Vista 64 bit Edition	Windows Vista
Microsoft Windows 2000 Professional Service Pack 4	Windows 2000 Professional
Microsoft Windows XP Service Pack 2-3	Windows XP
linux ubuntu	Linux Ubuntu
Linux Ubuntu Server	Linux Ubuntu Server

Cleanse Serial Number

Use to cleanse and remove invalid serial numbers.

Details	
Table	Robust Transform Engine Entity Cleanse Serial Number Operation [sn_cmdb_int_util_cleanse_serial_number_operation]
Input fields	*source_sys_rte_eb_fields* Input is the serial number to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting serial number.

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Examples

Serial Number	Serial Number Results
ec2aa2da-5312-aa3e-804c-c35feabeda5f	ec2aa2da-5312-aa3e-804c-c35feabeda5f
1045–1209–6738–4668–7696–2783	1045–1209–6738–4668–7696–2783

Cleanse Serial Number With Alternate Value Return if Invalid

Use to cleanse Serial Number and verify the length of the cleansed serial number. Returns the alternate value if the length of serial number is invalid.

Details	
Table	Robust Transform Engine Entity Cleanse Serial Number With Alternate Value Return [sn_cmdb_int_util_cle $anse_serial_number_with_alternate_value_return_if_invalid]
Input fields	*source_sys_rte_eb_fields* Inputs: serial number, Alternate value
Output field	*target_sys_rte_eb_field* Output: Cleansed serial number if the length is valid, Alternate value otherwise.
Script include function	*global.SerialNumberManager().isValid(input)*

The operation cleanses the serial number and checks If the cleansed serial number length is greater than or equal to the value specified in the *sn_cmdb_int_util.minimum_valid_serial_number_length* system property. The default value of the property is set to 7.

Cleanse IMEI Number With Alternate Value Return if Invalid

Use to cleanse the IMEI number and verify the length of the cleansed IMEI number. Returns the alternate value if the length of IMEI number is invalid.

Details	
Table	Robust Transform Engine Entity Cleanse IMEI With Alternate Value Return if Inval [sn_cmdb_int_util_cleanse_imei_with_alternate_value_return_if_invalid]
Input fields	*source_sys_rte_eb_fields* Inputs: IMEI number, Alternate value
Output field	*target_sys_rte_eb_field*

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Details	
	Output: IMEI number if the length is valid, Alternate value otherwise.
Script include function	None

The operation cleanses the IMEI number and checks If the cleansed IMEI number length is equal to the value specified in the *sn_cmdb_int_util.valid_imei_number_length* system property. The default value of the property is set to 15.

Cleanse Software Model

Use to cleanse and create a software model. Also, to create manufacturer and software model if they do not exist and follow with a split operation.

Details	
Table	Robust Transform Engine Entity Cleanse Software Model Operation [sn_cmdb_int_util_cleanse_software_model_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The manufacturer name **2.** The software name **3.** The software version (not required) If only manufacturer or name is provided, then only those values are processed and returned.
Output field	*target_sys_rte_eb_field* Output is the resulting sys_id and name of the company in core_company, the cleansed software name, and the cleansed software version all concatenated by a triple pipe (|||).
Script include function	*sn_cmdb_int_util.CmdbIntegrationSoftwareModelUtil().cleanseSoft model, version)*

If a matching manufacturer record does not exist, then a new record is created so the return always includes the sys_id and name for the manufacturer (if the manufacturer is not empty or invalid).

The manufacturer name is processed the same as in the Cleanse Company transform and then the manufacturer name is sent to the MakeAndModelJS platform API.

The software name and version are cleansed and formatted and returned. The version is removed from the software name if present.

Examples

Manufacturer	Software Name	Software Version	Results
Dell Inc.			
	NoManufacturer		

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Examples (continued)

Manufacturer	Software Name	Software Version	Results
		1.0.0.0	
Dell Inc.	DataEngine	1.0.17.2	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||DataEngine|||1.0.17.2
GenuineIntel	TestSoftware	1.0.0.1	7aad6d00c611228400f00e0f80b67d2d||| Intel|||TestSoftware|||1.0.0.1
Dell Inc.	TestSoftware	232	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||TestSoftware|||232
Dell Inc.	TestSoftware	123.0.0.0	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||TestSoftware|||123.0
America Online	TestSoftware	1.0.0.0	0c43d035c61122750000251553f6f8e8||| America Online|||TestSoftware|||1.0
America Online	TestSoftware	1.0.0.0	0c43d035c61122750000251553f6f8e8||| America Online|||TestSoftware|||1.0
dell	LowerCase	1.0.0.0	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||LowerCase|||1.0
Dell Corporation. Incorporated, Corp.	TestSoftware	1.0.0.0	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||TestSoftware|||1.0
Microsoft	Microsoft SQL Server 2016 Enterprise	2.0.0	0e8b8e650a0a0b3b004f285ffbb1a4fc||| Microsoft|||Microsoft SQL Server 2016 Enterprise|||2.0
Dell Computer	DataEngine	1.0.17.2	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||DataEngine|||1.0.17.2
Adobe	TestSoftware	1	b7e8b5c4c0a80169008b49e468920048||| Adobe Systems|||TestSoftware|||1.0

Create Software Instance Name

Use when a hardware name, software name, and software version is provided, to create a new software instance name.

Details	
Table	Robust Transform Engine Entity Create Software Instance Name Operation [sn_cmdb_int_util_create_software_instance_name_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is:

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Details	
	1. The hardware name **2.** The software name **3.** The software version (not required)
Output field	*target_sys_rte_eb_field* Output is the software instance name.
Script include function	*sn_cmdb_int_util.CmdbIntegrationSoftwareModelUtil().createSoftw* *sw_name_in, sw_version_in)*

Examples

Hardware Name	Software Name	Software Version	Results
computer1	microsoft	2.0.1	microsoft 2.0.1-computer1
computer2	adobe		adobe-computer2
computer3	adobe	2.1	adobe 2.1-computer3
hw2	sw3	301	sw3 301-hw2

Derive CI Class from Model

Use when processing a computer record and a model is provided but the class of the computer is ambiguous otherwise. Can be used along with other Derive CI Class transforms.

Details	
Table	Robust Transform Engine Entity Derive Class From Model Operation [sn_cmdb_int_util_derive_class_from_model_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The model name **2.** The current class name
Output field	*target_sys_rte_eb_field* Output is the resulting class name.
Script include function	*sn_cmdb_int_util.CmdbIntegrationClassUtil().deriveClassNameFrom* *class_in)*

Does not return a value of a class which is higher in the class hierarchy (a parent class) than the provided input class. For example, does not return cmdb_ci_computer if the input is cmdb_ci_server. Looks only at the cmdb_ci_computer hierarchy, going through cmdb_ci_server (cmdb_ci_computer, cmdb_ci_server, children of cmdb_ci_server).

Currently looks for Server, Windows Server, and Linux Server indicators in the model.

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Examples

Model	Class	Class Results
window server	cmdb_ci_computer	cmdb_ci_win_server
Microsoft server	cmdb_ci_computer	cmdb_ci_win_server
linux server	cmdb_ci_computer	cmdb_ci_linux_server
Microsoft server	cmdb_ci_server	cmdb_ci_win_server
linux server	cmdb_ci_server	cmdb_ci_linux_server
Red hat server	cmdb_ci_server	cmdb_ci_linux_server
Arch server	cmdb_ci_server	cmdb_ci_linux_server
Centos server	cmdb_ci_server	cmdb_ci_linux_server
Debian server	cmdb_ci_server	cmdb_ci_linux_server
Fedora server	cmdb_ci_server	cmdb_ci_linux_server
Suse server	cmdb_ci_server	cmdb_ci_linux_server
Oracle server	cmdb_ci_server	cmdb_ci_linux_server
Rhel server	cmdb_ci_server	cmdb_ci_linux_server
Ubuntu server	cmdb_ci_server	cmdb_ci_linux_server
Junk		
	cmdb_ci_server	cmdb_ci_server
Junk server	cmdb_ci_computer	cmdb_ci_server
Junk	cmdb_ci_computer	cmdb_ci_computer

Derive CI Class from Native Class Identifier

Use when processing a computer record and a native class indicator is provided but the class of the computer is ambiguous otherwise. Can be used along with other Derive CI Class transforms.

Details	
Table	Robust Transform Engine Entity Derive Class From Native Value Operation [sn_cmdb_int_util_derive_class_from_native_value_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The native class identifier **2.** The current class name
Output field	*target_sys_rte_eb_field* Output is the resulting class name.
Script include function	*sn_cmdb_int_util.CmdbIntegrationClassUtil().deriveClassNameFrom class_in)*

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Does not return a value of a class which is higher in the class hierarchy (a parent class) than the provided input class. For example, does not return cmdb_ci_computer if the input is cmdb_ci_server. Looks only at the cmdb_ci_computer hierarchy, going through cmdb_ci_server (cmdb_ci_computer, cmdb_ci_server, children of cmdb_ci_server).

Currently looks for Server, Windows Server, and Linux Server indicators in the native identifier.

Examples

Native Class	Class	Class Results
window server	cmdb_ci_computer	cmdb_ci_win_server
Microsoft server	cmdb_ci_computer	cmdb_ci_win_server
linux server	cmdb_ci_computer	cmdb_ci_linux_server
Microsoft server	cmdb_ci_server	cmdb_ci_win_server
linux server	cmdb_ci_server	cmdb_ci_linux_server
Red hat server	cmdb_ci_server	cmdb_ci_linux_server
Arch server	cmdb_ci_server	cmdb_ci_linux_server
Centos server	cmdb_ci_server	cmdb_ci_linux_server
Debian server	cmdb_ci_server	cmdb_ci_linux_server
Fedora server	cmdb_ci_server	cmdb_ci_linux_server
Suse server	cmdb_ci_server	cmdb_ci_linux_server
Oracle server	cmdb_ci_server	cmdb_ci_linux_server
Rhel server	cmdb_ci_server	cmdb_ci_linux_server
Ubuntu server	cmdb_ci_server	cmdb_ci_linux_server
Junk		
	cmdb_ci_server	cmdb_ci_server
Junk server	cmdb_ci_computer	cmdb_ci_server
Junk	cmdb_ci_computer	cmdb_ci_computer

Derive CI Class from Operating System

Use when processing a computer record and an operating system is provided but the class of the computer is ambiguous otherwise. Can be used along with other Derive CI Class transforms.

Details	
Table	Robust Transform Engine Entity Derive Class From OS Operation [sn_cmdb_int_util_derive_class_from_os_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The operating system name **2.** The current class name
Output field	*target_sys_rte_eb_field*

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Details	
	Output is the resulting class name.
Script include function	*sn_cmdb_int_util.CmdbIntegrationClassUtil().deriveClassNameFrom class_in)*

Does not return a value of a class which is higher in the class hierarchy (a parent class) than the provided input class. For example, does not return cmdb_ci_computer if the input is cmdb_ci_server. Looks only at the cmdb_ci_computer hierarchy, going through cmdb_ci_server (cmdb_ci_computer, cmdb_ci_server, children of cmdb_ci_server).

Currently looks for Server, Windows Server, and Linux Server indicators in the operating system name.

Examples

Operating System	Class	Class Results
window server	cmdb_ci_computer	cmdb_ci_win_server
Microsoft server	cmdb_ci_computer	cmdb_ci_win_server
linux server	cmdb_ci_computer	cmdb_ci_linux_server
Microsoft server	cmdb_ci_server	cmdb_ci_win_server
linux server	cmdb_ci_server	cmdb_ci_linux_server
Red hat server	cmdb_ci_server	cmdb_ci_linux_server
Arch server	cmdb_ci_server	cmdb_ci_linux_server
Centos server	cmdb_ci_server	cmdb_ci_linux_server
Debian server	cmdb_ci_server	cmdb_ci_linux_server
Fedora server	cmdb_ci_server	cmdb_ci_linux_server
Suse server	cmdb_ci_server	cmdb_ci_linux_server
Oracle server	cmdb_ci_server	cmdb_ci_linux_server
Rhel server	cmdb_ci_server	cmdb_ci_linux_server
Ubuntu server	cmdb_ci_server	cmdb_ci_linux_server
Junk		
	cmdb_ci_server	cmdb_ci_server
Junk server	cmdb_ci_computer	cmdb_ci_server
Junk	cmdb_ci_computer	cmdb_ci_computer

Derive Virtual From Hardware Model

Use when processing a computer record that may be virtual, a hardware model is provided, and the virtual status is ambiguous. Can be used along with other Derive Virtual From transforms.

Details	
Table	Robust Transform Engine Entity Derive Virtual From Model Operation [sn_cmdb_int_util_derive_virtual_from_model_operation]

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Details	
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The hardware model name **2.** The current virtual flag value
Output field	*target_sys_rte_eb_field* Output is the resulting virtual flag (true/false). If the current virtual flag is 'true', the result is true. Otherwise the result is 'true' or 'false'.
Script include function	*sn_cmdb_int_util.CmdbIntegrationVirtualDetectionUtil().detectVi is_virtual_in)*

Looks for indicators in the model name for a virtual device (VMware).

Examples

Hardware Model	Virtual Flag	Virtual Flag Results
thinkpad	true	true
thinkpad	false	false
thinkpad		false
vmware inc	true	true
	true	true
	false	false
		false

Derive Virtual From Native Indicator

Use when processing a computer record that may be virtual, a virtual indicator is provided by the source, and the virtual status is ambiguous. Can be used along with other Derive Virtual From transforms.

Details	
Table	sn_cmdb_int_util_derive_virtual_from_native_value_operation
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The native indicator **2.** The current virtual flag value
Output field	*target_sys_rte_eb_field* Output is the resulting virtual flag (true/false). If the current virtual flag is 'true', the result is true. Otherwise the result is 'true' or 'false'.
Script include function	*sn_cmdb_int_util.CmdbIntegrationVirtualDetectionUtil().detectVi is_virtual_in)*

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Tests native indicator against a list of common values and looks for a 'true' boolean indicator.

Examples

Native Virtual Value	Virtual Flag	Virtual Flag Results
virtual	false	true
virtual		true
virtual	true	true
y	false	true
y		true
y	true	true
yes	false	true
yes		true
yes	true	true
true	false	true
true		true
true	true	true
t	false	true
t		true
t	true	true
other	false	false
other		false
other	true	true
not virtual	false	false
not virtual		false
not virtual	true	true
	false	false
		false
	true	true

Derive Virtual From Serial Number

Use when processing a computer record that may be virtual, a serial number is provided by the source, and the virtual status is ambiguous. Can be used along with other Derive Virtual From transforms.

Details	
Table	sn_cmdb_int_util_derive_virtual_from_serial_number_operation
Input fields	*source_sys_rte_eb_fields* Input in order is:

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Details	
	1. The serial number **2.** The current virtual flag value
Output field	*target_sys_rte_eb_field* Output is the resulting virtual flag (true/false). If the current virtual flag is 'true', the result is true. Otherwise the result is 'true' or 'false'.
Script include function	*sn_cmdb_int_util.CmdbIntegrationVirtualDetectionUtil().detectVi (serial_in, is_virtual_in)*

Looks for indicators in the serial number for a virtual device (VMware).

Examples

Serial Number	Virtual Flag	Virtual Flag Results
123	true	true
123	false	false
123		false
vmware-123	true	true
	true	true
	false	false
		false

Extract and Scale by Units

Use when the source has numerical values that need to be scaled and numerical value with an input such as 2048Mb. The source does not always provide the units so it may be required to calculate or guess the units being provided. The target units depend on the target field in the CMDB. If not specified, the decimal place field is set at 2 by default.

Note:
This field is case sensitive.

Details	
Table	sn_cmdb_int_util_extract_and_scale_by_units_operation
Input fields	*source_sys_rte_eb_fields*
Output field	*target_sys_rte_eb_field*
Script include function	*sn_cmdb_int_util.CmdbIntegrationExtractScaleUnitUtil().extractA*

Examples

Input Value	Default Unit	Output Unit	Result
2048Mb	Mb	GB	2GB

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Examples (continued)

Input Value	Default Unit	Output Unit	Result
17179869184	B	GB	16GB

First Non Null Value

Use when you have a list of fields providing similar information that must map to a single field and you want to rank the order in which they can provide those values.

For Example Internally in SolarWinds, there is a hierarchy of tables that are join. In one example, a computer's name could come from the child most table or any of that tables parents but each of those is a separate field in the pull. Starting with the most specific table, the values are searched for the first instance of a name value.

Details	
Table	sn_cmdb_int_util_first_non_null_operation
Input fields	*source_sys_rte_eb_fields* Input is a list of fields of any length.
Output field	*target_sys_rte_eb_field* Output is the value from the first field in the list that doesn't have a null (or empty) value.
Script include function	*sn_cmdb_int_util.CmdbIntegrationFirstNonNullValueUtil().firstNo*

Example

Field 1	Field 2	Field 3	Result
	foo	foo2	foo

Process Name, Domain, FQDN, DNS set

Use when the source provides name, domain, FQDN, or DNS information. Can be used for only a subset of these (if for example, the source only provides name and domain). In the case that a source only provides fields that are lower in the input list (FQDN) the CmdbIntegrationHardwareNameUtil script include can be called from a script operation to minimize having to create empty dummy fields.

Details	
Table	sn_cmdb_int_util_process_name_set_operation
Input fields	*source_sys_rte_eb_fields* Takes up to four Input fieldss (any additional fields are ignored), in the following order: **1.** Name **2.** Domain

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Details	
	3. FQDN **4.** DNS You don't have to provide all four input values, but you must provide those values in the specified order. If for example, you only want to cleanse domain, you must provide a name attribute, even it if empty.
Output field	*target_sys_rte_eb_field* Output is a concatenated set of values in the same order, using a triple pipe (|||): {name}|||{domain}|||{fqdn}|||{dns}
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareNameUtil().processNameD domain, fqdn, dns)*

FQDN and DNS are first processed to see if their formats are correct. FQDN has an additional discovery regex it must pass (via properties): `glide.discovery.fqdn.regex – default : ^([^.]+)\\.((?:[^.]+\\.)+[^.]+)$`

Possible name and domain values are extracted if possible. When name and domain are processed, if there is no FQDN, a value is generated if possible. A resulting name value is also modified using the following discovery flags:

1. glide.discovery.hostname.case – default: No change. Can be set to 'Lower case', 'Upper case', 'No change'
2. glide.discovery.hostname.include_domain – default: false. If 'true' the domain is added to the final name value

Examples

Name	Domain	FQDN	DNS	Results
myName	other.net	otherName.other.net	mycomp.servicenow.com	myName||| other.net||| otherName.other.net||| mycomp.servicenow.com
na	other.net	otherName.other.net	mycomp.servicenow.com	otherName||| other.net||| otherName.other.net||| mycomp.servicenow.com
			servicenow.com	||| servicenow.com|||||
			name.servicenow.com	name||| servicenow.com||| name.servicenow.com||| name.servicenow.com
		name.servicenow.com		name||| servicenow.com||| name.servicenow.com|||

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Examples (continued)

Name	Domain	FQDN	DNS	Results
		name.servicenow.com		name||| servicenow.com||| name.servicenow.com|||
name	servicenow.com			name||| servicenow.com||| name.servicenow.com|||

Process FQDN

Use when the source provides a suspected FQDN value but no other naming fields such as name, domain, or DNS.

Details	
Table	sn_cmdb_int_util_process_fqdn_operation
Input fields	*source_sys_rte_eb_field* Input is a single field containing an FQDN.
Output field	*target_sys_rte_eb_field* Output is a concatenated set of values in the same order using a triple pipe (|||): {name}|||{domain}|||{fqdn}|||{dns}
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareNameUtil().processNameD* *'', fqdn, '')*

The processing follows the same logic as the 'Process Name, Domain, FQDN, DNS set' transform except that only FQDN is used as an input.

Example

Input	Result
mycomputer.servicenow.com	mycomputer|||servicenow.com||| mycomputer.servicenow.com|||

Scale Unit

Use when the source has numerical inputs that must be scaled. The source does not always provide the current units so it may be required to calculate or guess the units being provided. The target units depend on the field being targeted in the CMDB.

Details	
Table	sn_cmdb_int_util_scale_unit_operation
Input fields	*source_sys_rte_eb_fields* Inputs in order are:

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Details	
	1. The input value **2.** The current units **3.** The target units
Output field	*target_sys_rte_eb_field* Output is the input value scaled from the current units to the target units. If no units are found for the current units, then the input value is returned. If no current or target units are found the input is returned as the output.
Script include function	*sn_cmdb_int_util.CmdbIntegrationScaleUnitUtil().scaleUnits(inpu input_unit, output_unit)*

Example

Input	Result
• Input Field 1: 1 • Input Field 2: GB • Input Field 3: MB	1024

Software Bundle ID Lookup

Use when a source, such as Jamf, does not provide the software publisher but does provide a Mac software bundle ID. Software Bundle ID Lookup looks up records in the Bundleid Lookup [sn-cmdb_int_util_bundleid_lookup] table by bundle_id. If a record with the specified bundle_id exists, it extracts the respective software publisher. Otherwise, it creates a new record which will be queried the next time the Lookup Mac Software Bundle IDs data source runs.

Details	
Table	sn_cmdb_int_util_software_bundle_id_lookup_operation
Input fields	• source_sys_rte_eb_field • Bundle ID
Output field	*target_sys_rte_eb_field* Output is the resulting artist name, track name, and seller name, all concatenated by a triple pipe (|||), or an empty string if no match is found.
Script include function	*sn_cmdb_int_util.CmdbIntegrationSoftwareBundleIdLookup. lookupSoftware(bundleId)*

Example

Input	Result
Input Field 1: com.microsoft.Word	Microsoft Corporation|||Microsoft Word||| Microsoft Corporation

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User Lookup

Use to look up a user in the User [sys_user] table by user name or email, attempting to match in the following order:

1. The User Name matching the *user_name* attribute.
2. The Email matching the email attribute.
3. If nothing is matching, it returns empty.

Details	
Table	sn_cmdb_int_util_user_lookup_operation
Input fields	*source_sys_rte_eb_fields* Inputs in order are: 1. User Name 2. Email (Optional)
Output field	*target_sys_rte_eb_field* sysId of the sys_user.
Script include function	*sn_cmdb_int_util.CmdbIntegrationUserLookup.lookupUser(username, email)*

Examples

Input	Result
Input Field 1: abel.tuter	62826bf03710200044e0bfc8bcbe5df1
• Input Field 1: atuter • Input Field 2: abel.tuter@example.com	62826bf03710200044e0bfc8bcbe5df1

Configuring the ADM adapter for Service Graph Connectors

You can configure the Application Dependency Mapping (ADM) adapter to populate running processes, TCP connections, and applications into CMDB.

As a user with the admin role, you can use the *ADMHelper* script include to configure the ADM adapter that populates running processes, TCP connections, and applications into CMDB. The *ADMHelper* script include is available within the Integration Commons for CMDB (sn_cmdb_int_util) store app. The *ADMHelper* script include invokes the *ApplicationDependencyMapping* script include that is available within the Discovery and Service Mapping Patterns application (sn_itom_pattern).

The ADM adapter requires the inputs as discussed in the following table:

Inputs for the ADM adapter

Input	Input type
Running Process Details	Required

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Inputs for the ADM adapter (continued)

Input	Input type
Computer Sys Id	Required
TCP connection details	Optional
ADM Properties	Optional

For interpreting and populating the CIs, the ADM processor requires the input data in a specific format. Ensure that the keys are formed as shown in the following example:

Example keys for ADM processor

TCP connections data

```
[
{
"pid": "1068",
"local_ip":
 "127.0.0.1",
"local_port":
 "199",
"ip": "0.0.0.0",
"port": "199",
"state":
 "LISTEN",
"type": "on"
}
]
```

Running process

```
[
   {
"pid": "1",
"ppid": "0",
"command": "/usr/lib/systemd/systemd",
 "name": "systemd",
"parameters": "--switched-root --system
 --deserialize 21"
}

]
```

The *ApplicationDependencyMapping* script include processes TCP connections and running process data and populates the following tables:

- TCP Connections [cmdb_tcp]
- Running Process [cmdb_running_process]
- Application [cmdb_ci_appl]

Note:
After the data is populated into the TCP Connections [cmdb_tcp] and Running Process [cmdb_running_process] tables, the *ApplicationDependencyMapping* script include reconciles the TCP connections and running process data for populating the Application [cmdb_ci_appl] table based on the data in the Network Adapter [cmdb_ci_network_adapter] and IP Address [cmdb_ci_ip_address] tables. Classified processes are added to the corresponding child class in the Application [cmdb_ci_appl] table. The addition of unclassified processes to the Application [cmdb_ci_appl] table depends on the system property value.

Accessing the connection details of Service Graph Connectors

The common connection framework included within the Integration Commons for CMDB (sn_cmdb_int_util) store app enables accessing connection details of Service Graph Connectors in a single view.

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With the common connection framework, you can access all the connections used by Service Graph Connectors or the connections that are specific to a Service Graph Connector. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection for a Service Graph Connector.

Viewing connections

To view the connection details for all Service Graph Connectors that use the common connection framework, navigate to **All** > **Service Graph Connectors** > **Connections** from the application navigator.

If a Service Graph Connector uses the common connection framework, you can also view the connections specific to the connector. To view the connection details, open the Service Graph Connector from the application navigator, access its Connections module to view the Service Graph Connections list, and then select the connection name.

The Service Graph Connections page displaying the connection details also includes the **Test Connection** related link that you can select to test the connection. If the connection is successful, a success message is displayed. Else, an error message with the reason of failure is displayed.

Common connection framework tables

The common connection framework uses the following tables:

Service Graph Connections [sn_cmdb_int_util_service_graph_connection]

Stores the connection records for all the Service Graph Connectors that use the common connection framework. The Service Graph Connections [sn_cmdb_int_util_service_graph_connection] table also includes other common connection framework tables as related lists.

Properties [sn_cmdb_int_util_service_graph_connection_property]

Stores the connection properties associated with a specific connection.

Service Graph Connection Data Sources [sn_cmdb_int_util_service_graph_connection_data_source]

Stores the many-to-many (m2m) connection details between the Service Graph Connections [sn_cmdb_int_util_service_graph_connection] table and the data sources for a Service Graph Connector.

Service Graph Connection Scheduled Data Imports [sn_cmdb_int_util_service_graph_connection_scheduled_data_import]

Stores the m2m connection details between the Service Graph Connections [sn_cmdb_int_util_service_graph_connection] table and the scheduled data imports for a Service Graph Connector.

Service Graph Connection Test Script [sn_cmdb_int_util_service_graph_connection_test_script]

Stores records that include scripts for triggering the test connection process for Service Graph Connectors.

Managing CMDB data deletion

The Integration Commons for CMDB (sn_cmdb_int_util) store app uses post-script and transform map methods to remove imported Configuration Management Database (CMDB) records that were deleted later from the source third-party application.

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Post-script method

The post-script method checks the Source [sys_object_source] table for configuration items (CIs) not updated in the last run for a specific source feed. It then removes any non-updated CIs from the associated target CMDB tables synchronously, handling the removal of target records one at a time.

Most Service Graph Connectors use the post-script method to manage the removal of any CMDB records.

The post-script method uses the `RecordRemoval` script to handle various record deletion strategies. Hard deletion involves permanently and completely removing records from the CMDB, making them unrecoverable and suitable for data that is no longer needed. Soft deletion marks records as deleted without actually removing them from the CMDB, allowing for potential recovery and preserving historical data. Optimized soft deletion, managed by the Identification and Reconciliation Engine (IRE), enhances this soft deletion approach by using a specialized table, such as the extension attributes table, and applying reconciliation rules to manage deleted records more efficiently. By default, the table can hold up to 100 records at a time, but as a user with the admin role, you can adjust this limit by setting the *`sn_cmdb_int_util.ire_payload_items_size`* system property. This property is not available by default and you must create this property of type integer within the Integration Commons for CMDB (sn_cmdb_int_util) store app. For more information, see Add a system property.

Transform map-based method

The transform map-based method checks the Source [sys_object_source] table for configuration items (CIs) not updated in the last run for a specific source feed. It then utilizes the multi-threaded deletion approach to remove any non-updated CIs from the associated target CMDB tables concurrently, handling the removal of all target records within an import set at once. Multiple import sets are created to store target record data within the Integration Commons Remove Record [sn_cmdb_int_util_remove_record] staging table enabling multi-threaded deletion of records. Therefore, reducing the data processing time.

The Integration Commons Remove Record [sn_cmdb_int_util_remove_record] staging table tracks non-updated CIs by storing target record details including the discovery source, source feed, target table sys_id, and target table name of these CIs. The on-start script defined within the *`Remove Record Transform Map`* then deletes the records from the associated target tables.

The transform map-based method is used by a Service Graph Connector to improve the data processing time. For example, the SG-Tanium Remove Software data source within the Service Graph Connector for Tanium removes software data using the transform map-based method. See Service Graph Connector for Tanium.

Partition size computation for parallel loading in Integration Commons for CMDB

Integration Commons for CMDB supports computed partition size for the parallel loading framework, if supported in a Service Graph Connector.

The parallel loading feature of ServiceNow AI Platform, executes data load using multiple threads. The partition size for a data source is computed by the Integration Commons for CMDB application used by the parallel loading feature. This partition size confirms that the workload is evenly distributed among the available threads. By balancing the data load, a data source within a Service Graph Connector can manage data loading uniformly across the available nodes, reducing processing time and improving overall efficiency. This approach promotes efficient data loading, minimizes latency, and optimizes the performance of data sources.

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The partition size computation for the parallel loading feature within the Integration Commons for CMDB application is based on the following calculations:

- Partition size calculation
- Parallel jobs calculation

Partition size calculation

The partition size for parallel loading in a data source is determined by both the number of active primary nodes on your ServiceNow instance and the total volume of data to be loaded by the data source using the following formula:

```
Partition size = Total data volume / (10% * Active primary
 nodes)
```

For example, if there are `4` active primary nodes and the data volume to be loaded is `1000` units, the partition size is calculated as:

```
Partition size = 1000 / (10% * 4) = 1000 / 0.4 = 25
```

Parallel jobs calculation

Parallel jobs enable distributing the workload evenly across multiple jobs, reducing the data loading time and improving the efficiency of data retrieval. The calculation of the number of parallel jobs created for a partition is based on the following formula:

```
Number of parallel jobs = Total data volume/Partition size
```

In the earlier example, where the total data volume is `1000` units and the partition size is `25`, the number of parallel jobs created is calculated as:

```
Number of parallel jobs = 1000/25 = 40
```

Quick start tests for Integration Commons for CMDB

Validate that integrations for CMDB pass validation and still work after you make any configuration changes such as applying an upgrade or developing an application.

Danger:
By default, the system property that is used to run automated tests is disabled to prevent you from accidentally running these tests on a production system. To avoid data corruption or an outage, run tests only on development, test, and other non-production instances. See Enable or disable executing Automated Test Framework tests.

Integration Commons for CMDB

CMDB INT: CMDB Integrations Validation test suite
Test suite to verify the integrity of an integration using multiple tests.

Test	Description	Release version
CMDB INT: Set Test Session Application	Modify the run server-side script to set an application name so that you can test only one integration. Otherwise, all integrations installed will be tested.	Paris

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CMDB INT: CMDB Integrations Validation test suite

Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
CMDB INT: Test Against Source Analysis	Test an integration against the values in the CMDB Integration Source Analysis [sn_cmdb_int_util_cmdb_integration_source_analysis] table.	Paris
CMDB INT: Validate Application Feed	Validate all application feeds in an integration.	Paris
CMDB INT: Validate Discovery Source	Validate that the discovery source exists.	Paris
CMDB INT: Validate Entity Mappings	Validate all entity mappings of an integration.	Paris
CMDB INT: Validate Fields	Validate fields for CMDB Integrations.	Paris
CMDB INT: Validate Lookups	Validate CMDB integration lookups.	Paris
CMDB INT: Validate Mandatory Operations	Validate that all integrations for mandatory operations exist for mapped fields.	Paris
CMDB INT: Validate Operations	Validate all operations for an integration.	Paris
CMDB INT: Validate References	Validate CMDB integration references.	Paris
CMDB INT: Validate Related Entries	Validate all related classes against the data dictionary for related entries.	Paris
CMDB INT: Validate Relationships	Validate CMDB integration relationships.	Paris

To learn more about Integration Commons for CMDB, see Integration Commons for CMDB.

Related topics

Quick start tests

IntegrationHub ETL

Use the IntegrationHub ETL store app to create and manage ETL transform maps, which integrate third-party data into the CMDB or into non-CMDB tables without compromising the integrity of data. IntegrationHub ETL provides a simplified user interface that guides you through the integration process end-to-end, including a test integration run of sample data.

The IntegrationHub ETL (sn_int_studio) plugin provides the IntegrationHub ETL functionality.

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- Use the CMDB Integrations Dashboard to track progress, results, and errors associated with using custom integrations created in IntegrationHub ETL. The CMDB Integrations Dashboard is included in the Integration Commons for CMDB store app.
- Watch the IntegrationHub ETL | Importing resources into the CMDB video for an introduction and walk through of the IntegrationHub ETL tool.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Roles required

Users with the cmdb_inst_admin role can use IntegrationHub ETL to create integrations, or customize a pre-existing integration provided by ServiceNow or a vendor at the ServiceNow Store. A vendor can create a new integration and provide it as an application for anyone to use.

Support for non-CMDB tables

Starting with the Washington DC release, IntegrationHub ETL supports the integration of third-party data into some non-CMDB tables. IntegrationHub ETL supports those non-CMDB tables that are supported by Identification and Reconciliation (IRE). For details about which non-CMDB tables are supported and any needed configuration, see IRE support for non-CMDB tables.

Supported non-CMDB tables are available in IntegrationHub ETL when specifying classes, conditional classes, class associations, and reference sources in mapping definitions. However, there are some differences between using CMDB classes and non-CMDB tables in IntegrationHub ETL:

- Specifying class associations isn't mandatory for non-CMDB tables.
- Adding relationships doesn't apply to non-CMDB tables.
- Class associations for a non-CMDB table is based on a reference field instead of a CMDB relationship.

Note:
Although the IntegrationHub ETL user interface and accompanying documentation references CMDB and CMDB elements, most of those references also apply to supported non-CMDB tables.

Process

The two key components that IntegrationHub ETL uses for processing are:

- Robust Transform Engine (RTE): Used to transform raw source data that is stored in staging tables, into the data that is mapped and integrated into the CMDB. RTE uses ETL transform maps that were created for the integration during data transformation.
- Identification and Reconciliation engine (IRE): Used as a centralized framework for identification and reconciliation processes across different data sources. IRE processes help maintain data integrity in the CMDB and in supported non-CMDB tables.

IntegrationHub ETL uses RTE and IRE which work together to process and integrate data. Data is first imported from a data source, and is then stored in temporary staging tables in Import Sets systems. Using the data in the staging tables and the ETL transform map created by IntegrationHub ETL, RTE creates IRE payloads which are then processed by IRE. IRE applies

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reconciliation processes to avoid potential problems such as duplicate CIs, ensuring that the CMDB or non-CMDB tables remain healthy, and then integrates the resulting data.

When you create an integration, you import source data, transform data if needed, and select target CMDB classes (or non-CMDB tables) and attributes to map the data to. Eventually, you run an integration test of the sample data, using your settings in the IntegrationHub ETL. You can then preview the integration test results and adjust any settings before scheduling recurring integration runs for large data sets. If you develop and test the ETL transform map on a development instance, then you can test and adjust the configuration before implementation on a production instance.

For example, you can integrate data from SCCM (Microsoft System Center Configuration Manager).

Refer to the community page IntegrationHub-Extract Tranform Load (IH-ETL) is GA in ServiceNow store for an overview of IntegrationHub ETL, including its components and workflow.

Guided Setup

A guided setup organizes all the tasks in the correct order, tracks the completion of tasks, and enforces any task dependencies. Tasks that depend on the completion of other tasks, are enabled or disabled as you step through the tool and complete tasks.

Read-only mode

When opening a Service Graph Connector in which IntegrationHub ETL isn't detecting any incoming data from the data source, the integration is available in read-only mode. In read-only mode you can access all the guided setup tasks on the ETL Transform Map Assistant page. You can examine all the settings and definitions in the integration even though it isn't populated with actual data. However, you can't make any updates to a read-only connection.

Read-only mode is useful for studying an existing connection for the purpose of creating a new connection that is similar to the read-only connection. The read-only mode can also assist in troubleshooting issues with the connection.

IntegrationHub ETL and Import Sets

Using IntegrationHub ETL and ETL transform maps has the following advantages over using Import Sets and transform maps:

- Identification and Reconciliation Engine (IRE) processes are incorporated into the IntegrationHub ETL so all data is automatically processed by IRE as part of the integration. Using Import Sets and transform maps does not provide a simple way to apply IRE processes.
- IntegrationHub ETL uses guided setup which provides guidance and a simple user interface for the entire process of integrating third-party data.
- IntegrationHub ETL includes an integration test for a small data set using the new ETL transform map. This test lets you review the results and adjust configuration settings before scheduling recurring integrations.

Terms

The following terms are associated with the IntegrationHub ETL:

CMDB application

Name of the third-party vendor such as SCCM 2019. A CMDB application has two associated attributes: *`Name`* and *`Discovery Source`*. When creating a new

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integration, ensure to configure a discovery source for the CMDB application that you plan to use, before using the IntegrationHub ETL.

Data source

The source feed, such as SCCM 7.0 Computer Identity, where the raw source data is imported from. If you use various REST endpoints for different types of data, then each REST endpoint is associated with its own data source and an ETL transform map.

ETL transform map

The output generated by IntegrationHub ETL. You can integrate third-party data into the CMDB or into non-CMDB tables using an ETL transform map which is configured for the respective integration.

Source data

Original, raw data that have been imported into IntegrationHub ETL. Source data can be used in its original form, or you can transform the data before mapping and integration.

Transform

An operation, that you can apply to a specific data column to transform the data values. For example, to transform the format of the data values. Use transforms to standardize data formats and meet other system requirements.

Transformed data

Some of the source data might not be compliant with the requirements of its target CMDB attributes and classes or non-CMDB tables. In those cases, you can apply various types of transforms to the source data, before mapping the data to the target CMDB classes and attributes or non-CMDB tables. Transforms, can for example convert data format, replace values, and concatenate values from multiple data columns.

Each CMDB application can have multiple connections for retrieving raw data. Each connection that is used to retrieve a certain type of data, has its own pair of data source and an ETL transform map. Therefore, one CMDB application can have multiple ETL transform maps, and each of those ETL transform maps is associated with a single Data Source.

For example:

CMDB Application	ETL Transform Map	Data Source
SCCM	SCCM Computer Identify	/sccm/2019/comp
	SCCM Disk	/sccm/2019/disk
	SCCM Application	/sccm/2019/appl

Nested data payloads

To process nested data payloads, you must first ensure that the data source that is used for the integration, is set with the Data in single column option. With that setting, you can correctly represent nested data in a JSON payload which IntegrationHub ETL then processes as nested data, rather than as flat data.

Sample of nested data:

```
{
            "u_computer_fqdn": "computer2-fqdn",
            "u_computer_id": 2,
```

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```
            "u_computer_ip": "computer2-ip",
            "u_computer_location": "PDX",
            "u_computer_mac": "computer2-mac",
            "u_computer_name": "nested-payload-computer2",
            "u_computer_os": "computer2-os",
            "interfaces": [
                {
                    "u_interface_ip": "computer2-eth1-ip",
                    "u_interface_mac": "computer2-eth1-mac",
                    "u_interface_name": "computer2-eth1",
                    "ip": ""
                },
                {
                    "u_interface_ip": "computer2-eth2-ip",
                    "u_interface_mac": "computer2-eth2-mac",
                    "u_interface_name": "computer2-eth2",
                    "ip": {
                        "u_ip_address": "computer2-eth2-ip",
                        "u_mac_address": "computer2-eth2-mac"
                    }
                }
            ],
            "software": [
                {
                    "u_software_name": "computer2-software2",
                    "u_software_version":
"computer2-software2-1.0",
                    "instance": {
                        "u_software_instance_name":
"computer2-software1-instance"
                    }
                },
                {
                    "u_software_name": "computer2-software2",
                    "u_software_version":
"computer2-software2-2.0",
                    "instance": {
                        "u_software_instance_name":
"computer2-software2-instance"
                    }
                }
            ]
        },
```

You can view the layers of nested data in a separate panel in IntegrationHub ETL, apply transforms, map, and integrate that data into the CMDB.

When creating a nested data JSON payload, the following restrictions apply:

- Field names must start with a letter (between A-Z or a-z) or with '_', and must only contain letters (between A-Z or a-z), digits (0-9), or the '_' character.

  For example, a field name can't contain special characters such as *, [,], #, $, spaces, and dot.

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- Field names can't be “temp” or “object”, which are reserved for internal use.
- Consistently throughout the payload, you must use an array or an object to represent data in a specific level, regardless of the number of items in the level. If you use an array for multiple items in one object, you must also use an array to represent a single item in other objects.

For a demo about working with nested payload data, watch the Integration Hub - ETL nested payload feature demo video on the ServiceNow YouTube channel.

Related topics

Teams related list

Create an ETL transform map

IntegrationHub ETL provides a guided setup which walks you through the completion of all necessary tasks for creating an ETL transform map for a specific integration.

Guided setup

Guided setup organizes all the tasks in the correct order, tracks the completion of tasks, and enforces any task dependencies. Tasks that depend on the completion of other tasks, are enabled or disabled as you step through the tool and complete tasks.

Use guided setup on the ETL Transform Map Assistant page to complete the following tasks.

Import source data and specify basic details

Provide basic details for the integration, such as the source of the data that you want to integrate into CMDB, and import the source data.

Before you begin

The data source that you plan to select for the ETL Transform Map must exist in the same application scope as the one being used in the current session.

When you open an ETL transform map, by default the map is not validated. You can enable this validation step by adding the system property *sn_int_studio.validation.enabled* to the System Properties [sys_properties] table and then setting it to **true**. After validation is complete, you choose how to handle validation errors.

Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store. Starting with IntegrationHub ETL v3.2, integrations are grouped by the *CMDB Application* value, in which case expand the respective group to locate an integration.
2. Click the **Name** of an integration to view or modify, or click **Create new**.
   If the system property *sn_int_studio.validation.enabled* is set to **true**, then IntegrationHub ETL validates the ETL transform map that you are loading. If there are any validation errors, the Invalid Mapping Data Detected dialog box appears, listing all the specific errors that were detected. You can choose to delete the invalid mappings and continue with only the valid mappings, or you can choose to keep the invalid mappings. However, notifications about invalid mappings will continue to appear as you continue to work with the integration.

   The system detects errors such as:

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- Missing source or target fields in corresponding Robust Transform Engine (RTE) field mappings records
- Missing table columns in an import set

  Note:
  In this situation, any corresponding metadata records in RTE are no longer valid and are automatically deleted. Records such as field mappings and transform operations that are associated with the missing table columns in the import set, are deleted.

- Missing an Identification and Reconciliation Engine (IRE) lookup rule for a lookup class

3. On the ETL Transform Map Assistant page, in the Specify Basic Details section of the guided setup, select the **Import Source Data and Provide Basic Details** task.
4. Fill out the form.

Field	Description
CMDB Application	The CMDB application associated with the ETL transform map. You can select **Add new**, which adds the **CMDB Application** and the **Discovery Source** fields for the new CMDB application.
Name	Name of the ETL transform map.
Description	Description of the integration.
Data Source	List of all data sources in the system. **Note:** Be cautious in subsequently modifying the data source as it can result in substantial changes to the data integration. Aligning to the import set table of the new data source might require the removal of columns and associated transforms, or the addition of new columns. IntegrationHub ETL validation processes will detect any required updates and let you agree or reject these updates.
Sample Import Set	An Import Set that is associated with the specified **Data Source**. A subset of that Import Set data is used to preview source data. Select the **Auto-pull a new import set** option to pull a new Import Set of the associated data source. Starting with IntegrationHub ETL v3.2, if no Import Set is specified, then the map is

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Field	Description
	loaded and is automatically set to be in read-only mode. You can review configurations in the map but can't edit mappings or transforms.
Preview Size Override	Number of data records that are loaded and used as sample for the preview for this transform map. If set, this custom setting overrides the value of the *sn_int_studio.preview.size* system property, and applies only to the current transform map. If **Load Complete Schema** is disabled, then the nested data structure for the map is generated based only on the specified number of records that are loaded. Field available starting with IntegrationHub ETL v3.2.
Load Complete Schema	Enable or disable loading the entire data schema for generating the data structure for the map. When disabled, the nested data structure for the map is generated based only on the number or records loaded as sample records for preview. The number of records loaded is determined by either the **Preview Size Override** setting, or by the global system property *sn_int_studio.preview.size*. Field available starting with IntegrationHub ETL v3.2.
CMDB Application	Name of a new **CMDB Application**. Appears if you set **CMDB Application** to **Add new**.
Discovery Source	Discovery source associated with a new **CMDB Application**. Appears if you set **CMDB Application** to **Add new**.

5. Click **Save** to save the current changes or **Mark as Complete**.

   A time stamp appears in the header when you click **Save**, which remains for the duration of the IntegrationHub ETL session for the ETL transform map. When you re-enter the session or switch between ETL maps, the time stamp disappears.

Related topics

Create an Import Set data source

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Preview and prepare data

Review sample records of raw source data, which will be integrated into the CMDB. Transform and prepare data to align with the target classes and attributes, if needed.

Before you begin

The number of records in the sample data is globally determined by the system property *sn_int_studio.preview.size*, which is set to 100 by default. The maximum number of records in the sample data that IntegrationHub ETL can process is 10,000. If you set that property above the 10,000 limit, then IntegrationHub ETL will only process up to 10,000 records and a message will appear to that effect.

Starting with IntegrationHub ETL v3.2, you can override the value of the *sn_int_studio.preview.size* property by setting the **Preview Size Override** field on the Import Source Data and Provide Basic Details form, per map.

To process nested data from a nested payload, the respective data source must be set with the **Data in single column** option.

Role required: cmdb_inst_admin

About this task

Review the values in the data columns of the sample data and identify columns that do not align with the requirements of the intended target classes and attributes. You can transform data, for example, by converting the data format, replacing values, and concatenating data columns. You can apply transformations one on top of another, creating a chain of data transformations. You can also set a data column to be ignored in the mapping and integration process.

Note:
To set a CMDB attribute to be empty, use the string '<EMPTY#_STRING>'.

Columns for nested data appear alongside the rest of the data, with a **Nested Objects** notation in the data column header. The count of nested data items per object appear with a link which lets you drill to deeper levels of the nested data. To show the data structure of nested data in a separate panel, enable the **Show data structure** option.

The Data Structure panel has two options for displaying nested data:

- **Tree**: Nested data grouped by objects, where each object node corresponds to a record entry in the source data. Expand object nodes to show all nested data for the record.
- **Collection**: Nested data grouped by the top-level object (by default) and then by nested data items such as software. Expand a node such as software, to show which software is installed on each computer.

You can navigate through the levels of nested data in the Data Structure panel, the breadcrumbs path, or through number links that appear in the source data itself. Your selections and the data that appears are kept synchronized between all views of the nested data, regardless of navigation.

For a demo about working with nested payload data, watch the Integration Hub - ETL nested payload feature demo video on the ServiceNow YouTube channel.

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.

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2. In the ETL Transform Map Assistant page, in the Prepare Source Data for Mapping section of the guided setup, select **Preview and Prepare Data**.
3. **Optional:** Select **Show data structure** to open the Data Structure panel which shows the structure of nested data.
   In the Data Structure panel, you can drill down through the levels of nested data.
4. **Optional:** Select the action menu for a column and then select a Sort operation.
5. Select the action menu for a column, and then either select **Group by** to group the data by the respective column, or select **Ungroup** to undo the grouping operation.
6. **Optional:** Click **New Transform** and then select **Use Source Column** , or select the action menu for a column and select **New Transform** to transform the selected column.

   (Optional) You can't create new transforms for nested objects at this top-level view of the data. A nested object column contains number links which indicate the number of nested items for the record. To create a new transform for nested objects, click that number link to drill down to the actual nested data. Alternatively, navigate in the Data Structure panel to the nested object for which you want to create a transform.

   A transform of nested data can reference parent objects of the nested data being transformed. Using the sample payload for nested data as an example, a transform for an interface object can reference the parent computer object but can't reference a software object.

   a. In the New Transform sidebar on the right, select a **Transform Type** and modify the **Transform Description** if appropriate.
      For more details about transform types, see Transform types in IntegrationHub ETL.

   b. **Optional:** Select **Hide initial column used for this transform** to hide from the current view all the columns that were used for this transform.
      This setting is temporary for the current session, and if you refresh the page, the hidden column reappears. To show a hidden column, you can also click the gear icon on the banner frame. Then, move the hidden column from the Available to the Selected list and click **OK**.

   c. Select or verify the **Input Column** whose values are being transformed.

   d. **Optional:** Modify the **Output Column Name** for any of the columns that will be added with the transformed values.

   e. Click **Apply**.
      A new column with the transformed values appears, placed in alphabetical order based on the output column name. If you used the suggested output column name, then the new column appears to the right of the input column.

   f. Review the transformed data and adjust any transforms, if needed.

7. **Optional:** To apply the 'Set Fixed Value Column' transform:
   a. Click **New Transform** and then select **Set Fixed Value Column**.
   b. In the Set Fixed Value Column sidebar, enter a **Column Name** and a **Column Description** for the new column.
   c. Set **Assign Column Value** to the value that is fixed for the new column.
   d. Click **Apply**.
8. **Optional:** Select the action menu for a column, and then select **Ignore in Mapping** to exclude the column from mapping and integration in the current session.

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(Optional) In a subsequent session, the **Ignore in Mapping** setting does not apply, and the column will be included in mapping.

You can click **Include in Mapping** to undo the **Ignore in Mapping** setting for the column.

9. **Optional:** Select the action menu for a column, and then select **Delete This and Downstream Columns** to delete the column along with any columns that were added using this column as an input column.
10. **Optional:** Click **New Transform** and then select **Table Lookup**, which lets you specify a table to look up and extract additional values from, then fill out the fields in the Table Lookup sidebar on the right.
Values from the specified lookup table are matched with the mapped data. For the records that match, the specified values from the lookup table, are added as a column, to the data that is being prepared for mapping.

Table Lookup

Field	Description
Lookup Table	Table to use for matching with the data that is being mapped. When records from the lookup table and the mapped data satisfy the **Look Up Condition**, then specified values from the **Lookup Table** are extracted from the respective record and added to the mapped data.
Lookup Condition	(Optional) A set of pairs of column conditions. Each pair specifies a column in the lookup table and a column in the mapped data, which are attempted to be matched. ○ **If values of target table column**: The column in the target table to match to a column in the mapped data. ○ **Match values of source data table**: The column in the mapped data to match to a column in the lookup table. You can add multiple pairs of columns to match on.
Lookup Condition	(Optional) Values to extract from the **Lookup Table** when there is a match with the mapped data. **Then output values from the following columns**: The lookup table columns to extract values from, when values from the lookup table and the mapped data, satisfy the **Lookup Condition**. You can specify multiple lookup table columns to extract values from. For every column that you specify, a corresponding

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Field	Description
	Output Column Name field automatically appears. Specify a label for the column that will be added with the extracted values.
Output Column Name	(Optional) A label for the column that will be added to the mapped data, with the values extracted from the lookup table. An **Output Column Name** field is automatically added for every column that you specify in **Then output values from the following columns**.

11. Review the data and ensure that the intended set of data to be integrated is transformed, correctly formatted and prepared for import.
12. Click **Mark as Complete**.

Result

Data is prepared when the set of source data columns and transformed columns that you want to integrate, meet any formatting and other value requirements of the target CMDB classes and attributes. These columns are then ready to be mapped and integrated to CMDB classes and attributes.

About mapping data columns to CMDB classes and attributes

There are several requirements and guidelines for mapping source data to target CMDB classes and attributes. Also, there is an option of deactivating class mappings while preserving the settings for an easy reactivation. Review these concepts to ensure proper processing by the Identification and Reconciliation Engine (IRE).

Required mappings

You must map data to all required attributes of the target class in addition to mapping to attributes that are not configured as required. Also, the following two fields appear by default and you cannot delete them:

Source Native Key

IRE uses to uniquely identify a record and for building relationships and references. Also, improves performance of insert and update operations. When processing a payload, IRE generates an error if this field is empty.

Source Recency Timestamp

IRE uses to identify records that are older than the current record and therefore can be ignored, to help resolve conflicting attribute values. If a value is provided, it is used only if it is later than the value that is currently stored in the CMDB. If a value is not provided, IRE updates the attribute with the current timestamp.

The following system properties let you modify how IRE uses the *source_recency_timestamp* value in a payload to update the *last_scan* attribute in the Source [sys_object_source] table:

- glide.identification_engine.skip_updating_last_scan_if_older
- glide.identification_engine.ire_message_listener_skip_updating_last_scan_to_now

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For more information about how IRE uses *source_native_key* and *source_recency_timestamp* for CI identification, see Identification and Reconciliation engine (IRE).

Conditional class

A conditional class lets you map different sets of data records to different target classes according to specific column values, or the status of a specific plugin.

For example, if a display name contains 'Windows', then 'Windows Server' is selected as the target class. But if the display name contains 'Linux', then 'Linux Server' is selected as the target class. For records that do not meet any of these conditions (display name does not contain 'Windows' nor 'Linux'), 'Server' is selected as the target class.

Associated class

An associated class lets you select the CMDB class to be associated with a target non-CMDB table. Setting an associated class is required for IRE processing if the non-CMDB table is not configured for IRE processing. For a non-CMDB table that is supported and configured for IRE processing, setting an associated class is optional. See IRE support for non-CMDB tables for more information.

The software Instance is a non-CMDB class but it does not have IRE rules associated with it. So, things we said about it here pre-Utah are still valid. But for non-CMDB classes with IRE rules it's not mandatory to have an association. For example “If the target class for mapping is a non-CMDB class with a reference to a CMDB class, you must select the CMDB class to associate the non-CMDB target class with” non-CMDB class with IRE rules Instead of “you must” it should be. “You can”. Same with the Example it's not valid for non-CMDB with IRE rules.

If the target class for mapping is a non-CMDB class with a reference to a CMDB class, you must select the CMDB class to associate the non-CMDB target class with. A non-CMDB class refers to a class, such Serial Number [cmdb_serial_number], that does not extend the Configuration Item [cmdb_ci] class. The Related Entry [cmdb_related_entry] class might contain multiple CMDB class associations for the same non-CMDB class. Therefore, select the appropriate association to allow IRE processes to update the target non-CMDB class.

For example, the Related Entry [cmdb_related_entry] class has a record which associates the non-CMDB Software Instance [cmdb_software_instance] class with the CMDB Software Package [cmdb_ci_spkg] class. If you select Software Instance as a target class, you must associate the Software Instance class with the Software Package [cmdb_ci_spkg] class.

Deactivating class mappings

When you edit an ETL transform map, provided by a Service Graph Connector for example, you can delete a class mapping to prevent the class from being populated when the integration runs. However, if you later decide to populate that class, you must readd that class and reconfigure all the class mappings. Instead, you can deactivate a class mapping to temporarily ignore the class during the integration run, while preserving all of its mapping configuration. A class that you choose to deactivate is grayed out in the user interface but you can continue and edit the class mappings. Later, you can reactivate a class mapping to enable populating the class, without needing to reconfigure the class mappings.

Some classes that you choose to deactivate, trigger an automatic deactivation of additional classes that you did not directly choose to deactivate. Which classes are automatically deactivated, depends on the class that you chose to deactivate. For example, whether the class has dependent relationships or associated classes. Those automatically deactivated classes:

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- Appear in light gray in the user interface and you can't reactivate them.
- Are automatically reactivated when you reactivate:
  - The class that you initially deactivated which triggered the automatic deactivation
  - Any class that the deactivated class depends on

All classes that you directly deactivate mappings for and the resulting class mappings that are automatically deactivated, are not populated when the integration runs. Also, any relationships and lookup tables associated with those classes, are not populated when the integration runs.

Class mapping and other deactivation scenarios:

- Deactivate a class which no class depends on and which has no associated classes:

  Triggers an automatic deactivation of any lookup rules and relationships associated with the deactivated class.

- Deactivate a lookup rule, such as serial number, within a class mapping:

  Does not trigger any automatic deactivations.

- Deactivate a CMDB class which is associated with a non-CMDB class:
  - Triggers an automatic deactivation of the associated non-CMDB class.
  - Deactivating the non-CMDB class, does not impact the associated CMDB class.

- Deactivate a class with dependent relationships (Applies only if the dependent relationship exists in IntegrationHub ETL):
  - Triggers an automatic deactivation of any class that has a single dependent relationship with the deactivated class.

  - If a class has multiple dependent relationships, then it is automatically deactivated only when you deactivate all of the dependent on classes.

    For example, a scenario in which the File System class has dependent relationships with both, the Computer and a Server class. If you deactivate the Computer class, the File System class is not automatically deactivated. Only if you also deactivate the Server class, the File System class is automatically deactivated.

- Deactivate a conditional class or a class mapping within a conditional class:
  - Deactivating or activating a conditional class, triggers an automatic deactivation or activation of all conditional class mappings within the conditional class.

  - Deactivating a class mapping within a conditional class: Prevents the deactivated class from getting populated during integration runs. However, the associated 'If', 'Else if', or 'Else' conditions themselves remain in effect within the condition of the conditional class. For example, if you deactivate the following class mapping:

    [If] [operating_system] [contains] [Linux] Then [Class] [is] [Linux Server].

    Then, the Linux Server class is not populated, but the **[If] [operating_system] [contains] [Linux]** condition is in effect.

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Map data columns to CMDB classes and attributes

Choose target classes and attributes in the CMDB to map source data columns to. You can map a data column to a specific target class, or add conditions so that the choice of target class depends on specific data values.

Before you begin

Role required: cmdb_inst_admin

About this task

Data columns that you map can be either source data columns which were not transformed, or transformed data columns. For example, to integrate a data column into the Computer and Software Package classes, select those classes as target classes and then map data columns into specific attributes in those classes.

When you configure mapping for a class, relationship, or a lookup rule, those items are always initially set as activated. For details about the results of deactivating mappings, see Deactivating class mappings.

Note:
Changing a class impacts any mappings that were already configured for the class, sometimes deleting those mappings. Details about the affected mappings and the impact, appear in the Affected mappings dialog box before you proceed with the class change. However, these details appear only when the change is from a CMDB class to another CMDB class or from a non-CMDB class to another non-CMDB class.

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. In the ETL Transform Map Assistant page, in the Map Data to CMDB and Add Relationships section of the guided setup, select **Select CMDB Classes to Map Source Data**.
   Attributes that are configured as required in the platform, are noted, and you must map a data column to each of those attributes.
3. Click **Add Class** to add a target class to map to, or click **Edit Class** to edit a class.

   a. In the Add Class dialog box, select a CMDB **Class**.

   b. Click **Save**.

   c. **Optional:** Set the **Activate/Deactivate Mapping** toggle switch for a class, to on or off.
   If the Affected class mappings dialog box appears, review the list of affected classes, and then click **Proceed**.
   When you add a non-CMDB class, it is initially deactivated and the **Activate/Deactivate Mapping** toggle switch is disabled, until you add an associated class that is active.

4. Click **Add Conditional Class** and then in the **Add Conditional Class** dialog box, specify the conditions that must be met for data to be mapped to different target classes.

   a. **Collection** is automatically set to the data branch in the hierarchy which is associated with the lowest-level attribute.
   You can modify the value to the data branch from which you want to map data from, which must be at a higher level in the same data branch of the hierarchy.

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b. In the **If** drop-down list, select attribute conditions that data values must meet, or enter `plugins` in the search box and specify a plugin condition.
You can then specify that the rest of the records, which did not match any conditions, are mapped to yet a different target class. Data records will be mapped to different target classes according to the conditions met.

When processing nested data, a prefix denotes the first level in the nested hierarchy for attribute items.

Note:
When you select a non-CMDB class, it is initially deactivated and the **Activate/Deactivate Mapping** toggle switch is disabled, until you add an associated class that is active.

c. Click **Save**.

d. Optional: Set the **Activate/Deactivate Mapping** toggle switch for a conditional class, to on or off.
If the Affected class mappings dialog box appears, review the list of affected classes, and then click **Proceed**.

e. Optional: Click **Edit Class** to edit the settings of a conditional class.
In the Edit Conditional Class dialog box, set the **Activate/Deactivate Mapping** toggle switch for a class mapping, to on or off. Click **Save**, and if the Affected class mappings dialog box appears, review the list of affected classes and then click **Proceed**.

- A deactivated class is not populated during integration runs, however, this doesn't affect the associated condition. The 'If', 'Else if', and 'Else' conditions themselves remain in effect within the condition of the conditional class and matching CIs are filtered accordingly.
- The toggle switch of the conditional class reflects the summary of the states of all the conditional class mappings within the conditional class. If at least one of the conditional class mappings is activated, then the toggle switch of the conditional class appears as activated. Otherwise, the toggle switch of the conditional class appears as deactivated.

5. For a non-CMDB class, click **Add Associated Class** to associate the non-CMDB class with a CMDB class and to enable the **Activate/Deactivate Mapping** toggle switch..
Or, click **Edit Associated Class** to edit an already associated class.

a. In the Add Associated Class dialog box, select a CMDB class.
The list includes all entries in the Related Entry [cmdb_related_entry] class for the specified non-CMDB table (deactivated classes are not included).

b. Click **Add**.

c. Optional: Set the **Activate/Deactivate Mapping** toggle switch for an associated class, to on or off.

Note:
If an associated class was not added or is deactivated, then the **Activate/Deactivate Mapping** toggle switch is disabled.

6. Click **Set Up Mapping** to configure mapping for a newly added class, or click **Edit Mapping** to edit a mapping.

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a. To map, drag data columns from the Data sidebar on the right, to CMDB target attribute on the left side of the mapping page.

Or, click the  icon to search and select data columns for the mapping.
When mapping nested data:

- Data columns in the Data sidebar appear in a tree format that represents the structure of the nested data. Each attribute is associated with sample data for the attribute.
- Transformed columns are noted by a cyan-shaded dot.
- All mappings to a specific CMDB class must be from the same source branch in the nested data. Only the branch from which you selected the first column to map, is valid for selecting columns in subsequent mappings.

  This restriction applies differently when mapping to attributes in lookup tables. All mappings to attributes in a lookup table also must be from the same source branch. However, that source branch can be different than the source branch you used with non-lookup tables.

  Note:
  You can work around this restriction by using the Copy transform in the data preparation step, to copy attributes from a parent level to a child level. Prepare the data so that all the attributes that you want to map, are at the same level.

- When you drag a column to map from the Data sidebar, the fields of CMDB target attributes that are valid for the mapping, are highlighted by a green frame. If you attempt to drop a column in an invalid target attribute, the respective field is highlighted by a red frame and an error appears.

b. Click **Add Attribute**.

c. In the Add Attribute dialog box, from the **Attribute** list, select one or more items as target attributes to map data to.
You can also scroll down to the **IRE Settings** section of the list and select one of the robust import set transformer properties . Click **Save**.
For information about precedence order between robust import set transformer properties defined at the individual item level and at the IRE payload level, see robust import set transformer properties .

d. Map any lookup rules such as the 'Serial Number Lookup 1' rule.

Lookup rules are in a deactivated state until you map them. Click the filter icon for the lookup rule to edit or add any lookup filters. In the lookup filter dialog box, specify attribute or plugin conditions that must be met for data to be mapped to various target classes. Then click **Save**.

After mapping a field of a lookup rule, you can set the Activate/Deactivate Lookup rule toggle switch for a rule, to on or off.

e. Optional: Click **View Class Details** to view the current class in CI Class Manager.

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f. **Optional:** Click the **Transform Data** tab to navigate to the data preparation page where you can review and further transform data that you want to map.

g. Return to the Select CMDB Classes to Map Source Data page.

7. Click **Mark as Complete**.

Add Relationships

Add relationships that exist among the target CMDB classes, for an integration.

Before you begin

- A class that you want to add in the relationship, must be in an activated state.
- A base relationship or a relationship within a conditional relationship, that you want to edit, must be in an activated state.
- In a conditional relationship that you want to edit, at least one relationship condition must be in an activated state. Otherwise, the **Edit Relationship** button is grayed out.

Role required: cmdb_inst_admin

About this task

When creating relationships with nested data, you can't create a relationship between sibling objects from the nested data. Using the sample payload for nested data as an example, you can't create a relationship between interfaces and software.

ITOM Visibility, if available, uses enhanced discovery patterns to identify and add CI relationships to the Suggested Relationships table in the base system. When applicable, use the Suggested Relationships table to select relationships that are in compliance with Common Service Data Model (CSDM) standards.

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration. The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. In the ETL Transform Map Assistant page, in the Map Data to CMDB and Add Relationships section of the guided setup, select **Add Relationships**.
3. Add relationships.
   a. Add relationships by selecting **Add Relationship** or **Add Conditional Relationship** if you want to specify attribute conditions that must be met before adding a relationship.
   b. Complete the following actions as needed.
   The **Relationship Type** list menu changes based on the selected parent and child class:
      - If there is a dependent relationship, the list is disabled and the relationship type is automatically populated.
      - If there is more than one dependent relationship, the list displays both containment and hosting relationship options and the containment relationship type is automatically populated.

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- If there is no dependent relationship, the list displays **Suggested relationships** with the first suggested relationship automatically selected, followed by the base system relationship types.
- If there is no suggested relationship, the list displays **No suggested relationships** followed by the base system relationship types.

4. Click **Save** to save the current changes or **Mark as Complete**.

   A time stamp appears in the header when you click **Save**, which remains for the duration of the Integration Hub ETL session for the ETL transform map. When you re-enter the session or switch between ETL maps, the time stamp disappears.

Preview mapping results

Preview the results of the sample data integration.

Before you begin

Role required: cmdb_inst_admin

About this task

Run an integration test and view a summary of the results, for the sample data (by default, up to 100 records). The summary includes total numbers for relationships that were created, mapped classes, partial and incomplete payloads that IRE couldn't process. You can also view detailed messages from Robust Transform Engine (RTE) and from Identification Reconciliation Engine (IRE).

Note:
Most IntegrationHub ETL log messages (from RTE and IRE) are informational. However, even if the *com.glide.import_set.importlog_level* and the *glide.importlog.log_to_table* system properties are set to not add INFO log messages, IntegrationHub ETL does render INFO log messages. For more details about these properties, see Import sets properties.

After you view the details in the summary page, you can return to any step to make adjustments and then rerun the integration.

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration. The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. In the ETL Transform Map Assistant page, in the Preview Sample Integration Results and Schedule Import section of the guided setup, select **Test and Rollback Integration Results**.
3. On the Test and Rollback Integration Results page, click **Run Integration**.
4. View the summary page and click the various tabs to see the integration run results for the affected CMDB classes. You can click  to open CI forms and view information.

   Note:
   The order of the attribute columns follows the default columns list for the class in the platform. First, the default columns for the class appear from left to right, followed by the rest of the attribute columns organized in alphabetical order. For example, to see the default columns list for the Computers class, navigate to **All** > **Configuration** > **Computers**.

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5. **Optional:** Select any class tab and click **Edit Mapping** to return to the Select CMDB Classes to Map Source Data page where you can review and change mapping settings.

   Note:
   Clicking **Edit Mapping** rolls back all the changes that were made to the CMDB as a result of this integration run.

6. **Optional:** Click the **Relationships** tab and review any relationships that were created. Click **Edit Relationships** to return to the Add Relationships page where you can review and change any relationship configurations.

   Note:
   Clicking **Edit Relationships** rolls back all the changes that were made to the CMDB as a result of this integration run.

7. Click the **Error Log**, **Activity Log**, or the **Warning Log** tabs to see the respective details logged by IRE and RTE during the integration.

   IRE log records are grouped by categories and further organized by the respective class. For IRE log messages, the Message column contains only the messages themselves which were extracted from the raw log message. The Log Message column contains the complete log message, which includes class and category in addition to the message itself. RTE logs appear under the Other category.

   Use the **Verbose** toggle switch to change the viewing mode for the Message and the Log Message columns:

   - Verbose on: Shows fully expanded text of log messages.
   - Verbose off: Shows a condensed version of the log messages. The fully expanded text of the log messages appears when you point to a message.

8. Click the **Incomplete Payloads** and **Partial Payloads** tabs for details about IRE payloads for the integration run.
9. Select **Mark as Complete**.
   The Rollback options dialog box appears and you can choose either of the following options.
   - **Retain Data**: All the changes to the CMDB resulting from this integration, are retained.
   - **Perform Rollback**: All the changes to the CMDB resulting from this integration, are rolled back and the CMDB is restored to its state before running the integration.

Provide integration schedule

Configure a schedule for importing data to CMDB using this ETL Transform Map.

Before you begin

Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. In the ETL Transform Map Assistant page, in the Preview Sample Integration Results and Schedule Import section of the guided setup, select **Set Import Schedule**.
3. On the Provide Schedule page, click **Set Schedules**.
4. In the Scheduled Data Imports list view (which opens in a new tab), click **New**.

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5. Fill out the Scheduled Data Import form and then click **Submit**.
   See Schedule a data import for details about the form fields.
6. Click **Mark as Complete**.

Transform types in IntegrationHub ETL

Use various transforms in IntegrationHub ETL to convert and prepare source data for mapping to the CMDB.

Transforms from the Integration Commons for CMDB store app, are also available in IntegrationHub ETL.

Concatenation

Combines the values from input fields into a single string, joining them on the optional *joining_string* field.

Details	
Table	sys_rte_eb_concat_operation
Input fields	*source_sys_rte_eb_fields*
Output field	*target_sys_rte_eb_field*
Additional Fields	*joining_string* (optional)

Example	
Input	“input_1”, “input_2”, “input_3”
Additional Fields	*joining_string* = ”, ”
Result	“input_1, input_2, input_3”

Convert to Boolean

Converts the incoming value to a boolean. ‘`true`’ and ‘`1`’ values convert to 'true' (case insensitive), and any other values convert to 'false'.

Details	
Table	sys_rte_eb_to_boolean_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Examples:

- All of the following inputs return 'true':
  - true
  - 1
- All of the following inputs return 'false':

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- “input_1”
- “”
- 0
- 11

Convert to Date

Attempts to convert the incoming value to a *GlideDateTime* value by applying the *date_format* to the incoming value. Attempts to directly convert using *GlideDateTime* if the *date_format* is incorrect.

Details	
Table	sys_rte_eb_to_date_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field* Returns an empty value if unable to parse at all.
Additional Fields	*date_format* (Java simple date format)

Example	
Input	"2018/09/20 11:21:00 a.m. EST”
Additional Fields	*date_format* = “yyyy/MM/dd hh:mm:ss a z”
Result	“2018-09-20 16:21:00”

Example	
Input	"2018/09/20 01:21:00 PM EST”
Additional Fields	*date_format* = “yyyy/MM/dd hh:mm:ss a z”
Result	“2018-09-20 18:21:00”

Example	
Input	"09/20/18”
Additional Fields	*date_format* = “yyyy/MM/dd hh:mm:ss a z”
Result	“0018-09-20 00:00:00”

Convert to Numeric

Converts the incoming value to a number.

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Details	
Table	sys_rte_eb_to_numeric_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field* If the incoming value is non-numeric, then the output is empty.

Example	
Input	1.23
Result	1.23

Example	
Input	1.00
Result	1

Example	
Input	input_1
Result	null

Example	
Input	two
Result	null

Copy

Copies the source field's value to all of the target fields.

Details	
Table	sys_rte_eb_copy_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_fields*
Additional Fields	*overwrite_existing_value* (optional, boolean): If **true**, then the values of target fields are replaced. Otherwise, any non-empty value is not overwritten.

Extract Leading Numeric

Sets the target field to be the first numeric value found in the source field.

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Details	
Table	sys_rte_eb_extract_numeric_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *decimal_places* (optional, number): Forces the output to have a specified number of decimal places. • *remainder_target_field* (optional, reference to a field): Set to the trimmed remainder of the source field, after removing the first numeric value.

Example	
Input	“100 mb”
Result	"100”

Example	
Input	“100.123 mb”
Result	“100.123"

Example	
Input	“100.123 mb”
Additional Fields	*decimal_places* = 2
Result	“100.12”

Example	
Input	“100 mb”
Additional Fields	*decimal_places* = 2
Result	“100.00”

Example	
Input	“100 mb”
Additional Fields	*remainder_target_field* = <field>
Result	“100” and <field> = “mb”

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Glide Lookup

Performs a lookup in the database on the *target_table*.

Details	
Table	sys_rte_eb_glide_lookup_operation
Input fields	*source_sys_rte_eb_fields*
Output field	*target_sys_rte_eb_fields*
Additional Fields	• *target_table* • *glide_matching_fields* (string): Comma-separated list of column names in the target table. For each input field in *source_sys_rte_eb_fields*, there must be an equal number of values in *glide_matching_fields* • *glide_target_fields* (string): Comma-separated list of column names in the target table. For each target field in *target_sys_rte_eb_fields*, there must be an equal number of values in *glide_target_fields*.

Example	
Input	• Input Field 1: 100 South Charles Street, Baltimore • Input Field 2: MD
Additional Fields	• Target Table: Location (cmn_location) • Glide Matching Fields: street,state • Glide Target Fields: sys_id
Result	Output Field 1: 25ab9c4d0a0a0bb300f7dabdc0ca7c1c

Min/Max

Sets the target field to either the maximum or minimum of the values from all input fields.

Details	
Table	sys_rte_eb_min_max_operation
Input fields	*source_sys_rte_eb_fields*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *data_type* (choice list <STRING,NUMERIC,DATE>) • *min_max* (choice list <MIN,MAX>)

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Example	
Input	“2”, “-1”, “0”
Additional Fields	• *data_type* = NUMERIC • *min_max* = MAX
Result	“2”

Example	
Input	“a”, “b”
Additional Fields	• *data_type* = STRING • *min_max* = MAX
Result	“b”

Example	
Input	“2”, “-1”, “0”
Additional Fields	• *data_type* = NUMERIC • *min_max* = MIN
Result	“-1”

Example	
Input	“a”, “b”
Additional Fields	• *data_type* = STRING • *min_max* = MIN
Result	“a”

Multiple Input Script

Runs a script with multiple inputs, setting the *target_field* == output for that script.

Each source field is available inside of the ‘batch’ variable as JavScript fields. The name of the JavaScript field is the field attribute of the entity field (looking at *sys_rte_eb_field.field*, not *sys_rte_eb_field.name*).

Details	
Table	sys_rte_eb_multi_in_script_operation
Input fields	*source_sys_rte_eb_fields*

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Details	
Output field	*target_sys_rte_eb_field*
Additional Fields	• *script* (script) • *use_unique_input_sets* (boolean): When **true**, only unique input values are included in the data batch for IRE processing. Otherwise, all input object's field values are included.

Example for using *use_unique_input_sets*, with a script function that takes *record_type* and *operating_system* as input and returns *record_with_os*:

Input data

Record	record_type	operating_system	record_with_os
1	computer	Windows XP	
2	computer	Linux	
3	computer	Windows XP	

If *use_unique_inputs_sets* is set to **true**, then the script processes only two values (computer + Windows XP and computer + Linux). If *use_unique_inputs_sets* is set to **false**, then each of the three values is individually processed (computer + Windows XP, computer + Linux, and computer + Windows XP).

Sample script:

```
          (function(batch, output) {
              for (var i = 0; i < batch.length; i++) {
                      // batch[i] is the unique set of
inputs/individual record
                      // batch[i].<field> gives access to the
field value
                      var in0 = gs.nil(batch[i].record_type) ?
'' : batch[i].record_type;
                      var in1 =
gs.nil(batch[i].operating_system) ? '' :
batch[i].operating_system;
                      // output[i] is the output for the
specific combination of inputs/individual record
                      output[i] = in0 + "_" + in1;
                  }
              }
          })(batch, output);
```

Sample script:

```
          /* Example Script
           // In this example the script input fields are
'input_field_1', 'input_field_2' - replace these with the
fields used as script inputs // There is a static field
'input' that has all the input field values concatenated with a
'|' (function(batch, output) {
               for (var i = 0; i < batch.length; i++) {
```

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```
                    //step1: access the input variables
                    var a = batch[i].input_field_1; //Value of
the first source field.
                    var b = batch[i].input_field_2; //Value of
the second source field.

                    //step2: Your script/code goes here.
                    var c = a + b;

                    //step3: set the output for each elements
                    output[i] = b;
                }

            })(batch, output);
           */
```

Rexeg Replace

Replaces each substring of the incoming string that matches the specified *match_regex*, with the specified *replacement_regex* string value.

Details	
Table	sys_rte_eb_regex_replace_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *match_regex* (string, regular expression) • *replacement_regex* (string)

Example	
Input	“String&With(Special)$Characters”
Additional Fields	• *match_regex* = “[^0-9a-zA-Z]+” • *replacement_regex* = “ ”
Result	“String With Special Characters”

Replace

Replaces each substring in the incoming string that matches the specified *match_string*, with the *replacement_string* string value.

Details	
Table	sys_rte_eb_replace_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

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Details	
Additional Fields	• *match_string* (string) • *replacement_string* (string)

Example	
Input	“Original String”
Additional Fields	• *match_string* = “Original” • *replacement_string* = “Replacement”
Result	“Replacement String”

Round Numeric

Rounds the number value to the nearest whole number. Non-numbers are truncated.

Details	
Table	sys_rte_eb_round_numeric_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Example	
Input	“1.5”
Result	"2"

Example	
Input	“1.4”
Result	"1"

Example	
Input	“i’m a string”
Result	""

Script

Runs a script with input, setting the target_field == output for that script.

This transform has been superseded by the Multi Input Script transform and is included for backwards compatibility with existing configurations.

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Details	
Table	sys_rte_eb_script_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *script* (script) • *use_unique_input_sets* (boolean): When **true**, only unique input values are included in the data batch for IRE processing. Otherwise, all input object's field values are included. For an example and for more details, see the Multiple Input Script transform.

The source field is included in the 'batch' variable as the JavaScript field 'input'.

```
          (function(batch, output) {
                for (var i = 0; i < batch.length; i++) {
                        // batch[i] is the unique set of
inputs/individual record
                        // batch[i].input gives access to the
field value
                        var in0 = gs.nil(batch[i].input) ? '' :
batch[i].input;
                        // output[i] is the output for the
specific combination of inputs/individual record
                        output[i] = in0 + " modified by script";
                    }
                }
            })(batch, output);
```

Example:

```
/* Example Script
 (function(batch, output) {
     for (var i = 0; i < batch.length; i++) {
         //step1: access the input variables
         var a = batch[i].input; //Value of the source field.

         //step2: Your script/code goes here.
         var b = a + 1;
         //step3: set the output for each elements
         output[i] = b;
     }
 })(batch, output);
*/
```

Set

Sets the target field's value to the string specified in *set_value*.

Details	
Table	sys_rte_eb_set_operation
Input fields	*source_sys_rte_eb_field*

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Details	
Output field	*target_sys_rte_eb_field*
Additional Fields	• *set_value* (string) • *overwrite_existing_value* (optional, boolean): When **true**, the current value of the target field is overwritten. Otherwise, a non-empty value isn't replaced.

Split

Splits the source field's value on the *splitting_string* and assigns each resulting item from the split to the *target_sys_rte_eb_fields*, in order.

Details	
Table	sys_rte_eb_split_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_fields*
Additional Fields	*splitting_string* (string)

Example	
Input	"value1||value2||value3", with *target_sys_rte_eb_fields* {target1,target2,target3}
Additional Fields	*splitting_string* = "||"
Result	target1 : value1, target2 : value2, target3 : value3

Example	
Input	"value1||value2||value3", with *target_sys_rte_eb_fields* {target1}
Additional Fields	*splitting_string* = "||"
Result	target1 : value1

Example	
Input	"value1", with *target_sys_rte_eb_fields* {target1,target2,target3}
Additional Fields	*splitting_string* = "||"
Result	target1 : value1, target2 : <null>, target3 : <null>

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Trim

Trims leading and trailing whitespace from the *source_sys_rte_eb_field* value and assigns the result to the *target_sys_rte_eb_field*. This transform is equivalent to a Java String.trim().

Details	
Table	sys_rte_eb_trim_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Example	
Input	" value 1 "
Result	"value 1"

Uppercase

Uppercases the *source_sys_rte_eb_field* value and assigns the result to *target_sys_rte_eb_field*.

Details	
Table	sys_rte_eb_upper_case_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Example	
Input	"value1"
Result	"VALUE1"

Uppercase Trim

Combines both the Uppercase and the Trim transforms.

Details	
Table	sys_rte_eb_upper_case_trim_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Example	
Input	" value1 "
Result	"VALUE1"

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Add before and after scripts to an integration data source

Add custom before and after scripts for a data source of a CMDB integration application. Those scripts provide access to the input and output payloads of IRE. When a CMDB integration invokes Identification and Reconciliation Engine (IRE), those scripts run before and after IRE processes the integration payload.

Before you begin

Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**.

   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.

2. Click the **CMDB Application** link for the integration that you want to add scripts for.
3. On the CMDB Integration Studio Application form, in the CMDB Integration Studio Application Data Sources related list, open the data source record for the CMDB integration.
4. On the CMDB Integration Studio Application Data Source form, check **Execute Before Script** or **Execute After Script**.
5. Review the **Before Script** and **After Script** comments and enter your custom scripts at the bottom of the script field.
   The comments in the script fields provide details for the before and after scripts. Use those guidelines, explanations such as what operations are supported, and examples when creating your custom script.
6. Click **Update**.

Related topics

Identification and Reconciliation engine (IRE)

Duplicate an ETL transform map

Use an existing ETL transform map if you need to create a map that is mostly similar to that existing map. Select an existing map, specify a new data source for the new duplicate map, and then change or retain other settings such as data transforms.

Before you begin

The data source for the new duplicated ETL transform map must satisfy these requirements:

- The schema of the data source must be identical to the schema of the original ETL transform map. For example, both data sources must have an identical number of columns and identical column labels.
- The data source must preexist.
- The data source must not be used in any other ETL transform map.

Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. Click **Duplicate** and then fill out the Duplicate ETL Transform Map form.

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Field	Description
Duplicate from	The ETL transform map to duplicate from.
CMDB application	The CMDB application associated with the ETL transform map. You can select **Add new**, which adds the **CMDB Application** and the **Discovery Source** fields for the new CMDB application.
Discovery Source	Discovery source associated with a new CMDB Application. Appears if you set **CMDB Application** to **Add new**.
CMDB Application Name	Name of a new CMDB Application. Appears if you set **CMDB Application** to **Add new**.
Name	Name of the ETL transform map.
Data Source	The source feed, unique for this ETL transform map, where the raw source data is imported from.

3. Click **Create Duplicate**.

Result
Data for the new duplicated ETL transform map is imported, and the **Import Source Data and Provide Basic Details** task, is set as complete.

What to do next
Continue with the next steps on the guided setup steps to review the imported data and complete the integration using the duplicated ETL transform map.

Getting started with Service Graph Connectors

Service Graph Connectors, including API Service Graph Connectors, are predefined integrations that ingest third-party data and API data into the Configuration Management Database (CMDB) from various domains, such as security, servers, software or monitoring, Internet of Things (IoT), and cloud.

Important:
See Service Graph Connectors and API Service Graph Connectors for a list of connectors provided by ServiceNow.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Service Graph Connectors overview

The following video provides an overview of Service Graph Connectors.

Service Graph Connectors

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As a purpose-built app, you can use a Service Graph Connector, including an API Service Graph Connector, to maintain the quality and consistency of third-party data in your CMDB.

You can use the following connector types:

Service Graph Connectors

A Service Graph Connector imports and integrates third-party data into CMDB and non-CMDB tables. For a list of Service Graph Connectors, see Service Graph Connectors.

API Service Graph Connectors

An API Service Graph Connector imports and integrates third-party API data into CMDB and non-CMDB tables. For a list of API Service Graph Connectors, see API Service Graph Connectors.

Partner-built connectors

Service Graph Connectors can be built by partners and vendors. For a list of partner-built connectors, see the ServiceNow Store website.

The connectors also make sure that third-party data is mapped to the right locations in your CMDB as specified by the Common Service Data Model (CSDM). The CSDM enables ServiceNow products to use the data and increases reporting accuracy. For more information on CSDM, see Common Service Data Model.

The Service Graph Connectors, including API Service Graph Connectors, manage the configuration data pipeline in the following steps:

1. Ingest the data by identifying class, attribute, and data sources by using the identification rules.
2. Standardize the data to comply with your CMDB.
3. Reconcile the data into a single coherent picture by using the reconciliation rules.
4. Ingest the data into your CMDB.

You can track the status and processing results of all installed integrations using the SGC Central view within the CMDB Workspace or integrations dashboard provided with the Integration Commons for CMDB store app. For more information, see SGC Central, Integration Commons for CMDB, and CMDB Integrations Dashboard.

Using SGC Central for connectors

The Service Graph Connector Central application also called as SGC Central is available as a view in the CMDB Workspace. The application enables you to discover and install Service Graph Connectors, including API Service Graph Connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. The SGC Central application also ensures that connectors remain supported and up-to-date with certified partners.

The SGC Central application minimizes customization and accelerates time to value with intuitive setup options and playbook-guided connector deployment. If the playbook experience isn't available for a connector, you can follow the guided setup provided with the connector.

To learn more, see SGC Central.

Required role

As a user with the admin role, you can install Service Graph Connectors, including API Service Graph Connectors.

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Using connectors

By using Service Graph Connectors and API Service Graph Connectors, you can mandate data governance and design practices. Examples of mandated practices using connectors include:

- Consistently associating data with specific CI types. For instance, IP addresses are assigned to network interfaces rather than a mix of interfaces and servers. Ensuring that ServiceNow products know where to find third-party data. For more information, see CMDB classifications and class dependency.
- Using the Identification and Reconciliation (IRE) engine to identify and classify data correctly before it's loaded into the CMDB. Helping prevent duplicate CIs and ensuring that attribute values are consistent across multiple data sources.

  For information on the IRE-related rules used in Service Graph Connectors, see the following topics:

  - CMDB Identification and Reconciliation
  - Identification rules
  - Reconciliation rules
  - Create an IRE data source rule
  - Detecting duplicate CIs
  - Create a data refresh rule
  - Create an identification inclusion rule
- Using the IntegrationHub ETL functionality so that data is transformed and loaded in the fastest and most efficient manner. For more information, see IntegrationHub ETL.

Resolving connector issues

You can use the Service Graph Connector Support Tools scoped application to resolve any issues or perform a general analysis on a Service Graph Connector installed on your instance. See Service Graph Connector Support Tools.

Service Graph Connectors

You can use a Service Graph Connector to import and integrate third-party data into CMDB and non-CMDB tables.

Important:
Visit the ServiceNow Store website to view the latest list of all Service Graph Connectors.

To learn more, see Getting started with Service Graph Connectors.

Select an application to learn about the Service Graph Connector available for ingesting data from the application into your CMDB.

Public cloud providers

AWS	GCP	Microsoft Azure
aws		

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Wiz		

Endpoint or IT asset management applications

Google Console	Jamf	Microsoft Intune
Microsoft SCCM	Tanium	VMware Workspace ONE UEM

Monitoring and observability applications

AppDynamics	Datadog	Dynatrace
OpenTelemetry	New Relic	SolarWinds

Security solutions

Microsoft Defender for Endpoint	Microsoft Active Directory	Qualys
Rapid7		

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Software, server, or network applications

Infoblox 	**Trellix** Trellix	

Operational Technology (OT) applications

Claroty CTD 	**Microsoft Defender for IoT (On-premises Management Console)** 	**Microsoft Defender for IoT (Azure)** 
Operational Technology (Excel import) 		

Partner-built connectors

Service Graph Connectors can be built by partners and vendors. For a list of partner-built connectors, see the ServiceNow Store website.

Service Graph Connector for Active Directory

The Service Graph Connector for Active Directory retrieves computer and software information from the Microsoft Active Directory (AD) product and imports it into the Configuration Management Database (CMDB) in your instance using Lightweight Directory Access Protocol (LDAP).

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

- Microsoft Active Directory version: Last tested on
- Supported ServiceNow® versions:
  - Utah
  - Vancouver
  - Washington

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Use cases

Import computer and software details about your assets from the Microsoft Active Directory product into your CMDB.

Guided setup

The guided setup for the Service Graph Connector for Active Directory provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, Configure Service Graph Connector for Active Directory.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft Active Directory integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Service Graph Connector for Active Directory data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

After you complete the guided setup, you configure the integration to periodically pull data from the Active Directory. The data is loaded into the following tables.

You can use the Integration Hub ETL application to view the data maps.

Data sources and staging tables for Active Directory

Data source	Staging table
SGC Active Directory Import	SGC Active Directory Import [sn_sec_sgc_ad_active_directory_import]
Computer	Computer [cmdb_ci_computer]
Software	Software [cmdb_ci_spkg], [cmdb_software_instance], [cmdb_sam_sw_install]
SGC Active Directory Computer	SGC Active Directory Computer [sn_sec_sgc_ad_active_directory_computer]

Configure Service Graph Connector for Active Directory

Configure your Lightweight Directory Access Protocol (LDAP) connections and verify them, set up scheduled imports, and optionally add multiple instances with the Guided Setup.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM

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Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

After you have followed the instructions provided to you to download and activate the Service Graph Connector for Active Directory application, refer to Download an application from the ServiceNow Store for the first time and Install a Security Operations integration. There are a few steps you need to complete before you configure this integration.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Active Directory** > **Setup**.
2. On the Welcome to Guided Setup Home page, select **Continue**.
3. On the Experience page, select **Best Experience** followed by **Continue**.
   The Service Graph Connector for Active Directory (AD) page is displayed with the following tasks:
   - Configure LDAP Server
   - Add Multiple Instances
   - Set up scheduled import jobs
4. Select **Configure LDAP Server** to expand it.
   The following steps are displayed in the left navigation panel:
   - Configure Inactive threshold
   - Update LDAP OU definition
   - Configure LDAP Server Details
   - Test LDAP Server Connection

   A single LDAP server is supplied along with the application. This server includes a computer organizational (OU) unit that retrieves a computer's object information from the computers OU.
5. **Optional:** Select **Configure Inactive threshold** to open the record.
   The System Property sn_sec_sgc_ad.inactive_threshold form is displayed.
6. Select the **here** link in the message at the top of the form to edit the record.
7. **Optional:** Alternatively, you can select the **Globe** icon in the upper right of the screen and select **Service Graph Connector for Active Directory** from the list to change the application scope so you can edit the form.

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As you progress through the Guided Setup, follow any instructions you see at the top of the pages in for modifying the application scope so you can open, edit, and save the record.

8. Enter a threshold in the **Value** field.
   The default value is 90 days. Before you modify this value, refer to the information about the threshold setting at the top of the page. With this setting, assets that match the day threshold value are excluded from import.
9. Right-click in the gray header titled System Property sn_sec_sgc_ad.inactive_threshold of the record and select **Save**.
10. Select **Mark as complete** followed by **Continue**.
    The LDAP OU Definition Access record is displayed.
11. Update LDAP OU Definition Access.

    a. Follow the steps listed at the top of the page and on the LDAP OU Definition record to verify or switch the application scope to 'Global' with the application picker.

    b. Select the **LDAP OU Definition** record on the table to open it.

    c. On the record, if not selected, select the **Application Access** tab.

    d. If displayed, select the link to edit the record followed by the check boxes for the permission settings you want.

    e. Right-click in the gray header of the Table LDAP OU Definition record and select **Save**.

    f. Select **Mark as complete** followed by **Continue**.
    The Configure LDAP Server Details page is displayed.

12. Provide the details for LDAP server connection.

    a. Verify values or fill in the fields.

Field	Value
Name	Read-only: Unique name for the LDAP server for example SGC-AD-computer.
Application	Read-only: Service Graph Connector for Active Directory (AD).
Active	Check box selected.
Login distinguished name	Login name for the AD server.
Login password	Password for the AD server.
Starting search directory	Directory you want to search for example `DC=Ops`.
(Optional) MID Server	Dedicated MID Server for the connection, if available.

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Field	Value
	Note: A MID Server is required for on-premise connections if the instance is not publicly accessible.
LDAP Server URLs	Add the URL for the server for example `ladp://host-name:389/`.

b. Right-click in the gray header titled LDAP Server and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
The Test LDAP Server Connection page is displayed.

13. Test the LDAP Server Connection.

a. Scroll to the Related links section on the form and select the **Test Connection** link
If the connection is successful, a Connected Successfully message is displayed. If your connection test fails, a message is displayed with information about why the connection failed. Review the Message field for how to proceed.

b. If you edit the record to fix the connection, right-click in the gray header titled LDAP Server and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
Add Multiple Instances is displayed in the top header the tasks.

Adding Multiple instances is optional. If you don't want to add multiple instances, you can proceed to step 14 and the Set scheduled import jobs task.

14. Optional: Add multiple instances.
To add multiple instances, you must update data source access. You must edit the permissions on the Datasource [sys_data_source] table to create a data source for the new connection in the Service Graph Connector for Active Directory.

15. Select **Add Multiple Instances** from the top header drop down list.
The following tasks are displayed:

- Update Data Source Access
- Update Scheduled Data Import Access
- Add Another LDAP Server
- List of configured LDAP servers

16. Select **Update Data Source Access**.

a. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

b. Select the Data Import record from the list to open it.

c. With the **Application Access** tab selected, follow the instructions to edit the record and modify the check boxes.

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d. Right-click in the gray header titled Table Data Source and select **Save**.

e. Select **Mark as complete** followed by **Continue**.
The Update scheduled data import access page is displayed.

17. Update scheduled data import access.

a. Select the **Scheduled Data Import** record from the list to open it.

b. **Optional:** With the **Application Access** tab selected, follow the instructions to edit the record and modify the check boxes.

c. Right-click in the gray header titled Table Scheduled Data Import and select **Save**.

d. Select **Mark as complete** followed by **Continue**.
The Add Another LDAP Server page is displayed. There are two steps for this task:

- LDAP server configuration
- Basic LDAP server information

18. Provide LDAP server configuration information.

a. Fill out the fields.

Field	Value
Type of LDAP server	Active Directory
Server name	Unique name of the LDAP server.
Server URL	URL for example `ldap://host-name:389/`.
Start search directory	Directory you want to search for example `DC=SecOps`.

b. Select **Submit**.
After you submit these edits, complete the second configuration step.

c. Fill in the fields for the basic LDAP server information.

Field	Value
Application	Read-only Service Graph Connector for Active Directory.
Active	Check box selected.
Login distinguished name	Login name for the AD server.
Login password	Password for the AD server.
Starting search directory	Directory you want to search for example `DC=SecOps`.
MID Server	Dedicated MID Server for the connection.

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Field	Value
	Note: A MID Server is not required for the LDAP server.

d. Right-click in the gray header titled LDAP Server and select **Save**.

e. Select **Mark as complete** followed by **Continue**.
The List of configured LADP server page is displayed.

f. Select your new record from the list to open it and test the connection.

g. Optional: Edit information on the form.

h. When you are satisfied with the information, scroll to the Related links and select the **Test Connection** link.
If the connection is successful, a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

i. After a successful connection, right-click in the gray header titled LDAP Server and select **Save**.

j. Select **Mark as complete** followed by **Continue**.

19. To set up scheduled jobs, select **Set up scheduled import jobs** from the drop down list in the top header.
You must activate a scheduled job from the configuration page.

a. On the Configure the scheduled jobs page, select a record from the Scheduled Data Imports list to open it.

b. Select the **Active** check box and fill in the fields.

Field	Value
Name	Unique name for the LDAP server, SGC-AD-computer.
Application	Read-only Service Graph Connector for Active Directory (AD).
Run	How often you want the job to run. If you want to run a test import prior to scheduling it, you might prefer to set this to **Once**.
Run as	Run the scheduled job with the credentials of another specified user.
Time	When you want the job to run.
Active	Select the check box.

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Field	Value
Conditional	Specific conditions under which this job is run.
Use connection	Leave this deactivated for the first run. Specifies another connection and credentials for this job.
Concurrent import	Leave activated. Splits data into multiple imports sets. See the message for more information.
Partition Method	Leave as Custom size.
Partition size	15,000. Import set size for early scheduling.
Execute pre-import script	Leave activated. Specifies a script to run before the import is performed.
Execute post-import script	Leave activated. Specifies a script to run after the import is performed.

c. **Optional:** Select **Execute now** to run the job.
If you do not choose to run the job on-demand, the next job runs according to the schedule you set.

d. Right-click in the gray Scheduled Data Imports header and select **Save**.

e. Select **Mark as complete** followed by **Continue**.

20. On the Home page for Guided Setup, select **Complete** to finish the configuration.

CMDB classes targeted in Service Graph Connector for Active Directory

When you complete the guided setup, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Name	name
Category	category
Object ID	object_id
Fully qualified domain name	fqdn
Checked out	check_out
Check in	check_in
First discovered	first_discovered
Operating System	os

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Attribute label	Attribute name
OS Version	os_version

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Name	name
Key	key
Version	version

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data.

Attribute label	Attribute name
Name	name
Install On	installed_on
Product Name	software

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data.

Attribute label	Attribute name
Display Name	display_name
Version	version
Discovery source	discovery_source

SGC Active Directory Computer [sn_sec_sgc_ad_active_directory_computer]

The following attributes in the SGC Active Directory Computer [sn_sec_sgc_ad_active_directory_computer] table are populated by collected data.

Attribute label	Attribute name
Account expires	account_expires
Bad password count	bad_pwd_count
Bad password time	bad_password_time
Code page	code_page
Common name	cn

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Attribute label	Attribute name
Country code	country_code
Description	description
Display name	display_name
Distinguished name	distinguished_name
DN	dn
Dscorepropagation data	dscore_propagation_data
Instance type	instance_type
Iscritical system object	iscritical_system_object
Keywords	keywords
Last logon	last_logon
Local policy flags	local_policy_flags
Logon count	logon_count
Member of	member_of
Ms-DS-Host service account	msds_host_service_account
Ms-DS-Supported encryption types	msds_support_ncryptiontypes
Name	name
Object class	object_class
Object GUID	object_guid
Other well known objects	other_well_known_objects
Password last set	pwd_last_set
Primary group id	primary_groupid
SamAccount name	sam_account_name
SamAccount type	sam_account_type
Service binding information	service_binding_information
Service class name	service_class_name
Service DNS name	service_dns_name
Service DNS name type	service_dns_name_type
Service principal name	service_principal_name
Show in advanced view only	show_in_advanced_view_only
Source	source
User account control	user_account_control
USN changed	usn_changed
USN created	usn_created
When changed	when_changed

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Service Graph Connector for AWS

Use the Service Graph Connector for AWS to securely bring in Amazon Web Services (AWS) data into your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

The integration uses AWS native technologies and AWS security best practices to enable cloud teams to connect the data within their ServiceNow workflow. For more information about the Service Graph Connector for AWS, see the Service Graph Connector for AWS - Introduction article on the ServiceNow Community site.

Supported ServiceNow versions

- Washington DC
- Xanadu
- Yokohama
- Zurich

Use cases

The following are examples on how you can use the Service Graph Connector for different ServiceNow applications:

- Visibility into cloud resources, relationships, and state in real time.
- Deep discovery of applications for ITAM or SAM outcomes.
- Governance and compliance outcome.

Important information for upgrading Service Graph Connector for AWS

Before you begin the upgrade process, complete the following tasks:

- If there are any customizations, delete the records associated with the Service Graph Connector for AWS from the Customer Updates [sys_update_xml] table. See Customer Updates table.
- Upgrade any dependencies.

After you've installed the latest version of the Service Graph Connector for AWS:

- Perform a full import of data from your AWS instance. Verify that the **Use last run datetime** field value is cleared for all the AWS data sources in the Data Source [sys_data_source] table.
- Download and rerun the AWS scripts. See Configure the AWS environment.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for AWS using SGC Central.

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Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring AWS integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the AWS data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

Note:
If the **Use last run datetime** field for an AWS data source in the Data Source [sys_data_source] table is empty, the connector imports all available initial data. If the **Use last run datetime** field includes a date stamp, the connector imports incremental data that has been newly added since the previous run.

The following table lists the import schedule order, the data sources and import schedules of the same name, the staging tables, the target tables as CMDB CI classes, the import schedule requirement type, and the import schedule dependencies for AWS.

Data mapping for AWS

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
1	SG-AWS-Organization	SG-AWS-Organization [sn_aws_integ_sg_aws_organization]	Cloud Organizations	Required
2	SG-AWS-Org-Units	SG-AWS-Org-Units [sn_aws_integ_sg_aws_org_units]	AWS Organizational Unit	Optional
3	SG-AWS-Service-Account	SG-AWS-Service-Account [sn_aws_integ_sg_aws_service_account]	Cloud Service Account Cloud Organizations Key Value	Required
4	SG-AWS-Service-Account-Tags	SG-AWS-Service-Account-Tags [sn_aws_integ_sg_aws_service_account_tags]	Cloud Service Account Key Value	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
5	SG-AWS-Org-Unit-Accounts	SG-AWS-Org-Unit-Accounts [sn_aws_integ_sg_aws_org_unit_accounts]	Cloud Service Account	Optional
6	SG-AWS-Datacenters	SG-AWS-Datacenters [sn_aws_integ_sg_aws_datacenters]	Cloud Service Account AWS Datacenter	Required
7	SG-AWS-VPC	SG-AWS-VPC [sn_aws_integ_sg_aws_vpc]	Cloud Service Account Cloud Network AWS Datacenter Key Value SG-AWS Extension Attributes	Required
8	SG-AWS-Subnets	SG-AWS-Subnets [sn_aws_integ_sg_aws_subnets]	Availability Zone Cloud Network Cloud Subnet AWS Datacenter Key Value SG-AWS Extension Attributes	Required
9	SG-AWS-Network-Interface	SG-AWS-Network-Interface [sn_aws_integ_sg_aws_network_interface]	Cloud Network Cloud Subnet Cloud Mgmt Network Interface AWS Datacenter Key Value	Required for a virtual machine (VM) instance

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
			SG-AWS Extension Attributes	
10	SG-AWS-Security-Group	SG-AWS-Security-Group [sn_aws_integ_sg_aws_security_group]	Cloud Network Compute Security Group AWS Datacenter Key Value SG-AWS Extension Attributes	Required for a VM instance
11	SG-AWS-Storage-Volume	SG-AWS-Storage-Volume [sn_aws_integ_sg_aws_storage_volume]	Storage Volume Storage Volume Snapshot AWS Datacenter Key Value SG-AWS Extension Attributes	Required for a VM instance
12	SG-AWS-Image-Private	SG-AWS-Image [sn_aws_integ_sg_aws_image]	Image	Required for a VM instance
13	SG-AWS-Image-Id	SG-AWS-Image-Id [sn_aws_integ_sg_aws_image_id]	Image	Required for a VM instance

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
14	SG-AWS-Hardware-Type	SG-AWS-Hardware-Type [sn_aws_integ_sg_aws_hardware_type]	Hardware Type AWS Datacenter	Required for a VM instance
15	SG-AWS-EC2	SG-AWS-EC2 [sn_aws_integ_sg_aws_ec2]	Virtual Machine Instance The following CIs are populated when populating the Virtual Machine Instance CI: Server VNIC Endpoint Storage Mapping Block Endpoint IP Address Network Adapter Key Value	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
16	SG-AWS-ELB-V1	SG-AWS-ELB-V1 [sn_aws_integ_sg_aws_elb_v1]	Cloud Load Balancer Compute Security Group Availability Zone AWS Datacenter Key Value SG-AWS Extension Attributes	Optional
17	SG-AWS-ELB-V2	SG-AWS-ELB-V2 [sn_aws_integ_sg_aws_elb_v2]	Cloud Load Balancer Compute Security Group Availability Zone AWS Datacenter Key Value SG-AWS Extension Attributes	Optional
18	SG-AWS-RDS	SG-AWS-RDS [sn_aws_integ_sg_aws_rds]	Cloud DataBase AWS Datacenter Key Value SG-AWS Extension Attributes	Optional
19	SG-AWS-API-Gateway	SG-AWS-API-Gateway [sn_aws_integ_sg_aws_api_gateway]	Cloud Gateway [cmdb_ci_cloud_gateway] AWS Datacenter Key Value SG-AWS Extension Attributes	Optional
20	SG-AWS-Lambda	SG-AWS-Lambda [sn_aws_integ_sg_aws_lambda]	Cloud Function	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
21	SG-AWS-S3	SG-AWS-S3 [sn_aws_integ_sg_aws_s3]	Cloud Object Storage	Optional
22	SG-AWS-DynamoDb	SG-AWS-DynamoDb [sn_aws_integ_sg_aws_dynamodb]	DynamoDB Table AWS Datacenter Key Value SG-AWS Extension Attributes	Optional
23	SG-AWS-Software-Inventory	SG-AWS-Software-Inventory [sn_aws_integ_sg_aws_software_inventory] SG-AWS-Software-Staging [sn_aws_integ_sg_aws_temp_software_staging]	When the Software Asset Management (SAM) application isn't installed: Software Packages Software Instance Server When the SAM application is installed: Software Installation Server	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
24	SG-AWS-Software-Remove	SG-AWS-Software-Remove [sn_aws_integ_sg_aws_software_remove]	None	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
25	SG-AWS-SSM-SendCommand	SG-AWS-SSM-SendCommand [sn_aws_integ_sg_aws_ssm_sendcommand]	Application Running Process TCP Connections	Optional
26	SG-AWS-Tags	SG-AWS-Tags [sn_aws_integ_sg_aws_tags]	DynamoDB Table Cloud Load Balancer Cloud Function Key Value	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
27	SG-AWS-VM-Hw-Consolidation	SG-AWS-VM-Hw-Consolidation [sn_aws_integ_sg_aws_vm_hw_consolidation]	Virtual Machine Instance Server	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
28	SG-AWS-EKS-Cluster	SG-AWS-EKS-Cluster [sn_aws_integ_sg_aws_eks_cluster]	Kubernetes Cluster AWS Datacenter Key Value SG-AWS Extension Attributes	Optional
29	SG-AWS-EKS-Cluster-2	SG-AWS-EKS-Cluster-2 [sn_aws_integ_sg_aws_eks_cluster_2]	Kubernetes Cluster AWS Datacenter Key Value	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
			SG-AWS Extension Attributes	
30	SG-AWS-EKS-FULL	SG-AWS-EKS-FULL [sn_aws_integ_sg_aws_eks_full]	Kubernetes Cluster Server Kubernetes Namespace Kubernetes Node Kubernetes Service Kubernetes Pod Docker Container	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
			Docker Image Kubernetes Volume Kubernetes Deployment Kubernetes DaemonSet Kubernetes ReplicaSet	
31	SG-AWS-Generic-Resources	SG-AWS-Generic-Resources [sn_aws_integ_sg_aws_generic_resources]	Cloud Resource SG-AWS Extension Attributes	Optional
32	SG-AWS-Redshift-Cluster	SG-AWS-Redshift-Cluster [sn_aws_integ_sg_aws_redshift_cluster]	Amazon Redshift	Optional

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes	Import schedule requiremen type
33	SG-AWS-Get-Inventory	SG-AWS-Get-Inventory [sn_aws_integ_sg_aws_get_inventory]	Server	Required
34	SG-AWS-GenericTags	SG-AWS-GenericTags [sn_aws_integ_sg_aws_generictags]	Cloud Resource Key Value	Optional

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Note:

- The SG-AWS-Generic-Resources data source imports data for generic resources that aren't tracked by other data sources. The connector utilizes the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table to differentiate between generic and other supported resource types.

  The connector first populates all supported resources in the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table. These resources, categorized under their respective supported resource types, have specific data sources designated for ingestion within the connector. When the SG-AWS-Generic-Resources data source is executed and retrieves unsupported resource types, they are added to the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table and categorized as generic.

- To import global generic resources such as IAM user and IAM group, specify a standard AWS region that has `Config` enabled with *`includeGlobalResourceTypes`* set to `true` by updating the value of the *`sn_aws_integ.global_generic_resource_region`* system property for the SG-AWS-Generic-Resources data source.

  If an aggregator is configured, and the *`sn_aws_integ.global_generic_resource_region`* value is not specified, the aggregator region is assigned as the value of this system property for importing global generic resources.

- If the AWS Systems Manager (SSM) service isn't enabled, the connector populates the server records in the Server [cmdb_ci_server] class. If the AWS SSM service is enabled, then based on the platform type obtained through the SSM service, the server records are populated in either the Linux Server [cmdb_ci_linux_server] class or the Windows Server [cmdb_ci_win_server] class. The Server [cmdb_ci_server] class is the parent class of the Linux Server [cmdb_ci_linux_server] and the Windows Server [cmdb_ci_win_server] classes.
- All labels associated with an AWS resource are added to the Key Value [cmdb_key_value] table.

  Note:
  You can use the CMDB Data Manager to delete tag data from retired CIs in the Key Value [cmdb_key_value] table based on conditions like retention time and discovery source. A scheduled job runs the policy, which can be configured to execute during off-peak hours.

- The basic information about a GCP resource is stored in the SG-AWS Extension Attributes [sn_aws_extension_attributes] table.
- Starting with the Service Graph Connector for AWS 2.10.0 version, the SG-AWS-Get-Inventory data source runs before the SG-AWS-EC2 data source and creates a Server [cmdb_ci_server] CI with the host name mapped to the Name attribute, instead of being mapped to the VM name.
- The SG-AWS-GenericTags data source imports tag data only for generic resources that have an ARN key. You can use the SG-AWS Extension Attributes [sn_aws_extension_attributes] table to verify which generic resources have an ARN key.

For more information on where data is saved when pulling data from AWS, see CMDB classes targeted in Service Graph Connector for AWS and Supported AWS resource types.

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When you run the diagnostic test, the data is loaded in the following tables:

- SG AWS Diagnostic Details [sn_aws_integ_sg_aws_diagnostic_details]
- SG-AWS Diagnostic Summary [sn_aws_integ_sg_aws_diagnostic_summary]
- SG AWS Diagnostic Summary Notes [sn_aws_integ_sg_aws_diagnostic_summary_notes]

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

The AWS configuration data for each connection is stored in the SG AWS Application properties [sn_aws_integ_sg_aws_application_properties] table.

For more information about how CI information is pulled from AWS, see the Service Graph Connector for AWS - Functional Spec and CI article on the ServiceNow Community site.

BYOL support

Bringing your own licenses (BYOL) is the process of bringing previously purchased on-premises licenses to Amazon AWS Cloud. The connector supports the BYOL of the Image CIs for Oracle Database servers on Amazon AWS Cloud by populating the Key Value [cmdb_key_value] table with the licensing information. When the licensing information is found, the key is set to `Windows_OS_License_Type_automatic` and the key value is set to `BYOL` in the Key Value [cmdb_key_value] table.

To support BYOL, the *`sn_aws_integ.load_all_images`* system property is enabled during the initial pull to import the metadata of all Image CIs included in the SG-AWS-Image-Id data source. After the initial pull, the property is deactivated automatically. The SG-AWS-Image-Id data source then imports the metadata of the Image CIs without names only.

Managing retired CIs in EKS components

If the Amazon Elastic Kubernetes Services (EKS) CIs are deleted in EKS components such as pods, services, and volumes, the corresponding CI entries are automatically set to **Retired** in the following CMDB CI classes:

Kubernetes Cluster, Kubernetes Node, Kubernetes Pod, Kubernetes Service, Kubernetes DaemonSet Kubernetes Namespace, Kubernetes Deployment, Docker Container, Kubernetes Volume

Shared VPC and subnets support

Import CI relationships established between virtual private clouds (VPCs), subnets, and network interfaces hosted in different AWS accounts. For example, a VPC in one AWS account can be connected to a subnet in the same account, which can then link to a network interface and a virtual machine in another AWS account.

Additional resources

See the following articles on the ServiceNow Community site for any additional information on the AWS set up:

- Service Graph Connector for AWS - Introduction
- How do I configure the AWS Service Graph Connector?
- Service Graph Connector for AWS - Diagnostic Tool & Troubleshooting Issues

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- Service Graph Connector for AWS - Functional Spec and CI
- Cloud Discovery and SG-AWS

Related content

Service Graph Connectors

Enable optimized deletion of retired CIs in AWS

Enable optimized SG-AWS-SendCommand data source performance

Handling import failures for large AWS resources

Handling memory utilization errors for Service Graph Connector for AWS

Life cycle management of records in Service Graph Connector for AWS

Record removal process in Service Graph Connector for AWS

Configure the AWS environment for the Service Graph Connector for AWS

Configure your Amazon Web Services (AWS) environment to import data using the Service Graph Connector for AWS.

Before you begin

Install the Service Graph Connector for AWS application (sn_aws_integ). For more information, see Install a ServiceNow Store application.

Role required: application administrator

Procedure

1. Learn about the AWS resources used by the connector.
   Get familiar with the AWS concepts to learn how the Service Graph Connector for AWS is integrated with AWS.
2. Download the AWS scripts.
   Download the AWS scripts included within the guided setup of the Service Graph Connector for AWS.
3. Review the requirements before executing the AWS scripts.
   Complete the prerequisites before you execute the AWS scripts.
4. Execute the AWS scripts.
   Execute scripts provided with the Service Graph Connector for AWS to set up the AWS environment for importing data.

AWS resources used by the Service Graph Connector for AWS

Get familiar with the AWS concepts to learn how the Service Graph Connector for AWS is integrated with Amazon Web Services (AWS).

AWS Config service and configuration recorder

Important:
The AWS Config service and AWS configuration recorder are required for setting up the connector.

The AWS Config service monitors and records changes to your AWS resource configurations.

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The AWS configuration recorder detects changes in resource configurations and captures these changes as configuration items (CIs). The is required for setting up the connector. The configuration recorder enables recording all hardware data in AWS Config. See What Is AWS Config? on the AWS Documentation site.

The Service Graph Connector for AWS includes the `EnableAWSConfig.yml` script to enable the AWS Config service that instead enables the configuration recorder. See Executing scripts required for setting up AWS.

Note:
Ensure that the AWS Config service is enabled for all applicable AWS accounts and regions.

AWS Config aggregator

Important:
The AWS Config aggregator is optional for setting up the connector.

The AWS Config aggregator collects the AWS Config configuration and compliance data from the following sources:

- Multiple accounts and multiple regions
- Single account and multiple regions
- An organization in AWS organizations and all the accounts within the organization that have AWS Config enabled.

The advantages of using an AWS Config aggregator with the Service Graph Connector for AWS are:

- Gets all the data from a single location.
- Gets the bootstrap updates (baseline configurations) and the incremental updates (new configurations added after the last update).
- Doesn't require looping into each account and region.
- Accelerates pulling data.

Due to these advantages, consider leveraging the AWS Config aggregator for pulling data from multiple accounts or multiple regions.

Note:
For detecting any deleted resources, the connector uses the `config:ListDiscoveredResources` API to loop through each AWS account and region and update the CMDB CI accordingly. As a date range for selecting resources can't be specified in the `ListDiscoveredResources` API, the connector might make multiple API calls to gather all the data that might impact the performance of the connector.

For more information on setting up an AWS Config aggregator, see Multi-Account Multi-Region Data Aggregation and Setting Up an Aggregator Using the Console on the AWS Documentation site.

AWS Systems Manager and AWS Systems Manager Inventory

Important:
AWS Systems Managerand AWS Systems Manager Inventory are required for setting up the deep discovery feature.

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The AWS Systems Manager enables fetching server data, also called as deep discovery data, from EC2 instances across AWS accounts and regions through SSM documents. The deep discovery data includes host name, serial number, CPU data, TCP data, and process information.

The AWS Systems Manager Inventory imports the software data installed on the EC2 instances. The Inventory resource group in AWS Systems Manager collects information about the EC2 instances and the software applications installed on them.

Ensure that the following items are configured in all AWS accounts:

- The AWS Systems Manager Agent (SSM Agent) is installed on all managed EC2 instances.
- The AmazonSSMForInstancesRole IAM instance profile role is attached as the instance profile on EC2 instances.
- The AWS Systems Manager Inventory is configured in each AWS region.
- The AWS Systems Manager has access to the managed EC2 instances.

Note:
By default, AWS Systems Manager doesn't have permission to perform actions on EC2 instances. You can grant access by attaching the AmazonSSMForInstancesRole IAM instance profile role to the EC2 instance. See Setting up AWS Systems Manager on the AWS Documentation site.

The advantages of using AWS Systems Manager and AWS Systems Manager Inventory are:

- The AWS Systems Manager enables getting the detailed server data such as host name, serial number, CPU data, TCP data, and process information.
- The AWS Systems Manager Inventory enables the server classification and getting the software data.

Download the AWS scripts

Download the AWS scripts included within the guided setup of the Service Graph Connector for AWS.

Before you begin

- Ensure that you have installed the Service Graph Connector for AWS application (sn_aws_integ). For more information, see Install a ServiceNow Store application.
- Ensure that you've selected the **Service Graph Connector for AWS** application scope by using the application picker. See Application picker.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connector for AWS** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. In the Configure the AWS environment section of the Service Graph Connector for AWS page, select **Get Started**.
4. For the Download the scripts task, select **Configure**.
5. When you download all the scripts onto your local machine, select **Close** to close the Download the scripts dialog box and return to the guided setup.
6. Set the Download the scripts task to complete by selecting **Mark as Complete**.

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Prerequisites for executing scripts

Complete the prerequisites before you execute the AWS scripts.

Important:
Ensure that you have downloaded the scripts available within the Service Graph Connector for AWS. See Download the AWS scripts.

Decide the following details to be used later during the execution of the AWS scripts:

- ServiceNow IAM role
- ServiceNow IAM username
- S3 bucket for the ServiceNow IAM role

Note:
Define an S3 bucket only when you are using deep discovery scripts.

Determine the ServiceNow IAM role

Determine the identity and access management (IAM) role that performs read-only operations in member accounts to fetch the configuration items (CIs) from the AWS environment.

By default, the `CreateSnowOrganizationAccountAccessRoleInMemberAccount.yml` script creates the SnowOrganizationAccountAccessRole IAM role. You can use the default name created by the script or create a new IAM role. However, when required as an input parameter, you must enter the same IAM role across scripts. See Executing scripts required for setting up AWS.

Determine the ServiceNow IAM username

Determine the name of the IAM user that assumes the ServiceNow IAM role in the member accounts.

By default, the `CreateServiceNowUser.yml` script creates the NOWSGCUser IAM user. You can use the default name created by the script or create a new IAM user. However, when required as an input parameter, you must enter the same IAM username across scripts. See Executing scripts required for setting up AWS.

Define the S3 bucket for deep discovery

Set up an S3 bucket with read and delete privileges for the ServiceNow IAM role to store and delete the *SendCommand* API responses when importing AWS data.

Before you begin
Role required: Application administrator

About this task
Create an S3 bucket for the Service Graph Connector for AWS application and enable the ServiceNow IAM role to have access to this bucket in the organization.

Note:
Use an S3 bucket only when you want to perform deep discovery on EC2 instances.

Procedure

1. Create an S3 bucket in an AWS account region.
   See Creating a bucket on the AWS documentation site.

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Note:
The S3 bucket must have the following permission settings.

S3 bucket permissions and their settings

Permission	Setting
Access	Bucket and objects not public
S3 Block Public Access	Block public access to S3 buckets and objects

For more information, see S3 Block Public Access on the AWS documentation site.

2. Add a bucket policy.

   See Bucket policies on the AWS documentation site.

   To access the S3 bucket you created in step 1, its bucket policy must allow the IAM instance profile role attached to the managed EC2 instances. You can either create a bucket policy or grant access to your AWS member account in the bucket access control list (ACL). The member account must include the EC2 instances.

   Note:
   Adding an AWS member account to the bucket ACL allows all users and roles in the member account to access the S3 bucket.

   Refer to the following sample code when adding a bucket policy.

```
{
    "Version": "2012-10-17",
    "Id": "S3PolicyforServiceNowIAMrole",
    "Statement": [
        {
            "Sid": "EC2S3Access",
            "Effect": "Allow",
            "Principal": {
                "AWS":
 "arn:aws:iam::AWS-ACCOUNT:role/INSTANCE-PROFILE-ROLE-NAME"
            },
            "Action": [
                "s3:GetObject",
                "s3:PutObject",
                "s3:PutObjectAcl"
            ],
            "Resource": "arn:aws:s3:::DOC-EXAMPLE-BUCKET/*"
        }
    ]
}
```

   Where

   - *SOURCE-AWS-ACCOUNT* is the AWS account ID of the member account that includes the EC2 instances.
   - *INSTANCE-PROFILE-ROLE-NAME* is the IAM instance profile that is attached to the EC2 instances.

     By default, the *AmazonSSMForInstancesRoleSetup.yml* script creates the AmazonSSMForInstancesRole IAM instance profile role and attaches the role to the

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AmazonSSMManagedInstanceCore bucket policy. See Executing scripts required for setting up AWS.

- *DOC - EXAMPLE - BUCKET* is the S3 bucket name.

The following example bucket policy shows the effect, principal, action, and resource elements. The policy allows AmazonSSMRoleForInstances, an IAM instance profile role in an account with ID `123456789000`, `s3:GetObject`, `s3:PutObject`, and `s3:PutObjectAcl` S3 permissions on the `myS3Bucket` bucket.

```
{
    "Version": "2012-10-17",
    "Id": "S3PolicyforServiceNowIAMrole",
    "Statement": [
        {
            "Sid": "EC2S3Access",
            "Effect": "Allow",
            "Principal": {
                "AWS": [

 "arn:aws:iam::123456789000:role/AmazonSSMRoleForInstances",

 "arn:aws:iam::123456789001:role/AmazonSSMRoleForInstances",

 "arn:aws:iam::123456789002:role/AmazonSSMRoleForInstances",

 "arn:aws:iam::123456789003:role/AmazonSSMRoleForInstances",

 "arn:aws:iam::123456789004:role/AmazonSSMRoleForInstances"
                ]
            },
            "Action": [
                "s3:GetObject",
                "s3:PutObject",
                "s3:PutObjectAcl"
            ],
            "Resource": "arn:aws:s3:::myS3Bucket/*"
        }
    ]
}
```

3. Attach IAM permissions to the instance profile role for EC2 instances to publish the *SendCommand* API responses to the S3 bucket you created in step 1.
See Using instance profiles and Attach an IAM role to an instance on the AWS documentation site.

The IAM instance profile role attached to the managed EC2 instances must have the `s3:GetObject`, `s3:PutObject`, and `s3:PutObjectAcl` S3 permissions to allow access to the S3 bucket as shown in the following sample policy.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
        "Sid": "PublishTerminalOutputToS3",
            "Effect": "Allow",
            "Action": [
                "s3:PutObject",
```

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```
                "s3:GetObject",
                "s3:PutObjectAcl"
            ],
            "Resource": "arn:aws:s3:::DOC-EXAMPLE-BUCKET/*"
        }
    ]
}
```

Where, *DOC-EXAMPLE-BUCKET* is the S3 bucket name.

Note:
Make sure you add the suffix `/*` at the end of the bucket name to enable creating files under the bucket name.

Executing scripts required for setting up AWS

You must execute scripts provided with the Service Graph Connector for AWS to set up the AWS environment for importing data.

Important:
Before executing an AWS script, ensure that you have completed the prerequisites. See Prerequisites for executing scripts.

The AWS scripts provided with the connector configure AWS resources to import the configuration items (CIs) data into the CMDB. To learn more, see AWS resources used by the Service Graph Connector for AWS.

Based on the AWS environment requirements, the scripts provided with the Service Graph Connector for AWS are categorized as described in the following table.

Basic scripts	Deep discovery scripts	Amazon EKS scripts
Scripts for configuring the AWS environment to import data by using the connector.	Scripts for setting up deep discovery on Amazon Elastic Compute Cloud (Amazon EC2) instances.	Scripts for setting up Amazon Elastic Kubernetes Service (EKS) clusters.

Basic scripts

Use the basic scripts to configure the AWS environment for importing data using the Service Graph Connector for AWS.

The following table describes the basic AWS scripts available with the connector, the input parameters entered when executing a script, the conditions to execute the scripts, and the script execution results.

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Basic script details

Script	Input parameters
EnableAWSConfig.yml	None
CreateServiceNowUser.yml	**SNUserName** Name of the ServiceNow IAM user t created as part of the setup. See Pre for executing scripts. Default value: `NOWSGCUser` **MbrActRoleName** Name of the ServiceNow IAM role th created as part of the setup. See Pre for executing scripts. Default value: `SnowOrganizationAccountA`
CreateSnowOrganizationAccountAccessRoleInMemberAccount.yml	**ACNNBR** Management account ID when the S IAM user is in a management accou Or Designated member account ID whe ServiceNow IAM user is in a designa member account. **S3Bucket** Amazon S3 bucket name to get the `SendCommand` output. **ServiceNowUserName** Name of the ServiceNow IAM user t created as part of the setup. See Pre for executing scripts. Default value: `NOWSGCUser`
SnowDesignatedAccountAccessRoleInManagementAccount.yml	**MEMBERACTNBR** Member account ID where the Servi user was created.

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Basic script details (continued)

Script	Input parameters
AWS-SystemsManager-AutomationExecutionRole.yml	None
AWS-SystemsManager-AutomationAdministrationRole.yml	None

Deep discovery scripts

Use the deep discovery scripts to set up deep discovery on Amazon EC2 instances.

Note:
Execute the deep discovery scripts only when you want to perform deep discovery on EC2 instances.

The following table describes the deep discovery scripts, the input parameters entered when executing a script, the conditions to execute the scripts, and the script execution results.

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Deep discovery script details

Script	Input parameters	Execution condition	Result
AmazonSSMForInstancesRoleSetup.yml	**S3Bucket** S3 bucket name that collects the details from EC2 instances. See Prerequisites for executing scripts.	Execute the script in all the AWS accounts by creating a CloudFormation StackSet in the management account. See Create a stack set on the AWS documentation site.	Creates the AmazonSSMForInstance IAM instance profile role to be attached to the EC instances.
SG-AWS-RunShellScript-Setup.yml	None	Execute the script in all the AWS accounts and the AWS regions by creating a CloudFormation StackSet in the management account. AWS administrators must update SSM documents and verify that EC2 instances can execute relevant commands for proper integration. See Create a stack set on the AWS documentation site.	Creates AWS Systems Manager (SSM) docume to fetch deep discovery from a Linux EC2 instanc Retrieves version details middleware applications including Apache HTTP server, Nginx server, Apa Tomcat server, and MyS instance.
SG-AWS-RunPowerShellScript-Setup.yml	None	Execute the script in all the AWS accounts and the AWS regions by	Creates AWS SSM docu to fetch deep discovery from a Windows EC2 ins

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Deep discovery script details (continued)

Script	Input parameters	Execution condition	Result
		creating a CloudFormation StackSet in the management account. See Create a stack set on the AWS documentation site.	

Amazon EKS scripts

Use the Amazon EKS scripts to set up Amazon Elastic Kubernetes Service (EKS) clusters.

Note:
Execute the Amazon EKS scripts only when the Amazon EKS service for Kubernetes clusters is required.

The following table describes the Amazon EKS scripts, the conditions to execute the scripts, and the script execution results.

Amazon EKS script details

Script	Execution condition	Result
SG-AWS-RunKubeCtlEKSNamesShellScript.yml	Execute the script in all the AWS accounts and the AWS regions where the EC2 Bastion hosts are located by creating a CloudFormation StackSet in the management account. See Create a stack set on the AWS documentation site.	Creates an AWS SSM document to discover EKS clusters associated with EC2 Bastion hosts. **Note:** An AWS Cloud administrator can update the SSM document in their AWS setup.
SG-AWS-RunKubeCtlShellScript.yml	Execute the script in all the AWS accounts and the AWS regions where the EC2 Bastion hosts are located by creating a CloudFormation StackSet in the management account.	Creates an AWS SSM document to fetch CIs related to Kubernetes components, such as pods, services, and deployments, from EKS clusters.

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Amazon EKS script details (continued)

Script	Execution condition	Result
	See Create a stack set on the AWS documentation site.	**Note:** An AWS Cloud administrator can update the SSM document in their AWS setup.

Configure Service Graph Connector for AWS using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for AWS for pulling in AWS data into the CMDB

Before you begin

- Install Service Graph Connector for AWS version 2.7.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- Verify that you've completed the prerequisites for setting up AWS. See Configure the AWS environment.

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Dashboard page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the AWS connector type and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Complete the prerequisites for setting up the AWS environment.

   a. Configure the basic setup in the AWS environment required for importing data using the connector.

      i. In the **Prerequisites** stage of the playbook, select the **Download basic scripts** activity.

      ii. Execute the scripts to configure the AWS environment.

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For more information on executing scripts, see Basic scripts.

iii. Select the **I have read the instructions and executed the script accordingly** check box to confirm that you have executed the scripts.

iv. Select **Continue**.

b. Set up deep discovery on Amazon Elastic Compute Cloud (Amazon EC2) instances.

> **Note:**
> Complete this step only to perform deep discovery on EC2 instances. Else, select **Skip**.

i. In the **Prerequisites** stage of the playbook, select the **Download deep discovery scripts** activity.

ii. Execute the scripts to configure Amazon EC2 instances for deep discovery.

For more information on executing scripts, see Deep discovery scripts.

iii. Select **Continue**.

c. Set up Amazon Elastic Kubernetes Service (EKS) clusters.

> **Note:**
> Complete this step only when the Amazon EKS service for Kubernetes clusters is required. Else, select **Skip**.

i. In the **Prerequisites** stage of the playbook, select the **Download Amazon EKS scripts** activity.

ii. Execute the scripts to set up Amazon EKS clusters.

For more information on executing scripts, see Amazon EKS scripts.

iii. Select **Continue**.

7. Complete the setup for configuring the connector for importing data.

a. Create and test connection.

i. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

ii. On the form, fill in the fields.

Create and test connection form

Field	
Connection name	Name to identify the AWS connection record. For example, `SG_AWS_CredentialAlias_Org`.
Access Key ID	Access key ID of the IAM user that has permissions to interact with the AWS resources.
Secret Access Key	Secret access key that corresponds to the Access key ID required for authenticating the connection securely.

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Field	
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
Mid Selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

iii. Select **Create and test connection**.

iv. Once the connection test is complete, select **Continue**.

b. Set configuration properties for the connection to access the AWS resources.

i. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

ii. In the Organization details section, fill in the organization details including the account identifier, name and description of the AWS organization.

iii. In the S3 account details section, fill in the details.

S3 account details

Field	Description
S3 account ID	Numeric identifier of the AWS account that hosts the Amazon Simple Storage Service (Amazon S3) bucket.
S3 bucket name	Name of the Amazon S3 bucket that collects the details from Amazon EC2 instances.
S3 region	Region where the Amazon S3 bucket resides.

iv. In the **AWS regions** field of the AWS regions and STS assume role name section, enter the AWS regions to collect the CI data.

By default, the Service Graph Connector for AWS runs through all the AWS regions to collect the CI data.

You can enter AWS specific regions to speed up the CI data import process. For example, `us-east1, us-east-2`.

If this field is left empty, the Service Graph Connector for AWS pulls the resources from all the AWS regions.

However, for the AWS GovCloud regions, don't leave the **Regions** field empty. The supported AWS GovCloud regions are `us-gov-east-1` and `us-gov-west-1`.

If you update the **Regions** field value later, clear the value of the **Last run datetime** field in all the data sources related to the Service Graph Connector for AWS to import a new set of data.

v. In the **STS assume role name** field of the AWS regions and STS assume role name section, enter the AWS Identity and Access Management (IAM) role name.

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The AWS IAM role name is obtained by the ServiceNow user by calling the `AssumeRole` API offered by the AWS Security Token Service (STS). The `AssumeRole` API returns a set of temporary security credentials for the ServiceNow user to access the AWS resources.

Note:
Enter the IAM role name but don't prefix `arn` in the name. If you leave this field is empty, the value of this field is automatically set to **SnowOrganizationAccountAccessRole**, which is the default IAM role name for the ServiceNow user.

vi. In the SSM SendCommand document details section, enter the name of the document that defines the actions run by the AWS Systems Manager (SSM) on a Linux-based Amazon EC2 instance or a Windows-based Amazon EC2 instance in their respective fields.

vii. In the **Management account ID** field of the Management account ID and standalone account ID section, enter the management account ID in the AWS organization.

Enter a value for this field when the ServiceNow user was created in an AWS member account.

The account calls the `ListAccounts` API associated with the AWS organization to collect CI information from all the accounts. For more information, see ListAccounts on the AWS documentation site.

viii. In the **Standalone account ID** field of the Management account ID and standalone account ID section, enter the ID of a member account in the AWS organization.

Note:
When specifying a standalone account, the AWS organization-related data such as the organization name, organization units, organization ID, and service accounts are not imported. To import the full data later, clear any value mentioned in the **Standalone account ID** field. See the Service Graph Connector for AWS - Standalone Setup [KB1642159] article in the Now Support Knowledge Base.

ix. In the AWS config aggregator details section, enter the AWS account details for the aggregator resource type.

AWS config aggregator details

Field	Description
Config aggregator account	AWS account where the aggregator resource type in the AWS Config service has been configured. Enter a value in this field when you're using an AWS Config aggregator.
Config aggregator name	Name of the aggregator resource type. This field is available only when you enter a value in the **Config aggregator account** field.
Config aggregator region	Region where the aggregator resource type resides. This field is available only when you enter a value in the **Config aggregator account** field.

x. In the AWS key rotation setup section, enter the key rotation process details.

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AWS key rotation setup

Field	Description
AWS rotate keys	Option to enable the key rotation process.
AWS key rotation date	Key rotation date. Set the value to the required key rotation date for the first run. For subsequent runs, this field is automatically set to the rotation date. This field is available only when you select the **AWS Rotate Keys** check box.
AWS key rotation period (in days)	Key rotation period in days. This field is available only when you select the **AWS rotate keys** check box.
AWS key rotation status	Status message of a key rotation displaying whether the rotation was a success or a failure. This field is automatically set to display the key rotation status message. This field is available only when you select the **AWS rotate keys** check box. If the rotation status is a failure, an email notification is triggered, if configured.
Email accounts for receiving error notifications	Comma-separated list of the email addresses of recipients who receive notifications about the AWS key rotation errors.
Email account groups for receiving error notifications	Comma-separated list of the ServiceNow groups who receive notifications about the AWS key rotation errors.

xi. Select the **Is gov cloud** check box in the Gov cloud setup section to indicate that the connection setup is for the AWS GovCloud.

xii. In the SSM EKS SendCommand document details section, enter the AWS SSM document details.

SSM EKS SendCommand document details

Field	Description
EKS cluster names document	Name of the AWS SSM document to discover EKS clusters associated with EC2 Bastion hosts.
EKS shell script document	Name of the AWS SSM document to fetch CIs related to Kubernetes components, such as pods, services, and deployments, from EKS clusters.

xiii. Select **Save properties**.

xiv. Select **Continue**.

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c. Configure the required EC2 resources for Amazon Elastic Kubernetes Service (EKS) to import EKS cluster data.

Note:
Complete this step only when EC2 resources are needed. Else, select **Skip** for the **Configure EKS EC2 resources** activity.

An EKS EC2 resource is a bastion host that has network access to EKS clusters. The EKS clusters aren't directly accessible to the connector. Therefore, you must provide the EKS EC2 resource details. For importing EKS cluster data, the connector uses the SSM Send Command on EKS EC2 resources to run kubectl commands remotely.

Note:
Ensure that you've configured your AWS environment for the EKS integration. For more information, see the Service Graph Connector for AWS - Amazon EKS Integration [KB1437138] article in the Now Support Knowledge Base.

i. In the **Setup** stage of the playbook, select the **Configure EKS EC2 resources** activity.

ii. On the Configure EKS EC2 resources page, select **New**.

iii. On the Configure EKS EC2 resources window that appears, fill in the fields.

Configure EKS EC2 resources fields

Field	Description
EKS EC2 Resource Id	Identifier of the EKS EC2 resource.
EC2 Region	AWS region where the EKS EC2 resource is located.
EC2 Account	User name assigned to the EKS EC2 resource account.
Connection Alias	Connection alias associated with the AWS environment setup and configured in step 7.a.ii.
Connection	Connection name associated with the AWS environment setup and configured in step 7.a.ii.
Active	Option to activate the EKS EC2 resource.

iv. Select **Save**.

v. Repeat steps from 7.c.ii to 7.c.iv to add more EKS EC2 resources.

vi. Select **Continue**.

d. Run the AWS diagnostic tool before running a scheduled import job to identify any issues in the AWS environment setup.

i. In the **Setup** stage of the playbook, select the **Run diagnostic tests** activity.

ii. On the Run diagnostic test page, select an option to exclude the corresponding test results from the diagnostic summary.

Skip SSM setup tests

Excludes the software inventory data from the summary results by not calling the `GetInventory` API. Select this option when you've opted out or not set up the configuration for SSM.

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Skip SSM Deep Discovery tests

Excludes the deep discovery data from the summary results. Select this option when you've opted out or not set up the configuration for SSM deep discovery.

Skip EKS setup tests

Excludes the EKS data from the summary results by not running the kubectl commands.

> **Note:**
> This check box appears only when you've configured EC2 resources in the **Configure EKS EC2 resources** activity.

iii. Select **Run diagnostic test** and wait for the test to complete.

iv. Review the diagnostic summary, the API access results, and the IAM permission validation logs.

v. When the test results are successful, select **Continue**.

e. Configure the import schedule to import data at regular intervals.

i. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

ii. Expand the Parent scheduled data import within the Import schedules list to select the **SG-AWS-Organization** import schedule.

iii. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

iv. Select **Save**.

Alternatively, select **Execute Now** to execute the import schedule immediately.

v. Select **Continue**.

f. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

- Service Graph Connector for AWS
- CMDB classes targeted in Service Graph Connector for AWS
- Supported AWS resource types
- Accessing the connection details of Service Graph Connector for AWS
- Additional features within the Service Graph Connector for AWS

Configure Service Graph Connector for AWS using the guided setup

Set up the AWS environment and scheduled jobs to pull in AWS data into the CMDB.

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Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.

Ensure that you've completed the prerequisites for setting up AWS. See Configure the AWS environment.

Note:
When upgrading from an earlier version, ensure that you've updated the SSM documents and IAM permissions in your AWS instance.

- For updating SSM documents, run the `SG-AWS-RunShellScript-Setup.yml`, `SG-AWS-RunPowerShellScript-Setup.yml`, and `SG-AWS-RunKubeCtlShellScript.yml` scripts.
- For updating the IAM permissions assigned to the SnowOrganizationAccountAccessRole role, run the `CreateSnowOrganizationAccountAccessRoleInMemberAccount.yml` script.

Role required: admin

About this task

For more information on the **Service Graph Connector for AWS** setup instructions, see the following articles:

- Service Graph Connector for AWS - Setup Instructions [KB1220597] article on the Now Support Knowledge Base.
- Service Graph Connector for AWS - Introduction on the ServiceNow Community site.
- SGC-AWS - Release 2.0 Features on the ServiceNow Community site.

If you upgrade the connector, complete the following tasks before the upgrade process:

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- If there are any customizations, delete the records associated with the Service Graph Connector for AWS from the Customer Updates [sys_update_xml] table. See Customer Updates table.
- Upgrade any dependencies.

After you've installed the latest version of the Service Graph Connector for AWS:

- Perform a full import of data from your AWS instance. Verify that the **Use last run datetime** field value is cleared for all the AWS data sources in the Data Source [sys_data_source] table.
- Download and rerun the AWS scripts. See Configure the AWS environment.

Procedure

1. Ensure that you've selected the **Service Graph Connector for AWS** application scope by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **AWS** > **Setup**.
3. Configure the AWS environment.

   Note:
   For the Download the scripts task, select **Configure** to download the scripts.

   After you've downloaded the scripts and configured the AWS environment, set the Download the scripts and AWS Setup Instructions tasks to complete.
4. Configure the authentication credentials to authenticate requests sent to the AWS APIs.

   a. Configure your AWS credentials.

      i. For the Configure the connection section of the Service Graph Connector for AWS page, select **Get Started**.

      ii. For the Configure the credentials task, select **Configure**.

      iii. In the **Name** field, enter a name for the authentication.

      `SG-AWS-Credentials-Org` is the default credential alias name. You can add multiple AWS instances. However, don't modify the default connection alias.

      iv. Enter the access key ID and the secret access key in the **Access Key ID** and **Secret Access Key** fields respectively.

      The AWS access keys are long-term credentials for the IAM user and include two parts: an access key ID and a secret access key. You must use both the access key ID and the secret access key together to authenticate requests.

      v. Return to the Configure the connection task page by selecting the back icon (<).

      vi. Set the Configure the credentials task to complete by selecting **Mark as Complete**.

   b. Test the AWS API connection to import data from the AWS application.

      i. For the Test the connection task in the Configure the connection section, select **Configure**.

      ii. Select the **Test Connection** related link.

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iii. When the **Status** field is set to **Success**, select the back icon (<) to return to the guided setup.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

c. Update the required configuration properties for an AWS instance.

i. For the Update configuration properties for instance task, select **Configure**.

ii. On the SG-AWS Configuration Properties form that opens in a new tab, review, and modify the fields.

SG-AWS Configuration Properties form

Field	Description
Connection Details	
Connection Alias	Name to identify the AWS connection record. For example, `SG_AWS_CredentialAlias_Org`. You can add multiple AWS instances. However, don't modify the name for the default connection alias `SG_AWS_CredentialAlias_Org`.
Organization Details	
Organization Account	Numeric account identifier of the AWS organization.
Organization Name	Name of the AWS organization.
Organization Description	Description of the AWS organization.
AWS Regions	
Regions	AWS regions to collect the CI data. By default, the Service Graph Connector for AWS runs through all the AWS regions to collect the CI data. You can enter AWS specific regions to speed up the CI data import process. For example, `us-east1, us-east-2`. If this field is left empty, the Service Graph Connector for AWS pulls the resources from all the AWS regions. However, for the AWS GovCloud regions, don't leave the **Regions** field empty. The supported AWS GovCloud regions are `us-gov-east-1` and `us-gov-west-1`. If you update the **Regions** field value later, clear the value of the **Last run datetime** field in all the data sources related to the Service Graph Connector for AWS to import a new set of data.
STS Assume Role Name	
STS Role	AWS Identity and Access Management (IAM) role name that is obtained by the ServiceNow user by calling the *`AssumeRole`* API offered by the AWS Security Token Service (STS). The *`AssumeRole`* API returns a set

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Field	Description
	of temporary security credentials for the ServiceNow user to access the AWS resources. **Note:** Enter the IAM role name but don't prefix `arn` in the name. If you leave this field is empty, the value of this field is automatically set to **SnowOrganizationAccountAccessRole**, which is the default IAM role name for the ServiceNow user.
S3 Account Details	
S3 Account Id	Numeric identifier of the AWS account that hosts the Amazon Simple Storage Service (Amazon S3) bucket.
S3 Bucket Name	Name of the Amazon S3 bucket that collects the details from Amazon EC2 instances.
S3 Region	Region where the Amazon S3 bucket resides.
SSM SendCommand Document Details	
SSM Send Command Linux Name	Name of the document that defines the actions run by the AWS Systems Manager (SSM) on a Linux-based Amazon EC2 instance.
SSM Send Command Windows Name	Name of the document that defines the actions run by the AWS SSM on a Windows-based Amazon EC2 instance.
Management Account ID	
Management Account ID	Management account in the AWS organization. The account calls the *`ListAccounts`* API associated with the AWS organization to collect CI information from all the accounts. For more information, see ListAccounts on the AWS documentation site. Enter a value for this field when the ServiceNow user was created in an AWS member account.
Standalone Account ID Details	
Standalone Account ID	ID of a member account in the AWS organization. **Note:** When specifying a standalone account, AWS organization-related data such as the organization name, organization units, organization ID, and service accounts are not imported. If you want to import the full data later, clear any value mentioned in the **Standalone Account ID** field. See the Service Graph Connector for AWS - Standalone Setup [KB1642159] article in the Now Support Knowledge Base.
AWS Config Aggregator Details	
Config Aggregator Account	AWS account where the aggregator resource type in the AWS Config service has been configured. Enter a value in this field when you're using an AWS Config aggregator.

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Field	Description
Config Aggregator Name	Name of the aggregator resource type. This field is available only when you enter a value in the **Config Aggregator Account** field.
Config Aggregator Region	Region where the aggregator resource type resides. This field is available only when you enter a value in the **Config Aggregator Account** field.
AWS Key Rotation Setup	
AWS Rotate Keys	Option to enable the key rotation process.
AWS Key Rotation Date	Key rotation date. Set the value to the required key rotation date for the first run. For subsequent runs, this field is automatically set to the rotation date. This field is available only when you select the **AWS Rotate Keys** check box.
AWS Key Rotation Period (in Days)	Key rotation period in days. This field is available only when you select the **AWS Rotate Keys** check box.
AWS Key Rotation Status	Status message of a key rotation displaying whether the rotation was a success or a failure. This field is automatically set to display the key rotation status message. This field is available only when you select the **AWS Rotate Keys** check box. If the rotation status is a failure, an email notification is triggered, if configured.
Email accounts for receiving error notifications	Comma-separated list of the email addresses of recipients who receive notifications about the AWS key rotation errors.
Email account groups for receiving error notifications	Comma-separated list of the ServiceNow groups who receive notifications about the AWS key rotation errors.
Gov Cloud Setup	
Is Gov Cloud	Option to indicate that the connection setup is for the AWS GovCloud.
SSM EKS SendCommand Document Details	
EKS Cluster Names Document	Name of the AWS SSM document to discover EKS clusters associated with EC2 Bastion hosts.
EKS Shell Script Document	Name of the AWS SSM document to fetch CIs related to Kubernetes components, such as pods, services, and deployments, from EKS clusters.

iii. Select **Save** and then **Close** to close the tab and return to the guided setup tab.

iv. Set the Update configuration properties for instance task to complete by selecting **Mark as Complete**.

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5. Configure the required EC2 resources for Amazon Elastic Kubernetes Service (EKS) to import EKS cluster data.
   An EKS EC2 resource is a bastion host that has network access to EKS clusters. The EKS clusters aren't directly accessible to the connector. Therefore, you must provide the EKS EC2 resource details. For importing EKS cluster data, the connector uses the SSM Send Command on EKS EC2 resources to run kubectl commands remotely.

   Note:
   Ensure that you've configured your AWS environment for the EKS integration. For more information, see the Service Graph Connector for AWS - Amazon EKS Integration [KB1437138] article in the Now Support Knowledge Base.

   a. For the Configure the EKS Resource Details section of the Service Graph Connector for AWS page, select **Get Started**.

   b. For the Enter the EKS EC2 Resource Details task, select **Configure**.

   c. On the form that opens in a new tab, fill in the fields.

   SG-AWS-EKS-EC2-Resource form

Field	Description
EKS EC2 Resource Id	Identifier of the EKS EC2 resource.
EC2 Account	User name assigned to the EKS EC2 resource account.
EC2 Region	AWS region where the EKS EC2 resource is located.
Active	Option to activate the EKS EC2 resource. **Note:** Set to false, if you are not using the EKS EC2 resource resource.
Connection	Connection alias associated with the AWS environment setup and configured in step 4.a.

   d. Select **Submit** to return to the guided setup.

   e. Repeat steps from 5.b to 5.d to add multiple EKS EC2 resources.
   All the EKS EC2 resources are added to the SG-AWS-EKS-Master [sn_aws_integ_sg_aws_eks_master] table.

   f. Set the Enter the EKS EC2 Resource Details task to complete by selecting **Mark as Complete**.

6. Run the AWS diagnostic tool before running a scheduled import job to identify any issues in the AWS environment setup.

   a. For the Service Graph AWS Diagnostic Tool section of the Service Graph Connector for AWS page, select **Get Started**.

   b. For the AWS Setup Diagnostic Tool task, select **Configure**.

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c. Select the organization ID from the text field.

d. Select **Run Diagnostic Test**.

Tip:
Select one of the following options to exclude the corresponding test results from the diagnostic summary:

Skip SSM setup tests

Excludes the software inventory data from the summary results by not calling the `GetInventory` API. Select this option when you've opted out or not set up the configuration for SSM.

Skip SSM Deep Discovery tests

Excludes the deep discovery data from the summary results. Select this option when you've opted out or not set up the configuration for SSM deep discovery.

Skip EKS setup tests

Excludes the EKS data from the summary results by not running the kubectl commands. Select this option when you've opted out or not set up the EKS integration.

e. **Optional:** View only EKS cluster test results by selecting **View EKS Test Details**.

f. **Optional:** Preview any previous diagnostic tool results by selecting **Load DT Results**, selecting a diagnostic ID, and then selecting **Load Results**.

g. When you finish reviewing the diagnostic summary results, select the back button of your browser to return to the guided setup.

h. Set the AWS Setup Diagnostic Tool task to complete by selecting **Mark as Complete**.

7. Configure the scheduled jobs to import data from the AWS application.

a. In the Configure the scheduled import jobs section of the Service Graph Connector for AWS page, select **Get started**.

b. For the Configure the scheduled job task, select **Configure**.

c. Select the scheduled job that you want to activate.

d. On the Scheduled Data Import form, verify the field values for the scheduled job. For more information, see Schedule a data import.

e. Select **Update**.

f. Repeat the steps 7.c to 7.e for each scheduled job for data import.

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g. Select the back icon (<) to return to the guided setup page.

h. Set the Configure the scheduled job task to complete by selecting **Mark as Complete** in the guided setup.

8. **Optional:** Add multiple AWS instances.

a. In the Add Multiple Instances section of the Service Graph Connector for AWS page, select **Get Started**.

b. Ensure that you have edit permissions for the Datasource [sys_data_source] table to create data sources for the new instance.

i. Select the **Global** application scope by using the application picker.

ii. For the Update Data Source Access task, select **Configure**.

iii. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

iv. Select **Update** to close the tab and return to the guided setup.

v. Modify the application scope again to **Service Graph Connector for AWS** by using the application picker.

vi. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

c. Update access for scheduled import jobs.

i. Select the **Global** application scope by using the application picker.

ii. For the Update Scheduled Data Import Access task, select **Configure**.

iii. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

iv. Select **Update** to close the tab and return to the guided setup tab.

v. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**.

vi. Modify the application scope again to **Service Graph Connector for AWS** by using the application picker.

d. Clear the cache of the Data Source [sys_data_source] and Scheduled Data Imports [scheduled_import_set] tables to enable creating a data source for the new connection in the Service Graph Connector for AWS.

i. For the Clear Cache for Data Source and Scheduled Data Imports tables task, select **Configure**.

ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
      GlideCacheManager.flushTable("sys_data_source");


 GlideTableManager.invalidateTable("scheduled_import_set");
      GlideCacheManager.flushTable("scheduled_import_set");

      GlideTableManager.invalidateTable("sys_db_object");
      GlideCacheManager.flushTable("sys_db_object");
```

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iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. Set the Clear Cache for Data Source and Scheduled Data Imports tables task to complete by selecting **Mark as Complete**.

vi. Modify the application scope again to **Service Graph Connector for AWS** by using the application picker.

e. Create a credential alias for the new AWS connection in the Service Graph Connector for AWS.

i. For the Create new Connection & Credentials Alias Record task, select **Configure**.

ii. On the Connection & Credential Aliases form that opens in a new tab, fill in the connection details.

iii. Select **Submit** and close the tab and return to the guided setup tab.

iv. Set the Create new Connection & Credentials Alias Record task to complete by selecting **Mark as Complete**.

f. Create credentials for the new AWS credential alias.

i. For the Create new Connection & Credentials Alias Record task, select **Configure**.

ii. On the Connections page of the Flow Designer, select **Add Connection**.

iii. In the Create Connection window, fill in the connection name, access key, and secret key details.

iv. Select **Create Connection**.

v. Close the Flow Designer and return to the guided setup tab.

vi. Set the Create new Connection & Credentials Alias Record task to complete by selecting **Mark as Complete**.

g. Update properties for the new instance for the Service Graph Connector for AWS by selecting **Configure** for the Configure AWS environment for the new Instance task.
For more information, follow the step 4.c discussed earlier for configuring the properties of the AWS connection available by default.

When you're done updating the properties, set the Configure AWS environment for the new Instance task to complete by selecting **Mark as Complete**.

h. Enter the EKS EC2 Resource details by selecting **Configure** for the Update EKS Resource Details task.
For more information, follow the step 5 discussed earlier for configuring the EKS EC2 Resource details for the AWS connection available by default.

When you're done updating the properties, set the Update EKS Resource Details task to complete by selecting **Mark as Complete**.

i. Configure the scheduled imports for the new AWS instance.

i. For the Configure the Scheduled Imports task, select **Configure**.

ii. In the Scheduled Data Imports list that opens in a new tab, select the organization of the AWS instance that you want to configure.

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iii. Select the scheduled data import that you want to activate.

iv. On the Scheduled Data Import form, modify the field values for the scheduled job.

v. Select **Update**.

vi. Repeat the steps 8.i.iii to 8.i.v for each scheduled job for data import.

vii. Close the tab for the Scheduled Data Imports list and return to the guided setup tab.

viii. Set the Configure the Scheduled Imports task to complete by selecting **Mark as Complete** in the guided setup.

Related topics

Handling import failures for large AWS resources

Handling memory utilization errors for Service Graph Connector for AWS

CMDB classes targeted in Service Graph Connector for AWS

When you complete setting up the connection, you can configure the integration to periodically pull data from AWS. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Amazon Redshift [cmdb_ci_aws_redshift]

The following attributes in the Amazon Redshift [cmdb_ci_aws_redshift] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
TCP port(s)	tcp_port
Cluster Availability Status	cluster_availability_status
Install Status	install_status
Availability Zone	availability_zone
Fully qualified domain name	fqdn
Node Count	node_count
Node Type	node_type
Operational status	operational_status
Start date	start_date
VPC ID	vpc_id

Relationships created for Application

Parent class	Relationship type	Child class
Amazon Redshift [cmdb_ci_aws_redshift]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Amazon Redshift [cmdb_ci_aws_redshift]	Reference	Availability Zone [cmdb_ci_availability_zone]

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Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
Version	version
TCP port(s)	tcp_port
Running Process	running_process
Running process key parameters	running_process_key_parameters
Name	name
Running process command	running_process_command

Relationship created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Server [cmdb_ci_server]

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Availability Zone

Parent class	Relationship type	Child class
Availability Zone [cmdb_ci_availability_zone]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Availability Zone [cmdb_ci_availability_zone]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region
Install Status	install_status
Operational status	operational_status

Relationships created for AWS Datacenter

Parent class	Relationship type	Child class
AWS Datacenter [cmdb_ci_aws_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availablity_zone]
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

AWS Organizational Unit [cmdb_ci_aws_org_unit]

The following attributes in the AWS Organizational Unit [cmdb_ci_aws_org_unit] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Org Unit Parent ID	org_unit_parent_id
Organizational ID	aws_org_id
Root ID	root_id

Relationship created for AWS Organizational Unit

Parent class	Relationship type	Child class
AWS Organizational Unit [cmdb_ci_aws_org_unit]	Contains::Contained by	Cloud Service Account [cmdb_ci_cloud_service_account]

Block Endpoint [cmdb_ci_endpoint_block]

The following attributes in the Block Endpoint [cmdb_ci_endpoint_block] table are populated by collected data:

Attribute label	Attribute name
Host	host

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Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
TCP port(s)	tcp_port
Automated Backups	automated_backup
Category	category
Fully qualified domain name	fqdn
Install Status	install_status
Operational status	operational_status
State	state
Type	type
Version	version

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Code Size	code_size

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Attribute label	Attribute name
CodeSha256	codesha256
Function Last Modified	function_last_modified
Install Status	install_status
Language	language
Operational status	operational_status
Version	version

Relationships created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Reference	Key Value [cmdb_key_value]

Cloud Gateway [cmdb_ci_cloud_gateway]

The following attributes in the Cloud Gateway [cmdb_ci_cloud_gateway] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Fully qualified domain name	fqdn
Install Status	install_status
Operational status	operational_status

Relationships created for Cloud Gateway

Parent class	Relationship type	Child class
Cloud Gateway [cmdb_ci_cloud_gateway]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Gateway [cmdb_ci_cloud_gateway]	Reference	Key Value [cmdb_key_value]

Cloud Hardware Type [cmdb_ci_cloud_hardware_type]

The following attributes in the Cloud Hardware Type [cmdb_ci_cloud_hardware_type] table are populated by collected data:

Attribute label	Attribute name
Name	name

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Attribute label	Attribute name
Object ID	object_id
Provider	provider
Cores	cores
Install Status	install_status
IP Address	ip_address
Local Storage GB	local_storage_gb
Memory MB	memory_mb
Operational status	operational_status
vCPUs	vcpus
Zone	zone

Relationships created for Cloud Hardware Type

Parent class	Relationship type	Child class
Cloud Hardware Type [cmdb_ci_cloud_hardware_type]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Cloud Image [cmdb_ci_cloud_os_image]

The following attributes in the Cloud Image [cmdb_ci_cloud_os_image] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Environment	environment
Guest OS	guest_os
Image Source	image_source
Image Type	image_type
Provider	provider
Root Device Type	root_device_type

Relationships created for Cloud Image

Parent class	Relationship type	Child class
Cloud Image [cmdb_ci_cloud_os_image]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Image [cmdb_ci_cloud_os_image]	Reference	Key Value

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Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Canonical Hosted Zone ID	canonical_hosted_zone_id
Canonical Hosted Zone Name	canonical_hosted_zone_name
DNS Name	dns_name
Fully qualified domain name	fqdn
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Contains::Contained by	Compute Security Group [cmdb_ci_compute_security_group]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]

Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Name	name
Object ID	object_id
Public IP	public_ip
Install Status	install_status
Operational status	operational_status
Private DNS	private_dns
Private IP	private_ip
Public DNS	public_dns

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Attribute label	Attribute name
State	state
Configuration Item	cmdb_ci

Relationships created for Cloud Mgmt Network Interface

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Use End Point To::Use End Point From	VNIC Endpoint [cmdb_ci_endpoint_vnic]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Key Value [cmdb_key_value]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Virtual Machine Instance [cmdb_ci_vm_instance]

Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Cidr	cidr
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Compute Security Group [cmdb_ci_compute_security_group]
Cloud Network [cmdb_ci_network]	Reference	Key Value [cmdb_key_value]

Cloud Object Storage [cmdb_ci_cloud_object_storage]

The following attributes in the Cloud Object Storage [cmdb_ci_cloud_object_storage] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Object ID	object_id
ACL Access Type	acl_access_type
Cloud Provider	cloud_provider
Creation Date	creation_date
Encryption Type	encryption_type
Install Status	install_status
Operational status	operational_status
Policy Access Type	policy_access_type
Service Name	service_name

Relationships created for Cloud Object Storage

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	Key Value [cmdb_key_value]

Cloud Organizations [cmdb_ci_cloud_org]

The following attributes in the Cloud Organizations [cmdb_ci_cloud_org] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Master Email	master_email
Name	name
Operational status	operational_status
Root ID	root_id

Relationships created for Cloud Organizations

Parent class	Relationship type	Child class
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	AWS Organizational Unit [cmdb_ci_aws_org_unit]

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Cloud Resource [cmdb_ci_cmp_resource]

The following attributes in the Cloud Resource [cmdb_ci_cmp_resource] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Install Status	install_status
Operational status	operational_status
Resource type	resource_type
State	state

Relationship created for Cloud Resource

Parent class	Relationship type	Child class
Cloud Resource [cmdb_ci_cmp_resource]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name
Name	name
Account Email	account_email
Install Status	install_status
Is management account	is_master_account
Operational status	operational_status
Parent account	parent_account
Datacenter Type	datacenter_type
Discovery credentials	discovery_credentials
Account Id	account_id
Object ID	object_id
Organization Id	organization_id

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Relationships created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Key Value [cmdb_key_value]

Cloud Subnet [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Available IP Count	available_ip_count
CIDR	cidr
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Subnet

Parent class	Relationship type	Child class
Cloud Subnet [cmdb_ci_cloud_subnet]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Cloud Subnet [cmdb_ci_cloud_subnet]	Contains::Contained by	Cloud Mgmt Network Interface [cmdb_ci_nic]
Cloud Subnet [cmdb_ci_cloud_subnet]	Reference	Key Value [cmdb_key_value]

Compute Security Group [cmdb_ci_compute_security_group]

The following attributes in the Compute Security Group [cmdb_ci_compute_security_group] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status

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Relationships created for Compute Security Group Table

Parent class	Relationship type	Child class
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	Key Value [cmdb_key_value]

Docker Container [cmdb_ci_docker_container]

The following attributes in the Docker Container [cmdb_ci_docker_container] table are populated by collected data:

Attribute label	Attribute name
Container id	container_id
Image id	image_id
Install Status	install_status
Name	name
Operational status	operational_status
Status	status

Docker Image [cmdb_ci_docker_image]

The following attributes in the Docker Image [cmdb_ci_docker_image] table are populated by collected data:

Attribute label	Attribute name
Image id	image_id
Install Status	install_status
Name	name
Operational status	operational_status

Relationship created for Docker Image

Parent class	Relationship type	Child class
Docker Image [cmdb_ci_docker_image]	Instantiates::Instantiated by	Docker Container [cmdb_ci_docker_container]

DynamoDB Table [cmdb_ci_dynamodb_table]

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Attribute label	Attribute name
Name	name
Object ID	object_id
Cloud Provider	cloud_provider
Creation Date	creation_date
Encryption	encryption
Install Status	install_status
Operational status	operational_status
Read Units	read_units
Service Name	service_name
Write Units	write_units

Relationships created for DynamoDB Table

Parent class	Relationship type	Child class
DynamoDB Table [cmdb_ci_dynamodb_table]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
DynamoDB Table [cmdb_ci_dynamodb_table]	Reference	Key Value [cmdb_key_value]

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Cores	cores
Install Status	install_status
Local Storage GB	local_storage_gb
Memory MB	memory_mb
Operational status	operational_status
vCPUs	vcpus

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Note:
If the *sn_itom_pattern.use a single hardware type for cloud data center* property is set to `true`, hardware type data is populated in the Cloud Hardware Type [cmdb_ci_cloud_hardware_type] table. If this property is set to `false`, hardware type data is populated in the Hardware Type [cmdb_ci_compute_template] table. Before you configure the *sn_itom_pattern.use a single hardware type for cloud data center* property, the existing hardware type data must be cleaned. For instructions, see the Service Graph Connector For AWS - Migrating to a new hardware type model [KB1705233] article in the Now Support Knowledge Base.

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Class	sys_class_name
Description	short_description
Environment	environment
Guest OS	guest_os
Image Source	image_source
Image Type	image_type
Install Status	install_status
Operational status	operational_status
Root Device Type	root_device_type

Relationships created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Image [cmdb_ci_os_template]	Reference	Key Value

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

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Attribute label	Attribute name
Install Status	install_status
Nic	nic
IP Address	ip_address
Name	name
Operational status	operational_status

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	Value

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data:

Attribute label	Attribute name
Cluster Resource ID	cluster_resource_id
IP Address	ip_address
Name	name
Port	port
Fully qualified domain name	fqdn
Install status	install_status
Namespace	namespace
Operational status	operational_status

Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

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Relationships created for Kubernetes Cluster (continued)

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Managed by::Manages	Server [cmdb_ci_server]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	Key Value [cmdb_key_value]

Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]

The following attributes in the Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Install Status	install_status
Operational status	operational_status
SelfLink	self_link

Relationship created for Kubernetes DaemonSet

Parent class	Relationship type	Child class
Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Deployment [cmdb_ci_kubernetes_deployment]

The following attributes in the Kubernetes Deployment [cmdb_ci_kubernetes_deployment] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace

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Attribute label	Attribute name
Available Replicas	available_replicas
Install Status	install_status
Operational status	operational_status
SelfLink	self_link

Relationship created for Kubernetes Deployment

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Install Status	install_status
Namespace	namespace
Operational status	operational_status

Kubernetes Node [cmdb_ci_kubernetes_node]

The following attributes in the Kubernetes Node [cmdb_ci_kubernetes_node] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Install Status	install_status
Operational status	operational_status

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name

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Attribute label	Attribute name
Namespace	namespace
Install Status	install_status
IP Address	ip_address
Operational status	operational_status
Resource version	resource_version

Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Kubernetes Volume [cmdb_ci_kubernetes_volume]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Image [cmdb_ci_docker_image]

Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]

The following attributes in the Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Install Status	install_status
Operational status	operational_status
SelfLink	self_link

Relationships created for Kubernetes ReplicaSet

Parent class	Relationship type	Child class
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Service [cmdb_ci_kubernetes_service]

The following attributes in the Kubernetes Service [cmdb_ci_kubernetes_service] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid

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Attribute label	Attribute name
Name	name
Namespace	namespace
Install Status	install_status
IP Address	ip_address
Operational status	operational_status
Selector	selector

Kubernetes Volume [cmdb_ci_kubernetes_volume]

The following attributes in the Kubernetes Volume [cmdb_ci_kubernetes_volume] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Mount Path	mount_path
Name	name
Volume ID	volume_id
Install Status	install_status
Namespace	namespace
Operational status	operational_status

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
MAC Address	mac_address
Configuration Item	cmdb_ci
Name	name
Install Status	install_status
Operational status	operational_status

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server], Linux Server [cmdb_ci_linux_server], or Windows Server [cmdb_ci_win_server]

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Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
Name	name
Class	sys_class_name
CPU core count	cpu_core_count
CPU core thread	cpu_core_thread
CPU count	cpu_count
CPU name	cpu_name
CPU manufacturer	cpu_manufacturer
CPU speed (MHz)	cpu_speed
Disk Space (GB)	disk_space
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Install Status	install_status
Is Virtual	virtual
Object ID	object_id
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram

Note:
If the AWS Systems Manager (SSM) service isn't enabled, the connector populates the server records in the Server [cmdb_ci_server] class. If the AWS SSM service is enabled, then based on the platform type obtained through the SSM service, the server records are populated in either the Linux Server [cmdb_ci_linux_server] class or the Windows Server [cmdb_ci_win_server] class. The Server [cmdb_ci_server] class is the parent class of the Linux Server [cmdb_ci_linux_server] and the Windows Server [cmdb_ci_win_server] classes.

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]

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Relationships created for Server (continued)

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Reference	Software Installation [cmdb_sam_sw_install]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Key	key
Discovery source	discovery_source
Name	name
Version	version
Manufacturer	manufacturer

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Name	name
Installed on	installed_on

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Attribute label	Attribute name
Install date	install_date

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

Storage Mapping [cmdb_ci_storage_mapping]

The following attributes in the Storage Mapping [cmdb_ci_storage_mapping] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Host	host
Install Status	install_status
Mapping Type	mapping_type
Mount Point	mount_point
Operational status	operational_status

Relationship created for Storage Mapping

Parent class	Relationship type	Child class
Storage Mapping [cmdb_ci_storage_mapping]	Use End Point To::Use End Point From	Block Endpoint [cmdb_ci_endpoint_block]

Storage Volume [cmdb_ci_storage_volume]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Volume ID	volume_id
Install Status	install_status
Name	name
Operational status	operational_status
Size	size
Size bytes	size_bytes

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Attribute label	Attribute name
State	state
Storage Type	storage_type

Relationships created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Reference	Key Value [cmdb_key_value]

Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]

The following attributes in the Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status

Relationship created for Storage Volume Snapshot

Parent class	Relationship type	Child class
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
CPUs	cpus
Disks	disks
Disks size (GB)	disks_size
Fully qualified domain name	fqdn
Install Status	install_status
IP Address	ip_address

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Attribute label	Attribute name
Memory (MB)	memory
Monitor	monitor
Network adapters	nics
Operational status	operational_status
Placement Group ID	placement_group_id
State	state
VM Instance ID	vm_inst_id

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Located in::Houses	Availability Zone [cmdb_ci_availability_zone]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Storage Mapping [cmdb_ci_storage_mapping]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Cloud Hardware Type [cmdb_ci_cloud_hardware_type]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]
Virtual Machine Instance [cmdb_ci_vm_instance]	Use End Point To::Use End Point From	Storage Volume [cmdb_ci_storage_volume]
Virtual Machine Instance [cmdb_ci_vm_instance]	Use End Point To::Use End Point From	Cloud Mgmt Network Interface [cmdb_ci_nic]

VNIC Endpoint [cmdb_ci_endpoint_vnic]

The following attributes in the VNIC Endpoint [cmdb_ci_endpoint_vnic] table are populated by collected data:

Attribute label	Attribute name
Host	host
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status

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Quick start tests for Service Graph Connector for AWS

Validate that Service Graph Connector for AWS still works after you make any configuration change such as applying an upgrade or developing an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Danger:
By default, the system property that is used to run automated tests is disabled to prevent you from accidentally running these tests on a production system. To avoid data corruption or an outage, run tests only on development, test, and other non-production instances. See Enable or disable executing Automated Test Framework tests.

SG-AWS: Service Graph Connector for AWS Validation test suite

Test suite to verify the integrity of an integration using multiple tests.

Test	Description	Release version
SG-AWS API Gateway	Validate the ingestion of multiple CI records in the Cloud Gateway.	Utah
SG-AWS DynamoDb	Validate the ingestion of multiple CI records in the DynamoDB table.	Utah
SG-AWS EC2	Loads data in the CMDB such as all dependent CIs such as Organizations, Service-Accounts, Networks, Subnets, and Network-Interfaces, after which mock data for SG-AWS-EC2 is prepared.	Utah
SG-AWS EKS Cluster	Validates the ingestion of multiple CI records in the Kubernetes Cluster table.	Utah
SG-AWS ELB V1	Validates the ingestion of multiple CI records in the Cloud Load Balancer.	Utah
SG-AWS ELB V2	Validates the ingestion of multiple CI records in the Cloud Load Balancer.	Utah
SG-AWS Generic Resource	Validates the ingestion of multiple CI records in the Cloud Resource table.	Utah
SG-AWS Hardware Type	Validates the ingestion of multiple CI records in the Hardware Type table.	Utah
SG-AWS Image Id	Validates the ingestion of multiple CI records in the Image table.	Utah
SG-AWS Image Private	Validates the ingestion of multiple CI records in the Image table.	Utah

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SG-AWS: Service Graph Connector for AWS Validation test suite

Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
SG-AWS Lambda	Validates the ingestion of multiple CI records in the Cloud function table.	Utah
SG-AWS Network Interface	Validates the ingestion of multiple CI records in the Cloud Mgmt Network Interface table.	Utah
SG-AWS Organization	Tests RTE mappings for the ingestion of CIs in the Cloud Organization table.	Utah
SG-AWS RDS	Validates the ingestion of mutliple CI records in the Cloud Database table.	Utah
SG-AWS S3	Validates the ingestion of multiple CI records in the Cloud Object Storage table.	Utah
SG-AWS Security Group	Validates the ingestion of multiple CI records in the Compute Security Group table.	Utah
SG-AWS Service Account	Tests RTE mappings for the ingestion of CIs in the Cloud Service Account table.	Utah
SG-AWS Software Inventory	Validates the ingestion of Software Data and classification of CI records in the Server table. It tests whether the server is classified as Linux or Windows.	Utah
SG-AWS Software Remove	Validates the removal of Software Data from the cmdb_software_instance or the cmdb_sam_sw_install table.	Utah
SG-AWS Storage Volume	Loads mock import data for Storage Volume into the relevant staging table. Validates if fields are populated as expected in the cmdb_ci_storage_volume, cmdb_ci_storage_vol_snapshot, and sn_aws_extension_attributes tables and if the appropriate	Utah

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SG-AWS: Service Graph Connector for AWS Validation test suite
Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
	relationships have been created between the inserted CIs.	
SG-AWS SSM SendCommand	Validates the ingestion of multiple CI records in the TCP Connection and Running Process tables. Updates records in the Server table.	Utah
SG-AWS Subnets	Validates the ingestion of multiple CIs in the Cloud Subnet table.	Utah
SG-AWS VM Hw Consolidation	Validates the update of multiple CI records in the Virtual Machine Instance and Server table.	Utah
SG-AWS VPC	Tests RTE mappings associated with SG-AWS VPC Data source. It loads import set data for VPCs, Datacenters, Service-Acccount, and Organizations. Validates if the CIs have been added to the cmdb_ci_network table, the fields are populated with the expected value, and appropriate relationships verified through the cmdb_rel_ci table.	Utah

Related topics

Quick start tests

Accessing the connection details of Service Graph Connector for AWS

You can access the connection details of the Service Graph Connector for AWS in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for AWS. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an AWS connection

Access the details of an AWS connection configured for the Service Graph Connector for AWS.

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Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AWS** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Additional features within the Service Graph Connector for AWS

Use the additional features available within the Service Graph Connector for AWS to maximize its use for importing data.

The following features are available within the Service Graph Connector for AWS:

Enabling optimized deletion of retired CIs in AWS

Enable the *sn_aws_integ.enableOptimizedDeletion* system property for the optimized deletion of retired configuration items (CIs) in AWS during delta import of data.

Enabling optimized SG-AWS-SendCommand data source performance

When using the SG-AWS-Software-Inventory data source, enable the *sn_aws_integ.is_software_inventory_enabled* system property for optimizing the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources.

Handling import failures for large AWS resources

Manage the data source failure when importing resources from AWS.

Handling memory utilization errors for Service Graph Connector for AWS

Avoid the memory utilization errors when using the Service Graph Connector for AWS to import a large number of CIs from an AWS instance.

Setting up partition size with parallel loading enabled

Optimize the performance of the SG-AWS-Image-Private, SG-AWS-Tags, SG-AWS-SendCommand, and AWS-SSM-GetS3Object data sources by configuring the partition size setting in the *aws_account_partition_size* connection property.

Disable parallel loading for Service Graph Connector for AWS data sources

Disable parallel loading for specific data sources in the Service Graph Connector for AWS.

Handling parallel deletion of CIs in Service Graph Connector for AWS

Optimize performance when using the Service Graph Connector for AWS by enabling the parallel deletion of CIs.

Enable mapping for Cloud Os Image in AWS

Enable mapping of AWS Cloud Os Image data to the Cloud Image [cmdb_ci_cloud_os_image] table.

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Enable optimized deletion of retired CIs in AWS

Enable the *sn_aws_integ.enableOptimizedDeletion* system property for the optimized deletion of retired configuration items (CIs) in AWS during delta import of data.

Before you begin

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

About this task

By default, the *ListDiscoveredResources* API is utilized in batches of 20 to ascertain deleted resource data as there's no other API in AWS that provides deleted resource deltas. This action adversely impacts performance, particularly with a large number of resources, as the majority of time is dedicated to API calls.

When your AWS instance has a large number of CIs to import, you can enable the *sn_aws_integ.enableOptimizedDeletion* property to accelerate the import time. The property enables deleting any retired CI classes with an improved logic. In this optimized deletion approach, a complete pull is conducted. Without depending on AWS API calls, the deleted CI is determined by comparing imported resources from the last run with the resources imported in the current run. By default, the value of the property is set to `false`.

Note:
You can use the *sn_aws_integ.enableOptimizedDeletion* property only when you have the AWS Config aggregator setup.

Procedure

1. Enter `sys_properties.list` in the navigation filter, and then open the *sn_aws_integ.enableOptimizedDeletion* property.
2. In the **Value** field, enter `true`.
3. Select **Update**.

Enable optimized SG-AWS-SendCommand data source performance

When the SG-AWS-Software-Inventory data source is being utilized, enable the *sn_aws_integ.is_software_inventory_enabled* system property for optimizing the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources.

Before you begin

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

About this task

The SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources utilize *SSM GetInventory* API calls for importing software data, impacting performance. To enhance the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources, consider leveraging the SG-AWS-Software-Inventory data source by enabling the *sn_aws_integ.is_software_inventory_enabled* system property. This optimization skips a substantial number of *SSM GetInventory* API calls, enhancing the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources. However, the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources import data from the same servers that are configured for the SG-AWS-Software-Inventory data source.

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By default, the *sn_aws_integ.is_software_inventory_enabled* property is set to `false`. To enhance the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources, set the *sn_aws_integ.is_software_inventory_enabled* property to `true`.

Procedure

1. Enter `sys_properties.list` in the navigation filter, and then open the *sn_aws_integ.is_software_inventory_enabled* property.
2. In the **Value** field, enter `true`.
3. Select **Update**.

Handling import failures for large AWS resources

Manage the data source failure when importing resources from AWS.

When importing large AWS resources, the data sources in the Service Graph Connector for AWS might fail because of a Direct REST response exceeding the 1024-MB limit. For more information, see REST step.

You can save the response as an attachment to handle the REST response size limitation error in the Service Graph Connector for AWS.

Save the response as an attachment

With the save response as an attachment feature, the response of each data source is temporarily stored as an attachment and after the response is read, the attachment is deleted automatically. The save response as an attachment feature is activated by default and is triggered by the *sn_aws_integ.save_payload_as_attachment* system property.

As a user with the admin role, you can deactivate the save response as an attachment feature by setting the *sn_aws_integ.save_payload_as_attachment* property to `false`. When the feature is deactivated and the response size is within the limit, the data sources run normally.

Handling memory utilization errors for Service Graph Connector for AWS

You can use the `SgAwsApplicationProperties` script include to avoid memory utilization errors when importing a large number of configuration items (CIs) from an AWS instance via the Service Graph Connector for AWS.

By making multiple database calls to ingest AWS data in smaller batches, the `SgAwsApplicationProperties` script include avoids overloading of the Robust Transform Engine (RTE) and results in reduced memory usage. However, for the script include to function properly, verify that the AWS Config aggregator is enabled on your AWS instance.

To access the script include, navigate to **All** > **System Definitions** > **Script Includes**, and then search for and select `SgAwsApplicationProperties`. For more information, see Script includes.

In the `SgAwsApplicationProperties` script include, you can modify the functions as described in the following table to resolve memory utilization errors.

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SgAwsApplicationProperties script include functions

Functionality	Implementation
Enable multiple database calls to import the AWS Config data.	Set the value of the *isConfigDbLoadEnabled* function to `true`. For the function to work correctly, verify that the AWS Config aggregator is enabled. **Note:** Enabling *isConfigDbLoadEnabled* might impact the import set load time as multiple database calls are being made instead of a single database call. Enabling the *isConfigDbLoadEnabled* function resolves the memory utilization error for the following data sources: • SG-AWS-API-Gateway • SG-AWS-DynamoDb • SG-AWS-EC2 • SG-AWS-EKS-Cluster • SG-AWS-ELB-V1 • SG-AWS-ELB-V2 • SG-AWS-Generic-Resources • SG-AWS-Lambda • SG-AWS-Network-Interface • SG-AWS-RDS • SG-AWS-S3 • SG-AWS-Security-Group • SG-AWS-Storage-Volume • SG-AWS-Subnets • SG-AWS-VPC
Enable multiple database calls to import the tag-related data from your AWS service account.	Set the value of the *isConfigTagsDbLoadEnabled* function to `true`. For the function to work correctly, verify that both the AWS Config aggregator and the *isConfigDbLoadEnabled* function are enabled. Enabling the *isConfigTagsDbLoadEnabled* function facilitates the AWS Config aggregator to reduce the load time for tag-related data in the following data sources: • SG-AWS-Lambda • SG-AWS-DynamoDb • SG-AWS-ELB-V1 • SG-AWS-ELB-V2

Set partition size for AWS accounts with parallel loading enabled

When using the SG-AWS-Image-Private, SG-AWS-Tags, SG-AWS-SendCommand, and AWS-SSM-GetS3Object data sources, you can optimize their performance by setting the partition size in the *aws_account_partition_size* connection property.

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Before you begin

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

About this task

The parallel loading feature is available for the SG-AWS-Image-Private, SG-AWS-Tags, SG-AWS-SendCommand, and AWS-SSM-GetS3Object data sources from the *Washington DC* Patch 5 release. This feature determines the number of AWS accounts that can be executed as parallel jobs to retrieve configuration item (CI) data. Partition size determines how many AWS accounts a single parallel-thread evaluates for data retrieval. For example, if you set the *aws_account_partition_size* property to 5 and there are 25 AWS accounts, the application generates 5 parallel jobs during data loading.

Note:
If the *aws_account_partition_size* property isn't configured, the partition size computation feature of the Integration Commons for CMDB application automatically determines the partition size for parallel loading at runtime. See Partition size computation for parallel loading in Integration Commons for CMDB.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AWS** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. From the **Property** column of the Service Graph Connection Properties related list, select **aws_account_partition_size**.
4. In the **Value** field, enter a numeric value greater than 0 for the partition size.
5. Select **Update**.

Disable parallel loading for Service Graph Connector for AWS data sources

You can disable parallel loading for specific data sources in the Service Graph Connector for AWS.

Before you begin

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AWS** > **Data sources**.
2. From the list of data sources, open the data source for which you want to disable parallel loading.
3. Clear the **Enable parallel loading** check box.
4. Select **Update**.

Handling parallel deletion of CIs in Service Graph Connector for AWS

Parallel deletion of configuration items (CIs) in the Service Graph Connector for AWS optimizes performance.

The parallel deletion feature is available for the following data sources from Washington DC patch 5 after the parallel job plugin is activated:

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- SG-AWS-API-Gateway
- SG-AWS-DynamoDb
- SG-AWS-EC2
- SG-AWS-ELB-V1
- SG-AWS-ELB-V2
- SG-AWS-Generic-Resources
- SG-AWS-Lambda
- SG-AWS-Network-Interface
- SG-AWS-RDS
- SG-AWS-S3
- SG-AWS-Security-Group
- SG-AWS-Storage-Volume
- SG-AWS-Subnets
- SG-AWS-VPC

Note:
If you upgraded to Service Graph Connector for AWS version 2.9.1 before the parallel job plugin was activated, you must run the SGC - `Parallel Loading Fix` script to enable parallel deletion.

Multiple jobs are created for deleting CIs based on the number of accounts in your configuration. You can modify the number of jobs that are created by setting the partition size in the *`aws_account_partition_size`* connection property. See Set partition size for AWS accounts with parallel loading enabled.

Note:
Only one job is created to import new and updated CIs.

Enable mapping for Cloud Os Image in AWS

Enable the *`sn_cmdb_ci_class.use_single_cloud_os_image`* system property to add Cloud Os Image data to the Cloud Image [cmdb_ci_cloud_os_image] table instead of adding the data to the Image [cmdb_ci_os_template] table.

Before you begin

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

About this task

In Service Graph Connector for AWS version 2.9.1 and earlier, the Cloud Os Image data was added to the Image [cmdb_ci_os_template] table. Multiple records were created for the same image because the Image [cmdb_ci_os_template] table is a dependent class. Starting with the Service Graph Connector for AWS 2.10.0 version, Cloud Os Image data is added to the Cloud Image [cmdb_ci_cloud_os_image] table, which is an independent class, when the *`sn_cmdb_ci_class.use_single_cloud_os_image`* system property is enabled.

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Procedure

1. Enter `sys_properties.list` in the navigation filter, and then open the *`sn_cmdb_ci_class.use_single_cloud_os_image`* property.
2. In the **Value** field, enter `true`.
3. Select **Update**.

Service Graph Connector for AWS reference

Reference topics provide additional information about Service Graph Connector for AWS components.

Supported AWS resource types

Several AWS resource types are imported as CMDB data by the Service Graph Connector for AWS.

AWS Config resources

When the AWS Config aggregator is enabled, the following APIs are invoked:

- ListDiscoveredResources
- BatchGetAggregateResourceConfig
- SelectAggregateResourceConfig

When the AWS Config aggregator is disabled, the following APIs are invoked:

- ListDiscoveredResources
- SelectResourceConfig
- BatchGetResourceConfigAction

Note:
For a list of AWS resource types supported by AWS Config, see Supported Resource Types on the AWS documentation site.

CMDB CI classes and AWS Config resources

CMDB CI classes	AWS resource type	AWS Config resource identifier
Cloud Network [cmdb_ci_network]	Amazon VPC	AWS::EC2::VPC
Cloud Subnet [cmdb_ci_cloud_subnet]	Amazon subnet	AWS::EC2::Subnet
Cloud Mgmt Network Interface [cmdb_ci_nic]	Amazon Elastic network interface	AWS::EC2::NetworkInterface

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CMDB CI classes and AWS Config resources (continued)

CMDB CI classes	AWS resource type	AWS Config resource identifier
Compute Security Group [cmdb_ci_compute_security_group]	Amazon EC2 security group	AWS::EC2::SecurityGroup
Storage Volume [cmdb_ci_storage_volume]	Amazon EBS volume	AWS::EC2::Volume
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Classic load balancer	AWS::ElasticLoadBalancing::LoadBalancer
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Application load balancer, network load balancer, or gateway load balancer	AWS::ElasticLoadBalancingV2::LoadBalancer
Cloud Gateway [cmdb_ci_cloud_gateway]	API gateway with WebSocket APIs or HTTP APIs	AWS::ApiGatewayV2::Api
Virtual Machine Instance [cmdb_ci_vm_instance]	Amazon EC2 instance	AWS::EC2::Instance
Server [cmdb_ci_server]	Amazon EC2 instance	AWS::EC2::Instance
Cloud DataBase [cmdb_ci_cloud_database]	Amazon RDS DB instance	AWS::RDS::DBInstance
Cloud Function [cmdb_ci_cloud_function]	Lambda function	AWS::Lambda::Function
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Amazon S3 bucket	AWS::S3::Bucket
DynamoDB Table [cmdb_ci_dynamodb_table]	DynamoDB table	AWS::DynamoDB::Table

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CMDB CI classes and AWS Config resources (continued)

CMDB CI classes	AWS resource type	AWS Config resource identifier
Software [cmdb_ci_spkg]	Software configuration for managed instances	AWS::SSM::ManagedInstanceInventory
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Amazon EKS cluster	AWS::EKS::Cluster
Amazon Redshift [cmdb_ci_aws_redshift]	Amazon Redshift	AWS::Redshift::Cluster

Amazon EC2 resources

CMDB CI classes and Amazon EC2 resources

CMDB CI classes	AWS resource type	AWS API action
Availability Zone [cmdb_ci_availability_zone]	AWS availability zone	None
Hardware Type [cmdb_ci_compute_template]	Amazon EC2 instance types	DescribeInstanceTypes
Image [cmdb_ci_os_template]	Amazon Machine Image (AMI)	DescribeImages
Cloud Image [cmdb_ci_cloud_os_image]	Amazon Machine Image (AMI)	DescribeImages
Cloud Hardware Type [cmdb_ci_cloud_hardware_type]	Amazon EC2 instance types	DescribeInstanceTypes

AWS Systems Manager resources

All AWS Systems Manager resources invoke the SendCommand API action.

CMDB CI classes and AWS Systems Manager resources

CMDB CI classes	AWS resource type	AWS API action
Running Process [cmdb_running_process]	Running process in EC2 instances	SendCommand

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CMDB CI classes and AWS Systems Manager resources (continued)

CMDB CI classes	AWS resource type	AWS API action
TCP Connections [cmdb_tcp]	TCP connections in EC2 instances	
Kubernetes Node [cmdb_ci_kubernetes_node]	Amazon EKS node	
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Amazon EKS pod	
Kubernetes Service [cmdb_ci_kubernetes_service]	Amazon EKS service	
Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Kubernetes DaemonSet	
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Kubernetes namespace	
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Kubernetes deployment	
Docker Container [cmdb_ci_docker_container]	Docker container	
Kubernetes Volume [cmdb_ci_kubernetes_volume]	Kubernetes Volume	

Organizations resources

CMDB CI classes and organizations

CMDB CI classes	AWS resource type	AWS API action
Cloud Organizations [cmdb_ci_cloud_org]	AWS Organizations	DescribeOrganization
Cloud Service Account [cmdb_ci_cloud_service_account]	AWS accounts	ListAccounts
AWS Datacenter [cmdb_ci_aws_datacenter]	AWS regions	DescribeRegions

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Resource Group Tagging resources

CMDB CI class and resource group tagging

CMDB classes	AWS resource type	AWS API action
Key Value [cmdb_key_value]	Tags for AWS Lambda, Amazon DynamoDB, ELBv1, and ELBv2	GetResources

Generic resources

Generic resources are stored in the Cloud Resource [cmdb_ci_cmp_resource] CMDB CI class.

CMDB CI classes and generic resources

CMDB CI class	AWS resource type	AWS API action
Cloud Resource [cmdb_ci_cmp_resource]	State Manager association compliance	AWS::SSM::AssociationCompliance
	Database subnet group	AWS::RDS::DBSubnetGroup
	AWS WAF rate based rule	AWS::WAF::RateBasedRule
	AWS WAF regional rule group	AWS::WAFRegional::RuleGroup
	AWS WAF regional rate based rule	AWS::WAFRegional::RateBasedRule
	Managed policies and inline policies	AWS::IAM::Policy
	AWS WAF Web ACL rule	AWS::WAF::WebACL
	AWS WAF Regional Web ACL rule	AWS::WAFRegional::WebACL
	AWS Certificate Manager (ACM) certificate	AWS::ACM::Certificate
	Amazon EC2 Auto Scaling group	AWS::AutoScaling::AutoScalingGroup

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CMDB CI classes and generic resources (continued)

CMDB CI class	AWS resource type	AWS API action
	IAM user for AWS account	AWS::IAM::User
	Amazon Redshift event subscription	AWS::Redshift::EventSubscription
	Amazon RDS DB snapshot	AWS::RDS::DBSnapshot
	Amazon Redshift cluster parameter group	AWS::Redshift::ClusterParameterGroup
	Amazon EC2 Auto Scaling group launch configuration	AWS::AutoScaling::LaunchConfiguration
	Amazon Redshift cluster snapshot	AWS::Redshift::ClusterSnapshot
	AWS CloudFormation stack	AWS::CloudFormation::Stack
	AWS CodeBuild project	AWS::CodeBuild::Project
	AWS Elastic Beanstalk application version	AWS::ElasticBeanstalk::ApplicationVersion
	AWS CodePipeline pipeline	AWS::CodePipeline::Pipeline
	Amazon Redshift security group	AWS::Redshift::ClusterSecurityGroup
	Amazon CloudFront distribution	AWS::CloudFront::Distribution
	AWS CloudTrail trail	AWS::CloudTrail::Trail
	Amazon CloudFront streaming distribution	AWS::CloudFront::StreamingDistribution

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CMDB CI classes and generic resources (continued)

CMDB CI class	AWS resource type	AWS API action
	AWS WAF rule group	AWS::WAF::RuleGroup
	Amazon RDS DB security group	AWS::RDS::DBSecurityGroup
	Amazon RDS event subscription	AWS::RDS::EventSubscription
	AWS WAF regional rule	AWS::WAFRegional::Rule
	AWS WAF rule	AWS::WAF::Rule
	IAM role for AWS account	AWS::IAM::Role
	Amazon EC2 Auto Scaling scheduled action	AWS::AutoScaling::ScheduledAction
	AWS Elastic Beanstalk environment	AWS::ElasticBeanstalk::Environment
	AWS Redshift cluster	AWS::Redshift::Cluster
	Amazon EC2 Auto Scaling group scaling policy	AWS::AutoScaling::ScalingPolicy
	AWS Shield protected AWS resource	AWS::Shield::Protection
	Amazon CloudWatch alarm	AWS::CloudWatch::Alarm
	EncryptionConfig - AWS X-Ray	AWS::XRay::EncryptionConfig
	AWS Shield protected AWS region	AWS::ShieldRegional::Protection

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CMDB CI classes and generic resources (continued)

CMDB CI class	AWS resource type	AWS API action
	Amazon Redshift subnet group	AWS::Redshift::ClusterSubnetGroup
	AWS Elastic Beanstalk application	AWS::ElasticBeanstalk::Application
	IAM group for AWS account	AWS::IAM::Group

Life cycle management of records in Service Graph Connector for AWS

Life cycle management in the Service Graph Connector for AWS monitors and updates the statuses of AWS resources throughout their entire life cycle, from creation to deletion.

The life cycle management process helps maintain the accuracy and integrity of data in the Configuration Management Database (CMDB).

In life cycle management, the record removal process involves systematically deleting obsolete or unnecessary resources. This step ensures that outdated entries are cleared, keeping the CMDB accurate and up-to-date. See Record removal process in Service Graph Connector for AWS.

Life cycle management for CIs in Service Graph Connector for AWS

The following table lists the configuration items (CIs) in CMDB and other non-CMDB tables for which life cycle management is available in Service Graph Connector for AWS.

Supported tables for life cycle management

Data source	CMDB CI classes	Life cycle management available
SG-AWS-Organization	Cloud Organizations [cmdb_ci_cloud_org]	Yes
SG-AWS-Org-Units	AWS Organizational Unit [cmdb_ci_aws_org_unit]	Yes
SG-AWS-Service-Account	Cloud Service Account [cmdb_ci_cloud_service_account]	Yes
SG-AWS-Service-Account-Tags	Key Value [cmdb_key_value]	No
SG-AWS-Org-Unit-Accounts	None	No
SG-AWS-Datacenters	AWS Datacenter [cmdb_ci_aws_datacenter]	No
SG-AWS-VPC	Network Adapter [cmdb_ci_network_adapter]	Yes
SG-AWS-Subnets	Availability Zone [cmdb_ci_availability_zone]	No
	Cloud Subnet [cmdb_ci_cloud_subnet]	Yes

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-AWS-Network-Interface	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
SG-AWS-Security-Group	Compute Security Group [cmdb_ci_compute_security_group]	Yes
SG-AWS-Storage-Volume	Storage Volume [cmdb_ci_storage_volume]	Yes
	Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Yes
SG-AWS-Image-Private	Image [cmdb_ci_os_template]	Yes
SG-AWS-EC2	Virtual Machine Instance [cmdb_ci_vm_instance]	Yes
	Server [cmdb_ci_server]	Yes
	Block Endpoint [cmdb_ci_endpoint_block]	Yes
	VNIC Endpoint [cmdb_ci_endpoint_vnic]	Yes
	Storage Mapping [cmdb_ci_storage_mapping]	Yes
	Image [cmdb_ci_os_template]	Yes
	IP Address [cmdb_ci_ip_address]	Yes
SG-AWS-Image-Id	Image [cmdb_ci_os_template]	Yes
SG-AWS-Hardware-Type	Hardware Type [cmdb_ci_compute_template]	Yes
SG-AWS-VM-Hw-Consolidation	None	No
SG-AWS-ELB-V1	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
SG-AWS-ELB-V2	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
SG-AWS-RDS	Cloud DataBase [cmdb_ci_cloud_database]	Yes
SG-AWS-S3	Cloud Object Storage [cmdb_ci_cloud_object_storage]	Yes
SG-AWS-DynamoDb	DynamoDB Table [cmdb_ci_dynamodb_table]	Yes
SG-AWS-API-Gateway	Cloud Gateway [cmdb_ci_cloud_gateway]	Yes
SG-AWS-Lambda	Cloud Function [cmdb_ci_cloud_function]	Yes
SG-AWS-Software-Inventory	Software Installation [cmdb_sam_sw_install]	No
	Software [cmdb_ci_spkg]	No
	Software Instance [cmdb_software_instance]	No
SG-AWS-Software-Remove	None	No

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-AWS-SSM-SendCommand	TCP Connections [cmdb_tcp]	No
	Running [cmdb_running_process]	No
	Application [cmdb_ci_appl]	No
SG-AWS-Tags	Key Value [cmdb_key_value]	No
SG-AWS-EKS-Cluster	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Yes
SG-AWS-EKS-Cluster-2	None	No
SG-AWS-EKS-FULL	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Yes
	Kubernetes Node [cmdb_ci_kubernetes_node]	Yes
	Kubernetes Service [cmdb_ci_kubernetes_service]	Yes
	Kubernetes Pod [cmdb_ci_kubernetes_pod]	Yes
	Docker Container [cmdb_ci_docker_container]	Yes
	Kubernetes Volume [cmdb_ci_kubernetes_volume]	Yes
	Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Yes
	Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Yes
	Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Yes
SG-AWS-Generic-Resources	Cloud Resource [cmdb_ci_cmp_resource]	Yes
SG-AWS-Redshift-Cluster	Amazon Redshift [cmdb_ci_aws_redshift]	Yes
SG-AWS-Generic-Tags	Key Value [cmdb_key_value]	No
SG-AWS-Get-Inventory	Server [cmdb_ci_server]	Yes

Record removal process in Service Graph Connector for AWS

The Service Graph Connector for AWS uses the optimized deletion approach to manage removal of records.

Record removal is the process of handling data that is no longer needed. For any discovered resources deleted later after pulling data, the Service Graph Connector for AWS automatically updates the **Install Status** field of the associated CMDB CI classes to indicate any retired or deleted records.

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Deletion of records in Service Graph Connector for AWS involves marking the install status of a record as **retired** rather than permanently deleting it from the system. The record remains in the database, making it possible to reference or restore it later. Deletion for Service Graph Connector for AWS relies on the Source [sys_object_source table], which can become inefficient with large datasets.

To enhance the deletion process, you can enable the optimized deletion method that leverages the SG-AWS Extension Attributes [sn_aws_extension_attributes] table. This table is regularly purged of obsolete records, improving performance and efficiency. The process still marks the install status of a record as **retired** but the streamlined data structure reduces overhead, ensuring quicker processing and better system performance. See Enable optimized deletion of retired CIs in AWS.

Optimized deletion is enabled for all tables in the Service Graph Connector for AWS, except for the following tables:

Hardware Type [cmdb_ci_compute_template], Availability Zone [cmdb_ci_availability_zone], AWS Datacenter [cmdb_ci_aws_datacenter], Running Process [cmdb_running_proces], TCP Connections [cmdb_tcp], and Application [cmdb_ci_appl]

Service Graph Connector for ExtraHop

Use the Service Graph Connector for ExtraHop to pull data from the ExtraHop application into your ServiceNow instance.

Important:
Starting with the Vancouver release, the ServiceNow hosted Service Graph Connector for Extrahop is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported. The Extrahop hosted Service Graph Connector for Extrahop provides the latest experience for this functionality. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

The Service Graph Connector for ExtraHop provides real-time network visibility across your enterprise by implementing stream processing, so that you can transform your network data into structured wire data.

The Service Graph Connector for ExtraHop pulls network visibility data into the ServiceNow® Configuration Management Database (CMDB) application. The connector enriches discovered device data and establishes relationships between devices based on network traffic flow.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

System requirements and supported versions

Dependencies and requirements:

- MID Server that is installed on Linux or Windows, unless the ExtraHop appliance is publicly accessible.
- ExtraHop Discover appliance with firmware version 7.2 or later with a user account that has unlimited privileges.

- Supported versions: ExtraHop v7.9.
- Supported ServiceNow versions:

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- Tokyo
- Utah
- Vancouver
- Washington DC

Use cases

The following are examples on how you can use the Service Graph Connector:

- Identification of network interactions between CIs.
- Discovery of network traffic flow data between computers or other types of hardware.
- Creation of relationships between devices. The relationships are based on network traffic flow.

Guided setup

The guided setup for the Service Graph Connector for ExtraHop provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for ExtraHop.

CMDB Integrations Dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed Service Graph Connectors. You can see metrics for all integration runs. You can also filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring ExtraHop integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from data sources in the ExtraHop application is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from the ExtraHop application. The data is loaded into the following staging tables:

- ExtraHop Computer [sn_extrahop_integr_computer]
- ExtraHop Network Activity [sn_extrahop_integr_activity]

The data is then inserted into the following target tables:

- CI Relationship [cmdb_rel_ci]
- Hardware [cmdb_ci_hardware]
- IP Address [cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]

Related topics

Service Graph Connectors

Configure Service Graph Connector for ExtraHop

Set up a REST message and scheduled jobs to import ExtraHop data into your CMDB.

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Before you begin

Important:
Starting with the Vancouver release, the ServiceNow hosted Service Graph Connector for Extrahop is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported. The Extrahop hosted Service Graph Connector for Extrahop provides the latest experience for this functionality. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- MID Server that is installed on Linux or Windows, unless the ExtraHop appliance is publicly accessible.
- ExtraHop Discover appliance with firmware version 7.2 or later, with a user account that has unlimited privileges.
- To connect to the ExtraHop application, configure an API key. For more information, see ExtraHop REST API Guide, specifically, see the "ExtraHop API requirements" section.

Roles required: admin

Procedure

1. Navigate to **All** > **Service Graph Connector ExtraHop** > **Setup**.
2. On the Getting started page, click **Get Started**.
3. On the Service Graph Connector for the ExtraHop page, in the Configure REST message section, select the task **Configure ExtraHop REST message**.
4. Configure a REST message to use when sending requests to the ExtraHop API.
   a. On the next page, in the Configure ExtraHop REST message task section, click **Configure**.
   b. On the form, fill in the fields.

REST Message form

Field	Description
Name	Descriptive name for this REST Message. This field is automatically set.

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Field	Description
Endpoint	URL to the web service API endpoint. Set the field to a base URL. For example, `https://myextrahop.com`. **Note:** Updating the Endpoint base URL also updates the base URLs for all HTTP methods that are associated with the ExtraHop REST message. In the **HTTP Request** tab, update the Authorization header to use your API key in the **Value** field.
Description	Description for this REST Message. This field is automatically set.
Application	Application that contains this message. The field is automatically set.
Authentication type	Type of authentication to apply to HTTP requests. The field is automatically set.
Use mutual authentication	Option to use multiple authentication by authenticating HTTP requests. Mutual authentication cannot be used with a MID Server.

c. Click **Update** if necessary.

d. In the Configure ExtraHop REST message task section, click **Mark as Complete**.

5. Test the connection to the ExtraHop Computer API.

a. In the Test Computer connection task section, click **Configure**.

b. On the form, fill in the fields.

HTTP Method form

Field	Description
Name	Unique identifier for this HTTP method. This field is automatically set.
Endpoint	URL to the web service API endpoint
Use MID Server	MID Server that sends this HTTP request. Using a MID Server is not compatible with mutual authentication.
REST Message	REST message record that this method is based on. This field is automatically set.
HTTP method	HTTP method that is implemented by this method. This field is automatically set.

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Field	Description
Application	Application that contains this method. This field is automatically set.
Authentication type	Type of authentication to apply to HTTP requests.
Use mutual authentication	Option to use multiple authentication by authenticating HTTP requests. Mutual authentication cannot be used with a MID Server.

c. Select the **HTTP Request** tab and fill out the **Use MID Server** field.

d. Click the **Authentication** tab and then click the **Test** related link.
Testing the connection takes a few moments. When the test is complete, the page is refreshed and shows the test results.

e. Select **Mark as Complete**.

> **Note:**
> The connection is successful if the **HTTP Status** field is set to **200**. If there are any errors in the **Error Message** field, then the connection failed and further troubleshooting is required.

f. Click **Update** if necessary.

g. In the Test Computer connection task section, click **Mark as Complete**.

6. Test the connection to the ExtraHop Network Activity Create API.

a. In the Test Network Activity Create connection task section, click **Configure**.

b. On the form, fill in the fields.

HTTP Method form

Field	Description
Name	Unique identifier for this HTTP method.
Endpoint	URL to the web service API endpoint
Use MID Server	MID Server that sends this HTTP request. Using a MID Server is not compatible with mutual authentication.
REST Message	REST message that this method is based on. This field is automatically set.
HTTP method	HTTP method that is implemented by this method. This field is automatically set.
Application	Application that contains this record. This field is automatically set.

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Field	Description
Authentication type	Type of authentication to apply to HTTP requests. This field is automatically set.
Use mutual authentication	Option to use multiple authentication by authenticating HTTP requests. Mutual authentication cannot be used with a MID Server.

c. Click the **Authentication** tab and then click the **Test** related link.
Testing the connection takes a few moments. When the test is complete, the page is refreshed and shows the test results.

d. Select **Mark as Complete**.

> **Note:**
> The connection is successful if the **HTTP Status** field is set to **200**. If there are any errors in the **Error Message** field, then the connection failed and further troubleshooting is required.

e. Click **Update** if necessary.

f. In the Test Network Activity Create connection task section, click **Mark as Complete**.

7. Set up the scheduled import jobs.

a. On the Service Graph Connector for ExtraHop page, in the Set up scheduled import jobs section, select the task **Configure Computer scheduled job**.

b. In the Configure Computer scheduled job task section, click **Configure**.

c. On the form, fill in the fields.

Scheduled Data Import form

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import.
Run as	Option to run the scheduled job with the credentials of the specified user.
Active	Option to activate the scheduled job. Select this option.
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.
Partition Method	Partition method for the concurrent import set.
Partition Size	Import set size for early scheduling.

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Field	Description
Execute pre-import script	Option to specify a script to run before the import is performed.
Execute post-import script	Option to specify a script to run after the import is performed.
Application	Application that contains this scheduled job.
Run	Frequency of running the import.
Conditional	Conditions under which this job is executed.

d. Click **Update** if necessary.

e. In the Configure Computer scheduled job task section, click **Mark as Complete**.

8. Configure the Network Activity scheduled job.

a. On the Service Graph Connector for ExtraHop page, in the Set up scheduled import jobs section, select the task **Configure Network Activity scheduled job**.

b. In the Configure Network Activity scheduled job task section, click **Configure**.

c. On the form, fill in the fields.

Scheduled Data Import form

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import.
Run as	Option to run the scheduled job with the credentials of the specified user.
Active	Option to activate the scheduled job. Select this option.
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.
Partition Method	Partition method for the concurrent import set.
Partition Size	Import set size for early scheduling.
Execute pre-import script	Option to specify a script to run before the import is performed.
Execute post-import script	Option to specify a script to run after the import is performed.
Application	Application that contains this scheduled job.
Run	Frequency of running the import.

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Field	Description
Conditional	Conditions under which this job is executed.

d. Click **Update** if necessary then **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for ExtraHop

When you complete setting up the connection, you can configure the integration to periodically pull data from ExtraHop. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Important:
Starting with the Vancouver release, the ServiceNow hosted Service Graph Connector for Extrahop is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported. The Extrahop hosted Service Graph Connector for Extrahop provides the latest experience for this functionality. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

The following attributes in the Hardware [cmdb_ci_hardware] table are populated by collected data:

Attribute label	Attribute name
Name	name
Manufacturer	manufacturer

Relationships created for Hardware

Parent class	Relationship type	Child class
Hardware [cmdb_ci_hardware]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Hardware [cmdb_ci_hardware]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Hardware [cmdb_ci_hardware]	Receives data from::Sends data to	Hardware [cmdb_ci_hardware]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Name	name
Nic	nic

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Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Name	name
Configuration Item	cmdb_ci
MAC Address	mac_address

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Hardware [cmdb_ci_hardware]

Service Graph Connector for GCP

Use the Service Graph Connector for GCP to ingest CMDB data from a Google Cloud Platform (GCP) project using the REST APIs.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Key features

- Get started quickly with a streamlined onboarding process.
- Use only the credentials you need.
- No MID Server required.
- Get end-to-end data coverage.
- No agents or individual scanning needed.
- Performant at scale.

Supported versions

Versions

GCP	ServiceNow
Last tested on July 16, 2025	• Washington DC • Xanadu

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Versions (continued)

GCP	ServiceNow
	• Yokohama • Zurich

Use cases

You can use the Service Graph Connector for GCP to get visibility into cloud resource identities, relationships, and state in real-time.

Important information for upgrading Service Graph Connector for GCP

After you've installed the latest version of the Service Graph Connector for GCP, you must synchronize the newly added data sources. Use the Advanced Setup section in the guided setup to synchronize data sources. For more information, see Configure Service Graph Connector for GCP.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for GCP using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring GCP integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the GCP data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from the GCP application.

The following table lists the data sources, the staging tables, the target tables as the CMDB CI classes, and the resource types imported for a GCP project.

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Data mapping for GCP

Data source	Staging table	CMDB CI classes	Resource types
SG-GCP Organization	SG-GCP Organization [sn_gcp_integ_sg_gcp_organization]	Cloud Organizations	Organization
SG-GCP Folder	SG-GCP Folder [sn_gcp_integ_sg_gcp_folder]	Google Organization Folder SG-GCP Extension Attributes	Folder
SG-GCP Project	SG-GCP Project [sn_gcp_integ_sg_gcp_project]	Google Organization Project Cloud Service Account Key Value SG-GCP Extension Attributes	Project
SG-GCP Network	SG-GCP Network [sn_gcp_integ_sg_gcp_network]	Cloud Network SG-GCP Extension Attributes	Network
SG-GCP Machine Image	SG-GCP Machine Image [sn_gcp_integ_sg_gcp_machine_image]	Image Key Value SG-GCP Extension Attributes	MachineImage
SG-GCP Subnet	SG-GCP Subnet [sn_gcp_integ_sg_gcp_subnet]	Cloud Subnet Google Datacenter Key Value SG-GCP Extension Attributes	Subnetwork
SG-GCP Storage Volume	SG-GCP Storage Volume [sn_gcp_integ_sg_gcp_storage_volume]	Storage Volume	Disk

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
		Google Datacenter Cloud Disk Type Key Value SG-GCP Extension Attributes	
SG-GCP Storage Volume Snapshot	SG-GCP Storage Volume Snapshot [sn_gcp_integ_sg_gcp_storage_vol_snapshot]	Storage Volume Snapshot Key Value SG-GCP Extension Attributes	Snapshot
SG-GCP Security Group	SG-GCP Security Group [sn_gcp_integ_sg_gcp_security_group]	Compute Security Group Network ACL Network ACL Rule Key Value SG-GCP Extension Attributes	Firewall
SG-GCP Software Inventory	SG-GCP Software Inventory [sn_gcp_integ_sg_gcp_software_inventory]	When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application	Instance

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
		is installed: Software Installation	
SG-GCP VM Instance	SG-GCP VM Instance [sn_gcp_integ_sg_gcp_vm_instance]	Virtual Machine Instance Google Datacenter Hardware Type Availability Zone Cloud Mgmt Network Interface Server Storage Mapping VNIC Endpoint Block Endpoint IP Address Key Value SG-GCP Extension Attributes	Instance
SG-GCP Execute Patch Job	SG-GCP Execute Patch Job [sn_gcp_integ_sg_gcp_execute_patch_job]	Not applicable	Not applicable
SG-GCP Hardware Type	SG-GCP Hardware Type [sn_gcp_integ_sg_gcp_hardware_type]	Hardware Type Google Datacenter Availability Zone	MachineType

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
SG-GCP VM Hw Consolidation	SG-GCP VM Hw Consolidation [sn_gcp_integ_sg_gcp_vm_hw_consolidation]	Virtual Machine Instance Server	None
SG-GCP Load Balancer Pool	SG-GCP Load Balancer Pool [sn_gcp_integ_sg_gcp_load_balancer_pool]	Load Balancer Pool Google Datacenter Cloud Service Account SG-GCP Extension Attributes Key Value	TargetPool
SG-GCP Load Balancer Pool Member	SG-GCP Load Balancer Pool Member [sn_gcp_integ_sg_gcp_load_balancer_pool_member]	Load Balancer Pool Member SG-GCP Extension Attributes	TargetPool
SG-GCP Load Balancer Health Service	SG-GCP Load Balancer Health Service[sn_gcp_integ_sg_gcp_load_balancer_health_service]	Cloud Load Balancer Health Service SG-GCP Extension Attributes	HealthCheck
SG-GCP Load Balancer	SG-GCP Load Balancer [sn_gcp_integ_sg_gcp_load_balancer]	Cloud Load Balancer Google Datacenter Cloud Service Account SG-GCP Extension Attributes	BackendService

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
		Key Value	
SG-GCP Load Balancer Service	SG-GCP Load Balancer Service [sn_gcp_integ_sg_gcp_load_balancer_service]	Load Balancer Service SG-GCP Extension Attributes	ForwardingRule
SG-GCP Cloud Database	SG-GCP Cloud Database [sn_gcp_integ_sg_gcp_cloud_database]	Cloud DataBase Google Datacenter SG-GCP Extension Attributes Key Value	Instance
SG-GCP Cloud Function	SG-GCP Cloud Function [sn_gcp_integ_sg_gcp_cloud_function]	Cloud Function Google Datacenter SG-GCP Extension Attributes Key Value	Function
SG-GCP Cloud Object Storage	SG-GCP Cloud Object Storage [sn_gcp_integ_sg_gcp_cloud_object_storage]	Cloud Object Storage Google Datacenter Key Value SG-GCP Extension Attributes	Buckets
SG-GCP Kubernetes Cluster	SG-GCP Kubernetes Cluster [sn_gcp_integ_sg_gcp_kubernetes_cluster]	Kubernetes Cluster Key Value SG-GCP Extension Attributes	Cluster

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
SG-GCP Kubernetes Node	SG-GCP Kubernetes Node [sn_gcp_integ_sg_gcp_kubernetes_node]	Kubernetes Node SG-GCP Extension Attributes	Node
SG-GCP Kubernetes Pod	SG-GCP Kubernetes Pod [sn_gcp_integ_sg_gcp_kubernetes_pod]	Kubernetes Pod Kubernetes Volume Docker Image Docker Container Key Value SG-GCP Extension Attributes	Pod
SG-GCP Kubernetes Service	SG-GCP Kubernetes Service [sn_gcp_integ_sg_gcp_kubernetes_service]	Kubernetes Service Key Value SG-GCP Extension Attributes	Service
SG-GCP Kubernetes Namespace	SG-GCP Kubernetes Namespace [sn_gcp_integ_sg_gcp_kubernetes_namespace]	Kubernetes Namespace Cloud Service Account Key Value SG-GCP Extension Attributes	Namespace
SG-GCP Kubernetes Deployment	SG-GCP Kubernetes Deployment [sn_gcp_integ_sg_gcp_kubernetes_deployment]	Kubernetes Deployment Key Value SG-GCP Extension Attributes	Deployment

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
SG-GCP Kubernetes Replicaset	SG-GCP Kubernetes Replicaset [sn_gcp_integ_sg_gcp_kubernetes_replicaset]	Kubernetes ReplicaSet Key Value SG-GCP Extension Attributes	ReplicaSet
SG-GCP Kubernetes Cluster Roles	SG-GCP Kubernetes Cluster Roles [sn_gcp_integ_sg_gcp_kubernetes_cluster_role]	Kubernetes Cluster Role Key Value SG-GCP Extension Attributes	ClusterRole
SG-GCP Kubernetes Cluster Role Binding	SG-GCP Kubernetes Cluster Role Binding [sn_gcp_integ_sg_gcp_kubernetes_cluster_role_binding]	Kubernetes Cluster Role Binding Key Value SG-GCP Extension Attributes	ClusterRoleBindi
SG-GCP Kubernetes Node Pool	SG-GCP Kubernetes Node Pool [sn_gcp_integ_sg_gcp_kubernetes_node_pool]	Kubernetes Node Pool Key Value SG-GCP Extension Attributes	NodePool
SG-GCP Generic Resource	SG-GCP Generic Resource [sn_gcp_integ_sg_gcp_generic_resource] **Note:** The SG-GCP Generic Resource data source only works with a service account that has organization-level access.	Cloud Resource	Resource
SG-GCP Annotation	SG-GCP Annotation [sn_gcp_integ_sg_gcp_annotation]	Key Value	Annotation
SG-GCP Get Patch Job	SG-GCP Get Patch Job [sn_gcp_integ_sg_gcp_get_patch_job]	Not applicable	Not applicable
SG-GCP Generic	SG-GCP Generic Resource Annotation [sn_gcp_integ_sg_gcp_generic_resource_annotation]	Key Value	Annotation

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
Resource Annotation			

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Note:

- The SG-GCP Annotation data source populates all labels and tags associated with GCP supported resources to the Key Value table.
- Starting with the Service Graph Connector for GCP 1.10 version, the SG-GCP Generic Resource Annotation data source populates the tags and labels for Generic resources to the Key Value table.
- The basic information about a GCP resource is stored in the SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes] table.
- After all the data sources are executed, the Server [cmdb_ci_server] class is updated with the class entry, and then based on the Windows or Linux class, the records are created in the Windows Server [cmdb_ci_win_server] and Linux Server [cmdb_ci_linux_server] classes, respectively.
- The SG-GCP Generic Resource data source imports data for generic resources not tracked by other data sources. The connector utilizes the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table to differentiate between generic and other supported resource types.

  The connector first populates all supported resources in the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table. These resources, categorized under their respective supported resource types, have specific data sources designated for ingestion within the connector. When the SG-GCP Generic Resource data source is executed and retrieves unsupported resource types, they are added to the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table and categorized as generic.

- For any discovered resources deleted later after pulling data, the Service Graph Connector for GCP automatically updates the **Install Status** field of the associated CMDB CI classes to indicate any retired or deleted records. For more information, see Life cycle management of records in Service Graph Connector for GCP and Record removal process in Service Graph Connector for GCP.
- Starting with the Service Graph Connector for GCP 1.9.0 version, when the *sn_itom_pattern.use a single hardware type for cloud data centers* system property is set to `true`, hardware type data is added to the Cloud Hardware Type [cmdb_ci_cloud_hardware_type] table, instead of being added to the Hardware Type [cmdb_ci_compute_template] table. For more information, see the Service Graph Connector For GCP - Migrating to a new hardware type model [KB1899584] article in the Now Support Knowledge Base.
- Starting with the Service Graph Connector for GCP 1.9.0 version, when the *sn_cmdb_ci_class.use_single_cloud_os_image* system property is set to `true`, image type data is added to the Cloud Image [cmdb_ci_cloud_os_image] table, instead of being added to the Image [cmdb_ci_os_template] table. For more information, see the Service Graph Connector For GCP - Migrating to a new Cloud OS Image model [KB1983751] article in the Now Support Knowledge Base.
- Starting with the Service Graph Connector for GCP 1.9.0 version, list API calls return only the information that is required to make batch calls and not the entire resource response.
- Starting with the Service Graph Connector for GCP 1.10 version, parallel data loading is enabled for the SG-GCP Annotation and SG-GCP Generic Resource Annotation data sources.
- Starting with the Service Graph Connector for GCP 1.10 version, you can configure the *AppScript Folder IDs* connection property to exclude AppScript folder information from imports. Automations are run on AppScript folders, which contain multiple projects that include meta information. AppScript folders don't contain any resources such as networks, subnets, and VMs.

  Specify the AppScript folder IDs as a comma-separated list in the `Value` field of the

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For more information on where data is saved when pulling data from a GCP project, see CMDB classes targeted in Service Graph Connector for GCP.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

BYOL and BYOS support

Bringing your own licenses (BYOL) or bringing your own subscriptions (BYOS) is the process of bringing previously purchased on-premises licenses or subscriptions to Google Cloud. The connector supports the BYOL and BYOS of the Image CIs for the Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) services on Google Cloud. The connector populates the Key Value [cmdb_key_value] table with the licensing information. Depending on the platform usage, the key is set to either `Windows_OS_License_Type_automatic` or `Linux_OS_License_Type_automatic`, and the key value is set to either `BYOL` or `BYOS`.

Related topics

- Service Graph Connectors
- Handling import failures for large GCP resources
- Deep discovery for Service Graph Connector for GCP

Configure Service Graph Connector for GCP using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for GCP for pulling in GCP project data into the CMDB.

Before you begin

Install Service Graph Connector for GCP version 1.8.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the GCP connector type and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

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6. Complete the prerequisites for setting up the GCP environment.

   a. Set up the GCP environment and create a Java KeyStore (JKS) certificate to encrypt the security certificates obtained from a GCP application.

      i. In the **Prerequisites** stage of the playbook, select the **Review setup instructions** activity.

      ii. Select **Service Graph connector for GCP - Setup Instructions** link to view the setup instructions included in the Service Graph connector for GCP - Setup Instructions [KB1220598] article in the Now Support Knowledge Base.

      iii. Make a note of the destination keystore password. You need to specify this password while importing the JKS certificate into the Service Graph Connector for GCP application.

      iv. Select the **I have read the setup instructions** check box to confirm that you have set up the GCP environment according to the instructions.

      v. Select **Continue**.

      vi. After completing the **Review setup instructions** activity, select **Continue**.

   b. Create an X.509 certificate to associate the JKS certificate for the GCP application with the Service Graph Connector for GCP.

      Note:
      You can skip this step if you're reusing an existing certificate by selecting **Skip**.

      i. In the **Prerequisites** stage of the playbook, select the **Create X.509 certificate** activity.

      ii. Select **New**.

      iii. On the form, fill in the fields.

Create new X.509 Certificate form

Field	Description
Name	Name of the X.509 certificate. For example, `SG-GCP-509Certificate-Org1`.
Key store password	Password to access the JKS certificate as noted down in the step 6.a.iii.
Short description	Description of the X.509 certificate.

      iv. In the Attachments section, select **Add File** to browse and upload the keystore.p12 file for the JKS certificate you created in step 6.a.

      v. Select the **I have read the setup instructions** check box after you have completed the setup.

      vi. After completing the **Create X.509 certificate** activity, select **Continue**.

7. **Optional:** Download the scripts that are required to enable deep discovery for the Service Graph Connector for GCP.

   a. In the **Prerequisites** stage of the playbook, select the **Download GCP deep discovery scripts** activity.

   b. Download the deep discovery scripts for Linux and Windows VMs.

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For more information about deep discovery for the Service Graph Connector for GCP, see the Service Graph Connector for GCP - Deep Discovery Setup Instructions [KB2213095] article in the Now Support Knowledge Base.

c. After completing the **Download GCP deep discovery scripts** activity, select **Continue**.

8. Enter connection details and test the API connection for importing GCP data.

a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection Name	Name to identify the GCP connection record.
Service Account Email	ServiceNow service account associated with the GCP application.
Keystore	Name of the X.509 certificate that you created in step 6.b.
Keystore Password	Password to access the JKS certificate as noted down in the step 6.a.iii.
Organization Id	ID of the organization associated with the GCP application.
Discovery Scope	Discovery scope of the GCP application. The available options are: **Organization** Select **Organization** when the ServiceNow service account has access to data within the GCP organization. **Projects** Select **Projects** when the ServiceNow service account has access to data within GCP projects only.

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

9. **Optional:** Configure the deep discovery connection properties.

a. In the **Setup** stage of the playbook, select the **Configure connection properties** activity. If deep discovery is already configured on the connection, the values are pre-populated on the Deep Discovery properties form. For more information about the deep discovery connection properties for GCP, see Deep discovery connection properties.

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b. Review the pre-populated fields on the Deep Discovery properties form.

c. After completing the **Configure connection properties** activity, select **Continue**.

10. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-GCP Organization** import schedule.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

11. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for GCP

Deep discovery for Service Graph Connector for GCP

Configure Service Graph Connector for GCP using the guided setup

Set up scheduled import jobs to pull in data from a GCP project into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

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Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
If you have an earlier version of the Service Graph Connector for GCP, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: admin

Note:
If you create non-admin RunAs users to run scheduled imports, grant the cmdb_inst_admin role to those users.

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for GCP application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **GCP** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the connection to send requests to the GCP application.

   a. In the Configure the Connection and Credentials section of the Service Graph Connector for GCP page, select **Get Started**.

   b. Set up the GCP environment and create a Java KeyStore (JKS) certificate to encrypt the security certificates obtained from a GCP application.

      Make a note of the destination keystore password. You need to specify this password while importing the JKS certificate into the Service Graph Connector for GCP application.

      For instructions, see the Service Graph Connector for GCP - Setup Instructions [KB1220598] article in the Now Support Knowledge Base.

      Note:
      After you have set up the GCP environment, return to the guided setup and set the GCP Setup Instructions task in the Configure the Connection and Credentials section to complete by selecting **Mark as Complete**.

   c. Create an X.509 certificate to associate the JKS certificate for the GCP application with the Service Graph Connector for GCP.

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i. For the Create X.509 certificate task, select **Configure**.

ii. On the form that opens in a new tab, fill in the fields.

X.509 Certificate form

Field	Description
Name	Name of the X.509 certificate. For example, `SG-GCP-509Certificate-Org1`.
Notify on expiration	Users to be notified when the certificate expires. If no users are selected, the logged-in user is added by default, along with the last two logged-in users with the administrator role.
Warn in days to expire	Number of days to send a notification before the certificate expires.
Active	Option to activate the certificate.
Type	Certificate container that is automatically set to **Java Key Store**. Leave the field value set to **Java Key Store**.
Expires in days	Number of days until the certificate expires.
Key store password	Password to access the JKS certificate as noted down in the previous step.
Short description	Description of the X.509 certificate.

iii. Select the manage attachments icon ( ).

iv. Select **Choose file** to browse and upload the keystore.p12 file for the JKS certificate you created in step 4.b.

v. Close the dialog box.

vi. Select the **Validate Stores/Certificates** related link.

vii. On successful validation, select **Update** to return to the guided setup page.

viii. Set the Create X.509 certificate task to complete by selecting **Mark as Complete**.

d. Edit the default connection.

i. For the Edit Default Connection task, select **Configure**.

ii. In the Flow Designer, select **SG-GCP Default Connection**, and then select **Edit**.

iii. On the form that opens in the Edit Connection dialog box, fill in the fields.

Edit Connection form

Field	Description
Service Account Email	Service account created in and associated with the GCP application.
Keystore	Name of the keystore that you created in step 4.b.

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Field	Description
Key Password	Destination keystore password associated with the keystore.
Organization Id	ID of the organization associated with the GCP application.
Discovery Scope	Discovery scope of the GCP application. The available options are: **organizations** Select **organizations** when the ServiceNow service account has access to data within the GCP organization. **projects** Select **projects** when the ServiceNow service account has access to data within GCP projects only.

iv. Select **Edit and Get OAuth Token**.

v. After the OAuth token flow is completed successfully, close the dialog box and the browser tab, and return to the guided setup page.

vi. Set the Edit Default Connection task to complete by selecting **Mark as Complete**.

e. Test the GCP API connection to import data from the GCP application.

i. For the Test the Connection task, select **Configure** to open the SG-GCP Default Connection page in a new browser tab.

ii. Test the connection by selecting the **Test Connection** related link.

Testing the connection may take a few moments. The page is refreshed to show the test results.

iii. When the **Status** field is set to **Success**, close the browser tab and return to the guided setup page.

If any of the tests have an error code or message or error sign, the connection failed and further troubleshooting is required.

iv. Set the Test the Connection task to complete by selecting **Mark as Complete**.

f. Configure the scheduled jobs to import data from the GCP application.

i. For the Configure the Scheduled Imports task, select **Configure** to open the Scheduled Data Imports list in a new browser tab.

ii. Select the SG-GCP Organization scheduled job.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job.

For more information, see Schedule a data import.

iv. Select **Active** check box to activate the SG-GCP Organization scheduled job.

v. In the **Run** field, select **Periodically** to specify how often the job will run.

vi. Select **Update**.

vii. Return to the guided setup page.

viii. Set the Configure the Scheduled Imports task to complete by selecting **Mark as Complete**.

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5. **Optional:** Add multiple GCP instances.

   a. In the Add Multiple Instances section of the Service Graph Connector for GCP page, select **Get Started**.

   b. Create data sources for the new GCP connection.

      i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.

      ii. For the Update Data Source Access task, select **Configure**.

      iii. To edit the record, select the **Global** application scope from the application picker.

      iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

      v. Select **Update**.

      vi. Return to the guided setup page.

      vii. From the application picker, select the **Service Graph Connector for GCP** application scope.

      viii. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

   c. Create a scheduled import job for the new GCP connection.

      i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.

      ii. For the Update Scheduled Data Import Access task, select **Configure**.

      iii. To edit the record, select the **Global** application scope from the application picker.

      iv. In the Application Access related list of the Scheduled Data Import form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

      v. Select **Update**.

      vi. Return to the guided setup page.

      vii. From the application picker, select the **Service Graph Connector for GCP** application scope.

      viii. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**.

   d. Clear the cache on the Data Source [sys_data_source] and Scheduled Data Imports [scheduled_import_set] tables.

      i. For the Clear Cache for Data Source and Scheduled Data Imports tables task, select **Configure**.

      ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
GlideCacheManager.flushTable("sys_data_source");
GlideTableManager.invalidateTable("scheduled_import_set");
GlideCacheManager.flushTable("scheduled_import_set");
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

      iii. Select **Run Script** to run the background script in the **global** scope.

      The script may take several minutes to execute.

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iv. After the script is executed, select **Close**.

v. Return to the guided setup page.

vi. From the application picker, select the **Service Graph Connector for GCP** application scope.

vii. Set the Clear Cache for Data Source and Scheduled Data Imports tables task to complete by selecting **Mark as Complete**.

e. To create an X.509 certificate for the new GCP instance, repeat the step 4.c, and then set the Create X.509 certificate task to complete by selecting **Mark as Complete**.

f. Add a new connection.

i. For the Add New Connection task, select **Configure**.

ii. In the Flow Designer, select **Add Connection**.

iii. On the form that opens in the Create Connection dialog box, fill in the fields.

Edit Connection form

Field	Description
Connection Name	Unique name for the new connection.
Service Account Email	ServiceNow service account associated with the GCP application.
Keystore	Name of the keystore that you created in step 5.e.
Key Password	Destination keystore password associated with the keystore.
Organization Id	ID of the organization associated with the GCP application.
Discovery Scope	Discovery scope of the GCP application. The available options are: **organizations** Select **organizations** when the ServiceNow service account has access to data within the GCP organization. **projects** Select **projects** when the ServiceNow service account has access to data within GCP projects only.

g. Test the new connection.

i. For the Test New Connection task, select **Configure**.

ii. In Service Graph Connections page that opens in a new browser tab, select the new connection that you want to test from the list of available connections.

iii. Test the connection by selecting the **Test Connection** related link.

Testing the connection may take a few moments. The page is refreshed to show the test results.

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iv. When the **Status** field is set to **Success**, close the browser tab and return to the guided setup page.

If any of the tests have an error code or message or error sign, the connection failed and further troubleshooting is required.

v. Set the Test New Connection task to complete by selecting **Mark as Complete**.

h. To configure the scheduled jobs to import data from the new GCP instance, repeat step 4.f, and then set the Configure the Scheduled Imports task to complete by selecting **Mark as Complete**.

6. Synchronize new data sources to import data from GCP instances.

a. In the Advanced Setup section of the Service Graph Connector for GCP page, select **Get Started**.

b. Synchronize new data sources for creating all the required credentials to make the new data sources work correctly.

i. For the Sync New Data source task, select **Configure**.

ii. Select **Synchronize Datasources**.

iii. Return to the guided setup page by closing the Sync New Data source window.

iv. Set the Sync New Data source task to complete by selecting **Mark as Complete**.

7. Set up OS Config Patch Jobs to enable deep discovery.

a. In the Setup OS Config Patch Jobs for extended discovery section of the Service Graph Connector for GCP page, select **Get Started**.

b. For the Download script files task, select **Configure**.

c. Save the Shell script and PowerShell script files.

The Shell script contains commands that run on Linux VMs. The PowerShell script contains commands that run on Windows VMs.

d. In the Shell script and PowerShell script files, specify the name of and the path in the Cloud Storage Bucket where the output of the commands are to be uploaded.

e. Upload the deep discovery scripts to the Cloud Storage Bucket.

f. Navigate back to the guided setup page, and set the Download script files task to complete by selecting **Mark as Complete**.

g. For the Configure GCP Cloud Storage Bucket for running Patch Jobs task, select **Configure**.

h. To configure the GCP Cloud Storage Bucket to run patch jobs, follow the deep discovery setup instructions in the Service Graph Connector for GCP - Deep Discovery Setup Instructions [KB2213095] article in the Now Support Knowledge Base.

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i. Navigate back to the guided setup page, and set the Configure GCP Cloud Storage Bucket for running Patch Jobs task to complete by selecting **Mark as Complete**.

j. For the Configure connection properties task, select **Configure**.

k. On the SG-GCP Configuration Properties form, select the connection for which you want to run deep discovery from the **Connection** list.

In the Properties section of the SG-GCP Configuration Properties form, the following fields are populated with the values for the connection that you selected. If required, update the field values.

Field	Description
Name of the Cloud Storage Bucket where the .sh and .ps1 files are uploaded in Google Cloud Platform	Name of the Cloud Storage Bucket where the deep discovery scripts are saved.
Path to the .sh file uploaded to Cloud Storage Bucket	Path of the deep discovery Shell script file.
Generation number of the .sh file uploaded to Cloud Storage Bucket	Number used to identify the versioning of the cloud storage object.
Path to the.ps1 file uploaded to Cloud Storage Bucket	Path of the deep discovery PowerShell script file.
Generation number of the .ps1 file uploaded to Cloud Storage Bucket	Number used to identify the versioning of the cloud storage object.
Name of the Cloud Storage Bucket provided in .sh and .ps1 files where the outputs of the commands have to be stored	Name of the output Cloud Storage Bucket.
Folder path provided in .sh and .ps1 files where the outputs are uploaded in the Storage Bucket	Path of the output storage folder in the Cloud Storage Bucket.

l. Select **Save**.

m. Navigate back to the guided setup, and set the Configure connection properties task to complete by selecting **Mark as Complete**.

Related topics

Service Graph Connector for GCP

Configure Service Graph Connector for GCP using SGC Central

Deep discovery for Service Graph Connector for GCP

CMDB classes targeted in Service Graph Connector for GCP

When you complete setting up the connection, you can configure the integration to periodically pull data from a GCP project. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

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Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Block Endpoint [cmdb_ci_endpoint_block]

The following attributes in the Block Endpoint [cmdb_ci_endpoint_block] table are populated by collected data:

Attribute label	Attribute name
Host	host
Name	name
Install Status	install_status
Operational status	operational_status

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
TCP port(s)	tcp_port
CPU Count	cpu_count
Fully qualified domain name	fqdn
Install Status	install_status
IP Address	ip_address
Memory Size (GB)	memory_size
Node Count	node_count
Operational status	operational_status
State	state
Type	type
Version	version

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Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Disk Type [cmdb_ci_disk_type]

The following attributes in the Cloud Disk Type [cmdb_ci_disk_type] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationships created for Cloud Disk Type

Parent class	Relationship type	Child class
Cloud Disk Type [cmdb_ci_disk_type]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Disk Type [cmdb_ci_disk_type]	Reference	Key Value [cmdb_key_value]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
CodeSha256	codesha256
Function Last Modified	function_last_modified
Install Status	install_status
Language	language
Operational status	operational_status
Version	version

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Relationships created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Reference	Key Value [cmdb_key_value]
Cloud Function [cmdb_ci_cloud_function]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]

The following attributes in the Cloud Load Balancer Health Service [cmdb_ci_lb_health_service] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Healthy threshold	healthy_threshold
Install Status	install_status
Interval in seconds	check_interval_sec

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Attribute label	Attribute name
Monitor type protocol	monitor_type
Operational status	operational_status
Port	port
Request path	request_path
Timeout in seconds	timeout_sec
Unhealthy threshold	unhealthy_threshold

Relationships created for Cloud Load Balancer Health Service

Parent class	Relationship type	Child class
Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Name	name
Object ID	object_id
Public IP	public_ip
Install Status	install_status
Operational status	operational_status
Private IP	private_ip
Configuration Item	cmdb_ci

Relationships created for Cloud Mgmt Network Interface

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Virtual Machine Instance [cmdb_ci_vm_instance]

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Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Network ACL [cmdb_ci_network_acl]
Cloud Network [cmdb_ci_network]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Object Storage [cmdb_ci_cloud_object_storage]

The following attributes in the Cloud Object Storage [cmdb_ci_cloud_object_storage] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Cloud Provider	cloud_provider
Install Status	install_status
Operational status	operational_status
Service Name	service_name

Relationships created for Cloud Object Storage

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

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Relationships created for Cloud Object Storage (continued)

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	Key Value [cmdb_key_value]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Organizations [cmdb_ci_cloud_org]

The following attributes in the Cloud Organizations [cmdb_ci_cloud_org] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Time	time

Relationships created for Cloud Organizations

Parent class	Relationship type	Child class
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	Google Organization Folder [cmdb_ci_gcp_folder]
Cloud Organizations [cmdb_ci_cloud_org]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Resource [cmdb_ci_cmp_resource]

The following attributes in the Cloud Resource [cmdb_ci_cmp_resource] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Install status	install_status
Operational status	operational_status
Resource type	resource_type

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Relationships created for Cloud Resource

Parent class	Relationship type	Child class
Cloud Resource [cmdb_ci_cmp_resource]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Cloud Resource [cmdb_ci_cmp_resource]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name
Account Id	account_id
Discovery credentials	discovery_credentials
Name	name
Object ID	object_id
Datacenter Type	datacenter_type
Install status	install_status
Operational status	operational_status
Organization Id	organization_id

Relationships created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Key Value [cmdb_key_value]
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Subnet [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Available IP Count	available_ip_count
Broadcast Address	broadcast_address
CIDR	cidr
Gateway	gateway

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Attribute label	Attribute name
Install Status	install_status
Operational status	operational_status
State	state
Subnet Mask	subnet_mask

Relationships created for Cloud Subnet

Parent class	Relationship type	Child class
Cloud Subnet [cmdb_ci_cloud_subnet]	Contains::Contained by	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Cloud Subnet [cmdb_ci_cloud_subnet]	Reference	Key Value [cmdb_key_value]
Cloud Subnet [cmdb_ci_cloud_subnet]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Compute Security Group [cmdb_ci_compute_security_group]

The following attributes in the Compute Security Group [cmdb_ci_compute_security_group] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Compute Security Group

Parent class	Relationship type	Child class
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	Key Value [cmdb_key_value]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Docker Container [cmdb_ci_docker_container]

The following attributes in the Docker Container [cmdb_ci_docker_container] table are populated by collected data:

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Attribute label	Attribute name
Container id	container_id
Command	command
Container created	container_created_at
Image id	image_id
Install Status	install_status
Name	name
Operational status	operational_status
Status	status

Docker Image [cmdb_ci_docker_image]

The following attributes in the Docker Image [cmdb_ci_docker_image] table are populated by collected data:

Attribute label	Attribute name
Image id	image_id
Name	name

Google Datacenter [cmdb_ci_google_datacenter]

The following attributes in the Google Datacenter [cmdb_ci_google_datacenter] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region
Install Status	install_status

Relationships created for Google Datacenter

Parent class	Relationship type	Child class
Google Datacenter [cmdb_ci_google_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]
Google Datacenter [cmdb_ci_google_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Google Organization Folder [cmdb_ci_gcp_folder]

The following attributes in the Google Organization Folder [cmdb_ci_gcp_folder] table are populated by collected data:

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Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Parent	parent_ci
Parent Id	parent_id
Parent Type	parent_type
Time	time

Relationship created for Google Organization Folder

Parent class	Relationship type	Child class
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	Cloud Organizations [cmdb_ci_cloud_org]
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	Google Organization Folder [cmdb_ci_gcp_folder]

Google Organization Project [cmdb_ci_gcp_project]

The following attributes in the Google Organization Project [cmdb_ci_gcp_project] table are populated by collected data:

Attribute label	Attribute name
Operational status	operational_status
Discovery credentials	discovery_credentials
Name	name
Object ID	object_id
Install Status	install_status
Parent	parent_ci
Parent Id	parent_id
Parent Type	parent_type
Project Id	project_id
Status	status
Time	time

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Relationships created for Google Organization Project

Parent class	Relationship type	Child class
Google Organization Project [cmdb_ci_gcp_project]	Reference	Google Organization Folder [cmdb_ci_gcp_folder]
Google Organization Project [cmdb_ci_gcp_project]	Reference	Cloud Organizations [cmdb_ci_cloud_org]

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Class	className
Description	short_description
Local Storage GB	local_storage_gb
Memory MB	memory_mb
vCPUs	vcpus
Zone	zone

Note:
If the *sn_itom_pattern.use a single hardware type for cloud data centers* system property is set to `true`, the *className* is set to Cloud Hardware Type [cmdb_ci_cloud_hardware_type]. If the property is set to `false`, the *className* is set to Hardware Type [cmdb_ci_compute_template].

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Class	className

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Attribute label	Attribute name
Fully qualified domain name	fqdn
Install Status	install_status
Operational status	operational_status

Note:
If the *sn_cmdb_ci_class.use_single_cloud_os_image* system property is set to `true`, the *className* is set to Cloud Image [cmdb_ci_cloud_os_image]. If the property is set to `false`, the *className* is set to Image [cmdb_ci_os_template].

Relationships created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Image [cmdb_ci_os_template]	Reference	Key Value [cmdb_key_value]
Image [cmdb_ci_os_template]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Install Status	install_status
IP version	ip_version
Name	name
Operational status	operational_status

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Key Value [cmdb_key_value]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

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The tags and labels associated with the following CI classes are populated in the Key Value [cmdb_key_value] table.

CMDB CI classes	Label populated	Tag populated
Cloud DataBase [cmdb_ci_cloud_database]	Yes	Yes
Cloud Function [cmdb_ci_cloud_function]	Yes	Yes
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	No	Yes
Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	No	Yes
Cloud Network [cmdb_ci_network]	No	Yes
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Yes	Yes
Cloud Organizations [cmdb_ci_cloud_org]	No	Yes
Cloud Resource [cmdb_ci_cmp_resource]	Yes	Yes
Cloud Service Account [cmdb_ci_cloud_service_account]	Yes	Yes
Cloud Subnet [cmdb_ci_cloud_subnet]	No	Yes
Compute Security Group [cmdb_ci_compute_security_group]	No	Yes
Google Organization Folder [cmdb_ci_gcp_folder]	No	Yes
Google Organization Project [cmdb_ci_gcp_project]	Yes	Yes
Image [cmdb_ci_os_template]	No	Yes
IP Address [cmdb_ci_ip_address]	Yes	Yes
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Yes	Yes
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Yes	Yes
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Yes	Yes
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Yes	Yes

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CMDB CI classes	Label populated	Tag populated
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Yes	Yes
Kubernetes Node [cmdb_ci_kubernetes_node]	Yes	Yes
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Yes	Yes
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Yes	Yes
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Yes	Yes
Kubernetes Service [cmdb_ci_kubernetes_service]	Yes	Yes
Load Balancer Pool [cmdb_ci_lb_pool]	No	Yes
Load Balancer Service [cmdb_ci_lb_service]	Yes	Yes
Storage Volume [cmdb_ci_storage_volume]	Yes	Yes
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Yes	Yes
Virtual Machine Instance [cmdb_ci_vm_instance]	Yes	Yes

Note:
Labels are not supported by Google Cloud for the following CI classes:

- Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
- Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]
- Cloud Network [cmdb_ci_network]
- Cloud Organizations [cmdb_ci_cloud_org]
- Cloud Subnet [cmdb_ci_cloud_subnet]
- Compute Security Group [cmdb_ci_compute_security_group]
- Google Organization Folder [cmdb_ci_gcp_folder]
- Image [cmdb_ci_os_template]
- Load Balancer Pool [cmdb_ci_lb_pool]

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data:

Attribute label	Attribute name
Cluster Resource ID	cluster_resource_id

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Attribute label	Attribute name
IP Address	ip_address
Kubernetes UID	k8s_uid
Name	name
Port	port
Cluster Version	cluster_version
Description	short_description
Install Status	install_status
Operational status	operational_status
SelfLink	self_link
Subnet Mask	subnet_mask

Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	Key Value [cmdb_key_value]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]

The following attributes in the Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Comments	comments

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Attribute label	Attribute name
Description	short_description
Install Status	install_status
Operational status	operational_status
Kubernetes Cluster	cluster
Name	name

Relationships created for Kubernetes Cluster Role

Parent class	Relationship type	Child class
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Reference	Key Value [cmdb_key_value]

Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]

The following attributes in the Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Comments	comments
Description	short_description
Install Status	install_status
Name	name
Kubernetes Cluster	cluster
Operational status	operational_status

Relationships created for Kubernetes Cluster Role Binding

Parent class	Relationship type	Child class
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

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Relationships created for Kubernetes Cluster Role Binding (continued)

Parent class	Relationship type	Child class
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Reference	Key Value [cmdb_key_value]

Kubernetes Deployment [cmdb_ci_kubernetes_deployment]

The following attributes in the Kubernetes Deployment [cmdb_ci_kubernetes_deployment] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Available Replicas	available_replicas
Description	short_description
Desired Replicas	desired_replicas
Install Status	install_status
Kubernetes Cluster	cluster
Operational status	operational_status
Total Replicas	total_replicas
Unavailable Replicas	unavailable_replicas
Updated Replicas	updated_replicas

Relationships created for Kubernetes Deployment

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

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Relationships created for Kubernetes Deployment (continued)

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Key Value [cmdb_key_value]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Description	short_description
Install Status	install_status
Namespace	namespace
Operational status	operational_status

Relationships created for Kubernetes Namespace

Parent class	Relationship type	Child class
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Contains::Contained by	Kubernetes Deployment [cmdb_ci_kubernetes_deployment]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Contains::Contained by	Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	Key Value [cmdb_key_value]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Node [cmdb_ci_kubernetes_node]

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Attribute label	Attribute name
IP Address	ip_address
Kubernetes UID	k8s_uid
Name	name
Description	short_description
Install Status	install_status
Namespace	namespace
Operational status	operational_status
Kubernetes Cluster	cluster

Relationships created for Kubernetes Node

Parent class	Relationship type	Child class
Kubernetes Node [cmdb_ci_kubernetes_node]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Node [cmdb_ci_kubernetes_node]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Key Value [cmdb_key_value]

Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]

The following attributes in the Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Disk Type	disk_type
Image Type	image_type
Install Status	install_status
Machine Type	machine_type
Operational status	operational_status
Pod CIDR Range	podIpv4CidrSize
Resource version	resource_version
Kubernetes Cluster	cluster

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Relationships created for Kubernetes Node Pool

Parent class	Relationship type	Child class
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Uses::Used by	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Reference	Key Value [cmdb_key_value]
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Description	short_description
Host IP	host_ip
Install Status	install_status
IP Address	ip_address
Operational status	operational_status
Resource version	resource_version

Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Image [cmdb_ci_docker_image]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Kubernetes Volume [cmdb_ci_kubernetes_volume]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	Key Value [cmdb_key_value]

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Relationships created for Kubernetes Pod (continued)

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]

The following attributes in the Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Description	short_description
Desired Replicas	desired_replicas
Install Status	install_status
Operational status	operational_status
SelfLink	self_link
Total Replicas	total_replicas
Kubernetes Cluster	cluster

Relationships created for Kubernetes ReplicaSet

Parent class	Relationship type	Child class
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Key Value [cmdb_key_value]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Service [cmdb_ci_kubernetes_service]

The following attributes in the Kubernetes Service [cmdb_ci_kubernetes_service] table are populated by collected data:

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Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Description	short_description
Install Status	install_status
IP Address	ip_address
Operational status	operational_status

Relationships created for Kubernetes Service

Parent class	Relationship type	Child class
Kubernetes Service [cmdb_ci_kubernetes_service]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	Key Value [cmdb_key_value]
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Volume [cmdb_ci_kubernetes_volume]

The following attributes in the Kubernetes Volume [cmdb_ci_kubernetes_volume] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Mount Path	mount_path
Name	name
Volume ID	volume_id
Namespace	namespace

Load Balancer Pool [cmdb_ci_lb_pool]

The following attributes in the Load Balancer Pool [cmdb_ci_lb_pool] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status

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Relationships created for Load Balancer Pool

Parent class	Relationship type	Child class
Load Balancer Pool [cmdb_ci_lb_pool]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Load Balancer Pool [cmdb_ci_lb_pool]	Owns::Owned by	Load Balancer Pool Member [cmdb_ci_lb_pool_member]
Load Balancer Pool [cmdb_ci_lb_pool]	Reference	Key Value [cmdb_key_value]
Load Balancer Pool [cmdb_ci_lb_pool]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Load Balancer Pool Member [cmdb_ci_lb_pool_member]

The following attributes in the Load Balancer Pool Member [cmdb_ci_lb_pool_member] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install status	install_status
Operational status	operational_status

Relationship created for Load Balancer Pool Member

Parent class	Relationship type	Child class
Load Balancer Pool Member [cmdb_ci_lb_pool_member]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Load Balancer Service [cmdb_ci_lb_service]

The following attributes in the Load Balancer Service [cmdb_ci_lb_service] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Name	name
Object ID	object_id
Port	port
Install Status	install_status
Listener Protocol	listener_protocol
Operational status	operational_status
Service Type	service_type

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Relationships created for Load Balancer Service

Parent class	Relationship type	Child class
Load Balancer Service [cmdb_ci_lb_service]	Contains::Contained by	Load Balancer Pool [cmdb_ci_lb_pool]
Load Balancer Service [cmdb_ci_lb_service]	Hosted on::Hosts	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Load Balancer Service [cmdb_ci_lb_service]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Load Balancer Service [cmdb_ci_lb_service]	Reference	Key Value [cmdb_key_value]

Network ACL [cmdb_ci_network_acl]

The following attributes in the Network ACL [cmdb_ci_network_acl] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Install Status	install_status
Operational status	operational_status

Relationships created for Network ACL

Parent class	Relationship type	Child class
Network ACL [cmdb_ci_network_acl]	Contains::Contained by	Network ACL Rule [cmdb_ci_network_acl_rule]
Network ACL [cmdb_ci_network_acl]	Reference	Key Value [cmdb_key_value]

Network ACL Rule [cmdb_ci_network_acl_rule]

The following attributes in the Network ACL Rule [cmdb_ci_network_acl_rule] table are populated by collected data:

Attribute label	Attribute name
Name	name
Allow Deny	allow_deny
Allowed\Denied Traffic	allowed_denied_traffic
Destination Ranges	destination_ranges
Install Status	install_status

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Attribute label	Attribute name
Operational status	operational_status
Outbound	is_outbound
Source Ranges	source_ranges
Target Tags	target_tags

Relationship created for Network ACL Rule

Parent class	Relationship type	Child class
Network ACL Rule [cmdb_ci_network_acl_rule]	Reference	Key Value [cmdb_key_value]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Class	sys_class_name
CPU count	cpu_count
Disk space (GB)	disk_space
Host name	host_name
Install Status	install_status
IP Address	ip_address
Is Virtual	virtual
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Reference	Software Installation [cmdb_sam_sw_install]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]

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Relationships created for Server (continued)

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

The following attributes in the SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes] table are populated by collected data:

Attribute label	Attribute name
Resource ID	resource_id
Folder ID	folder_id
Organization ID	organization_id
Parent	parent
Project	project
Project ID	project_id
Self Link	self_link
Service Graph Connection Record	sg_connection_record
Region	region
Resource Type	resource_type
Organization-Credential Record	org_credential_record

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Key	key
Discovery source	discovery_source
Name	name
Version	version
Manufacturer	manufacturer

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

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Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source
Last scanned	last_scanned
Installed on	installed_on

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Server [cmdb_ci_server]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Name	name
Installed on	installed_on
Install date	install_date

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

Storage Mapping [cmdb_ci_storage_mapping]

The following attributes in the Storage Mapping [cmdb_ci_storage_mapping] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status

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Attribute label	Attribute name
Mapping Type	mapping_type
Operational status	operational_status

Storage Volume [cmdb_ci_storage_volume]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Volume ID	volume_id
Install Status	install_status
Name	name
Operational status	operational_status
Size bytes	size_bytes
State	state
Storage type	storage_type

Relationships created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Reference	Key Value [cmdb_key_value]
Storage Volume [cmdb_ci_storage_volume]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]

The following attributes in the Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Capacity	capacity
Install Status	install_status
Operational status	operational_status
Parent ID	parent_id
Size (GB)	size

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Attribute label	Attribute name
State	state
Volume Name	volume_name

Relationships created for Storage Volume Snapshot

Parent class	Relationship type	Child class
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Provisioned From::Provisioned	Storage Volume [cmdb_ci_storage_volume]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Reference	Key Value [cmdb_key_value]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
CPUs	cpus
Disks	disks
Disks size (GB)	disks_size
Install Status	install_status
IP Address	ip_address
Memory (MB)	memory
Network adapters	nics
Operational status	operational_status
State	state
Termination Protection	termination_protection
VM Instance ID	vm_inst_id

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]

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Relationships created for Virtual Machine Instance (continued)

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Cloud Mgmt Network Interface [cmdb_ci_nic]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Storage Mapping [cmdb_ci_storage_mapping]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Use End Point To::Use End Point From	Block Endpoint [cmdb_ci_endpoint_block]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Google Organization Project [cmdb_ci_gcp_project]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

VNIC Endpoint [cmdb_ci_endpoint_vnic]

The following attributes in the VNIC Endpoint [cmdb_ci_endpoint_vnic] table are populated by collected data:

Attribute label	Attribute name
Host	host
Name	name
Object ID	object_id
Install Status	install_status
IP Address	ip_address
Operational status	operational_status

Relationship created for VNIC Endpoint

Parent class	Relationship type	Child class
VNIC Endpoint [cmdb_ci_endpoint_vnic]	Implement End Point To::Implement End Point From	Cloud Mgmt Network Interface [cmdb_ci_nic]

Accessing the connection details of Service Graph Connector for GCP

You can access the connection details of the Service Graph Connector for GCP in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

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With the CCF, you can access all the connections used by the Service Graph Connector for GCP. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a GCP connection

Access the details of a GCP connection configured for the Service Graph Connector for GCP.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **GCP** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Handling import failures for large GCP resources

Manage the data source failure when importing resources from GCP.

When importing large GCP resources, the data sources in the Service Graph Connector for GCP might fail because of a Direct REST response exceeding the 1024-MB limit. For more information, see REST step.

You can use one or more of the following options to handle the REST response size limitation error in the Service Graph Connector for GCP:

- Save the response as an attachment
- Modify the batch size

Save the response as an attachment

With the save response as an attachment feature, the response of each data source is temporarily stored as an attachment and after the response is read, the attachment is deleted automatically. The save response as an attachment feature is activated by default and is triggered by the *sn_gcp_integ.save_rest_response_as_attachment* system property.

As a user with the admin role, you can deactivate the save response as an attachment feature by setting the *sn_gcp_integ.save_rest_response_as_attachment* property to `false`. When the feature is deactivated and the response size is within the limit, the data sources run normally.

Modify the batch size

By default, the maximum batch size of the environment variable for a data source is set to 100 records. You can reduce or increase the batch size based on the data volume. To manage the batch size of a data source, you must add a system property of integer type for the data source as described in the following table.

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System properties for handling the batch size of Service Graph Connector for GCP data sources

Data source	System property
SG-GCP Cloud Database	sg_gcp_cloud_db_batch_size
SG-GCP Cloud Function	sg_gcp_cloud_function_batch_size
SG-GCP Cloud Object Storage	sg_gcp_object_storage_batch_size
SG-GCP Kubernetes Cluster	sg_gcp_kubernetes_cluster_batch_size
SG-GCP Kubernetes Cluster Role	sn_gcp_integ.sg_gcp_kubernetes_cluster_role_batch_size
SG-GCP Kubernetes Cluster Role Binding	sn_gcp_integ.sg_gcp_kubernetes_cluster_role_binding_batch_size
SG-GCP Kubernetes Deployment	sg_gcp_kubernetes_deployment_batch_size
SG-GCP Kubernetes Namespace	sg_gcp_kubernetes_namespace_batch_size
SG-GCP Kubernetes Node	sg_gcp_kubernetes_node_batch_size
SG-GCP Kubernetes Pod	sg_gcp_kubernetes_pod_batch_size
SG-GCP Kubernetes Replicaset	sg_gcp_kubernetes_replicaset_batch_size
SG-GCP Kubernetes Service	sg_gcp_kubernetes_service_batch_size
SG-GCP Load Balancer	sg_gcp_load_balancer_batch_size
SG-GCP Load Balancer Health Service	sg_gcp_lb_health_service_batch_size
SG-GCP Load Balancer Pool	sg_gcp_lb_pool_batch_size
SG-GCP Load Balancer Pool Member	sg_gcp_lb_pool_member_batch_size
SG-GCP Load Balancer Service	sn_gcp_integ.sg_gcp_lb_service_batch_size
SG-GCP Network	sg_gcp_network_batch_size
SG-GCP Kubernetes Node Pool	sn_gcp_integ.sg_gcp_kubernetes_node_pool_batch_size
SG-GCP Security Group	sg_gcp_security_group_batch_size
SG-GCP Software Inventory	sg_gcp_software_inventory_batch_size
SG-GCP Storage Volume	sg_gcp_storage_volume_batch_size
SG-GCP Storage Volume Snapshot	sg_gcp_storage_vol_snapshot_batch_size

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System properties for handling the batch size of Service Graph Connector for GCP data sources (continued)

Data source	System property
SG-GCP Subnet	sg_gcp_subnet_batch_size
SG-GCP VM Instance	sg_gcp_vm_instance_batch_size

Note:
You must add these system properties as they aren't available by default. You must have the admin role to add or modify a system property. For more information, see Add a system property.

Deep discovery for Service Graph Connector for GCP

The SG-GCP Execute Patch Job and SG-GCP Get Patch Job scheduled import jobs enable deep discovery by running patch jobs at the GCP project level.

Deep discovery involves fetching server data. The deep discovery data populates host name, serial number, CPU data, TCP connections, and running processes data into the CMDB.

The Service Graph Connector for GCP uses OS Config Patch jobs on GCP projects to execute the deep discovery commands on the VMs. These patch jobs run independently on Linux and Windows VMs.

The following scheduled imports execute the OS Config Patch jobs, and then read and delete the output:

- SG-GCP Execute Patch Job
- SG-GCP Get Patch Job

Deep discovery connection properties

Deep discovery connection properties

Connection property name	Connection property value
Scripts Bucket Name	Name of the Cloud Storage Bucket where the deep discovery scripts are saved.
Outputs Bucket Name	Name of the output Cloud Storage Bucket.
Outputs Storage Path	Path of the output Cloud Storage Bucket.
Shell Script Object Path	Path of the deep discovery Shell script file.
Shell Script Generation Number	Number that is used to identify the versioning of the cloud storage object.
PowerShell Script Object Path	Path of the deep discovery PowerShell script file.
PowerShell Script Generation Number	Number that is used to identify the versioning of the cloud storage object.

SG-GCP Execute Patch Job

The SG-GCP Execute Patch Job scheduled import reads the path of the Shell and PowerShell scripts uploaded to the Cloud Storage Bucket and the generation numbers from the deep

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discovery connection properties. The scheduled import then runs the commands on Linux and Windows VMs separately.

In the Import Set table for the SG-GCP Execute Patch Job import schedule, each project will have two rows, one for Linux VMs and the other for Windows VMs. The **Import Set** rows remain in `Pending` state because no transformations are required for these rows. The **Import Set** rows include the patch job ID and the list of instances on which the deep discovery script is run. The output is stored in the Cloud Storage Bucket with the Object ID of the VMs on which the deep discovery commands are run.

SG-GCP Get Patch Job

The SG-GCP Get Patch Job scheduled import reads the output of the commands that are run on the Linux and Windows VMs. The scheduled import reads the output from the output bucket and folder path that are specified in the deep discovery connection properties. The SG-GCP Get Patch Job scheduled import then deletes the output from the Cloud Storage Bucket. The **Import Set** rows are processed using Application Dependency Mapping (ADM) to populate the Server records with the data of the VMs on which deep discovery was run. The **Import Set** rows include VM data such as running processes, TCP connections, and CPU information.

Application Dependency Mapping

Using the deep discovery information, Application Dependency Mapping (ADM) creates and classifies the following applications from the imported middleware information:

- Apache Web Server
- MongoDB Instance
- MSFT SQL Instance
- MySQL Instance
- Nginx Web Server
- Oracle Database Listener
- Oracle Instance
- PostgreSQL Instance
- Tomcat

Additional resource

Service Graph Connector for GCP - Deep Discovery Setup Instructions [KB2213095] article in the Now Support Knowledge Base

Life cycle management of records in Service Graph Connector for GCP

Life cycle management in the in the Service Graph Connector for GCP monitors and updates the statuses of GCP resources throughout their entire life cycle, from creation to deletion.

The life cycle management process helps maintain the accuracy and integrity of data in the Configuration Management Database (CMDB).

In life cycle management, the record removal process involves systematically deleting obsolete or unnecessary resources. This step ensures that outdated entries are cleared, keeping the CMDB accurate and up-to-date. See Record removal process in Service Graph Connector for GCP.

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Life cycle management for CIs in Service Graph Connector for GCP

The following table lists the configuration items (CIs) for which life cycle management is available in Service Graph Connector for GCP.

Supported CIs for life cycle management

Data source	CMDB CI classes	Life cycle management available
SG-GCP Organization	Cloud Organizations [cmdb_ci_cloud_org]	Yes
SG-GCP Folder	Google Organization Folder [cmdb_ci_gcp_folder]	Yes
SG-GCP Project	Google Organization Project [cmdb_ci_gcp_project]	Yes
	Cloud Service Account [cmdb_ci_cloud_service_account]	Yes
SG-GCP Network	Cloud Network [cmdb_ci_network]	Yes
SG-GCP Machine Image	Image [cmdb_ci_os_template]	Not applicable
SG-GCP Subnet	Cloud Subnet [cmdb_ci_cloud_subnet]	Yes
	Google Datacenter [cmdb_ci_google_datacenter]	Not applicable
SG-GCP Storage Volume	Storage Volume [cmdb_ci_storage_volume]	Yes
SG-GCP Storage Volume Snapshot	Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Yes
SG-GCP Security Group	Compute Security Group [cmdb_ci_compute_security_group]	Yes
	Network ACL [cmdb_ci_network_acl]	Yes
	Network ACL Rule [cmdb_ci_network_acl_rule]	Yes
SG-GCP Software Inventory	Software [cmdb_ci_spkg] Software Instance [cmdb_software_instance] Software Installation [cmdb_sam_sw_install]	Yes
SG-GCP VM Instance	Virtual Machine Instance [cmdb_ci_vm_instance]	Yes
	Server [cmdb_ci_server]	Yes
	Storage Mapping [cmdb_ci_storage_mapping]	Yes
	VNIC Endpoint [cmdb_ci_endpoint_vnic]	Yes
	Block Endpoint [cmdb_ci_endpoint_block]	Yes
	IP Address [cmdb_ci_ip_address]	Yes
	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
	Hardware Type [cmdb_ci_compute_template]	Not applicable

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Supported CIs for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
	Image [cmdb_ci_os_template]	Yes
	Availability Zone [cmdb_ci_availability_zone]	Not applicable
SG-GCP Execute Patch Job	Not applicable	Not applicable
SG-GCP Hardware Type	Hardware Type [cmdb_ci_compute_template]	Not applicable
	Google Datacenter [cmdb_ci_google_datacenter]	Not applicable
	Availability Zone [cmdb_ci_availability_zone]	Not applicable
SG-GCP VM Hw Consolidation	Virtual Machine Instance [cmdb_ci_vm_instance]	Not applicable
SG-GCP Load Balancer Pool	Load Balancer Pool [cmdb_ci_lb_pool]	Yes
SG-GCP load Balancer Pool Member	Load Balancer Pool Member [cmdb_ci_lb_pool_member]	Yes
SG-GCP Load Balancer Health Service	Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	Yes
SG-GCP Load Balancer	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
SG-GCP Load Balancer Service	Load Balancer Service [cmdb_ci_lb_service]	Yes
SG-GCP Cloud Database	Cloud DataBase [cmdb_ci_cloud_database]	Yes
SG-GCP Cloud Function	Cloud Function [cmdb_ci_cloud_function]	Yes
SG-GCP Cloud Object Storage	Cloud Object Storage [cmdb_ci_cloud_object_storage]	Yes
SG-GCP Kubernetes Cluster	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Yes
SG-GCP Kubernetes Node	Kubernetes Node [cmdb_ci_kubernetes_node]	Yes
SG-GCP Kubernetes Pod	Kubernetes Pod [cmdb_ci_kubernetes_pod]	Yes
	Kubernetes Volume [cmdb_ci_kubernetes_volume]	No
	Docker Image [cmdb_ci_docker_image]	No
	Docker Container [cmdb_ci_docker_container]	Yes
SG-GCP Kubernetes Service	Kubernetes Service [cmdb_ci_kubernetes_service]	Yes
SG-GCP Kubernetes Namespace	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Yes

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Supported CIs for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-GCP Kubernetes Deployment	Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Yes
SG-GCP Kubernetes Replicaset	Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Yes
SG-GCP Kubernetes Cluster Roles	Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Yes
SG-GCP Kubernetes Cluster Role Binding	Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Yes
SG-GCP Kubernetes Node Pool	Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Yes
SG-GCP Generic Resource	Cloud Resource [cmdb_ci_cmp_resource]	Yes
SG-GCP Annotation	Key Value [cmdb_key_value]	Not applicable
SG-GCP Get Patch Job	Not applicable	Not applicable
SG-GCP Generic Resource Annotation	Key Value [cmdb_key_value]	Not applicable

Record removal process in Service Graph Connector for GCP

The Service Graph Connector for GCP uses soft deletion and hard deletion to manage the removal of records.

Record removal is the process of handling data that is no longer needed. For any discovered resources that are deleted later after pulling data, the Service Graph Connector for GCP automatically updates the **Install Status** field of the associated CMDB CI classes to indicate any retired or deleted records.

- Soft deletion
- Hard deletion

Soft deletion

Soft deletion involves marking the install status of a record as **retired** rather than permanently deleting it from the system. The record remains in the database, making it possible to reference or restore it later. Soft deletion for Service Graph Connector for GCP relies on the SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes] table. This table is regularly purged of obsolete records, improving performance and efficiency. The process marks the install status of a record as **retired**, but the streamlined data structure reduces overhead, enabling quicker processing and better system performance.

Soft deletion is enabled for the following data sources in Service Graph Connector for GCP:

- SG-GCP Folder
- SG-GCP Project
- SG-GCP Network
- SG-GCP Subnet

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- SG-GCP Storage Volume
- SG-GCP Storage Volume Snapshot
- SG-GCP Security Group
- SG-GCP VM Instance
- SG-GCP Load Balancer Pool
- SG-GCP Load Balancer Pool Member
- SG-GCP Load Balancer Health Service
- SG-GCP Load Balancer
- SG-GCP Load Balancer Service
- SG-GCP Cloud Database
- SG-GCP Cloud Function
- SG-GCP Cloud Object Storage
- SG-GCP Kubernetes Cluster
- SG-GCP Kubernetes Node
- SG-GCP Kubernetes Pod
- SG-GCP Kubernetes Service
- SG-GCP Kubernetes Namespace
- SG-GCP Kubernetes Deployment
- SG-GCP Kubernetes Replicaset
- SG-GCP Kubernetes Cluster Roles
- SG-GCP Kubernetes Cluster Role Binding
- SG-GCP Kubernetes Node Pool

Starting with the Service Graph Connector for GCP 1.10 version, the SG-GCP Generic Resource data source uses the post-script method for soft deletion, which relies on the Source [sys_object_source] table. For more information about the post-script method, see Post-script method.

Hard deletion

Hard deletion involves permanently deleting a record from the system. The record is removed from the CMDB and can't be referenced or restored later. The SG-GCP Software Inventory data source uses the hard deletion method for the deletion of records.

Service Graph Connector for Google Console

Use the Service Graph Connector for Google Console to import device details from Chromebooks into the Configuration Management Database (CMDB).

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Key features

- Get visibility across Chromebook devices.
- Get started quickly with a streamlined onboarding process.
- Use only the credentials you need.

Supported versions

Versions

Google Console	ServiceNow
Last tested on July 05, 2024	• Xanadu • Washington DC • Vancouver • Utah

Use cases

You can use the Service Graph Connector for Google Console to get visibility into Google ChromeOS devices, enabling administrators to centrally manage enrollment, configuration, and monitoring these devices.

Guided setup

The guided setup for the Service Graph Connector for Google Console provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for Google Console.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Google Console integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Google Console data source is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from the Google Console application.

Note:
For any discovered resources that were deleted later, the Service Graph Connector for Google Console automatically marks the corresponding records as no longer active or valid in CMDB.

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The following table lists the data sources, the staging tables, and the target tables as CMDB CI classes as where data is stored for a Chromebook device within Google Console.

Data mapping for Google Console

Data source	Staging table	CMDB CI classes	Resource type
SG-GoogleConsole-ChromeDevices	SG-GoogleConsole-ChromeDevices [sn_googleconsole_i_sg_googleconsole_chromedevices]	Computer IP Address Network Adapter When the Software Asset Management (SAM) and SAM Foundation applications are not installed: Software Software Instance When the SAM application, the SAM Foundation application, or both are installed: Software Installation	Chrome OS devices

For more information on where data is saved when pulling data from a Chromebook device, see CMDB classes targeted in Service Graph Connector for Google Console.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Google Console

Set up scheduled import jobs to pull in Chromebook device data from the Google Console into your CMDB.

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Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.

Role required: admin

Procedure

1. Verify that the application scope is set to the Service Graph Connector for Google Console application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Google Console** > **Setup**.
3. On the Service Graph Connector for Google Console page, verify that the **Quick Start** option is selected and then select **Continue**.
4. Configure the authentication credentials to send requests to the Google Console API.

   a. In the Configure the Connection and Credentials section of the Service Graph Connector for Google Console page, select **Start**.

   b. Set up the Google Console environment.

      i. Select the Google Console Setup Instructions task.

      ii. Select the link to the Service Graph connector for Google Console - Setup Instructions [KB1516892] article in the Now Support Knowledge Base and follow the instructions to set up the Google Console environment.

      Note:
      Make a note of the destination keystore password. You need to specify this password while importing the Java Keystore (JKS) certificate into the Service Graph Connector for Google Console application.

      iii. Set the Google Console Setup Instructions task to complete by selecting the **Mark as complete** check box and then select **Continue**.

   c. Create an X.509 certificate to associate the JKS certificate for the Google Console application with the Service Graph Connector for Google Console.

      i. Select the Create X.509 certificate task.

      ii. In the X.509 Certificates list, select **New**.

      iii. On the form, fill in the fields.

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X.509 Certificate form

Field	Description
Name	Name of the X.509 certificate. For example, `SG-GoogleConsole-509Certificate`.
Type	Certificate container. Select **Java Key Store**.
Key store password	Password to access the JKS certificate as noted down in the previous step.

Note:
You can leave the value of other fields as-is.

iv. Select the manage attachments icon ( ).

v. Select **Choose file** to browse and upload the keystore.p12 file for the JKS certificate you created in the previous step.

vi. Close the dialog box.

vii. Select the **Validate Stores/Certificates** related link.

viii. On successful validation, select **Update** to return to the guided setup page.

ix. Set the Create X.509 certificate task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Configure the connection.

i. Verify that the application scope is set to the Service Graph Connector for Google Console application by using the application picker.

ii. Select the Configure the Connection task and then select **Click Here**.

iii. On the Connections page that opens in another browser tab, select **Edit** for the **SG-GoogleConsole** connection that is available by default.

iv. On the form, fill in the fields.

Edit Connection form

Field	Description
Connection Name	Name to identify the connection record. For example, `SG-GoogleConsole`. Don't modify the name for the default connection alias `SG-GoogleConsole`.
Service Account Email	Email address of the service account in Google Console.
Keystore Password	The password that you used when you created the JKS file in the previous step.
Keystore	Select the name of the JKS file you created in the previous step.

v. Select **Edit and Get OAuth Token**.

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vi. After the OAuth token is generated, return to the guided setup.

vii. Set the Configure the Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

e. Set up the configuration properties.

i. Select the Add configuration properties task.

ii. In the Service Graph Connections section, review and modify the property details by selecting a property from the **Property** column in the Service Graph Connection Properties related list.

You can configure the *Customer ID* property to pull Chromebook devices for the specified customer ID.

iii. Select **Update** in the Service Graph Connection Properties section.

iv. Set the Add connection properties task to complete by selecting the **Mark as complete** check box and then select **Continue**.

f. Test the Google Console API connection to import data from the Google Console application.

i. Select the Test Connection task.

ii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iii. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

5. **Optional:** Integrate with multiple Google Console instances.

a. Follow the instructions in the Service Graph connector for Google Console - Setup Instructions [KB1516892] article in the Now Support Knowledge Base to set up the Google Console environment.

Note:
Make a note of the destination keystore password.

b. In the Add Multiple Instances section of the Service Graph Connector for Google Console page, select **Start**.

c. Create data sources for the new Google Console connection.

i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.

ii. Select the Update Data Source Access task.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

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vi. From the application picker, select the Service Graph Connector for Google Console application scope.

vii. Set the Update Data Source Access task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Create a scheduled import job for the new Google Console connection.

i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.

ii. Select the Update Scheduled Data Import task.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Scheduled Data Import form, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. From the application picker, select the Service Graph Connector for Google Console application scope.

vii. Set the Update Scheduled Data Import task to complete by selecting the **Mark as complete** check box and then select **Continue**.

e. Create an X.509 certificate for the new Google Console instance by repeating the step 4.c, and then mark the Create X.509 certificate task to complete by selecting the **Mark as complete** check box and then select **Continue**.

f. Add another connection for the new Google Console instance.

i. Verify that the application scope is set to the Service Graph Connector for Google Console application by using the application picker.

ii. Select the Add Another Connection task and then select **Click Here**.

iii. On the Connections page that opens in another browser tab, select **Add Connection**.

iv. On the form, fill in the fields.

Create Connection form

Field	Description
Connection Name	Name to identify the connection record.
Service Account Email	Email address of the service account in Google Console.
Keystore Password	The password that you used when you created the JKS file in the previous step.
Keystore	Select the name of the JKS file you created in the previous step.

v. Select **Create and Get OAuth Token**.

vi. After the OAuth token is generated, return to the guided setup.

vii. Set the Add Another Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

g. Add the configuration properties for the new Google Console instance.

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i. Select the Add configuration properties task.

ii. Select the connection record you created in the previous step.

iii. In the Service Graph Connections section, review and modify the property details by selecting a property from the **Property** column in the Service Graph Connection Properties related list.

You can configure the *Customer ID* property to pull Chromebook devices for the specified customer ID.

iv. Select **Update** in the Service Graph Connection Properties section.

v. Set the Add connection properties task to complete by selecting the **Mark as complete** check box and then select **Continue**.

h. Test the Google Console API connection to import data from new Google Console instance.

i. Select the Test New Connections task.

ii. Select the connection record you created in the previous step.

iii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iv. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test New Connections task to complete by selecting the **Mark as complete** check box and then select **Continue**.

6. Configure the scheduled job for the import of Google Console data.

a. In the Configure the scheduled jobs section of the Service Graph Connector for Google Console page, select **Start**.

b. Select the **SG-GoogleConsole-ChromeDevices** scheduled job.
For a multiple instance setup, select the scheduled job created with the scheduled import in step 5.d for the new connection.

c. On the Scheduled Data Import form, verify the field values.

For more information, see Schedule a data import.

d. Select the **Active** check box to activate the scheduled job.

e. In the **Run** field, select **Periodically** to specify how often the job will run.

f. Select **Update**.

g. Set the Configure the scheduled jobs task to complete by selecting the **Mark as complete** check box and then select **Continue**.

7. On the Service Graph Connector for Google Console page, select **Complete** to save your changes.

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8. In the Complete setup dialog box, select **Complete** to complete the setup.
9. In the message box that appears, select **Done**.

CMDB classes targeted in Service Graph Connector for Google Console

When you complete setting up the connection, you can configure the integration to periodically pull Google Console data from Chromebook devices. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name	Google Console attribute
Install Status	install_status	status
Model number	model_number	model
Model ID	model_id	model
Manufacturer	manufacturer	model
Name	name	serialNumber
Serial number	serial_number	serialNumber
Assigned	assigned	lastEnrollmentTime
Operating System	os	os
Operational status	operational_status	status
OS Version	os_version	osVersion
Assigned to	assigned_to	annotatedUser

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Reference	When the Software Asset Management (SAM) and SAM Foundation applications aren't installed: Software [cmdb_ci_spkg] Software Instance [cmdb_software_instance] When the SAM or SAM Foundation application is installed:

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Relationships created for Computer (continued)

Parent class	Relationship type	Child class
		Software Installation [cmdb_sam_sw_install]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name	Google Console attribute
IP Address	ip_address	lastKnownNetwork.ipAddress
Name	name	lastKnownNetwork.ipAddress
Nic	nic	macAddress

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name	Google Console attribute
Configuration Item	cmdb_ci	serialNumber
MAC Address	mac_address	macAddress
Name	name	macAddress

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) and SAM Foundation applications are not installed:

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Attribute label	Attribute name	Google Console attribute
Key	key	name-version
Name	name	name
Version	version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application, the SAM Foundation application, or both are installed:

Attribute label	Attribute name	Google Console attribute
Discovery source	discovery_source	None
Display name	display_name	Name
Installed on	installed_on	serialNumber
Version	version	Version

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Computer [cmdb_ci_computer]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM and SAM Foundation applications are not installed:

Attribute label	Attribute name	Google Console attribute
Installed on	installed_on	serialNumber
Name	name	name, version, serialNumber

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

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Service Graph Connector for Infoblox

Use the Service Graph Connector for Infoblox to pull data from an Infoblox instance into your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

- Supported versions: Infoblox API v2.11.2
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama
  - Zurich

Use cases

The following example use cases describe how you can use the Service Graph Connector for Infoblox for different ServiceNow® applications:

- Configure the Infoblox connection for connecting to an Infoblox instance.
- Create IP address management (IPAM) tasks when subnets are added or deleted.
- Schedule periodic synchronization of IPAM CIs by configuring scheduled data imports jobs.
- View imported IPAM CIs and IPAM tasks.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Infoblox using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Infoblox integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

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Data mapping

Data from the Infoblox data source is mapped and transformed into the ServiceNow CMDB configuration item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to pull data periodically from Infoblox.

The following data sources are included for the Infoblox app:

SG-Infoblox IP Pool

Imports all the network containers from the Infoblox instance, loads the imported data in the SG-Infoblox IP Pool [sn_infoblox_integ_sg_infoblox_ip_pool] table, and then populates the IP Pool [cmdb_ci_ip_pool] target table. The SG-Infoblox Network data source runs after the SG-Infoblox IP Pool data source does.

SG-Infoblox Network

Runs after the SG-Infoblox IP Pool data source, imports the IPv4 and IPv6 networks and subnets data from the Infoblox instance, loads the imported data in the SG-Infoblox Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subnetwork] table, and then populates the IP Network Subnet [cmdb_ci_ip_network_subnet] and Managed Network [cmdb_ci_managed_network] target tables. The SG-Infoblox IP Address data source runs after the SG-Infoblox Network data source does.

The Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subnetwork] table determines which IP addresses are imported based on the value of the *Get Ip Address* field. To import an IP address, set the *Get Ip Address* field value to `true`. Alternatively, you can specify the list of IP addresses to be imported in pipe-delimited string format in the **Value** field of the *sn_infoblox_integ.included_network_regex* system property.

Note:
IP addresses will not be imported during the first run of the Service Graph Connector for Infoblox unless you update the *sn_infoblox_integ.included_network_regex* system property because the *Get Ip Address* field value is set to `false` by default.

SG-Infoblox IP Address

Runs after the SG-Infoblox Network data source, imports the IPv4 and IPv6 IP addresses from the Infoblox instance, loads the imported data in the SG-Infoblox IP Address [sn_infoblox_integ_sg_infoblox_ip_address] table, and then populates the Allocated IP Address [cmdb_ci_allocated_ip_address], IP Network Subnet [cmdb_ci_ip_network_subnet], and Managed Network [cmdb_ci_managed_network] target tables.

SG-Infoblox DNS Alias

Imports all the canonical name (CNAME) records from the Infoblox instance, loads the imported data in the SG-Infoblox DNS Alias [sn_infoblox_integ_sg_infoblox_dns_alias] table, and then populates the DNS Alias [cmdb_ci_dns_alias] target table.

For more information on where data is saved when pulling data from Infoblox, see CMDB classes targeted in Service Graph Connector for Infoblox.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

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Parallel data loading

Starting with the Service Graph Connector for Infoblox 1.3.0 version, parallel data loading can be enabled for the SG-Infoblox Network and SG-Infoblox IP Address data sources by setting the partition size in the *sn_infoblox_integ.parallel_loading_partition_size* system property. This system property determines the maximum number of networks that each partition processes. The maximum value that you can set for the partition size is 150.

- For the SG-Infoblox Network data source, the partition size is based on network views.
- For the SG-Infoblox IP Address data source, the partition size is based on the number of networks.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Infoblox using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Infoblox for pulling in Infoblox data into the CMDB.

Before you begin

Install Service Graph Connector for Infoblox version 1.2.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Infoblox connector type and then select **Configure connection**.
   A default connection, SG_Infoblox_Connection, for Infoblox is available within the application. As the Service Graph Connector for Infoblox supports only a single instance, you can configure the default connection for the first time or resume editing it thereafter.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing Infoblox data.

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a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

b. On the form, fill in the fields.

Configure and test connection form

Field	Description
Connection name	Name to identify the Infoblox connection record.
Connection URL	Infoblox base URL in the following format: `<base-URL>`.
User name	User name for authenticating the HTTP request.
Password	Password for the username used for authenticating the HTTP request.
Use MID Server	Option to use the MID Server for connecting to the Infoblox instance. **Note:** A MID Server is required only if a direct connection between the ServiceNow and Infoblox instances isn't possible.
Mid Selection	MID Server for the connection. This field appears only when you select the **Use MID Server** check box.

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

7. **Optional:** Specify network views and the API version for connecting to the Infoblox instance by setting the configuration properties.

Note:
To skip this step, select **Continue** for the **Set configuration properties** activity. If you skip this step, the default values of the *Network view* and *API version* properties are considered.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. In the **Network view** field, enter the network views for which data is to be imported. For multiple views, separate them with commas. For example: `view1,view2`.

If you leave this field empty or set it to `Default`, the data sources within the connector import data from all the network views.

c. In the **API version** field, enter the version of WAPI you're using.

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(Optional) For more information about the Infoblox API, see the Infoblox Developer documentation.

d. Select **Save properties**.

e. Select **Continue**.

8. **Optional:** Opt for task creation on network insertion or deletion.

> **Note:**
> To skip this step, select **Continue** for the **Configure task preferences** activity.

a. In the **Setup** stage of the playbook, select the **Configure task preferences** activity.

b. Select the **Create task on network insertion** check box to enable creating a task when a network is inserted.

c. Select the **Create task on network deletion** to enable creating a task when a network is deleted.

d. In the Task user group list, select the user group assigned to tasks created on network insertion or deletion.

e. Select **Save preferences**.

f. Select **Continue**.

9. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-Infoblox IP Pool** import schedule.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

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Related topics

Service Graph Connector for Infoblox

CMDB classes targeted in Service Graph Connector for Infoblox

Accessing the connection details of Service Graph Connector for Infoblox

Configure Service Graph Connector for Infoblox using the guided setup

Pull in data from Infoblox into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
If you have an earlier version of the Service Graph Connector for Infoblox, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: admin

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Infoblox application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Infoblox** > **Setup**.
3. On the Getting started page, select **Get Started**.

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4. Configure the authentication credentials and HTTP connection details for sending requests to the Infoblox API.

   a. Configure your Infoblox authentication credentials.

      i. In the Configure the connection section of the Service Graph Connector for Infoblox page, select **Get Started**.

      ii. For the Configure Infoblox authentication credentials task, select **Configure** to open the Basic Auth Credentials page opens in a new browser tab.

      iii. In the **Name** field, enter a name for the authentication.

      For example, `Infoblox Credential`.

      iv. In the **User name** field, enter the user name that is used to authenticate the HTTP request when this authentication profile is enabled.

      v. In the **Password** field, enter the password for the user name that is used to authenticate the HTTP request.

      vi. Select **Update** to return to the guided setup page.

      vii. Set the Configure Infoblox authentication credentials task to complete by selecting **Mark as Complete**.

   b. Configure the Infoblox connection settings.

      i. For the Configure Infoblox HTTP connection task, select **Configure** to open the HTTP(s) Connection page in a new browser tab.

      ii. Review the fields and in the **Name** field and enter the Infoblox instance name.

      iii. Use the URL builder to build the connection string or in the **Connection URL** field, enter the Infoblox base URL in the following format: `https://<base-URL>`.

      iv. In the **api_version** field of the Attributes section, enter the version of WAPI you're using.

      v. In the **network_view** field of the Attributes section, enter the network views for which data is to be imported.

      For multiple views, separate the views with commas. For example: `view1,view2`. If you leave this field empty, the data sources import data from all the network views.

      vi. Select **Update** to return to the guided setup page.

      vii. Set the Configure Infoblox HTTP connection task to complete by selecting **Mark as Complete**.

      For more information about the Infoblox API, see the Infoblox Developer documentation.

   c. Configure the connection properties.

      i. For the Configure connection properties task, select **Configure** to open the Service Graph Connections page in a new browser tab.

      ii. To review and modify the property details, select a property from the **Property** column in the Service Graph Connection Properties related list.

      iii. Select **Update** on the Service Graph Connection Properties page.

      iv. Select **Update** on the Service Graph Connections page to return to the guided setup page.

      v. Set the Configure connection properties task to complete by selecting **Mark as Complete**.

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d. Test the Infoblox API connection to import data from the Infoblox application.

i. In the Configure the connection section of the Service Graph Connector for Infoblox page, select **Continue**.

ii. For the Test the connection task, select **Configure** to open the Service Graph Connections page in a new browser tab.

iii. Select **Test Connection**.

iv. When the **Status** field is set to **Success**, select **Update** to close the Test the connection dialog box and return to the guided setup page.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test the connection task to complete by selecting **Mark as Complete**.

5. Optional: Add multiple instances.

Note:
If you don't need to add multiple instances, you can skip this step.

a. In the Add Multiple Instances section of the Service Graph Connector for Infoblox page, select **Get Started**.

b. For the Update Data Source Access task, select **Configure**.

c. Select the Data Source [sys_data_source] table.

d. Select the **Global** application scope by using the application picker.

e. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

f. Select **Update** to close the tab and return to the guided setup.

g. Modify the application scope again to **Service Graph Connector for Infoblox** by using the application picker.

h. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

i. For the Update Scheduled Data Import Access task, select **Configure**.

j. Select the Scheduled data import [scheduled_import_set] table.

k. Repeat steps 5.d to 5.g.

l. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**.

m. Clear the cache for the new connection.

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i. For the Clear Cache for Data Source and Scheduled Data Imports tables task, select **Configure**.

ii. Select the **Global** application scope by using the application picker.

iii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
GlideCacheManager.flushTable("sys_data_source");

GlideTableManager.invalidateTable("scheduled_import_set");
GlideCacheManager.flushTable("scheduled_import_set");

GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

iv. Select **Run Script** to run the background script.

The script may take several minutes to execute.

v. After the script is executed, select **Close**.

vi. Modify the application scope again to **Service Graph Connector for Infoblox** by using the application picker.

vii. Set the Clear Cache for Data Source and Scheduled Data Imports tables task to complete by selecting **Mark as complete**.

n. Add a basic authentication connection to the new Infoblox instance.

i. For the Add Another Basic Auth Connection task, select **Configure**.

ii. To create a new connection, select **Add Connection**.

iii. In the Connection Information section of the Create Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the Infoblox connection record.
Connection URL	Infoblox base URL in the following format: `<base-URL>`.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
MID Selection	Name of the MID Server used by the connector. (Optional) This field appears only when the **Use MID server** check box is selected.
MID Application	Name of the MID application used by the connector.

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Field	Description
	(Optional) This field appears only when the **Use MID server** check box is selected.

iv. In the Credential Information section of the Create Connection window, fill in the fields.

Credential Information

Field	Description
Username	Infoblox account user name that is used to authenticate the connection request.
Password	Password that is used to authenticate the connection request.

v. Select **Create Connection**.

vi. Navigate back to the guided setup, and set the Add Another Basic Auth Connection task to complete by selecting **Mark as Complete**.

o. Test the newly added connections.

i. For the Test connections task, select **Configure**.

ii. From the **Name** column, select the new connection.

iii. Select the **Test Connection** related link to start the testing process.

iv. When the **Status** field is set to **Success**, return to the guided setup page.

> **Note:**
> If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test connections task to complete by selecting **Mark as Complete**.

6. Configure the IP address management tasks and user groups.

a. Enable properties to create an IP address management task when deleting or inserting a network.

i. In the Configure IP address management tasks section of the Service Graph Connector for Infoblox page, select **Get Started**.

ii. For Enable creating a task, select **Configure** to open the Enable create Task page in a new browser tab.

iii. Select the **Create a task when a network is deleted** and **Create a task when a network is inserted** check boxes to enable properties for creating IP address management tasks when deleting and inserting a network, respectively.

iv. Select **Save**.

v. Close the Enable create Task page tab and return to the guided setup page.

vi. Set Enable creating a task to complete by selecting **Mark as Complete**.

b. Configure the user group for IP address management tasks.

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i. For the Configure the user group for IP address management tasks task, select **Configure** to open the SG Infoblox Connection page in a new browser tab.

ii. In the **Connection alias** field, review and change the connection alias.

iii. In the **Task user group** field, change the assignment group for the connection alias.

> **Note:**
> By default, the user group for the IP address management tasks is assigned to the IP Address Management user group. To change the default assignment group, change the task user group for the connection alias.

iv. Select **Update** to return to the guided setup page.

v. Set the Configure the user group for IP address management tasks task to complete by selecting **Mark as Complete**.

7. Configure the scheduled jobs to import data from the Infoblox application.

a. In the Set up scheduled import jobs section of the Service Graph Connector for Infoblox page, select **Get started**.

b. For the Configure the scheduled jobs task, select **Configure** to open the Scheduled Data Imports page in a new browser tab.

c. From the **Name** column, select the scheduled job that you want to activate.

d. On the Scheduled Data Import form, verify the field values for the scheduled job. For more information, see Schedule a data import.

e. Select **Update**.

f. Repeat the steps 7.c to 7.e for each scheduled job for data import.

g. Close the Scheduled Data Imports page tab and return to the guided setup page.

h. Set the Configure the scheduled jobs task to complete by selecting **Mark as Complete** in the guided setup.

CMDB classes targeted in Service Graph Connector for Infoblox

When you complete setting up the connection, you can configure the integration to pull data periodically from Infoblox. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Allocated IP Address [cmdb_ci_allocated_ip_address]

The following attributes in the Allocated IP Address [cmdb_ci_allocated_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Managed Network	managed_network

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Attribute label	Attribute name
Is Broadcast	is_broadcast
Is Conflict	is_conflict
Is DHCP	is_dhcp
Is DNS	is_dns
Is Managed	is_managed
Is Reserved	is_reserved
Name	name

Relationship created for Allocated IP Address

Parent class	Relationship type	Child class
Allocated IP Address [cmdb_ci_allocated_ip_address]	Reference	Managed Network [cmdb_ci_managed_network]

DNS Alias [cmdb_ci_dns_alias]

The following attribute in the DNS Alias [cmdb_ci_dns_alias] table is populated by collected data:

Attribute label	Attribute name
Name	name

IP Network Subnet [cmdb_ci_ip_network_subnet]

The following attributes in the IP Network Subnet [cmdb_ci_ip_network_subnet] table are populated by collected data:

Attribute label	Attribute name
Name	name
Parent Pool	parent_pool
CIDR	cidr

Relationships created for IP Network Subnet

Parent class	Relationship type	Child class
IP Network Subnet [cmdb_ci_ip_network_subnet]	Members::Member of	Allocated IP Address [cmdb_ci_allocated_ip_address]
IP Network Subnet [cmdb_ci_ip_network_subnet]	Reference	SG-Infoblox Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subne

IP Pool [cmdb_ci_ip_pool]

The following attributes in the IP Pool [cmdb_ci_ip_pool] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Parent Pool	parent_pool
CIDR	cidr

Managed Network [cmdb_ci_managed_network]

The following attribute in the Managed Network [cmdb_ci_managed_network] table is populated by collected data:

Attribute label	Attribute name
Name	name

SG-Infoblox Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subnetwork]

The following attributes in the SG-Infoblox Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subnetwork] table are populated by collected data:

Attribute label	Attribute name
Connection ID	connection_id
Get Ip Address	list_ip_address
Network	network
Network Type	network_type
Network View	network_view

Accessing the connection details of Service Graph Connector for Infoblox

You can access the connection details of the Service Graph Connector for Infoblox in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Infoblox. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an Infoblox connection

Access the details of an Infoblox connection configured for the Service Graph Connector for Infoblox.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Infoblox** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Service Graph Connector for Jamf

Use the Service Graph Connector for Jamf to pull data from Jamf into your ServiceNow instance.

The Service Graph Connector for Jamf pulls data from computers, disks, networks, and software applications into the ServiceNow® Configuration Management Database (CMDB) application.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

- Supported versions:
  - Jamf API v2.1.0
  - Jamf Pro API 10.28.0
  - Jamf Pro 10.35.0
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama

Use cases

The following are examples on how you can use the Service Graph Connector for different ServiceNow® applications:

- IT Operations Management (ITOM) Visibility
  - Detailed hardware and software inventory tracking for macOS hardware and apps. The tracking can be done with or without Software Asset Management (SAM).
  - Detailed hardware and software inventory tracking for hardware and apps for both iPhones and iPads. The tracking can be done with or without Software Asset Management (SAM).
  - Compliance tracking for mobile devices and end-user computers.
  - Duplicate data detection on imports to improve performance of nightly imports.
- Software Asset Management (SAM) and IT Asset Management (ITAM)
  - Software package and installation tracking.
  - License reclamation by detecting removed software.
  - Software Usage tracking.

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- IT Service Management (ITSM)
  - Incidents, problems, and changes on discovered configuration items (CI).
  - Automatic ownership assignment based on top users.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Jamf using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Jamf integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Jamf data source is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from Jamf.

The delta data synchronization feature is available in Jamf version 2.14 and higher. You can configure the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* connection properties for synchronizing only delta data from a Jamf instance. See Configuring data synchronization in Service Graph Connector for Jamf.

The following data sources are included for the Jamf application:

SG-Jamf Computers

Imports data from computers and loads the imported data in the SG-Jamf Computers [sn_jamf_integrate_sg_jamf_computers] staging table.

SG-Jamf Lookup Mac Software Bundle Ids

Imports data from software applications installed on macOS devices and loads the imported data in the SG-Jamf Lookup Mac Software Bundle Ids [sn_cmdb_int_util_mac_software_bundleid_lookup] staging table.

Note:
To view the publisher information for applications installed on macOS devices, run the SG-Jamf Lookup Mac Software Bundle Ids data source before running the SG-Jamf Computers or SG-Jamf Mobile Devices data sources.

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SG-Jamf Mobile Devices

Imports data from mobile devices and loads the imported data in the SG-Jamf Mobile Devices [sn_jamf_integrate_sg_jamf_mobile_devices] staging table.

SG-Jamf Remove Computers Software

Removes the imported computer software data that were later deleted from the source and updates the information in the SG-Jamf Remove Computers Software [sn_jamf_integrate_jamf_remove_software] staging table.

SG-Jamf Remove Mobile Software

Removes the imported mobile software data that were later deleted from the source and updates the information in the SG-Jamf Remove Mobile Software [sn_jamf_integrate_remove_mobile_software] staging table.

SG-Jamf Software Usage

Imports the software usage details from the Jamf environment to track which software data is being used infrequently, hasn't been used recently enough, or isn't being used at all and loads the imported data in the SG-Jamf Software Usage [sn_jamf_integrate_jamf_software_usage] staging table. Based on the software usage information, you can add a reclamation rule to aggregate usage records and to identify unused software devices. See Software reclamation rules.

Note:
The SG-Jamf Software Usage data source is available only when the Software Asset Management Professional plugin (com.snc.samp) is activated on your ServiceNow instance. See Request Software Asset Management.

The imported data is then inserted into the following target tables:

- CI Relationship [cmdb_rel_ci]
- Computer [cmdb_ci_computer]
- Disk [cmdb_ci_disk]
- Handheld Computing device [cmdb_ci_handheld_computing]
- IP Address [cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]
- Printer [cmdb_ci_printer]
- Serial Number [cmdb_serial_number]
- Software Installation [cmdb_sam_sw_install] (If the SAM application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)
- Software Usage [samp_sw_usage]

Note:
For the Computer [cmdb_ci_computer] and Handheld Computing device [cmdb_ci_handheld_computing] data sources, if you created multiple Jamf instances and want to know where the CIs originated from, you can identify the origins from the **Key** and **Value** columns. Additionally, you can view the Jamf Extension Attributes [sn_jamf_integrate_extension_attribute] and Most recent discovery [last_discovered] fields in both data sources. If you want to configure multiple instances, follow the steps in Configure Service Graph Connector for Jamf using the guided setup in step 4.

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For more information on where data is saved when pulling data from a Jamf application, see CMDB classes targeted in Service Graph Connector for Jamf.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Jamf using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Jamf for pulling in Jamf data into the CMDB.

Before you begin

Install Service Graph Connector for Jamf version 2.13.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

When using client credentials for authentication, obtain the OAuth credentials from your Jamf administrator. Make a note of the following details:

- Application (client) ID
- Client Secret

If using Client Credentials authentication in Jamf Pro, you need to utilize the API Roles and Clients functionality. For more details, refer to the API Roles and Clients section in the Jamf documentation. When creating a new API client in the Jamf environment, the **Access token lifetime** field on the form for creating a client enables setting how long the token remains valid. The default is `60` seconds, but due to ServiceNow AI Platform limitations, the value must be set to more than `60` seconds. Setting the token lifetime to `3600` seconds (1 hour) helps prevent potential issues.

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Jamf connector type and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

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6. Determine the type of authentication for the Jamf connection.

   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.
   If needed, expand the **Setup** stage to select an activity.

   b. Select an alias template for the connection.

   - **SG-Jamf OAuth Connection**: Select when using OAuth or client credentials for authentication.
   - **SG-Jamf Basic Connection**: Select when using Basic authentication or Bearer token.

   c. Select **Continue**.

7. Enter connection details and test the API connection for importing data.

   a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

   b. On the form, fill in the fields.

   - When the **SG-Jamf OAuth Connection** template is selected, fill in the details as shown in the following table.

OAuth connection information

Field	Description
Connection Name	Name to identify the Jamf connection record.
Connection URL	Base URL to connect to the Jamf API. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
OAuth Client ID	Application (client) ID of your Jamf client application as noted in the Before you begin section. **Note:** Verify that the Jamf client has read privileges for the **Computers** and **Mobile Devices** categories in Jamf.
OAuth Client Secret	Client Secret of your Jamf client application as noted in the Before you begin section.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
Mid Selection	Name of the MID Server used by the connector.

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Field	Description
	This field appears only when the **Use MID Server** check box is selected.

- When the **SG-Jamf Basic Connection** template is selected, fill in the details as shown in the following table.

Basic connection information

Field	Description
Connection Name	Name to identify the Jamf connection record.
Connection Host	Target host value used by the connection. **Note:** Update the **Host** field with your Jamf base URL or IP address. For example, `demojamfhost.com` or `127.0.0.1`.
User Name	User name that is used to authenticate the HTTP or HTTPS request when this Basic authentication profile is enabled. **Note:** Verify that the Jamf user has read privileges for the **Computers** and **Mobile Devices** categories in Jamf.
Password	Password that is used to authenticate the HTTP or HTTPS request when this Basic authentication profile is enabled.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
Mid Selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

8. Optional: Set configuration properties for the connection to access Jamf resources.

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Note:
To skip this step, select **Continue** for the **Set configuration properties** activity. If you skip this step, the default values of the properties are considered.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. Set the fields for configuration properties as described in the following table.

Configuration properties

Field	Description
Import managed application records only	Option to limit the import to managed application records only. **Note:** If the **Import managed application records only** check box is cleared, the default behavior is to import all application records.
Use JAMF Pro API	Option to enable the use of the Jamf Pro API for querying computer records. **Note:** When the **Use JAMF Pro API** check box is selected, the connector uses the Jamf Pro API, which offers pagination of response data and improved performance over the Jamf Classic API.

c. Select **Continue**.

9. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.

e. Repeat steps from 9.b to 9.d for each job displayed on the page.

f. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

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Related topics

Service Graph Connector for Jamf

CMDB classes targeted in Service Graph Connector for Jamf

Accessing the connection details of Service Graph Connector for Jamf

Configure Service Graph Connector for Jamf using the guided setup

Set up authentication credentials and scheduled jobs to import Jamf data into your Configuration Management Database (CMDB).

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- ITOM Licensing plugin (com.snc.itom.license). An unlicensed plugin that contains computation logic for SU consumption as necessary. For more information, see Request Discovery.
- Jamf Classic API version 10.x.

When using client credentials for authentication, obtain the OAuth credentials from your Jamf administrator. Make a note of the following details:

- Application (client) ID
- Client Secret

If using Client Credentials authentication in Jamf Pro, you need to utilize the API Roles and Clients functionality. For more details, refer to the API Roles and Clients section in the Jamf documentation. When creating a new API client in the Jamf environment, the **Access token lifetime** field on the form for creating a client enables setting how long the token remains valid. The default is 60 seconds, but due to ServiceNow AI Platform limitations, the value must be set to more than 60 seconds. Setting the token lifetime to 3600 seconds (1 hour) helps prevent potential issues.

Roles required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Jamf** > **Setup**.
2. On the Getting Started page, select **Get started**.
3. Set configuration properties.

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a. On the Service Graph Connector for Jamf page, in the Set configuration properties section, select **Configure JSON data size limit**.

b. For the Configure JSON data size limit task, select **Configure**.

c. Select the **Global** application scope from the application picker.

d. Set the `com.glide.transform.json.max-partial-length` system property value.

- To create a system property, select **New** and enter `com.glide.transform.json.max-partial-length` as the name and `65536` as the value of the property.
- If the *`com.glide.transform.json.max-partial-length`* property already exists, verify that its value is set to `65536`.

e. Set the Configure JSON data size limit task to complete by selecting **Mark as Complete**.

4. Configure the authentication credentials and HTTP connection for sending requests to the Jamf API.

a. Enter Basic or Bearer token authentication details.

> **Important:**
> Skip this step if using Client credentials for authentication, and instead go to step 4.c.

i. For the Configure Jamf authentication: Basic or Bearer token authentication task, select **Configure**.

ii. On the form, fill in the fields.

Basic Auth Credentials form

Field	Description
Name	Descriptive name of this authentication configuration.
User name	User name that is used to authenticate the HTTP or HTTPS request when this Basic authentication profile is enabled. **Note:** Verify that the Jamf user has read privileges for the **Computers** and **Mobile Devices** categories in Jamf.
Password	Password that is used to authenticate the HTTP or HTTPS request when this Basic authentication profile is enabled.

iii. Select **Update**.

iv. Set the Configure Jamf authentication: Basic or Bearer token authentication task to complete by selecting **Mark as Complete**.

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b. Configure the Jamf HTTP connection.

> **Important:**
> Skip this step if using Client credentials for authentication, and instead go to step 4.c.

i. For the Configure Jamf HTTP connection task, select **Configure**.

ii. On the form, fill in the fields.

HTTP(s) Connection form

Field	Description
Name	Name of the connection.
Credential	Credential value used by this connection.
Connection alias	Connection value that is used to refer to the connection.
Active	Option to activate the HTTP connection.
Domain	Domain that contains the connection.
URL builder	Option to enable the system to build the connection URL.
Connection URL	Connection URL for the connection. You can either manually enter a URL or use the URL builder to build the connection string. **Note:** You can't modify the **Connection URL** field if you select the **URL builder** check box.
Mutual authentication	Option to set the connection with mutual authentication. This field appears only when the **URL builder** check box is selected.
Protocol	Underlying protocol used by the connection. This field appears only when the **URL builder** check box is selected. **Note:** Update the **Protocol** field if you are using anything other than `https`.
Use MID server	Option to select a MID Server that sends this HTTP connection. Using a MID Server is not compatible with mutual authentication.
Connection timeout	Number of milliseconds the system waits for a successful host connection. If a successful connection doesn't occur during this time, the connection request

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Field	Description
	times out. Leave this field empty to use the system default connection timeout value.
Host	Target host value used by the connection. This field appears only when the **URL builder** check box is selected. **Note:** Update the **Host** field with your Jamf base URL or IP address. For example, `demojamfhost.com` or `127.0.0.1`.
Override default port	Target value port that is used by the connection. This field appears only when the **URL builder** check box is selected.
Base path	Base path for HTTPS connection. This field appears only when the **URL builder** check box is selected. **Note:** To use the Jamf Pro API, the **Base path** field must be empty. Therefore, clear any value in the **Base path** field.

iii. Select **Update**.

iv. Set the Configure Jamf HTTP connection task to complete by selecting **Mark as Complete**.

c. Configure the client authentication credentials.

Important:
Skip this step if using basic token for authentication, and instead go to step 4.a.

i. For the Configure Jamf authentication: Client credentials task, select **Configure**.

ii. Select **Edit** for the SG-Jamf OAuth Connection, the default connection.

iii. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection Name	Name to identify the Jamf connection record. `SG-Jamf OAuth Connection` is the default credential alias name and is read-only.
Connection URL	Base URL to connect to the Jamf API.

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Field	Description
	Note: This field is automatically set to the URL to connect to the application. Leave the field value as is.

iv. (Optional) If a MID Server is required for the Jamf server connection, select the **Use MID Server** check box. Then, select the MID Server-related fields accordingly.

v. In the Credential Information section of the Edit Connection window, fill in the fields.

Credential Information

Field	Description
OAuth Client ID	Application (client) ID of your Jamf client application as noted in the Before you begin section. **Note:** Verify that the Jamf client has read privileges for the **Computers** and **Mobile Devices** categories in Jamf.
OAuth Client Secret	Client Secret of your Jamf client application as noted in the Before you begin section.

d. Test the connection.

i. For the Test connection task, select **Configure**.

ii. Review the properties in the Service Graph Connection Properties related list.

Note:
The properties in the Service Graph Connection Properties related list of the connection record are modifiable. Be sure to complete the guided setup, review the property descriptions, and follow the instructions carefully before making any changes to them.

- For Basic authentication, set the *auth_type* property value to `basic` (applicable only for Jamf versions lower than 10.35. Note that Jamf no longer supports Basic authentication, and it will be disabled for all instances starting with Jamf version 11.5).
- For Bearer token authentication, set the *auth_type* property value to `bearer` (available in Jamf version 10.35 or higher).
- For Client credentials (OAuth 2.0) authentication, set the *auth_type* property value to `oauth` (available in Jamf version 10.49 or higher).
- If no authentication type is selected, the connector defaults to Bearer token authentication.

iii. Test the connection by selecting the **Test Load 20 Records** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

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Note:
The connection is successful if the **HTTP Status** is **200**. If there is anything displayed in the **Error Code** and **Error Message** fields, then the connection failed and further troubleshooting is required. Do not select **Load All Records** during this setup.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

5. **Optional:** Add multiple instances.

Note:
If you don't need to add multiple instances, you can skip this step.

a. In the Add Multiple Instances section of the Service Graph Connector for Jamf page, select **Get Started**.

b. Enable creating data sources for the new Jamf connection.

i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.

ii. For the Update data source Access task, select **Configure**.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. Select the back icon (<) to return to the guided setup page.

vii. From the application picker, select the **Service Graph Connector for Jamf** application scope.

viii. Set the Update data source Access task to complete by selecting **Mark as Complete**

c. Enable creating a scheduled data import job for the new Jamf connection.

i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.

ii. For the Update scheduled data import access task, select **Configure**.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Scheduled Data Import form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. Select the back icon (<) to return to the guided setup page.

vii. From the application picker, select the **Service Graph Connector for Jamf** application scope.

viii. Set the Update scheduled data import access task to complete by selecting **Mark as Complete**.

d. Select authentication type for new connection.

Note:
From the application picker, select the **Service Graph Connector for Jamf** application scope.

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i. For the Select authentication type for new connection task, select **Configure**.

ii. Select **sn_jamf_integrate.auth_type** from the **Name** column.

iii. Set the *sn_jamf_integrate.auth_type* property to one of the following values:

- `basic`: Basic authentication that uses a username and password.
- `bearer`: Bearer token authentication that uses a username and password to retrieve a bearer token.
- `oauth`: Client credentials authentication that uses a client ID and client secret to authenticate via OAuth 2.0.

iv. Navigate back to the guided setup.

v. Set the Select authentication type for new connection task to complete by selecting **Mark as Complete**.

e. Add another connection.

> **Note:**
> Verify that the **Service Graph Connector for Jamf** application scope is selected in the application picker.

i. For the Add another connection task, select **Configure**.

ii. In the Flow Designer, select **Add Connection**.

iii. On the form, based on the authentication type fill in the fields.

> **Note:**
> - For Basic or Bearer token authentication-based connection, don't include `https://` in the **Connection Host** field. Example connection host value: `test.jamfcloud.com`.
> - For Client credentials authentication-based connection, include `https://` in the **Connection URL** field. Example connection URL value: `https://test.jamfcloud.com`.

iv. Depending on the authentication type, select the button to create the connection.

v. Navigate back to the guided setup.

vi. Set the Add another connection task to complete by selecting **Mark as Complete**.

f. When using the Jamf Pro API, the Jamf Pro 10.35 or higher version, or both, specify the Jamf Pro version and API.

i. For the Select JAMF Pro version and API task, select **Configure**.

ii. In the **Use JAMF Pro API** column, for the connection you created, modify the value from **false** to **true** to use the Jamf Pro API instead of the Classic API.

iii. Update the **Jamf Pro 10.35 or higher** column value to **true** when using the Jamf Pro 10.35 or higher version.

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Note:
With the **Jamf Pro 10.35 or higher** column value set to **true**, the Bearer Token authentication is used to authenticate the Jamf API. Else, the basic authentication is used.

iv. Set the Select JAMF Pro version and API task to complete by selecting **Mark as Complete**.

g. Test the new connections.

i. For the Test new connections task, select **Configure**.

ii. Select the name of the connection you want to test.

iii. To validate the data source configuration, select **Test Load 20 Records**.

Note:
If any of the tests have an error code or message or error sign, the connection failed and further troubleshooting is required.

iv. Set the Test new connections task to complete by selecting **Mark as Complete**.

6. Set up the scheduled import jobs.

a. For the Configure scheduled jobs task in the Set up scheduled import jobs section, select **Configure**.

b. Select the scheduled job that you want to activate.

Note:
By default, the SG-Jamf Mobile Devices scheduled job is automatically set as **Active** and runs the SG-Jamf Computer scheduled job as a parent.

c. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box to activate the scheduled job.

For more information, see Schedule a data import.

d. Select **Update**.

e. Repeat the steps 6.b to 6.d for each scheduled job for data import.

f. Set the Configure scheduled jobs task to complete by selecting **Mark as Complete** in the guided setup.

CMDB classes targeted in Service Graph Connector for Jamf

When you complete setting up the connection, you can configure the integration to periodically pull data from Jamf. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

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Attribute label	Attribute name
MAC Address	mac_address
Name	name
Serial number	serial_number
CPU core count	cpu_core_count
CPU count	cpu_count
CPU name	cpu_name
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Most recent discovery	last_discovered
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram
Model ID	model_id
Assigned to	assigned_to
Manufacturer	manufacturer
Operating System	os

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Contains::Contained by	Disk [cmdb_ci_disk]
Computer [cmdb_ci_computer]	Reference	Key Value [cmdb_key_value]
Computer [cmdb_ci_computer]	Reference	SG-Jamf Extension Attributes [sn_jamf_integrate_extension_attributes]

Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Manufacturer	manufacturer

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Attribute label	Attribute name
Computer	computer
Model ID	model_id
Name	name
Serial number	serial_number
Most recent discovery	last_discovered
Size bytes	size_bytes

Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Reference	Computer [cmdb_ci_computer]

Handheld Computing Device [cmdb_ci_handheld_computing]

The following attributes in the Handheld Computing Device [cmdb_ci_handheld_computing] table are populated by collected data:

Attribute label	Attribute name
Description	short_description
Carrier	carrier
Name	name
Serial number	serial_number
Disk spae (GB)	disk_space
ICCID	iccid
IMEI	imei
MEID	meid
Operating System	os
OS Version	os_version
Phone Number	phone_number
Root Access	root_access
Manufacturer	manufacturer
Assigned to	assigned_to
Model ID	model_id

Relationships created for Handheld Computing Device

Parent class	Relationship type	Child class
Handheld Computing Device [cmdb_ci_handheld_computing]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]

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Relationships created for Handheld Computing Device (continued)

Parent class	Relationship type	Child class
Handheld Computing Device [cmdb_ci_handheld_computing]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Handheld Computing Device [cmdb_ci_handheld_computing]	Reference	Key Value [cmdb_key_value]
Handheld Computing Device [cmdb_ci_handheld_computing]	Reference	SG-Jamf Extension Attributes [sn_jamf_integrate_extension_attributes]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Most recent discovery	last_discovered
Name	name
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name

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Attribute label	Attribute name
Discovery Source	discovery_source
Most recent discovery	last_discovered

Relationships created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]
Network Adapter [cmdb_ci_network_adapter]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]

Printer [cmdb_ci_printer]

The following attributes in the Printer [cmdb_ci_printer] table are populated by collected data:

Attribute label	Attribute name
Name	name
IP Address	ip_address
Most recent discovery	last_discovered

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]
Serial Number [cmdb_serial_number]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]

SG-Jamf Extension Attributes [sn_jamf_integrate_extension_attributes]

The following attributes in the SG-Jamf Extension Attributes [sn_jamf_integrate_extension_attributes] table are populated by collected data:

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Attribute label	Attribute name
Id	id
Extension Attributes	extension_attributes

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Version	version
Manufacturer	manufacturer
Key	key
Name	name

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Discovery source	discovery_source
Display name	display_name
Installed on	installed_on
Last scanned	last_scanned
Publisher	publisher
Version	version

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Server [cmdb_ci_server]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

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Attribute label	Attribute name
Name	name
Installed on	installed_on

Relationships created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Accessing the connection details of Service Graph Connector for Jamf

You can access the connection details of the Service Graph Connector for Jamf in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Jamf. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Jamf connection

Access the details of a Jamf connection configured for the Service Graph Connector for Jamf.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Jamf** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Configuring data synchronization in Service Graph Connector for Jamf

You can configure the connection properties for synchronizing only delta data from a Jamf instance.

The delta data synchronization feature is available in Jamf version 2.14 and higher. The connector provides the ability to import only delta data from a Jamf instance. With delta synchronization enabled, the importing process of Jamf data is quicker because the connector imports only the changes in Jamf data. The **Last success import time** field of a data source displays the timestamp of the most recent successful pull run. The delta pull period is calculated by subtracting the last successful run date and time from the current date and time that is Delta period = Current date timestamp - Last success import date timestamp.

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The application includes the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* connection properties to enable delta synchronization for computers and mobile devices, respectively. By default, the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* properties are set to `false`. To enable delta data synchronization, set these properties to `true`.

Note:

- The *is_delta_enabled_for_computers* connection property is available only if the *use_jamf_pro_api* property is set to `true`.
- The *is_delta_enabled_for_mobiles* connection property is available only if the *use_jamf_mobile_pro_api* property is set to `true`.

See Service Graph Connector for Jamf properties.

When you want to import full data from your Jamf instance, you must disable the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* properties by setting these properties to `false`. See Disable delta synchronization.

Note:
When the full import of data is completed, set the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* properties back to `true` to pull delta data later. If you leave the properties set to `false`, full data is imported with every pull, which takes considerable time.

Disable delta synchronization

Disable delta synchronization to import all the Jamf data.

Before you begin
Role required: admin

About this task
The delta data synchronization feature is available in Jamf version 2.14 and higher.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Jamf** > **Connections**.
2. From the list of connections, open the connection for which you want to disable delta synchronization.

   The connection properties are displayed in the Service Graph Connection Properties related list.

   - To disable delta synchronization for computers, open the *is_delta_enabled_for_computers* property.
   - To disable delta synchronization for mobile devices, open the *is_delta_enabled_for_mobiles* property.
3. In the **Value** field, enter `false`.
4. Select **Update**.

Service Graph Connector for Jamf properties

Service Graph Connector for Jamf properties control the behavior of the connector.

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Connection properties

These connection properties are available for the Service Graph Connector for Jamf.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Jamf** > **Connections**, and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for Jamf

Property	Description
auth_type	Set the property to `basic` to use Basic authentication for the connection. This authentication type uses a username and password. Set the property to `oauth` to use Client credentials (OAuth 2.0) authentication for the connection. This authentication type uses a client ID and client secret. The default Bearer token authentication type uses a username and password to retrieve a token for subsequent connection requests. • Type: basic | bearer | oauth • Default value: `bearer` **Note:** • For an OOB default connection, any of the three authentication types can be used. • For additional connections (multi-instance), only the Basic and Bearer authentication types can be used. To use the Client credentials (OAuth 2.0) authentication type, follow the guided setup to configure client authentication credentials for the connection. See Configure Service Graph Connector for Jamf using the guided setup.
import_managed_apps_only	Set the property to `true` to import only managed application records. When the property is set to `false`, all application records are imported. • Type: true | false • Default value: `false`
is_delta_enabled_for_computers	Set the property to `true` to enable the SG-Jamf Computers data source to pull only the changes (delta) between consecutive imports.

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Connection properties for Service Graph Connector for Jamf (continued)

Property	Description
	When the property is set to `false`, a full import is performed with every pull. **Note:** This property is available only if the *`use_jamf_pro_api`* property is set to `true`. • Type: true | false • Default value: `false` See Configuring data synchronization in Service Graph Connector for Jamf.
is_delta_enabled_for_mobiles	Set the property to `true` to enable the SG-Jamf Mobile Devices data source to pull only the changes (delta) between consecutive imports. When the property is set to `false`, a full import is performed with every pull. **Note:** This property is available only if the *`use_jamf_mobile_pro_api`* property is set to `true`. • Type: true | false • Default value: `false` See Configuring data synchronization in Service Graph Connector for Jamf.
use_jamf_mobile_pro_api	Set the property to `true` to use the Jamf Pro API for querying Jamf mobile device records. Set the property to `false` to use the Jamf Classic API. **Note:** The Jamf Pro API is supported by Jamf version 11.4 and higher. The Jamf Pro API supports pagination of response data and provides performance improvement compared to the Jamf Classic API. • Type: true | false • Default value: null
use_jamf_pro_api	Set the property to `false` to use the Jamf Classic API instead of the Jamf Pro API for querying Jamf mobile device records. When the property is set to `true`, the Jamf Pro API is used for querying Jamf mobile device records.

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Connection properties for Service Graph Connector for Jamf (continued)

Property	Description
	Note: The Jamf Pro API is supported by Jamf version 11.4 and higher. The Jamf Pro API supports pagination of response data and provides performance improvement compared to the Jamf Classic API. • Type: true | false • Default value: `true`

Service Graph Connector for Microsoft Azure

Use the Service Graph Connector for Microsoft Azure to pull data from Microsoft Azure into your CMDB.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

Supported ServiceNow versions:

- Washington DC
- Xanadu
- Yokohama
- Zurich

Use cases

The following are examples on how you can use the Service Graph Connector:

- Visibility into cloud resources, relationships, and state in near real-time.
- Service ITAM/SAM outcomes through deep discovery of applications.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Microsoft Azure using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

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CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft Azure integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Azure data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow® CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from Azure. The data is loaded into staging tables and then inserted into the target tables.

The following table lists the data sources, the staging tables, and the target tables as CMDB CI and non-CMDB classes for Azure.

Data mapping for Azure

Data source	Staging table	Target tables
SG-Azure Subscriptions	SG Azure Subscriptions [sn_sg_azure_integ_subscriptions]	Cloud Service Account Key Value
SG-Azure Datacenter Updation	SG-Azure Datacenter Updation [sn_sg_azure_integ_datacenter_updation]	Azure Datacenter
SG-Azure Resource Group	SG-Azure Resource Group [sn_sg_azure_integ_resource_groups]	Resource Group Key Value
SG-Azure Availability Zone	SG-Azure Availability Sets [sn_sg_azure_integ_availability_sets]	Availability Zone Key Value
SG-Azure Storage Volume	SG-Azure Storage Volume [sn_sg_azure_integ_storage_volume]	Storage Volume Key Value
SG-Azure Load Balancers	SG-Azure Load Balancers [sn_sg_azure_integ_load_balancers]	Cloud Load Balancer Cloud LB IPAddress

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Data mapping for Azure (continued)

Data source	Staging table	Target tables
		Key Value
SG-Azure Network	SG-Azure Network [sn_sg_azure_integ_network]	Cloud Network Cloud Service Account Cloud Subnet Key Value
SG-Azure Public IP Address	SG-Azure Public IP Address [sn_sg_azure_integ_public_ip_address]	Cloud Public IP Address Cloud Mgmt Network Interface Cloud Load Balancer Cloud LB IPAddress Key Value
SG-Azure Security Group	SG-Azure Security Group [sn_sg_azure_integ_security_group]	Compute Security Group Key Value
SG-Azure Storage Accounts	SG-Azure Storage Accounts [sn_sg_azure_integ_storage_accounts]	Cloud Storage Account Key Value
SG-Azure Virtual Machines	SG-Azure Virtual Machine [sn_sg_azure_integ_virtual_machine]	Virtual Machine Instance Image Linux Server Server

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Data mapping for Azure (continued)

Data source	Staging table	Target tables
		Windows Server Key Value
SG-Azure Network Interface	SG-Azure Network Interface [sn_sg_azure_integ_network_interface]	Cloud Mgmt Network Interface IP Address Hardware Virtual Machine Instance Key Value
SG-Azure SQL	SG-Azure SQL [sn_sg_azure_integ_sql]	Cloud DataBase Key Value
SG-Azure Functions	SG-Azure Functions [sn_sg_azure_integ_functions]	Cloud Function
SG-Azure Generic Resources	SG-Azure Generic Resources [sn_sg_azure_integ_generic_resources] **Note:** The SG-Azure Generic Resources data source imports data for generic resources that aren't tracked by other data sources.	Cloud Resource Key Value
SG-Azure Scale Sets	SG-Azure Scale Sets [sn_sg_azure_integ_scale_sets]	Instance Scale Set
SG-Azure Scale Sets VMs	SG-Azure Scale Sets VMs [sn_sg_azure_integ_scale_sets_vms]	Virtual Machine Instance Storage Volume Image Cloud Mgmt Network Interface

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Data mapping for Azure (continued)

Data source	Staging table	Target tables
		Hardware Type Azure Datacenter Linux Server Server Windows Server Key Value
SG-Azure Software	SG-Azure Software [sn_sg_azure_integ_software] **Note:** The SG-Azure Software data source imports the software data from the ConfigurationData table in the Log Analytics workspace of Azure. The SG-Azure Software import is set to inactive by default.	When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation
SG-Azure Software Remove	SG-Azure Software Remove [sn_sg_azure_integ_software_remove] The SG-Azure Software Remove import is set to inactive by default.	When the SAM application isn't installed: Software Software Instance When the SAM application is installed:

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Data mapping for Azure (continued)

Data source	Staging table	Target tables
		Software Installation
SG-Azure TCP	SG-Azure TCP [sn_sg_azure_integ_tcp] **Note:** The SG-Azure TCP data source imports the TCP and processes data from the VMConnection and VMProcess tables in the Log Analytics workspace of Azure. To populate the tables, you must first enable the VM insights feature in the Azure portal. For more information, see Enabling VM insights for collecting Azure data.	TCP Connection Running Process
SG-Azure Hardware Template Updation	Hardware templates [sn_sg_azure_integ_hardware_templates]	Hardware Type
SG-Azure HW Consolidation	SG-Azure HW Consolidation [sn_sg_azure_integ_hw_consolidation]	Virtual Machine Instance Computer
SG-Azure Run Command	SG-Azure Run Command [sn_sg_azure_integ_run_command]	No data created
SG-Azure Get Run Command	SG-Azure Get Run Command [sn_sg_azure_integ_get_run_command]	Application TCP Connection Running Process
SG-Azure Kubernetes Cluster	SG-Azure Kubernetes Cluster [sn_sg_azure_integ_kubernetes_cluster]	Kubernetes Cluster

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Note:

- The connector utilizes the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table to differentiate between generic and other supported resource types.

  The connector first populates all supported resources in the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table. These resources, categorized under their respective supported resource types, have specific data sources designated for ingestion within the connector. When the SG-Azure Generic Resources data source is executed and retrieves unsupported resource types, they are added to the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table and categorized as generic.

- Starting with the Service Graph Connector for Microsoft Azure 1.12.0 version, the SG-Azure Hardware Template Updation and SG-Azure HW Consolidation import schedules replace the SG-Azure Hardware Template import schedule. The SG-Azure Hardware Template Updation and SG-Azure HW Consolidation data sources fetch only the data of the hardware templates that are used for VMs in Azure, instead of fetching all hardware templates.

For more information on where data is saved when pulling data from Azure, see CMDB classes targeted in Service Graph Connector for Microsoft Azure and Supported Microsoft Azure resource types.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional resource

How do I configure the Azure Service Graph Connector?

Related topics

- Service Graph Connectors
- Configure Service Graph Connector for Microsoft Azure using the guided setup
- CMDB classes targeted in Service Graph Connector for Microsoft Azure
- Configuring data synchronization in Service Graph Connector for Microsoft Azure
- Enabling VM insights for collecting Azure data
- Setting up multiple connections in Service Graph Connector for Microsoft Azure

Configure Service Graph Connector for Microsoft Azure using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Microsoft Azure for pulling in Microsoft Azure data into the CMDB.

Before you begin

Install Service Graph Connector for Microsoft Azure version 1.9.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Important:
After the initial import of Azure data, the application performs a delta import of data. However, you can perform a full pull of data anytime later by disabling the delta synchronization and setting the *sn_sg_azure_integ.is_delta_sync_enabled* property to `false`. For more information, see Configuring data synchronization in Service Graph Connector for Microsoft Azure.

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Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

The connector uses the Azure Management APIs for the complete pull of data from Azure. However, to pull delta changes from Azure, the Azure Resource Graph APIs are used. The domain name system (DNS) is Microsoft Azure Management, but the path is a resource graph.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Microsoft Azure connector type and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Complete the prerequisites for setting up the Azure environment.

   a. Complete the instructions required for setting up the Azure environment.

      i. In the **Prerequisites** stage of the playbook, select the **Review setup instructions** activity.

      ii. Obtain the OAuth credentials including client ID, client secret, and token URL from your Microsoft Azure administrator.

      iii. For importing hardware data, grant the `User.Read` permission on the *`Microsoft Graph`* API in the Azure environment. Also, ensure that the IAM policy for the Azure subscription has the Reader role. See Assign a user as an administrator of an Azure subscription with conditions on the Microsoft Azure documentation site.

      iv. For importing software data, grant the `Data.Read` permission on the *`Log Analytics`* API in the Azure environment. In addition, set up a Log Analytics workspace in the Azure environment.

      v. After completing the **Review setup instructions** activity, select **Continue**.

7. Determine whether to import only hardware data or both hardware and software data.

   a. In the **Setup** stage of the playbook, select the **Select services** activity.
   If needed, expand the **Setup** stage to select an activity.

   b. **Optional:** To import both hardware and software data, select the **Hardware and software** check box.

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Note:
Importing software data requires a hardware connection.

(Optional) If you need to import only hardware data, the **Hardware only** check box is already selected by default.

c. Select **Continue**.

8. Enter the connection details and test the API connection for importing hardware data.

a. In the **Setup** stage of the playbook, select the **Create and test hardware connection** activity.

b. On the form, fill in the fields.

Create and test hardware connection form

Field	Description
Connection name	Name to identify the hardware connection record. For example, `SG-Azure hardware connection`.
Connection URL	Base URL to connect to your Azure client application. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
OAuth client ID	Application (client) ID of your Azure client application as noted in step 6.a.
OAuth client secret	Client secret of your Azure client application as noted in step 6.a.

OAuth token URL	Callback URL for the Azure client application.
	
	Based on the region of your Azure client application, enter the token URL in one of the following formats:
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China

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Field	Description

	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Azure client application as noted in step 6.a.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

9. Configure the import schedule to import hardware data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure hardware import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the *Connection name*-**SG-Azure Subscriptions** import schedule.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

10. Enter the connection details and test the API connection for importing software data.

The **Create and test software connection** activity for importing software data appears only when the **Hardware and software** check box is selected in step 7.b.

a. In the **Setup** stage of the playbook, select the **Create and test software connection** activity.

b. On the form, fill in the fields.

Create and test software connection form

Field	Description
Software connection name	Name to identify the software connection record.

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Field	Description
	For example, `SG-Azure software connection`.
Hardware connection name	Name of the hardware connection record. **Note:** This field is automatically set to the hardware connection name specified in step 8.b.
Connection URL	Base URL to connect to the Log Analytics workspace in the following format: `https://api.loganalytics.io/v1/workspaces/<workspace_id>` Where `<workspace_id>` is the ID of the Log Analytics workspace as noted in step 6.a. **Note:** This field is automatically set to the URL to connect to the Log Analytics workspace. Replace the `<workspace_id>` variable in the auto-generated URL with the workspace ID of your Log Analytics workspace.
OAuth client ID	Application (client) ID of your Azure client application as noted in step 6.a.
OAuth client secret	Client secret of your Azure client application as noted in step 6.a.

OAuth token URL	Token URL of your Azure client application.
	
	Based on the region of your Azure client application, enter the token URL in one of the following formats:
	
	▪ Global
	
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	
	▪ US Government
	
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	
	▪ China

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Field	Description

	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Azure client application as noted in step 6.a.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

11. Configure the import schedule to import software data at regular intervals.

The **Configure software import schedule** activity for importing software data appears only when the **Hardware and software** check box is selected in step 7.b.

a. In the **Setup** stage of the playbook, select the **Configure software import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the *Connection name*-**SG-Azure TCP** import schedule.

c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Repeat steps 11.b to 11.d for any other parent import schedule if not already set to active.

f. Select **Continue**.

12. In the **Setup** stage of the playbook, select the **Connection setup complete** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics

Service Graph Connector for Microsoft Azure

CMDB classes targeted in Service Graph Connector for Microsoft Azure

Supported Microsoft Azure resource types

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Service Graph Connector for Microsoft Azure properties

Accessing the connection details of Service Graph Connector for Microsoft Azure

Additional features within the Service Graph Connector for Microsoft Azure

Configure Service Graph Connector for Microsoft Azure using the guided setup

Set up data sources and scheduled import jobs to pull in data from Azure into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.

Important:
After the initial import of Azure data, the application performs a delta import of data. However, you can perform a full pull of data anytime later by disabling the delta synchronization and setting the *sn_sg_azure_integ.is_delta_sync_enabled* property to `false`. For more information, see Configuring data synchronization in Service Graph Connector for Microsoft Azure.

Role required: admin

About this task

The connector uses the Azure Management APIs for the complete pull of data from Azure. However, to pull delta changes from Azure, the Azure Resource Graph APIs are used. The domain name system (DNS) is Microsoft Azure Management, but the path is a resource graph.

For more information on the Azure setup instructions, see the Service Graph Connector for Azure - Overview article on the ServiceNow Community site.

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Azure** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. Create data sources and scheduled imports for the new connection.

   a. On the Service Graph Connector for Microsoft Azure page, in the Update Data Sources and Scheduled Imports Access, select the task **Update Scheduled Data Import Access**.

   b. In the Update Scheduled Data Import Access section, select **Configure** and do the following:

      i. For the Update Scheduled Data Import access task, select **Configure**.

      ii. Select the **Global** application scope by using the application picker.

      iii. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

      iv. Select **Update** to close the tab and return to the guided setup.

      v. Modify the application scope again to **Service Graph Connector for Microsoft Azure** by using the application picker.

      vi. Set the Update Scheduled Data Import access task to complete by selecting **Mark as Complete**.

      vii. Repeat the steps 3.b.ii to 3.b.v for the Update Data Source Access task with the Data Source [sys_data_source] table and set the task to complete by selecting **Mark as Complete**.

   c. Clear the cache for the new connection.

      i. In the Clear Cache for Datasource and Import set section, select **Configure**.

      ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
      GlideCacheManager.flushTable("sys_data_source");


 GlideTableManager.invalidateTable("scheduled_import_set");
      GlideCacheManager.flushTable("scheduled_import_set");

      GlideTableManager.invalidateTable("sys_db_object");
      GlideCacheManager.flushTable("sys_db_object");
```

      iii. Select **Run Script** to run the background script in the **global** scope.

      The script may take several minutes to execute.

      iv. After the script is executed, select **Close**.

      v. From the application picker, select the **Service Graph Connector for Microsoft Azure** application.

      vi. Select **Mark as Complete**.

4. Create a connection to import hardware configuration items (CIs) from the Azure client application.

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Note:
Ensure that you have the `User.Read` permission on the *`Microsoft Graph`* API for the hardware import. Also, ensure that the IAM policy for the Azure subscription has the Reader role. See Assign a user as an administrator of an Azure subscription with conditions on the Microsoft Azure documentation site.

a. Obtain the OAuth credentials from your Azure administrator.
Make a note of the following details:

- Application (client) ID
- Client Secret
- Directory (tenant) ID
- Connection URL

Note:
After getting the OAuth credentials, in the guided setup for Service Graph Connector for Microsoft Azure, go to the Create connection for the hardware import section of the Service Graph Connector for Microsoft Azure page and set the Get the OAuth credentials task to complete by selecting **Mark as Complete**.

b. Configure your Azure hardware connection and credentials.

i. In the Create connection for the hardware import section of the Service Graph Connector for Microsoft Azure page, select **Continue**.

ii. For the Create or Edit connection task, select **Configure**.

iii. On the Connections page of the Flow Designer, select **Configure** for the **SG-Azure Hardware Connection** connection that is available by default for the hardware import.

You can create multiple connections by selecting **Add Connection**.

iv. On the form, review and modify the fields.

Configure Connection form

Field	Description
Connection Information	
Connection Name	Name to uniquely identify the hardware connection record. For example, `SG-Azure Hardware Connection`.
Connection URL	Base URL to connect to your Azure client application. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
Credential Information	
OAuth Client ID	Application (client) ID of your Azure client application as described in step 4.a.

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Field	Description
OAuth Client Secret	Client Secret of your Azure client application as described in step 4.a.

OAuth Token URL	Token URL of your Azure client application.
	
	Based on the region of your Azure client application, enter the token URL in one of the following formats:
	
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	
	Where *<tenantid>* is the tenant ID of your Azure client application as described in step 4.a.

v. Select **Configure and Get OAuth Token**.

vi. When the OAuth token flow is successfully completed, return to the Create connection for the hardware import task page using the back button for your browser.

vii. Set the Create or Edit connection task to complete by selecting **Mark as Complete**.

c. Test the *Microsoft Graph* API connection to import hardware data from the Azure client application.

i. For the Test Connection task, select **Configure**.

ii. Select the data source associated with the newly created connection in the **Name** column of the Data Sources list.

iii. Select the **Test Load 20 Records** related link.

iv. When the state changes to **Complete**, return to the setup by selecting **Back to Guided Setup** in the Help panel.

v. Set the Test Connection task to complete by selecting **Mark as Complete**.

d. Review the scheduled data imports configuration.

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i. For the Set up scheduled import jobs task, select **Configure**.

ii. Select the *SG-Azure Subscriptions* scheduled job.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

iv. Select **Update**.

v. Set the Set up scheduled import jobs task to complete by selecting **Mark as Complete** in the Help panel.

5. Create a connection to import software information from the Azure client application.

Note:
Ensure that you have the `Data.Read` permission on the *Log Analytics* API for the software import.

a. Obtain the OAuth credentials and set up the Log Analytics workspace in the Azure.

i. Ensure that you have the OAuth credentials from step 4.a.

ii. Configure the Log Analytics workspace in the Azure client application.

- Use an existing workspace, if available.
- Create another workspace.

For more information, see Create Log Analytics workspace in the Azure documentation.

Note:
Make a note of the Workspace ID.

iii. Deploy Azure Monitoring Agent (AMA), and then enable change tracking and inventory using AMA.

For more information, see Enable Change Tracking and Inventory using Azure Monitoring Agent in the Azure documentation.

iv. Deploy Dependency Agent as part of VM insights to collect discovered data about VM processes and their connections.

For more information, see Enable VM Insights overview in the Azure documentation.

Note:
After obtaining the OAuth credentials, in the guided setup for Service Graph Connector for Microsoft Azure, go to the Create connection for the software import section of the Service Graph Connector for Microsoft Azure page and set the Get the OAuth credentials task to complete by selecting **Mark as Complete**.

b. Configure your Azure software connection and credentials.

i. In the Create connection for the software import section of the Service Graph Connector for Microsoft Azure page, select **Continue**.

ii. For the Create or Edit connection task, select **Configure**.

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iii. On the Connections page of the Flow Designer, select **Configure** for the **SG-Azure log analytics connection** connection that is available by default for the software import.

You can create multiple connections by selecting **Add Connection**.

iv. On the form, review and modify the fields.

Configure Connection form

Field	Description
Connection Information	
Software Connection Name	Name to uniquely identify the software connection record. For example, `SG-Azure log analytics connection`.
Hardware Connection Name	Name of the hardware connection associated with the software as described in step 4.b.iv. You add a hardware connection name to associate the software connection with the respective hardware.
Connection URL	Base URL to connect to the Log Analytics workspace in the following format: `https://api.loganalytics.io/v1/workspaces/<workspace_id>` Where `<workspace_id>` is the ID of the Log Analytics workspace as described in step 5.a.ii. **Note:** This field is automatically set to the URL to connect to the Log Analytics workspace. Replace the `<workspace_id>` variable in the auto-generated URL with the workspace ID of your Log Analytics workspace.
Credential Information	
OAuth Client ID	Application (client) ID of your Azure client application as described in step 4.a.
OAuth Client Secret	Client Secret of your Azure client application as described in step 4.a.
OAuth Token URL	Token URL of your Azure client application. Based on the region of your Azure client application, enter the token URL in one of the following formats:

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Field	Description

	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Azure client application as described in step 4.a.

v. Select **Configure and Get OAuth Token**.

vi. When the OAuth token flow is successfully completed, return to the Create connection for the software import task page using the back button for your browser.

vii. Set the Create or Edit connection task to complete by selecting **Mark as Complete**.

c. Test the *Log Analytics* API connection to import software data from the Azure client application.

i. For the Test Connection task, select **Configure**.

ii. Select the data source associated with the newly created connection in the **Name** column of the Data Sources list.

iii. Select the **Test Load 20 Records** related link.

iv. When the state changes to **Complete**, return to the setup by selecting **Back to Guided Setup** in the Help panel.

v. Set the Test Connection task to complete by selecting **Mark as Complete**.

d. Review the scheduled data imports configuration.

i. For the Set up scheduled import jobs task, select **Configure**.

ii. Select the *SG-Azure Software* scheduled data import.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

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iv. Select **Update**.

v. Set the Set up scheduled import jobs task to complete by selecting **Mark as Complete** in the Help panel.

6. **Optional:** Enable extended discovery using the `run` command.

(Optional) The `run` command is used to run a set of commands on the VMs to fetch server information such as CPU count, cores, model, and manufacturer. For information about extended discovery using the `run` command, see the Extended discovery with Run Command on Service Graph connector for Microsoft Azure [KB2210811] article in the Now Support Knowledge Base.

a. Download the scripts that are required to enable extended discovery.

i. For the Download the scripts task, select **Configure**.

ii. After the scripts are downloaded, select **Mark as Complete** to set the Download the scripts task to complete.

b. Configure an Azure storage account for extended discovery.

i. For the Configure Azure Storage account for Run Command task, select **Configure**.

For information about configuring an Azure storage account for extended discovery, see the Instructions for setting up Run Command in Service Graph Connector for Azure [KB2001668] article in the Now Support Knowledge Base.

ii. Set up a new Azure storage account.

iii. Set up a container to upload the script files.

iv. Set up another container to store the results.

v. Provide `run` command access to the service principal.

vi. Select **Mark as Complete** to set the Configure Azure Storage account for Run Command task to complete.

c. Configure the connection properties for the new instance that you created for Service Graph Connector for Microsoft Azure.

i. For the Configure connection properties task, select **Configure**.

ii. In the **Connection*** field of the SG-Azure Configuration Properties section, select the new instance that you created.

The fields in the Properties section are populated with the details of the instance.

iii. In the Properties section, provide the following details for the instance that you created:

- Name of the storage account where the containers are created
- Subscription ID where the storage account is created
- Resource group of the storage account
- Name of the container where the `sh` and `ps1` files are uploaded in Azure
- Name of the container where the results of the commands are to be stored
- URI of the `sh` file that has to be run on Linux machines
- URI of the `ps1` file that has to be run on Windows machines

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iv. Select **Save**.

v. Select **Mark as Complete** to set the Configure connection properties task to complete.

Result
The data from Azure is pulled into your CMDB.

CMDB classes targeted in Service Graph Connector for Microsoft Azure

When you complete setting up the connection, you can configure the integration to periodically pull data from Microsoft Azure. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
Version	version
TCP port(s)	tcp_port
Running Process	running_process
Running process key parameters	running_process_key_parameters
Name	name
Running process command	running_process_command

Relationship created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Computer [cmdb_ci_computer]

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

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Relationship created for Availability Zone

Parent class	Relationship type	Child class
Availability Zone [cmdb_ci_availability_zone]	Reference	Key Value [cmdb_key_value]

Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

Attribute label	Attribute name
Comments	comments
Name	name
Object ID	object_id
Region	region
Status	install_status

Relationships created for Azure Datacenter

Parent class	Relationship type	Child class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains::Contained by	Resource Group [cmdb_ci_resource_group]
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data.

Attribute label	Attribute name
Fully qualified domain name	fqdn
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state
Type	type
Version	version

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Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data.

Attribute label	Attribute name
App Function state	app_function_state
Code Location URL	code_location_url
Fully qualified domain name	fqdn
Function Last Modified	function_last_modified
Install Status	install_status
IP Address	ip_address
Name	name
Object ID	object_id
Operational status	operational_status

Relationship created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]

The following attributes in the Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress] table are populated by collected data.

Attribute label	Attribute name
Fully qualified domain name	fqdn
Install Status	install_status
IP Address	ip_address
IPAddress Type	ipaddress_type
Name	name
Object ID	object_id

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Attribute label	Attribute name
Operational status	operational_status

Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data.

Attribute label	Attribute name
Canonical Hosted Zone Name	canonical_hosted_zone_name
DNS Name	dns_name
Fully qualified domain name	fqdn
Install Status	install_status
IP Address	ip_address
Name	name
Object ID	object_id
Operational status	operational_status
State	state

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Owns::Owned by	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]

Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data.

Attribute label	Attribute name
Configuration Item	cmdb_ci
Install Status	install_status
IP Address	ip_address
MAC Address	mac_address
Name	name
Object ID	object_id
Operational status	operational_status

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Attribute label	Attribute name
Primary	primary
Private IP	private_ip
Public DNS	public_dns
Public IP	public_ip
State	state
Static	is_static

Relationships created for Cloud Mgmt Network Interface

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Contains::Contained by	Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Key Value [cmdb_key_value]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Virtual Machine Instance [cmdb_ci_vm_instance]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Computer [cmdb_ci_computer]

Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data.

Attribute label	Attribute name
Cidr	cidr
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Compute Security Group [cmdb_ci_compute_security_group]

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Relationships created for Cloud Network (continued)

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Cloud Network [cmdb_ci_network]	Reference	Key Value [cmdb_key_value]

Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]

The following attributes in the Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
Public DNS	public_dns
Public IP Address	public_ip_address
State	state

Relationships created for Cloud Public IP Address

Parent class	Relationship type	Child class
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Reference	Key Value [cmdb_key_value]

Cloud Resource [cmdb_ci_cmp_resource]

The following attributes in the Cloud Resource [cmdb_ci_cmp_resource] table are populated by collected data.

Attribute label	Attribute name
Description	short_description
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
Resource type	resource_type
State	state

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Relationships created for Cloud Resource

Parent class	Relationship type	Child class
Cloud Resource [cmdb_ci_cmp_resource]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Resource [cmdb_ci_cmp_resource]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data.

Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type

Relationship created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Key Value [cmdb_key_value]

Cloud Storage Account [cmdb_ci_cloud_storage_account]

The following attributes in the Cloud Storage Account [cmdb_ci_cloud_storage_account] table are populated by collected data.

Attribute label	Attribute name
Blob Service	blob_service
File Service	file_service
Install Status	install_status
Name	name
Object ID	object_id
Queue Service	queue_service
Sku Name	sku_name
State	state
Table Service	table_service

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Relationships created for Cloud Storage Account

Parent class	Relationship type	Child class
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Reference	Key Value [cmdb_key_value]

Cloud Subnet [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data.

Attribute label	Attribute name
CIDR	cidr
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

Relationship created for Cloud Subnet

Parent class	Relationship type	Child class
Cloud Subnet [cmdb_ci_cloud_subnet]	Reference	Key Value [cmdb_key_value]

Compute Security Group [cmdb_ci_compute_security_group]

The following attributes in the Compute Security Group [cmdb_ci_compute_security_group] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

Relationships created for Compute Security Group

Parent class	Relationship type	Child class
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

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Relationships created for Compute Security Group (continued)

Parent class	Relationship type	Child class
Compute Security Group [cmdb_ci_compute_security_group]	Reference	Key Value [cmdb_key_value]

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Name	name
CPU core count	cpu_core_count
CPU count	cpu_count
Disk space (GB)	disk_space
IP Address	ip_address
Is Virtual	virtual
Object ID	object_id
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram
Serial number	serial_number

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

For information about the classification of VDIs into the Computer [cmdb_ci_computer] CI class, see the Classification of VDIs into computer class using Service graph connector for Azure [KB2184443] article in the Now Support Knowledge Base.

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data.

Attribute label	Attribute name
Name	name

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Attribute label	Attribute name
Object ID	object_id
Class	sys_class_name
Cores	cores
Logical Storage GB	local_storage_gb
Memory MB	memory_mb
vCPUs	vcpus

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Note:
When the Cloud Hardware Type class extension is enabled, the **Class** attribute is set to `Cloud Hardware Type`. Else, the attribute is set to `Hardware Type`.

As a user with the admin role, you can enable the Cloud Hardware Type class extension by setting the **use a single hardware type for cloud data centers** property (*`sn_itom_pattern.use a single hardware type for cloud data centers`*) to `true`. For more information, see the Service Graph Connector For Microsoft Azure - Migrating to a new hardware type model [KB1288455] article in the Now Support Knowledge Base.

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data.

Attribute label	Attribute name
Guest OS	guest_os
Image Source	image_source
Install Status	install_status
Name	name
Object ID	object_id
Offer	offer
Operational status	operational_status
Version	version

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Attribute label	Attribute name
Vendor	vendor

Relationship created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Instance Scale Set [cmdb_ci_instance_scale_set]

The following attributes in the Instance Scale Set [cmdb_ci_instance_scale_set] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

Relationship created for Instance Scale Set

Parent class	Relationship type	Child class
Instance Scale Set [cmdb_ci_instance_scale_set]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

Attribute label	Attribute name
Owned By Configuration Item	owned_by_cmdb_ci
IP Address	ip_address
Name	name
Nic	nic

Relationships created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Cloud Mgmt Network Interface [cmdb_ci_nic]

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Relationships created for IP Address (continued)

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Computer [cmdb_ci_computer]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data.

Attribute label	Attribute name
Key	key
Value	value

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data.

Attribute label	Attribute name
Cluster Resource ID	cluster_resource_id
Cluster Version	cluster_version
Fully qualified domain name	fqdn
Install Status	install_status
Kubernetes UID	k8s_uid
Name	name

Relationship created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Linux Server [cmdb_ci_linux_server]

The following attributes in the Linux Server [cmdb_ci_linux_server] table are populated by collected data.

Attribute label	Attribute name
CPU core count	cpu_core_count
Disk space (GB)	disk_space
Install Status	install_status
Is Virtual	virtual

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Attribute label	Attribute name
Name	name
Object ID	object_id
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram
Serial number	serial_number

Relationship created for Linux Server

Parent class	Relationship type	Child class
Linux Server [cmdb_ci_linux_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

Resource Group [cmdb_ci_resource_group]

The following attributes in the Resource Group [cmdb_ci_resource_group] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Operational status	operational_status
Install Status	install_status
State	state

Relationships created for Resource Group

Parent class	Relationship type	Child class
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Virtual Machine Instance [cmdb_ci_vm_instance]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Instance Scale Set [cmdb_ci_instance_scale_set]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Image [cmdb_ci_os_template]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Storage Volume [cmdb_ci_storage_volume]
Resource Group [cmdb_ci_resource_group]	Reference	Key Value [cmdb_key_value]

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Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data.

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Server [cmdb_ci_server]
Serial Number [cmdb_serial_number]	Reference	Windows Server [cmdb_ci_win_server]
Serial Number [cmdb_serial_number]	Reference	Linux Server [cmdb_ci_linux_server]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data.

Attribute label	Attribute name
CPU core count	cpu_core_count
CPU count	cpu_count
Disk space (GB)	disk_space
Install Status	install_status
Is Virtual	virtual
Name	name
Object ID	object_id
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram
Serial number	serial_number
Comments	comments

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Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Owns::Owned by	Cloud Mgmt Network Interface [cmdb_ci_nic]
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data.

Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data.

Attribute label	Attribute name
Installed on	installed_on
Name	name

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Relationships created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Storage Volume [cmdb_ci_storage_volume]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
Size	size
Size bytes	size_bytes
State	state
Volume ID	volume_id

Relationships created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Reference	Key Value [cmdb_key_value]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data.

Attribute label	Attribute name
CPUs	cpus
Disks size (GB)	disks_size
Install Status	install_status
IP Address	ip_address
Memory (MB)	memory
Name	name
Object ID	object_id

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Attribute label	Attribute name
Operational status	operational_status
State	state
VM Instance ID	vm_inst_id

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Managed by::Manages	Instance Scale Set [cmdb_ci_instance_scale_set]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Cloud Mgmt Network Interface [cmdb_ci_nic]
Virtual Machine Instance [cmdb_ci_vm_instance]	Uses:Used by	Storage Volume [cmdb_ci_storage_volume]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Computer [cmdb_ci_computer]

Windows Server [cmdb_ci_win_server]

The following attributes in the Windows Server [cmdb_ci_win_server] table are populated by collected data.

Attribute label	Attribute name
CPU core count	cpu_core_count
Disk space (GB)	disk_space
Install Status	install_status
Is Virtual	virtual
Name	name
Object ID	object_id
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram
Serial number	serial_number

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Relationship created for Windows Server

Parent class	Relationship type	Child class
Windows Server [cmdb_ci_win_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

Quick start tests for Service Graph Connector for Microsoft Azure

Validate that Service Graph Connector for Microsoft Azure still works after you make any configuration change such as applying an upgrade or developing an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Danger:
By default, the system property that is used to run automated tests is disabled to prevent you from accidentally running these tests on a production system. To avoid data corruption or an outage, run tests only on development, test, and other non-production instances. See Enable or disable executing Automated Test Framework tests.

Service Graph Connector for Microsoft Azure

SG-Azure: Service Graph Connector for Microsoft Azure Validation test suite

Test suite to verify the integrity of an integration using multiple tests.

Test	Description	Release version
SG-Azure Availability Zone	Validate the successful ingestion of the record in the Availability Zone table with the prerequisite parent ingestion.	Utah
SG-Azure Data Center	Validate the successful ingestion of multiple records in the Azure Data Center table with the prerequisite parent ingestion.	Utah
SG-Azure Functions	Validate the successful ingestion of multiple records in the Cloud Service Account, Data Center, Cloud Database, and Cloud Function.	Utah
SG-Azure Generic Resources	Validate the successful ingestion of multiple records in the Cloud Resource and Relations table.	Utah
SG-Azure Hardware Template	Validate the successful ingesion of multiple records in the Hardware Template and Compute Template tables.	Utah
SG-Azure Load Balancers	Validate the successful ingestion of multiple records in the Load Balancer, Computer Security Group	Utah

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SG-Azure: Service Graph Connector for Microsoft Azure Validation test suite
Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
	and Relations table with the prerequisite parent ingestion.	
SG-Azure Network	Validate the successful ingestion of multiple records in the Network table with the prerequisite parent ingestion.	Utah
SG-Azure Network Interface	Validate the successful ingestion of multiple records in the Networks, Public IP Address and Relations table.	Utah
SG-Azure Public IP Address	Validate the successful ingestion of multiple records in the Public IP Address, Networks, and Load Balancer tables.	Utah
SG-Azure Resource Group	Validate the successful ingestion of records in the Resource Group table.	Utah
SG-Azure Scale Sets	Validate the successful ingestion of records in the Scale Sets and Relations tables.	Utah
SG-Azure Scale Sets VMs	Validate the successful ingestion of multiple records in the Servers, Virtual Machine Instance, Scale Sets, and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Security Groups	Validate the successful ingestion of multiple records in the Cloud Service Account, Computer Security Group, and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Server Config Data	Validate the successful ingestion of multiple records in the Virtual Machine Instance, Linux Server, and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Software	Validate the successful ingestion of multiple records in the Virtual Machine Instance, Software Records,	Utah

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SG-Azure: Service Graph Connector for Microsoft Azure Validation test suite
Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
	and Relations tables with the prerequisite parent ingestion.	
SG-Azure SQL	Validate the successful ingestion of multiple records in the Data Center, Cloud Database, and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Storage Account	Validate the successful ingestion of multiple records in the Storage Account, Computer Security Group and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Storage Volume	Validate the successful ingestion of multiple records in the Storage Volume, Computer Security Group and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Subscription	Validate the successful ingestion of records in the Cloud Service Account table.	Utah
SG-Azure VMs	Validate the successful ingestion of multiple records in the Virtual Machines, Virtual Machine Instance and Relations tables with prerequisite parent ingestion.	Utah

To learn more about Service Graph Connector for Microsoft Azure, see Service Graph Connector for Microsoft Azure.

Related topics

Quick start tests

Accessing the connection details of Service Graph Connector for Microsoft Azure

You can access the connection details of the Service Graph Connector for Microsoft Azure in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Microsoft Azure. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

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Access the details of an Azure connection

Access the details of an Azure connection configured for the Service Graph Connector for Microsoft Azure.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Azure** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Additional features within the Service Graph Connector for Microsoft Azure

Use the additional features available within the Service Graph Connector for Microsoft Azure to maximize its use for importing data.

The following features are available within the Service Graph Connector for Microsoft Azure:

Configure multiple Azure connections

Follow the guided setup to establish a hardware or software connection, or configure a workspace when adding a software connection.

Set partition size for Azure accounts with parallel loading enabled

Optimize the performance of data sources by enabling parallel data loading.

Disable delta synchronization

Import full data from your Azure instance when needed.

Enabling VM insights for collecting Azure data

Enable the VM insights feature for all the VMs in your Log Analytics workspace to populate the VMConnection and VMProcess tables in Azure.

Setting up multiple connections in Service Graph Connector for Microsoft Azure

The Service Graph Connector for Microsoft Azure supports multiple Azure connections.

Important:
Add multiple connections by selecting **Add connection** on the Connections page of the Flow Designer in the guided setup. For more information, see Configure Service Graph Connector for Microsoft Azure.

Setting up multiple connections

You can set up a hardware or software connection by using the guided setup. The Service Graph Connector for Microsoft Azure supports only one-to-one mapping between hardware and software connections. Therefore, when configuring multiple software connections, you must also configure an equivalent number of hardware connections. You can differentiate multiple connections using their respective connection aliases.

For example, if you add 10 software connections for 10 different workspaces, you must also add 10 hardware connections for each corresponding software connection.

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Setting up multiple workspaces

You can set up a workspace when adding a software connection using the guided setup. To set up multiple workspaces, you must configure that many different software connections in the Service Graph Connector for Microsoft Azure as there are workspaces and an equivalent number of hardware connections.

For example, if you have 10 workspaces, you must add 10 software connections for each workspace and 10 hardware connections for each corresponding software connection.

Set partition size for Azure accounts with parallel loading enabled

Optimize the performance of data sources by setting the partition size in the *azure_full_pull_partition_size* system property.

Before you begin

Set the application scope to Service Graph Connector for Microsoft Azure using the application picker. For more information, see Application picker.

Role required: admin

About this task

The parallel loading feature is available for the following data sources:

- Starting with the Service Graph Connector for Microsoft Azure 1.13.0 version:
  - SG-Azure Functions
  - SG-Azure Generic Resources
  - SG-Azure Get Run Command
  - SG-Azure Hardware Template Updation
  - SG-Azure HW Consolidation
  - SG-Azure Kubernetes Cluster
  - SG-Azure Load Balancers
  - SG-Azure Network Interface
  - SG-Azure Public IP Address
  - SG-Azure Run Command
  - SG-Azure Scale Sets VMs
- Starting with the Service Graph Connector for Microsoft Azure 1.11.0 version:
  - SG-Azure Network
  - SG-Azure Virtual Machines
  - SG-Azure Storage Volume

For a full data pull, the *azure_full_pull_partition_size* property determines the number of Azure subscriptions that can be executed as parallel jobs to retrieve configuration item (CI) data. Partition size determines how many Azure subscriptions a single parallel-thread evaluates for data retrieval. If you set the *azure_full_pull_partition_size* property to 100, the partition size is 100 subscriptions.

Note:
If the *azure_full_pull_partition_size* property isn't configured, the partition size computation feature of the Integration Commons for CMDB application automatically determines the partition size for parallel loading at runtime. See Partition size computation for parallel loading in Integration Commons for CMDB.

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Azure** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. From the **Property** column of the Service Graph Connection Properties related list, select **azure_full_pull_partition_size**.
   The *azure_full_pull_partition_size* system property determines the number of subscriptions that each partition processes for a full pull. For more information, see Service Graph Connector for Microsoft Azure properties.
4. In the **Value** field, enter a numeric value greater than 0 for the partition size.
5. Select **Update**.

> **Note:**
> After you enable parallel data loading for a data source, the **Test Load 20 Records** and **Load All Records** options don't work for executing the data source. You must select **Execute Now** from **Scheduled Data Import** to execute the data source for which parallel loading is enabled.

Configuring data synchronization in Service Graph Connector for Microsoft Azure

You can configure the system property for synchronizing only delta data from an Azure instance.

The connector provides the ability to import only delta data from an Azure instance. With delta synchronization enabled, the importing process of Azure data is quicker because the connector imports the changes in Azure data only. The **Last Run Time** field of a data source displays the timestamp of the most recent delta pull run. The **Last Run Time** field is updated only when the last delta pull run was a success. An empty **Last Run Time** field indicates no previous delta pull run for the data source, but either a full pull run or no run at all. The delta pull period is calculated by subtracting the last run date and time from the current date and time that is Delta period = Current date timestamp - Last run date timestamp.

The application includes the *sn_sg_azure_integ.is_delta_sync_enabled* system property to enable delta synchronization. By default, the property is set to `true`. However, when you want to import full data from your Azure instance, you must disable the *sn_sg_azure_integ.is_delta_sync_enabled* property. See Disable delta synchronization.

> **Note:**
> When the full import of data is completed, set the *sn_sg_azure_integ.is_delta_sync_enabled* property back to `true` to pull delta data later. If you leave the property set to `false`, full data is imported with every pull, which takes considerable time. In addition, always importing full data contributes to discrepancies in the pulled-in data, as the full import doesn't include any updated or deleted configuration items (CIs).

For a delta pull, you can also configure the grace time, page size, preceding time period, and API call duration using system properties. For more information, see Service Graph Connector for Microsoft Azure properties.

Disable delta synchronization

Disable delta synchronization to import all the Microsoft Azure data.

Before you begin

Set the application scope to Service Graph Connector for Microsoft Azure using the application picker. For more information, see Application picker.

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Role required: admin

Procedure

1. Enter `sys_properties.list` in the navigation filter, and then open the *`sn_sg_azure_integ.is_delta_sync_enabled`* property.
2. In the **Value** field, enter `false`.
3. Select **Update**.

Enabling VM insights for collecting Azure data

You must enable the VM insights feature in the Azure portal for collecting TCP and processes data using the Service Graph Connector for Microsoft Azure.

Requirements for enabling the VM insights feature

- Ensure that you've created the Log Analytics workspace to push the logs from virtual machines (VMs) via insights in Azure Monitor. See Insights in Azure Monitor on the Microsoft Azure documentation site.
- Note down the subscription name associated with your Log Analytics workspace.

Collecting the TCP and processes data

The SG-Azure TCP and SG-Azure VM Config Data data sources in the Service Graph Connector for Microsoft Azure import data from the VMConnection and VMProcess tables in Azure, respectively. To fetch data correctly from the VMConnection and VMProcess tables in Azure, you must enable the VM insights feature for all the VMs in your Log Analytics workspace. To learn how to populate these tables via insights, see Enable VM insights in the Azure portal on the Microsoft Azure documentation site.

There are several methods available for enabling VM insights. For more information, see Enable VM insights overview on the Microsoft Azure documentation site.

Note:
In the data collection rule, ensure that you've selected the **Enable guest performance** and **Enable processes and dependencies (Maps)** check boxes on the rule form.

Service Graph Connector for Microsoft Azure reference

Reference topics provide additional information about Service Graph Connector for Microsoft Azure components.

Supported Microsoft Azure resource types

Several Microsoft Azure resource types are imported as CMDB data.

Microsoft Azure resource types refer to the names included in delta queries used for filtering data using the Azure Resource Graph API for a specific data source.

Note:
Delta pulls include data from a specific time period that is defined by the condition within a delta query.

The following table lists the Service Graph Connector for Microsoft Azure data sources, Microsoft Azure resource types they import, and indicates whether they support both full pull and delta pull of data during import. ✓ indicates supported and # indicates not supported.

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Resource types supported in Service Graph Connector for Microsoft Azure

Data source	CMDB CI classes	Microsoft Azure resource type	Full pull	Delta pull
SG-Azure Subscriptions	Cloud Service Account [cmdb_ci_cloud_service_account]	Microsoft.Resources/ subscriptions	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Datacenter Updation	Azure Datacenter [cmdb_ci_azure_datacenter]	None	#	#
SG-Azure Resource Group	Resource Group [cmdb_ci_resource_group]	Microsoft.Resources/ subscriptions/ resourcegroups	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Availability Zone	Availability Zone [cmdb_ci_availability_zone]	Microsoft.Compute/ availabilitySets	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Storage Volume	Storage Volume [cmdb_ci_storage_volume]	Microsoft.Compute/disks	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Load Balancers	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Microsoft.Network/ loadBalancers	#	#
	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]	Microsoft.Network/ loadBalancers	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Network	Cloud Network [cmdb_ci_network]	Microsoft.Network/ virtualnetworks	#	#
	Cloud Service Account [cmdb_ci_cloud_service_account]	Microsoft.Network/ virtualnetworks	#	#
	Cloud Subnet [cmdb_ci_cloud_subnet]	Microsoft.Network/ virtualnetworks	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Network Interface	Cloud Mgmt Network Interface [cmdb_ci_nic]	Microsoft.Network/ networkInterfaces	#	#
	IP Address [cmdb_ci_ip_address]	Microsoft.Network/ networkInterfaces	#	#
	Hardware [cmdb_ci_hardware]	Microsoft.Network/ networkInterfaces	#	#
	Virtual Machine Instance [cmdb_ci_vm_instance]	Microsoft.Network/ networkInterfaces	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Public IP Address	Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Microsoft.Network/ publicIPAddresses	#	#

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Resource types supported in Service Graph Connector for Microsoft Azure (continued)

Data source	CMDB CI classes	Microsoft Azure resource type	Full pull	Delta pull
	Cloud Mgmt Network Interface [cmdb_ci_nic]	Microsoft.Network/ publicIPAddresses	#	#
	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Microsoft.Network/ publicIPAddresses	#	#
	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]	Microsoft.Network/ publicIPAddresses	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Security Group	Compute Security Group [cmdb_ci_compute_security_group]	Microsoft.Network/ networkSecurityGroups	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Storage Accounts	Cloud Storage Account [cmdb_ci_cloud_storage_account]	Microsoft.Storage/ storageAccounts	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Virtual Machines	Virtual Machine Instance [cmdb_ci_vm_instance]	Microsoft.Compute/ virtualMachines	#	#
	Image [cmdb_ci_os_template]	Microsoft.Compute/ virtualMachines	#	#
	Linux Server [cmdb_ci_linux_server]	Microsoft.Compute/ virtualMachines	#	#
	Server [cmdb_ci_server]	Microsoft.Compute/ virtualMachines	#	#
	Windows Server [cmdb_ci_win_server]	Microsoft.Compute/ virtualMachines	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Software	When the Software Asset Management (SAM) application isn't installed: Software [cmdb_ci_spkg] Software Installation [cmdb_sam_sw_install]	None	#	#
	When the SAM application is installed: Software Instance [cmdb_software_instance]	None	#	#
SG-Azure SQL	Cloud DataBase [cmdb_ci_cloud_database]	Microsoft.Sql/servers Microsoft.DBforPostgreSQL/ servers	#	#
	Key Value [cmdb_key_value]	Tags	#	#

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Resource types supported in Service Graph Connector for Microsoft Azure (continued)

Data source	CMDB CI classes	Microsoft Azure resource type	Full pull	Delta pull
SG-Azure TCP	TCP Connection [cmdb_tcp]	None	#	#
	Running Process [cmdb_running_process]	None	#	#
SG-Azure Functions	Cloud Function [cmdb_ci_cloud_function]	Microsoft.Web/sites	#	#
SG-Azure Generic Resources	Cloud Resource [cmdb_ci_cmp_resource]	Microsoft.ResourceGraph/ resources - Generic	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Scale Sets	Instance Scale Set [cmdb_ci_instance_scale_set]	Microsoft.Compute/ virtualmachinescalesets	#	#
SG-Azure Scale Sets VMs **Note:** Imports uniform orchestration scale sets VMs.	Virtual Machine Instance [cmdb_ci_vm_instance]	None	#	#
	Storage Volume [cmdb_ci_storage_volume]	None	#	#
	Image [cmdb_ci_os_template]	None	#	#
	Cloud Mgmt Network Interface [cmdb_ci_nic]	None	#	#
	Hardware Type [cmdb_ci_compute_template]	None	#	#
	Azure Datacenter [cmdb_ci_azure_datacenter]	None	#	#
	Linux Server [cmdb_ci_linux_server]	None	#	#
	Server [cmdb_ci_server]	None	#	#
	Windows Server [cmdb_ci_win_server]	None	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Software Remove	When the SAM application isn't installed: Software [cmdb_ci_spkg] Software Installation [cmdb_sam_sw_install]	None	#	#
	When the SAM application is installed: Software Instance [cmdb_software_instance]	None	#	#
SG-Azure Hardware	Hardware Type [cmdb_ci_compute_template]	None	#	#

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Resource types supported in Service Graph Connector for Microsoft Azure (continued)

Data source	CMDB CI classes	Microsoft Azure resource type	Full pull	Delta pull
Template Updation				
SG-Azure HW Consolidation	Virtual Machine Instance [cmdb_ci_vm_instance]	None	#	#
	Computer [cmdb_ci_computer]	None	#	#
SG-Azure Run Command	None	None	#	#
SG-Azure Get Run Command	Application [cmdb_ci_appl]	None	#	#
	TCP Connection [cmdb_tcp]	None	#	#
	Running Process [cmdb_running_process]	None	#	#
SG-Azure Kubernetes Cluster	SG-Azure Kubernetes Cluster [sn_sg_azure_integ_kubernetes_cluster]	microsoft.containerservice/managedclusters	#	#

Life cycle management of records in Service Graph Connector for Microsoft Azure

Life cycle management in the Service Graph Connector for Microsoft Azure monitors and updates the statuses of Azure resources throughout their entire life cycle, from creation to deletion.

The life cycle management process helps maintain the accuracy and integrity of data in the Configuration Management Database (CMDB).

Life cycle management for CIs in Service Graph Connector for Microsoft Azure

The following table lists the configuration items (CIs) in CMDB and other non-CMDB tables for which life cycle management is available in Service Graph Connector for Microsoft Azure.

Supported tables for life cycle management

Data source	CMDB CI classes	Life cycle management available
SG-Azure Availability Zone	Availability Zone [cmdb_ci_availability_zone]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Datacenter Updation	Azure Datacenter [cmdb_ci_azure_datacenter]	Not applicable
SG-Azure Functions	Cloud Function [cmdb_ci_cloud_function]	Yes
SG-Azure Generic Resources	Cloud Resource [cmdb_ci_cmp_resource]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Get Run Command	Application [cmdb_ci_appl]	Not applicable
	TCP Connection [cmdb_tcp]	Not applicable

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
	Running Process [cmdb_running_process]	Not applicable
SG-Azure Hardware Template Updation	Hardware Type [cmdb_ci_compute_template]	Not applicable
SG-Azure HW Consolidation	Virtual Machine Instance [cmdb_ci_vm_instance]	Not applicable
	Computer [cmdb_ci_computer]	Not applicable
SG-Azure Kubernetes Cluster	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Yes
SG-Azure Load Balancers	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Network	Cloud Network [cmdb_ci_network]	Yes
	Cloud Subnet [cmdb_ci_cloud_subnet]	Yes
	Cloud Service Account [cmdb_ci_cloud_service_account]	No
	Key Value [cmdb_key_value]	No
SG-Azure Network Interface	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
	IP Address [cmdb_ci_ip_address]	No
	Hardware [cmdb_ci_hardware]	Not applicable
	Virtual Machine Instance [cmdb_ci_vm_instance]	Not applicable
	Key Value [cmdb_key_value]	No
SG-Azure Public IP Address	Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Yes
	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Resource Group	Resource Group [cmdb_ci_resource_group]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Scale Sets	Instance Scale Set [cmdb_ci_instance_scale_set]	Yes

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-Azure Scale Sets VMs	Virtual Machine Instance [cmdb_ci_vm_instance]	Yes
	Storage Volume [cmdb_ci_storage_volume]	Yes
	Image [cmdb_ci_os_template]	Not applicable
	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
	Hardware Type [cmdb_ci_compute_template]	Not applicable
	Linux Server [cmdb_ci_linux_server]	Yes
	Server [cmdb_ci_server]	Yes
	Windows Server [cmdb_ci_win_server]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Security Group	Compute Security Group [cmdb_ci_compute_security_group]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Software	When the Software Asset Management (SAM) application isn't installed: Software [cmdb_ci_spkg] Software Instance [cmdb_software_instance] When the SAM application is installed: Software Installation [cmdb_sam_sw_install]	Yes
SG-Azure Software Remove	When the SAM application isn't installed: Software [cmdb_ci_spkg] Software Instance [cmdb_software_instance] When the SAM application is installed: Software Installation [cmdb_sam_sw_install]	Yes
SG-Azure SQL	Cloud DataBase [cmdb_ci_cloud_database]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Storage Accounts	Cloud Storage Account [cmdb_ci_cloud_storage_account]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Storage Volume	Storage Volume [cmdb_ci_storage_volume]	Yes
	Key Value [cmdb_key_value]	No

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-Azure Subscriptions	Cloud Service Account [cmdb_ci_cloud_service_account]	No
	Key Value [cmdb_key_value]	No
SG-Azure TCP	TCP Connection [cmdb_tcp]	No
	Running Process [cmdb_running_process]	No
SG-Azure Virtual Machines	Linux Server [cmdb_ci_linux_server]	Yes
	Server [cmdb_ci_server]	Yes
	Windows Server [cmdb_ci_win_server]	Yes
	Image [cmdb_ci_os_template]	Yes
	Key Value [cmdb_key_value]	No
	Virtual Machine Instance [cmdb_ci_vm_instance]	Yes

Service Graph Connector for Microsoft Azure properties

Service Graph Connector for Microsoft Azure properties control the behavior of the connector.

System properties

These system properties are available for Service Graph Connector for Microsoft Azure.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for Service Graph Connector for Microsoft Azure

Property	Description
api_retry_max	Enter the maximum retry limit for a Microsoft Azure API call made from the data sources within the connector. • Type: integer • Default value: 3 • Location: System Property [sys_properties] table
api_retry_max_without_backoff	Enter the maximum retry limit for a Microsoft Azure API call made from the data sources within the connector, without using exponential backoff to increase the waiting time between consecutive retries.

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System properties for Service Graph Connector for Microsoft Azure (continued)

Property	Description
	• Type: integer • Default value: 3 • Location: System Property [sys_properties] table
azure_full_pull_partition_size	Set the partition size for Azure full data pull. This property determines the number of subscriptions that each partition processes. The value must be set to a numeric value greater than 0. • Type: integer • Default value: null • Location: System Property [sys_properties] table **Note:** If no value is specified, the property value is determined based on the number of active threads in the instance. See Set partition size for Azure accounts with parallel loading enabled.
delta_grace_time	Enter the additional time period in hours added to the current delta pull period when fetching incremental changes. • Type: integer • Default value: 0 • Location: System Property [sys_properties] table
delta_page_size	Enter the page size that is the maximum number of records fetched per page in a delta pull for the data sources within the connector. • Type: integer • Default value: 500 • Location: System Property [sys_properties] table
is_delta_sync_enabled	Set the property to `false` to deactivate delta synchronization. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table See Configuring data synchronization in Service Graph Connector for Microsoft Azure.

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System properties for Service Graph Connector for Microsoft Azure (continued)

Property	Description
LDC_status	Set the property to `true` to enable populating the passive status of an Azure datacenter (also known as a logical datacenter) in the Comments attribute of the Azure Datacenter [cmdb_ci_azure_datacenter] CI class when the `regionType` attribute is `Logical` or the service account for the datacenter is deactivated . • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
load_balancer_page_limit	Enter the maximum number of records per page to be fetched in a delta pull for the SG-Azure Load Balancers data source. • Type: integer • Default value: `500` • Location: System Property [sys_properties] table
maximum_delta_total_period	Enter the maximum time period in days preceding the current run time during delta pull. • Type: integer • Default value: `7` • Location: System Property [sys_properties] table
maximum_delta_window_period	Enter the maximum time duration in hours for each API call to repeat within the total delta period during delta pull. • Type: integer • Default value: `24` • Location: System Property [sys_properties] table
network_interface_page_limit	Enter the maximum number of records per page to be fetched in a delta pull for the SG-Azure Network Interface data source. • Type: integer • Default value: `500` • Location: System Property [sys_properties] table
pull_disabled_subscriptions	Set the property to `false` to deactivate the import of resources associated with deactivated Azure subscriptions.

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System properties for Service Graph Connector for Microsoft Azure (continued)

Property	Description
	• Type: true | false • Default value: `true` • Location: System Property [sys_properties] table
security_group_page_limit	Enter the maximum number of records per page to be fetched in a delta pull for the SG-Azure Security Group data source. • Type: integer • Default value: `500` • Location: System Property [sys_properties] table
sn_sg_azure_integ.insert_short_lived_vms	Set the property to `false` to deactivate the creation of a virtual machine (VM) in the CMDB if the VM was created and terminated during the delta load period. • Type: true | false • Default value: `true` • Location: System Property [sys_properties] table
software_page_limit	Enter the maximum number of records fetched per page when importing software data through the SG-Azure Software data source. • Type: integer • Default value: `5000` • Location: System Property [sys_properties] table
tcp_and_process_page_limit	Enter the maximum number of records fetched per page when importing TCP and running process data through the SG-Azure TCP data source. • Type: integer • Default value: `1000` • Location: System Property [sys_properties] table
tcp_time_period	Enter the time period in hours during which TCP and running process data is imported through the SG-Azure TCP data source. • Type: integer • Default value: `1` • Location: System Property [sys_properties] table

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System properties for Service Graph Connector for Microsoft Azure (continued)

Property	Description
vm_power_state_page_limit	Enter the maximum number of records fetched per page when importing the power state of VMs through the SG-Azure VM Config Data data source. • Type: integer • Default value: 1000 • Location: System Property [sys_properties] table
network_page_limit	Custom property for the SG-Azure Network data source. Create this system property if you need to decrease the number of records that are fetched in a delta pull. For more information, see Add a system property. Specify the maximum number of records per page to be fetched in a delta pull for the SG-Azure Network data source. • Type: integer • Default value: 500 • Location: System Property [sys_properties] table

Service Graph Connector for Microsoft Defender Endpoint

Use the Service Graph Connector for Microsoft Defender Endpoint to pull data from machines protected by the Microsoft Defender for Endpoint security solution into your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

- Supported Microsoft Defender for Endpoint versions:
  - Microsoft Defender for Endpoint Plan 1
  - Microsoft Defender for Endpoint Plan 2
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama

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Use cases

The ServiceNow Security Operations applications have features that interact with the Service Graph Connector to gain insights into machines utilizing the Microsoft Defender for Endpoint security solution.

Important Information for upgrading Service Graph Connector for Microsoft Defender Endpoint

After you upgrade to Service Graph Connector for Microsoft Defender Endpoint 1.2.0, migrate data from the Server [cmdb_ci_server] CI class to the Computer [cmdb_ci_computer] CI class. For more information, see the Service Graph Connector for Microsoft Defender Endpoint - Data migration after upgrade to version 1.2.0 [KB2096769] article in the Now Support Knowledge Base.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Microsoft Defender Endpoint using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft Defender for Endpoint integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Microsoft Defender for Endpoint data source is mapped and transformed into the ServiceNow CMDB configuration item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to pull data periodically from the machines utilizing the Microsoft Defender for Endpoint security solution.

The following data source is included for the Microsoft Defender for Endpoint security solution:

SG-Defender Machines

Imports all the machine-related data from the machines utilizing the Microsoft Defender for Endpoint security solution, loads the imported data in the SG-Defender Machines [sn_defender_integ_sg_defender_machines] staging table, and then populates the following target tables:

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- IP Address [cmdb_ci_ip_address]
- Software Installation [cmdb_sam_sw_install] (If the Software Asset Management (SAM) application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)
- SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_related]
- Network Adapter [cmdb_ci_network_adapter]
- Computer [cmdb_ci_computer]
- Windows Server [cmdb_ci_win_server]

Note:
Only operating system details are populated in the Software Installation [cmdb_sam_sw_install], Software Instance [cmdb_software_instance], and Software [cmdb_ci_spkg] tables.

For more information on where data is saved when pulling data from the Microsoft Defender for Endpoint security solution, see CMDB classes targeted in Service Graph Connector for Microsoft Defender Endpoint.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Microsoft Defender Endpoint using SGC Central

Set up scheduled import jobs to pull in Microsoft Defender for Endpoint data into your Configuration Management Database (CMDB).

Before you begin

Complete the following tasks:

- Install Service Graph Connector for Microsoft Defender Endpoint version 1.1.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- Verify that you have an active subscription to Microsoft Defender for Endpoint.
- Verify that you have created an Azure application to get programmatic access to Microsoft Defender for Endpoint. See Create an app to access Microsoft Defender for Endpoint without a user in the Microsoft 365 documentation.
- Obtain the tenant ID, client ID, and client secret details for the Microsoft Defender for Endpoint administrator account.
- Enable the Machine.Read.All and Machine.ReadWrite.All permissions in Microsoft Defender for Endpoint. See Permissions for the `List machines` API in the Microsoft 365 documentation.

Role required: cmdb_inst_admin or admin

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About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Microsoft Defender connector type, and then select **Configure connection**.
   A default connection, SG Defender OAuth2.0 connection, for Microsoft Defender for Endpoint is available within the application. As the Service Graph Connector for Microsoft Defender Endpoint supports only a single instance, you can configure the default connection for the first time or resume editing it thereafter.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing Microsoft Defender for Endpoint data.

   a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

   b. On the form, fill in the fields.

Configure and test connection form

Field	Description
Connection Name	Name to identify the Microsoft Defender for Endpoint connection record. **Note:** This field is automatically set to `SG Defender OAuth2.0 connection`. Leave the field value as is.
OAuth Client ID	Application (client) ID of your Microsoft Defender for Endpoint as described in the Before you begin section.
OAuth Client Secret	Client Secret of your Microsoft Defender for Endpoint as described in the Before you begin section.

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Field	Description
OAuth token URL	Token URL of your Microsoft Defender for Endpoint. Enter the token URL in the following format: `https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token` Where *<tenantid>* is the tenant ID of your Microsoft Defender for Endpoint as described in the Before you begin section.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
Mid Selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

7. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-Defender Machines** import schedule.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

8. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

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Related topics

Service Graph Connector for Microsoft Defender Endpoint

CMDB classes targeted in Service Graph Connector for Microsoft Defender Endpoint

Accessing the connection details of Service Graph Connector for Microsoft Defender Endpoint

Configure Service Graph Connector for Microsoft Defender Endpoint using the guided setup

Pull in data from machines utilizing the Microsoft Defender for Endpoint security solution into your Configuration Management Database (CMDB).

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. For Event Management to work, the Observability Commons for CMDB (sn_observability) app must be installed prior to installing the connector. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Complete the following tasks:

- Install the Service Graph Connector for Microsoft Defender Endpoint application (sn_defender_integ). For more information, see Install a ServiceNow Store application.
- Ensure that you have an active subscription to Microsoft Defender for Endpoint.
- Ensure that you have created an Azure application to get programmatic access to Microsoft Defender for Endpoint. See Create an app to access Microsoft Defender for Endpoint without a user in the Microsoft 365 documentation.
- Obtain the tenant ID, client ID, and client secret details for the Microsoft Defender for Endpoint administrator account.
- Enable the Machine.Read.All and Machine.ReadWrite.All permissions in Microsoft Defender for Endpoint. See Permissions for the `List machines` API in the Microsoft 365 documentation.

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Role required: admin

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Microsoft Defender Endpoint application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Microsoft Defender** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the authentication credentials details for sending requests to the *List machines* API in Microsoft Defender for Endpoint.

   a. Configure your Microsoft Defender for Endpoint authentication credentials.

      i. In the Configure the connection section of the Service Graph Connector for Microsoft Defender page, select **Get Started**.

      ii. For the Configure the credentials task, select **Configure**.

      iii. On the form, review and modify the fields.

Application Registries form

Field	Description
Connection Name	Name to identify the connection record. **Note:** This field is automatically set to the `SG Defender OAuth` connection record. Leave the field value as is.
Client ID	Application (client) ID of your Microsoft Defender for Endpoint as described in the Before you begin section.
Client Secret	Client Secret of your Microsoft Defender for Endpoint as described in the Before you begin section.
OAuth Token URL	Token URL of your Microsoft Defender for Endpoint. Enter the token URL in the following format: `https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token` Where *<tenantid>* is the tenant ID of your Microsoft Defender for Endpoint as described in the Before you begin section.

      iv. Select **Update** to return to the guided setup page.

      v. Set the Configure the credentials task to complete by selecting **Mark as Complete**.

   b. Test the *List machines* API connection to import machine-related data from Microsoft Defender for Endpoint.

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i. For the Test the connection task, select **Configure**.

ii. On the Service Graph Connections page, select **Test Connection**.

iii. When the **Status** field is set to **Success**, select **Update** to close the Test the connection dialog box and return to the guided setup page.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

5. Configure the scheduled jobs to import machine-related data from Microsoft Defender for Endpoint.

a. In the Set up scheduled import jobs section of the Service Graph Connector for Microsoft Defender page, select **Get Started**.

b. For the Configure scheduled jobs task, select **Configure**.

c. From the **Name** column, select the scheduled job that you want to activate.
By default, the SG-Defender Machines scheduled job is available to run the SG-Defender Machines data source.

d. On the Scheduled Data Import form, verify the field values for the scheduled job.
For more information, see Schedule a data import.

e. Select **Update**.

f. Select the back button of your browser to return to the guided setup page.

g. Set the Configure the scheduled jobs task to complete by selecting **Mark as Complete** in the guided setup.

Related topics

Accessing the connection details of Service Graph Connector for Microsoft Defender Endpoint

CMDB classes targeted in Service Graph Connector for Microsoft Defender Endpoint

When you complete setting up the connection, you can configure the integration to pull data periodically from machines utilizing the Microsoft Defender for Endpoint security solution. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
Discovery source	discovery_source
Install Status	install_status
Name	name

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Attribute label	Attribute name
Operating System	os
OS Version	os_version

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Reference	SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_re
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
Install Status	install_status
IP Address	ip_address
IP version	ip_version
Name	name
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_related]

The following attributes in the SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_related] table are populated by collected data:

Attribute label	Attribute name
Agent Version	agent_version
Device Id	device_id

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Attribute label	Attribute name
Exposure Level	exposure_level
First Seen	first_seen_date
Health Status	health_status
IsAadJoined	isaadjoined
Last Reported	last_reported
Managed by	managed_by
Onboarding Status	onboarding_status

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Discovery source	discovery_source
Install Status	install_status
MAC Address	mac_address
Name	name

Relationships created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

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Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Discovery source	discovery_source
Display name	display_name
Version	version

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Installed on	installed_on
Name	name

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

Windows Server [cmdb_ci_win_server]

The following attributes in the Windows Server [cmdb_ci_win_server] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Class	sys_class_name
Discovery source	discovery_source
Install Status	install_status
Name	name
Operating System	os
OS Version	os_version

Relationships created for Windows Server

Parent class	Relationship type	Child class
Windows Server [cmdb_ci_win_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]

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Relationships created for Windows Server (continued)

Parent class	Relationship type	Child class
Windows Server [cmdb_ci_win_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Windows Server [cmdb_ci_win_server]	Reference	SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_re
Windows Server [cmdb_ci_win_server]	Reference	Software Installation [cmdb_sam_sw_install]

Service Graph Connector for Microsoft Defender Endpoint properties

Service Graph Connector for Microsoft Defender Endpoint properties control the behavior of the connector.

System properties

These system properties are available for Service Graph Connector for Microsoft Defender Endpoint.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for Service Graph Connector for Microsoft Defender Endpoint

Property	Description
sn_defender_integ.pagination_record_count	Enter the maximum number of rows fetched in the *`List machines`* API response from the machine resource type. • Type: integer • Default value: 500 • Location: System Property [sys_properties] table

Accessing the connection details of Service Graph Connector for Microsoft Defender Endpoint

You can access the connection details of the Service Graph Connector for Microsoft Defender Endpoint in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Microsoft Defender Endpoint. The connection details include the connection alias, data sources, and scheduled data imports associated with a connection. You can also test the connection.

Access the details of a Microsoft Defender for Endpoint connection

Access the details of a Microsoft Defender for Endpoint connection configured for the Service Graph Connector for Microsoft Defender Endpoint.

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Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Service Graph Connectors** > **Microsoft Defender** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics
Accessing the connection details of Service Graph Connectors

Life cycle management of records in Service Graph Connector for Microsoft Defender Endpoint

Life cycle management in the Service Graph Connector for Microsoft Defender Endpoint monitors and updates the statuses of Microsoft Defender for Endpoint resources throughout their entire life cycle, from creation to deletion.

The life cycle management process helps maintain the accuracy and integrity of data in the Configuration Management Database (CMDB).

Life cycle management for CIs in Service Graph Connector for Microsoft Defender Endpoint

The following table lists the configuration items (CIs) in CMDB and other non-CMDB tables for which life cycle management is available in the Service Graph Connector for Microsoft Defender Endpoint. The Install Status [install_status] attribute of the CIs is updated to installed or retired according to the state of the CI.

Supported tables for life cycle management

Data source	CIs	Life cycle management available
SG-Defender Machines	Windows Server [cmdb_ci_win_server]	Yes
SG-Defender Machines	IP Address [cmdb_ci_ip_address]	Yes
SG-Defender Machines	Network Adapter [cmdb_ci_network_adapter]	Yes
SG-Defender Machines	Computer [cmdb_ci_computer]	Yes

Service Graph Connector for Microsoft Intune

Use the Service Graph Connector for Microsoft Intune to pull data from the Microsoft Intune application into your ServiceNow instance.

The Service Graph Connector for Microsoft Intune pulls data from mobile devices, computers and software applications into the ServiceNow® Configuration Management Database (CMDB)

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application. The integration provides greater visibility into mobile devices, computers and related software applications that run on them.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

Versions

Microsoft Intune	ServiceNow
• Microsoft Intune Graph API v1.0 • Microsoft Intune Graph API Beta	• Washington DC • Xanadu • Yokohama

Use cases

The following are examples on how you can use the Service Graph Connector for different ServiceNow® applications:

- IT Operations Management (ITOM) Visibility
  - Detailed hardware and application inventory for Android, Apple, and Windows mobile devices. The inventory can be used with or without Software Asset Management (SAM).
  - Compliance tracking for mobile devices. You can build your own device (BYOD) or use corporate-owned devices.
- IT Service Management (ITSM)
  - Incidents, problems, and changes on discovered configuration items (CI).
  - Ownership tracking and assignment for mobile devices.

You can also do the following types of administrative actions:

- Device Management: You can report on various aspects of the device.
- Integration with Azure Monitor: Delta notification.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Microsoft Intune using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

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CMDB integration dashboards

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft Intune integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from data sources in the Microsoft Intune application is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following table describes the data sources, the staging tables, and the target tables as CMDB CI classes, and the resource types imported for a Microsoft Intune application.

Data mapping for Microsoft Intune

Data source	Staging table	CMDB CI classes	Resource types
SG-Intune Computer	SG-Intune Computer [sn_intune_integrat_computer]	Computer SG-Intune Computer Related IP Address Serial Number When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Computers
SG-Intune Devices	SG-Intune Devices [sn_intune_integrat_devices]	Handheld Computing Device Serial Number Network Adapter SG-Intune Device Related IP Address When the Software Asset Management (SAM) application isn't installed: Software	Mobile devices

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Data mapping for Microsoft Intune (continued)

Data source	Staging table	CMDB CI classes	Resource types
		Software Instance When the SAM application is installed: Software Installation	
SG-Intune Software	SG-Intune Software [sn_intune_integrat_software]	Software	Discovered apps
SG-Intune Device Reports	SG-Intune Device Reports [sn_intune_integrat_device_reports]	Computer or Handheld Computing Device Serial Number Network adapter SG-Intune Computer Related SG-Intune Device Related IP Address **Note:** Imports Wireless (Wi-Fi) IPv4 Address of a device only. When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Computers and mobile devices
SG-Intune Software Reports	SG-Intune Software Reports [sn_intune_integrat_software_reports]	When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Discovered apps

When you complete setting up the connection, you can configure the integration to periodically pull data from the Microsoft Intune application.

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Note:

- Configure the SG-Intune Device Reports data source only when resolving server errors and improving slow performance with the SG-Intune Computer and SG-Intune Devices data sources.
- Configure the SG-Intune Software Reports data source only when resolving server errors and improving slow performance with the SG-Intune Software data source.
- For any discovered software applications that were deleted later in the Microsoft Intune application, the Service Graph Connector automatically deletes the corresponding records in CMDB.
- To view more details about a handheld computing device or computer in the Computer [cmdb_ci_computer] class, enable the related lists SG-Intune Device Related and SG-Intune Computer Related.

  You can add these related lists by configuring the Related Lists view on the form that opens when you select a handheld computing device or computer configuration item (CI) in the Computer [cmdb_ci_computer] class. Computer CIs are displayed in the Computers list, accessed by navigating to **All** > **Configuration** > **Base Items** > **Computers**. For more information about adding related lists to a form, see Configuring the form layout.

For more information on where data is saved when pulling data from a Microsoft Intune application, see CMDB classes targeted in Service Graph Connector for Microsoft Intune.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional resources

Service Graph Connector for Microsoft Intune - Troubleshooting connection issues on ServiceNow Community

Related topics

Service Graph Connectors

Configure Service Graph Connector for Microsoft Intune using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Microsoft Intune for pulling in Microsoft Intune data into the CMDB.

Before you begin

Install Service Graph Connector for Microsoft Intune version 2.5.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Obtain the following information from your Microsoft Intune administrator:

- Client ID
- Client Secret
- Token URL

For the connector to access the data in Microsoft Intune, the credential information is required to use the Microsoft Graph API. Therefore, you must grant the following Graph API permissions from the App registrations page in the Microsoft portal:

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- DeviceManagementManagedDevices.Read.All (Type: Application)
- DeviceManagementApps.Read.All (Type: Application)
- User.Read.All (Type: Application)

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

For more details on permissions, see Service Graph Connector for Microsoft Intune - Troubleshooting connection issues on ServiceNow Community and Microsoft Graph permissions reference on the Microsoft documentation site.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Microsoft Intune connector type and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing Microsoft Intune data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection Name	Name to identify the Microsoft Intune connection record. For example, `SG-Intune connection`.
Connection URL	Base URL to connect to your Microsoft Intune application. Based on the region of your Microsoft Intune application, enter the connection URL in one of the following formats:

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Field	Description

	▪ Global
	`https://graph.microsoft.com`
	▪ US Government
	`https://graph.microsoft.us`
	▪ China
	`https://microsoftgraph.chinacloudapi.cn`
	▪ Germany
	`https://graph.cloudapi.de/`

OAuth Client ID	Client ID of the Microsoft Intune application as noted in the Before you begin section.
OAuth Client Secret	Client secret of the Microsoft Intune application as noted in the Before you begin section.

OAuth Token URL	Callback URL for the Microsoft Intune application.
	Based on the region of your Microsoft Intune application, enter the token URL in one of the following formats:
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Microsoft Intune application.

Use MID server	Option to use the MID Server for connecting to the Microsoft Intune instance.

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Field	Description
	Note: A MID Server is required only if a direct connection between the ServiceNow and Microsoft Intune instances isn't possible.
Mid Selection	MID Server for the connection. This field appears only when you select the **Use MID Server** check box.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

7. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Expand the Parent scheduled data import within the Import schedules list to select the *`Connection Name`*-**SG-Intune Devices** import schedule.

   c. Select the **Active** check box, and then fill in the run schedule and time details.

      For more information, see Schedule a data import.

   d. Select **Save**.
   Alternatively, select **Execute Now** to execute the import schedule immediately.

   e. Select **Continue**.

8. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Microsoft Intune

CMDB classes targeted in Service Graph Connector for Microsoft Intune

Accessing the connection details of Service Graph Connector for Microsoft Intune

Configure Service Graph Connector for Microsoft Intune using the guided setup

Set up authentication credentials and a scheduled job to import Microsoft Intune data into your CMDB.

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Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Obtain the following information from your Microsoft Intune administrator:

- Client ID
- Client Secret
- Token URL

For the connector to access the data in Microsoft Intune, the credential information is required to use the Microsoft Graph API. Therefore, you must grant the following Graph API permissions from the App registrations page in the Microsoft portal:

- DeviceManagementManagedDevices.Read.All (Type: Application)
- DeviceManagementApps.Read.All (Type: Application)
- User.Read.All (Type: Application)

For more details on permissions, see Service Graph Connector for Microsoft Intune - Troubleshooting connection issues on ServiceNow Community and Microsoft Graph permissions reference on the Microsoft documentation site.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- ServiceNow IntegrationHub Professional Pack Installer (com.glide.hub.integrations.professional). You must activate this plugin before you use the SG-Intune Device Reports and SG-Intune Software Reports data sources.
- Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.

Starting with Service Graph Connector for Microsoft Intune 2.1.1 release, the multi-instance support is available to import data from multiple Microsoft Intune instances. This feature involves dynamically creating data sources and scheduled imports; thus, requires the granting of additional permissions. The guided setup includes additional steps for this feature.

Role required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Intune** > **Setup**.
2. On the Getting Started page, select **Get started**.
3. Configure the credentials.

   a. On the Service Graph Connector for Microsoft Intune page, in the Configure the connection section, select the task **Configure credentials**.

   b. On the next page, in the Configure credentials task section, select **Configure**.

   c. On the form, fill in the fields.

Edit Connection form

Field	Description
Connection Name	Name of the Microsoft Intune application. This field is automatically set.

Connection URL	Connection URL for the connection.
	
	Based on the region of your Microsoft Intune application, enter the connection URL in one of the following formats:
	▪ Global
	`https://graph.microsoft.com`
	▪ US Government
	`https://graph.microsoft.us`
	▪ China
	`https://microsoftgraph.chinacloudapi.cn`
	▪ Germany
	`https://graph.cloudapi.de/`

OAuth Client ID	The client ID of the Microsoft Intune application.
OAuth Client Secret	The client secret of the Microsoft Intune application.
OAuth Token URL	Callback URL for the Microsoft Intune application. Based on the region of your Microsoft Intune application, enter the token URL in one of the following formats:

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Field	Description

	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Microsoft Intune application.

d. Select **Edit and Get OAuth Token**.

e. Go back to the guided setup page and for the Configure credentials task, select **Mark as Complete**.

4. **Optional:** If needed, configure the MID Server.
   a. In the Configure MID Server section, select **Configure**.
   b. Select the **Use MID server** check box.
   c. Select **Update** to save the record.

   Note:
   You do not need to update the other fields.

5. Test the connection to the Microsoft Intune API.
   a. In the Test the connection section, select **Configure**.
   b. On the form, review the fields.

Data Source form

Field	Description
Name	Unique name for this data source.
Import set table label	Label of the table that will be created for this data source.

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Field	Description
Import set table name	Name of the table that will be created for this data source.
Data in single column	Option to set to data in single column.
Type	Data storage type of the data to be imported.
Application	Application containing this record.

c. **Optional:** Modify the properties in the Service Graph Connection Properties related list of the connection record.

> **Note:**
> Try to retain the default value of the *software_path* property to ensure the proper retrieval of software details.

d. Select the **Test Connection** related link to start the testing process.

e. When the **Status** field is set to **Success**, return to the guided setup page.
If any of the tests have errors, follow the suggestions for remediation.

f. In the Test the connection task section, select **Mark as Complete**.

6. Add multiple instances.

a. On the left sidebar, select the Add Multiple Instances icon ( ).

b. On the Service Graph Connector for Microsoft Intune page, in the Add Multiple Instances section, select the Update Data Source Access task.

c. Select the **Global** application scope by using the application picker.

d. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

e. Select **Update** to close the tab and return to the guided setup.

f. Modify the application scope again to **Service Graph Connector for Microsoft Intune** by using the application picker.

g. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

h. Repeat the steps 6.c to 6.f for the Update Scheduled data import access task with the Scheduled data import [scheduled_data_set] table and set the task to complete by selecting **Mark as Complete**.

7. Clear the cache for the new connection.

a. In the Clear Cache for Datasource and Import set section, select **Configure**.

b. In the **Run script** text box of the background script page, enter the following script:

```
     GlideTableManager.invalidateTable("sys_data_source");
     GlideCacheManager.flushTable("sys_data_source");


GlideTableManager.invalidateTable("scheduled_import_set");
     GlideCacheManager.flushTable("scheduled_import_set");
```

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```
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

c. Select **Run Script** to run the background script in the **global** scope.
The script may take several minutes to execute.

d. After the script is executed, select **Close**.

e. From the application picker, select the **Service Graph Connector for Microsoft Intune** application.

f. Select **Mark as Complete**.

8. To either add or save the connection, select **Configure** for the Create or Edit connection task.
   - To add a connection, select **Add Connection**.
   - To save the edits for the existing connection, select **Edit**.

Note:
Obtain the following information from your Microsoft Intune administrator:
- Client ID
- Client Secret
- Token URL

When a Microsoft Intune administrator registers an application, the Client ID, Client Secret, and Token URL will be available. To get more information about how to register an application, see the Microsoft Intune documentation site.

a. On the form, fill in the fields or edit as needed.

Create Connection form

Field	Description
Connection Name	Display name for the connection.

Connection URL	Connection URL for the new connection.
	
	Based on the region of your Microsoft Intune application, enter the connection URL in one of the following formats:
	▪ Global
	`https://graph.microsoft.com`
	▪ US Government
	`https://graph.microsoft.us`
	▪ China
	`https://microsoftgraph.chinacloudapi.cn`

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Field	Description
	▪ Germany `https://graph.cloudapi.de/`
OAuth Client ID	Client ID for the Microsoft Intune application.
OAuth Client Secret	Client Secret for the Microsoft Intune application.

OAuth Token URL	Callback URL for the Microsoft Intune application.
	Based on the region of your Microsoft Intune application, enter the token URL in one of the following formats:
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Microsoft Intune application.

b. Either add or save the connection.

- To create the new connection, select **Create and Get OAuth Tokens**.
- To save the edits for the existing connection, select **Edit and Get OAuth Token**.

c. Navigate back to the guided setup and select **Mark as Complete**.

d. Optional: Set up the MID Server for the connection you created.

i. In the Configure Mid Servers section, select **Configure**.

ii. Select the name of the connection you created.

iii. Select the **Use MID server** check box.

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iv. Select **Update**.

v. When you're finished with the task, select **Mark as Complete**

9. Test the API connection to import data from the Microsoft Intune application.

a. Test the connection, in the Test New Connections section, by selecting **Configure**.

i. Select the name of the data source associated with the newly created connection.

ii. Select the **Test Connection** related link to start the process.

iii. Optionally modify the properties in the Service Graph Connection Properties related list.

Microsoft Intune connection properties

Property	Description
api_version	The version of the Microsoft Intune Graph API.
software_path	The path of the software code for finding apps and associated devices or vice versa. Leave the property value as is.
include_primary_user_details	Enable retrieving the details of the primary user during import and populating the **assigned_to** attribute in the records of the cmdb_ci table by setting the property value to `true`. For retrieving the enrolled user details, set the property value to `false`. Retrieving primary user details increases the time for importing data because of additional API calls. **Note:** When a user is assigned to a device initially, the enrolled and primary users are the same. If the device is reassigned to another user, the primary user name is reassigned to the new user, but the enrolled user is still the original enrolled user name.
include_ip_address_details	Enable retrieving the IP addresses of devices during import and populate the records in the cmdb_ci_ip_address table by setting the property value to `true`. To skip retrieving IP addresses, set the property to `false`. Retrieving IP addresses increases the time for importing data because of additional API calls.

Note:
The properties in the Service Graph Connection Properties related list of the connection record are modifiable. However, try to retain the default value of the *`software_path`* property to ensure the proper retrieval of software details.

iv. When the **Status** field is set to **Success**, return to the guided setup page.

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Note:
If any of the tests have errors, follow the suggestions for remediation.

v. Return to the guided setup and select **Mark as Complete** for the Test New Connections task.

10. Set up the scheduled import jobs.

a. For the Configure scheduled jobs task in the Set up scheduled import jobs section, select **Configure**.

b. Select the name of the scheduled import you want to run.

c. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

d. Select **Update**.

e. Set the Configure scheduled jobs task to complete by selecting **Mark as Complete**.

11. Use advanced options to resolve server errors and improve performance with the SG-Intune Computer, SG-Intune Devices, and SG-Intune Software data sources while importing a large number of devices into the Microsoft Intune portal.

Note:

- The SG-Intune Device Reports data source serves as an alternative to the SG-Intune Computer and SG-Intune Devices data sources, importing the same information while optimizing the data retrieval process by minimizing API calls and reducing import time.
- The SG-Intune Software Reports data source serves as an alternative to the SG-Intune Software data source.
- Both the SG-Intune Device Reports and SG-Intune Software Reports data sources require the paid ServiceNow IntegrationHub Professional Pack Installer (com.glide.hub.integrations.professional) plugin.
- To enable the creation of attachments, the `glide.attachment.extensions` system property must be set to either null or `bin, zip, json`.

  For more information, see the Service Graph Connector For Microsoft Intune – Advanced [KB1641546] article in the Now Support Knowledge Base.

a. Configure the scheduled jobs to import data using the SG-Intune Device Reports and SG-Intune Software Reports data sources.

i. In the Advanced [Beta] section, for the Configure scheduled jobs for advanced data sources task, select **Configure**.

ii. In the Scheduled jobs list, select **SG-Intune Trigger Device Reports** job.

iii. On the Scheduled Script Execution form, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule script execution form.

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iv. Select **Update**.

v. To activate the scheduled job for the SG-Intune Software Reports data source, repeat steps 11.a.ii to 11.a.iv by selecting the **SG-Intune Trigger Software Reports** scheduled job.

vi. Return to the guided setup page and set the Configure scheduled jobs for advanced data sources task to complete by selecting **Mark as Complete**.

Important:

- Deactivate the SG-Intune Computer and SG-Intune Devices scheduled imports after setting up the SG-Intune Trigger Device Reports scheduled job for the SG-Intune Device Reports data source.
- Deactivate the SG-Intune Software scheduled import after setting up the SG-Intune Trigger Software Reports scheduled job.
- Activate the ServiceNow IntegrationHub Professional Pack Installer (com.glide.hub.integrations.professional) plugin on your instance.

For more information, see the Service Graph Connector For Microsoft Intune – Advanced [KB1641546] article in the Now Support Knowledge Base.

b. Configure the scheduled import for the SG-Intune Device Reports and SG-Intune Software Reports data sources.

i. In the Advanced [Beta] section, for the Configure the scheduled import for advanced data sources task, select **Configure**.

ii. In the Scheduled Data Imports list, select the **SG-Intune Device Reports** scheduled import.

iii. On the Scheduled Data Import form, verify the field values for the scheduled data import and select the **Active** check box.

For more information, see Schedule a data import.

iv. Select **Update**.

v. Return to the guided setup page and set the Configure the scheduled import for advanced data sources task to complete by selecting **Mark as Complete**.

Important:

Verify that the SG-Intune Device Reports scheduled import is configured to run 3 hours after the SG-Intune Trigger Device Reports and SG-Intune Trigger Software Reports scheduled jobs.

Example: If the SG-Intune Trigger Device Reports job is set for 9 a.m. and SG-Intune Trigger Software Reports for 10 a.m. daily, schedule the SG-Intune Device Reports scheduled import for 1 p.m. daily.

c. When using multiple instances, update the permissions on the Scheduled Script Execution [sys_autoscript] table so that you can add scheduled jobs for the new connections.

i. For the Update scheduled job access task, select **Configure**.

ii. Select the **Global** application scope from the application picker.

iii. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes.

iv. Select#**Update**.

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v. Switch back to the Service Graph Connector for Microsoft Intune application scope using the application picker.

vi. Return to the guided setup page and set the Update scheduled job access task to complete by selecting **Mark as Complete**.

d. When using multiple instances, clear the Scheduled Script Execution (sysauto_script) table cache to configure scheduled jobs for the new connections.

i. For the Clear cache for scheduled job task, select **Configure**.

ii. Select the **Global** application scope from the application picker.

iii. In the **Run script** field, enter the following code:

```
GlideTableManager.invalidateTable("sysauto_script");
GlideCacheManager.flushTable("sysauto_script");
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

iv. Select#**Run Script**.

v. Switch back to the Service Graph Connector for Microsoft Intune application scope using the application picker.

vi. Return to the guided setup page and set the Clear cache for scheduled job task to complete by selecting **Mark as Complete**.

e. When using multiple instances, create advanced data sources, scheduled jobs, and scheduled imports for the new connections.

Tip:
You can create additional connections for multiple instances by following the instructions in the Add Multiple Instances section of the guided setup.

i. For the Set up advanced data sources for multiple instances task, select **Configure**.

ii. On the form, fill in the fields to configure your scheduled job details for the new connection.

Field	Description
Instance Prefix to Data source and Scheduled data import sets	Identifier that is used in all of the data source and scheduled import names for this distinct SG-Intune connection. In a multiple instance deployment, keep prefix short, meaningful identifier that enables you to identify a set of related data sources. **Note:** Try to keep the prefix the same as your connection name.
Connection and Credentials Alias	Connection alias that was created in the previous step.
Run Scheduled Import as User	User to populate the field on the scheduled data import.

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iii. Select **Submit** to create scheduled imports for your new connection.

iv. To activate any newly created scheduled jobs, repeat steps 11.a.ii to 11.a.iv.

v. To activate any newly created parent scheduled import, repeat steps 11.b.ii to 11.b.iv.

vi. Return to the guided setup page and set the Set up advanced data sources for multiple instances task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for Microsoft Intune

When you complete setting up the connection, you can configure the integration to periodically pull data from Microsoft Intune. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Serial number	serial_number
Description	short_description
Disk space (GB)	disk_space
Manufacturer	manufacturer
Operating System	os
OS Version	os_version
Model ID	model_id
Assigned to	assigned_to
Chassis type	chassis_type

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Reference	SG-Intune Computer Related [sn_intune_integrat_computer_related]
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]

Handheld Computing Device [cmdb_ci_handheld_computing]

The following attributes in the Handheld Computing Device [cmdb_ci_handheld_computing] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Serial number	serial_number
Description	short_description
Disk space (GB)	disk_space
IMEI	imei
MEID	meid
Operating System	os
OS Version	os_version
Phone Number	phone_number
Root Access	root_access
Model ID	model_id
Carrier	carrier
Assigned to	assigned_to
Manufacturer	manufacturer

Relationships created for Handheld Computing Device

Parent class	Relationship type	Child class
Handheld Computing Device [cmdb_ci_handheld_computing]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Handheld Computing Device [cmdb_ci_handheld_computing]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Handheld Computing Device [cmdb_ci_handheld_computing]	Reference	SG-Intune Device Related [sn_intune_integrat_device_related]
Handheld Computing Device [cmdb_ci_handheld_computing]	Reference	Software Installation [cmdb_sam_sw_install]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data:

Attribute label	Attribute name
Display name	display_name
Version	version
Discovery source	discovery_source
Publisher	publisher
Installed on	installed_on

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Note:
The Publisher attribute is populated by the SG-Intune Software Reports data source only.

Relationships created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing] Computer [cmdb_ci_computer]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Configuration Item	cmdb_ci

Relationships created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP version	ip_version
Owned By Configuration Item	owned_by_cmdb_ci
IP Address	ip_address
Name	name

Relationships created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]

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Relationships created for IP Address (continued)

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Computer [cmdb_ci_computer]

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
Serial number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]

SG-Intune Computer Related [sn_intune_integrat_computer_related]

The following attributes in the SG-Intune Computer Related [sn_intune_integrat_computer_related] table are populated by collected data:

Attribute label	Attribute name
Device ID	device_id
Azure AD Registered	azure_ad_registered
Compliance State	compliance_state
Device Enrollment Type	device_enrollment_type
Email Address	email_address
Encrypted	is_encrypted
Managed Device Owner Type	managed_device_owner_type
Management Agent	management_agent
Supervised	is_supervised

SG-Intune Device Related [sn_intune_integrat_device_related]

The following attributes in the SG-Intune Device Related [sn_intune_integrat_device_related] table are populated by collected data:

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Attribute label	Attribute name
Device ID	device_id
Azure AD Registered	azure_ad_registered
Compliance State	compliance_state
Device Category	device_category
Device Enrollment Type	device_enrollment_type
Device State	device_state
Email Address	email_address
Encrypted	is_encrypted
Managed Device Owner Type	managed_device_owner_type
Management Agent	management_agent
Security Patch Level	security_patch_level
Supervised	is_supervised
System Management Bios Version	system_management_bios_version
Wifi Subnet ID	wifi_subnet_id

Note:
The attributes Device Category, Device State, Security Patch Level, System Management Bios Version, and Wifi Subnet ID are populated by the SG-Intune Device Reports data source only.

The attributes Azure AD Registered, Device Enrollment Type, and Management Agent aren't populated by the SG-Intune Device Reports data source.

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Installed on	installed_on

Relationships created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Accessing the connection details of Service Graph Connector for Microsoft Intune

You can access the connection details of the Service Graph Connector for Microsoft Intune in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Microsoft Intune. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Microsoft Intune connection

Access the details of a Microsoft Intune connection configured for the Service Graph Connector for Microsoft Intune.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Intune** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Service Graph Connector for Microsoft Intune properties

Service Graph Connector for Microsoft Intune properties control the behavior of the connector.

Connection properties

These connection properties are available for Service Graph Connector for Microsoft Intune.

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Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Intune** > **Connections** and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for Microsoft Intune

Property	Description
api_version	Enter the version of the Microsoft Intune Graph API. • Type: string • Default value: `v1.0`
device_report_chunks_count	Set the number of device report chunks. The value must be a power of 16 (for instance, 1, 16, 256, and so on). • Type: integer • Default value: `1`
export_apis_max_calls_before_wait	Set the maximum number of API calls that can be made consecutively before a waiting period is enforced. • Type: integer • Default value: `8`
export_apis_wait_time_in_ms	Set the duration (in milliseconds) for the waiting period after the specified number of consecutive API calls is reached. • Type: integer • Default value: `120000`
include_ip_address_details	Set the property to `true` to retrieve IP address details during import and add the records to the IP Address [cmdb_ci_ip_address] table. Set the property to `false` to skip retrieving IP addresses. Retrieving IP addresses increases the time for importing data because of additional API calls. • Type: true | false • Default value: `true`
include_primary_user_details	Set the property to `true` to retrieve primary user details during import and add the assigned_to attribute to the Configuration item [cmdb_ci] table. Set the property to `false` to retrieve the enrolled user details.

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Connection properties for Service Graph Connector for Microsoft Intune (continued)

Property	Description
	Retrieving primary user details increases the time for importing data because of additional API calls. **Note:** When a user is assigned to a device initially, the enrolled and primary users are the same. If the device is reassigned to another user, the primary user name is reassigned to the new user, but the enrolled user is still the original enrolled user name. • Type: true | false • Default value: `true`
software_path	Set the path of the software code for finding apps and associated devices. **Note:** Set the property to null value to enable the logic to determine the path of the software code. • Type: device | app • Default value: `device`
software_report_chunks_count	Set the number of software report chunks. The value must be a power of 16 (for instance, 1, 16, 256, and so on). • Type: integer • Default value: `16`

Service Graph Connector for Microsoft SCCM

Use the Service Graph Connector for Microsoft SCCM to pull data from Microsoft System Center Configuration Manager (SCCM) into your ServiceNow instance.

The Service Graph Connector for Microsoft SCCM (SG-SCCM) imports SCCM data into the ServiceNow® Configuration Management Database (CMDB) application. The integration does not write to the SCCM database and supports the Microsoft Endpoint Configuration Manager (MECM). The integration pulls data from computers, processors, operating systems, disks, networks, and software.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Supported versions

- Supported Microsoft SCCM/MECM versions:
  - 2409
  - 2403
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama

Use cases

The following ServiceNow applications have features that interact with the Service Graph Connector:

- IT Operations Management (ITOM) Visibility
  - Ability to get visibility into your infrastructure.
  - Detailed hardware and software inventory tracking. The tracking can be done with or without Software Asset Management (SAM).
  - Ability to detect delta changes for efficient incremental imports from SCCM to the ServiceNow AI Platform.
- IT Service Management (ITSM)
  - Incidents, problems, and changes on discovered configuration items (CI).
  - Automatic device ownership assignment.
- Software Asset Management (SAM) and IT Asset Management (ITAM)
  - Tight integration with Software Asset Management Professional and client software distribution workflows.
  - Inventory Software package and installation tracking.
  - Software Usage tracking.
  - License reclamation by detecting removed software.
  - Support for software editions, normalizing publisher information, and normalizing product Information.
  - Support for SCCM Asset Intelligence.

Important information for upgrading Service Graph Connector for Microsoft SCCM

After you've installed the latest version of the Service Graph Connector for Microsoft SCCM, ensure that you have removed the **last_run_datetime** field value from the Data Source [sys_data_source] table for the SCCM data sources.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Microsoft SCCM using SGC Central.

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Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft SCCM integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the SCCM data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow® CMDB using the Identification and Reconciliation Engine (IRE).

The SCCM data sources include the following:

- SG-SCCM Computer Identity

  You can see the following data if it is available in SCCM:

  - Asset Tag. If the Asset Tag data is available, the mapping can be optionally enabled via the guided setup.
  - Assigned
  - DNS Domain
- SG-SCCM Computer OU. This data source imports data about the Organizational Unit (OU) name. The data is stored in the SG-SCCM Computer Related [sn_sccm_integrate_sccm_2019_computer_related] table. To add the view, open the computer record, click the top header, and select **View** > **SG-SCCM Computer Related**.
- SG-SCCM Disk
- SG-SCCM Last Discovered Update. This data source will run at the end of the import schedules to update the last_discovered date on the Computer CI. The source will conduct a full pull of all the computers and bring in only the ResourceID and the LastHWScan columns to update the CMDB Computer table.
- SG-SCCM Network
- SG-SCCM Operating System
- SG-SCCM Processor
- SG-SCCM Removed Software. Ensure the **Use last run datetime** option is cleared for every run.
- SG-SCCM Removed Software AI. Ensure the **Use last run datetime** option is cleared for every run.
- SG-SCCM Software
- SG-SCCM Software AI

Note:
If you have Asset Intelligence on your Microsoft SCCM instance, you have to run SG-SCCM Removed Software AI and SG-SCCM Software AI. If you do not have Asset Intelligence on your instance, you have to run SG-SCCM Removed Software and SG-SCCM Software.

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When you complete setting up the connection, you can configure the integration to periodically pull data from SCCM. The data is loaded into staging tables and then inserted into the following target tables:

- CI Relationship [cmdb_rel_ci]
- Computer [cmdb_ci_computer] (required)
- Disk [cmdb_ci_disk]
- IP address [cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]
- Serial Number [cmdb_serial_number]
- Software Installation [cmdb_sam_sw_install] (If the SAM application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)
- Software Usage [samp_sw_usage]

For more information on where data is saved when pulling data from a Microsoft SCCM application, see CMDB classes targeted in Service Graph Connector for Microsoft SCCM.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Resolving the missing IP address or MAC address issue

By default, network adapters that are missing an IP address or MAC address are not imported. To include these network adapters in the import, do the following:

1. Navigate to **Service Graph Connector for Microsoft SCCM** > **Data Sources**.
2. Select **SG-SCCM Network**.
3. Remove the where clause from the **SQL statement** field.

Additional resources

- How do I configure the SG-SCCM Service Graph Connector? article on the ServiceNow Community site
- Service Graph Connector for Microsoft SCCM - FAQ and Troubleshooting blog post on the ServiceNow Community site
- Service Graph Connector for Microsoft SCCM 3.0 Setup Guidelines [KB1001248] article in the Now Support Knowledge Base
- Support for Removed Software functionality in Service Graph Connector for SCCM integration blog post on the ServiceNow Community site

Related topics

Service Graph Connectors

Configure Service Graph Connector for Microsoft SCCM using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Microsoft SCCM for pulling in Microsoft SCCM data into the CMDB.

Before you begin

Install Service Graph Connector for Microsoft SCCM version 3.5.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

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Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Microsoft SCCM connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Select a template that matches the credentials for establishing a Java Database Connectivity (JDBC) connection to the SCCM database.

   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.

   b. Select a template.

   - **SCCM JDBC Connection Credentials**: Select to use a username and password to establish a JDBC connection to the SCCM database.
   - **SCCM JDBC Conn Cred (Integrated Auth)**: Select to use Windows JDBC-integrated authentication, which uses domain credentials, for authenticating a JDBC connection to the SCCM database.

   c. Select **Continue**.

7. Enter connection details and test the API connection for importing Microsoft SCCM data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection name	Name to identify the Microsoft SCCM connection record. For example, `SG-SCCM connection`.

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Field	Description
Query timeout	Number of seconds the JDBC driver waits for a query to complete. 0 indicates no timeout. If the timeout is exceeded, the integration considers the JDBC result inaccessible and marks the result as an error.
Connection timeout	Number of seconds before the MID Server connection cache pool closes the connection and removes the connection. 0 indicates no timeout.
Host	Network address of the server where the Microsoft SQL Server database is located.
Database name	Name of the Microsoft SQL Server database that SCCM uses.
Override default port	Custom port of the Microsoft SQL Server instance. The default port for Microsoft SQL Server is 1433
Instance name	Microsoft SQL Server instance.
MID Server	MID Server for the connection. **Note:** It's required to select a MID Server for an Integrated Authentication connection. For the **SCCM JDBC Connection Credentials** option, this field appears only when you select the **Use MID Server** check box.
Note: The following fields appear only when you select the **SCCM JDBC Connection Credentials** template in step 6.	
Format	JDBC driver used for connecting to the SCCM database. SCCM uses Microsoft SQL Server as its database backend. This field is automatically set to **com.microsoft.sqlserver.jdbc.SQLServerDriver**. Leave the field value as is.
Username	User name for connecting to the JDBC server.

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Field	Description
Password	Password for the JDBC server.
Use MID Server	Option to use the MID Server for accessing the JDBC server.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

8. **Optional:** Configure the connection and connector properties to map attributes and manage data imports.

> **Note:**
> To skip this step, select **Continue** for the **Configure properties** activity.

a. In the **Setup** stage of the playbook, select the **Configure properties** activity.

b. To map the asset tags from Microsoft SCCM to the asset tag attribute in the Computer [cmdb_ci_computer] class, in the Connection properties section of the Configure properties page, select the **Map asset tags** check box.

c. To avoid creating duplicate records in the CMDB Disks [cmdb_ci_disk] table when the Discovery application is running, in the Connector properties section of the Configure properties page, select the **Avoid creating duplicate records** check box.

d. To set the import disk name to the format starting with Disk #[*disknumber*], in the Connector properties section of the Configure properties page, select the **Transform disk name to disk number** check box.
Where the *disknumber* is the number extracted from the disk name

e. Select **Continue**.

9. **Optional:** Modify the SQL statement for a data source.

> **Note:**
> To skip this step, select **Skip** for the **Customize data source SQL statement** activity.

a. In the **Setup** stage of the playbook, select the **Customize data source SQL statement** activity.

b. Double-click (or use the keyboard shortcut) the **Custom SQL statement** column value for a data source and enter the custom SQL statement.

c. Repeat the step 9.b for each data source where you want to modify the SQL statement.

d. Select **Mark Complete**.

10. Configure the import schedules to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the *Connection Name*-**SCCM Computer Identity** import schedule.

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c. Select the **Active** check box, and then fill in the run schedule and time details.

   For more information, see Schedule a data import.

d. Select **Save**.
   Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

11. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics

Service Graph Connector for Microsoft SCCM

CMDB classes targeted in Service Graph Connector for Microsoft SCCM

Enable Software Editions in Service Graph Connector for Microsoft SCCM

Accessing the connection details of Service Graph Connector for Microsoft SCCM

Configure Service Graph Connector for Microsoft SCCM using the guided setup

Set up and validate data source connection credentials to import Microsoft SCCM data into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

Confirm that you are in the Service Graph Connector for Microsoft SCCM application scope by using the application picker.

Note:
If you're currently using a version of the Microsoft SCCM plugin, see Upgrade from the legacy SCCM plugin to the Service Graph Connector for Microsoft SCCM.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- Integration - JDBC (com.snc.integration.jdbc)
- Windows MID Server required for access to the SCCM environment.

To access Microsoft SCCM data, you must have appropriate access to the Microsoft SCCM database. You must have sufficient credentials to query the SQL Server that contains the Microsoft SCCM database. You must do the following:

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1. Create a SQL Server account to connect to the Microsoft SCCM database on the MID Server to use the data sources.
2. Connect to your Microsoft SCCM SQL Server and configure the following:
   a. Add a new login username and password for SQL authentication.
   b. Choose the Microsoft SCCM database that ServiceNow data sources will connect to.
   c. Assign the db_datareader role membership to the Microsoft SCCM user.

Note:
If you have the Service Graph Connector for Microsoft SCCM version 2.1.6 or earlier versions installed in your production environment, contact Customer Service and Support for additional steps to remove the SCCM Discovery Source from being included when calculating the subscription unit consumption.

Starting with Service Graph Connector for Microsoft SCCM version 3.0.4, support for multi-instance is introduced, enabling Service Graph Connector for Microsoft SCCM to connect to and import data from multiple Microsoft SCCM instances. This feature involves dynamically creating data sources and scheduled imports, requiring the granting of additional permissions. For more information about how to complete these steps, see Service Graph Connector for Microsoft 3.0 Setup Guidelines [KB1001248] in Now Support .

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SCCM** > **Setup**.
2. On the Getting Started page, select **Get Started**.
3. On the Service Graph Connector for Microsoft SCCM page, in the Configure Data source and Scheduled data import access section, select the task **Configure Data source access**.
4. Update the data source access to enable creating data sources and scheduled data imports for a new connection in the Service Graph Connector for Microsoft SCCM.
   a. For the Configure Data source access task, select **Configure**.
   b. Select the **Global** application scope by using the application picker.
   c. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.
   d. Select **Update** to close the tab and return to the guided setup.
   e. Modify the application scope again to **Service Graph Connector for Microsoft SCCM** by using the application picker.
   f. Set the **Update Data Source Access** task to complete by selecting **Mark as Complete**.
   g. Repeat the steps 4.b to 4.e for the Update Scheduled data import access task with the Scheduled data import [scheduled_data_set] table and set the task to complete by selecting **Mark as Complete**.
5. Configure the authentication credentials and configuration used for connecting to the Microsoft SCCM database.

   a. Use a username and password to establish a JDBC connection to the SCCM database.

   Note:
   Perform this step only when you want to use a username and password to establish a JDBC connection. Otherwise, select **Skip** to skip the step.

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i. For the Configure connection task in the Configure the connection section, select **Configure**.

ii. Configure the connection.

- To configure the connection available by default, select **Configure** for the SCCM JDBC Connection Credentials connection.
- To create another connection, select **Add Connection**.

> **Note:**
> You can create multiple connections by selecting **Add Connection**. If not redirected to the connection setup, on the Workflow Studio Integrations page search for SCCM JDBC Connection Credentials to modify the default connection or add another connection.

iii. On the form, fill in the fields.

Configure Connection or Create Connection form

Field	Description
Connection Information	
Connection name	Name to identify the Microsoft SCCM connection record. For example, `SG-SCCM connection`.
Query timeout	Number of seconds the JDBC driver waits for a query to complete. `0` indicates no timeout. If the timeout is exceeded, the integration considers the JDBC result inaccessible and marks the result as an error.
Connection timeout	Number of seconds before the MID Server connection cache pool closes the connection and removes the connection. `0` indicates no timeout.
Format	JDBC driver used for connecting to the Microsoft SCCM database. Microsoft SCCM uses Microsoft SQL Server as its database backend. This field is automatically set to **com.microsoft.sqlserver.jdbc.SQLServerDriver**. Leave the field value as is.
Host	Network address of the server where the Microsoft SQL Server database is located.
Database name	Name of the Microsoft SQL Server database that Microsoft SCCM uses.

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Field	Description
Override default port	Custom port of the Microsoft SQL Server instance. The default port for Microsoft SQL Server is 1433
Instance name	Microsoft SQL Server instance.
Use MID Server	Option to use the MID Server for accessing the JDBC server.
MID Server	MID Server for the connection. **Note:** It's required to select a MID Server for an Integrated Authentication connection. For the **SCCM JDBC Connection Credentials** option.
Credential Information	
Username	User name for connecting to the JDBC server.
Password	Password for the JDBC server.

iv. Save your changes.

- For the default connection, select **Configure Connection**.
- For a new connection, select **Create Connection**.

v. Navigate back to the guided setup and set the Configure connection task to complete by selecting **Mark as Complete**.

b. Use Windows JDBC-integrated authentication, which uses domain credentials, for authenticating a JDBC connection to the SCCM database.

Note:
Perform this step if you need the JDBC connection with integrated authentication. Otherwise, select **Skip** to skip the step.

i. For the Configure connection (Integrated authentication) task in the Configure the connection section, select **Configure**.

ii. Configure the connection.

- To configure the connection available by default, select **Configure** for the SCCM JDBC Conn Cred (Integrated Auth) connection.
- To create another connection, select **Add Connection**.

Note:
You can create multiple connections by selecting **Add Connection**. If not redirected to the connection setup, on the Workflow Studio Integrations page section search for SCCM JDBC Conn Cred (Integrated Auth) to modify the default connection or add another connection.

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iii. On the form, fill in the fields.

Configure Connection or Create Connection form

Field	Description
Connection name	Name to identify the Microsoft SCCM connection record.
Query timeout	Number of seconds the JDBC driver waits for a query to complete. 0 indicates no timeout. If the timeout is exceeded, the integration considers the JDBC result inaccessible and marks the result as an error.
Connection timeout	Number of seconds before the MID Server connection cache pool closes the connection and removes the connection. 0 indicates no timeout.
Host	Network address of the server where the Microsoft SQL Server database is located.
Database name	Name of the Microsoft SQL Server database that Microsoft SCCM uses.
Override default port	Custom port of the Microsoft SQL Server instance. The default port for Microsoft SQL Server is 1433
Instance name	Microsoft SQL Server instance.
MID Server	MID Server for the connection. **Note:** It's required to select a MID Server for an Integrated Authentication connection. For the **SCCM JDBC Connection Credentials** option.

iv. Save your changes.

- For the default connection, select **Configure Connection**.
- For a new connection, select **Create Connection**.

v. Navigate back to the guided setup and set the Configure connection (Integrated authentication) task to complete by selecting **Mark as Complete**.

6. Configure the connection and connector properties to map attributes and manage data imports.

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a. **Optional:** Enable mapping asset tags from Microsoft SCCM to the asset tag attribute in the Computer [cmdb_ci_computer] class.

   i. For the Configure Connection Properties task in the Configure Data Source and Scheduled Data Import section, select **Configure**.

   ii. In the Name column, select the connection.

   iii. In the Service Graph Connection Properties related list, select **asset_tag** in the Property column.

   iv. In the **Value** field, enter `true` to enable mapping asset tags.

   v. Select **Update**.

   vi. Navigate back to guided setup and set the Configure Connection Properties task to complete by selecting **Mark as Complete**.

b. Test the Computer Identity data source to verify that all data sources are properly connected.

   i. For the Validate Data Sources task in the Configure Data Source and Scheduled Data Import section, select **Configure**.

   ii. In the Name column, select the Computer Identity data source associated with the connection.

   iii. Select **Test Load 20 Records**.

   iv. When the **State** field is set to **Complete** and the **Completion code** field is set to **Success**, select the **Return to data source** link.

   v. Navigate back to guided setup and set the Validate Data Sources task to complete by selecting **Mark as Complete**.

c. Ensure that all data from the Computer Identity source is imported without the date time filtering during the next test load.

   i. For the Reset 'Last run datetime' in test load data source task in the Configure Data Source and Scheduled Data Import section, select **Configure**.

   ii. In the Name column, select the Computer Identity data source associated with the connection.

   iii. Clear the **Use last run datetime** check box.

   iv. Select **Update**.

   v. Navigate back to guided setup and set the Reset 'Last run datetime' in test load data source task to complete by selecting **Mark as Complete**.

7. **Optional:** Configure the process for importing disk data when the Discovery application is running.

   a. Avoid creating duplicate records in the CMDB Disks [cmdb_ci_disk] table.

      Note:
      You can avoid creating duplicate records in the CMDB Disks [cmdb_ci_disk] table when the Discovery application is running by configuring the *`sn_sccm_integrate.sccm_disks_managed`* property and setting its value to `true`. By default, the property value is set to `false`.

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i. For the Configure Disk Data Imports task in the Configure Disk Data Imports section, select **Configure**.

ii. On the System Property page, set the value of the *sn_sccm_integrate.sccm_disks_managed* property to `true`.

iii. Select **Update**.

iv. Set the Configure Disk Data Imports task to complete by selecting **Mark as Complete**.

> **Note:**
> Any existing disk records are updated only after the next hardware scan is executed in the Microsoft SCCM instance.

b. **Optional:** Transform imported disk name to disk number format.

> **Note:**
> You can set the imported disk name to the format `Disk #<disknumber>`. Where *<disknumber>* is the number extracted from the imported disk name.

i. Select the **Integration Commons for CMDB** application scope from the application picker.

ii. For the Configure Disk Name Transformation task in the Configure Disk Data Imports section, select **Configure**.

iii. On the System Property page, set the value of the *sn_cmdb_int_util.transform_disk_name_to_discovery_format* property to `true`.

iv. Select **Update**.

v. From the application picker, select the Service Graph Connector for Microsoft SCCM application scope.

vi. Set the Configure Disk Name Transformation task to complete by selecting **Mark as Complete**.

8. Configure the scheduled data imports.

> **Note:**
> If the **Use Integrated Authentication** check box is selected for the data source, the run as user for the scheduled data import job must have the import_admin role. For more information, see the "Use Integrated Authentication" is being unchecked when you run the scheduled import related to SG-SCCM or SG-SCCM Computer Identity Data Source [KB1312810] article in the Now Support Knowledge Base.

a. For the Configure scheduled jobs task in the Configure scheduled jobs task section, select **Configure**.

b. On the Scheduled Data Import form, verify the field values for the scheduled job. For more information, see Schedule a data import.

All other Service Graph Connector for Microsoft SCCM scheduled jobs that are active will run in their specified order after the Computer Identity scheduled job is finished running. Select the **Active** check box for a scheduled job to activate the job.

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> **Important:**
> If you are upgrading to the Service Graph Connector for Microsoft SCCM, deactivate the existing 'SG-SCCM Computer Identity scheduled data import'. Additionally, you cannot use the baseline scheduled data import or data sources that have a name starting with 'SG-SCCM' because they are used as templates for creating an instance of data sources and scheduled data imports.

c. Select **Update**.

d. Set the Configure Scheduled data imports task to complete by selecting **Mark as Complete**.

e. **Optional:** When upgrading the Service Graph Connector for Microsoft SCCM, deactivate the existing SG-SCCM Computer Identity scheduled data import.
For the Deactivate Legacy Scheduled Data Imports task, select **Configure**.

f. In the Name column, select the SG-SCCM Computer Identity scheduled data import and clear the **Active** check box.

g. Set the Deactivate Legacy Scheduled Data Imports task to complete by selecting **Mark as Complete**.

9. **Optional:** Customize the Instance Data source SQL statement.
   a. For the Customizing Data source SQL statement task in the Customize Instance Data source SQL statement section, select **Configure**.
   b. Select the name of the instance in which you want to customize the SQL statement.
   c. Select **Update**.
   d. Set the Customizing Data source SQL statement task to complete by selecting **Mark as Complete**.

Trouble?

To resolve issues when configuring the connector, you can view the following additional resources:

- How to identify and delete duplicate CMDB CI Relationship records or ones that have orphan or missing parent/child relationships [KB0780988] in the Now Support Knowledge Base
- How to delete sys_object_source records [KB0746309] in the Now Support Knowledge Base
- Duplicate software installs with different Discovery Source [KB0958768] in the Now Support Knowledge Base
- Assigned To Field Doesn't Get Updated For Computer CIs in Service Graph Connector for SCCM [KB1277555] in the Now Support Knowledge Base
- Service Graph connector for Microsoft SCCM software usages data import blog post on the ServiceNow Community site

CMDB classes targeted in Service Graph Connector for Microsoft SCCM

When you complete setting up the connection, you can configure the integration to periodically pull data from Microsoft SCCM. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

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Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Serial number	serial_number
CPU core count	cpu_core_count
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
CPU manufacturer	cpu_manufacturer
Name	name
Asset tag	asset_tag
Assigned	assigned
Chassis type	chassis_type
Class	sys_class_name
CPU core thread	cpu_core_thread
CPU count	cpu_count
CPU name	cpu_name
Default Gateway	default_gateway
DNS Domain	dns_domain
Most recent discovery	last_discovered
Operating System	os
OS Address Width (bits)	os_address_width
OS Domain	os_domain
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram
Model ID	model_id
Manufacturer	manufacturer
Assigned to	assigned_to

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]

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Relationships created for Computer (continued)

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Contains::Contained by	Disk [cmdb_ci_disk]
Computer [cmdb_ci_computer]	Reference	Key Value [cmdb_key_value]
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]
Computer [cmdb_ci_computer]	Reference	SG-SCCM Computer Related [sn_sccm_integrate_sccm_2019_computer_rela

Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Disk space (GB)	disk_space
Size bytes	size_bytes
Computer	computer
Device ID	device_id
Name	name
Description	short_description
Drive type	drive_type
Manufacturer	manufacturer
Model ID	model_id

Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Reference	Computer [cmdb_ci_computer]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Name	name
Nic	nic

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Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name
DHCP Enabled	dhcp_enabled
Netmask	netmask
Configuration Item	cmdb_ci

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

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Relationship created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]

SG-SCCM Computer Related [sn_sccm_integrate_sccm_2019_computer_related]

The following attributes in the SG-SCCM Computer Related [sn_sccm_integrate_sccm_2019_computer_related] table are populated by collected data:

Attribute label	Attribute name
Resource ID	resource_id
OU Name	ou_name

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Name	name
Version	version
Vendor	vendor
Manufacturer	manufacturer

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Publisher	publisher
Last scanned	last_scanned
Installed on	installed_on
Display name	display_name
Discovery source	discovery_source

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Attribute label	Attribute name
Install date	install_date
Prod id	prod_id
Version	version
Revision	revision
Sccm group ID	sccm_group_id
SCCM TimeStamp	sccm_timestamp
Assigned to	assigned_to

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Computer [cmdb_ci_computer]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Installed on	installed_on
Install date	install_date
Sccm group ID	sccm_group_id
SCCM TimeStamp	sccm_timestamp

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Upgrade from the legacy SCCM plugin to the Service Graph Connector for Microsoft SCCM

Deactivate the scheduled imports and pull records so that you can upgrade from the Microsoft SCCM 2016 plugin or an earlier version of the plugin to the Service Graph Connector for Microsoft SCCM.

Before you begin
Role required: none

If you are upgrading to the Service Graph Connector for Microsoft SCCM, the following steps are mandatory. The steps must be executed in any instance with an existing install of the Microsoft SCCM 2016 plugin or with an earlier version of the plugin.

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Note:
The Service Graph Connector for Microsoft SCCM is an independent implementation that does not reuse any components from the Microsoft SCCM 2016 plugin.

About this task

The Service Graph Connector for Microsoft SCCM is a successor to the Microsoft SCCM 2016 plugin. If you already have the Microsoft SCCM 2016 plugin or an earlier version installed in your instance, you must follow these steps to enable the successful transition from using the SCCM plugin to using the Service Graph Connector. Additionally, you can run a SG-SCCM cleanup to delete the Network Adapters and Disks created from the older SCCM plugin to make the migration faster.

When the Service Graph Connector for Microsoft SCCM is installed in an instance, you must no longer run any components from the Microsoft SCCM 2016 plugin, including Data Sources and Scheduled Data Imports. The SCCM 2016 plugin Scheduled Data Imports must be tuned off. The Service Graph Connector for Microsoft SCCM installs a new set of SG-SCCM Data Sources and Scheduled Data Imports.

Warning:
This upgrade process should be performed and validated in a non-production or test instance that is based on a recent clone of the customer production instance. Failure to first validate upgrade in a non-production instance may result in unexpected outcomes and possible data loss or corruption.

Any customizations to the SCCM 2016 plugin will not automatically migrate. The customizations would have to be reimplemented in the Service Graph Connector for Microsoft SCCM, such as by using IntegrationHub-ETL.

Procedure

1. **Optional:** If you are migrating from the SCCM 2016 plugin, then run the Migration Readiness Tool for Service Graph Connector for SCCM.

   (Optional) The plugin can be downloaded from the ServiceNow Store.

   The tool does not migrate any changes, but runs a series of ATF tests to identify any customizations that were done to the legacy SCCM 2016 plugin compared to the OOB SCCM 2016 plugin. It will not migrate the changes between the two plugins, but serves to alert any customizations.

2. After the tool has finished running, review the tests that were failed.
   A failed test means that a customization was made in the plugin. The customization could be a transform map. For example, if a transform map was modified, then it needs to be reimplemented in the connector.
3. Deactivate the scheduled imports from the older SCCM plugin.
   For more information on how to deactivate scheduled imports, see Upgrade the SCCM integration version.
4. **Optional:** Delete duplicate OS software records in the older SCCM plugin.

   Note:
   There is no cleanup required for Computer OS Software records if SAM is enabled.

   a. Navigate to the Software Package or Software Instance table in the older SCCM plugin.

   b. Search for the duplicate OS records that you want to delete.

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You can tell which records are the SG-SCCM software OS records if the version number is included in the Name or Product Name.

c. To delete the duplicate software OS records from the Software Package table, do the following:

i. On the Software Package table, select the duplicate OS record that does not have **SG-SCCM** in the **Discovery Source** column.

ii. Delete the duplicate OS record and repeat with other records as needed.

d. To delete the duplicate software OS records from the Software Instance table, do the following:

i. On the Software Instance table, select the duplicate OS record that has the **SCCM group ID** column empty.

ii. Delete the duplicate OS record and repeat with other records as needed.

Note:
This step is optional because there is a difference in the way software OS records are written to the CMDB, between the legacy SCCM plugin and Service Graph Connector. The SCCM plugin did not record values to sys_object_source, a discovery_source, or a sccm_group_id.

5. After you are finished deactivating the scheduled imports and deleting the duplicate OS records from the older SCCM plugin, configure the connector.
For instructions, see Configure the Service Graph Connector for Microsoft SCCM.

6. **Optional:** Clean up the Disk and Network Adapter records created by the SCCM plugin.

a. Confirm that you are in the Service Graph Connector for Microsoft SCCM application scope.

b. Navigate to **Scheduled Job** > **SG-SCCM CleanupUtil**.

c. Select the *SG-SCCM CleanupUtil* scheduled job, and then switch to the global application scope.

d. To make a copy of the scheduled job, right-click the header of the scheduled job and select **Insert and Stay**.

e. Change the name to **SG-SCCM CleanupUtil Global**.

f. Click **Update**.

g. When you need to run the scheduled job, click **Execute Now**.

h. **Optional:** To check the progress of the run, do the following:

i. Navigate to **System Log** > **All**.

ii. To filter the records for the script run, enter `SG-SCCM CleanupUtil` under the **Message** search box.

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The script will have a log message for each batch so that you know the status of the current run and its progress.

Note:
The duration of the run depends on the amount of Network Adapter and Disk data in the CMDB from the previous SCCM integration. The data must meet the condition for the cleanup.

What to do next
When you execute the Service Graph Connector components, your existing CMDB data created by the SCCM plugin becomes managed and maintained by Service Graph Connector for Microsoft SCCM.

Upgrade from an earlier version of Service Graph Connector for Microsoft SCCM to the later version

Upgrade your Service Graph Connector for Microsoft SCCM. When you upgrade versions, you can select the files that you want to transfer from the earlier version to the later version of the Service Graph Connector for Microsoft SCCM.

Before you begin
To avoid any serious upgrade issues, perform the upgrade in a test or development instance prior to upgrading in a production environment.
Role required: admin

About this task
When you upgrade from an earlier version to the latest version of the Service Graph Connector for Microsoft SCCM, there are Skipped Updates. The original SCCM data source files that were installed have the last run date updated as part of the data source runs. The files will be treated as custom files by the platform. When the newer version is installed, the newer data sources will not be automatically upgraded.

After you have upgraded to the newer version, you can check the upgrade status.

Procedure

1. Review all the updates from the upgrade center and select the data source files from the newer version.
   You can access the upgrade history and review the updates from the Skipped Changes to Review related list. See Review skipped records using related lists.
2. If you have customized the earlier version, select the changes that you need from the older file and migrate them to the new file.

Note:
Repeat this migration process for all the other skipped update files.

What to do next
After the upgrade, if there are changes to the SQL in the data source files or mapping, then do the following:

1. Clear the **Use last run datetime** check box in all the data sources.
2. Perform a full pull of data from all the data sources.

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Note:
Upgrading from Service Graph Connector for Microsoft SCCM v2.3 to v2.3.1 requires a minimum pull of Computer and Software, because the Source Native Key for the software within the SQL was changed in the SG-SCCM Removed Software data source. Without the correct Source Native Keys, it will not be able find the software in the CMDB.

For more information on resolving any conflicts, see the following topics:

- Revert a customization
- Resolve a skipped update and set a resolution status
- Skipped Changes to Review related list

Enable Software Editions in Service Graph Connector for Microsoft SCCM

Enable software editions so that you can gather edition information for products such as Adobe Acrobat, Microsoft SQL Server, and Windows Exchange Server into the Service Graph Connector for Microsoft SCCM.

Before you begin

Note:
There are two types of setup that are required, one on the SCCM Manager and the other on the ServiceNow Instance. For more information on how to set up the SCCM Manager, see the SCCM Manager Setup section of the Custom solution to gather editions in SCCM [KB0721360] article on the HI Knowledge Base. When you're finished setting up the SCCM Manager, refer back to this task and complete the steps.

Role required: admin

About this task

You can set up the ServiceNow Instance on the Service Graph Connector for Microsoft SCCM.

Procedure

1. Navigate to **All** > **Service Graph Connector Microsoft SCCM** > **Import Schedules**.
2. Select the Software Edition scheduled import you created to edit this import record.
3. Select the **Active** check box.
4. Click **Update**.
5. Navigate to **Service Graph Connector Microsoft SCCM** > **Data Sources**.
6. Select the Software Edition data source you created.
7. Under the Transforms list, select **Update software install with edition**.
8. Edit the data source and select the **Active** check box.
9. Click **Update**.

What to do next

You can verify that the edition information has been gathered by doing the following:

1. Navigate to **Service Graph Connector Microsoft SCCM** > **Data Sources** and the Software Edition data source you want to verify.
2. Select **Load All Records**.

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Note:
If the displayed completion code is `Success`, then the software edition data source was executed successfully. If the displayed completion code is `Error`, then there is an error that must be fixed.

Accessing the connection details of Service Graph Connector for Microsoft SCCM

You can access the connection details of the Service Graph Connector for Microsoft SCCM in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Microsoft SCCM. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Microsoft SCCM connection

Access the details of a Microsoft SCCM connection configured for the Service Graph Connector for Microsoft SCCM.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SCCM** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Service Graph Connector for Netskope

The Service Graph Connector for Netskope pulls in asset inventory data (hardware and software) from the Netskope database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

- Netskope API version: Get Client Data v1.
- Netskope client version: 112.
- Washington, Xanadu, Yokohama ServiceNow® family releases.

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Use cases

- Import Netskope Client information and store it in appropriate configuration item (CI) classes in your CMDB.
- Configure multiple instances of Netskope in the Service Graph Connector.

Guided setup

Use the guided setup feature to help you configure your integration in an organized sequence of tasks.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring SentinelOne integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Configure the Service Graph Connector for Netskope

The guided setup for the Service Graph Connector for Netskope provides an organized sequence of tasks to configure the integration on your ServiceNow AI Platform instance.

Before you begin
To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI Class Models store app store app, which is automatically installed.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- Guided Setup (com.sn.ads.setup).
- Data Stream (com.glide.hub.action_type.datastream).
- ITOM Patterns.

Roles required:

- Netskope Role - Viewer
- ServiceNow AI Platform® Role - admin

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Procedure

1. Navigate to **Service Graph Connectors** > **Netskope** > **Setup**.
2. On the Home page, select **Continue**.
3. On the Experience page, select the **Best Experience** from it.
4. On the Service Graph Connector for Netskope page in the Configure the connection page, select the **Configure Netskope Authentication Credentials** task and follow these steps:
   a. In the API Key field, enter your Netskope API Key and update the credential record.
   b. Select the **Mark as Complete** checkbox and select **Continue**.
5. In the **Configure** *Netskope* **HTTP Connection** task follow these steps:
   a. Add the Netskope base URL (Uniform Resource Locator).
   b. Select the **Mark as Complete** checkbox and select **Continue**.
6. In the **Test Connection** task follow these steps:
   a. Select the **Test Connection** link.

      The Status code field displays 200 if the connection is successful.

   b. Select the **Mark as Complete** checkbox and select **Continue**.
7. **Optional:** To create another connection, select the **Update Data Source Access** section and follow these steps:
   a. Give permission to create and update the data source.
   b. Select the **Mark as Complete** checkbox and select **Continue**.
   c. Give permission to create and update the Scheduled Import Sets.
   d. Select the **Mark as Complete** checkbox and select **Continue**.
   e. Clear the cache with the code snippet mentioned previously using Scripts-Background.
   f. Select the **Mark as Complete** checkbox and select **Continue**.
   g. Add a new connection by clicking the link.
   h. After you add a new connection, select the **Mark as Complete** checkbox and select **Continue**.
   i. Select the new connection record and select the **Test Connection link**.

      The Status code field displays 200 if the connection is successful.

   j. Select the **Mark as Complete** checkbox and select **Continue**.
8. Fill out the fields on the Scheduled Data Import form:

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import, for example, SG-Netskope-Client.
Run as	Option to run the scheduled job with the credentials of the specified user.
Active	Option to activate the scheduled job. Select this option.

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Field	Description
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.
Partition Method	Partition method for the concurrent import set. Select **Custom Size**.
Partition Size	Import set size for early scheduling. Set 1000 as a value.
Execute pre-import script	Option to specify a script to run before the import is performed. Leave this field with its default setting.
Execute post-import script	Option to specify a script to run after the import is performed. Leave this field with its default setting.
Application	Application that contains this scheduled job.
Run	Frequency of running the import.
Conditional	Conditions under which this job is executed.

9. Click **Execute Now**.
10. In the Help task bar, select **Mark as Complete** and select **Continue**.

Service Graph Connector for Observability - AppDynamics

Use the Service Graph Connector for Observability - AppDynamics to ingest CMDB data from an AppDynamics installation using REST APIs. Push events from AppDynamics into ServiceNow with Event Management.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

- Supported versions: AppDynamics version 20.3
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama
  - Zurich

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Observability - AppDynamics using SGC Central.

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Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring AppDynamics integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the AppDynamics data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The AppDynamics data sources include the following:

- SG-AppDynamics Application Services
- SG-AppDynamics Servers and Applications
- SG-AppDynamics Server Tags
- SG-AppDynamics Tier to Tier Relationship

For more information on where data is saved when pulling data from AppDynamics, see CMDB classes targeted in Service Graph Connector for Observability - AppDynamics.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional resources

- Service Graph Connector for Observability AppDynamics article on the ServiceNow Community site
- How do I configure the AppDynamics Service Graph Connector? article on the ServiceNow Community site

Related topics

Service Graph Connectors

Configure Service Graph Connector for Observability - AppDynamics using SGC Central

Set up scheduled import jobs to pull in AppDynamics data into your Configuration Management Database (CMDB).

Before you begin

- Install Service Graph Connector for Observability - AppDynamics version 1.4.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- Install Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This application must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

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Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the AppDynamics connector type, and then select **Configure connection**.
   A default connection for AppDynamics is available within the application. As the Service Graph Connector for Observability - AppDynamics supports only a single instance, you can configure the default connection for the first time or resume editing it thereafter.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing AppDynamics data.

   a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

   b. On the form, fill in the fields.

Configure and test connection form

Field	Description
Connection name	Name to identify the AppDynamics connection record.
Connection URL	Base URL of your AppDynamics controller.
OAuth Client ID	Application (client) ID of your AppDynamics client application. **Note:** Verify that Server Visibility is active for the AppDynamics account and the AppDynamics user has the Applications and Dashboards Viewer (Default) and Server Monitoring User (Default) roles.

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Field	Description
OAuth Client Secret	Client secret of your AppDynamics client application.
Use MID server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
MID selection	Name of the MID Server used by the connector. This field appears only when the **Use MID server** check box is selected.

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

7. **Optional:** Enable real-time event integration by creating an HTTP request template to receive real-time health-check alerts and events from AppDynamics to your ServiceNow instance.

   Note:
   To skip this step, select **Skip** for the **Enable real-time event integration** activity.

   a. In the **Setup** stage of the playbook, select the **Enable real-time event integration** activity.

   b. Select **Continue** to create an HTTP request template automatically.

   (Optional) After you enable real-time event integration, multiple API calls are executed to start the event ingestion service in AppDynamics. For more information, see the Service Graph Connector for Observability AppDynamics article on the ServiceNow Community site.

8. Configure duplicate detection rules.

   AppDynamics uses duplicate detection rules to insert only new or updated rows into the CMDB. To insert all rows, deactivate the rule and run the **Clean AppDynamics Duplicate Row Hashes** scheduled job for a full data import.

   a. In the **Setup** stage of the playbook, select the **Configure duplicate detection rules** activity.

   b. In the Duplicate detection rules list, select the rule from the **Name** column.

   c. On the Edit duplicate detection rule window, select the **Active** check box to activate the rule.

   Note:
   To remove fields from being evaluated, add the field names in the **Ignore Fields** field for a rule. To ignore multiple fields, separate the fields with commas.

   d. Select **Save**.

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e. Repeat steps from 8.b to 8.d for each rule you want to activate.

f. Select **Continue**.

9. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the **SG-AppDynamics Servers and Applications** import schedule.

c. Select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Observability - AppDynamics

CMDB classes targeted in Service Graph Connector for Observability - AppDynamics

Accessing the connection details of Service Graph Connector for Observability - AppDynamics

Configure Service Graph Connector for Observability - AppDynamics using the guided setup

Set up scheduled import jobs to pull in data from AppDynamics into your Configuration Management Database (CMDB).

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

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Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

When using client credentials for authentication, obtain the OAuth credentials from your AppDynamics administrator. Make a note of the following details:

- Application (client) ID
- Client Secret

Note:
If you have an earlier version of the Service Graph Connector for Observability - AppDynamics, then do not migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: admin

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Observability - AppDynamics application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **AppDynamics** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the authentication credentials and establish an HTTP connection to send requests to the AppDynamics API.

   a. In the Configure API authentication section of the Service Graph Connector for Observability - AppDynamics page, select **Get Started**.

   b. Configure the connection for AppDynamics by editing the default connection.

   You can configure either a Basic Auth connection or an OAuth connection.

   Note:
   As the connector supports only single instance, edit the **AppDynamicsConnectionAlias** connection, available by default.

   - Configure a Basic Auth connection.
     i. For the Configure Basic Auth Connection task, select **Configure**.
     ii. Select **Edit** for AppDynamicsConnectionAlias.

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Note:
If not redirected to the connection setup, search for **AppDynamicsConnectionAlias** on the Integrations page, and then select **View Details** to edit the default connection.

iii. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the AppDynamics connection record. `AppDynamicsConnectionAlias` is the default credential alias name and is read-only.
Host name	Host name of your AppDynamics controller.

iv. (Optional) If a MID Server is required for the AppDynamics server connection, select the **Use MID server** check box. Then, select the MID Server-related fields accordingly.

v. In the Credential Information section of the Edit Connection window, fill in the fields.

Credential Information

Field	Description
Username	AppDynamics account user name that is used to authenticate the connection request. **Note:** Verify that Server Visibility is active for the AppDynamics account and the AppDynamics user has the Applications and Dashboards Viewer (Default) and Server Monitoring User (Default) roles.
Password	Password that is used to authenticate the connection request.

vi. Select **Edit Connection**.

vii. Return to the guided setup page.

viii. Set the Configure Basic Auth Connection task to complete by selecting **Mark as Complete**.

- Configure an OAuth connection.

  i. For the Configure OAuth Authentication: Client Credentials task, select **Configure**.

  ii. Select **Edit** for AppDynamicsConnectionAlias.

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Note:
If not redirected to the connection setup, search for **AppDynamicsConnectionAlias** on the Integrations page, and then select **View Details** to edit the default connection.

iii. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the AppDynamics connection record. `AppDynamicsConnectionAlias` is the default credential alias name and is read-only.
Connection URL	Base URL of your AppDynamics controller.

iv. (Optional) If a MID Server is required for the AppDynamics server connection, select the **Use MID server** check box. Then, select the MID Server-related fields accordingly.

v. In the Credential Information section of the Edit Connection window, fill in the fields.

Credential Information

Field	Description
OAuth Client ID	Application (client) ID of your AppDynamics client application as noted in the Before you begin section. **Note:** Verify that the API client has a role with the required privileges and sufficient Token Expiration Time.
OAuth Client Secret	Client secret of your AppDynamics client application as noted in the Before you begin section.

vi. Select **Edit Connection**.

vii. Return to the guided setup page.

viii. Set the Configure OAuth Authentication: Client Credentials task to complete by selecting **Mark as Complete**.

c. Test the connection.

i. For the Test connection task, select **Configure**.

ii. Select the **Test Connection** related link to start the testing process.

iii. When the **Status** field is set to **Success**, return to the guided setup page.

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Note:
If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

d. Enable AppDynamics event integration with your ServiceNow instance by pushing a default HTTP Request Template to AppDynamics.

Note:
To push HTTP requests, verify that the Observability Commons for CMDB application (sn_observability) is installed for events ingestion on your ServiceNow instance. Also, on your AppDynamics instance, as the ServiceNow user, you must have the account-level Configure HTTP Request Templates permission to create or modify HTTP Request Templates.

i. For the Push HTTP Request Template task, select **Configure**.

ii. Select the **Push HTTP Request Template** related link.

iii. Return to the guided setup page.

iv. Set the Push HTTP Request Template task to complete by selecting **Mark as Complete**.

After you push the HTTP request template, multiple API calls are executed to start the event ingestion service in AppDynamics. For more information, see the Service Graph Connector for Observability AppDynamics article on the ServiceNow Community site.

5. Configure duplicate detection rules.

a. For the Configure duplicate detection rules task in the Duplicate detection rules section, select **Configure**.

b. In the CMDB Duplicate Row Rules list, set the **Active** column value for a rule to **true** to activate the rule.

Note:
To remove fields from being evaluated, add the field names in the **Ignore Fields** column for a rule. To ignore multiple fields, separate the fields with commas.

c. Return to the guided setup page.

d. Set the Configure duplicate detection rules task to complete by selecting **Mark as Complete**.

6. Configure advanced settings.

a. For the Advanced Settings task in the Advanced section, select **Configure**.

b. Review and modify the advanced properties.

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Advanced properties

Property	Description
Toggle to populate relationships between tiers	Option to enable the import of relationships between AppDynamics tiers in the CI Relationship [cmdb_rel_ci] table.
The number of minutes of metrics to fetch in order to generate tier to tier relationships	Number of minutes of metrics to fetch for generating tier-to-tier relationships. For example, 60 retrieves the last hour's relationships.
Toggle to import business transactions from AppDynamics	Option to enable the import of business transactions into the Calculated Application Service [cmdb_ci_service_calculated] table.
Toggle to populate tags for imported servers	Option to enable the import of server tags into the Key Value [cmdb_key_value] table.
Toggle to import node data from AppDynamics and map to the cmdb_ci_appl hierarchy	Option to enable the import of nodes into the Application [cmdb_ci_appl] table hierarchy.

c. Select **Save**.

d. Set the Advanced Settings task to complete by selecting **Mark as Complete**.

7. Set up the SG-AppDynamics Servers and Applications scheduled job available by default.

a. For the Configure scheduled job task in the Set up scheduled import jobs section, select **Configure**.

b. On the Scheduled Data Import form, verify the field values for the SG-AppDynamics Servers and Applications scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

c. Select **Update**.

d. Set the Configure scheduled job task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for Observability - AppDynamics

When you complete setting up the connection, you can configure the integration to periodically pull data from AppDynamics. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

AppDynamics Extension [sn_sg_appd_extension]

The following attributes in the AppDynamics Extension [sn_sg_appd_extension] table are populated by collected data:

Attribute label	Attribute name
AppDynamics ID	appdynamics_id

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Attribute label	Attribute name
Controller Name	controller_name
Agent Type	agent_type
Type	type

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
Name	name
Running process command	running_process_command

Relationships created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Server [cmdb_ci_server]
Application [cmdb_ci_appl]	Reference	AppDynamics Extension [sn_sg_appd_extension]

Calculated Application Service [cmdb_ci_service_calculated]

The following attributes in the Calculated Application Service [cmdb_ci_service_calculated] table are populated by collected data:

Attribute label	Attribute name
Name	name
Hide from dashboard	hide_from_dashboard
Metadata	metadata
Operational status	operational_status
Service Populator Status	populator_status
Service Populator	service_populator
Service Type	type
Short Description	short_description

Relationships created for Calculated Application Service

Parent class	Relationship type	Child class
Calculated Application Service [cmdb_ci_service_calculated]	Depends on::Used by	Application [cmdb_ci_appl]

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Relationships created for Calculated Application Service (continued)

Parent class	Relationship type	Child class
Calculated Application Service [cmdb_ci_service_calculated]	Depends on::Used by	Server [cmdb_ci_server]
Calculated Application Service [cmdb_ci_service_calculated]	Depends on::Used by	Calculated Application Service [cmdb_ci_service_calculated]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Nic	nic
IP version	ip_version
Name	name

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Discovery source	discovery_source

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Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
Name	name

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]

Accessing the connection details of Service Graph Connector for Observability - AppDynamics

You can access the connection details of the Service Graph Connector for Observability - AppDynamics in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Observability - AppDynamics. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an AppDynamics connection

Access the details of an AppDynamics connection configured for the Service Graph Connector for Observability - AppDynamics.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AppDynamics** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

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Service Graph Connector for Observability - Datadog

Use the Service Graph Connector for Observability - Datadog to ingest CMDB data from a Datadog installation using REST APIs. Push events from Datadog into ServiceNow with Event Management.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

Supported ServiceNow versions:

- Washington DC
- Xanadu
- Yokohama

Guided setup

The guided setup for the Service Graph Connector for Observability - Datadog provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for Observability - Datadog using guided setup.

[store-future: BEGIN review]

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Observability - Datadog using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

[End]

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Observability Datadog integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Datadog data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

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The Datadog data source includes SGO-Datadog Hosts [sn_datadog_integra_datadog_hosts].

For more information on where data is saved when pulling data from Datadog, see CMDB classes targeted in Service Graph Connector for Observability - Datadog.

When you complete setting up the connection, the data from Datadog is automatically loaded into staging tables and then inserted into the following target tables:

- Cloud DataBase [cmdb_ci_cloud_database]
- Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
- Cloud Service Account [cmdb_ci_cloud_service_account]
- IP Address [cmdb_ci_ip_address]
- Key Value [cmdb_key_value]
- Logical Datacenter [cmdb_ci_logical_datacenter]
- Network Adapter [cmdb_ci_network_adapter]
- Server [cmdb_ci_server]

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Observability - Datadog using SGC Central

Configure Service Graph Connector for Observability - Datadog using guided setup

CMDB classes targeted in Service Graph Connector for Observability - Datadog

Accessing the connection details of Service Graph Connector for Observability - Datadog

[store-future: BEGIN review]

Configure Service Graph Connector for Observability - Datadog using SGC Central

Set up scheduled import jobs to pull in Datadog data into your Configuration Management Database (CMDB).

Before you begin

- Install Service Graph Connector for Observability - Datadog version 1.3.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- Install the Observability Commons for CMDB application (sn_observability), which is only required for event ingestion. This application must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

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Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

> **Tip:**
> Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Datadog connector type, and then select **Configure connection**.
   A default connection, SGO-Datadog Connection, for Datadog is available within the application. As the Service Graph Connector for Observability - Datadog supports only a single instance, you can configure the default connection for the first time or resume editing it thereafter.
5. Install the Observability Commons for CMDB application (sn_observability) for event ingestion.

> **Note:**
> The **Install Observability Commons for CMDB** activity appears only when the Observability Commons for CMDB application (sn_observability) isn't already installed. If event ingestion isn't needed, you can skip this step by selecting **Continue** for the **Install Observability Commons for CMDB** activity.

   a. In the **Prerequisites** stage of the playbook, select the **Install Observability Commons for CMDB** activity.
   b. Install the Observability Commons for CMDB application (sn_observability) from the ServiceNow Store.
   c. After you have installed the application, select **Continue**.
6. Enter connection details and test the API connection for importing Datadog data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Configure and test connection form

Field	Description
Connection name	Name to identify the Datadog connection record.
Connection URL	Base URL for the Datadog API endpoint.
API key	Datadog API token.
Application key	Datadog application key that works together with the API key to provide user-level authentication.

   c. Select **Update and test connection**.

   d. Once the connection test is complete, select **Continue**.

7. **Optional:** Configure the connector properties to access resources.

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Note:
To skip this step, select **Continue** for the **Set configuration properties** activity.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. In the **Hosts filter** field, enter host tags in the `key:value` format to import data only from hosts that match the specified tags in Datadog.

Note:
For multiple entries, separate the tags with commas. Example: `datadog:monitored,env:production`.

In the example, the filter includes monitored hosts in the `key:value` format as `datadog:monitored` and `env:production`. Therefore, the data from only these hosts with matching tags are imported.

c. Select **Continue**.

8. **Optional:** Fetch monitors from Datadog to use the webhook for sending updates to your ServiceNow instance.

Note:
This step appears only when the Observability Commons for CMDB application (sn_observability) is installed on your instance. To skip this step, select **Skip** for the **Configure observability** activity.

a. In the **Setup** stage of the playbook, select the **Configure observability** activity.

b. To fetch all the monitors from the Datadog environment, select **Fetch monitors**.

c. After fetching the Datadog monitors, select the check boxes next to the monitor names in the Datadog monitors section and then mark them as active by selecting **Mark as active**.
In the table of fetched monitors, the active monitors are set to **true**, and inactive monitors are set to **false** in the **Webhook Active** cell for that monitor.

Note:

- At least one Datadog monitor must be active for observability to work.
- To exclude a monitor, double-click the value in the **Webhook Active** cell for that monitor in the table of fetched monitors, select **false** (if it is currently set to **true**), and then select **OK**.
- Any update in the **Webhook Active** value is synced between ServiceNow and Datadog.

d. When at least one monitor is set to **true**, select **Continue** for the **Configure observability** activity.

9. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list and select the **SGO Datadog - Hosts** import schedule.

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c. Select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics

Service Graph Connector for Observability - Datadog

CMDB classes targeted in Service Graph Connector for Observability - Datadog

Accessing the connection details of Service Graph Connector for Observability - Datadog
[End]

Configure Service Graph Connector for Observability - Datadog[store-future: BEGIN review] using guided setup[End]

Pull in data from Datadog into your Configuration Management Database (CMDB).

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

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Note:
If you have an earlier version of the Service Graph Connector for Observability - Datadog, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Observability Datadog** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. Configure the authentication credentials and the host name to send requests to the Datadog API.

   a. Configure your Datadog credentials.

      i. In the Configure the Connection section of the Datadog Integration with CMDB page, select **Get Started**.

      ii. For the Configure the Credentials task, select **Configure**.

      iii. In the **Connection name** field, enter a name for the connection.

      Note:
      Do not modify the name of the default connection.

      iv. In the **Connection URL** field, enter the base URL or IP address for Datadog.

      v. In the **API key** field, enter the Datadog API token.

      vi. In the **Application key** field, enter the application key used for connecting to the Datadog API.

      vii. Select **Update**.

      viii. Set the Configure the Credentials task to complete by selecting **Mark as Complete**.

   b. Test the connection.

      i. For the Test Connection task, select **Configure**.

      ii. Test the connection by selecting the **Test Connection** related link.

      Testing the connection might take a few moments. The page is refreshed to show the test results.

      iii. When the **Status** field is set to **Success**, select **Update**.

      If any of the tests have errors, follow the suggestions for remediation.

      iv. Set the Test Connection task to complete by selecting **Mark as complete**.

   c. **Optional:** Add a filter for the SGO-Datadog Hosts [sn_datadog_integra_datadog_hosts] data source.

      i. For the Create Hosts Filter task, select **Configure**.

      ii. Enter a comma-separated list of host tags in `key:value` format in the **Value** field to define a filter for pulling host data from Datadog.

      For example, `datadog:monitored,env:production`.

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iii. Select **Update**.

iv. Set the Create Hosts Filter task to complete by selecting **Mark as complete**.

4. Configure the webhook and monitors for Observability Datadog.

a. In the Configure Observability section of the Datadog Integration with CMDB page, select **Get started**.

b. For the Configure the Webhooks and Monitors task, select **Configure**.

c. In the Datadog Webhooks list, select **New** to add a Datadog webhook.

d. Fill in the fields.

New record form

Field	Description
Name	Name of the Datadog webhook.
Connection Alias	Search for and select the connection and credential alias that you created in step 3.

e. Select **Submit**.

f. Populate the Datadog Webhooks list by selecting the **Synchronize Monitors** related link on the Datadog Webhook page.

> **Note:**
> In the Datadog Webhooks list, don't select **New** to add a monitor as this option is not used in this scenario.

g. In the **Name** column of the Datadog Webhooks list, select a monitor.

h. On the Datadog Monitors page, select the **Webhook Active** check box, and then select **Update**.

i. Repeat steps 4.g and 4.h for all the monitors in the Datadog Webhooks list.

j. On the Datadog Webhook page, select **Update** to save your changes.

k. Set the Configure the Webhooks and Monitors task to complete by selecting **Mark as Complete**.

Related topics

Service Graph Connector for Observability - Datadog

CMDB classes targeted in Service Graph Connector for Observability - Datadog

Accessing the connection details of Service Graph Connector for Observability - Datadog

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CMDB classes targeted in Service Graph Connector for Observability - Datadog

When you complete setting up the connection, the data is automatically pulled from Datadog. The data is saved in target tables.

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Fully qualified domain name	fqdn
Name	name
Type	type
Version	version

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

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Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Nic	nic
Name	name

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Logical Datacenter [cmdb_ci_logical_datacenter] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region

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Relationship created for Logical Datacenter

Parent class	Relationship type	Child class
Logical Datacenter [cmdb_ci_logical_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Configuration Item	cmdb_ci
MAC Address	mac_address
Name	name

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
CPU core thread	cpu_core_thread
CPU count	cpu_count
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
Disk space (GB)	disk_space
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Name	name
Operating System	os
RAM (MB)	ram

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Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]

Related topics

Service Graph Connector for Observability - Datadog

Accessing the connection details of Service Graph Connector for Observability - Datadog

You can access the connection details of the Service Graph Connector for Observability - Datadog in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Observability - Datadog. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Datadog connection

Access the details of a Datadog connection configured for the Service Graph Connector for Observability - Datadog.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Datadog** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for Observability - Datadog

Service Graph Connector for Observability - Dynatrace

Use the Service Graph Connector for Observability - Dynatrace to ingest CI data, events, metrics, and logs from Dynatrace into your ServiceNow instance.

Note:
The Service Graph Connector for Observability - Dynatrace provided by ServiceNow is different from the Service Graph Connector for Dynatrace provided by Dynatrace.

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Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

- Supported versions:
  - Minimum version supported: Dynatrace SaaS; Version 1.284
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama
  - Zurich

Important information for upgrading Service Graph Connector for Observability - Dynatrace

Before upgrading the Service Graph Connector for Observability - Dynatrace to version 1.10.0 or later, disable the reconciliation rules for tables extending the Application [cmdb_ci_appl] table. See the Reconciliation rules(ServiceNow, ServiceWatch) on multiple table like Apache web server stopping other discovery source to update fields on those tables [KB1649455] article in the Now Support Knowledge Base.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Observability - Dynatrace using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Dynatrace integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Dynatrace data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following table describes the data sources, the staging tables, the target tables as CMDB CI classes, and the Dynatrace entities imported by each data source.

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Data mapping for Dynatrace entities

Data source	Description	Staging table	CMDB CI classes	Entities
SGO-Dynatrace Hosts	Ingests host data from Dynatrace. Contains computer data.	SGO-Dynatrace Hosts [sn_dynatrace_integ_ss_dynatrace_hosts]	Computer IP Address [cmdb_ci_ip_address] Key value When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation **Note:** Only the operating system data is stored in the Software Packages, Software Instance, and Software Installation CI classes.	Host
SGO-Dynatrace Processes	Ingests process data from Dynatrace. Contains running process data.	SGO-Dynatrace Processes [sn_dynatrace_integ_ss_dynatrace_processes]	The target table is populated using Application Dependency Mapping (ADM). The ADM adapter analyzes the imported data and command-line arguments, identifies the appropriate table based on	Process

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
			the conditions included in Discovery Process Classifications list, and inserts the data into the table, which extends the Application [cmdb_ci_appl] table. To learn about process classification, see Discovery classifiers. **Note:** The addition of unclassified processes to the Application [cmdb_ci_appl] table depends on the value of the *sn_dynatrace_integ.createUnmatched* system property. For more information, see Service Graph Connector for Observability - Dynatrace properties.	
SGO-Dynatrace Process Groups	Ingests process group data from Dynatrace. Contains a group of similar running processes.	SGO-Dynatrace Process Groups [sn_dynatrace_integ_sg_dynatrace_process_groups]	Group	Process Group
SGO-Dynatrace Services	Ingests service data from Dynatrace.	SGO-Dynatrace Services [sn_dynatrace_integ_sg_dynatrace_services]	Calculated Application Service	Service

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
	Contains information related to services that are detected via the Dynatrace agent. Can be filtered using advanced settings properties.		Key value	
SGO-Dynatrace Applications	Ingests application data from Dynatrace. Contains information related to the applications defined manually. Applications are parents to services representing a higher level, logical group of services.	SGO-Dynatrace Applications [sn_dynatrace_integ_sg_dynatrace_applications]	Calculated Application Service Key value	Application
SGO-Dynatrace Application Rels	Ingests application relationships from Dynatrace. Returns the same data as the SGO-Dynatrace Services data source. Maps relationships between applications and processes that could have been skipped due to filtered services.	SGO-Dynatrace Application Relationships [sn_dynatrace_integ_sg_dynatrace_application_relationships]	Calculated Application Service	Service
SGO-Dynatrace AWS Application Network LB	Ingests cloud load balancer data from Dynatrace.	SGO-Dynatrace AWS Application Network LB [sn_dynatrace_integ_sgo_dynatrace_aws_application_network_lb]	Cloud Load Balancer Key Value	AWS Network Load Balancer

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
	Contains information related to AWS application and network load balancer.			AWS Application Load Balancer
SGO-Dynatrace AWS Datacenters	Ingests AWS datacenter and availability zone data from Dynatrace. Contains information related to AWS datacenters and availability zones.	SGO-Dynatrace AWS Availability Zone [sn_dynatrace_integ_sgo_dynatrace_aws_availability_zone]	AWS Datacenter Availability Zone	AWS Availability Zone
SGO-Dynatrace AWS EC2 Instance	Ingests AWS virtual machine instance data from Dynatrace. Contains information related to virtual machine instances, server details, cloud hardware type, cloud image, and tags.	SGO-Dynatrace AWS EC2 Instance [sn_dynatrace_integ_sg_dynatrace_aws_ec2_instance]	Virtual Machine Instance Server Cloud Hardware Type Hardware Type Image Key Value	EC2 Instance
SGO-Dynatrace AWS Elastic Loadbalancer	Ingests cloud load balancer data from Dynatrace. Contains load balancer details and tags.	SGO-Dynatrace AWS Elastic Loadbalancer [sn_dynatrace_integ_sgo_dynatrace_aws_elastic_loadbalancer]	Cloud Load Balancer Key Value	Elastic Load Balancer
SGO-Dynatrace AWS Service Account	Ingests cloud service account data from Dynatrace. Contains information related to AWS account IDs.	SGO-Dynatrace AWS Service Account [sn_dynatrace_integ_sgo_dynatrace_aws_service_account]	Cloud Service Account	AWS Credentials

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
SGO-Dynatrace Azure Load Balancer	Ingests Azure load balancer data from Dynatrace. Contains Azure load balancer and cloud load balancer IP address and tag details.	SGO-Dynatrace Azure Load Balancer [sn_dynatrace_integ_sgo_dynatrace_azure_load_balancer]	Cloud Load Balancer Cloud LB IPAddress Key Value	Azure Load Balancer
SGO-Dynatrace Azure Region	Ingests Azure datacenter data from Dynatrace. Contains Azure datacenter information.	SGO-Dynatrace Azure Region [sn_dynatrace_integ_sgo_dynatrace_azure_region]	Azure Datacenter	Azure Region
SGO-Dynatrace Azure Storage Accounts	Ingests Azure cloud storage account data from Dynatrace. Contains information related to cloud storage accounts.	SGO-Dynatrace Azure Storage Accounts [sn_dynatrace_integ_sgo_dynatrace_azure_storage_accounts]	Cloud Storage Account	Azure Storage Account
SGO-Dynatrace Azure Strg Acnts v2	Ingests Azure cloud storage account data from Dynatrace using v2 API. Contains information related to cloud storage accounts.	SGO-Dynatrace Azure Storage Accounts v2 [sn_dynatrace_integ_sgo_dynatrace_azure_storage_accounts_v2]	Cloud Storage Account	cloud:azure:storage:storageaccou
SGO-Dynatrace Azure Subscriptions	Ingests Azure subscription data from Dynatrace. Contains Azure subscription details.	SGO-Dynatrace Azure Subscriptions [sn_dynatrace_integ_sg_dynatrace_azure_subscriptions]	Cloud Service Account	Azure Subscription
SGO-Dynatrace Azure VM	Ingests Azure virtual machine instance data from Dynatrace.	SGO-Dynatrace Azure VM [sn_dynatrace_integ_sgo_dynatrace_azure_vm]	Virtual Machine Instance	Azure VM

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
	Contains information related to Azure virtual machine instances.			
SGO-Dynatrace Docker Container	Ingests Docker container data from Dynatrace. Contains information related to the Docker container image.	SGO-Dynatrace Docker Container [sn_dynatrace_integ_sgo_dynatrace_docker_container]	Docker Container Application Docker Image Computer [cmdb_ci_computer]	Container Group Instance
SGO-Dynatrace Kubernetes Cluster	Ingests Kubernetes cluster data from Dynatrace. Contains information related to Kubernetes clusters.	SGO-Dynatrace Kubernetes Cluster [sn_dynatrace_integ_sgo_dynatrace_kubernetes_cluster]	Kubernetes Cluster	Kubernetes Cluster
SGO-Dynatrace Kubernetes Namespace	Ingests Kubernetes namespace data from Dynatrace. Contains information related to Kubernetes namespaces.	SGO-Dynatrace Kubernetes Namespace [sn_dynatrace_integ_sgo_dynatrace_kubernetes_namespace]	Kubernetes Namespace	Cloud Application Namespace
SGO-Dynatrace Kubernetes Node	Ingests Kubernetes node data from Dynatrace. Contains information related to Kubernetes nodes.	SGO-Dynatrace Kubernetes Node [sn_dynatrace_integ_sgo_dynatrace_kubernetes_node]	Kubernetes Node	Kubernetes Node
SGO-Dynatrace Kubernetes Pod	Ingests Kubernetes pod data from Dynatrace.	SGO-Dynatrace Kubernetes Pod [sn_dynatrace_integ_sgo_dynatrace_kubernetes_pod]	Kubernetes Pod	Cloud Application Instance

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
	Contains information related to Kubernetes pods.			
SGO-Dynatrace Kubernetes Service	Ingests Kubernetes service data from Dynatrace. Contains information related to Kubernetes services.	SGO-Dynatrace Kubernetes Service [sn_dynatrace_integ_sgo_dynatrace_kubernetes_service]	Kubernetes Service	Kubernetes Service
SGO-Dynatrace Azure Cosmos DB v1	Ingests Azure Cosmos DB data from Dynatrace. Contains information related to Azure Cosmos DB.	SGO-Dynatrace Azure Cosmos DB v1 [sn_dynatrace_integ_sgo_dynatrace_azure_cosmos_db_v1]	Cloud DataBase Azure Datacenter Cloud Service Account Key value	AZURE_COSMOS_DB
SGO-Dynatrace Azure Cosmos DB V2	Ingests Azure Cosmos DB data from Dynatrace. Contains information related to Azure Cosmos DB.	SGO-Dynatrace Azure Cosmos DB V2 [sn_dynatrace_integ_sgo_dynatrace_azure_cosmos_db_v2]	Cloud DataBase Azure Datacenter Cloud Service Account Key value	cloud:azure:documentdb:databas cloud:azure:documentdb:databas
SGO-Dynatrace Azure SQL Server V2	Ingests Azure SQL Server data from Dynatrace. Contains information related to Azure SQL Server.	SGO-Dynatrace Azure SQL Server V2 [sn_dynatrace_integ_sgo_dynatrace_azure_sql_server_v2]	Cloud DataBase Azure Datacenter Key value	cloud:azure:sql:servers:databases cloud:azure:sql:servers:databases cloud:azure:sql:servers:databases
SGO-Dynatrace Azure Function App	Ingests Azure Functions app data from Dynatrace. Contains information related to Azure Functions app.	SGO-Dynatrace Azure Function App [sn_dynatrace_integ_sgo_dynatrace_azure_function_app]	Cloud Function Azure Datacenter Cloud Service Account Key value	AZURE_FUNCTION_APP

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
SGO-Dynatrace Azure Scale Sets VM	Ingests Azure Virtual Machine Scale Sets (VMSS) data from Dynatrace. Contains information related to Azure VMSS.	SGO-Dynatrace Azure Scale Sets VM [sn_dynatrace_integ_sgo_dynatrace_azure_scale_sets_vm]	Instance Scale Set Azure Datacenter Cloud Service Account Key value	AZURE_VM_SCALE_SET
SGO-Dynatrace AWS RDS V1	Ingests Amazon Relational Database Service (RDS) data from Dynatrace. Contains information related to Amazon RDS.	SGO-Dynatrace AWS RDS V1 [sn_dynatrace_integ_sgo_dynatrace_aws_rds_v1]	Cloud DataBase AWS Datacenter Key value	RELATIONAL_DATABASE_SERVIC
SGO-Dynatrace AWS RDS V2	Ingests Amazon Relational Database Service (RDS) data from Dynatrace. Contains information related to Amazon RDS.	SGO-Dynatrace AWS RDS V2 [sn_dynatrace_integ_sgo_dynatrace_aws_rds_v2]	Cloud DataBase AWS Datacenter Key value	cloud:aws:rds
SGO-Dynatrace AWS Dynamo DB v1	Ingests Amazon Dynamo DB data from Dynatrace. Contains information related to Amazon Dynamo DB.	SGO-Dynatrace AWS Dynamo DB v1 [sn_dynatrace_integ_sgo_dynatrace_aws_dynamo_db_v1]	DynamoDB Table AWS Datacenter Key value	DYNAMO_DB_TABLE
SGO-Dynatrace AWS Dynamo DB v2	Ingests Amazon Dynamo DB data from Dynatrace. Contains information related to Amazon Dynamo DB.	SGO-Dynatrace AWS Dynamo DB v2 [sn_dynatrace_integ_sgo_dynatrace_aws_dynamo_db_v2]	DynamoDB Table AWS Datacenter Key value	cloud:aws:dynamodb

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
SGO-Dynatrace AWS Lambda Func V1	Ingests AWS Lambda Function data from Dynatrace. Contains information related to AWS Lambda Function.	SGO-Dynatrace AWS Lambda Func V1 [sn_dynatrace_integ_sgo_dynatrace_aws_lambda_func_v1]	Cloud Function Azure Datacenter Key value	AWS_LAMBDA_FUNCTION
SGO-Dynatrace AWS Lambda Func V2	Ingests AWS Lambda Function data from Dynatrace. Contains information related to AWS Lambda Function.	SGO-Dynatrace AWS Lambda Func V2 [sn_dynatrace_integ_sgo_dynatrace_aws_lambda_func_v2]	Cloud Function Azure Datacenter Key value	cloud:aws:lambda
SGO-Dynatrace AWS S3 Bucket V2	Ingests Amazon S3 bucket data from Dynatrace. Contains information related to Amazon S3 bucket.	SGO-Dynatrace AWS S3 Bucket V2 [sn_dynatrace_integ_sgo_dynatrace_aws_s3_bucket_v2]	Cloud Object Storage AWS Datacenter Key value	cloud:aws:s3
SGO-Dynatrace Custom Applications	Ingests custom application data from Dynatrace. Contains information related to custom applications.	SGO-Dynatrace Custom Applications [sn_dynatrace_integ_sgo_dynatrace_custom_applications]	Calculated Application Service Configuration Item [cmdb_ci] Key value	CUSTOM_APPLICATION
SGO-Dynatrace AWS Auto Scaling Group V1	Ingests AWS autoscaling group data from Dynatrace using V1 API. Contains information related to AWS autoscaling group.	SGO-Dynatrace AWS Auto Scaling Group V1 [sn_dynatrace_integ_sgo_dynatrace_aws_auto_scaling_group_v1]	Cloud Resource AWS Datacenter Key value	AUTO_SCALING_GROUP

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When you complete setting up the connection, you can configure the integration to pull data from Dynatrace periodically. The data is loaded into the staging tables, and then inserted into the target tables.

For more information on where data is saved when pulling data from Dynatrace, see CMDB classes targeted in Service Graph Connector for Observability - Dynatrace.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional resources

- Introduction to Service Graph Connector for Observability Dynatrace article on the ServiceNow Community site
- How do I configure the Dynatrace Service Graph Connector? article on the ServiceNow Community site

Related topics

Service Graph Connectors

Service Graph Connector for Observability - Dynatrace properties

Configure Service Graph Connector for Observability - Dynatrace using SGC Central

Set up scheduled import jobs to pull in Dynatrace data into your Configuration Management Database (CMDB).

Before you begin

Install Service Graph Connector for Observability - Dynatrace version 1.11.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Dynatrace connector type, and then select **Configure connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

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a. **Optional:** Install the Observability Commons for CMDB application (sn_observability) for event ingestion.

> **Note:**
> The **Install Observability Commons for CMDB** activity appears only when the Observability Commons for CMDB application (sn_observability) isn't already installed. If event ingestion isn't needed, you can skip this step by selecting **Continue** for the **Install Observability Commons for CMDB** activity.

i. In the **Prerequisites** stage of the playbook, select the **Install Observability Commons for CMDB** activity.

ii. Install the Observability Commons for CMDB application (sn_observability) from the ServiceNow Store.

iii. After you have installed the application, select **Continue**.

b. Create data sources for the connection.

> **Note:**
> This step is required when configuring the connector for the first time only.

i. Verify that you have edit permissions for the Datasource [sys_data_source] table.

ii. In the **Prerequisites** stage of the playbook, select the **Update data source access** activity.

iii. Select **Update access**.

iv. To edit the record, select the **Global** application scope from the application picker.

v. In the Application Access related list of the Data Source form, select the **Can create**, **Can update**, and **Can delete** check boxes.

vi. Select **Update**.

vii. From the application picker, select the application scope of the connector.

viii. After completing the **Update data source access** activity, select **Continue**.

c. Enable creating scheduled jobs for the connection by updating the scheduled data import access.

> **Note:**
> This step is required when configuring the connector for the first time only.

i. Verify that you have edit permissions for the Scheduled Data Import [scheduled_import_set] table.

ii. In the **Prerequisites** stage of the playbook, select the **Update scheduled data import access** activity.

iii. Select **Update access**.

iv. To edit the record, select the **Global** application scope from the application picker.

v. In the Application Access related list of the Data Source form, select the **Can create**, **Can update**, and **Can delete** check boxes.

vi. Select **Update**.

vii. From the application picker, select the application scope of the connector.

viii. After completing the **Update scheduled data import access** activity, select **Continue**.

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d. Enable creating values for the connection by updating the variable value access.

> **Note:**
> This step is required when configuring the connector for the first time only.

i. Verify that you have edit permissions for the Value [sys_variable_value] table.

ii. In the **Prerequisites** stage of the playbook, select the **Update variable value access** activity.

iii. Select **Update access**.

iv. To edit the record, select the **Global** application scope from the application picker.

v. In the Application Access related list of the Data Source form, select the **Can create**, **Can update**, and **Can delete** check boxes.

vi. Select **Update**.

vii. From the application picker, select the application scope of the connector.

viii. After completing the **Update variable value access** activity, select **Continue**.

e. Clear the cache on the Data Source [sys_data_source] table.

> **Note:**
> This step is required when configuring the connector for the first time only.

i. In the **Prerequisites** stage of the playbook, select the **Clear cache** activity.

ii. Select **Run clear cache**.

iii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
     GlideCacheManager.flushTable("sys_data_source");


 GlideTableManager.invalidateTable("scheduled_import_set");
     GlideCacheManager.flushTable("scheduled_import_set");


 GlideTableManager.invalidateTable("sys_variable_value");
     GlideCacheManager.flushTable("sys_variable_value");

     GlideTableManager.invalidateTable("sys_db_object");
     GlideCacheManager.flushTable("sys_db_object");
```

iv. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

v. After the script is executed, select **Close**.

vi. From the application picker, select the application scope of the connector.

vii. After completing the **Clear cache** activity, select **Continue**.

f. Verify that the Event Management application works properly with the Dynatrace environment by copying the `EvtMgmtImpactManagerMediator` script to the Global application scope.

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Note:
This step is displayed only when the Observability Commons for CMDB plugin (sn_observability) is already installed and is required when configuring the connector for the first time only.

i. In the **Prerequisites** stage of the playbook, select the **Enable script access for event management** activity.
ii. Select **Enable script access**.
iii. Select the **Global** application scope from the application picker.
iv. From the context menu, select **Insert and Stay**.
v. Verify that the `EvtMgmtImpactManagerMediator` script was copied to the Global application scope and the **Accessible from** field was set to `All application scopes`.
vi. Select **Update**.
vii. From the application picker, select the application scope of the connector.
viii. After completing the **Enable script access for event management** activity, select **Continue**.

6. Enter connection details and test the API connection for importing Dynatrace data.

a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection name	Name to identify the Dynatrace connection record.
Hostname	Hostname of your Dynatrace environment.
API Key	Dynatrace API Key. **Note:** The API Key must be prefixed with `api-token`.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

7. **Optional:** Configure the connection and connector properties to map attributes and manage data imports.

Note:
To skip this step, select **Continue** for the **Set configuration properties** activity.

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a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. Fill in the form.

Configuration properties

Field	Description
Management zone Ids	List of the management zone IDs to fetch from your Dynatrace environment. For multiple entries, separate the zone IDs with commas.
Management zone names	List of the management zones to fetch from your Dynatrace environment. For multiple entries, separate the zone names with commas.
Service types	List of the Dynatrace service types from where to ingest the data into the CMDB. For multiple entries, separate the service types with commas. **Note:** All service types except for DATABASE_SERVICE are mapped to the Calculated Application Service [cmdb_ci_service_calculated] CMDB table. The DATABASE_SERVICE service type is mapped to the Database Instance [cmdb_ci_db_instance] CMDB table. Valid values are: ▪ BACKGROUND_ACTIVITY ▪ CICS_SERVICE ▪ CUSTOM_SERVICE ▪ DATABASE_SERVICE ▪ ENTERPRISE_SERVICE_BUS_SERVICE ▪ EXTERNAL ▪ IBM_INTEGRATION_BUS_SERVICE ▪ IMS_SERVICE ▪ MESSAGING_SERVICE ▪ QUEUE_LISTENER_SERVICE ▪ RMI_SERVICE ▪ RPC_SERVICE ▪ WEB_REQUEST_SERVICE ▪ WEB_SERVICE
Tags	List of the tag names to fetch from your Dynatrace environment. For multiple entries, separate the tags with commas.

c. To manage data source failures during import, select the **Save REST response as attachment** check box to save each response as an attachment temporarily.

d. Select **Continue**.

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8. **Optional:** To enable Dynatrace notifications as events in your ServiceNow instance, trigger the workflow to create a problem notification and alerting profile in your Dynatrace environment.

   Note:
   This step is displayed only when the Observability Commons for CMDB plugin (sn_observability) is already installed. To skip this step, select **Skip** for the **Configure observability** activity.

   a. In the **Setup** stage of the playbook, select the **Configure observability** activity.

   b. Select **Create problem notification**.

   Note:
   The created records appear in the Dynatrace application under the display name `ServiceNow default Problem notification` and can be customized.

   c. Dismiss any success alerts and select **Continue**.

9. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Expand the Parent scheduled data import within the Import schedules list to select the **SGO-Dynatrace Hosts -** *`Connection Name`* import schedule.

   c. Select the **Active** check box, and then fill in the run schedule and time details.

   For more information, see Schedule a data import.

   d. Select **Save**.
   Alternatively, select **Execute Now** to execute the import schedule immediately.

10. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next
Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics
- Service Graph Connector for Observability - Dynatrace
- CMDB classes targeted in Service Graph Connector for Observability - Dynatrace
- Service Graph Connector for Observability - Dynatrace properties

Configure Service Graph Connector for Observability - Dynatrace

Use the Service Graph Connector for Observability - Dynatrace to ingest Configuration Management Database (CMDB) data from Dynatrace using REST APIs. This connector is the second generation of the Service Graph Connector for Observability - Dynatrace application developed by ServiceNow.

Before you begin
To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery

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application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion and will need to be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
To access the Dynatrace API, you need an access token with Read entities (entities.read) scope.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Dynatrace Observability** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. Set impact values for clusters and have the connector get access to the `SNC.ImpactManager` API.

   Note:
   This step appears when Observability Commons is installed.

   a. On the Setup page, in the Enable Access To SNC.Impact Manager section, select the **Copy Script to Global Scope** task.

   b. In the Copy Script to Global Scope section, copy the script.

      i. Select **Configure**.

      ii. Switch to the global scope.

      iii. Select the Additional actions icon ( ).

      iv. Select **Insert and Stay**.

      v. Select **Mark as Complete**.

   c. In the Verify script is copied properly section, verify the script.

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i. Select **Configure**.

ii. Select the *EvtMgmtImpactManagerMediator* script and verify it was copied to the global scope.

iii. In the **Accessible from** field, ensure it is set to **All application scopes**.

iv. Select **Mark as Complete**.

4. Configure the basic setup.

a. On the Setup page, in the Basic section, select the **Configure Auth Token for Dynatrace** task.

b. On the next page, in the Configure Auth Token for Dynatrace section, configure the authentication token.

i. Select **Configure**.

ii. In the **API Key** field, enter `api-token <your api token>`.

For example, `api-token mytokenid`.

iii. Select **Mark as Complete**.

c. In the Configure HTTP Connection for Dynatrace section, configure the HTTP connection.

i. Select **Configure**.

ii. Update the **Host** field with a fully qualified hostname for your Dynatrace instance.

For example, `abc123.live.dynatrace.com`.

The hostname is automatically filled in the **Connection URL** field.

iii. Enable the use of a MID Server, select the **Use MID Server** check box.

Note:
The HTTP connection will be pre-configured to use the API key that was configured during the previous setup task.

iv. Select **Mark as Complete**.

d. Test the HTTP connection.

i. In the Test Connection section, select **Configure**.

ii. To test the connection configuration, select **Test Connection**.

Note:
If any of the tests have errors, follow the suggestions for remediation.

iii. Set the Test Connection task to complete by selecting **Mark as Complete**.

e. In the Create Default Notification Payload Template section, select **Configure**.

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Note:
You need an access token with the following scopes:

- Read configuration (ReadConfig)
- Write configuration (WriteConfig)
- Read log content (LogExport)
- Read metrics (metrics.read)
- Read settings (settings.read)
- Write settings (settings.write)
- Read logs (logs.read)

i. Update the name of the payload template, if needed.

ii. Select **Problem Notification Setup**.

iii. Set the Create Default Notification Payload Template task to complete by selecting **Mark as Complete**.

f. **Optional:** If you want to support multiple instances, in the Upgrade Source Native Keys section, select **Configure**.

i. In the **Run script** text box of the background script page, enter the following script:

```
var gr = new GlideRecord("sys_object_source");
gr.addQuery("name", "SGO-Dynatrace");
var grOR = gr.addQuery("id", "STARTSWITH", "HOST-");
grOR.addOrCondition("id", "STARTSWITH",
 "PROCESS_GROUP_INSTANCE-");
grOR.addOrCondition("id", "STARTSWITH", "PROCESS_GROUP-");
grOR.addOrCondition("id", "STARTSWITH", "SERVICE-");
grOR.addOrCondition("id", "STARTSWITH", "APPLICATION-");
gr.query();
while (gr.next()) {
    gr.setValue("id", "f379137e075820107add6a77c4a93538|||"
 + gr.getValue("id"));
    gr.update();
}
```

ii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iii. After the script is executed, select **Close**.

iv. From the application picker, select the **Service Graph Connector for Observability Dynatrace** application.

v. Select **Mark as Complete**.

5. For a Grail-enabled tenant, configure the OAuth 2.0 client credentials and test the connection. For more information on Dynatrace OAuth credentials, see Authentication for the Account Management API on the Dynatrace documentation site.

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a. Set the Dynatrace Grail status to indicate whether using the Grail-enabled tenant.

Note:

You can check Grail enablement by contacting your Dynatrace administrator.

i. In the Configure Dynatrace Grail OAuth section of the Service Graph Connector for Observability Dynatrace Setup page, select **Get Started**.

ii. For the Set Dynatrace Grail status task, select **Configure** and review or modify the property settings for a Grail-enabled tenant.

iii. If you've Grail-enabled tenant, set the **Value** field of the *`grailEnabled`* property to `true`.

Else, leave the value set to `false`.

iv. Set the Configure Dynatrace Grail OAuth task to complete by selecting **Mark as Complete**.

b. Add a new OAuth connection.

Note:
You need an OAuth token with the following scope permissions in Grail:

- storage:logs:read
- storage:buckets:read

i. In the Configure OAuth credentials section, select **Configure**.

ii. On the Flow Designer page that opens in a new browser tab, select **Add Connection**.

iii. Enter a name, the connection URL, OAuth client ID, and OAuth client secret details.

iv. Select **Create and Get OAuth Token**.

v. Return to the guided setup page.

vi. Set the Configure OAuth credentials task to complete by selecting **Mark as Complete**.

c. Test the new OAuth connection.

i. In the Test Connection section, select **Configure**.

ii. To test the connection configuration, select **Test Connection**.

iii. When the **Status** field is set to **Success**, select **Update** to close the Test the connection dialog box and return to the guided setup page.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test Connection task to complete by selecting **Mark as Complete**.

6. Set up the additional configurations.

a. On the Guided setup page, in the Advanced section, select the **Advanced settings** task.

b. In the Advanced Settings section, select **Configure** and review or modify the existing settings for a custom configuration.
You can configure the following settings:

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- Review the page size used in REST API requests to fetch Dynatrace entities.
- Define number of days a configuration item (CI) can be inactive before it is ignored.
- Enter the percentage of an application cluster's nodes that need to be in a state to raise that state to its parent in the service map.

  For example, you can define the percentage of nodes that need to go critical for the parent of a cluster to be in a critical state. If there are 10 nodes in a cluster, setting the property value to 70 would require at least 7 out of the 10 nodes in the cluster to go into a critical state to reflect up to the parent service of the cluster.
- Enable ingesting events that do not have a matching CI in the CMDB.
- Enable populating the Application (cmdb_ci_appl) CIs from Dynatrace (Dynatrace processes) during scheduled imports.

c. Select **Save**.

d. Select **Mark as Complete** for the Advanced Settings task.

e. Configure connection properties for the Dynatrace connection.

i. In the Configure Instance Settings section, select **Configure**.

ii. In the Service Graph Connection Properties related list, configure the properties of the connection record.

Dynatrace connection properties

Property	Description
managementZoneNames	Enter the name of the management zone to fetch from your Dynatrace environment. For multiple entries, separate the zone names with commas.
tags	Enter the name of the tags to fetch from your Dynatrace environment. For multiple entries, separate the tags with commas.
serviceTypes	Enter the list of Dynatrace service types from where to ingest the data into CMDB. For multiple entries, separate the service types with commas.

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Property	Description
	Note: All service types except for DATABASE_SERVICE are mapped to the Calculated Application Service [cmdb_ci_service_calculated] CMDB table. The DATABASE_SERVICE service type is mapped to the Database Instance [cmdb_ci_db_instance] CMDB table. Valid values are: ▪ BACKGROUND_ACTIVITY ▪ CICS_SERVICE ▪ CUSTOM_SERVICE ▪ DATABASE_SERVICE ▪ ENTERPRISE_SERVICE_BUS_SERVICE ▪ EXTERNAL ▪ IBM_INTEGRATION_BUS_SERVICE ▪ IMS_SERVICE ▪ MESSAGING_SERVICE ▪ QUEUE_LISTENER_SERVICE ▪ RMI_SERVICE ▪ RPC_SERVICE ▪ WEB_REQUEST_SERVICE ▪ WEB_SERVICE
managementZoneIds	Enter the name of the management zone ID to fetch from your Dynatrace environment. For multiple entries, separate the zone IDs with commas.

iii. Select **Update**.

iv. Complete the Configure Instance Settings task by selecting **Mark as Complete**.

f. Execute the *`Fix Older Ids`* fix script to migrate the IDs of the imported data from the previous format to the latest format of the object IDs.

Note:
Beginning with the 1.9.0 version of the Service Graph Connector for Observability - Dynatrace, the latest format of the object IDs, which is Base64 Encoding, is used for data import. The *`Fix Older Ids`* fix script migrates any existing data with previous object IDs to the latest format.

g. Configure the notification settings.

The setup enables pulling ITOM events from Dynatrace into the ServiceNow instance.

i. In the Configure Problem Notification section, select **Configure**.

ii. To push the configuration to Dynatrace, select **Problem Notification Setup**.

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iii. To receive the configuration from Dynatrace, select **Fetch Notification Setup**.

iv. Complete the Configure Problem Notification task by selecting **Mark as Complete**.

7. Clean up records from the previous instance.

Note:
If you are not migrating from the previous Dynatrace version, you can skip this step.

a. On the Setup page, in the Clean Up Records From Previous Integration section, select the **Execute the New Integration** task.

b. On the next page, in the Execute the New Integration section, select **Configure** and select **Update**.

c. Select **Mark as Complete**.

d. In the Verify Integration Execution Has Completed section, verify the integration execution.

i. Select **Configure**.

ii. In the **State** field, wait for the field to change to **Complete** or **Complete with errors**.

It is normal to have errors during the migration from an older version.

iii. To refresh the list, select and hold (or right-click) the header and select **Refresh List**.

iv. Select **Mark as Complete**.

e. In the Delete Application Services Left Over From Previous Version section, select **Configure** to delete any application services that you no longer need from the previous integration.

f. Select **Mark as Complete**.

g. In the Cleanup Identification Remnants - Copy Script section, copy the script.

i. Select **Configure**.

ii. Change the current scope to **Global**.

iii. Select the menu icon ( ).

iv. Select **Insert and Stay**.

v. Select **Mark as Complete**.

h. In the Cleanup Identification Remnants - Execute Script section, execute the script.

i. Select **Configure**.

ii. Select the record of the script you copied.

iii. Select **Update**.

8. **Optional:** Add multiple instances.

Note:
If you do not need to add multiple instances, you can skip this step.

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a. In the Add Multiple Instances section of the Service Graph Connector for Microsoft Defender page, select **Get Started**.

b. Update the data source access to create a data source for the new connection.
   i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.
   ii. For the Update Data Source Access task, select **Configure**.
   iii. To edit the record, select the **Global** application scope from the application picker.
   iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.
   v. Select **Update** to return to the guided setup page.
   vi. Select the **Service Graph Connector for Observability Dynatrace** application scope from the application picker.
   vii. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

c. Update the scheduled data import access to create a scheduled import for the new connection.
   i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.
   ii. For the Update Scheduled Data Import Access task, select **Configure**.
   iii. To edit the record, select the **Global** application scope from the application picker.
   iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.
   v. Select **Update** to return to the guided setup page.
   vi. Select the **Service Graph Connector for Observability Dynatrace** application scope from the application picker.
   vii. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**.

d. Update the value access to create the data source for the new connection.
   i. Ensure that you have edit permissions for the Value [sys_variable_value] table.
   ii. For the Update Value Access task, select **Configure**.
   iii. To edit the record, select the **Global** application scope from the application picker.
   iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.
   v. Select **Update** to return to the guided setup page.
   vi. Select the **Service Graph Connector for Observability Dynatrace** application scope from the application picker.
   vii. Set the Update Value Access task to complete by selecting **Mark as Complete**.

e. Clear the data source and import set cache for the new connection.
   i. For the Clear Cache for Datasource and Import set task, select **Configure**.
   ii. In the **Run script** text box of the background script page, enter the following script:

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```
     GlideTableManager.invalidateTable("sys_data_source");
     GlideCacheManager.flushTable("sys_data_source");


GlideTableManager.invalidateTable("scheduled_import_set");
     GlideCacheManager.flushTable("scheduled_import_set");


GlideTableManager.invalidateTable("sys_variable_value");
     GlideCacheManager.flushTable("sys_variable_value");

     GlideTableManager.invalidateTable("sys_db_object");
     GlideCacheManager.flushTable("sys_db_object");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. Select the **Service Graph Connector for Observability Dynatrace** application scope from the application picker.

vi. Set the Clear Cache for Datasource and Import set task to complete by selecting **Mark as Complete**.

f. Add another connection.

i. Ensure that the application scope is set to **Service Graph Connector for Observability** in the application picker.

ii. For the Add Another Connection task, select **Configure**.

iii. On the Flow Designer page that opens in a new browser tab, select **Add Connection**.

iv. On the form, fill in the fields.

Connection form

Field	Description
Connection Name	Display name for the connection.
Connection Hostname	Host name of the Dynatrace instance.
API Key	Dynatrace API Key. **Note:** The API Key must be prefixed with `api-token`.

v. Select **Create Connection**.

vi. Return to the guided setup page.

vii. Set the Add Another Connection task to complete by selecting **Mark as Complete**.

g. If using a Grail-enabled tenant, configure additional OAuth 2.0 connections.

i. For the Add another OAuth connection task, select **Configure**.

ii. On the Flow Designer page that opens in a new browser tab, select **Add Connection**.

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iii. Enter a name, the connection URL, OAuth client ID, and OAuth client secret details.

iv. Select **Create and Get OAuth Token**.

v. Return to the guided setup page.

vi. Set the Add another OAuth connection task to complete by selecting **Mark as Complete**.

h. If using a Grail-enabled tenant, select the OAuth 2.0 client credentials alias created earlier in the Add another OAuth connection task.

i. For the Link connection record with OAuth client credentials task, select **Configure**.

ii. In the **OAuth 2.0 Connection and Credentials Alias** field, search for and select the OAuth connection alias you created in the step 8.g.

iii. In the **Service Graph connection record**, search for and select the connection record you created in step 8.f.

iv. Select **Submit**.

v. Return to the guided setup page.

vi. Set the Link connection record with OAuth client credentials task to complete by selecting **Mark as Complete**.

i. **Optional:** Set up the MID Server for the connection you created.

i. For the Configure Mid Servers task, select **Configure**.

ii. Select the name of the connection you created.

iii. Select the **Use MID server** check box.

iv. Select **Update**.

v. Set the Configure Mid Servers task to complete by selecting **Mark as Complete**.

j. Configure the instance settings.

i. In the Configure Instances section, select **Configure**.

ii. Select the name of the connection you want to configure and then select **Update**.

iii. Set the Configure Instances task to complete by selecting **Mark as Complete**.

k. Test the new connections.

i. For the Test Connections task, select **Configure**.

ii. Select the name of the connection you want to test.

iii. To validate the data source configuration, select **Test Load 20 Records**.

iv. When the **Status** field is set to **Success**, select **Update** to close the Test the connection dialog box and return to the guided setup page.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test Connections task to complete by selecting **Mark as Complete**.

l. Create default notification payload templates.

i. Ensure that you have the access token with the following scopes:

- Read configuration (ReadConfig)
- Write configuration (WriteConfig)

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- Read log content (LogExport)
- Read metrics (metrics.read)

ii. For the Create Default Notification Payload Templates task, select **Configure**.

iii. Select the connection you want to create a default notification payload template for.

iv. Update the name of the payload template, if needed.

v. Select **Problem Notification Setup**.

The notification is created with the payload parameters as described in the following table.

Notification payload paramters

Parameter	Description
name	Name of the notification. The name is automatically prefixed with `ServiceNow Default Problem Notification` and the instance name is added to it.
alertingProfile	ID of the alerting profile in Dynatrace.
type	Type of payload that is automatically set to `webhook`.
url	Webhook URL in the format `https://https://<instance name>.service-now.com/ /api/sn_em_connector/em/inbound_event?source=SGO-Dynatrace`.
payload	Custom payload created for notification in the following format:

```
{
  "ImpactedEntities": {ImpactedEntities},
  "ImpactedEntity": "{ImpactedEntity}",
  "PID": "{PID}",
  "ProblemDetailsHTML": "{ProblemDetailsHTML}",
  "ProblemDetailsJSON": {ProblemDetailsJSON},
  "ProblemDetailsMarkdown":
 "{ProblemDetailsMarkdown}",
  "ProblemDetailsText": "{ProblemDetailsText}",
  "ProblemID": "{ProblemID}",
  "ProblemImpact": "{ProblemImpact}",
  "ProblemSeverity": "{ProblemSeverity}",
  "ProblemTitle": "{ProblemTitle}",
  "ProblemURL": "{ProblemURL}",
  "State": "{State}",
  "Tags": "{Tags}"
```

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Parameter	Description
	}

vi. Repeat the steps for each connection.

vii. Set the Create Default Notification Payload Templates task to complete by selecting **Mark as Complete**.

9. Set up scheduled import jobs.

   a. In the Set up scheduled import jobs section of the Service Graph Connector for Microsoft Defender page, select **Get Started**.

   b. For the Configure the scheduled import jobs task, select **Configure**.

   c. Select the name of the scheduled import you want to run.

   d. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

      For more information, see Schedule a data import.

   e. Select **Update**.

   f. Set the Set up scheduled import jobs task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for Observability - Dynatrace

When you complete setting up the connection, you can configure the integration to periodically pull data from Dynatrace. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data.

Attribute label	Attribute name
Class	sys_class_name
Configuration file	config_file
Installation directory	install_directory
Name	name
Operational status	operational_status
Running process command	running_process_command
Running process key parameters	running_process key parameters
Version	version

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Relationships created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Computer [cmdb_ci_computer]
Application [cmdb_ci_appl]	Runs on::Runs	Docker Container [cmdb_ci_docker_container]
Application [cmdb_ci_appl]	Reference	Key value [cmdb_key_value]

Note:
Based on the Discovery Process Classifications list, the tables that extend the Application [cmdb_ci_appl] table are populated by the SGO-Dynatrace Processes [sn_dynatrace_integ_sg_dynatrace_processes] data source.

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region

Relationships created for AWS Datacenter

Parent class	Relationship type	Child class
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
AWS Datacenter [cmdb_ci_aws_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]

Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

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Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Region	region

Relationship created for Azure Datacenter

Parent class	Relationship type	Child class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Calculated Application Service [cmdb_ci_service_calculated]

The following attributes in the Calculated Application Service [cmdb_ci_service_calculated] table are populated by collected data.

Attribute label	Attribute name
Comments	comments
Correlation ID	correlation_id
Hide from dashboard	hide_from_dashboard
Metadata	metadata
Name	name
Operational status	operational_status
Service Populator	service_populator
Service Populator Status	populator_status
Service Type	type

Note:
The *Comments* attribute includes the following information:

- Service Type
- Edition
- TCP Port

Relationships created for Calculated Application Service

Parent class	Relationship type	Child class
Calculated Application Service [cmdb_ci_service_calculated]	Depends on::Used by	Configuration Item [cmdb_ci]

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Relationships created for Calculated Application Service (continued)

Parent class	Relationship type	Child class
Calculated Application Service [cmdb_ci_service_calculated]	Runs on::Runs	Computer [cmdb_ci_computer]
Calculated Application Service [cmdb_ci_service_calculated]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Calculated Application Service [cmdb_ci_service_calculated]	Contains::Contained by	Group [cmdb_ci_group]
Calculated Application Service [cmdb_ci_service_calculated]	Reference	Key value [cmdb_key_value]

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data.

Attribute label	Attribute name
Fully qualified domain name	fqdn
Install Status	install_status
Name	name
Object ID	object_id
State	state
TCP port(s)	tcp_port
Type	type
Version	version

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data.

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Attribute label	Attribute name
Code Size	code_size
Fully qualified domain name	fqdn
Install Status	install_status
Language	language
Name	name
Object ID	object_id
Version	version

Relationships created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Reference	Key Value [cmdb_key_value]

Cloud Hardware Type [cmdb_ci_cloud_hardware_type]

The following attributes in the Cloud Hardware Type [cmdb_ci_cloud_hardware_type] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Provider	provider

Relationship created for Cloud Hardware Type

Parent class	Relationship type	Child class
Cloud Hardware Type [cmdb_ci_cloud_hardware_type]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]

The following attributes in the Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id

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Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Owns::Owned by	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]

Cloud Object Storage [cmdb_ci_cloud_object_storage]

The following attributes in the Cloud Object Storage [cmdb_ci_cloud_object_storage] table are populated by collected data.

Attribute label	Attribute name
Cloud Provider	cloud_provider
Install Status	install_status
Name	name
Object ID	object_id
Service Name	service_name

Relationships created for Cloud Object Storage

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	Key Value [cmdb_key_value]

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Cloud Resource [cmdb_ci_cmp_resource]

The following attributes in the Cloud Resource [cmdb_ci_cmp_resource] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id

Relationships created for Cloud Resource

Parent class	Relationship type	Child class
Cloud Resource [cmdb_ci_cmp_resource]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Resource [cmdb_ci_cmp_resource]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data.

Attribute label	Attribute name
Account Id	account_id
Datacenter Type	datacenter_type
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status

Cloud Storage Account [cmdb_ci_cloud_storage_account]

The following attributes in the Cloud Storage Account [cmdb_ci_cloud_storage_account] table are populated by collected data.

Attribute label	Attribute name
Name	name
Install Status	install_status
Object ID	object_id
Sku Name	sku_name

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Relationships created for Cloud Storage Account

Parent class	Relationship type	Child class
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Reference	Key Value [cmdb_key_value]

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Class	sys_class_name
CPU core count	cpu_core_count
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Is Virtual	virtual
Name	name
Operating System	os
OS Version	os_version
RAM (MB)	ram

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Reference	Key Value [cmdb_key_value]
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]

Docker Container [cmdb_ci_docker_container]

The following attributes in the Docker Container [cmdb_ci_docker_container] table are populated by collected data.

Attribute label	Attribute name
Container id	container_id
Install Status	install_status
Name	name

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Note:
The *Install Status* value is based on the value of the *properties.containerStatus.state* field in the incoming payload.

- If the *properties.containerStatus.state* value is `running`, the *Install Status* value is set to `1 (Installed)`.
- If the *properties.containerStatus.state* value is `terminated` or is empty, or if there are any errors, the *Install Status* value is set to `7 (Retired)`.
- For all other *properties.containerStatus.state* values, the *Install Status* value isn't updated.

Docker Image [cmdb_ci_docker_image]

The following attributes in the Docker Image [cmdb_ci_docker_image] table are populated by collected data.

Attribute label	Attribute name
Image id	image_id
Image digest	image_digest
Name	name

Relationship created for Docker Image

Parent class	Relationship type	Child class
Docker Image [cmdb_ci_docker_image]	Instantiates::Instantiated by	Docker Container [cmdb_ci_docker_container]

DynamoDB Table [cmdb_ci_dynamodb_table]

The following attributes in the DynamoDB Table [cmdb_ci_dynamodb_table] table are populated by collected data.

Attribute label	Attribute name
Name	name
Install Status	install_status
Object ID	object_id

Relationships created for DynamoDB Table

Parent class	Relationship type	Child class
DynamoDB Table [cmdb_ci_dynamodb_table]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
DynamoDB Table [cmdb_ci_dynamodb_table]	Reference	Key Value [cmdb_key_value]

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Group [cmdb_ci_group]

The following attribute in the Group [cmdb_ci_group] table is populated by collected data.

Attribute label	Attribute name
Name	name

Relationship created for Group

Parent class	Relationship type	Child class
Group [cmdb_ci_group]	Contains::Contained by	Application [cmdb_ci_appl]

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationship created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Instance Scale Set [cmdb_ci_instance_scale_set]

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Attribute label	Attribute name
Name	name
Install Status	install_status
Object ID	object_id

Relationships created for Instance Scale Set

Parent class	Relationship type	Child class
Instance Scale Set [cmdb_ci_instance_scale_set]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Instance Scale Set [cmdb_ci_instance_scale_set]	Reference	Key Value [cmdb_key_value]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Name	name

Key value [cmdb_key_value]

The following attributes in the Key value [cmdb_key_value] table are populated by collected data.

Attribute label	Attribute name
Key	key
Value	value

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data.

Attribute label	Attribute name
Cluster Resource ID	cluster_resource_id
Install Status	install_status
Name	name

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Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Kubernetes UID	k8s_uid
Name	name

Kubernetes Node [cmdb_ci_kubernetes_node]

The following attributes in the Kubernetes Node [cmdb_ci_kubernetes_node] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Kubernetes UID	k8s_uid
Name	name

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace

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Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Runs on::Runs	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]

Kubernetes Service [cmdb_ci_kubernetes_service]

The following attributes in the Kubernetes Service [cmdb_ci_kubernetes_service] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data.

Attribute label	Attribute name
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Is Virtual	virtual
Name	name
Object ID	object_id

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Key	key

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Attribute label	Attribute name
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data.

Attribute label	Attribute name
Discovery source	discovery_source
Display name	display_name
Version	version

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data.

Attribute label	Attribute name
Installed on	installed_on
Name	name

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
IP Address	ip_address
Name	name

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Attribute label	Attribute name
Object ID	object_id
Operational status	operational_status
VM Instance ID	vm_inst_id

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Cloud Hardware Type [cmdb_ci_cloud_hardware_type]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]

Set up push notifications from Dynatrace

Set up push notifications of events from Dynatrace into a ServiceNow instance that has the Service Graph Connector for Observability - Dynatrace installed.

Before you begin

If you don't have an alerting profile in Dynatrace, then complete the following steps to create one:

1. Navigate to **Settings** > **Alerting** > **Alerting Profiles**.
2. Set up an alerting profile according to your business needs.

> **Note:**
> For more information about how to set up an alerting profile, see Alerting profiles on the Dynatrace documentation site.

You must have Observability Commons for CMDB installed.

Role required: admin

Procedure

1. In the Dynatrace instance, navigate to **Settings** > **Integration** > **Problem notifications**.
2. Click **Add Notification**.
3. On the form, fill in the fields.

Field	Value
Notification Type	Custom Integra

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Field	Value
Display Name	Name of the nc
Webhook URL	Use the followi `sn_em_conn`
Additional HTTP Headers > Create basic authorization	**a.** In the Servic **i.** Navigate to **ii.** Select the **iii.** Set the **Pa** **iv.** Clear the **P** **v.** Update or **b.** Set the **User** **c.** Set the **Pass** **d.** Click **Add**.
Custom Payload	Use the followi `{ "connec "Impact "Impact "PID": "Proble "Proble "Proble "Proble "Proble "Proble "Proble "Proble "Proble "State" "Tags": }` **Note:** For the <cc **a.** Navigate **b.** Select to **c.** Right-cli
Alerting Profile	Select the alert
Sending Test Notifications	Click to send a

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Service Graph Connector for Observability - Dynatrace properties

Service Graph Connector for Observability - Dynatrace properties control the behavior of the connector.

Connection properties

These connection properties are available for Service Graph Connector for Observability - Dynatrace.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Dynatrace Observability** > **Connections** and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for Observability - Dynatrace

Property	Description
managementZoneIds	Enter a list of management zone IDs to fetch from Dynatrace. For multiple entries, separate the IDs with commas.
managementZoneNames	Enter a list of management zones to fetch from Dynatrace. For multiple entries, separate the names with commas.
tags	Enter a list of tags to fetch from Dynatrace. For multiple entries, separate the tags with commas.
grailEnabled	Set the property to `true` for a Grail-enabled tenant.
OAuth Connection	View the Sys ID of the OAuth connection and credential alias linked to the Service Graph connection record.
serviceTypes	Enter a list of Dynatrace service types from where to ingest the data into CMDB. For multiple entries, separate the service types with commas.

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Connection properties for Service Graph Connector for Observability - Dynatrace (continued)

Property	Description
	Note: All service types except for DATABASE_SERVICE are mapped to the Calculated Application Service [cmdb_ci_service_calculated] CMDB table. The DATABASE_SERVICE service type is mapped to the Database Instance [cmdb_ci_db_instance] CMDB table. Valid values are: • BACKGROUND_ACTIVITY • CICS_SERVICE • CUSTOM_SERVICE • DATABASE_SERVICE • ENTERPRISE_SERVICE_BUS_SERVICE • EXTERNAL • IBM_INTEGRATION_BUS_SERVICE • IMS_SERVICE • MESSAGING_SERVICE • QUEUE_LISTENER_SERVICE • RMI_SERVICE • RPC_SERVICE • WEB_REQUEST_SERVICE • WEB_SERVICE
saveRESTResponseAsAttachment	Set the property to `true` to use the SGO-Dynatrace Fetch Entities For Larger Payload action flow and save the response from Dynatrace as an attachment with a `.json` extension. Set the property to `false` to use the dedicated action flow and consume the response from Dynatrace as a data stream for processing. • Type: true | false • Default value: `false`

System properties

These system properties are available for Service Graph Connector for Observability - Dynatrace.

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Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for Service Graph Connector for Observability - Dynatrace

Property	Description
sn_dynatrace_integ.critical_cluster_threshold	Enter the percentage of an application cluster's nodes that need to be in a state to raise that state to its parent in the service map. • Type: integer • Default value: `75` • Location: System Property [sys_properties] table
sn_dynatrace_integ.default_from_value_days	Enter the number of days a configuration item (CI) can be inactive before it is ignored. • Type: integer • Default value: `300` • Location: System Property [sys_properties] table
sn_dynatrace_integ.events_for_unmatched_ci.enabled	Set the property to `true` to ingest events that don't have a matching CI in CMDB. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_dynatrace_integ.page_size	Enter the page size used in REST requests to fetch Dynatrace entities. • Type: integer • Default value: `50` • Location: System Property [sys_properties] table
sn_dynatrace_integ.populate_applications	Set the property to `true` to populate the Application [cmdb_ci_appl] CIs from Dynatrace processes. Set the property to `false` to ignore the Application [cmdb_ci_appl] CIs.

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System properties for Service Graph Connector for Observability - Dynatrace (continued)

Property	Description
	• Type: true | false • Default value: `false` • Location: System Property [sys_properties] table **Note:** This property is read via scheduled imports. The manual execution of the SGO-Dynatrace Processes and SGO-Dynatrace Process Groups data sources will not consider this property.
sn_dynatrace_integ.createUnmatchedApplicationCIs	Set the property to `true` to add unclassified processes to the Application [cmdb_ci_appl] table. Set the property to `false` to ignore unclassified processes. • Type: true | false • Default value: `true` • Location: System Property [sys_properties] table **Note:** Classified processes are added to the corresponding child application classes in the Application [cmdb_ci_appl] table regardless of the value of this property.

Accessing the connection details of Service Graph Connector for Observability - Dynatrace

You can access the connection details of the Service Graph Connector for Observability - Dynatrace in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Observability - Dynatrace. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection.

Access the details of a Dynatrace connection

Access the details of a Dynatrace connection configured for the Service Graph Connector for Observability - Dynatrace.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Dynatrace Observability** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for Observability - Dynatrace properties

Accessing the connection details of Service Graph Connectors

Service Graph Connector for Observability - New Relic

Use the Service Graph Connector for Observability - New Relic to ingest CMDB data from a New Relic installation using REST APIs. Push events from New Relic into ServiceNow with Event Management.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

- New Relic version: Last tested on July 01, 2025
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama
  - Zurich

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Observability - New Relic using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time

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duration, or a specific integration run. For more details about monitoring Observability New Relic integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the New Relic data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following data sources are included for New Relic:

- SG-New Relic Application Services
- SG-New Relic Applications
- SG-New Relic Disks
- SG-New Relic Hosts
- SG_New Relic Networks

When you complete setting up the connection, you can configure the integration to periodically pull data from the New Relic application. The data is loaded into the following staging tables:

- SG-New Relic Applications [sn_newrelic_integ_sg_new_relic_applications]
- SG-New Relic Application Services [sn_newrelic_integ_application_services]
- SG-New Relic Disks [sn_newrelic_integ_disks]
- SG-New Relic Hosts [sn_newrelic_integ_hosts]
- SG_New Relic Networks [sn_newrelic_integ_networks]

The data is then inserted into the following target tables:

- Application [cmdb_ci_appl]
- Application service [cmdb_ci_service_calculated]
- Disk [cmdb_ci_disk]
- IP Address[cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]
- Running Process [cmdb_running_process]
- Server [cmdb_ci_server]
- Software Installation [cmdb_sam_sw_install] (If the Software Asset Management (SAM) application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)

For more information on where data is saved when pulling data from New Relic, see CMDB classes targeted in Service Graph Connector for Observability - New Relic.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

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System property

The *sn_newrelic_integ.alerts_for_unmatched_ci.enabled* system property determines whether to ingest events that don't have a matching CMDB CI class. Set the value of this system property to `true` to ingest unmatched events. The default value is `false`.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Observability - New Relic using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Observability - New Relic for pulling in New Relic project data into the CMDB.

Before you begin

Dependencies and requirements:

- Install Service Graph Connector for Observability - New Relic version 1.3.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- Install Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Role required: cmdb_inst_admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the New Relic connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing New Relic data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

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Configure and test connection form

Field	Description
Connection Name	Name to identify the New Relic connection record.
Connection URL	New Relic base URL in the following format: *<base-URL>*.
API Key	New Relic API key or tenant code.
Account ID	New Relic account ID.

c. Select **Update and test connection**.

d. After the connection test is complete, select **Continue**.

7. For the Configure Observability activity, select **Continue**.
   New Relic creates the destination, channel, and workflow required to enable alerts for all configuration items (CIs).
8. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Select **Configure import schedule**.

   c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-New Relic Hosts** import schedule.

   d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

      For more information, see Schedule a data import.

   e. Select **Save**.
      Alternatively, select **Execute Now** to execute the import schedule immediately.

   f. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was configured.
10. Enable alerts for configuration items (CIs) that aren't available in the CMDB.
    a. Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
    b. Select **Settings**.
    c. Select **New Relic system properties**.
    d. On the System Properties form, select the *sn_newrelic_integ.alerts_for_unmatched_ci.enabled* system property.
    e. Set the **Value** of the system property to `true`.
    f. Select **Submit**.

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What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Observability - New Relic

Configure Service Graph Connector for Observability - New Relic using the guided setup

Set up scheduled import jobs to pull in data from New Relic into your CMDB.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
If you have an earlier version of the Service Graph Connector for Observability - New Relic, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: admin

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Observability - New Relic application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **New Relic** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the authentication credentials to send requests to the New Relic application.

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a. Configure your New Relic connection and credentials.

i. In the Configure the Connection section of the New Relic Integration with CMDB page, select **Get Started**.

ii. For the Configure connection and credentials task, select **Configure**.

iii. On the Connections page of the Flow Designer, select **Configure** for the **NewRelicConnectionAlias** connection that is available by default.

iv. On the form, review and modify the fields.

Configure Connection form

Field	Description
Connection Information	
Connection Name	Name to uniquely identify the connection record. For example, `NewRelicConnectionAlias`.
Connection URL	Base URL to connect to the New Relic application in the following format: `https://api.newrelic.com/graphql` **Note:** This field is automatically set to the URL to connect to the *NerdGraph* API in the New Relic application. Leave the field value as is.
Credential Information	
API Key	*NerdGraph* API token used for authentication on the New Relic application.
Account ID	Account ID associated with the New Relic credential.

v. Select **Configure Connection**.

Note: The Service Graph Connector for Observability - New Relic supports connection to a single New Relic instance only. So, you can use the single default connection only.

vi. Return to the Configure the connection task page using the back button for your browser.

vii. Set the Configure connection and credentials task to complete by selecting **Mark as Complete**.

b. Test the *NerdGraph* API connection to import data from the New Relic application.

i. In the Configure the Connection section of the New Relic Integration with CMDB page, select **Continue**.

ii. For the Test Connection task, select **Configure**.

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iii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iv. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test Connection task to complete by selecting **Mark as Complete**.

5. Configure the destination, channel, and workflow for Observability New Relic and turn on alerts for unmatched configuration items (CIs).

a. Configure the destination, channel, and workflow for Observability New Relic.

i. In the Configure Observability section of the New Relic Integration with CMDB page, select **Get started**.

ii. For the Configure destination, channel and workflow task, select **Configure**.

iii. In the SG-New Relic Webhooks list, select **New**.

iv. On the form, fill in the fields.

New record form

Field	Description
Name	Name of the New Relic configuration. The `destination`, `channel`, and `workflow` strings are appended to the configuration name when the configuration is created.
Connection and Credential Alias	Select the connection alias that you created in step 4.

v. Select **Submit**.

vi. Set the Configure destination, channel and workflow task to complete by selecting **Mark as Complete**.

b. Enable alerts for configuration items (CIs) that aren't available in the CMDB.

i. In the Configure Observability section of the New Relic Integration with CMDB page, select **Continue**.

ii. For the Turn on alerts for unmatched CI task, select **Configure**.

iii. On the System Properties form, select the *`sn_newrelic_integ.alerts_for_unmatched_ci.enabled`* system property.

iv. Set the **Value** of the system property to `true`.

v. Select **Submit**.

vi. Set the Turn on alerts for unmatched CI task to complete by selecting **Mark as Complete**.

6. Configure the scheduled jobs to import data from the New Relic application.

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a. In the Set up scheduled data imports section of the New Relic Integration with CMDB page, select **Get started**.

b. For the Configure Scheduled Data Imports task, select **Configure**.

c. Select the scheduled job that you want to activate.

d. On the Scheduled Data Import form, verify the field values for the scheduled job. For more information, see Schedule a data import.

e. Select the **Active** check box to activate the scheduled job.

f. Select **Update**.

g. Repeat steps 6.c to 6.f for each scheduled job for data import.

h. Navigate back to the guided setup page.

i. Set the Configure Scheduled Data Imports task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for Observability - New Relic

When you complete setting up the connection, you can configure the integration to periodically pull data from New Relic. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
CPU core count	cpu_core_count
Disk space (GB)	disk_space
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Host name	host_name
Operating System	os

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Contains::Contained by	Disk [cmdb_ci_disk]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]

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Calculated Application Service [cmdb_ci_service_calculated]

The following attributes in the Calculated Application Service [cmdb_ci_service_calculated] table are populated by collected data:

Attribute label	Attribute name
Name	name
Metadata	metadata
Service Populator Status	populator_status
Service Type	type

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Name	name
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

Attribute label	Attribute name
Installed on	installed_on
Name	name

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

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Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Nic	nic
Name	name

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Device ID	device_id
Free disk space (GB)	free_space
Computer	computer
Name	name
Disk space (GB)	disk_space
File system	file_system

Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Hosted on::Hosts	Server [cmdb_ci_server]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Configuration Item	cmdb_ci
MAC Address	mac_address
Name	name

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Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
Name	name
Running process command	running_process_command

Relationship created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Server [cmdb_ci_server]

Accessing the connection details of Service Graph Connector for Observability - New Relic

You can access the connection details of the Service Graph Connector for Observability - New Relic in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Observability - New Relic. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Service Graph Connector for Observability - New Relic connection

Access the details of a New Relic connection configured for the Service Graph Connector for Observability - New Relic.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **New Relic** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

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Service Graph Connector for OpenTelemetry

Use the Service Graph Connector for OpenTelemetry to ingest Configuration Management Database (CMDB) data from the ServiceNow Cloud Observability (formerly Lightstep) application using REST APIs. Push events from the Cloud Observability application into ServiceNow with Event Management.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported ServiceNow versions

- Utah
- Vancouver
- Washington DC

Use cases

The following examples describe how you can use the Service Graph Connector for OpenTelemetry:

- Import project topologies from Cloud Observability so that the site reliability engineering (SRE) teams can have a single view for triage with other ServiceNow data points (such as a change request, an incident) from a single view.
- Import events created by Cloud Observability against monitored projects to pinpoint SRE triage activities.

Guided setup

The guided setup for the Service Graph Connector for OpenTelemetry provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for OpenTelemetry.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Cloud Observability integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Cloud Observability data sources is mapped and transformed into the ServiceNow CMDB configuration item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to pull data from the application periodically.

The following table describes the data sources, the scheduled jobs, the staging tables, and the target tables as CMDB CI classes for the Cloud Observability application.

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Data mapping for Cloud Observability

Data source	Description	Scheduled job	Staging table	C cl
OpenTelemetry Resources	Imports all the Kubernetes clusters, workloads, and application services from the OpenTelemetry traces.	OpenTelemetry Resources OpenTelemetry Delta Resources	OpenTelemetry Resources [sn_sg_lightstep_resources]	C A S K C K D K N K P K S K R K D K J K C K N S K
OpenTelemetry Pods	Imports all the Kubernetes pods from the containers.	OpenTelemetry Pods OpenTelemetry Delta Pods	OpenTelemetry K8s Pods [sn_sg_lightstep_pods]	K C K P
OpenTelemetry Containers	Imports all the containers from the OpenTelemetry traces.	OpenTelemetry Containers OpenTelemetry Delta Containers	OpenTelemetry docker containers [sn_sg_lightstep_containers]	D C

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Data mapping for Cloud Observability (continued)

Data source	Description	Scheduled job	Staging table	C cl
OpenTelemetry Container Images	Imports all the container images from the OpenTelemetry traces.	OpenTelemetry Container Images OpenTelemetry Delta Container Images	Opentelemetry container images [sn_sg_lightstep_container_images]	D Ir
OpenTelemetry Services	Imports all the Kubernetes services from the OpenTelemetry traces.	OpenTelemetry Delta Services OpenTelemetry Services	OpenTelemetry K8s Services [sn_sg_lightstep_kubernetes_services]	K S
OpenTelemetry Dependency Map	Imports the dependency maps to get an aggregate view of the traced data. The data source also imports and loads any inferred services and their related services data in the Inferred service [sn_sg_lightstep_inferred_service] staging table. **Note:** You need to link the imported inferred services with a CI manually. See Inferred service linking.	OpenTelemetry Dependency Map	OpenTelemetry Dependency Map [sn_sg_lightstep_dependency_map]	C A S

For more information on where data is saved when pulling data from Cloud Observability, see CMDB classes targeted in Service Graph Connector for OpenTelemetry.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Inferred service linking

The ServiceNow Cloud Observability application can infer the presence of an inferred service when the span calling the remote service has the necessary information. Service Graph Connector for OpenTelemetry provides the linking of inferred services and their related services with CIs in the CMDB. For more information, see Linking inferred services with CIs.

Related topics

Service Graph Connectors

Configure Service Graph Connector for OpenTelemetry

Set up scheduled import jobs to pull in data from ServiceNow Cloud Observability (formerly Lightstep) into your Configuration Management Database (CMDB).

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Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. For Event Management to work, the Observability Commons for CMDB app must be installed prior to installing the connector. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
If you have an earlier version of the Service Graph Connector for OpenTelemetry, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: admin

Procedure

1. Ensure that the application scope is set to Service Graph Connector for OpenTelemetry by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **OpenTelemetry** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the application properties to set up your organization and authentication credentials for sending requests to the ServiceNow Cloud Observability APIs.

   a. In the Configure the connection section of the Service Graph Connector for OpenTelemetry page, select **Get started**.

   b. For the Use OpenTelemetry task, ensure that the Cloud Observability application meets the conditions as discussed in the ServiceNow Cloud Observability setup [KB1527588] article in the Now Support Knowledge Base.

   Important:
   Note down your projects, organization, and API key details of the Cloud Observability application to be used later during the installation of the connector.

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After you have set up the OpenTelemetry environment in the Cloud Observability application, return to the guided setup and mark the Use OpenTelemetry task to complete by selecting **Mark as Complete**.

c. Enter your Cloud Observability organization details from where you want to retrieve the projects, resources, and dependency-mapping information.

i. For the Set up your organization task, select **Configure**.

ii. In the **Value** field of the Service Graph Connection Properties form, enter the name of your Cloud Observability organization.

iii. Select **Update**.

iv. Mark the Set up your organization task to complete by selecting **Mark as Complete**.

d. Enter the API key details associated with the Cloud Observability application.

i. For the Set up the API key task, select **Configure**.

ii. In the **API Key** field of the API Key Credentials form, enter the API key associated with the Cloud Observability application that you noted down in step 4.b.

iii. Select **Update**.

iv. Set the Set up the API key task to complete by selecting **Mark as Complete**.

e. Test the Cloud Observability API connection to import data from the Cloud Observability application.

i. For the Test the connection task, select **Configure**.

ii. Select the **Test Connection** related link.

iii. When the **Status** field is set to **Success**, select **X** to close the Test the connection dialog box and return to the guided setup page.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

f. Retrieve all the projects included in your Cloud Observability organization.

i. For the Get projects task, select **Configure**.

ii. Select **Get Projects**.

iii. When the Project properties related list is populated with all the projects included in the organization you specified in step 4.c.ii, select **X** to close the Get projects dialog box and return to the guided setup page.

iv. Set the Get projects task to complete by selecting **Mark as Complete**.

5. **Optional:** Configure additional configurations to set up lookback time, add excluded projects, run project diagnostics, and configure integration settings for service maps and stale configuration items (CIs).

a. In the Advanced settings section of the Service Graph Connector for OpenTelemetry page, select **Continue**.

b. Set up the lookback time from when you want to retrieve resources from the projects.

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(Optional) Lookback time is used to calculate the start and end time for retrieving resources from a project of an organization and should match the scheduled job frequency setting. For example, if the lookback time is set to 12 hours, resources are retrieved from the start time calculated as the current time minus 12 hours and until the end time that is the current time.

i. For the Set up lookback time task, select **Configure**.

ii. In the **Value** field of the Service Graph Connection Properties form, enter the lookback time in hours.

iii. Select **Update**.

iv. Set the Set up lookback time task to complete by selecting **Mark as Complete**.

c. Select the projects from which you don't want to retrieve resources.

i. For the Add excluded projects task, select **Configure**.

ii. Select a project from the **Project** column.

iii. Select the **Exclude project** check box.

iv. Select **Update**.

v. Repeat steps from 5.c.ii to 5.c.iv for each project that you want to exclude.

vi. Select **X** to close the Add excluded projects dialog box and return to the guided setup page.

vii. Set the Add excluded projects task to complete by selecting **Mark as Complete**.

d. Run project diagnostics to test the Resource API response and ensure that the API contains the Kubernetes cluster name, Kubernetes namespace, and Kubernetes nodes.

i. For the Run project diagnostics task, select **Configure**.

ii. Select a project from the **Project** column.

iii. Select **Run diagnostics**.

iv. When the **Diagnostics status** field set to **Success**, select **X** to close the Run project diagnostics dialog box and return to the guided setup page.

If any of the Diagnostic tests have errors, follow the instructions in the **Diagnostics message** field to resolve the errors.

v. Repeat the steps 5.d.ii to 5.d.iv for each project that you want to run diagnostics.

vi. Set the Run project diagnostics task to complete by selecting **Mark as Complete**.

e. Configure the system properties for service maps and stale CIs.

i. For the Configure system properties for the connector task, select **Configure**.

ii. Verify the default values for the properties or fill in the values for a custom configuration.

iii. Select **Save**.

iv. Set the Configure system properties for the connector task to complete by selecting **Mark as Complete**.

6. Configure the scheduled jobs to import complete or incremental data from the Cloud Observability application.

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a. In the Configure the scheduled import jobs section of the Service Graph Connector for OpenTelemetry page, select **Continue**.

b. Activate the scheduled job for full data import.

By default, the *OpenTelemetry Resources* scheduled job is available for full data import. However, you must activate the job.

i. For the Configure the scheduled job for full import task, select **Configure**.

ii. On the Scheduled Data Import form for the *OpenTelemetry Resources* scheduled job, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

iii. Select **Update**.

iv. Set the Configure the scheduled job for full import task to complete by selecting **Mark as Complete** in the guided setup.

c. **Optional:** Activate the scheduled job for delta data import.

(Optional) By default, the *OpenTelemetry Delta Resources* scheduled job is available for delta data import. However, you must activate the job.

Note:
The delta data pull doesn't occur in the following scenarios:

- The full data import is scheduled at the same time.
- The **Last Run Datetime** field of a data source is empty.
- The last delta data pull period is more than 3 days.

i. For the Configure the scheduled job for delta import task, select **Configure**.

ii. On the Scheduled Data Import form for the *OpenTelemetry Delta Resources* scheduled job, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

iii. Select **Update**.

iv. Set the Configure the scheduled job for delta import task to complete by selecting **Mark as Complete** in the guided setup.

Note:
When adding a new project to retrieve resources, be sure to perform a full import before running a delta import to avoid partial data and populate the CMDB accurately.

7. Manage alerts and events by sending events from the Cloud Observability application to the ServiceNow Event Management application.
You can manage alerts and events only when the Observability Commons for CMDB application is installed.

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Note:
Enabling this feature requires a paid Cloud Observability license, but the feature is also available to free accounts for the purpose of evaluating the product in non-production environments. You can reach out to your ServiceNow account representative for more information.

a. In the Manage alerts and events section of the Service Graph Connector for OpenTelemetry page, select **Continue**.

b. Create a webhook destination for a project.

i. For the Create a webhook task, select **Configure**.

ii. Select a project that is not excluded from the **Project** column.

iii. Select **Create Webhook** to create a webhook destination in the Cloud Observability application.

iv. After a success message appears, select **X** to close the Create a webhook dialog box and return to the guided setup page.

When the webhook is created successfully:

- The system automatically creates a user record for each webhook destination in your ServiceNow instance.
- The user name of the user record starts with `ls_api_<project_name>` and the user is assigned the evt_mgmt_integration role.

v. Repeat the steps 7.b.ii to 7.b.iv for each project for which you want to create a webhook.

vi. Set the Create a webhook task to complete by selecting **Mark as Complete** in the guided setup.

c. Configure the system property for ingesting events that don't have matching CIs in the CMDB.

i. For the Configure the property for unmatched CIs task, select **Configure**.

ii. In the **Value** field, enter **true**.

iii. Select **Update**.

iv. Set the Configure the property for unmatched CIs task to complete by selecting **Mark as Complete** in the guided setup.

Related topics

Service Graph Connector for OpenTelemetry properties

Accessing the connection details of Service Graph Connector for OpenTelemetry

Linking inferred services with CIs

CMDB classes targeted in Service Graph Connector for OpenTelemetry

When you complete setting up the connection, you can configure the integration to periodically pull data from ServiceNow Cloud Observability (formerly Lightstep). The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

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Calculated Application Service [cmdb_ci_service_calculated]

The following attributes in the Calculated Application Service [cmdb_ci_service_calculated] table are populated by collected data:

Attribute label	Attribute name
Service Populator	service_populator
Name	name
Hide from dashboard	hide_from_dashboard
Operational status	operational_status
Service Populator Status	populator_status
Service Type	type

Relationships created for Calculated Application Service

Parent class	Relationship type	Child class
Calculated Application Service [cmdb_ci_service_calculated]	Connects to::Connected by	Kubernetes Deployment [cmdb_ci_kubernetes_deployment]
Calculated Application Service [cmdb_ci_service_calculated]	Connects to::Connected by	Calculated Application Service [cmdb_ci_service_calculated]
Calculated Application Service [cmdb_ci_service_calculated]	Reference	Key Value [cmdb_key_value]

Docker Container [cmdb_ci_docker_container]

The following attributes in the Docker Container [cmdb_ci_docker_container] table are populated by collected data:

Attribute label	Attribute name
Container id	container_id
Install Status	install_status
Name	name

Docker Image [cmdb_ci_docker_image]

The following attributes in the Docker Image [cmdb_ci_docker_image] table are populated by collected data:

Attribute label	Attribute name
Image id	image_id
Install Status	install_status

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Attribute label	Attribute name
Name	name

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data:

Attribute label	Attribute name
Name	name
Namespace	namespace
Install Status	install_status
Kubernetes UID	k8s_uid

Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]

Kubernetes Cronjob [cmdb_ci_kubernetes_cronjob]

The following attributes in the Kubernetes Cronjob [cmdb_ci_kubernetes_cronjob] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster
Name	name
Namespace	namespace
Install Status	install_status

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Relationships created for Kubernetes Cronjob

Parent class	Relationship type	Child class
Kubernetes Cronjob [cmdb_ci_kubernetes_cronjob]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Cronjob [cmdb_ci_kubernetes_cronjob]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]

The following attributes in the Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster
Name	name
Namespace	namespace
Install Status	install_status

Relationships created for Kubernetes DaemonSet

Parent class	Relationship type	Child class
Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Deployment [cmdb_ci_kubernetes_deployment]

The following attributes in the Kubernetes Deployment [cmdb_ci_kubernetes_deployment] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster
Name	name
Namespace	namespace
Install Status	install_status

Relationships created for Kubernetes Deployment

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

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Relationships created for Kubernetes Deployment (continued)

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Connects to::Connected by	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Connects to::Connected by	Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Job [cmdb_ci_kubernetes_job]

The following attributes in the Kubernetes Job [cmdb_ci_kubernetes_job] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Install Status	install_status

Relationships created for Kubernetes Job

Parent class	Relationship type	Child class
Kubernetes Job [cmdb_ci_kubernetes_job]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Job [cmdb_ci_kubernetes_job]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster
Name	name
Install Status	install_status

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Relationship created for Kubernetes Namespace

Parent class	Relationship type	Child class
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Node [cmdb_ci_kubernetes_node]

The following attributes in the Kubernetes Node [cmdb_ci_kubernetes_node] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Install Status	install_status
Namespace	namespace
Kubernetes Cluster	cluster

Relationships created for Kubernetes Node

Parent class	Relationship type	Child class
Kubernetes Node [cmdb_ci_kubernetes_node]	Hosted on::Hosts	Server [cmdb_ci_server]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data:

Attribute label	Attribute name
Name	name
Install Status	install_status
Kubernetes Cluster	cluster
Kubernetes UID	k8s_uid
Namespace	namespace
IP Address	ip_address
Start date	start_date

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Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Image [cmdb_ci_docker_image]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]

The following attributes in the Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Install Status	install_status
Kubernetes Cluster	cluster

Relationships created for Kubernetes ReplicaSet

Parent class	Relationship type	Child class
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Connects to::Connected by	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Service [cmdb_ci_kubernetes_service]

The following attributes in the Kubernetes Service [cmdb_ci_kubernetes_service] table are populated by collected data:

Attribute label	Attribute name
Name	name
Namespace	namespace
Install Status	install_status

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Kubernetes StatefulSet [cmdb_ci_kubernetes_statefulset]

The following attributes in the Kubernetes StatefulSet [cmdb_ci_kubernetes_statefulset] table are populated by collected data:

Attribute label	Attribute name
Name	name
Kubernetes Cluster	cluster
Namespace	namespace
Install Status	install_status

Relationship created for Kubernetes StatefulSet

Parent class	Relationship type	Child class
Kubernetes StatefulSet [cmdb_ci_kubernetes_statefulset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes StatefulSet [cmdb_ci_kubernetes_statefulset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Server [cmdb_ci_server]

The following attribute in the Server [cmdb_ci_server] table is populated by collected data:

Attribute label	Attribute name
Name	name

Related topics

- Kubernetes extension classes
- CI relationships in the CMDB

Service Graph Connector for OpenTelemetry properties

Service Graph Connector for OpenTelemetry properties control the behavior of the connector.

Connection properties

These connection properties are available for Service Graph Connector for OpenTelemetry.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **OpenTelemetry** > **Connections** and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

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Connection properties for Service Graph Connector for OpenTelemetry

Property	Description
Organization	Enter the name of an OpenTelemetry organization. • Type: string • Default value: None • Location: Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table
Lookback Time	Enter time in hours to retrieve OpenTelemetry resources. • Type: integer • Default value: `12` • Location: Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table

System properties

These system properties are available for Service Graph Connector for OpenTelemetry.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for Service Graph Connector for OpenTelemetry

Property	Description
sn_sg_lightstep.classes_to_inactivate_stale_records	Enter a list of configuration item (CI) classes to be inactivated as stale records. For multiple entries, separate the CI classes with commas. • Type: string • Default value: None • Location: System Property [sys_properties] table
sn_sg_lightstep.events_for_unmatched_ci.enabled	Set the property to `true` to ingest events that don't have a matching CI in CMDB. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_sg_lightstep.resource_api_num_rows	Enter the maximum number of rows fetched in the

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System properties for Service Graph Connector for OpenTelemetry (continued)

Property	Description
	Resource API response from OpenTelemetry resources. • Type: integer • Default value: 2500 • Location: System Property [sys_properties] table
sn_sg_lightstep.service_map_classes_to_exclude	Enter a list of CI classes to be excluded from the service map. For multiple entries, separate the CI classes with commas. • Type: string • Default value: None • Location: System Property [sys_properties] table
sn_sg_lightstep.service_map_max_levels	Enter the maximum hierarchy level of CIs to be included in the service map. • Type: integer • Default value: 5 • Location: System Property [sys_properties] table
sn_sg_lightstep.service_map_relationship_types_to_exclude	Enter a list of CI relationship types to be excluded from the service map. For multiple entries, separate the CI relationship types with commas. • Type: string • Default value: None • Location: System Property [sys_properties] table

Linking inferred services with CIs

Create inferred services relationships in your ServiceNow instance with other Cloud Observability application services as originally configured in the application by linking an inferred service configuration item (CI) in CMDB with an inferred service from the Cloud Observability application.

Inferred services

The inferred services in the Cloud Observability application are referred to as external services, libraries, or dependencies such as a database or a third-party API that haven't been

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instrumented with OpenTelemetry. These types of technologies are manually defined in the Cloud Observability application, and you can import them into your ServiceNow instance through the Service Graph Connector for OpenTelemetry.

For information about adding inferred services in the Cloud Observability application, see Add inferred services in the Cloud Observability documentation.

Storing inferred services data

The OpenTelemetry Dependency Map [sn_sg_lightstep_dependency_map] data source available with the Service Graph Connector for OpenTelemetry iterates through all the included projects in a Cloud Observability organization and pulls in the inferred services details. Inferred services details include mapping of related services. The data source saves these details in the Inferred service [sn_sg_lightstep_inferred_service] table.

The following attributes in the Inferred service [sn_sg_lightstep_inferred_service] table are populated by the OpenTelemetry Dependency Map [sn_sg_lightstep_dependency_map] data source.

Attribute label	Attribute name
Project	project
Organization	organization
ID	id
Inferred service	inferred_service
Inferred service CI	inferred_service_ci
Active	active
Last scan	last_scan
Cloud Observability CI	cloud_observability_ci

Due to insufficient information for defining identification rules, the pulled in inferred services don't automatically bind to a CI in CMDB. However, as a user with the cmdb_inst_admin role, you can manually link a CI to an inferred service. The linking creates appropriate relationships with the related services and generates the inferred service mapping in the respective application service maps of your ServiceNow instance.

Link an inferred service

Link a Cloud Observability inferred service with a CI to create relationships between the inferred service and other Cloud Observability services in your ServiceNow instance.

Before you begin

Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **OpenTelemetry** > **Inferred services**.
2. Review the inferred services available from the Cloud Observability app in the **Inferred service** column.
3. For an inferred service, double-click the **Inferred service CI** column cell.
4. Select the lookup using list icon (🔍) to search for and select an inferred service CI available within the Configuration item [cmdb_ci] table.

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5. Select the save icon ( ).
6. Repeat the steps 3 to 5 for each inferred service that you want to link with a CI.

Result

The *Update CI relationship* business rule is triggered that creates appropriate relationships for the inferred service with the related services and generates the inferred service mapping in the respective application service maps.

Note:

- If you remove any mapping later, the *Delete CI relationship* business rule is triggered to delete any relationships between the inferred service CIs and the Cloud Observability inferred services.
- For any inferred services that were not last scanned in the Cloud Observability app, the Service Graph Connector automatically deactivates the corresponding records in CMDB and deletes the relationship for the inactive records.

Accessing the connection details of Service Graph Connector for OpenTelemetry

You can access the connection details of the Service Graph Connector for OpenTelemetry in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for OpenTelemetry. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection.

Access the details of a Service Graph Connector for OpenTelemetry connection

Access the details of an OpenTelemetry connection configured for the Service Graph Connector for OpenTelemetry.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **OpenTelemetry** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for OpenTelemetry properties

Accessing the connection details of Service Graph Connectors

Service Graph Connector for Qualys

The Service Graph Connector for Qualys pulls in asset inventory data (hardware and software) from the Qualys database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

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Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

Use this data to manage your Qualys resources directly from your ServiceNow AI Platform® instance.

Supported Qualys APIs:

- Qualys Global Asset API v2. You might prefer to use this API if you are importing data for the Security Posture Control Security Posture Control application.
- Qualys Asset Management API v2. This API is deactivated by default. You should only activate this API if you don't have access to the Qualys Cybersecurity Asset Management (CSAM) product. ServiceNow uses a different API (Asset management and tagging) for this API but the data returned is not comprehensive.

Supported ServiceNow® versions:

- Utah
- Vancouver
- Washington

Use cases

The following are examples on how you can use the Service Graph Connector for Qualys for different ServiceNow applications:

- Complements the Qualys Asset Discovery.
- Import data with the Global Asset API or the Asset Management API.
- Multi-instance support.

Guided Setup

The guided setup for the Service Graph Connector for Qualys provides you with an organized sequence of tasks to configure the integration on your instance.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Qualys integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Hardware CI Rules

The hardware Configuration item (CI) mapping rule table is equipped with hardware category1, hardware category2 and corresponding target CI class. Following a Qualys API call, the system checks the hardware category1 and hardware category2 to determine their satisfaction, if hardware category1 and hardware category2 is match with the table record then the associated target CI class is added to the import set table data. During the mapping process, this designated target CI class is then utilized.

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Computer CI Rules

The Computer CI Mapping Rule table is equipped with predefined rules, including criteria such as OS name, OS category, OS category 2, OS Publisher, OS Product name, and the corresponding target CI class. Following a Qualys API call, the system checks these rules to determine their satisfaction. If a rule is met, the associated target CI class is added to the import set table data. During the mapping process, this designated target CI class is then utilized.

If you want to update CI attributes, you must create new reconciliation rules to determine which discovery sources can update CI attributes. See 'Reconciliation rules' in the online product documentation and the Identification and Reconciliation Fundamentals article in the ServiceNow Support Knowledge base for more information.

Asset Management CI Rules

The Asset Management CI Mapping Rule table is equipped with predefined rules, including criteria such as Operating System, Is Volume Info Present, Is processor Present, Cloud Provider and the corresponding target CI class. Following a Qualys API call, the system checks these rules to determine their satisfaction. If a rule is met, the associated target CI class is added to the import set table data. During the mapping process, this designated target CI class is then utilized.

Configure the Service Graph Connector for Qualys

Set up the Qualys environment and scheduled jobs to import in Qualys data into your Configuration Management Database (CMDB).

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

There are two supported Qualys APIs:

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- Qualys Global Asset API v2. You might prefer to use this API if you are importing data for the Security Posture Control application.
- Qualys Asset Management API v2. This API is deactivated by default. You should only activate this API if you don't have access to the Qualys Cybersecurity Asset Management (CSAM) product. ServiceNow® uses a different API (Asset management and tagging) for this API but the data returned is not comprehensive.

For more information, see Service Graph Connector for Qualys APIs.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Qualys** > **Setup**.
2. Select **Continue** on the Home page.
3. Select **Best Experience** and **Continue** on the Experience page.
   On the Service Graph Connector for Qualys page in the Configure the connection page, three tasks are displayed:
   - Configure the connection
   - Add multiple instances
   - Set up scheduled import jobs
4. Select **Start** for the **Configure the Connection** task to expand it.
   The following steps are displayed:
   - Configure Qualys authentication credentials
   - Configure Qualys HTTP Connection
   - Test Connection
5. Select **Configure Qualys authentication credentials**.

   a. In the Username and Password field, enter your Qualys username and password.

   b. Select the **Active** check box to activate the record.

   c. Right-click in the gray header titled Basic Auth Credentials and select **Save**.

   d. Select **Mark as complete** followed by **Continue**.
   The Configure Qualys HTTP Connection page is displayed.

6. Fill in the fields.

   a. Add the Qualys base URL or Host details.

   Domain part of the URL without the 'https'. An example might be `qualysapi.qualys.com`.

   b. **Optional:** If the API is accessible through a MID Server, activate the **Use MID Server** check box.

   c. In the advanced MID Server configuration section select the appropriate MID Server from the MID Selection list.

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d. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

e. Select **Mark as complete** followed by **Continue**.
The Test Connection page is displayed.

7. Test the connection.

a. Update the **use_asset_management_and_tagging_api** property in the 'Service Graph Connection Properties' section.

Option	Description
true	Set the property **use_asset_management_and_tagging_api** flag to `true` if you are using the asset management and tagging API in the configuration.
false	Set the property **use_asset_management_and_tagging_api** to `false` if you are not using the asset management and tagging API in the configuration.

b. In the Related links section select the **Test Connection** link.
If the connection is successful, the status code field displays 200 or 201 and a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

c. Right-click in the gray header titled Service Graph Connections and select **Save**.

d. Select **Mark as complete** followed by **Continue**.
The Update Data Source Access page is displayed.

8. Update the data source.

a. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

b. Select a record from the list to open it.

c. Select the **Application Access** tab.

d. Select the check boxes to set the permissions you want.

e. Right-click in the gray header titled Tables and select **Save**.

f. Select **Mark as complete** followed by **Continue**.
The Update Scheduled Data Import page is displayed.

9. Update the Scheduled Data Import record.

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a. Follow the steps listed at the top of the page to switch the application scope with the application picker as required to open, edit, and save the record.

b. Select the **Application Access** tab.

c. Select the check boxes to set the permissions you want.

d. Right-click in the gray header titled Table and select **Save**.

e. Select **Mark as complete** followed by **Continue**.
The Add Another Connection task is displayed.

10. Follow the instructions at the top of the page to add a connection.

a. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

b. Select the link.
The SG-Qualys Connections page is displayed.

c. Select **Add Connection** and fill out the fields.

Field	Description
Connection name	Unique name for your connection
Connection URL	Connection URL
User name	Qualys account user name
Password	Qualys account password

d. Select **Create Connection**.

e. Navigate back to the Add Another Connection page in the Setup Assistant.

f. Select **Mark as complete** followed by **Continue**.
The Configure MID Server for new HTTP connection page is displayed.

11. Configure the MID Server

a. Select a record to open it.

b. Select the Use MID server check box.

c. Select the search icon in the MID Server field and choose one from the list.

d. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

e. Select **Mark as complete** followed by **Continue**.
The Test New Connections page is displayed.

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12. Test the connection.

a. Select the record for the connection you want to test.

b. Scroll to the Related links section and select the **Test Connection** link.
If the connection is successful, the status code field displays 200 or 201 and a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

c. Right-click in the gray header titled, Service Graph Connections and select **Save**.

d. Select **Mark as complete** followed by **Continue**.
The Configure the scheduled jobs page is displayed.

13. Configure the scheduled jobs.

a. Select a record to open it.

b. Fill out the scheduled data import from.

Field	Description
Name	Name of the scheduled job.
Application	Read-only application name.
Data source	Data source record that defines the data to import.
Run	How often you want the job to run. If you want to run a test import prior to scheduling it, you might prefer to select **Once**.
Run as	Option to run the scheduled job with the credentials of the specified user.
Conditional	Specific conditions under which this job is run.
Active	Option to activate the scheduled job. Select this option.
Use connection	Leave this deactivated for the first run. Specifies another connection and credentials for this job.
Concurrent Import	Leave check box activated. Splits data into multiple imports sets. See the field message for more information.
Partition Method	Leave set as `Custom size`.
Partition Size	Leave set as 1 , 000. Import set size for early scheduling.
Execute pre-import script	Leave check box selected. Specifies a script to run before the import is performed.
Execute post-import script	Leave check box selected. Specifies a script to run after the import is performed.

c. Right-click in the gray header titled Scheduled Data Import and select **Save**.

d. Optional: Select **Execute Now**.
If you do not choose to run the job on-demand, the next job runs according to the schedule you set.

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e. Select **Mark as complete** followed by **Continue**.
The Home page of the Setup Assistant is displayed.

14. **Optional:** Add Multiple Instances

a. Select Add Multiple Instances to expand it.
The following steps are displayed:

- Update Data Source Access
- Update Scheduled Data Import
- Add Another Connection
- Configure MID Server for New HTTP connection
- Test New Connections

b. To update the Data Source, follow the steps listed in step 8.

c. To update the Scheduled Data Import, follow the steps in step 9.

d. To add another connection, follow the steps listed in step 10.

e. To configure a MID Server, follow the steps listed in step 11.

f. To test connections, follow the steps listed in step 12.

15. On the Service Graph Connector for Qualys page for Guided Setup, select **Complete** to finish the configuration.

Service Graph Connector for Qualys APIs

Data from the Qualys data source fields is imported with the Global Asset API and the Asset Management and Tagging API.

Global Asset API

- A Qualys Cybersecurity Asset Management (CSAM) license is required.
- Asset information includes details such as Hardware Category and OS Category.

Asset Management and Tagging API

- A CSAM license is not required
- Asset information does not include details about Hardware Category and OS Category.

Mapped attributes

The following table compares what data is imported by the two APIs. The sections after the table list data imported by the Global asset API that is not supported by the Asset Management and Tagging API.

Global Asset API	Asset Management and Tagging API
Mapped attributes	Mapped attributes

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Global Asset API	Asset Management and Tagging API
assetId	created
assetUUID	name
hostId	dnsHostName
lastModifiedDate	fqdn
agentId	os
createdDate	manufacturer
sensorLastUpdatedDate	tracking method
assetType	netbios
address	timezone
dnsName	network guid
assetName	IsDockerHost
netbiosName	modified
timeZone	lastVulnScan
biosDescription	model
lastBoot	cloudProvider
totalMemory	type
cpuCount	qwebHostId
lastLoggedOnUser	criticalSocre
domainRole	lastSystemBoot
hwUUID	domain
biosSerialNumber	lastLogOnUser
biosAssetTag	lastComplianceScan
isContainerHost	
AWS Cloud details	AWS Cloud details
accountId	instanceId
availabilityZone	privateDnsName
hasAgent	privateIpAddress
hostname	instanceState
imageId	monitoringEnabled
instanceId	region

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Global Asset API	Asset Management and Tagging API
instanceState privateDNS privateIpAddress instanceType qualysScanner kernelId launchdate region.code region.name spotInstance subnetId vpcId tags.key tags.value	accountId availabilityZone instance_type AWS Cloud tag details • key • value
MS Azure Cloud details vmId state name imagePublisher imageVersion offer location platform resourceGroupName size subnet subscriptionId virtualNetwork	MS Azure Cloud details resourceGroupName vmId state subscriptionId location image_id publisher version offer vm_size subnet_id vpc_id MS Azure Cloud tag details • key • value
Network interface details	Network interface details

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Global Asset API	Asset Management and Tagging API
hostname addressIpV4 addressIpV6 macAddress interfaceName dnsAddress gatewayAddress manufacturer macVendorIntroDate netmask addresses	address host_name interface_name macAddress gatewayAddress interface_id type
Software details token1 token2 uniqueKey publisher installDate id installPath lastUseDate authorization authorizationDetectionScore	Software details version name
Volume details name free size	Volume details name free size
Open port details port description protocol	Open port details port protocol serviceName

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Global Asset API	Asset Management and Tagging API
detectedService firstFound lastUpdated	service_id
Processor details description speed numCPUs noOfSocket threadsPerCore coresPerSocket multithreadingStatus	Processor details name speed
Tag details tagId tagName foregroundColor backgroundColor businessImpact criticalityScore	Asset tag details id name
Agent details version configurationProfile activations connectedFrom lastActivity lastCheckedIn lastInventory udcManifestAssigned errorStatus	Agent details agentVersion agentLastCheckIn status platform connectedFrom agentId AgentConfigurationName ChirpStatus

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Additional Global asset API details

The following sections list data imported by the Global asset API that is not supported by the Asset Management and Tagging API.

Global asset API OS details

- fullName
- version
- publisher
- osName
- category
- category1
- category2
- productName
- edition
- marketVersion
- update
- architecture
- productUrl
- productFamily
- installDate
- release

Global asset API OS lifecycle

OS lifecycle details

- gaDate
- eolDate
- eosDate
- stage
- lifeCycleConfidence
- eolSupportStage
- eosSupportStage

Global asset API OS taxonomy

OS Taxonomy details

- id
- name
- category1
- category2

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Global asset API hardware

Hardware details

- fullName
- category
- category1
- category2
- manufacturer
- productName
- model
- productUrl
- productFamily

Global asset API hardware lifecycle

Hardware lifecycle details

- introDate
- gaDate
- eosDate
- obsoleteDate
- stage
- lifeCycleConfidence

Global asset API taxonomy

Hardware taxonomy details

- id
- name
- category1
- category2

Global asset API sensor

Sensor details

- activatedForModules
- pendingActivationForModules
- lastVMScan
- lastComplianceScan
- lastFullScan
- lastVmScanDateScanner
- lastVmScanDateAgent
- lastPcScanDateScanner
- lastPcScanDateAgent

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- firstEasmScanDate
- lastEasmScanDate

Global asset API service

Service details

- name
- status
- description

Global asset API last location

Last location details

- city
- state
- country
- name
- continent
- postal

Global asset API criticality

Criticality details

- score
- isDefault
- lastUpdated

Global asset API processor

Processor details

- description
- speed
- numCPUs
- noOfSocket
- threadsPerCore
- coresPerSocket
- multithreadingStatus

Global asset API business information

Business information details

- businessAppListData
- riskScore
- passiveSensor
- domain

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- subdomain
- missingSoftware
- whois
- organizationName
- isp
- asn
- easmTags
- hostingCategory1
- customAttributes

CMDB classes targeted in the Service Graph Connector for Qualys

When you complete the guided setup, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table. The Service Graph Connector for Qualys identifies and classifies information about various configuration Items (CIs).

SGC Qualys Asset Cloud Tag

The following attributes in the SGC Qualys Asset Cloud Tag [sn_sec_sgc_qualys_asset_cloud_tag] table are populated by collected data.

Attribute label	Attribute name
Key	key
Qualys Asset	qualys_asset
Value	value
Configuration item	configuration_item

SGC Qualys Asset Software Details [sn_sec_sgc_qualys_asset_software_details]

The following attributes in the SGC Qualys Asset Software Details [sn_sec_sgc_qualys_asset_software_details] table are populated by collected data.

Attribute label	Attribute name
Name	token1
Qualys Asset	qualys_asset
Configuration item	configuration_item
Unique key	unique_key
Id	id
Install Path	install_path
Last Use Date	last_use_date
Version	token2

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Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Offer	offer
Version	version

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Key	key
Discovery source	discovery_source
Name	name
Version	version
Manufacturer	manufacturer

SGC Qualys Asset Network Interface Details [sn_sec_sgc_qualys_asset_nic_details]

The following attributes in the SGC Qualys Asset Network Interface Details [sn_sec_sgc_qualys_asset_nic_details] table are populated by collected data.

Attribute label	Attribute name
Configuration item	configuration_item
IPv4	ip_v4
Addresses	addresses
Interface Id	interface_id
IPv6	ip_v6

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Attribute label	Attribute name
MAC Vendor Intro Date	mac_vendor_intro_date
Qualys Asset	qualys_asset
Type	type

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data.

Attribute label	Attribute name
Manufacturer	manufacturer
Name	name
Asset tag	asset_tag
Class	sys_class_name
CPU count	cpu_count
DNS Domain	dns_domain
First discovered	first_discovered
Fully qualified domain name	fqdn
Install Status	install_status
Operating System	os
Operational status	operational_status
OS Address Width (bits)	os_address_width
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram

SGC Qualys Asset Open Port Details [sn_sec_sgc_qualys_asset_open_port_details]

The following attributes in the SGC Qualys Asset Open Port Details [sn_sec_sgc_qualys_asset_open_port_details] table are populated by collected data.

Attribute label	Attribute name
Port	port
Protocol	protocol
Description	description
Detected Service	detected_service
First Found	first_found
Last Updated	last_updated
Qualys Asset	qualys_asset

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Attribute label	Attribute name
Service Id	service_id

SGC Qualys Asset Details [sn_sec_sgc_qualys_asset_details]

The following attributes in the SGC Qualys Asset Details [sn_sec_sgc_qualys_asset_details] table are populated by collected data.

Attribute label	Attribute name
Asset Name	asset_name
Activated Modules	activated_modules
Address	address
Agent Configuration Profile	agent_configuration_profile
Agent Connected From	agent_connected_from
Agent Eror Status	agent_error_status
Agent ID	agent_id
Agent Last Activity	agent_last_activity
Agent Last Checked In	agent_last_checked_in
Agent Last Inventory	agent_last_inventory
Agent Platform	platform
Agent Status	status
Agent UDC Manifest Assigned	agent_udc_manifest_assigned
Agent Version	agent_version
ASN	asn
Asset ID	asset_id
Asset Type	asset_type
Asset UUID	asset_uuid
Assigned Location	assigned_location
AWS Host Name	aws_host_name
AWS Kernel ID	aws_kernel_id
AWS Launch Date	aws_launch_date
AWS Region Name	aws_region_name
Azure Image Publisher	azure_image_publisher
Azure Platform	azure_platform
Azure Subnet	azure_subnet
Azure Virtual Network	azure_virtual_network
Bios Description	bios_description
Bios Serial Number	bios_serial_number

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Attribute label	Attribute name
Business AppListData	business_applist_data
Business Information	business_information
Chirp Status	chirp_status
City	lastlocation_city
Continent	lastlocation_continent
Country	lastlocation_country
Custom Attribrutes	custom_attributes
Domain	domain
Domain Role	domain_role
ESAM Tags	easm_tags
First EASM Scan Date	first_easm_scan_date
Hardware Category	hardware_category
Hardware Category1	hardware_category1
Hardware Category2	hardware_category2
Hardware FullName	hardware_fullname
Hardware Lifecycle Confidence	hardware_lifecycle_lifecycleconfidence
Hardware Lifecycle EOSDate	hardware_lifecycle_eosdate
Hardware Lifecycle GaDate	hardware_lifecycle_gadate
Hardware Lifecycle IntroDate	hardware_lifecycle_introdate
Hardware Lifecycle ObsoleteDate	hardware_lifecycle_obsoletedate
Hardware Lifecycle Stage	hardware_lifecycle_stage
Hardware Model	hardware_model
Hardware Product Family	hardware_product_family
Hardware Product Name	hardware_product_name
Hardware Product URL	hardware_product_url
Hardware Texonomy Category1	hardware_taxonomy_category1
Hardware Texonomy Category2	hardware_taxonomy_category2
Hardware Texonomy ID	hardware_taxonomy_id
Hardware Texonomy Name	hardware_taxonomy_name
Has Agent	aws_has_agent
Host ID	host_id
Hosting Category1	hosting_category1
Hw UUID	hw_uuid
Is Container Host	is_container_host
IsDefault	criticality_isdefault

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Attribute label	Attribute name
ISP	isp
Last Boot	last_boot
Last Compliance Scan	last_compliance_scan
Last EASM Scan Date	last_easm_scan_date
Last Full Scan	last_full_scan
Last Location Name	lastlocation_name
Last Logged On User	last_logged_on_user
Last Modified Date	last_modified_date
Last PC Scan Date Agent	last_pc_scan_date_agent
Last PC Scan Date Scanner	last_pc_scan_date_scanner
Last Updated	criticality_lastupdated
Last VM Scan	last_vm_scan
Last VM Scan Date Agent	last_vm_scan_date_agent
Last VM Scan Date Scanner	last_vm_scan_date_scanner
Missing Software	missing_software
NetBios Name	netbios_name
Network Guid	network_guid
Organization Name	organization_name
OS Category	os_category
OS Category1	os_category1
OS Category2	os_category2
OS Edition	os_edition
OS Lifecycle Confidence	os_lifecycle_confidence
OS Lifecycle EOL Date	os_lifecycle_eol_date
OS Lifecycle EOLSupport Stage	os_lifecycle_eol_supportstage
OS Lifecycle EOS Date	os_lifecycle_eos_date
OS Lifecycle EOSSupport Stage	os_lifecycle_eos_supportstage
OS Lifecycle Ga Date	os_lifecycle_ga_date
OS Lifecycle Stage	os_lifecycle_stage
OS Market Version	os_market_version
OS Name	os_name
OS Product Family	os_product_family
OS Product Name	os_product_name
OS Product URL	os_product_url
OS Release	os_release

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Attribute label	Attribute name
OS Taxonomy Category1	os_taxonomy_category1
OS Taxonomy Category2	os_taxonomy_category2
OS Taxonomy ID	os_taxonomy_id
OS Taxonomy Name	os_taxonomy_name
Passive Sensor	passive_sensor
Postal	lastlocation_postal
Provider	provider
Qualys Scanner	qualys_scanner
Risk Score	risk_score
Score	criticality_score
Sensor Last Updated Date	sensor_last_updated_date
Spot Instance	spot_instance
State	lastlocation_state
SubDomain	subdomain
Time Zone	time_zone
Tracking Method	tracking_method
Whols	whois

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
IP Address	ip_address
Monitor	monitor
State	state
VM Instance ID	vm_inst_id

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data.

Attribute label	Attribute name
Account Id	account_id
Name	name

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Attribute label	Attribute name
Object ID	object_id
Datacenter Type	datacenter_type

Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data.

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Object ID	object_id
Public IP	public_ip
DNS Domain	dns_domain
Host Name	host_name
IP default gateway	ip_default_gateway
Netmask	netmask
Manufacturer	manufacturer

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data.

Attribute label	Attribute name
Object ID	object_id

SGC Qualys Asset Tag [sn_sec_sgc_qualys_asset_tag]

The following attributes in the SGC Qualys Asset Tag [sn_sec_sgc_qualys_asset_tag] table are populated by collected data.

Attribute label	Attribute name
Tag Id	tag_id
Tag Name	tag_name
Background Color	background_color
Business Impact	business_impact
Criticality Score	criticality_score
Foreground Color	foreground_color
Qualys Asset	qualys_asset

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SGC Qualys Asset Processor Details [sn_sec_sgc_qualys_asset_processor_details]

The following attributes in the SGC Qualys Asset Processor Details [sn_sec_sgc_qualys_asset_processor_details] table are populated by collected data.

Attribute label	Attribute name
Description	processor_description
Cores Per Socket	processor_corespersocket
Multi Threading Status	processor_multithreadingstatus
No Of Socket	processor_noofsocket
Number of CPUs	processor_numcpus
Qualys Asset	qualys_asset
Speed	processor_speed

File System [cmdb_ci_file_system]

The following attributes in the File System [cmdb_ci_file_system] table are populated by collected data.

Attribute label	Attribute name
Name	name
Free space bytes	free_space_bytes
Size bytes	size_bytes

Software Instance [cmdb_software_instance]

The following attributes in the File System [cmdb_ci_file_system] table are populated by collected data.

Attribute label	Attribute name
Installed on	installed_on
Name	name
Install date	install_date

Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id

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Attribute label	Attribute name
Region	region

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region

Cloud Subnet [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data.

Attribute label	Attribute name
Object ID	object_id

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data.

Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source
Install date	install_date

Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data.

Attribute label	Attribute name
Object ID	object_id

SGC Qualys Asset Service Details [sn_sec_sgc_qualys_asset_service_details]

SGC Qualys Asset Service Details [sn_sec_sgc_qualys_asset_service_details].

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Name	name
Description	description
Qualys Asset	qualys_asset
Status	status

Relationships created by Cloud Network [cmdb_ci_network]

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]

Relationships created by Virtual Machine Instance [cmdb_ci_vm_instance]

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Virtualized by::Virtualizes	Server [cmdb_ci_server]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Relationships created by Server [cmdb_ci_server]

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Network Interface Details [sn_sec_sgc_qualys_asset_nic_details]
Server [cmdb_ci_server]	Reference	Software Installation [cmdb_sam_sw_install]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Service Details [sn_sec_sgc_qualys_asset_service_details]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Software Details [sn_sec_sgc_qualys_asset_software_details]

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Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Open Port Details [sn_sec_sgc_qualys_asset_open_port_details]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Processor Details [sn_sec_sgc_qualys_asset_processor_details]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Tag [sn_sec_sgc_qualys_asset_tag]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Cloud Tag [sn_sec_sgc_qualys_asset_cloud_tag]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Details [sn_sec_sgc_qualys_asset_details]
Server [cmdb_ci_server]	Contains::Contained by	File System [cmdb_ci_file_system]

Relationships created by Azure Datacenter [cmdb_ci_azure_datacenter]

Parent class	Relationship type	Child class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
AWS Datacenter [cmdb_ci_aws_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Relationships created by Hardware Type [cmdb_ci_compute_template]

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Relationships created by Image [cmdb_ci_os_template]

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Image [cmdb_ci_os_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

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Relationships created by Cloud Mgmt Network Interface [cmdb_ci_nic]

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Reference-type relationships

Parent class	Relationship type	Child class
SGC Qualys Asset Software Details [sn_sec_sgc_qualys_asset_software_details]	Reference	Server [cmdb_ci_server]
SGC Qualys Asset Network Interface Details [sn_sec_sgc_qualys_asset_nic_details]	Reference	Cloud Mgmt Network Interface [cmdb_ci_nic]
SGC Qualys Asset Cloud Tag [sn_sec_sgc_qualys_asset_cloud_tag]	Reference	Server [cmdb_ci_server]
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Service Graph Connector for Rapid7

The Service Graph Connector for Rapid7 pulls in asset inventory data (hardware and software) from the Rapid7 database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

- Version 4.0 of the Rapid7 InsightVM application.
- Utah, Vancouver, and Washington ServiceNow® family releases.

Use cases

- Complement the data from the Rapid7 InsightVM discovery product.
- Import hardware data and details about your assets from the Rapid7 InsightVM integration and store them in appropriate configuration item (CI) classes in your CMDB.

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CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Rapid7 integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Guided setup

Use the guided setup feature for the Service Graph Connector for Rapid7 to help you configure your integration in an organized sequence of tasks.

Note:
The API token requires the InsightIDR viewer role.

Configure the Service Graph Connector for Rapid7

After you have followed the instructions provided to you to download and activate the Service Graph Connector for Rapid7 application, refer to Download an application from the ServiceNow Store for the first time and Install a Security Operations integration. There are a few steps you need to complete before you configure this integration.

Configure the Service Graph Connector for Rapid7

Configure your connections, set up scheduled imports, verify successful connections and optionally add multiple instances in the Guided Setup.

Before you begin
To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Roles required:

- admin for tasks in the Guided Setup
- insightIDR viewer role for the API token

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Rapid7** > **Setup** in the navigation panel in your instance.
2. On the Welcome to Guided Setup Home page, select **Continue**.
3. On the Experience page that is displayed, select **Best Experience** followed by **Continue**.
   On the Service Graph Connector for Rapid7 page, there are three tasks displayed:
   - Configure the connection
   - Add multiple instances
   - Set up scheduled imports
4. Select **Configure the connection** to expand it.
   There are three steps:
   - Configure Rapid7 authentication credentials
   - Configure Rapid7 HTTP Connection
   - Test Connection
5. Select **Configure Rapid7 authentication credentials** and fill in the fields.

   a. Enter a name for the credentials, for example **SGRapid7.Credential**.

   b. Verify the **Active** check box is selected.

   c. In the API Key field, enter your Rapid7 InsightVM API key.

   d. Leave the other field values in their current settings.

   e. Right-click in the gray header titled API Key Credentials and select **Save**.

   f. Select **Mark as complete** followed by **Continue**.
   The Configure Rapid7 HTTP Connection page is displayed.

6. Configure Rapid7 HTTP Connection.

   a. Fill in the fields,

Field	Value
Name	Connection name, `SGRapid7`, for example.
Active	Selected.
Credential	Credentials to use for the connection. Select one from the list.
Connection alias	Select one from the list. **sn_sec_sgc_rapid7.SGRapid7**, for example
URL builder	Select the check box. Fill in the new fields.
Connection URL	URL that includes 'https', for example, https://us.api.insight.rapid7.com

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Field	Value
Host	Rapid7 domain part of the URL without the 'https'. An example might be `us.api.insight.rapid7.com`.
Protocol	`https`

b. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
The Test Connection page is displayed.

7. Test the connection.

a. Select the **Test Connection** link under Related Links.
If the connection is successful, 200 is displayed in the Status Code field and a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

b. Right-click in the gray header titled Service Graph Connections and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
The steps for Add Multiple Instances is displayed. This step is optional and you might prefer to wait after you confirm you can import data before setting up multiple instances.

8. To configure the scheduled job, navigate back to the Guided Setup page and select **Set up scheduled import jobs**.

a. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.
You must select the Active check box to activate the scheduled job.

b. Select a record.

c. Fill in the fields.

Field	Value
Name	Unique Name for scheduled job.
Application	Read-only: Service Graph Connector for Rapid7.
Data source	Data source used.
Run	How often you want the job to run. If you want to run a test import prior to scheduling it, you might prefer to select **Once**.
Run as	Run the scheduled job with the credentials of another specified user.
Time	When you want the job to run.
Active	Select the check box to activate the job.

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Field	Value
Conditional	Specific conditions under which this job is run.
Use connection	Leave this check box deactivated for the first run. Specifies another connection and credentials for this job.
Concurrent import	Leave check box activated. Splits data into multiple imports sets. See the field message for more information.
Partition Method	Leave as `Custom size`.
Partition size	15,000. Leave this value for the import set size for early scheduling.
Execute pre-import script	Leave check box activated. Specifies a script to run before the import is performed.
Execute post-import script	Leave check box activated. Specifies a script to run after the import is performed.

d. **Optional:** Select **Execute now** to run the job.
If you do not choose to run the job on-demand, the next job runs according to the schedule you set.

e. Right-click in the gray header titled Scheduled Data Imports and select **Save**.

f. Select **Mark as complete** followed by **Continue**.

9. **Optional:** Return to Guided setup and add multiple instances.
When indicated, follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.
10. Select **Update Data Sources**.

a. On the Update Data Source Access page, select **Data Source**.

b. On the page that is displayed, select the **Application Access** tab.

c. Review the access settings and update as needed.

d. Right-click in the gray header titled Table and select **Save**.

e. Select **Mark as complete** followed by **Continue**.

f. Select Schedule **Update Schedule Data Import**.

g. Select the **Application Access** tab to view the permission settings.

h. When you are satisfied with the settings, right-click in the gray header titled Tables and select **Save**.

i. Select **Mark as complete** followed by **Continue**.

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j. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

k. On the Add Another Connection page, select the **Click here** link.
The Flow Designer connection page is displayed and you can create a new connection.

l. From this page, select **Add Connection**.

m. Fill in the fields with your connection information.

Field	Description
Rapid7 Connection name	Unique name for your connection.
Rapid7 Connection URL	Connection URL.
API Key	Rapid7 API key.

n. Select **Create Connection**.
Your connections are displayed on the Rapid7 page.

o. Select **Mark as complete** followed by **Continue**.
The Test New Connections page is displayed. Locate your new connection and note the status is '`Pending`'.

p. Scroll and select the **Test Connection** link.
If the connection is successful, 200 is displayed in the Status Code field and a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

q. Right-click in the gray header titled Service Graph Connections and select **Save**.

r. Select **Mark as complete** followed by **Continue**.
The Configure the scheduled jobs page is displayed.

s. Repeat the steps listed previously in step 8.

t. On the Service Graph Connector for Rapid7 page for Guided Setup, select **Complete** to finish the configuration.

CMDB classes targeted in the Service Graph Connector for Rapid7

When you complete the guided setup, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Hardware [cmdb_ci_hardware]

The following attributes in the Hardware [cmdb_ci_hardware] table are populated by collected data.

Attribute label	Attribute name
Name	name

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Attribute label	Attribute name
Correlation ID	correlation_id
MAC Address	mac_address
Install Status	install_status
Operational Status	operational_status

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

Attribute label	Attribute name
Name	name
IP Address	ip_address
Owned By Configuration Item	owned_by_cmdb_ci

SGC Rapid7 Asset [sn_sec_sgc_rapid7_sgc_rapid7_asset]

The following attributes in the SGC Rapid7 Asset [sn_sec_sgc_rapid7_sgc_rapid7_asset] table are populated by collected data.

Attribute label	Attribute name
Assessed for policies	assessed_for_policies
Assessed for vulnerabilities	assessed_for_vulnerabilities
Configuration item	configuration_item
Credential assessments	credential_assessments
Critical vulnerabilities	critical_vulnerabilities
Exploits	exploits
Last assessed for vulnerabilities	last_assessed_for_vulnerabilities
Last scan end	last_scan_end
Last scan start	last_scan_start
Malware kits	malware_kits
Moderate vulnerabilities	moderate_vulnerabilities
New	new
OS architecture	os_architecture
OS description	os_description
OS family	os_family
OS name	os_name
OS system name	os_system_name
OS type	os_type

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Attribute label	Attribute name
OS vendor	os_vendor
OS version	os_version
Remediated	remediated
Risk score	risk_score
Same	same
Severe vulnerabilities	severe_vulnerabilities
Tags	tags
Total vulnerabilities	total_vulnerabilities
Type	type
Unique identifiers	unique_identifiers
Configuration item	configuration_item

Relationships created for Hardware

Parent class	Relationship type	Child class
Hardware [cmdb_ci_hardware]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Hardware [cmdb_ci_hardware]	Reference	SGC Rapid7 Asset [sn_sec_sgc_rapid7_sgc_rapid7_asset]

Relationships created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Hardware [cmdb_ci_hardware]

Relationships created by SGC Rapid7 Asset

Parent class	Relationship type	Child class
SGC Rapid7 Asset [sn_sec_sgc_rapid7_sgc_rapid7_asset]	Reference	Hardware [cmdb_ci_hardware]

Service Graph Connector for SentinelOne

The Service Graph Connector for SentinelOne pulls in asset inventory data (hardware and software) from the SentinelOne database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Supported Versions

- Supported SentinelOne API versions: Get Agents- V2.1
- Supported ServiceNow AI Platform® versions:
  - Xanadu
  - Washington
  - Vancouver

Use cases

- Import SentinelOne agent information and store it in appropriate configuration item (CI) classes in your CMDB.
- Configure multiple instances of SentinelOne in the Service Graph Connector.

Guided setup

Use the guided setup feature to help you configure your integration in an organized sequence of tasks.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring SentinelOne integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Configure the Service Graph Connector for SentinelOne

The guided setup for the Service Graph Connector for SentinelOne provides an organized sequence of tasks to configure the integration on your ServiceNow AI Platform instance.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI Class Models store app store app, which is automatically installed.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- Guided Setup (com.sn.ads.setup).

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- Data Stream (com.glide.hub.action_type.datastream).
- ITOM Patterns.

Roles required:

- SentinelOne Role - viewer
- ServiceNow AI Platform® Role - admin

Guided Setup

The guided setup for the Service Graph Connector for SentinelOne provides an organized sequence of tasks to configure the integration on your instance.

Procedure

1. Navigate to **Service Graph Connectors** > **SentinelOne** > **Setup**.
2. On the Home page, select **Continue**.
3. On the Experience page, select the **Best Experience** from it.
4. On the Service Graph Connector for SentinelOne page in the Configure the connection page, select the **Configure SentinelOne Authentication Credentials** task and follow these steps:
   a. In the API Key field, enter your SentinelOne API Key and update the credential record.
   b. Select the **Mark as Complete** checkbox and select **Continue**.
5. In the **Configure SentinelOne HTTP Connection** task follow these steps:
   a. Add the SentinelOne base URL (Uniform Resource Locator).
   b. Select the **Mark as Complete** checkbox and select **Continue**.
6. In the **Test Connection** task follow these steps:
   a. Select the **Test Connection** link.

      The Status code field displays 200 if the connection is successful.

   b. Select the **Mark as Complete** checkbox and select **Continue**.
7. **Optional:** To create another connection, select the **Update Data Source Access** section and follow these steps:
   a. Give permission to create and update the data source.
   b. Select the **Mark as Complete** checkbox and select **Continue**.
   c. Give permission to create and update the Scheduled Import Sets.
   d. Select the **Mark as Complete** checkbox and select **Continue**.
   e. Clear the cache with the code snippet mentioned previously using Scripts-Background.
   f. Select the **Mark as Complete** checkbox and select **Continue**.
   g. Add a new connection by clicking the link.
   h. After you add a new connection, select the **Mark as Complete** checkbox and select **Continue**.
   i. Select the new connection record and select the **Test Connection link**.

      The Status code field displays 200 if the connection is successful.

   j. Select the **Mark as Complete** checkbox and select **Continue**.

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8. Fill out the fields on the Scheduled Data Import form:

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import.
Run as	Option to run the scheduled job with the credentials of the specified user.
Active	Option to activate the scheduled job. Select this option.
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.
Partition Method	Partition method for the concurrent import set.
Partition Size	Import set size for early scheduling.
Execute pre-import script	Option to specify a script to run before the import is performed.
Execute post-import script	Option to specify a script to run after the import is performed.
Application	Application that contains this scheduled job.
Run	Frequency of running the import.
Conditional	Conditions under which this job is executed.

9. Click **Execute Now**.
10. In the Help task bar, select **Mark as Complete**.

CMDB classes targeted in the Service Graph Connector for SentinelOne

When you complete the guided setup, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data.

Attribute label	Attribute name
Object Id	object_id
Region	region
Name	name

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Relationships for AWS Datacenter

Parent Class	Relationship Type	Child Class
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

Attribute label	Attribute name
Object Id	region
Name	name
Region	region

Relationships for Azure Data Center

Parent Class	Relationship Type	Child Class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data.

Relationships for Availability Zone

Parent Class	Relationship Type	Child Class
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains:Contained by	Availability Zone [cmdb_ci_availability_zone]

Attribute label	Attribute name
Name	name
Object Id	object_id
Region	region

GCP Datacenter [cmdb_ci_google_datacenter]

The following attributes in the GCP Datacenter [cmdb_ci_google_datacenter] table are populated by collected data.

Attribute label	Attribute name
Name	name

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Attribute label	Attribute name
Object Id	object_id
Account Id	account_id
Datacenter Type	datacenter_type

Relationships for GCP Datacenter

Parent Class	Relationship Type	Child Class
GCP Datacenter [cmdb_ci_google_datacenter]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object Id	object_Id
Account Id	account_Id
Datacenter Type	datacenter_type

Relationships for Cloud Service Account

Parent Class	Relationship Type	Child Class
Network [cmdb_ci_network]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Cloud Subnets [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnets [cmdb_ci_cloud_subnet] table are populated by collected data.

Attribute label	Attribute name
Object Id	object_id
Name	name

Relationships for Cloud Subnets

Parent Class	Relationship Type	Child Class
Network [cmdb_ci_network]	Contains:Contained by	Cloud Subnets [cmdb_ci_cloud_subnet]

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Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object Id	object_id

Relationships for Hardware Type

Parent Class	Relationship Type	Child Class
Compute Template [cmdb_ci_compute_template]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
VM Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Compute Template [cmdb_ci_compute_template]

Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data.

Attribute label	Atribute name
Object Id	object_id
Name	name

Relationships for Cloud network

Parent Class	Relationship Type	Child Class
Network [cmdb_ci_network]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data.

Attribute label	Attribute name
Object Id	object_id
Name	name
VM Instance ID	vm_inst_id

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Relationships for VM Instance

Parent Class	Relationship Type	Child Class
VM Instance [cmdb_ci_vm_instance]	Hosted On: Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
VM Instance [cmdb_ci_vm_instance]	Virtualized by::Virtualizes	Server [cmdb_ci_server]
VM Instance [cmdb_ci_vm_instance]	Hosted On: Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data.

Attribute label	Attribute name
Key	key
Value	value
Tag	tag

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data.

Attribute label	Attribute name
Object Id	object_id
Name	name

Relationships for Image

Parent Class	Relationship Type	Child Class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data.

Attribute label	Attribute name
Attribute label	**Attribute name**
Name	name
Serial number	serial_number
CPU speed (MHz)	cpu_speed
CPU count	cpu_count

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Attribute label	Attribute name
RAM (MB)	ram
OS Address Width (bits)	os_address_width
Operating System	os
CPU core count	cpu_core_count
Fully qualified domain name	fqdn
CPU name	cpu_name
First Discovered	first_discovered
Model Id	model_id
Model Number	model_number
Name	name

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Name	name
Serial number	serial_number
CPU speed (MHz)	cpu_speed
CPU count	cpu_count
RAM (MB)	ram
OS Address Width (bits)	os_address_width
Operating System	os
CPU core count	cpu_core_count
Fully qualified domain name	fqdn
CPU name	cpu_name
First Discovered	first_discovered
Model Id	model_id
Model Number	model_number
Name	name

SentinelOne Asset Tags [sn_sec_sgc_sntlone_asset_tags]

The following attributes in the SentinelOne Asset Tags [sn_sec_sgc_sntlone_asset_tags] table are populated by collected data.

Attribute label	Attribute name
ID	tags_id

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Attribute label	Attribute name
Key	tags_key
Value	tags_value
Assigned At	tags_assignedat
Assigned By	tags_assignedby
Assigned By ID	assigned_by_id

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

Attribute label	Attribute name
IP Address	ip_address
Name	name
Nic	nic
IP version	ip_version

Relationships for IP Address

Parent Class	Relationship Type	Child Class
Server [cmdb_ci_server]	Owns:Owned by	IP Address [cmdb_ci_ip_address]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data.

Attribute label	Attribute name
Mac Address	mac_address
Name	name
Ip Default Gateway	ip_default_gateway
Discovery Source	discovery_source

Relationships for Network Adapter

Parent Class	Relationship Type	Child Class
Server [cmdb_ci_server]	Owns:Owned by	Network Adapter [cmdb_ci_network_adapter]

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SentinelOne Additional Attributes [sn_sec_sgc_sntlone_additonal_attributes]

The following attributes in the SentinelOne Additional Attributes [sn_sec_sgc_sntlone_additonal_attributes] table are populated by collected data.

Attribute label	Attribute name
NetworkInterfaces Name	networkinterfaces_name
NetworkInterfaces GatewayMacAddress	networkinterfaces_gatewaymacaddress
UUID	uuid
Configuration item	configuration_item
Network Quarantine Enabled	network_quarantine_enabled
Last Successful Scan Date	last_successful_scan_date
License_Key	license_key
First Discovered	first_discovered
Location Enabled	location_enabled
Ad ComputerDistinguishedName	ad_computerdistinguishedname
Agent Version	agent_version
Scan Status	scan_status
Scan Started At	scan_started_at
ID	id
IP Address Subnet	ip_address_subnet
Mitigation Mode Suspicious	mitigation_mode_suspicious
Last Scan Finished At	last_scan_finished_at
Firewall Enabled	firewall_enabled
Console Migration Status	console_migration_status
Group ID	group_id
Operational State Expiration	operational_state_expiration
Last IP To Mgmt	last_ip_to_mgmt
Threat Reboot Required	threat_reboot_required
Machine Type	machine_type
Is Pending Uninstall Ranger Status	Is_pending_uninstall ranger_status
Ad LastUserDistinguishedName	ad_lastuserdistinguishedname
Agent Up To Date	agent_up_to_date
Ranger Version	ranger_version
Last Boot Time	last_boot_time
Disk Encryption Status	disk_encryption_status

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Attribute label	Attribute name
Mitigation Mode	mitigation_mode
Last Full Scan	last_full_scan
Agent Uninstalled	agent_uninstalled
Extenal Id	extenal_id
Updated At	updated_at
Last Scan Aborted At	last_scan_aborted_at
Network Status	network_status
Show Alert Icon	show_alert_icon
Subscribed On	subscribed_on
Account ID	account_id
Recently Active	recently_active
Active Threats	active_threats
Allow Remote Shell	allow_remote_shell
Site Name	site_name
First Full Mode Time	first_full_mode_time
Infected	infected
App Vulnerability Status	app_vulnerability_status
Site ID	site_id
Agent Installer Type	agent_installer_type
Account Name	acount_name
NetworkInterfaces Name	networkinterfaces_name
NetworkInterfaces GatewayMacAddress	networkinterfaces_gatewaymacaddress
NetworkInterfaces ID	networkinterfaces_id
user_actions_needed	user_actions_needed
aws_security_group	aws_security_group
proxyState_console	proxyState_console
proxyState_deepVisibility	proxyState_deepVisibility
Ad UserPrincipalName	ad_userPrincipalName
Ad ComputerMemberOf	ad_computerMemberOf
Ad ComputerDistinguishedName	ad_computerDistinguishedName
Ad LastUserMemberOf	ad_lastUserMemberOf
Ad LastUserDistinguishedName	ad_lastUserDistinguishedName
Ad Mail	ad_mail
Agent Decommissioned	agent_decommissioned
Agent Operational State	agent_operational_state

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Attribute label	Attribute name
Last Active Date	last_active_date
Group Updated At	group_updated_at
Missing Permissions	missing_permissions

Service Graph Connector for SentinelOne Properties

Property	Description
sn_sec_sgc_sntlone.api_page_size	Enter the number of records per page to retrieve. • Type: string • Default value: 1000 • Location: System Property [sys_properties] table

Note:
To open the System Properties [sys_properties] table, enter sys_properties.LIST in the navigation filter.

Service Graph Connector for Splunk

The Service Graph Connector for Splunk pulls in asset inventory data (hardware and software) from the Splunk database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

Supported versions:

- Xanadu
- Washingtondc
- Vancouver

Use cases

By default, the Service Graph Connector for Splunk pulls the following basic forwarding details:

- Forwarder's version
- Forwarder's type
- Forwarder's last check-in time
- OS
- Host
- Host IP address

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With the Service Graph Connector for Splunk add-on, you have the option to import extended data for your Windows and Linux assets with the Service Graph Connector for Splunk that includes the following details:

- MAC address
- Operating system details
- Asset name
- Software details
- File system
- Last logon date
- Open ports

This data is stored in the Configuration Management Database (CMDB) and Splunk Asset Details extension attributes custom tables. To import these extended asset details, the add-on is required. See Install the add-on for the Service Graph Connector for Splunk.

Guided setup

The guided setup for the Service Graph Connector for Splunk provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see the section titled Configure the Service Graph Connector for Splunk.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Configure the Service Graph Connector for Splunk

Configure your connections, set up scheduled imports, verify successful connections and optionally add multiple instances in the Guided Setup.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.

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- Optional: Only required for event ingestion. Observability Commons for CMDB (sn_observability). If used, this app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Splunk** > **Setup** in the navigation panel in your instance.
2. On the Welcome to Guided Setup Home page, select **Continue**.
3. On the Experience page that is displayed, select **Best Experience** followed by **Continue**.
   On the Service Graph Connector for Splunk page, there are three tasks displayed:
   - Configure the connection
   - Add multiple instances
   - Set up scheduled import jobs
4. Select **Configure the connection** to expand it.
   There are three tasks:
   - Configure Splunk authentication credentials
   - Configure Splunk HTTP Connection
   - Test Connection
5. Select **Configure Splunk authentication credentials** and fill in the fields.

   a. Enter a name for the credentials, for example **SG-Splunk Credentials**.

   b. Verify the **Active** check box is selected.

   c. Enter your User name and Password for your Splunk instance.

   d. Leave the other field values in their current settings.

   e. Right-click in the gray header titled Basic Auth Credentials and select **Save**.

   f. Select **Mark as complete** followed by **Continue**.
   The Configure Splunk HTTP Connection page is displayed.

6. Configure the Splunk HTTP connection.

   a. Fill in the fields.

Field	Value
Name	Connection name, `SG-Splunk Connection`, for example.
Active	Selected.
Credential	Credentials to use for the connection. Select one from the list.

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Field	Value
Domain	global.
Connection alias	Select one from the list. **sn_sec_sgc_splunk.SGSplunk**, for example
URL builder	Select the check box. Fill in the new fields.
Host	Splunk domain part of the URL without the 'https'. An example might be `splunk3.com` or an IP address.
Override default port	The Splunk instance port,`8089`, for example.
Protocol	https.
(Optional) Use MID server	Select the check box for a dedicated MID Server for the connection, if available. i. Select **Specific MID Server** from the MID Selection drop down list. ii. Select a MID Server from the list. **Note:** A MID Server is required for on-premise connections if the connection is not publicly accessible.

b. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
The Test Connection page is displayed.

d. Optional: Set the flag for the **is the servicenow addon installed** (*`is_snow_addon_installed`*).
By default, the property on the Service Graph Connection Properties tab is set to **false**.

Option	Description
false	The default query is set to extract only essential information about the forwarder that includes the host name and the operating system.
true	The query offers more information about the forwarder along with extensive asset details via the ServiceNow add-on. (Optional) This data is imported only if the add-on is installed on the Splunk instance.

7. Test the connection.

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a. Select the **Test Connection** link under Related Links.
If the connection is successful, 201 is displayed in the Status Code field and a message is displayed after a few moments. If your connection test fails, review the Message and Suggestion fields for how to proceed.

b. After a successful test, right-click in the gray header titled Service Graph Connections and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
The steps for Add Multiple Instances is displayed. To add multiple instances, proceed to step 9. This step is optional and you might prefer to wait after you confirm you can import data before setting up multiple instances. To set the import schedule, follow the steps below.

8. To configure the scheduled job, select **Set up scheduled import jobs** from the drop down list under Add Multiple Instances in the header.

a. On the Configure the scheduled jobs page, select a record under Scheduled Data Imports.

b. Select the frequency from the list for the Run field.
If you want to run a test import prior to scheduling it, you might prefer to select **Once**.

c. Select the **Active** box to activate the scheduled job.

d. **Optional:** Edit the fields as required.

(Optional) You might prefer to leave these fields in their default settings for the first few runs to confirm data imports.

Field	Value
Name	Unique Name for scheduled job.
Application	Read-only: Service Graph Connector for Splunk
Data source	Data source used.
Run as	Run the scheduled job with the credentials of another specified user.
Time	When you want the job to run.
Conditional	Specific conditions under which this job is run.
Use connection	Leave this check box deactivated for the first run. Specifies another connection and credentials for this job.
Concurrent import	Leave check box activated. Splits data into multiple imports sets. See the field message for more information.
Partition Method	Leave as `Custom size`.
Partition size	15,000. Leave this value for the import set size for early scheduling.

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Field	Value
Execute pre-import script	Leave check box activated. Specifies a script to run before the import is performed.
Execute post-import script	Leave check box activated. Specifies a script to run after the import is performed.

e. **Optional:** Select **Execute now** to run the job.
If you do not choose to run the job on-demand, the next job runs according to the schedule you set.

f. Right-click in the gray header titled Scheduled Data Import and select **Save**.

g. Select **Mark as complete** followed by **Continue**.
The main task page is displayed.

9. **Optional:** To add multiple instances, select **Update Data Sources**.

(Optional) When indicated, follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

a. On the Update Data Source Access page, select **Data Source**.

b. On the page that is displayed, select the **Application Access** tab.

c. Review the access settings and update as needed.

d. Right-click in the gray header titled Table and select **Save**.

e. Select **Mark as complete** followed by **Continue**.

f. On the **Update Schedule Data Import** record, select **Schedule Data Import** to open it.

g. Select the **Application Access** tab to view the permission settings.

h. When you are satisfied with the settings, right-click in the gray header titled Tables and select **Save**.

i. Select **Mark as complete** followed by **Continue**.

j. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

k. On the Add Another Connection page, select the **Click here** link.
The Flow Designer connection page is displayed and you can create a new connection.

l. From this page, select **Add Connection**.

m. Fill in the fields with your connection information.

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Field	Description
Splunk Connection name	Unique name for your connection.
Splunk Connection URL	Connection URL in https format.
User name	Splunk user name.
Password	Splunk password.

n. Select **Create Connection**.
Your connections are displayed on the page.

o. On the Add Multiple Instance page, select **Mark as complete** followed by **Continue**.
The Configure MID Server for New HTTP Connection page is displayed.

p. Locate your new connection and select it to open the record.
The connection URL is displayed in the Connection URL field.

q. **Optional:** Select the Use MID server check box to add a MID Server.

i. Select **Specific MID Server** from the MID Selection drop down list.

ii. Select a MID Server from the list.

r. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

s. Select **Mark as complete** followed by **Continue**.
The Test New Connections page is displayed.

10. Test the new connection.

a. Scroll and select the connection you want to test.

b. Select the **Test Connection** link under Related Links.
If the connection is successful, 201 is displayed in the Status Code field and a message is displayed after a few moments. If your connection test fails, review the Message and Suggestion fields for how to proceed.

c. After a successful test, right-click in the gray header titled Service Graph Connections and select **Save**.

d. Select **Mark as complete** followed by **Continue**.
The Configure the scheduled jobs page is displayed

e. On the Service Graph Connector for Splunk page for Guided Setup, select **Complete** to finish the configuration.

Service Graph Connector for Splunk add-on

Import more detailed asset data with the Service Graph Connector for Splunk with an add-on developed by ServiceNow engineering. The add-on permits you to import data about your Windows and Linux assets.

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Service Graph Connector for Splunk

The Service Graph Connector for Splunk retrieves computer and software information from the Splunk product and imports it into the Configuration Management Database (CMDB) in your instance. By default, the following basic data is imported:

- Forwarder's version (agent)
- Forwarder's type (agent)
- Forwarder's last check-in time (agent)
- OS
- Host
- Host IP address

The service graph connector for Splunk is available on the ServiceNow® Store.

The ServiceNow Add-on for Windows and Linux assets

With the Windows and Linux Assets add-on, you have the option to import more detailed asset data with the Service Graph Connector for Splunk that includes the following data:

- MAC address
- Operating system details
- Asset name
- Installed software details
- File system
- Last logon date
- Open ports
- Running processes
- Running services

This add-on is available for download into your Splunk console from splunkbase.

Downloading and installing the add-on

Prior to installing this add-on, you must verify you have installed and activated the following applications and add-ons:

- Service Graph Connector Splunk
- Splunk_TA_nix version 9.0.0 (Linux) or later
- Splunk_TA_windows version 8.9.0 or later add-ons available from splunkbase.

These add-ons permit you to identify and import more specific data related to your Linux and Windows assets with your imports with the Splunk Service Graph Connector API.

For example, searches from these add-ons might provide you with data you want about Windows drivers, Windows Network Adaptors, Linux Hardware, and other OS Details.

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Target workloads

In the app.manifest, individual agents on a specific machine send information to a central hub (server) where data is collected, stored, and managed. This central machine is where the apps are installed.

To adjust workloads to specify resources for a search, indexing, or other workloads, in Splunk Web, select **Settings** > **Workload Management** > **Workload Rules**.

In the Status column, select the toggle to activate or deactivate individual workload rules.

Supported deployments

This add-on supports the following types of deployments:

- standalone
- distributed
- search head clustering

See Splunk documentation for more information about their supported workloads.

Install the add-on for the Service Graph Connector for Splunk

Install the Splunk add-on developed by ServiceNow® engineering from splunkbase to search for Windows and Linux Assets.

Before you begin
Role required: admin or security_admin

Procedure

1. Navigate to **splunkbase** (splunkbase) and log in.
2. In your Splunk console, select **Apps** > **FInd More Apps**.
3. Locate the **ServiceNow Add-on for Windows and Linux Assets** app and select **Install**.

   Note:
   You can upgrade from within the app.

4. Follow the prompts.
5. **Optional:** Navigate to **Settings** > **Searches, reports and alerts** to view when searches are scheduled.

   Note:

   (Optional) You can change the schedules, but since the schedules run in a specific order and require successful completion before the next search in the list is initiated, you might prefer to leave the settings in their defaults.

   After all the searches are completed, the data is grouped from each search into a few coalesced key-value parings (kvstores) for import into your instance: asset details, asset process details, asset service details, and asset software details.

6. Select **App: Search and Reporting (search)** > **ServiceNow Add-on for Windows and Linux Assets.**

   By default, search data is stored in the following key definitions:

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- Asset_index_macro: Index="internal"
- Asset_linex_Index_macro: index="main"
- Asset_windows_index="main"

If you are storing the search data for Linux and Windows in custom indexes, you must update your search macros.

7. To update your search macros, navigate to **Settings** > **Advanced search** > **Search macros** > **Search & Reporting (Search)** > **ServiceNow Add-on for Windows and Linux Assets ServiceNow_TA_windows_linux_assets**
8. On the Search macros page, update the index as required in the Definition column.
9. **Optional:** Adjust workloads to specify resources for search, indexing, and other workloads.
   a. In Splunk Web, select **Settings** > **Workload Management** > **Workload Rules**.
   b. In the Status column, select the toggle to activate or deactivate individual workload rules. See Service Graph Connector for Splunk add-on for more information about target workloads and supported deployments.

CMDB classes targeted in the Service Graph Connector for Splunk

When you complete the guided setup, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Hardware [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Name	name
Serial Number	serial_number
Operating System	os
OS Version	os_version
CPU name	cpu_name
CPU manufacturer	cpu_manufacturer
CPU type	cpu_type
CPU speed (MHz)	cpu_speed
CPU core count	cpu_core_count
CPU count	cpu_count
Manufacturer	manufacturer

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

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Attribute label	Attribute name
Name	name
IP Address	ip_address

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data.

Attribute label	Attribute name
Name	name
MAC Address	mac_address
Manufacturer	manufacturer

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Name	name
Version	version

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data.

Attribute label	Attribute name
Name	name
Product name	software
Installed On	installed_on

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data. This table is populated only when the Software Asset Management applications are installed.

Attribute label	Attribute name
Display Name	display_name
Version	version
Discovery Source	discovery_source

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Splunk Asset Details [sn_sec_sgc_splunk_asset_details]

The following attributes in the Splunk Asset Details [sn_sec_sgc_splunk_asset_details] table are populated by collected data.

Attribute label	Attribute name
Configuration Item	configuration_item
Forwarder GUID	forwarder_guid
Forwarder Type	forwarder_type
Forwarder Version	forwarder_version
Host Name	host_name
Host Status	host_status
Host type	host_type
Last logon date	last_check_in
Model Name	model_name
OS Architecture	os_architecture
OS Build Number	os_build_number
OS Family	os_family

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_rel_ci	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_rel_ci	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_rel_ci	Contains::Contained by	File system [cmdb_ci_file_system]

Service Graph Connector for SolarWinds

Use the Service Graph Connector for SolarWinds to pull in data from the SolarWinds software into your ServiceNow instance.

The Service Graph Connector for SolarWinds pulls in asset inventory data (hardware and software) from the SolarWinds database into the ServiceNow® Configuration Management Database (CMDB) application.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Supported versions

- Supported SolarWinds Orion minimum versions:
  - 2019.4 HF6
  - 2020.2.1. HF2
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama

Use cases

The following are examples on how you can use the Service Graph Connector:

- Automatic normalization of asset information for hardware, virtualization and cloud resources, and software.
- Ability to configure and save synchronization schedules.

Guided setup

The guided setup for the Service Graph Connector for SolarWinds provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for SolarWinds.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed Service Graph Connectors. You can see metrics for all integration runs. You can filter the view to a specific integration, a specific time duration, or a specific integration run. For more details about monitoring SolarWinds integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from data sources in the SolarWinds software is mapped and transformed into ServiceNow CMDB tables using the Robust Transform Engine (RTE). Data is inserted into ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from the SolarWinds software.

The data is loaded into staging tables and then inserted into the following CMDB target tables:

- AIX Server [cmdb_ci_aix_server]
- Availability Zone [cmdb_ci_availability_zone]
- CI Relationship [cmdb_rel_ci]
- Cloud Network [cmdb_ci_network]
- Cloud Service Account [cmdb_ci_cloud_service_account]
- Cloud Subnet [cmdb_ci_cloud_subnet]
- Computer [cmdb_ci_computer]
- Disk [cmdb_ci_disk]

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- Hardware [cmdb_ci_hardware]
- Hardware Type [cmdb_ci_compute_template]
- Hyper-V Server [cmdb_ci_hyper_v_server]
- IIS Virtual Directory [cmdb_ci_iisdirectory]
- Image [cmdb_ci_os_template]
- IP Address [cmdb_ci_ip_address]
- Linux Server [cmdb_ci_linux_server]
- Logical Datacenter [cmdb_ci_logical_datacenter]
- Microsoft iis Web Server [cmdb_ci_microsoft_iis_web_server]
- MS SQL Server [cmdb_ci_db_mssql_server]
- MS SQL DataBase [cmdb_ci_db_mssql_database]
- Network Adapter [cmdb_ci_network_adapter]
- Network Gear [cmdb_ci_netgear]
- Serial Number [cmdb_serial_number]
- Server [cmdb_ci_server]
- Software Installation [cmdb_sam_sw_install] (If the Software Asset Management (SAM) application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)
- Solaris Server [cmdb_ci_solaris_server]
- Storage Volume [cmdb_ci_storage_volume]
- UNIX Server [cmdb_ci_unix_server]
- VM Instance [cmdb_ci_vm_instance]
- Windows Server [cmdb_ci_win_server]

For more information on where data is saved when pulling data from SolarWinds, see CMDB classes targeted in Service Graph Connector for SolarWinds.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for SolarWinds using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for SolarWinds for pulling in SolarWinds data into the CMDB.

Before you begin

Install Service Graph Connector for SolarWinds version 2.6.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Air gap connections are available from version 2.5.0 of the Service Graph Connector for SolarWinds. You can set up either standard data sources or air gap data sources. Before you set up air gap data sources, you must configure the air gap solution for the Service Graph

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Connector for SolarWinds in your high-secure server and low-secure server. See Configuring air gap connections for Service Graph Connector for SolarWinds.

Role required: admin or cmdb_inst_admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Dashboard page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the SolarWinds connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Complete the setup for configuring the connector for importing data.

   a. Select the data source type.

      i. In the **Setup** stage of the playbook, select the **Select data source type** activity.

      - Select **Standard data sources** if you're working with environments that have direct internet access.

        Proceed to step 6.c.

      - Select **Air gap data sources** if you're working with restricted environments that don't have direct internet access.

      ii. Select **Continue**.

   b. Download and run the PowerShell scripts to set up an air gap connection.

      Note:
      Before you add an air gap data source, you must configure the air gap solution for the Service Graph Connector for SolarWinds in your high-secure and low-secure servers. See Configuring air gap connections for Service Graph Connector for SolarWinds.

      i. In the **Setup** stage of the playbook, select the **Download PowerShell scripts** activity.

      The **Download PowerShell scripts** activity appears only when you select **Air gap data sources** as the data source type in step 6.a.

      ii. Select **Download PowerShell scripts**.

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iii. Run the PowerShell scripts.

For more information on configuring an air gap connection, see Configuring air gap connections for Service Graph Connector for SolarWinds.

iv. After configuring the air gap connection, select **Continue**.

c. Create and test a connection.

i. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

ii. On the form, fill in the fields.

- For standard data sources:

Create and test connection form

Field	Description
Connection Name	Display name for the connection.
Connection URL	Connection host name for SolarWinds.
User name	User name for SolarWinds authentication.
Password	Password for SolarWinds authentication.
Use MID server	Option to use a MID Server. Select this check box.
MID selection	Select a MID Server from the list. This field appears only when the **Use MID Server** check box is selected.
MID application	Select a MID Server application from the list. This field appears only when the **Use MID Server** check box is selected.

- For air gap data sources:

Create and test connection form

Field	Description
Connection name	Display name for the connection.
Parent directory	Path of the SolarWinds directory where the data is stored in your low-secure server.
Archive data after retrieval	Option to archive data after retrieval.
Archive path [Optional]	Folder where the data is to be archived if the **Archive data after retrieval** check box is selected.

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Field	Description
MID server	Name of the MID Server that you deployed in your low-secure server. See Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server.

iii. Select **Create and test connection**.

iv. Once the connection test is complete, select **Continue**.

d. Configure the properties of the connector to access resources.

i. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

- Select **SAM installed** if a Service & Application Monitor (SAM) module is installed on the SolarWinds instance.
- Select **NPM installed** if a Network Performance Monitor (NPM) module is installed on the SolarWinds instance.

ii. Select **Continue**.

e. Configure the import schedule to import data at regular intervals.

i. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

ii. Expand the Parent scheduled data import within the Import schedules list, and select the SG-Solarwinds Hardware import schedule.

iii. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

iv. Select **Save**.

Alternatively, select **Execute Now** to execute the import schedule immediately.

v. Select **Continue**.

f. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for SolarWinds

CMDB classes targeted in Service Graph Connector for SolarWinds

Accessing the connection details of Service Graph Connector for SolarWinds

Configuring air gap connections for Service Graph Connector for SolarWinds

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Configure Service Graph Connector for SolarWinds

Set up authentication credentials and scheduled jobs to import SolarWinds data into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Before you start the configuration, navigate to **System Definition** > **Business Rules**, and deactivate the *ValidateServiceAccountID* business rule.

Air gap connections are available from version 2.5.0 of the Service Graph Connector for SolarWinds. You can set up either regular data sources or air gap data sources. Before you set up air gap data sources, you must configure the air gap solution for the Service Graph Connector for SolarWinds in your high-secure server and low-secure server. See Configuring air gap connections for Service Graph Connector for SolarWinds.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- SolarWinds Orion Platform.
- SolarWinds Server & Application Monitor and/or Network Performance Monitor.

Roles required:

- To configure the ServiceNow platform: admin
- To access SolarWinds data: User with SWIS (SolarWinds Information Service) access (the same as through the Orion website, not database users).

About this task

Note:
SolarWinds Integration can work with or without Service & Application Monitor (SAM) and Network Performance Monitor (NPM) being installed.

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. Configure your authentication credentials used to connect to the SolarWinds SWIS API.

   a. On the Service Graph Connector for SolarWinds page, in the Configure the connection section, select the **Configure the authentication credentials used to connect to SolarWinds SWIS API** task.

   b. For the Configure the authentication credentials used to connect to SolarWinds SWIS API task, select **Configure**.

   c. Fill in the fields on the Basic Auth Credentials form.

   Basic Auth Credentials form

Field	Description
Name	Human-readable name for this credential. This field is automatically set. You can optionally change this setting.
User name	SolarWinds user name. **Note:** The SolarWinds user must have a role with read privileges to the SolarWinds Information Service API for all SolarWinds data sources that the integration can pull data.
Password	SolarWinds password that is stored in the database in encrypted form.
Active	Option to check whether this credential is active.
Credential alias	Advanced selection criteria for this credential.
Order	Order in which credentials are tried. Smaller numbers are tried first.

   d. Select **Update** if required.

   e. Set the Configure the authentication credentials used to connect to the SolarWinds SWIS API task to complete by selecting **Mark as Complete**.

4. Configure the SolarWinds HTTP connection.

   a. For the Configure SolarWinds HTTP connection task, select **Configure**.

   b. Review the HTTP(s) Connection form, and fill in the fields as required.

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HTTP(s) Connection form

Field	Description
Name	Name of the connection. This field is automatically set. You can optionally change the name.
Use MID server	Option to enable the connection to use a MID server.
Host	Target host value used by the connection. This field is automatically set by the connection URL.
Credential	Credential value used by the connection.
Connection alias	Connection alias value with which the connection can be referred.
URL builder	URL builder that is used to build the connection URL.
Mutual authentication	Option to enable mutual authentication.
Protocol	Underlying protocol used by the connection.
Active	Option to activate the HTTP connection.
Domain	Domain to which the connection belongs.
Override default port	Target port value used by the connection.
Base path	Base path for HTTP(S) connection that is required but should not be modified.

c. Select **Update**, if required.

d. Set the Configure SolarWinds HTTP connection task to complete by selecting **Mark as Complete**.

5. Configure the SolarWinds modules.

a. For the Configure SolarWinds Modules task, select **Configure**.

b. Update the **Value** for the *sn_solarwinds_inte.npm_installed* and the *sn_solarwinds_inte.sam_installed* properties in one of the following ways:

- If the respective module is installed on the SolarWinds instance, then set the fields to **true**.
- If the respective module is not installed on the SolarWinds instance, then set the fields to **false**.

> **Note:**
> This update changes the API class and the data that is returned from them.

c. Set the Configure SolarWinds Modules task to complete by selecting **Mark as Complete**.

6. Test the connection.

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a. For the Test the connection task, select **Configure**.

b. Review the fields on the Data Source form, which are automatically set.

Data Source form

Field	Description
Name	Unique name for this data source.
Import set table label	Label of the table that will be created for this data source.
Import set table name	Name of the table that will be created for this data source.
Type	Data storage type of the data to be imported.
Data in single column	Data in single column.
Application	Application containing this record.
Data stream action	The Data Source request action that will be invoked to get data.

c. Test the connection by selecting the **Test Load 20 Records** related link.

Testing the connection takes a few moments, after which the page refreshes to show the test results.

This step tests the SG-Solarwinds Hardware data source, and verifies that data is loaded into the staging table. A successful connection for the SG-Solarwinds Hardware data source means that all SolarWinds data sources connect successfully, so you do not need to individually test all data sources.

The connection is successful if the **HTTP Status** is **200**. If there is an **Error Code** and **Error Message**, the connection failed and further troubleshooting is required.

d. Navigate back to the guided setup, and set the Test the connection task to complete by selecting **Mark as Complete**.

7. Add multiple instances.

Note:
If you do not need to add multiple instances, you can skip this step.

a. On the Service Graph Connector for SolarWinds page, in the Add Multiple Instances section, select the **Update Data Source Access** task.

b. For the Update Data Source Access task, select **Configure**.

c. Select the Data Source [sys_data_source] table.

d. Select the **Global** application scope by using the application picker.

e. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

f. Select **Update** to close the tab and return to the guided setup.

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g. Modify the application scope again to **Service Graph Connector for SolarWinds** by using the application picker.

h. Set the **Update Data Source Access** task to complete by selecting **Mark as Complete**.

i. Repeat the steps 7.d to 7.g for the Update Scheduled Data Import Access task with the Scheduled data import [scheduled_data_set] table and for the Update Value Access task with the Value [sys_variable_table] table, and set the tasks to complete by selecting **Mark as Complete**.

8. Clear the cache for the new connection.

a. Select the **Clear Cache for Datasource and Import set** task, and then select **Configure**.

b. Clear the cache by selecting **Global** from the Scope menu.

c. Enter the following script.

```
     GlideTableManager.invalidateTable("sys_data_source");
     GlideCacheManager.flushTable("sys_data_source");

GlideTableManager.invalidateTable("scheduled_import_set");
     GlideCacheManager.flushTable("scheduled_import_set");

GlideTableManager.invalidateTable("sys_variable_value");
     GlideCacheManager.flushTable("sys_variable_value");

     GlideTableManager.invalidateTable("sys_db_object");
     GlideCacheManager.flushTable("sys_db_object");
```

d. Select **Run Script**.

e. From the Scope menu, select **Service Graph Connector for SolarWinds**.

f. Set the Clear Cache for Datasource and Import set task to complete by selecting **Mark as Complete**.

9. Add a connection to another SolarWinds instance.

Note:
Confirm that the current scope is **Service Graph Connector for SolarWinds**.

a. Select the **Add Another Connection** task, and then select **Configure**.

b. In the Select Data Source Type section, select either regular data sources or air gap data sources.

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- To add or edit regular data sources, select **Regular Data Sources**.
- To add or edit air gap data sources, select **Airgap Data Sources**.

> **Note:**
> Before you add an air gap data source, you must configure the air gap solution for the Service Graph Connector for SolarWinds in your high-secure and low-secure servers. See Configuring air gap connections for Service Graph Connector for SolarWinds.

c. Either create or edit a connection.

- To create a new connection, select **Add Connection**.
- To edit an existing connection, select **Edit**.

d. Fill in or edit the fields on the form, as required.

- For regular data sources:

Create Connection form

Field	Description
Connection Name	Display name for the connection.
Connection URL	Connection host name for SolarWinds.
User name	User name for SolarWinds authentication.
Password	Password for SolarWinds authentication.

- For air gap data sources:

Create Connection form

Field	Description
Connection Name	Display name for the connection.
MID Server	Name of the MID server that you deployed in your low-secure server. See Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server.
Parent Directory	Path of the SolarWinds directory where the data is stored in your low-secure server.
Archive Data After Retrieval	Option to archive data after retrieval.
Archive Path [Optional]	Folder where the data is to be archived if the **Archive Data After Retrieval** check box is selected.

e. Either add or save the connection.

- To add a new connection, select **Create Connection**.
- To save the edits for the existing connection, select **Edit Connection**.

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f. Navigate back to the guided setup, and select **Mark as Complete** to set the Add Another Connection task to complete.

g. If required, set up the MID Server for the connection you created.

i. For the Configure Mid Servers task, select **Configure**.

ii. Select the name of the connection you created.

iii. Select the **Use MID server** check box.

iv. Select **Update**.

v. Set the Configure Mid Servers task to complete by selecting **Mark as Complete**.

h. If required, configure the connections in the Configure SolarWinds Modules section by selecting **Configure**.

i. When you're finished, close the window, and navigate back to the guided setup.

j. Set the Configure SolarWinds Modules task to complete by selecting **Mark as Complete**.

k. For the Test New Connections task, select **Configure**.

i. Select the name of the data source associated with the newly created connection.

ii. Select the **Test Load 20 Records** related link.

Note:
If the displayed completion code is `Success`, then the sources are validated. But if the displayed completion code is `Error`, then there is an error that you must fix.

iii. Navigate back to the guided setup, and set the Test New Connections task to complete by selecting **Mark as Complete**.

10. Set up scheduled import jobs.

a. On the Service Graph Connector for SolarWinds page, in the Set up scheduled import jobs section, select the **Configure the scheduled import jobs** task.

b. For the Configure the scheduled import jobs task, select **Configure**.

c. Review the fields on the Scheduled Data Import form, which are automatically set.

Scheduled Data Import form

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import.
Run as	Option to run the scheduled job with the credentials of the specified user.
Active	Option to activate the scheduled job. Select this option.

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Field	Description
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.
Partition Method	Partition method for the concurrent import set.
Partition Size	Import set size for early scheduling.
Execute pre-import script	Option to run a pre-import script before the import is performed.
Execute post-import script	Option to run a post-import script after the import is performed.
Application	Application containing this record.
Run	Frequency of running the import.
Conditional	Conditions under which this job is executed.

Note:
All active SolarWinds scheduled jobs will run in their specified order after the SG-Solarwinds Hardware scheduled job runs. You can modify the **Active** setting for each SolarWinds scheduled job as appropriate for your integration.

d. Select **Update** if required, and then select **Mark as Complete** to set the Set up scheduled import jobs task to complete.

Related topics

Service Graph Connector for SolarWinds

CMDB classes targeted in Service Graph Connector for SolarWinds

Configure Service Graph Connector for SolarWinds using SGC Central

Accessing the connection details of Service Graph Connector for SolarWinds

Configuring air gap connections for Service Graph Connector for SolarWinds

CMDB classes targeted in Service Graph Connector for SolarWinds

When you complete setting up the connection, you can configure the integration to periodically pull data from Solarwinds. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

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Relationships created for Availability Zone

Parent class	Relationship type	Child class
Availability Zone [cmdb_ci_availability_zone]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Availability Zone [cmdb_ci_availability_zone]	Contains::Contained by	Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Key Pair [cmdb_ci_cloud_key_pair] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Name	name

Relationship created for Cloud Key Pair

Parent class	Relationship type	Child class
Cloud Key Pair [cmdb_ci_cloud_key_pair]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type

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The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
CPU core count	cpu_core_count
CPU core thread	cpu_core_thread
CPU name	cpu_name
CPU speed (MHz)	cpu_speed
CPU manufacturer	cpu_manufacturer
Is Virtual	virtual

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Computer [cmdb_ci_computer]	Contains::Contained by	Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Model ID	model_id
Device ID	device_id
Name	name
Disk space (GB)	disk_space
Free disk space (GB)	free_space
Size	size
Size bytes	size_bytes
Computer	computer
Manufacturer	manufacturer
Volume serial number	volume_serial_number

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Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Reference	Computer [cmdb_ci_computer]

The following attributes in the Hardware [cmdb_ci_hardware] table are populated by collected data:

Attribute label	Attribute name
Model ID	model_id
Name	name
DNS Domain	dns_domain
Manufacturer	manufacturer
Serial number	serial_number
Class	sys_class_name
Default Gateway	default_gateway
Fully qualified domain name	fqdn

Relationships created for Hardware

Parent class	Relationship type	Child class
Hardware [cmdb_ci_hardware]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Hardware [cmdb_ci_hardware]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosed on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the IIS Virtual Directory [cmdb_ci_iisdirectory] table are populated by collected data:

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Attribute label	Attribute name
Alias	alias
Installation directory	install_directory
Name	name

Relationship created for IIS Virtual Directory

Parent class	Relationship type	Child class
IIS Virtual Directory [cmdb_ci_iisdirectory]	Runs on::Runs	Hardware [cmdb_ci_hardware]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationship created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Netmask	netmask
IP version	ip_version
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Logical Datacenter [cmdb_ci_logical_datacenter] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Region	region
Class	sys_class_name

Relationships created for Logical Datacenter

Parent class	Relationship type	Child class
Logical Datacenter [cmdb_ci_logical_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]
Logical Datacenter [cmdb_ci_logical_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Microsoft iis Web Server [cmdb_ci_microsoft_iis_web_server] table are populated by collected data:

Attribute label	Attribute name
Name	name
Running process command	running_process_command
Version	version
Operational status	operational_status
PID	pid
Install Status	install_status
Type	type

Relationships created for Microsoft iis Web Server

Parent class	Relationship type	Child class
Microsoft iis Web Server [cmdb_ci_microsoft_iis_web_server]	Contains::Contained by	IIS Virtual Directory [cmdb_ci_iisdirectory]
Microsoft iis Web Server [cmdb_ci_microsoft_iis_web_server]	Runs on::Runs	Hardware [cmdb_ci_hardware]

The following attributes in the MS SQL DataBase [cmdb_ci_db_mssql_database] table are populated by collected data:

Attribute label	Attribute name
Data Base	database
Name	name

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Relationship created for MS SQL DataBase

Parent class	Relationship type	Child class
MS SQL DataBase [cmdb_ci_db_mssql_database]	Runs on::Runs	Hardware [cmdb_ci_hardware]

The following attributes in the MSFT SQL Instance [cmdb_ci_db_mssql_instance] table are populated by collected data:

Attribute label	Attribute name
Edition	edition
Instance Name	instance_name
Name	name
Operational status	operational_status
Service pack	service_pack
Install Status	install_status

Relationships created for MSFT SQL Instance

Parent class	Relationship type	Child class
MSFT SQL Instance [cmdb_ci_db_mssql_instance]	Runs on::Runs	Hardware [cmdb_ci_hardware]
MSFT SQL Instance [cmdb_ci_db_mssql_instance]	Contains::Contained by	MS SQL DataBase [cmdb_ci_db_mssql_database]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
DHCP Enabled	dhcp_enabled
Netmask	netmask
Configuration Item	cmdb_ci
Mac manufacturer	mac_manufacturer
MAC Address	mac_address
Name	name

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Hardware [cmdb_ci_hardware]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

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Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationship created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Hardware [cmdb_ci_hardware]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Name	name
Version	version
Manufacturer	manufacturer

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

Attribute label	Attribute name
Install date	install_date
Installed on	installed_on
Name	name

Relationships created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]
Software Instance [cmdb_software_instance]	Reference	Hardware [cmdb_ci_hardware]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data:

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Attribute label	Attribute name
Object ID	object_id
Volume ID	volume_id
Name	name
Size bytes	size_bytes

Relationship created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
IP Address	ip_address
State	state

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Use End Point To::Use End Point From	Storage Volume [cmdb_ci_storage_volume]

Related topics

Service Graph Connector for SolarWinds

Accessing the connection details of Service Graph Connector for SolarWinds

You can access the connection details of the Service Graph Connector for SolarWinds in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for SolarWinds. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the

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connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a SolarWinds connection

Access the details of a SolarWinds connection configured for the Service Graph Connector for SolarWinds.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Configuring air gap connections for Service Graph Connector for SolarWinds

Air gap connections for the Service Graph Connector for SolarWinds enable safe and controlled data transfer without compromising security.

An air gap is a security measure that involves isolating a computer or network and preventing it from establishing an external connection. Air-gapped networks keep critical systems secure by isolating them from external connections to protect the systems from cyber threats. Air gap connections for the Service Graph Connector for SolarWinds facilitate controlled data exchange between the air-gapped networks and external systems while maintaining the integrity of the air-gapped environment.

Air gap connections are available from version 2.5.0 of the Service Graph Connector for SolarWinds. You can add either regular data sources or air gap data sources during the guided setup. To access the guided setup, see Configure Service Graph Connector for SolarWinds.

Perform the following sequence of tasks to configure the air gap solution before you add air gap data sources during the guided setup:

1. Configure air gap solution for Service Graph Connector for SolarWinds in a high-secure server
2. Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server
3. Configure air gap solution for Service Graph Connector for SolarWinds in a ServiceNow instance
4. Perform a test data load for the air gap solution for Service Graph Connector for SolarWinds
5. Perform a full data load for the air gap solution for Service Graph Connector for SolarWinds

Configure air gap solution for Service Graph Connector for SolarWinds in a high-secure server

Configure the air gap solution for the Service Graph Connector for SolarWinds in your high-secure server.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Setup** > **Add Multiple Instances** > **Add Another Connection**.
2. Download the `SgSolarWindsHighSecureSetup.ps1` and `GetSolarWindsData.ps1` PowerShell scripts from the link provided in the Add Another Connection section.
3. Log on to your high-secure server.
4. Create a SolarWinds directory.

   All the configurations required for the air gap solution are created in the SolarWinds directory.
5. Copy the `GetSolarWindsData.ps1` and `SgSolarWindsHighSecureSetup.ps1` PowerShell scripts that you downloaded in step 2 to the SolarWinds directory.
6. Start a PowerShell session, and run the `SgSolarWindsHighSecureSetup.ps1` script to generate the JSON configuration file that is used by the `GetSolarWindsData.ps1` script.

   a. At the prompt, enter the path for the SolarWinds directory that you created in step 4.

   b. Enter a name for the configuration file, or press the Return key to accept the default value.

   c. Enter the values for the global properties, or press the Return key to accept the default values.
      - *`npmInstalled`*: Set the value to `true` if the module is installed on the SolarWinds instance. Set the value to `false` if the module isn't installed on the SolarWinds instance.
      - *`samInstalled`*: Set the value to `true` if the module is installed on the SolarWinds instance. Set the value to `false` if the module isn't installed on the SolarWinds instance.
      - *`pageSize`*: Enter the number of records to be fetched in a SolarWinds API call.
      - *`endpoint`*: Update the **Host** field with the host name for your SolarWinds instance.
      - *`port`*: Specify the port on which the SolarWinds instance allows API calls.
      - *`credentialsPath`*: Specify the location to store the SolarWinds credentials XML file.
      - *`logDirectory`*: Specify the location to store the log file from the `GetSolarWindsData.ps1` script.

   d. Specify names for the data source data directories, or press the Return key to accept the default values.

      The directories are created if they don’t already exist.

   e. Enter the SolarWinds credentials.

      Note:
      You can either use Windows credential manager to store the user name and password, or implement your own mechanism for storing the credentials. The `GetSolarWindsData.ps1` script must have access to the credentials to trigger REST calls.

   f. Exit the PowerShell session.

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7. Provide write and delete permissions for the SolarWinds directory and the child directories.

   You must provide delete permissions for old records to be cleaned up.

Related topics

Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server

Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server

Configure the air gap solution for the Service Graph Connector for SolarWinds in your low-secure server after you finish the configuration in your high-secure server.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Setup** > **Add Multiple Instances** > **Add Another Connection**.
2. Download the `SgSolarWindsLowSecureSetup.ps1` PowerShell script from the link provided in the Add Another Connection section.
3. Log on to your low-secure server.
4. Create a SolarWinds directory.

   All the configurations required for the air gap solution are created in the SolarWinds directory.

5. Copy the `SgSolarWindsLowSecureSetup.ps1` PowerShell script that you downloaded in step 2 to the SolarWinds directory.
6. Start a PowerShell session, and run the `SgSolarWindsLowSecureSetup.ps1` script.

   a. At the prompt, enter the path for the SolarWinds directory that you created in step 4.

   b. Specify names for the data source data directories, or press the Return key to accept the default values.

      The directories are created if they don't already exist.

   c. Exit the PowerShell session.

7. Provide read and delete permissions for the SolarWinds directory.

Related topics

Configure air gap solution for Service Graph Connector for SolarWinds in a ServiceNow instance

Configure air gap solution for Service Graph Connector for SolarWinds in a ServiceNow instance

Configure the air gap solution for the Service Graph Connector for SolarWinds in your ServiceNow instance after you finish the configuration in your high-secure and low-secure servers.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **System Definition** > **Plugins**, and download the `ServiceNow IntegrationHub Action Step – PowerShell` plugin.
2. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Setup** > **Add Multiple Instances** > **Add Another Connection**.
3. Select the **Add Another Connection** task, and then select **Configure**.
4. In the Select Data Source Type section, select **Airgap Data Sources**, and then select **Add Connection**.
5. Fill in the fields on the Create Connection form.

Create Connection form

Field	Description
Connection Name	Display name for the connection.
MID Server	Name of the MID Server that you deployed in your low-secure server. You can obtain the *sys_id* of the MID Server from the ecc_agent table.
Parent Directory	Path of the SolarWinds directory where the data is stored in your low-secure server. See Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server.
Archive Data After Retrieval	Option to archive data after retrieval.
Archive Path [Optional]	Folder where the data is to be archived if the **Archive Data After Retrieval** check box is selected.

6. Select **Create Connection**.

Related topics

Perform a test data load for the air gap solution for Service Graph Connector for SolarWinds

Perform a test data load for the air gap solution for Service Graph Connector for SolarWinds

After you configure the air gap solution for the Service Graph Connector for SolarWinds, test whether the SolarWinds endpoint is accessible from the high-secure server.

Before you begin

Role required: admin

Procedure

1. Navigate to the SolarWinds directory in your high-secure server.
2. Run the `.\GetSolarWindsData.ps1 -configFilePath` *CONFIG_PATH* script, where *CONFIG_PATH* is the location of the JSON configuration file that is generated by the setup script.

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The script accesses the SolarWinds Hardware API, and creates a sample file in the Hardware directory and a log file in the Logs directory.

- If the test data load is successful, the log file contains the `Test Load status SUCCESS!` message.
- If the test data load fails, the log file contains the `Error occurred while processing hardware StatusCode 403` message.

  If the test data load fails, verify the SolarWinds user credentials and ensure that the user has the required permissions to pull the data from SolarWinds. If the credentials need to be updated, you must run the `SgSolarWindsHighSecureSetup.ps1` PowerShell script again. See Configure air gap solution for Service Graph Connector for SolarWinds in a high-secure server.

Related topics

Perform a full data load for the air gap solution for Service Graph Connector for SolarWinds

Perform a full data load for the air gap solution for Service Graph Connector for SolarWinds

After you verify that the test data load for the air gap solution for the Service Graph Connector for SolarWinds is successful, you can perform a full data load.

Before you begin
Role required: admin

Procedure

1. Navigate to the SolarWinds directory in your high-secure server.
2. Run the `.\GetSolarWindsdata.ps1 -completeLoad $true -configFilePath` *`CONFIG_PATH`* script, where *`CONFIG_PATH`* is the location of the JSON configuration file that is generated by the setup script.

   By default, the existing files in the data source data directories are deleted each time the `.\GetSolarWindsdata.ps1 -completeLoad $true -configFilePath` *`CONFIG_PATH`* script is run. You can add the *`-clean $false`* parameter to the script if you want to retain the existing files.

   The script fetches data from all the SolarWinds APIs, and stores the data in the respective directories.
3. After the data is loaded in your high-secure server, transfer the data to your low-secure server using a method of your choice, such as SFTP.
4. Verify that the data is loaded in your low-secure server.
5. Set the full data load job (using the `.\GetSolarWindsdata.ps1 -completeLoad $true -configFilePath` *`CONFIG_PATH`* script) to run on a schedule based on that of the Scheduled Import Job on your Service Graph Connector for SolarWinds instance.
6. Set the data transfer job (from your high-secure server to your low-secure server) on a schedule based on that of the Scheduled Import Job on your Service Graph Connector for SolarWinds instance.
7. Test the air gap connection in your ServiceNow instance.

   a. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Connections**.

   b. Select the air gap connection that you created.

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c. Select the **Test Connection** related link.
When the connection is successful, the **Status** field is set to `Success`. If the connection fails, follow the suggestions for remediation.

Service Graph Connector for Tanium

Use the Service Graph Connector for Tanium to bring in hardware, software, and software usage data from a Tanium environment into your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

Versions

Tanium	ServiceNow
• Tanium 1.9 or later versions for hardware and software • Tanium 1.17 or later versions for software usage	• Washington DC • Xanadu • Yokohama

Important information for upgrading Service Graph Connector for Tanium

Tanium Platform 7.6.2 or later versions support token-based authorization only. After you have installed the latest version of the Service Graph Connector for Tanium, verify the following configurations to use Tanium Platform 7.6.2 or later versions in your on-premise setups:

- For a single instance, reconfigure the authentication type of an existing connection to use token-based authorization.
- For multiple instances, deactivate the existing scheduled jobs for previously configured instances that used basic authorization, and then create and configure new instances to use token-based authorization.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Tanium using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

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CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Tanium integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Tanium data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following table describes the data sources, the staging tables, and the target tables including CMDB CI and non-CMDB CI classes for the Tanium application.

Data mapping for Tanium

Data source	Staging table	Target tables	Resource types
SG-Tanium Applications	SG-Tanium Applications [sn_tanium_integ_sg_tanium_applications]	Application Running Process TCP	Applications
SG-Tanium Hardware and Software	SG Tanium Import [sn_tanium_integ_sg_tanium_import]	Computer File System Disk IP Address When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Server and software
SG-Tanium Usage	SG Tanium Usage Import [sn_tanium_integ_sg_tanium_usage_import]	Software Usage [samp_sw_usage]	None

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Data mapping for Tanium (continued)

Data source	Staging table	Target tables	Resource types
SG-Tanium Remove Software	Integration Commons Remove Record [sn_cmdb_int_util_remove_record]	None	None

Note:

- The SG-Tanium Usage data source is available only when the Software Asset Management Professional plugin (com.snc.samp) plugin is activated on your ServiceNow instance. See Request Software Asset Management.
- The SG-Tanium Remove Software data source creates import sets and uses the transform map-based method for removing any target records for software data that weren't updated in the last delta query check. See Managing CMDB data deletion.
- Starting with the Service Graph Connector for Tanium 1.8.0 release, a buffer time is added for software removal when the *buffer_days_from_last_scan_for_hardware* system property is enabled. When this system property is enabled, the software removal candidate is removed only if the last scan time of the hardware on which the software removal candidate is installed is earlier than the last success import time + buffer time. To enable this property, set the value of the *buffer_days_from_last_scan_for_hardware* system property to a non-zero numeral value according to the number of days of buffer that you require. To disable this property, set the value to 0.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional resource

How do I configure the Tanium Service Graph Connector? article on the ServiceNow Community site

Related topics

Service Graph Connectors

Configure Service Graph Connector for Tanium using SGC Central

Set up scheduled import jobs to pull in Tanium data into your Configuration Management Database (CMDB).

Before you begin

Install Service Graph Connector for Tanium version 1.7.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

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Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Tanium connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Complete the prerequisites for setting up the Tanium environment.

   a. Create a custom view on your Tanium instance.

      i. In the **Prerequisites** stage of the playbook, select the **Create custom view** activity.

      ii. Create a custom view on your Tanium instance to be used in the **Select view** activity later by referring to the Tanium Asset User Guide for Cloud.

      Note:
      Copy the unmodifiable **ServiceNow (reserved)** view from the Tanium instance to create the custom view.

      iii. After creating a view, select the **I have created a custom view for this connection according to the instructions** check box.

      iv. After completing the **Select view** activity, select **Continue**.

7. Determine the type of authentication for the Tanium connection.

   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.
   If needed, expand the **Setup** stage to select an activity.

   b. Select an alias template for the connection.

   - **Basic authentication**: Select when using Basic authentication that grants access to the Tanium data.
   - **Token-based authentication**: Select when using an authentication token for the Tanium API to grants access to the Tanium data.

   c. Select **Continue**.

8. Enter connection details and test the API connection for importing Tanium data.

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a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection name	Name to identify the Tanium connection record.
Host name	Base URL or IP address of the Tanium server.
Username	Tanium account username that is used to authenticate the connection request. This field appears only when the **Basic authentication** alias template was selected in the **Select alias template** activity.
Password	Password associated with the user name required for authenticating requests. This field appears only when the **Basic authentication** alias template was selected in the **Select alias template** activity.
Token	Authentication token for the Tanium API that grants access to the Tanium data. This field appears only when the **Token-based authentication** alias template was selected in the **Select alias template** activity.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
MID selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

9. Select the view created on your Tanium instance.

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a. In the **Setup** stage of the playbook, select the **Select view** activity.

b. In the **View** field, select the custom view you created on the Tanium instance in the Prerequisites activity.

c. Select **Continue**.

10. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the *`Connection name`* **- SG-Tanium Usage** import schedule.

c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Repeat steps 10.b to 10.d for the *`Connection name`* **- SG-Tanium Hardware and Software** parent import schedule.

f. Select **Continue**.

11. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Tanium

CMDB classes targeted in Service Graph Connector for Tanium

Accessing the connection details of Service Graph Connector for Tanium

Configure Service Graph Connector for Tanium using the guided setup

Set up scheduled import jobs to pull in data from Tanium into your Configuration Management Database (CMDB).

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from

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that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.

Note:
If you have an earlier version of the Service Graph Connector for Tanium, then do not migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: admin

About this task

For more information on the Service Graph Connector for Tanium setup, see How do I configure the Tanium Service Graph Connector? article on the ServiceNow Community site.

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Tanium application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Tanium** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the authentication credentials and HTTP connection.

   a. On the Service Graph Connector for Tanium page, in the Configure the Connection and Credentials section, select **Set authentication type**.

   b. For the Set authentication type task, select **Configure**.

   c. Specify the system property details for the authentication type.

      i. In the **Value** field, enable either token-based authentication or basic authentication.

      - To enable the basic authorization, enter `basic`.
      - To enable the token-based authorization, enter `token`.

      Note:
      Tanium Platform 7.6.2 supports only token-based authorization for an on-premise setup. To use Tanium Platform 7.6.2 or later versions, enable the token-based authorization type and enter the details for the token-based authorization in the next step.

      ii. Select **Update**.

      iii. Set the Set authentication type task to complete by selecting **Mark as Complete**.

   d. Configure the connection based on the authentication type.

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i. For the basic authorization type:

1. For the Configure the Basic auth Credentials task, select **Configure**.

> **Note:**
> The Configure the Basic auth Credentials task appears only when you have specified `basic` as the value in the step 4.c.i.

2. Select **Edit** for Basic authentication within the sn_tanium_integ scope.
3. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the Tanium connection record. `Token-based authentication` is the default credential alias name and is read-only.
Host name	Base URL or IP address of the Tanium server. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.

4. (Optional) If a MID Server is required for the Tanium server connection, select the **Use MID Server** check box. Then, select the MID Server-related fields accordingly.
5. In the Credential Information section, enter the Tanium account username in the **Username** field and the password in the **Password** field.
6. Select **Edit connection**.
7. Return to the guided setup page.
8. Set the Configure the Basic auth Credentials task to complete by selecting **Mark as Complete**.

ii. For the token-based authorization type:

1. For the Configure the Token auth Credentials task, select **Configure**.

> **Note:**
> The Configure the Token auth Credentials task appears only when you have specified `token` as the value in the step 4.c.i.

2. Select **Edit** for Token-based authentication within the sn_tanium_integ scope.
3. In the Connection Information section of the Edit Connection window, fill in the fields.

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Connection Information

Field	Description
Connection name	Name to identify the Tanium connection record. `Token-based authentication` is the default credential alias name and is read-only.
Host name	Tanium base URL or IP address. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.

4. (Optional) If a MID Server is required for the Tanium server connection, select the **Use MID Server** check box. Then, select the MID Server-related fields accordingly.
5. In the Credential Information section of the Edit Connection window, enter the authentication token for the Tanium API in the **Token** field to grants access to Tanium data.
6. Select **Edit connection**.
7. Return to the guided setup page.
8. Set the Configure the Token auth Credentials task to complete by selecting **Mark as Complete**.

e. Test the connection.

i. For the Test connection task, select **Configure**.

ii. Select the **Test Connection** related link to start the testing process.

iii. When the **Status** field is set to **Success**, return to the guided setup page.

Note:
If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

f. Create a custom view.

Note:
The integration depends on a custom view from Tanium.

i. Configure the view on your Tanium instance.

1. On your Tanium instance, navigate to **Modules** > **Asset**.
2. Select **Views**.
3. If you have not done so already, create the ServiceNow (reserved) view by selecting **Create View** > **Create ServiceNow view**.

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Note:
By default, the ServiceNow (reserved) view is non-editable.

4. Create a copy of the view to edit it.
5. Edit the copy.
   a. Add all fields from the **SIU Product Usage** bucket.
   b. Add **Asset** to the **Last Seen** field.
   c. Add **Network Adapter** to the **Model** field.
6. Save the view.

ii. Select the view on your ServiceNow instance.

1. In the guided setup, for the Configure the View task, select **Configure**.
2. In the ServiceNow instance, select the view you created in step 4.f.i.
3. Select **Set View**.
4. Set the Configure the View task to complete by selecting **Mark as Complete**.

g. In the ADM setup instruction section, ignore the instructions as application dependency mapping is not supported currently.

5. Configure the Tanium scheduled jobs.

a. For the Configure the Scheduled Import task, select **Configure**.

b. Select the scheduled job that you want to activate.

c. On the Scheduled Data Import form, verify the field values for a scheduled job and select the **Active** check box to activate the scheduled job.

Note:
When using a token-based authentication, the user you specify in the **Run as** field for a scheduled job must have the connection_admin role.

For more information, see Schedule a data import.

d. Select **Update**.

e. Repeat the steps 5.b to 5.d for each scheduled job for data import.

f. Set the Configure the Scheduled Import task to complete by selecting **Mark as Complete**.

6. **Optional:** Add multiple instances.

Note:
If you don't need to add multiple instances, you can skip this step.

a. On the Service Graph Connector for Tanium page, in the Add Multiple Icons section, select the **Update Data Source Access** task.

b. On the next page, in the Update Data Source Access section, select **Configure**.

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c. Select the Data Source [sys_data_source] table.

d. Select the **Global** application scope by using the application picker.

e. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

f. Select **Update** to close the tab and return to the guided setup.

g. Modify the application scope again to **Service Graph Connector for Tanium** by using the application picker.

h. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

i. Repeat the steps 6.d to 6.g for the Update Scheduled data import access task with the Scheduled data import [scheduled_data_set] table and set the task to complete by selecting **Mark as Complete**.

a. Clear the cache for the new connection.

i. For the Clear Cache for Datasource and Import set task, select **Configure**.

ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
      GlideCacheManager.flushTable("sys_data_source");


 GlideTableManager.invalidateTable("scheduled_import_set");
      GlideCacheManager.flushTable("scheduled_import_set");

      GlideTableManager.invalidateTable("sys_db_object");
      GlideCacheManager.flushTable("sys_db_object");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. From the application picker, select the **Service Graph Connector for Tanium** application.

vi. Set the Clear Cache for Datasource and Import set task to complete by selecting **Mark as complete**.

b. Add a basic authorization connection to another Tanium instance.

Note:
Tanium Platform 7.6.2 supports only token-based authorization for an on-premise setup. To use Tanium Platform 7.6.2 or later versions, use the token-based authorization.

i. For the Add Another Basic Auth Connection task, select **Configure**.

ii. To create a new connection, select **Add Connection**.

iii. Enter the connection details on the Create Connection form.

iv. Select **Create Connection**.

v. Navigate back to the guided setup and set the Add Another Basic Auth Connection task to complete by selecting **Mark as Complete**.

c. Add a token-based authorization connection to another Tanium instance.

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i. For the Add Another Token Auth Connection task, select **Configure**.

ii. To create a new connection, select **Add Connection**.

iii. Enter the connection details on the Create Connection form.

iv. Select **Create Connection**.

v. Navigate back to the guided setup and set the Add Another Token Auth Connection task to complete by selecting **Mark as Complete**.

d. Set configuration properties for newly added connections.

i. For the Set configuration properties task, select **Configure**.

ii. From the **Name** column, select the new connection.

iii. In the Service Graph Connection Properties related list, review and modify the following properties.

Field	Value
max_retry_count	Determines the number of retry attempts triggered for a Tanium Asset REST action in case of failure.
pagination_record_count	Specifies the page size for each API call made during a Tanium Application Data REST action.
rest_action_limit	Specifies the page size for each API call made during a Tanium Asset REST action.
view_id	Specifies the identifier used to fetch hardware and software data from a specific Tanium view. To modify the view identifier, access the SG Tanium Connection [sn_tanium_integ_connection] table.

iv. Return to the guided setup page.

v. Set the Set configuration properties task to complete by selecting **Mark as Complete**.

e. Test the newly added connections.

i. For the Test connections task, select **Configure**.

ii. From the **Name** column, select the new connection.

iii. Select the **Test Connection** related link to start the testing process.

iv. When the **Status** field is set to **Success**, return to the guided setup page.

> **Note:**
> If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test connections task to complete by selecting **Mark as Complete**.

f. Set the Tanium view for the connection.

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i. For the Set view task, select **Configure**.

ii. In the **Connection and Credentials Alias** field, search for and select the alias created earlier in the Add Another Basic Auth Connection or Add Another Token Auth Connection task.

iii. In the **View** field, search for and select the corresponding Tanium view associated with the connection.

iv. Select **Set View**.

v. Set the Set view task to complete by selecting **Mark as Complete**.

g. Skip the ADM setup for multi instance task as ADM is not supported currently.

h. Configure the Tanium scheduled job.

i. For the Configure the Scheduled Imports task, select **Configure**.

ii. Select the scheduled data import that you want to activate.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

> **Note:**
> When using a token-based authentication, the user you specify in the **Run as** field for a scheduled job must have the connection_admin role.

For more information, see Schedule a data import.

iv. Select **Update**.

v. Repeat steps 6.h.ii to 6.h.iv for each scheduled job for data import.

vi. Set the Configure the Scheduled Imports task to complete by selecting **Mark as Complete**.

7. **Optional:** Use the advanced settings to manage excluding the serial number population on the IBM AIX and Oracle Solaris operating system (OS) platforms.

a. In the Advanced section of the guided setup, for the Advanced Settings task, select **Configure**.

b. To exclude the serial number population, enter `false` in the **Exclude the serial number population** field.

c. Select **Save**.

d. Close the window and set the Advanced Settings task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for Tanium

When you complete setting up the connection, you can configure the integration to periodically pull data from Tanium. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

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Attribute label	Attribute name
Class	sys_class_name
Name	name
Running process command	running_process_command

Relationship created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Computer[cmdb_ci_computer]

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Serial number	serial_number
Class	sys_class_name
CPU core count	cpu_core_count
CPU count	cpu_count
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
DNS Domain	dns_domain
IP Address	ip_address
CPU manufacturer	cpu_manufacturer
CPU name	cpu_name
Is Virtual	virtual
Most recent discovery	last_discovered
Operating System	os
OS Domain	os_domain
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram
Model ID	model_id
Manufacturer	manufacturer

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Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Contains::Contained by	Disk [cmdb_ci_disk]
Computer [cmdb_ci_computer]	Contains::Contained by	File System [cmdb_ci_file_system]
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]
Computer [cmdb_ci_computer]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Manufacturer	manufacturer
Name	name
Computer	computer
Serial number	serial_number
Device interface	device_interface
Storage type	storage_type
Model ID	model_id
Device ID	device_id
Size bytes	size_bytes

Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Reference	Computer [cmdb_ci_computer]

File System [cmdb_ci_file_system]

The following attributes in the File System [cmdb_ci_file_system] table are populated by collected data:

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Attribute label	Attribute name
Name	name
File system	file_system
Free space bytes	free_space_bytes
Label	label
Media type	media_type
Mount point	mount_point
Size bytes	size_bytes
Computer	computer

Relationship created for File System

Parent class	Relationship type	Child class
File System [cmdb_ci_file_system]	Reference	Computer [cmdb_ci_computer]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
Nic	nic
IP Address	ip_address
IP version	ip_version
Name	name

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Discovery source	discovery_source
Netmask	netmask
Mac manufacturer	mac_manufacturer

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Attribute label	Attribute name
MAC Address	mac_address
Name	name
Model ID	model_id
DHCP Enabled	dhcp_enabled

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationship created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Version	version
Manufacturer	manufacturer
Key	key
Name	name

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

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Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source
Last scanned	last_scanned

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Name	name
Installed on	installed_on

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attribute in the Virtual Machine Instance [cmdb_ci_vm_instance] table is populated by collected data:

Attribute label	Attribute name
Sys ID	sys_id

Note:
Service Graph Connector for Tanium doesn't create a Virtual Machine Instance CI. During look-up in the Virtual Machine Instance [cmdb_ci_vm_instance] table, if a VM instance is found that has an object ID that matches the cloud instance ID of a server instance, a relationship is created between that VM instance and the server instance.

Accessing the connection details of Service Graph Connector for Tanium

You can access the connection details of the Service Graph Connector for Tanium in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

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With the CCF, you can access all the connections used by the Service Graph Connector for Tanium. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Tanium connection

Access the details of a Tanium connection configured for the Service Graph Connector for Tanium.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Tanium** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Service Graph Connector for Trellix

Use the Service Graph Connector for Trellix to bring in device, server, and network data from a Trellix environment into your ServiceNow instance to streamline your incident response and asset management use cases.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Supported versions

Supported ServiceNow versions:

- Washington DC
- Xanadu
- Yokohama

Use cases

The following examples describe how you can use the Service Graph Connector for Trellix for security operations management:

- Identify cybersecurity risks in the environment.
- Assess dependencies between configuration items (CI).
- Enable effective security incident response and endpoint management systems.
- Identify data quality issues, reconcile inconsistencies, and manage incidents and changes on discovered CIs.

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Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Trellix using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Tanium integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Trellix data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following data source is included for the Trellix application:

SG-Trellix-Devices

Imports data from devices and loads the imported data in the SGC Trellix Device Import [sn_trellix_integ_sgc_trellix_device_import] staging table.

The imported data is then inserted into the following target tables:

- File System [cmdb_ci_file_system]
- IP Address [cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]
- Server [cmdb_ci_server]
- Software Installation [cmdb_sam_sw_install] (if the Software Asset Management (SAM) application is installed)
- Software [cmdb_ci_spkg] (if the SAM application isn't installed)
- Software Instance [cmdb_software_instance] (if the SAM application isn't installed)
- Storage Disk [cmdb_ci_storage_disk]

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

System property

The following system property is available for Service Graph Connector for Trellix: `sn_trellix_integ.getdevices_count`. This property sets the pagination size for the records that are fetched from the Trellix API.

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- Type: integer
- Default value: `100`

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Trellix using SGC Central

Configure Service Graph Connector for Trellix using guided setup

CMDB classes targeted in Service Graph Connector for Trellix

Configure Service Graph Connector for Trellix using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Trellix for pulling in Trellix data into the CMDB.

Before you begin
Install Service Graph Connector for Trellix version 1.0.0 [store-future: BEGIN review]or later [End]from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: cmdb_inst_admin or admin

About this task
The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Dashboard page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Trellix connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Complete the setup for configuring the connector for importing data.

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a. Create and test a connection.

i. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

ii. On the form, fill in the fields.

Create and test connection form

Field	
Connection name	Name to identify the Trellix connection record. For example, `SGTrellix`.
Connection url	URL of the connection.
User name	User name of your Trellix account.
Password	Password of your Trellix account.
Use MID server	Option to use a MID Server. Select this check box if you're using an on-premises instance of Trellix. **Note:** A MID Server must be configured on your ServiceNow instance before you select this option.
Mid Selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

iii. Select **Create and test connection**.

iv. Once the connection test is complete, select **Continue**.

b. Configure the import schedule to import data at regular intervals.

i. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

ii. Expand the Parent scheduled data import within the Import schedules list, and select the SG-Trellix-Devices import schedule.

iii. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

iv. Select **Save**.

Alternatively, select **Execute Now** to execute the import schedule immediately.

v. Select **Continue**.

c. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

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Related topics

- Service Graph Connector for Trellix
- CMDB classes targeted in Service Graph Connector for Trellix
- Accessing the connection details of Service Graph Connector for Trellix

Configure Service Graph Connector for Trellix using guided setup

Set up scheduled import jobs to pull in data from a Trellix project into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.

Role required: admin

Procedure

1. Verify that the application scope is set to the Service Graph Connector for Trellix application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Trellix** > **Setup**.
3. On the Service Graph Connector for Trellix page, verify that the **Quick Start** option is selected, and then select **Continue**.
4. Configure the connection to send requests to the Trellix application.
   a. On the Service Graph Connector for Trellix page, in the Configure the Connection and Credentials section, select **Start**.
   b. Configure the authentication credentials.

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i. For the Configure Trellix authentication credentials task, fill in the fields on the Basic Auth Credentials form.

Basic Auth Credentials form

Field	Description
Name	Credentials to use for the connection. For example, `SGTrellix.Credentials`.
Order	The sequence in which the records are processed. The default value is `100`.
User name	User name of your Trellix account.
Password	Password of your Trellix account.
Active	Verify that the check box is selected.

ii. Select **Update** to save the authentication credentials.

iii. Set the Configure Trellix authentication credentials task to complete by selecting **Mark as complete**, and then select **Continue**.

c. Configure the HTTP connection.

i. For the Configure Trellix HTTP Connection task, fill in the fields on the HTTP(s) Connection form.

HTTP(s) Connection form

Field	Description
Name	Name to identify the Trellix connection record. For example, `SGTrellix`. Don't modify the name for the default connection `SGTrellix`.
Active	Verify that the check box is selected.
Credential	Credentials to use for the connection.
Domain	Domain that contains the connection.
Connection alias	Connection alias that resolves your connection and credentials at runtime. **Note:** Only one connection is active per connection alias at a time.
Connection URL	Base URL of the connection. The base URL is the hostname of your Trellix instance. For example, `https://`*`subdomain`*`.`*`domain`*`.com:`*`port`*.
Use MID server	Option to use a MID Server. Select this check box if you're using an on-premises instance of Trellix. Complete the **Advanced MID Server Configuration**. **Note:** A MID Server must be configured on your ServiceNow instance before you select this option.

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Field	Description
MID selection	Select a MID Server from the list. This field appears only when the **Use MID Server** check box is selected.
MID application	Select a MID Server application from the list. This field appears only when the **Use MID Server** check box is selected.
Connection timeout	The maximum time (in seconds) the system waits while attempting to establish a connection.

ii. Select **Update** to save the HTTP connection details.

iii. Set the Configure Trellix HTTP Connection task to complete by selecting **Mark as complete**, and then select **Continue**.

d. Test the Trellix API connection to import data from the Trellix application.

i. Test the connection by selecting the **Test Connection** related link in the Test Connection task.

Testing the connection might take a few moments. The page is refreshed to show the test results.

ii. When the **Status** field is set to **Success**, set the Test Connection task to complete by selecting **Mark as complete**, and then select **Continue**.

If any of the tests have errors, follow the suggestions for remediation.

5. **Optional:** Add multiple instances.

Note:
If you don't need to add multiple instances, you can skip this step.

a. On the Service Graph Connector for Trellix page, in the Add Multiple Instances section, select **Start**.

b. In the Update Data Source Access section, select the Data Source [sys_data_source] table.

c. Select the **Global** application scope by using the application picker.

d. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

e. Modify the application scope again to **Service Graph Connector for Trellix** by using the application picker.

f. Select **Update** to save the data source access details.

g. Set the Update Data Source Access task to complete by selecting **Mark as Complete**, and then select **Continue**.

h. Repeat steps 5.c to 5.e for the Update Scheduled Data Import Access task with the Scheduled data import [scheduled_data_set] table.

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i. Select **Update** to save the scheduled data import access details.

j. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**, and then select **Continue**.

k. In the Add Another Connection section, modify the application scope to **Service Graph Connector for Trellix** by using the application picker.

l. Select **Click Here**.

m. On the Workflow Studio page, select **Add Connection** in the SGTrellix section.

n. Fill in the fields on the Create Connection form, and then select **Create Connection**.

Create Connection form

Field	Description
Connection name	Name to identify the Trellix connection record.
Connection url	URL of the connection.
Use MID server	Option to use a MID Server. Select this check box if you're using an on-premises instance of Trellix. Complete the **Advanced MID Server Configuration**. **Note:** A MID Server must be configured on your ServiceNow instance before you select this option.
MID selection	Select a MID Server from the list. (Optional) This field appears only when the **Use MID Server** check box is selected.
MID application	Select a MID Server application from the list. (Optional) This field appears only when the **Use MID Server** check box is selected.
User name	User name of your Trellix account.
Password	Password of your Trellix account.

o. Close the Workflow Studio page, and navigate back to the guided setup.

p. Set the Add Another Connection task to complete by selecting **Mark as Complete**, and then select **Continue**.

q. In the Test New Connections section, select the newly created connection record, and then select the **Test Connection** related link.

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(Optional) Testing the connection might take a few moments. The page is refreshed to show the test results.

r. When the **Status** field is set to **Success**, set the Test New Connections task to complete by selecting **Mark as complete**, and then select **Continue**.

(Optional) If any of the tests have errors, follow the suggestions for remediation.

6. Configure the scheduled jobs to import data from the Trellix application.

a. On the Service Graph Connector for Trellix page, in the Set up scheduled import jobs section, select **Start**.

b. For the Configure the scheduled jobs task, select the connection.

Note:
The SG-Trellix-Devices scheduled import job is set to inactive by default.

c. On the Scheduled Data Import form, verify the field values for the scheduled job.

For more information, see Schedule a data import.

d. Select the **Active** check box to activate the SG-Trellix-Devices scheduled import job.

e. In the **Run** field, select **Periodically** to specify how often the job runs.

f. Select **Execute Now** to execute the import schedule.

g. Set the Configure the scheduled jobs task to complete by selecting **Mark as complete**, and then select **Continue**.

7. On the Service Graph Connector for Trellix page, select **Exit** to exit the guided setup.
8. [store-future: BEGIN review] On the Service Graph Connector for Trellix page, select **Complete** to save your changes. [End]
9. [store-future: BEGIN review] In Complete setup dialog box, select **Complete** to complete the setup. [End]
10. [store-future: BEGIN review] In the message box that appears, select **Done**. [End]

Related topics

Service Graph Connector for Trellix

CMDB classes targeted in Service Graph Connector for Trellix

Accessing the connection details of Service Graph Connector for Trellix

CMDB classes targeted in Service Graph Connector for Trellix

When you complete setting up the connection, you can configure the integration to periodically pull data from Trellix. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

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File System [cmdb_ci_file_system]

The following attributes in the File System [cmdb_ci_file_system] table are populated by collected data:

Attribute label	Attribute name
Computer	computer
Disk Space (GB)	disk_space
Free space bytes	free_space_bytes
Name	name

Relationship created for File System

Parent class	Relationship type	Child class
File System [cmdb_ci_file_system]	Reference	Server [cmdb_ci_server]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Netmask	netmask
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Configuration Item	cmdb_ci
IP Address	ip_address
MAC Address	mac_address
Name	name
Netmask	netmask

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Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
CPU count	cpu_count
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
DNS Domain	dns_domain
Host name	host_name
Install Status	install_status
IP Address	ip_address
Is Virtual	virtual
MAC Address	mac_address
Manufacturer	manufacturer
Model ID	model_id
Name	name
Operating System	os
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram
Serial number	serial_number

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Contains::Contained by	Storage Disk [cmdb_ci_storage_disk]
Server [cmdb_ci_server]	Contains::Contained by	File System [cmdb_ci_file_system]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]

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Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data:

Attribute label	Attribute name
Discovery Source	discovery_source
Installed on	installed_on
Name	name
Version	version

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Server [cmdb_ci_server]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

Attribute label	Attribute name
Installed on	installed_on
Name	name

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Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

Storage Disk [cmdb_ci_storage_disk]

The following attributes in the Storage Disk [cmdb_ci_storage_disk] table are populated by collected data:

Attribute label	Attribute name
Computer	computer
Disk space (GB)	disk_space
Free disk space (GB)	free_space
Name	name

Relationship created for Storage Disk

Parent class	Relationship type	Child class
Storage Disk [cmdb_ci_storage_disk]	Reference	Server [cmdb_ci_server]

Related topics

Service Graph Connector for Trellix

Accessing the connection details of Service Graph Connector for Trellix

You can access the connection details of the Service Graph Connector for Trellix in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Trellix. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Trellix connection

Access the details of a Trellix connection configured for the Service Graph Connector for Trellix.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Trellix** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.

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4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for Trellix

Service Graph Connector for VMware Workspace ONE UEM

Use the Service Graph Connector for VMware Workspace ONE UEM to pull data from VMware Workspace ONE Unified Endpoint Management (UEM) into your ServiceNow Instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

The integration imports different hardware assets into the ServiceNow® Configuration Management Database (CMDB) application.

Supported versions

- Supported versions:
  - VMware Workspace ONE UEM version 2008
  - Application Discovery Manager (ADM) API version 2
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama
  - Zurich

Use cases

The following are examples on how you can use the Service Graph Connector for different ServiceNow applications:

- IT Operations Management (ITOM) Visibility
  - Detailed hardware and application inventory for Android, Apple, and Windows mobile devices. The inventory can be used with or without Software Asset Management (SAM).
  - Compliance tracking for mobile devices. You can build your own device (BYOD) or use corporate-owned devices.
- IT Service Management (ITSM)
  - Incident, problem, change on discovered configuration items (CI).
  - Ownership tracking and assignment for mobile devices.

Guided setup

The guided setup for the Service Graph Connector for VMware Workspace ONE UEM provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for VMware Workspace ONE UEM.

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CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Workspace ONE integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the VMware Workspace ONE UEM Devices and Apps data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you configure the integration to periodically pull data from VMware Workspace ONE UEM.

The data is loaded into the SG-Workspace ONE UEM Devices and Apps staging [sn_vmwoneuem_integ_devices_and_apps] table.

The data is then inserted into the following target tables:

- Computer [cmdb_ci_computer]
- Handheld Computing Device [cmdb_ci_handheld_computing]
- Media Player [cmdb_ci_media_player]
- Network Adapter [cmdb_ci_network_adapter]
- Printer [cmdb_ci_printer]
- SAM Software Installation [cmdb_sam_sw_install], if com.snc.sams plugin is installed.
- Serial Number [cmdb_serial_number]
- Software Instance [cmdb_software_instance], if com.snc.sams plugin is not installed.
- Software Package [cmdb_ci_spkg], if com.snc.sams plugin is not installed.

Note:
To view any additional information such as the device owner, type of ownership, or compliance status, you need to switch to the SG-Workspace ONE UEM view. This view displays a **SG-Workspace ONE UEM Device Related** tab in the related list tabs with the additional information.

For more information on where data is saved when pulling data from VMware Workspace ONE Unified Endpoint Management (UEM), see CMDB classes targeted in Service Graph Connector for VMware Workspace ONE UEM.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for VMware Workspace ONE UEM

Use the Service Graph Connector for VMware Workspace ONE UEM to pull mobile and computing devices data from VMware Workspace ONE Unified Endpoint Management (UEM) into your ServiceNow instance.

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Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.

Roles required: admin

When using client credentials for authentication, obtain the OAuth credentials from your VMware Workspace ONE UEM administrator. Make a note of the following details:

- Application (client) ID
- Client Secret
- Token URL

For information about how to get OAuth credentials, see the VMware documentation site.

About this task

To configure the Service Graph Connector for VMware Workspace ONE UEM, you must configure either OAuth authentication credentials or basic authentication credentials.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Workspace ONE UEM** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. In the Configure the Connection and Credentials section of the Service Graph Connector for VMware Workspace ONE UEM page, select **Get Started**.
4. Configure authentication credentials for the connection.
   You can configure either a basic authentication connection or an OAuth connection.

   a. For the Set authentication type task, select **Configure**.
      - To enable basic authentication, set the value of the *auth_type* connection property to `basic`.
      - To enable OAuth authentication, set the value of the *auth_type* connection property to `oauth`.

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b. Select **Update**, and navigate back to the guided setup page.

c. Set the Set authentication type task to complete by selecting **Mark as Complete**.

5. Configure the credentials for authentication.

- Configure a basic authentication connection.

  a. For the Configure the Basic Auth Credentials task, select **Configure**.

  b. On the form, fill in the fields.

Field	Description
Name	Name of the authentication. For example, `WorkspaceOneUEM Basic Auth Credentials`.
User name	Your VMware Workspace ONE UEM user name.
Password	Your VMware Workspace ONE UEM password.

  c. Select **Update**, and navigate back to the guided setup page.

  d. Set the Configure the Basic Auth Credentials task to complete by selecting **Mark as Complete**.

  e. For the Configure API key task, select **Configure** to configure an API key for the basic authentication connection.

  f. In the **API Key** field, enter your VMware Workspace ONE UEM API key or tenant code.

  g. Select **Update**, and navigate back to the guided setup page.

  h. Set the Configure API key task to complete by selecting **Mark as Complete**.

- Configure an OAuth connection.

  a. For the Configure the OAuth Credentials task, select **Configure**.

  b. On the form, fill in the fields.

Field	Description
Name	Name of the authentication. For example, `WorkspaceOneUEM OAuth Provider`.
Client ID	Application (client) ID of your VMware Workspace ONE UEM client application as noted in the Before you begin section.
Client Secret	Client secret of your VMware Workspace ONE UEM client application as noted in the Before you begin section.

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c. Select **Update**, and navigate back to the guided setup page.

d. Set the Configure the OAuth Credentials task to complete by selecting **Mark as Complete**.

6. Establish an HTTP connection to send requests to the VMware Workspace ONE UEM API.

a. For the Configure HTTP connection task, select **Configure**.

b. On the HTTP(s) Connection form, specify the host name of your VMware Workspace ONE UEM instance in the **Host** field.

> **Note:**
> The HTTP connection is pre-configured to use the authentication credentials that were configured in steps 4 and 5.

c. Select **Update**.

d. Set the Configure HTTP Connection task to complete by selecting **Mark as Complete**.

7. Test the connection.

a. For the Test the Connection task, select **Configure**.

b. Select the **Test Connection** related link to start the testing process.

c. When the **Status** field is set to **Success**, navigate back to the guided setup page.
If any of the tests have errors, follow the suggestions for remediation.

d. Set the Test the Connection task to complete by selecting **Mark as Complete**.

8. Set up the scheduled import job.

a. For the Configure the scheduled job task, select **Configure**.
The SG-Workspace ONE UEM Devices and Apps scheduled job is set to inactive by default.

b. Select the **SG-Workspace ONE UEM Devices and Apps** scheduled job.

c. On the Scheduled Data Import form, verify the field values for the scheduled job.
For more information, see Schedule a data import.

d. Select the **Active** check box to activate the SG-Workspace ONE UEM Devices and Apps scheduled job.

e. In the **Run** field, select **Periodically** to specify how often the job should run.

f. Select **Update**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

g. Set the Configure the scheduled job task to complete by selecting **Mark as Complete**.

9. **Optional:** Add multiple instances.

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Note:
If you don't need to add multiple instances, you can skip this step.

a. In the Add multiple instances section of the Service Graph Connector for VMware Workspace ONE UEM page, select **Get Started**.

b. For the Update scheduled data import access task, select **Configure**.

c. Select the Scheduled data import [scheduled_import_set] table.

d. Select the **Global** application scope by using the application picker.

e. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

f. Select **Update**, and then navigate back to the guided setup.

g. Modify the application scope again to **Service Graph Connector for VMware Workspace ONE UEM** by using the application picker.

h. Set the Update scheduled data import access task to complete by selecting **Mark as Complete**.

i. For the Update Data Source Access task, select **Configure**.

j. Select the Data Source [sys_data_source] table.

k. Repeat steps 9.d to 9.g.

l. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

m. Clear the cache for the new connection.

i. For the Clear cache for Data Source and Import Set tables task, select **Configure**.

ii. Select the **Global** application scope by using the application picker.

iii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
     GlideCacheManager.flushTable("sys_data_source");

 GlideTableManager.invalidateTable("scheduled_import_set");
     GlideCacheManager.flushTable("scheduled_import_set");
     GlideTableManager.invalidateTable("sys_db_object");
     GlideCacheManager.flushTable("sys_db_object");
```

iv. Select **Run Script** to run the background script.

The script may take several minutes to execute.

v. After the script is executed, select **Close**.

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vi. Modify the application scope again to **Service Graph Connector for VMware Workspace ONE UEM** by using the application picker.

vii. Set the Clear cache for Data Source and Import Set tables task to complete by selecting **Mark as complete**.

n. Configure the connection for the VMware Workspace ONE UEM instance.

(Optional) You can configure either a basic authentication connection or an OAuth connection.

- Configure a basic authentication connection.

  i. For the Add basic authentication connection task, select **Configure**.

  ii. To create a new connection, select **Add Connection**.

  iii. In the Connection Information section of the Create Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the VMware Workspace ONE UEM connection record.
Connection URL	Connection URL of your VMware Workspace ONE UEM connection. Use the format `https://`*`host-name`*`/API` for the connection URL.

  iv. In the Credential Information section of the Create Connection window, fill in the fields.

Credential Information

Field	Description
Username	VMware Workspace ONE UEM account user name that is used to authenticate the connection request.
Password	Password that is used to authenticate the connection request.

  v. Select **Create Connection**.

  vi. Navigate back to the guided setup, and set the Add basic authentication connection task to complete by selecting **Mark as Complete**.

  vii. For the Configure API key task, select **Configure** to configure an API key for the basic authentication connection.

  viii. Select the **API Key** record that corresponds to the connection alias for the new basic authentication connection.

  ix. Set the API key, and then select **Update**.

  x. Navigate back to the guided setup, and set the Configure API key task to complete by selecting **Mark as Complete**.

- Configure an OAuth connection.

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i. For the Add an OAuth connection task, select **Configure**.

ii. To create a new connection, select **Add Connection**.

iii. In the Connection Information section of the Create Connection window, fill in the fields.

Connection Information

Field	Description
Connection Name	Name to identify the VMware Workspace ONE UEM connection record.
Connection URL	Connection URL of your VMware Workspace ONE UEM controller. Use the format `https://host-name/API` for the connection URL.

iv. In the Credential Information section of the Create Connection window, fill in the fields.

Credential Information

Field	Description
OAuth Client ID	Application (client) ID of your VMware Workspace ONE UEM client application as noted in the Before you begin section.
OAuth Client Secret	Client secret of your VMware Workspace ONE UEM client application as noted in the Before you begin section.

For information about how to get OAuth credentials, see the VMware documentation site.

v. Select **Create and Get OAuth Token**.

vi. Navigate back to the guided setup, and set the Add an OAuth connection task to complete by selecting **Mark as Complete**.

o. Test the newly added connections.

i. For the Test connections task, select **Configure**.

ii. From the **Name** column, select the new connection.

iii. Select the **Test Connection** related link to start the testing process.

iv. When the **Status** field is set to **Success**, return to the guided setup page.

> **Note:**
> If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test connections task to complete by selecting **Mark as Complete**.

p. Configure the scheduled job to import data from the VMware Workspace ONE UEM application.

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(Optional) The SG-Workspace ONE UEM Devices and Apps scheduled job is set to inactive by default.

i. For the Configure import schedule task, select **Configure**.

ii. Select the **SG-Workspace ONE UEM Devices and Apps** scheduled job.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job.

(Optional) For more information, see Schedule a data import.

iv. Select the **Active** check box to activate the SG-Workspace ONE UEM Devices and Apps scheduled job.

v. In the **Run** field, select **Periodically** to specify how often the job should run.

vi. Select **Update**.

Alternatively, select **Execute Now** to execute the import schedule immediately.

10. **Optional:** Configure additional settings.

a. In the Configure additional settings (optional) section of the Service Graph Connector for VMware Workspace ONE UEM page, select **Get Started**.

b. For the Configure duplicate detection rules task, select **Configure**.

c. On the CMDB Duplicate Row Rule form, select **Active**.

d. Update the Value field to `true` to activate the duplicate detection rule during data import.

e. Select **OK**, and navigate back to the guided setup.

f. To remove fields from being evaluated, add the field names as a comma-separated list in the Ignore Fields column on the CMDB Duplicate Row Rules form.
Use this option for fields that change with every import.

g. Set the Configure duplicate detection rules task to complete by selecting **Mark as Complete**.

h. For the Enable software import task, select **Configure**.

i. Select the connection record for which you want to enable the import of software data.
The *`turn_off_software_import`* connection property is set to `true` by default.

j. Set the *`turn_off_software_import`* connection property value to `false` to import software data.

k. Set the Enable software import task to complete by selecting **Mark as Complete**.

l. For the Import non-managed software task, select **Configure**.

m. Select the connection record for which you want to import non-managed software data.
By default, software records that have the **IsManaged** field set to `false` aren't imported.

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n. Set the *managed_apps_only* connection property value to `false` to import non-managed software data.

o. Set the Import non-managed software task to complete by selecting **Mark as Complete**.

p. For the Import apps based on software status value task, select **Configure**.
By default, the connector imports applications that have the status value 2, 3, or 5.

Status values of applications

Status	Value
Pending Install	1
Installed	2
Pending Removal	3
Removed	4
Unknown	5

q. Select the connection record for which you want to update the set of imported applications.

r. Set the *import_apps_with_status* connection property value to the required software status values (as a comma-separated list).

s. Set the Import apps based on software status value task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for VMware Workspace ONE UEM

When you complete setting up the connection, you can configure the integration to periodically pull data from VMware Workspace ONE Unified Endpoint Management (UEM). The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Serial number	serial_number
Is Virtual	virtual
Most recent discovery	last_discovered
Operating System	os
OS Version	os_version
RAM (MB)	ram
Assigned to	assigned_to

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Attribute label	Attribute name
Model ID	model_id
Manufacturer	manufacturer

Handheld Computing Device [cmdb_ci_handheld_computing]

The following attributes in the Handheld Computing Device [cmdb_ci_handheld_computing] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Serial number	serial_number
IMEI	imei
Most recent discovery	last_discovered
Operating System	os
OS Version	os_version
Phone Number	phone_number
RAM (MB)	ram
Root Access	root_access
Manufacturer	manufacturer
Model ID	model_id
Carrier	carrier
Assigned to	assigned_to

Hardware [cmdb_ci_hardware]

The following attribute in the Hardware [cmdb_ci_hardware] table is populated by collected data:

Attribute label	Attribute name
Most recent discovery	last_discovered

Relationships created for Hardware

Parent class	Relationship type	Child class
Hardware [cmdb_ci_hardware]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Hardware [cmdb_ci_hardware]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Hardware [cmdb_ci_hardware]	Reference	SG-Workspace ONE UEM Device Related [sn_vmwoneuem_integ_device_related]

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Relationships created for Hardware (continued)

Parent class	Relationship type	Child class
Hardware [cmdb_ci_hardware]	Reference	Key Value [cmdb_key_value]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
Name	name
Nic	nic
IP Address	ip_address
IP version	ip_version

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Media Player [cmdb_ci_media_player]

The following attributes in the Media Player [cmdb_ci_media_player] table are populated by collected data:

Attribute label	Attribute name
Name	name
Serial number	serial_number
Manufacturer	manufacturer
Model ID	model_id
MAC Address	mac_address
Assigned to	assigned_to
Most recent discovery	last_discovered

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Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Name	name
Configuration Item	cmdb_ci
MAC Address	mac_address
Most recent discovery	last_discovered

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Hardware [cmdb_ci_hardware]

Printer [cmdb_ci_printer]

The following attributes in the Printer [cmdb_ci_printer] table are populated by collected data:

Attribute label	Attribute name
Assigned to	assigned_to
MAC Address	mac_address
Name	name
Most recent discovery	last_discovered
Manufacturer	manufacturer
Model ID	model_id
Serial number	serial number

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

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Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]
Serial Number [cmdb_serial_number]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
Serial Number [cmdb_serial_number]	Reference	Printer [cmdb_ci_printer]
Serial Number [cmdb_serial_number]	Reference	Media Player [cmdb_ci_media_player]

SG-Workspace ONE UEM Device Related [sn_vmwoneuem_integ_device_related]

The following attributes in the SG-Workspace ONE UEM Device Related [sn_vmwoneuem_integ_device_related] table are populated by collected data:

Attribute label	Attribute name
Device ID	device_id
Device Compliance State	compliance_state
Device Ownership	device_ownership
User Email	user_email
User Name	user_name

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Installed on	installed_on

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Hardware [cmdb_ci_hardware]

Accessing the connection details of Service Graph Connector for VMware Workspace ONE UEM

You can access the connection details of the Service Graph Connector for VMware Workspace ONE UEM in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for VMware Workspace ONE UEM. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a VMware Workspace ONE UEM connection

Access the details of a VMware Workspace ONE UEM connection configured for the Service Graph Connector for VMware Workspace ONE UEM.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Workspace ONE UEM** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for VMware Workspace ONE UEM

Service Graph Connector for Wiz

Use the Service Graph Connector for Wiz to ingest CMDB data from projects within the Wiz platform using the REST APIs.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Key features

- Get started quickly with a streamlined onboarding process.
- Use only the credentials you need.
- Be instantly aware of any modifications with near real-time discovery of changes.
- Get visibility across multiple cloud environments.
- Identify risks in the environment through Wiz.
- Assess application dependencies.
- Get the most out of your security incident response and endpoint management with the ServiceNow AI Platform.

Supported versions

Versions

Wiz	ServiceNow
Last tested on April 07, 2025	• Washington DC • Xanadu • Yokohama

Use cases

You can use the Service Graph Connector for Wiz to get visibility into cloud resource identities, relationships, and state in real-time.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Wiz using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Wiz integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

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Data mapping

Data from the Wiz data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from the Wiz application.

Note:
For any discovered resources that were deleted later, the Service Graph Connector for Wiz automatically marks the corresponding records as retired or absent in CMDB.

The following table lists the data sources, the staging tables, and the target tables CMDB CI classes and non-CMDB classes where data is stored for a Wiz project.

Data sources mapping for Wiz

Data source	Staging table	Target tables
SG-Wiz-Organization	SG-Wiz-Organization [sn_wiz_integ_sg_wiz_organization]	Cloud Organizations SG-Wiz Extension Attributes Google Organization Folder
SG-Wiz-Subscription	SG-Wiz-Subscription [sn_wiz_integ_sg_wiz_subscription]	Cloud Service Account Google Organization Project SG-Wiz Extension Attributes Key Value
SG-Wiz-Datacenter	SG-Wiz-Datacenter [sn_wiz_integ_sg_wiz_datacenter]	AWS Datacenter Azure Datacenter Google Datacenter SG-Wiz Extension Attributes
SG-Wiz-Resource-Group	SG-Wiz-Resource-Group [sn_wiz_integ_sg_wiz_resource_group]	Resource Group SG-Wiz Extension Attributes Key Value
SG-Wiz-Network-Interface	SG-Wiz-Network-Interface [sn_wiz_integ_sg_wiz_network_interface]	Cloud Mgmt Network Interface SG-Wiz Extension Attributes Key Value
SG-Wiz-Virtual-Network	SG-Wiz-Virtual-Network [sn_wiz_integ_sg_wiz_virtual_network]	Cloud Network SG-Wiz Extension Attributes Key Value

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Data sources mapping for Wiz (continued)

Data source	Staging table	Target tables
SG-Wiz-Firewall	SG-Wiz-Firewall [sn_wiz_integ_sg_wiz_firewall]	Compute Security GroupKey Value
SG-Wiz-Volume	SG-Wiz-Volume [sn_wiz_integ_sg_wiz_volume]	Storage Volume Cloud Disk Type SG-Wiz Extension Attributes Key Value
SG-Wiz-Virtual-Machine	SG-Wiz-Virtual-Machine [sn_wiz_integ_sg_wiz_virtual_machine]	Virtual Machine Instance Hardware Type Linux Server Windows Server Server Key Value SG-Wiz Extension Attributes
SG-Wiz-Virtual-Machine-Image	SG-Wiz-Virtual-Machine-Image [sn_wiz_integ_sg_wiz_virtual_machine_image]	Image **Note:** Data with no subscription IDs for images aren't imported. Also, if the subscription ID for an image is available, but the subscription-specific details are not available in Wiz, the data isn't imported by the connector. Key Value SG-Wiz Extension Attributes
SG-Wiz-Load Balancer	SG-Wiz-Load Balancer [sn_wiz_integ_sg_wiz_load_balancer]	Cloud Load Balancer Key Value SG-Wiz Extension Attributes
SG-Wiz-Database	SG-Wiz-Database [sn_wiz_integ_sg_wiz_database]	Cloud DataBase Cloud DataBase Cluster DynamoDB Table

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Data sources mapping for Wiz (continued)

Data source	Staging table	Target tables
		Key Value SG-Wiz Extension Attributes
SG-Wiz-Bucket	SG-Wiz-Bucket [sn_wiz_integ_sg_wiz_bucket]	Cloud Object Storage Key Value SG-Wiz Extension Attributes
SG-Wiz-Serverless	SG-Wiz-Serverless [sn_wiz_integ_sg_wiz_serverless]	Cloud Function Key Value SG-Wiz Extension Attributes
SG-Wiz-Network-Address	SG-Wiz-Network-Address [sn_wiz_integ_sg_wiz_network_address]	Cloud Public IP Address Key Value SG-Wiz Extension Attributes
SG-Wiz-Storage-Account	SG-Wiz-Storage-Account [sn_wiz_integ_sg_wiz_storage_account]	Cloud Storage Account Key Value SG-Wiz Extension Attributes
SG-Wiz-API-Gateway	SG-Wiz-API-Gateway [sn_wiz_integ_sg_wiz_api_gateway]	Cloud Gateway Key Value SG-Wiz Extension Attributes
SG-Wiz-Snapshot	SG-Wiz-Snapshot [sn_wiz_integ_sg_wiz_snapshot]	Storage Volume Snapshot Key Value SG-Wiz Extension Attributes
SG-Wiz Kubernetes Cluster	SG-Wiz Kubernetes Cluster [sn_wiz_integ_sg_wiz_k8s_cluster]	Kubernetes Cluster Key Value SG-Wiz Extension Attributes
SG-Wiz Kubernetes Namespace	SG-Wiz-K8s Namespace [sn_wiz_integ_sg_wiz_k8s_namespace]	Kubernetes Namespace Key Value SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Node	SG-Wiz-Kubernetes Node [sn_wiz_integ_sg_wiz_kubernetes_node]	Kubernetes Node Key Value

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Data sources mapping for Wiz (continued)

Data source	Staging table	Target tables
		SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Deployment	SG-Wiz-Kubernetes Deployment [sn_wiz_integ_sg_wiz_kubernetes_deployment]	Kubernetes Deployment Key Value SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Service	SG-Wiz-Kubernetes Service [sn_wiz_integ_sg_wiz_kubernetes_service]	Kubernetes Service Key Value SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Pod	SG-Wiz-Kubernetes Pod [sn_wiz_integ_sg_wiz_kubernetes_pod]	Kubernetes Pod Key Value SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Replica Set	SG-Wiz-Kubernetes Replica Set [sn_wiz_integ_sg_wiz_kubernetes_replica_set]	Kubernetes ReplicaSet Key Value SG-Wiz Extension Attributes
SG-Wiz Kubernetes Container	SG-Wiz Kubernetes Container [sn_wiz_integ_sg_wiz_kubernetes_container]	Docker Container SG-Wiz Extension Attributes
SG-Wiz-Compute Instance Group	SG-Wiz-Compute Instance Group [sn_wiz_integ_sg_wiz_compute_instance_group]	Instance Scale Set SG-Wiz Extension Attributes Key Value

Note:
All the labels or tags associated with a Wiz resource are added to the Key Value [cmdb_key_value] table and the project information about a Wiz resource is stored in the SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes] table.

For more information on where data is saved when pulling data from a Wiz project, see Target tables for storing Service Graph Connector for Wiz data and Supported Wiz types.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Set up the Wiz environment

You must obtain the credentials associated with the Wiz service account to configure Wiz for use with the Service Graph Connector for Wiz.

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Before you begin
Role required: Wiz user with a role that has Write (W) permission on service accounts

About this task
To create a service account, you must be logged in as a Wiz user with Write (W) permission on service accounts. Project-scoped roles can create service accounts only on their own projects.

For more information on obtaining Wiz details, see Add a Service Account on the Wiz documentation site (requires Wiz login).

Procedure
1. Log in to your Wiz dashboard.
2. Obtain the Wiz URL.
   a. Navigate to your user profile and copy the API Endpoint URL.

   Note:
   The Service Graph Connector for Wiz uses the following token URL:

   ```
   https://auth.app.wiz.io/oauth/token
   ```

3. Obtain the client ID and client secret.
   a. Navigate to **Settings** > **Service Accounts**.
   b. Select **Add Service Account**.
   c. Name the new service account.
   d. **Optional:** In the Projects list, select projects to limit access of the service account.
   e. In the **API Scopes** field, select the permissions `read:resources` and `read:projects`.
   f. Select **Add Service Account**.
   g. From the Copy your secret credentials dialog box that appears, copy the client secret and client ID from their respective fields.
   h. Select **Finish** to return to the Wiz dashboard.

Configure Service Graph Connector for Wiz using SGC Central
Set up scheduled import jobs to pull in data from a Wiz project into your Configuration Management Database (CMDB).

Before you begin
- Install Service Graph Connector for Wiz version 1.3.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- You must obtain the OAuth credentials associated with the Wiz service account and make a note of the following details:
  - Client ID
  - Client secret
  - OAuth token URL
  - Connection URL

  For more information, see Set up the Wiz environment.
- You must have the following permissions for the Wiz service account:

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- read:resources
- read:projects

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Wiz connector type, and then select **Configure connection**.
   A default connection, SG-Wiz, for Wiz is available within the application. As the Service Graph Connector for Wiz supports only a single instance, you can configure the default connection for the first time or resume editing it thereafter.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required when configuring the connector for the first time only. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing Wiz data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection name	Name to identify the Wiz connection record.
Connection URL	Base URL to connect to your Wiz application.

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Field	Description
	Note: Based on the region of your Wiz application, enter the connection URL in the following format: `https://api.<region>.app.wiz.io` Where *<region>* is the region where the Wiz tenant is located. For example, us1, us2, eu1, or eu2.
Client ID	Client ID of your Wiz application as described in Before you begin.
Client secret	Client secret of your Wiz application as described in Before you begin.
OAuth token URL	Token generation URL. This field is automatically set to the following URL: `https://auth.app.wiz.io/oauth/token`

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

7. Optional: Configure properties of the connector to access resources.

Note:
To skip this step, select **Continue** for the **Set configuration properties** activity.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. On the form, fill in the fields.

Configuration properties

Field	Description
Projects	List of project IDs for which the resources are to be imported. (Optional) Separate multiple entries with a comma.
Exclude projects	List of project IDs for which the resources are excluded only when the **Projects** property isn't set. In this case, all the resources except for the specified projects are imported. Separate multiple entries with a comma.

c. Select **Continue**.

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8. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Expand the Parent scheduled data import within the Import schedules list to select the **SG-Wiz-Organization** import schedule.

   c. Select the **Active** check box, and then fill in the run schedule and time details.

      For more information, see Schedule a data import.

   d. Select **Save**.
   Alternatively, select **Execute Now** to execute the import schedule immediately.

9. **Optional:** Enable the `Reset Last Run Datetime for SG-Wiz` script to retrieve full data periodically.

   Note:
   To skip this step, select **Skip** for the **Enable full data retrieval** activity.

   a. In the **Setup** stage of the playbook, select the **Enable full data retrieval** activity.

   b. Select the **Active** check box, and then fill in the run schedule and time details.

      Note:
      When active, the script clears the **Last Run Date Time** field value in a data source, ensuring that the SG-Wiz Organization scheduled job retrieves all Wiz-related data sources periodically.

   c. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics

- Service Graph Connector for Wiz
- Target tables for storing Service Graph Connector for Wiz data
- Service Graph Connector for Wiz properties
- Supported Wiz types
- Accessing the connection details of Service Graph Connector for Wiz

Configure Service Graph Connector for Wiz using guided setup

Set up scheduled import jobs to pull in data from a Wiz project into your CMDB.

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Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- Wiz advanced or standard license
- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.
- Discovery and Service Mapping Patterns (sn_itom_pattern). See Install Discovery and Service Mapping Patterns.
- Discovery Core (com.snc.discovery.core)

You must obtain the OAuth credentials associated with the Wiz service account and make a note of the following details:

- Client ID
- Client Secret
- OAuth Token URL
- Connection URL

See Set up the Wiz environment.

You must have the following permissions for the Wiz service account:

- read:resources
- read:projects

Role required: admin

Procedure

1. Verify that the application scope is set to the Service Graph Connector for Wiz application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Wiz** > **Setup**.
3. On the Service Graph Connector for Wiz page, verify that the **Quick Start** option is selected and then select **Continue**.
4. Configure the connection to send requests to the Wiz application.

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a. In the Configure the Connection and Credentials section of the Service Graph Connector for Wiz page, select **Start**.

b. Configure the connection.

i. Select the Configure the Connection task and then select **Click Here**.

ii. On the Connections page that opens in another browser tab, select **Edit** for the **SG-Wiz** connection that is available by default.

iii. On the form, fill in the fields.

Edit Connection form

Field	Description
Connection Name	Name to identify the connection record. For example, `SG-Wiz`. Don't modify the name for the default connection alias `SG-Wiz`.
Connection URL	Base URL to connect to your Wiz application. **Note:** Based on the region of your Wiz application, enter the connection URL in the following format: `https://api.<region>.app.wiz.io` Where *<region>* is the region where the Wiz tenant is located. For example, us1, us2, eu1, or eu2.
Client ID	Client ID of your Wiz application as described in Before you begin.
Client Secret	Client secret of your Wiz application as described in Before you begin.
OAuth Token URL	Token generation URL. This field is automatically set to the following URL: `https://auth.app.wiz.io/oauth/token`

iv. Select **Edit and Get OAuth Token**.

v. Return to the guided setup.

vi. Set the Configure the Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

c. Configure the connection properties.

i. Select the Add configuration properties task.

ii. In the Service Graph Connections section, review and modify the property details by selecting a property from the **Property** column in the Service Graph Connection Properties related list.

You can configure the following properties:

Projects

A list of comma-separated project IDs for which the resources are to be pulled.

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Exclude Projects

A list of comma-separated project IDs for which the resources are excluded only when the **Projects** property isn't set. In this case, all the resources except for the specified projects are imported.

Note:
If no property is configured, data from all the Wiz projects are fetched.

iii. Select **Update** in the Service Graph Connection Properties section.

iv. Set the Add connection properties task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Test the Wiz API connection to import data from the Wiz application.

i. Select the Test Connection task.

ii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iii. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

5. Configure the scheduled jobs to import data from the Wiz application.

a. Configure the scheduled job for the complete (full) import of data during the initial execution, and then incremental (delta) import of data on subsequent executions.

i. Select the Configure the scheduled jobs task.

ii. Select the **SG-Wiz-Organization** scheduled job.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job.

For more information, see Schedule a data import.

iv. Select the **Active** check box to activate the SG-Wiz-Organization scheduled job.

v. In the **Run** field, select **Periodically** to specify how often the job will run.

vi. Select **Update**.

vii. Set the Configure the scheduled jobs task to complete by selecting the **Mark as complete** check box and then select **Continue**.

b. Configure the Reset Last Run Datetime for SG-Wiz scheduled script to enable full pull for subsequent execution of the scheduled job.

Note:
To fetch the complete data using a data source on subsequent executions, you must remove the **Last Run Date Time** field value from a data source. The Reset Last Run Datetime for SG-Wiz scheduled script provided with the connector resets the **Last Run Date Time** field value automatically. Therefore, confirming that the SG-Wiz Organization scheduled job executes all data sources for a full pull.

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i. Select the Configure the scheduled script for full data retrieval task.

ii. Select the **Active** check box to activate the SG-Wiz scheduled script.

iii. In the **Run** field, select **Periodically** to specify how often the script will run.

For more information, see Automatically run a script of your choosing.

iv. Select **Update**.

v. Set the Configure the scheduled script for full data retrieval task to complete by selecting the **Mark as complete** check box and then select **Continue**.

6. On the Service Graph Connector for Wiz page, select **Complete** to save your changes.
7. In Complete setup dialog box, select **Complete** to complete the setup.
8. In the message box that appears, select **Done**.

Target tables for storing Service Graph Connector for Wiz data

When you complete setting up the connection, you can configure the integration to periodically pull data from a Wiz project. The data is saved in tables that extend from the CMDB CI classes and other non-CMDB classes.

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Region	region	name

Relationships created for AWS Datacenter

Parent class	Relationship type	Child class
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
AWS Datacenter [cmdb_ci_aws_datacenter]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId

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Attribute label	Attribute name	Wiz attribute
Region	region	name

Relationships created for Azure Datacenter

Parent class	Relationship type	Child class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains::Contained by	Resource Group [cmdb_ci_resource_group]
Azure Datacenter [cmdb_ci_azure_datacenter]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None
Type	type	nativeType

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster]

The following attributes in the Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Cluster ID	cluster_id	externalId
Name	name	name
Cluster Type	cluster_type	kind
Install Status	install_status	None

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Attribute label	Attribute name	Wiz attribute
Vendor	vendor	None

Relationships created for Cloud DataBase Cluster

Parent class	Relationship type	Child class
Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster]	Reference	Key Value [cmdb_key_value]
Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Disk Type [cmdb_ci_disk_type]

The following attributes in the Cloud Disk Type [cmdb_ci_disk_type] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	properties.volumeType, zone
Object ID	object_id	properties.volumeType, zone

Relationship created for Cloud Disk Type

Parent class	Relationship type	Child class
Cloud Disk Type [cmdb_ci_disk_type]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
CodeSha256	codesha256	awsLambda_codeSha256
Install Status	install_status	None
Language	language	runtime

Relationships created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

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Relationships created for Cloud Function (continued)

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud Function [cmdb_ci_cloud_function]	Reference	Key Value [cmdb_key_value]

Cloud Gateway [cmdb_ci_cloud_gateway]

The following attributes in the Cloud Gateway [cmdb_ci_cloud_gateway] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId (for Azure) providerUniqueId (for AWS)
Install Status	install_status	None

Relationships created for Cloud Gateway

Parent class	Relationship type	Child class
Cloud Gateway [cmdb_ci_cloud_gateway]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Gateway [cmdb_ci_cloud_gateway]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Gateway [cmdb_ci_cloud_gateway]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud Gateway [cmdb_ci_cloud_gateway]	Reference	Key Value [cmdb_key_value]

Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	name (for AWS Load Balancer v1)

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Attribute label	Attribute name	Wiz attribute
		externalId (for Azure and AWS Load Balancer v2)
Install Status	install_status	None

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
MAC Address	mac_address	macAddress
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None

Relationships created for Cloud Mgmt Network Interface

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Key Value [cmdb_key_value]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

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Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Cidr	cidr	addressRanges
Install Status	install_status	None

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Network [cmdb_ci_network]	Reference	Key Value [cmdb_key_value]
Cloud Network [cmdb_ci_network]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Object Storage [cmdb_ci_cloud_object_storage]

The following attributes in the Cloud Object Storage [cmdb_ci_cloud_object_storage] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId (for Azure and GCP) providerUniqueId (for AWS)
Cloud Provider	cloud_provider	cloudPlatform
Install Status	install_status	None

Relationships created for Cloud Object Storage

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

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Relationships created for Cloud Object Storage (continued)

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	Key Value [cmdb_key_value]

Cloud Organizations [cmdb_ci_cloud_org]

The following attributes in the Cloud Organizations [cmdb_ci_cloud_org] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Object ID	object_id	ProviderUniqueId(AWS and Azure), externalid (for GCP)
Name	name	name

Relationships created for Cloud Organizations

Parent class	Relationship type	Child class
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Organizations [cmdb_ci_cloud_org]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]

The following attributes in the Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None
Public IP Address	public_ip_address	address

Relationships created for Cloud Public IP Address

Parent class	Relationship type	Child class
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

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Relationships created for Cloud Public IP Address (continued)

Parent class	Relationship type	Child class
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Account Id	account_id	externalId
Name	name	name
Object ID	object_id	externalId
Datacenter Type	datacenter_type	cloudPlatform
Is master account	is_master_account	ProviderUniqueID (AWS only)
Organization Id	organization_id	ProviderUniqueID (AWS only)
Parent account	parent_account	ProviderUniqueID (AWS only)

Relationships created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Key Value [cmdb_key_value]
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Storage Account [cmdb_ci_cloud_storage_account]

The following attributes in the Cloud Storage Account [cmdb_ci_cloud_storage_account] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId

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Attribute label	Attribute name	Wiz attribute
Install Status	install_status	None

Relationships created for Cloud Storage Account

Parent class	Relationship type	Child class
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Reference	Key Value [cmdb_key_value]
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Compute Security Group [cmdb_ci_compute_security_group]

The following attributes in the Compute Security Group [cmdb_ci_compute_security_group] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None
Region	region	region

Relationships created for Compute Security Group

Parent class	Relationship type	Child class
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	Key Value [cmdb_key_value]

Docker Container [cmdb_ci_docker_container]

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Attribute label	Attribute name	Wiz attribute
Container id	container_id	externalId (for Kubernetes, ACA, and ACI) providerUniqueId (for ECS)
Image id	image_id	image
Install Status	install_status	None
Name	name	name

Relationships created for Docker Container

Parent class	Relationship type	Child class
Docker Container [cmdb_ci_docker_container]	Hosts:: Hosted on	AWS Datacenter [cmdb_ci_aws_datacenter] (for ECS)
Docker Container [cmdb_ci_docker_container]	Hosts:: Hosted on	Azure Datacenter [cmdb_ci_azure_datacenter] (for ACA, ACI)
Docker Container [cmdb_ci_docker_container]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

DynamoDB Table [cmdb_ci_dynamodb_table]

The following attributes in the DynamoDB Table [cmdb_ci_dynamodb_table] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	name
Install Status	install_status	None

Relationships created for DynamoDB Table

Parent class	Relationship type	Child class
DynamoDB Table [cmdb_ci_dynamodb_table]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
DynamoDB Table [cmdb_ci_dynamodb_table]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
DynamoDB Table [cmdb_ci_dynamodb_table]	Reference	Key Value [cmdb_key_value]

Google Datacenter [cmdb_ci_google_datacenter]

The following attributes in the Google Datacenter [cmdb_ci_google_datacenter] table are populated by collected data:

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Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	properties.externalId
Region	region	region

Relationships created for Google Datacenter

Parent class	Relationship type	Child class
Google Datacenter [cmdb_ci_google_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Google Datacenter [cmdb_ci_google_datacenter]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Google Organization Folder [cmdb_ci_gcp_folder]

The following attributes in the Google Organization Folder [cmdb_ci_gcp_folder] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Object ID	object_id	externalId
Name	name	name

Relationship created for Google Organization Folder

Parent class	Relationship type	Child class
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Google Organization Project [cmdb_ci_gcp_project]

The following attributes in the Google Organization Project [cmdb_ci_gcp_project] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Project Id	project_id	providerUniqueId

Relationship created for Google Organization Project

Parent class	Relationship type	Child class
Google Organization Project [cmdb_ci_gcp_project]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

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Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	instanceType
Object ID	object_id	instanceType

Relationships created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None

Relationships created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Image [cmdb_ci_os_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Image [cmdb_ci_os_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Image [cmdb_ci_os_template]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Image [cmdb_ci_os_template]	Reference	Key Value [cmdb_key_value]

Note:
Data with no subscription IDs for images aren't imported. Also, if the subscription ID for an image is available, but the subscription-specific details are not available in Wiz, the data isn't imported by the connector.

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Instance Scale Set [cmdb_ci_instance_scale_set]

The following attributes in the Instance Scale Set [cmdb_ci_instance_scale_set] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Install Status	install_status	None
Object ID	object_id	externalId

Relationships created for Instance Scale Set

Parent class	Relationship type	Child class
Instance Scale Set [cmdb_ci_instance_scale_set]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Instance Scale Set [cmdb_ci_instance_scale_set]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Instance Scale Set [cmdb_ci_instance_scale_set]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Instance Scale Set [cmdb_ci_instance_scale_set]	Reference	Key Value [cmdb_key_value]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Key	key	tags
Value	value	tags

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Cluster Resource ID	cluster_resource_id	providerUniqueId
Name	name	name
Install Status	install_status	None
Kubernetes UID	k8s_uid	externalId

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Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	Key Value [cmdb_key_value]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes Deployment [cmdb_ci_kubernetes_deployment]

The following attributes in the Kubernetes Deployment [cmdb_ci_kubernetes_deployment] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Kubernetes UID	k8s_uid	uid
Name	name	name
Namespace	namespace	namespace
Available Replicas	available_replicas	status_availableReplicas
Desired Replicas	desired_replicas	spec_replicas
Install Status	install_status	None
Total Replicas	total_replicas	status_replicas
Updated Replicas	updated_replicas	status_updatedReplicas
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID
SelfLink	self_link	api_version namespace name
Unavailable Replicas	unavailable_replicas	status_unavailableReplicas

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Relationships created for Kubernetes Deployment

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Key Value [cmdb_key_value]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Install Status	install_status	None
Namespace	namespace	name
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID
Name	name	name

Relationships created for Kubernetes Namespace

Parent class	Relationship type	Child class
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	Key Value [cmdb_key_value]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes Node [cmdb_ci_kubernetes_node]

The following attributes in the Kubernetes Node [cmdb_ci_kubernetes_node] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
IP Address	ip_address	status_address
Kubernetes UID	k8s_uid	uid
Name	name	name
Install Status	install_status	None
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID

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Relationships created for Kubernetes Node

Parent class	Relationship type	Child class
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Key Value [cmdb_key_value]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Kubernetes UID	k8s_uid	uid
Namespace	namespace	namespace
Host IP	host_ip	status_hostIP
Install Status	install_status	None
IP Address	ip_address	status_podIPs
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID
Name	name	name
Resource version	resource_version	resourceVersion

Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	Key Value [cmdb_key_value]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]

The following attributes in the Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Kubernetes UID	k8s_uid	uid

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Attribute label	Attribute name	Wiz attribute
Name	name	name
Namespace	namespace	namespace
Available Replicas	available_replicas	status_availableReplicas
Desired Replicas	desired_replicas	spec_replicas
Install Status	install_status	None
SelfLink	self_link	api_version namespace name
Total Replicas	total_replicas	status_replicas
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID

Relationships created for Kubernetes ReplicaSet

Parent class	Relationship type	Child class
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Key Value [cmdb_key_value]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes Service [cmdb_ci_kubernetes_service]

The following attributes in the Kubernetes Service [cmdb_ci_kubernetes_service] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Kubernetes UID	k8s_uid	uid
Name	name	name
Install Status	install_status	None
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID
Namespace	namespace	namespace
IP Address	ip_address	spec_clusterIP
Selector	selector	spec_selector
Service Type	service_type	spec_type

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Relationships created for Kubernetes Service

Parent class	Relationship type	Child class
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	Key Value [cmdb_key_value]
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Linux Server [cmdb_ci_linux_server]

The following attributes in the Linux Server [cmdb_ci_linux_server] table are populated by collected data.

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Serial number	serial_number	providerUniqueId
CPU count	cpu_count	vCPUs
Install Status	install_status	None
Is Virtual	None	None
Operating System	os	operatingSystem

Resource Group [cmdb_ci_resource_group]

The following attributes in the Resource Group [cmdb_ci_resource_group] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None

Relationships created for Resource Group

Parent class	Relationship type	Child class
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Storage Volume [cmdb_ci_storage_volume]
Resource Group [cmdb_ci_resource_group]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

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Relationships created for Resource Group (continued)

Parent class	Relationship type	Child class
Resource Group [cmdb_ci_resource_group]	Reference	Key Value [cmdb_key_value]

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name	Wiz
Serial Number	providerUniqueID	providerUniqueId
Serial Number Type	serial_number_type	None
Valid	serial_number_valid	providerUniqueId

Note:
The Serial Number [cmdb_serial_number] table is populated for Azure only.

Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Server [cmdb_ci_server]
Serial Number [cmdb_serial_number]	Reference	Windows Server [cmdb_ci_win_server]
Serial Number [cmdb_serial_number]	Reference	Linux Server [cmdb_ci_linux_server]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Serial number	serial_number	providerUniqueId
CPU count	cpu_count	vCPUs
Install Status	install_status	None
Is Virtual	virtual	None
Operating System	os	operatingSystem

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SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

The following attribute in the SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes] table is populated by collected data:

Attribute label	Attribute name	Wiz attribute
Project ID	project_id	productIDs
CMDB Class	u_cmdb_class	None

Storage Volume [cmdb_ci_storage_volume]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Object ID	object_id	externalId
Volume ID	volume_id	externalId
Install Status	install_status	None
Name	name	name
Size	size	sizeGb
Size bytes	size_bytes	sizeGb
Storage type	storage_type	volumeType

Relationships created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Storage Volume [cmdb_ci_storage_volume]	Reference	Key Value [cmdb_key_value]

Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]

The following attributes in the Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot] table is populated by collected data:

Attribute label	Attribute name	Wiz attribute
Object ID	object_id	externalId

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Attribute label	Attribute name	Wiz attribute
Name	name	name
Install Status	install_status	None

Relationships created for Storage Volume Snapshot

Parent class	Relationship type	Child class
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Reference	Key Value [cmdb_key_value]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
CPUs	cpus	vCPUs
Disks	disks	totalDisks
Install Status	install_status	None
Memory (MB)	memory	memoryGB
VM Instance ID	vm_inst_id	externalId

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Linux Server [cmdb_ci_linux_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

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Relationships created for Virtual Machine Instance (continued)

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Managed by::Manages	Instance Scale Set [cmdb_ci_instance_scale_set]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Windows Server [cmdb_ci_win_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]

Windows Server [cmdb_ci_win_server]

The following attributes in the Windows Server [cmdb_ci_win_server] table are populated by collected data.

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Serial number	providerUniqueID	providerUniqueId
CPU count	cpu_count	vCPUs
Install Status	install_status	None
Is Virtual	None	None
Operating System	os	operatingSystem

Service Graph Connector for Wiz properties

Service Graph Connector for Wiz properties control the behavior of the connector.

Connection properties

These connection properties are available for Service Graph Connector for Wiz.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Wiz** > **Connections** and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

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Connection properties for Service Graph Connector for Wiz

Property	Description
Projects	Enter a list of comma-separated Project IDs for which the resources are to be pulled. For multiple entries, separate the IDs with commas.
Exclude Projects	Enter a list of comma-separated Project IDs for which the resources are excluded only when the Projects property isn't set. In this case, all the resources except for the specified projects are imported. For multiple entries, separate the names with commas.

System properties

These system properties are available for Service Graph Connector for Wiz.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for Service Graph Connector for Wiz

Property	Description
sn_wiz_integ.list_resources_action.page_size	Enter the page size used in REST requests to fetch Wiz entities. • Type: string • Default value: `100` • Location: System Property [sys_properties] table

Supported Wiz types

The Wiz types and corresponding native types are imported as CMDB data and saved in tables that extend from the Configuration item [cmdb_ci] table.

For information on Wiz types and Wiz native types, see Security Graph Object Normalization on the Wiz documentation site (requires Wiz login).

Wiz types	Wiz native types	CMDB CI classes
Cloud Organization	AWS Organization GCP Organization	Cloud Organizations
	GCP Folder	Google Organization Folder
Subscription	AWS Account	Cloud Service Account
	Azure Subscription	
	GCP Project	Cloud Service Account

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Wiz types	Wiz native types	CMDB CI classes
		Google Organization Project
Region	AWS Region	AWS Datacenter
	Azure Location	Azure Datacenter
	GCP Region	Google Datacenter
Resource Group	Azure Resource Group	Resource Group
Network Interface	AWS Network Interface	Cloud Mgmt Network Interface
	Azure Network Interface	
	GCP Compute Network Interface	
Virtual Network	AWS VPC	Cloud Network
	Azure Virtual Network	
Firewall	AWS EC2 Security Group	Compute Security Group
	Azure Network Security Group	
	GCP Firewall	
Volume	AWS EC2 Volume (EBS)	Storage Volume
	AWS Lightsail Disk	
	Azure Disk	
	GCP Compute Disk	Storage Volume, Cloud Disk Type
Virtual Machine	AWS EC2 Instance	Virtual Machine Instance, Server, Hardware Type
	AWS Lightsail Instance	
	Azure Scale Set Virtual Machine	
	Azure Compute Virtual Machine	
	GCP Compute Instance	
Virtual Machine Image	AWS Machine Image (AMI)	Image
	Azure Compute Virtual Machine Image	
	GCP Compute Image	
Load Balancer	AWS ELB v1	Cloud Load Balancer
	AWS ELB V2 Application Load Balancer	
	AWS ELB V2 Gateway Load Balancer	
	AWS ELB V2 Network Load Balancer	

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Wiz types	Wiz native types	CMDB CI classes
	AWS ELB V2	
	Azure Application Gateway	
	Azure Load Balancer	
	Azure Traffic Manager	
	GCP Compute Backend Service	
	GCP Compute Region Backend Service	
Database	AWS DynamoDB Table	DynamoDB Table
	AWS ElastiCache for Memcached Cluster	Cloud DataBase Cluster
	AWS ElastiCache Redis Cluster	
	AWS RDS Aurora MySQL Cluster	
	AWS DocumentDB Cluster	
	AWS RDS MSSQL Server Cluster	
	AWS RDS MariaDB Cluster	
	AWS RDS MySQL Cluster	
	AWS Neptune Cluster	
	AWS RDS Oracle Cluster	
	AWS RDS PostgreSQL Cluster	
	Azure Cosmos DB Cassandra Keyspace	Cloud DataBase
	Azure Cosmos DB SQL Database	
	Azure MariaDB Database	
	Azure Cosmos DB MongoDB Collection	
	Azure Database for MySQL (Database)	
	Azure Database for MySQL Flexible (Database)	
	Azure Database for PostgreSQL (Database)	
	Azure Database for PostgreSQL Flexible (Database)	
	Azure Redis Database	
	Azure SQL Database	
	Azure SQL Managed Instance Database	

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Wiz types	Wiz native types	CMDB CI classes
	Azure Data Explorer (Kusto) Database Instance	
Bucket	AWS S3 Bucket	Cloud Object Storage
	Azure Blob Storage Container	
	GCP Bucket	
Serverless	AWS Lambda Function	Cloud Function
	Azure Function	
	GCP Cloud Function	
Network Address	AWS Elastic IP Address	Cloud Public IP Address
	Azure CDN Endpoint	
	Azure Public IP Addresses	
	GCP Compute Address	
	GCP Endpoint	
Storage Account	Azure Storage Account	Cloud Storage Account
API Gateway	AWS API Gateway	Cloud Gateway
	AWS API Gateway V2	
	Azure API Management	
Kubernetes Cluster	AWS Elastic Kubernetes Service (EKS) Cluster	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
	Azure Kubernetes Service (AKS) Cluster	
	GCP Kubernetes Engine (GKE) Cluster	
	Kubernetes Cluster	
Namespace	Kubernetes Namespace	Kubernetes Namespace
Kubernetes Node	Kubernetes Node	Kubernetes Node
Deployment	Kubernetes Deployment	Kubernetes Deployment
Kubernetes Service	Kubernetes Service	Kubernetes Service
Pod	Kubernetes Pod	Kubernetes Pod
Replica Set	Kubernetes Replica Set	Kubernetes ReplicaSet

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Wiz types	Wiz native types	CMDB CI classes
Compute Instance Group	AWS Auto Scaling Group	Instance Scale Set
	Azure Availability Set	
Container	Kubernetes Container	Docker Container
	AWS ECS Container	
	Azure ACA Container	
	Azure ACI Container	

Accessing the connection details of Service Graph Connector for Wiz

You can access the connection details of the Service Graph Connector for Wiz in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Wiz. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Wiz connection

Access the details of a Wiz connection configured for the Service Graph Connector for Wiz.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Wiz** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Domain separation and Service Graph Connectors

Domain separation is supported for Service Graph Connectors. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard*

The support level is Standard but has some exceptions or special conditions.

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- Includes all aspects of **Basic** level support.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must be able to configure minimum viable product (MVP) business logic and data parameters. This configuration is done per tenant, as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

How domain separation works in Service Graph Connectors

Domain separation is supported only for multi-instance Service Graph Connectors.

Note:
The Identification and Reconciliation Engine (IRE) uses strict domain separation in releases prior to San Diego. That is, hierarchical domains are not supported.

You must install the Domain Support - Domain Extensions Installer (`com.glide.domain.msp_extensions.installer`) plugin before working with the Service Graph Connectors tables. See Request domain separation.

Tables that do not have a Domain (sys_domain) column are not domain-separated. You can add a Domain (sys_domain) column to an existing table. See Add a domain field to a table.

Note:

- The import set tables are not domain-separated.
- Transform histories are not domain-separated.
- The Key Value [cmdb_key_value] and Software Instance [cmdb_software_instance] tables, which are related to the Configuration Management Database (CMDB), are not domain-separated.

For more information about domain separation for Service Graph Connectors, see the Service Graph Connector Domain Separation article in the Now Support Knowledge Base.

Related topics

Domain separation for service providers

[store-future: BEGIN review]

Configure domain separation for Service Graph Connectors

Configure domain separation for Service Graph Connectors to separate data into logically defined domains.

Before you begin

Role required: admin

Procedure

1. Install the Domain Support – Domain Extensions Installer system plugin to enable the domain separation feature for Service Graph Connectors.
2. Set up domains in **Domain Admin** > **Domains**.

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3. Create users for each domain.
4. Update the **Run As** user from a user on the Scheduled Data Import to a user within the domain in which you want the data to be imported.

[End]

Service Graph Connector Support Tools

You can use the ServiceNow® Service Graph Connector Support Tools application to resolve any issues or perform a general analysis on a Service Graph Connector installed on your instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Key features

The Service Graph Connector Support Tools application includes prebuilt conversations as a response to an issue type and enables resolving Service Graph Connector issues and to perform a general analysis.

The application provides capability to debug and resolve the following types of issues:

Connection issues

Depending on the data source selected, asks to update or set required properties, enables to run the Flow Designer action corresponding to the connector manually, and provides a link to HTTP logs for verifying the response from the data source.

Data issues

Checks for customizations in Identification and Reconciliation engine (IRE) rules, reconciliation rules, business rules, and mappings. Reviews the field and import causing the issue, reprocesses the import row, and provides the complete transformation information. Also, provides additional troubleshooting steps.

Performance issues

Depending on the data source and import set selected, makes a basic performance check and reviews the history of the Configuration Management Database (CMDB) integration executions.

Mapping issues

Reviews mappings for input and output fields using the IntegrationHub ETL store app.

The chatbot conversation also directs to the knowledge articles landing page in the Now Support knowledge base, if available for a connector.

Install Service Graph Connector Support Tools

You can install Service Graph Connector Support Tools if you have the admin role. The application installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.

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Role required: admin

About this task

The following applications or plugins are installed with Service Graph Connector Support Tools:

Integration Commons for CMDB (sn_cmdb_int_util)

Contains the CMDB Integrations Dashboard and a set of Robust Transform Engine (RTE) transforms and script includes.

Glide Virtual Agent Lite (com.glide.cs.chatbot.lite)

Provides IT service assistance using several prebuilt IT Service Management (ITSM) conversations.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Service Graph Connector Support Tools application (sn_sgc_support) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
4. Select **Install**.

Resolving Service Graph Connector issues

You can use the Service Graph Connector Support Tools application to initiate a chatbot conversation with a virtual agent and resolve an issue or perform a general analysis on a Service Graph Connector installed on your instance.

If a user with the admin role has installed the Service Graph Connector Support Tools application, you can initiate a chat conversation with a virtual agent to resolve Service Graph Connector issues. The application includes prebuilt conversations as a response to an issue type.

You can use the prebuilt conversations to debug and resolve the following types of issues:

Connection issues

Depending on the data source selected, the virtual agent suggests you to update or set required properties, run the Flow Designer action corresponding to the connector manually, and verify the response from the data source using HTTP logs.

Data issues

The virtual agent suggests you to check for customizations in Identification and Reconciliation engine (IRE) rules, reconciliation rules, business rules, and mappings. Review the field and import causing the issue, reprocess the import row, and view the complete transformation information. Also, suggests to perform additional troubleshooting steps.

Performance issues

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Depending on the data source and import set selected, the virtual agent suggests you to make a basic performance check and review the history of the Configuration Management Database (CMDB) integration executions.

Mapping issues

The virtual agent suggests you to review mappings for input and output fields using the IntegrationHub ETL store app.

Resolve a Service Graph Connector issue

Resolve the Service Graph Connector issues or perform a general analysis using the Troubleshooting module available for Service Graph Connectors.

Before you begin

Install Service Graph Connector Support Tools

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Troubleshooting**.
2. In the Now Support window, select **Click here to start a new conversation**.
3. Select **Show me everything**.
4. Select **Service Graph Connector Help**.
5. Select a help option.
6. Based on the selected help option, follow the help instructions to resolve an issue or perform a general analysis.
7. **Optional:** Close the conversation by selecting **End the chat**.

API Service Graph Connectors

You can use an API Service Graph Connector to import and integrate third-party API data into CMDB tables.

Important:
Visit the ServiceNow Store website to view the latest list of all API Service Graph Connectors.

Select a technology to learn about the API Service Graph Connector available for ingesting data from an application using the technology into your CMDB.

 Apigee X	 AWS API Gateway	 Azure API Management
 Kong Gateway		

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API Service Graph Connector for Apigee X

Use the ServiceNow® API Service Graph Connector for Apigee X to import API proxy details from an Apigee X application into the Configuration Management Database (CMDB).

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Key features

Import data into a normalized data model for consistency across other technologies.

Supported ServiceNow versions

- Washington DC
- Xanadu
- Yokohama

Use cases

You can use the API Service Graph Connector for Apigee X to:

- Maintain an end-to-end inventory of exposed and backend APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints, and create compliance requirements to measure against.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for Apigee X using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

Data mapping

Data from the Apigee X data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from an Apigee X application.

The following table lists the data sources in the order that they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for an Apigee X application.

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Data mapping for Apigee X

Data source	Staging table	Target tables
Organization	SGA Apigee X Organization [sn_apigee_x_sga_apigee_x_organization]	Cloud Organizations
Folder	SGA Apigee X Folder [sn_apigee_x_sga_apigee_x_folder]	Google Organization Folder
Project	SGA Apigee X Project [sn_apigee_x_sga_apigee_x_project]	Google Organization Project
Managed API	SGA Apigee X Managed API [sn_apigee_x_sga_apigee_x_managed_api]	Managed API API Deployment Apigee API Gateway
API Consumer	SGA Apigee X API Consumer [sn_apigee_x_sga_apigee_x_api_consumer]	API Consumer
API Frontend Backend	SGA Apigee X Frontend Backend [sn_apigee_x_sga_apigee_x_frontend_backend]	API Frontend API Backend
API Product	SGA Apigee X API Product [sn_apigee_x_sga_apigee_x_api_product]	API Product Bundle Key Value
API Consumer Subscription	SGA Apigee X API Consumer Subscription [sn_apigee_x_sga_apigee_x_api_consumer_subscription]	API Consumer Subscription Key Value
API Consumer Access	SGA Apigee X API Consumer Access [sn_apigee_x_sga_apigee_x_api_consumer_access]	API Consumer Access

For more information on where data is saved when pulling data from an Apigee X application, see Target tables for storing API Service Graph Connector for Apigee X data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Configure API Service Graph Connector for Apigee X using SGC Central

Set up scheduled import jobs to pull in Apigee X data into your CMDB.

Before you begin

Install API Service Graph Connector for Apigee X version 1.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: cmdb_inst_admin or admin

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About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Apigee X connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Complete the prerequisites for setting up the Apigee X environment.

   a. Set up the Apigee X environment and create a Java KeyStore (JKS) certificate to encrypt the security certificates obtained from an Apigee X application.

      i. In the **Prerequisites** stage of the playbook, select the **Review setup instructions** activity.

      ii. Review and complete the setup instructions on the API Service Graph connector for Apigee X - Setup Instructions [KBB0010364] article in the Now Support Knowledge Base.

      You must create a service account, assign roles, bind roles to the service account, enable APIs, create a P12 file, and register it in your ServiceNow instance.

      Make a note of the destination keystore password. You need to specify this password while importing the JKS certificate into the API Service Graph Connector for Apigee X application.

      iii. Select the **I have read the setup instructions** check box to confirm that you have set up the Apigee X environment according to the instructions.

      iv. Select **Continue**.

   b. Create an X.509 certificate to associate the Java KeyStore (JKS) certificate for the Apigee X application with the connector.

      Note:
      You can skip this step if you're reusing a previously created certificate.

      i. In the **Prerequisites** stage of the playbook, select the **Create X.509 certificate** activity.

      ii. On the form, fill in the fields.

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X.509 Certificate form

Field	Description
Name	Name of the X.509 certificate. For example, `SGA-ApigeeX-509Certificate`.
Key store password	Password to access the JKS certificate as noted down in the previous step.
Short description	Description of the X.509 certificate.

iii. In the Attachments section, select **Add File**.

iv. Browse and select the P12 file for the JKS certificate you created in the previous step.

v. On the Upload a file dialog box, select **Upload**.

vi. Select **Continue**.

7. Enter connection details and test the API connection for importing Apigee X data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Configure and test connection form

Field	Description
Connection name	Name to identify the Apigee X connection record.
Service account Email	Email address associated with the ServiceNow service account used for authentication with Apigee X as noted in the previous step.
X.509 certificate	Name of the X.509 certificate as noted in the previous step.
Keystore Password	Password associated with the keystore as noted in the previous step.

   c. Select **Create and test connection**.

   d. Once the connection test is complete, select **Continue**.

8. Set the configuration properties for the connection.

   a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

   b. Enter the properties.

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Service Graph Connection Properties

Property	Description
Apigee identification	
Organization Id	Organization within the Apigee X system to which the projects belong.
Project Id	Project identifier within the Apigee X environment that the connection will be linked to. For multiple project IDs, separate them with commas.
Data retrieval configuration	
Discovery Scope	Discovery scope of the Apigee X application. The available options are: **Organization** Select **Organization** when the ServiceNow service account has access to data within the Apigee X organization. **Projects** Select **Projects** when the ServiceNow service account has access to data within Apigee X projects only.
Exclude Environments	Apigee X environments that should be excluded from the connection. For multiple environments, separate them with commas. All gateways except those listed in the *`Exclude Environments`* property are fetched. If you leave this field empty, the data sources within the connector import data from all the environments.
Collection period in days	Duration in days for collecting API usage data.
Collect usage data	Option to enable usage data collection to retrieve API usage data over a specified duration.
Performance configuration	
Page size	Number of records per page. Default is `100`, minimum is `2`.
Partition size	Partition size for Apigee X managed APIs if parallel loading is enabled. Accepts a numeric value greater than zero. If left empty, the value is automatically calculated.

c. Select **Continue**.

9. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

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c. In the Configure import schedule dialog box, in the **Name** field, enter the **Organization** import schedule.

d. Select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.

f. For the **Configure import schedule** activity, select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

API Service Graph Connector for Apigee X

Target tables for storing API Service Graph Connector for Apigee X data

Configure API Service Graph Connector for Apigee X using the guided setup

Set up scheduled import jobs to pull in Apigee X data into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.

Role required: admin

Procedure

1. Verify that the application scope is set to the API Service Graph Connector for Apigee X application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Apigee X** > **Setup**.
3. On the API Service Graph Connector for Apigee X page, select **Continue**.
4. Configure the authentication credentials to send requests to the Apigee X application.

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a. In the Configure the Connection and Credentials section of the API Service Graph Connector for Apigee X page, select **Start**.

b. Grant the attachment update permission so that the API Frontend Backend data source can retrieve files from Apigee X and attach them to records.

   i. Select the Update Attachment Access task.

   ii. Select the **Global** application scope from the application picker.

   iii. On the Application Access related list of the Attachment subpage, select the#**Can update** check box, and then select#**Update**.

   iv. Select the **API Service Graph Connector for Apigee X** application scope from the application picker.

   v. Set the Update Attachment Access task to complete by selecting the **Mark as complete** check box and then select **Continue**.

c. Set up the Apigee X environment and create a Java KeyStore (JKS) certificate to encrypt the security certificates obtained from an Apigee X application.

   i. Select the Apigee X Setup Instructions task.

   ii. Review and complete the setup instructions on the API Service Graph connector for Apigee X - Setup Instructions [KBB0010364] article in the Now Support Knowledge Base.

   Make a note of the destination keystore password. You need to specify this password while importing the JKS certificate into the API Service Graph Connector for Apigee X application.

   iii. Set the Apigee X Setup Instructions task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Create an X.509 certificate to associate the Java KeyStore (JKS) certificate for the Apigee X application with the connector.

   i. Select the Create X.509 certificate task.

   ii. Select **New**.

   iii. On the form, fill in the fields.

X.509 Certificate form

Field	Description
Name	Name of the X.509 certificate. For example, `SGA-ApigeeX-509Certificate`.
Notify on expiration	Users to be notified when the certificate expires. If no users are selected, the logged-in user is added by default, along with the last two logged-in users with the administrator role.
Warn in days to expire	Number of days to send a notification before the certificate expires.
Active	Option to activate the certificate.
Type	Certificate container that is automatically set to **Java Key Store**. Leave the field value set to **Java Key Store**.

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Field	Description
Expires in days	Number of days until the certificate expires.
Key store password	Password to access the JKS certificate as noted down in the previous step.
Short description	Description of the X.509 certificate.

iv. Select the manage attachments icon ( ).

v. Select **Choose file** to browse and upload the keystore.p12 file for the JKS certificate you created in step 4.c.

vi. Close the dialog box.

vii. Select the **Validate Stores/Certificates** related link.

viii. On successful validation, select **Update** to return to the guided setup page.

ix. Set the Create X.509 certificate task to complete by selecting the **Mark as complete** check box and then select **Continue**.

e. Configure the connection.

i. Verify that the application scope is set to the API Service Graph Connector for Apigee X application by using the application picker.

ii. Select the Configure the Connection task.

iii. Select **Click Here** to open the Connections page in a separate browser tab.

iv. Search for and select **Edit** for SGA Apigee X Connection.

v. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the Apigee X connection record. `SGA Apigee X Connection` is the default credential alias name. You can add multiple Apigee X instances. However, try not to modify the default connection name.

vi. In the Credential Information section of the Edit Connection window, fill in the fields.

Credential Information

Field	Description
Service account email	Email address associated with the ServiceNow service account used for authentication with Apigee X as noted in the Before you begin section.
X.509 certificate	X.509 certificate created in step 4.d.

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Field	Description
Keystore Password	Password associated with the keystore as noted in the Before you begin section.

vii. Select **Edit and Get OAuth Token**.

viii. Select **Update**.

ix. When the OAuth token flow is successfully completed, return to the guided setup page and set the Configure the Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

f. Configure properties of the connector to access resources.

i. Select the Add configuration properties task.

ii. In the Service Graph Connection Properties related list, enter the values for the properties.

Service Graph Connection Properties

Property	Description
CollectionPeriod(days)	Duration in days for collecting API usage data.
CollectUsageData	Enable usage data collection to retrieve API usage data over a specified duration.
Discovery Scope	Discovery scope of the Apigee X application. The available options are: **Organization** Select **Organization** when the ServiceNow service account has access to data within the Apigee X organization. **Projects** Select **Projects** when the ServiceNow service account has access to data within Apigee X projects only.
Exclude Environments	Apigee X environments that should be excluded from the connection. For multiple environments, separate them with commas. All gateways except those listed in the *Exclude Environments* property are fetched.
Organization Id	Organization within the Apigee X system to which the project belongs.
Page Size	Number of records per page. Default is 100, minimum is 2.
PartitionSize	Partition size for Apigee X managed APIs if parallel loading is enabled. Accepts a numeric value greater than zero. If left empty, the value is automatically calculated.
Project Id	Project identifier within the Apigee X environment that the connection will be linked to.

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Property	Description
	For multiple project IDs, separate them with commas.

Tip:
To enter a property value, double-click (or use the keyboard shortcut) to enter a value in the **Value** cell for the property.

iii. Set the Add configuration properties task to complete by selecting the **Mark as complete** check box and then select **Continue**.

g. Test the connection.

i. Select the Test Connection task.

ii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iii. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

5. **Optional:** Integrate with multiple Apigee X instances.

a. In the Add Multiple Instances section of the API Service Graph Connector for Apigee X page, select **Start**.

b. Enable creating data sources for the new Apigee X connection.

i. Verify that you have edit permissions for the Datasource [sys_data_source] table.

ii. Select the Update Data Source Access task.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Data Source form that opens in another tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. From the application picker, select the **API Service Graph Connector for Apigee X** application scope.

vii. Set the Update Data Source Access task to complete by selecting the **Mark as complete** check box and then select **Continue**.

c. Enable creating a scheduled import job for the new Apigee X connection.

i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.

ii. Select the Update Scheduled Data Import Access task.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Scheduled Data Import form, select the **Can create**, **Can update**, and **Can delete** check boxes.

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v. Select **Update**.

vi. From the application picker, select the **API Service Graph Connector for Apigee X** application scope.

vii. Set the Update Scheduled Data Import Access task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Clear the cache on the Data Source [sys_data_source] and Scheduled Data Imports [scheduled_import_set] tables.

i. Select the Clear Cache for Data Source and Scheduled Data Imports tables task.

ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
GlideCacheManager.flushTable("sys_data_source");
GlideTableManager.invalidateTable("scheduled_import_set");
GlideCacheManager.flushTable("scheduled_import_set");
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
GlideTableManager.invalidateTable("sys_attachment");
GlideCacheManager.flushTable("sys_attachment");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. From the application picker, select the **API Service Graph Connector for Apigee X** application scope.

vi. Set the Clear Cache for Data Source and Scheduled Data Imports tables task to complete by selecting **Mark as complete**.

e. To create an X.509 certificate for the new Apigee X instance, repeat step 4.d, and then mark the Create X.509 certificate task to complete by selecting **Mark as complete**.

f. Add another connection for the new Apigee X instance.

i. Verify that the application scope is set to the **API Service Graph Connector for Apigee X** application by using the application picker.

ii. Select the Add Another Connection task and then select **Click Here**.

iii. On the Connections page that opens in another browser tab, select **Add Connection**.

iv. In the Create Connection window, fill in the connection, service account, and keystore details including keystore password.

(Optional) You created the keystore in step 5.e.

v. Select **Create and Get OAuth Token**.

vi. Close the Connections page and return to the guided setup page tab.

vii. Set the Add Another Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

g. Add properties for the new connection.

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i. Verify that the application scope is set to the **API Service Graph Connector for Apigee X** application by using the application picker.

ii. Select the Add configuration properties task.

iii. From the **Name** column, select the connection name you created in step 5.f.

iv. In the Service Graph Connection Properties related list, enter the values for the properties.

(Optional) For more information on properties, see 4.f.ii.

> **Tip:**
> To enter a property value, double-click (or use the keyboard shortcut) to enter a value in the **Value** cell for the property.

v. Set the Add configuration properties task to complete by selecting the **Mark as complete** check box and then select **Continue**.

h. Test the new connection.

i. Select the Test New Connections task.

ii. From the **Name** column, select the connection name you created in step 5.f.

iii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iv. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test New Connections task to complete by selecting the **Mark as complete** check box and then select **Continue**.

6. Configure the scheduled job for the import of Apigee X data.

a. In the Set up Scheduled Import Jobs section of the API Service Graph Connector for Apigee X page, select **Start**.

b. Select the **Organization** scheduled job.
For a multiple instance setup, select the scheduled import created with the connection in step 5.f.

c. On the Scheduled Data Import form, verify the field values.

For more information, see Schedule a data import.

d. Select the **Active** check box to activate the scheduled job.

e. In the **Run** field, select **Periodically** to specify how often the job will run.

f. Select **Update**.

g. Set the Set up Scheduled Import Jobs task to complete by selecting the **Mark as complete** check box and then select **Continue**.

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7. On the API Service Graph Connector for Apigee X page, select **Complete** to save your changes.
8. In the Complete setup dialog box, select **Complete** to complete the setup.
9. In the message box that appears, select **Done**.

Target tables for storing API Service Graph Connector for Apigee X data

When you complete setting up the connection, you can configure the integration to periodically pull data from an Apigee X application. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB classes.

Cloud Organizations [cmdb_ci_cloud_org]

The following attributes in the Cloud Organizations [cmdb_ci_cloud_org] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Time	time

Relationship created for Cloud Organizations

Parent class	Relationship type	Child class
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	Google Organization Folder [cmdb_ci_gcp_folder]

Google Organization Folder [cmdb_ci_gcp_folder]

The following attributes in the Google Organization Folder [cmdb_ci_gcp_folder] table are populated by collected data:

Attribute label	Attribute name
Parent	parent_ci
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Parent Id	parent_id
Parent Type	parent_type
Time	time

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Relationships created for Google Organization Folder

Parent class	Relationship type	Child class
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	Google Organization Folder [cmdb_ci_gcp_folder]
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	Cloud Organizations [cmdb_ci_cloud_org]

Google Organization Project [cmdb_ci_gcp_project]

The following attributes in the Google Organization Project [cmdb_ci_gcp_project] table are populated by collected data:

Attribute label	Attribute name
Parent	parent_ci
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status
Parent Id	parent_id
Parent Type	parent_type
Project Id	project_id
Time	time

Relationships created for Google Organization Project

Parent class	Relationship type	Child class
Google Organization Project [cmdb_ci_gcp_project]	Reference	Cloud Organizations [cmdb_ci_cloud_org]
Google Organization Project [cmdb_ci_gcp_project]	Reference	Google Organization Folder [cmdb_ci_gcp_folder]

Apigee API Gateway [cmdb_ci_apigee_api_gateway]

The following attributes in the Apigee API Gateway [cmdb_ci_apigee_api_gateway] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Install Status	install_status
Operational status	operational_status

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Relationships created for Apigee API Gateway

Parent class	Relationship type	Child class
APIgee API Gateway [cmdb_ci_apigee_api_gateway]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
APIgee API Gateway [cmdb_ci_apigee_api_gateway]	Reference	API Consumer [api_consumer]
Apigee API Gateway [cmdb_ci_apigee_api_gateway]	Provides::Provided by	API Consumer Subscription [cmdb_ci_api_consumer_subscription]
Apigee API Gateway [cmdb_ci_apigee_api_gateway]	Provides::Provided by	API Product Bundle [cmdb_ci_api_product_bundle]

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
Life Cycle Stage	life_cycle_stage
ID	id
Name	name
Version	version
Base URL	base_url
Install Status	install_status
Operational status	operational_status
Model ID	model_id
Correlation ID	correlation_id
Life Cycle Stage Status	life_cycle_stage_status

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]
Managed API [cmdb_ci_managed_api]	Reference	API Deployment [api_deployment]

API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

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Attribute label	Attribute name
API Version	api_version
Host	host
Method	method
Path	path
URL	url
Description	short_description
Name	name
Operational status	operational_status
Protocol	protocol

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
URL	url
Name	name
Operational status	operational_status
Type	type

API Product Bundle [cmdb_ci_api_product_bundle]

The following attributes in the API Product Bundle [cmdb_ci_api_product_bundle] table are populated by collected data:

Attribute label	Attribute name
ID	id
Creation Date	creation_date
Description	short_description
Discovered Access Type	discovered_access_type
Discovered Approval Type	discovered_approval_type
Last Modified Date	last_modified_date

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Attribute label	Attribute name
Name	name

Relationships created for API Product Bundle

Parent class	Relationship type	Child class
API Product Bundle [cmdb_ci_api_product_bundle]	Used by::Uses	API Consumer Subscription [cmdb_ci_api_consumer_subscription]
API Product Bundle [cmdb_ci_api_product_bundle]	Reference	Key Value [cmdb_key_value]

API Consumer Subscription [cmdb_ci_api_consumer_subscription]

The following attributes in the API Consumer Subscription [cmdb_ci_api_consumer_subscription] table are populated by collected data:

Attribute label	Attribute name
ID	id
Creation Date	creation_date
API Consumer	api_consumer
Discovered State	discovered_state
Last Modified Date	last_modified_date
Name	name

Relationship created for API Consumer Subscription

Parent class	Relationship type	Child class
API Consumer Subscription [cmdb_ci_api_consumer_subscription]	Reference	Key Value [cmdb_key_value]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

API Deployment [api_deployment]

The following attributes in the API Deployment [api_deployment] table are populated by collected data:

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Attribute label	Attribute name
API	api
Name	name

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
API Gateway	api_gateway
Custom ID	custom_id
Email	email
Registration Date	registration_date
Username	username

API Consumer Access [api_consumer_access]

The following attributes in the API Consumer Access [api_consumer_access] table are populated by collected data:

Attribute label	Attribute name
API Product Bundle	api_product_bundle
API Consumer Subscription	api_consumer_subscription
API	api
API Consumer	api_consumer

Accessing the connection details of API Service Graph Connector for Apigee X

You can access the connection details of the API Service Graph Connector for Apigee X in a single view using the common connection framework included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the API Service Graph Connector for Apigee X. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an Apigee X connection

Access the details of an Apigee X connection configured for the API Service Graph Connector for Apigee X.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Apigee X** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

API Service Graph Connector for AWS API Gateway

Use the ServiceNow® API Service Graph Connector for AWS API Gateway to import API details from an AWS API Gateway service into the Configuration Management Database (CMDB).

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Key features

Import data into a normalized data model for consistency across other technologies.

Supported ServiceNow versions

- Washington DC
- Xanadu
- Yokohama

Use cases

You can use the API Service Graph Connector for AWS API Gateway to:

- Maintain an end-to-end inventory of defined APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints, and create compliance requirements to measure against.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for AWS API Gateway using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

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Data mapping

Data from the AWS API Gateway data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from an AWS API Gateway service.

The following table lists the data sources in the order they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for an AWS API Gateway service.

Data mapping for AWS API Gateway

Data source	Staging table	Target tables
Managed API Rest	SGA-AWS Managed API Rest [sn_aws_api_gw_int_api_gateway_managed_api_import_set]	AWS API Gateway Managed API Key Value
Managed API V2	SGA-AWS Managed API V2 [sn_aws_api_gw_int_sga_aws_managed_api_v2]	Managed API AWS API Gateway Key Value
Frontend Backend REST	SGA-AWS Frontend-Backend REST [sn_aws_api_gw_int_sga_aws_frontend_backend_rest]	API Backend API Frontend
Backend V2	SGA-AWS Backend V2 [sn_aws_api_gw_int_sga_aws_backend_v2]	API Backend
Frontend V2	SGA-AWS Frontend V2 [sn_aws_api_gw_int_sga_aws_frontend_v2]	API Frontend
Deployment Rest	SGA-AWS API Gateway Deployment Rest [sn_aws_api_gw_int_sga_aws_api_gateway_deployment_rest]	API Deployment
Deployment V2	SGA-AWS API Gateway Deployment V2 [sn_aws_api_gw_int_sga_aws_api_gateway_deployment_v2]	API Deployment
Consumer	SGA-AWS Consumers [sn_aws_api_gw_int_sga_aws_consumers]	API Consumer
Policies	SGA-AWS API Gateway Policies [sn_aws_api_gw_int_sga_aws_api_gateway_policies]	API Policy
API Consumer Access	SGA-AWS-API-Consumer-Access [sn_aws_api_gw_int_sga_aws_api_consumer_access]	API Consumer Access

For more information on where data is saved when pulling data from an AWS API Gateway service, see Target tables for storing API Service Graph Connector for AWS API Gateway data.

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You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Configure API Service Graph Connector for AWS API Gateway using SGC Central

Set up scheduled import jobs to pull in AWS API Gateway data into your CMDB.

Before you begin

Install API Service Graph Connector for AWS API Gateway version 1.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

The authentication mechanism used by the connector is AWS Signature Type (HMAC Authentication Technique) with AWS Security Token Service (STS) token. For information about permissions, see the API Service Graph Connector for AWS API Gateway - Setup Instructions [KB1962734] article in the Now Support Knowledge Base.

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Enter connection details and test the API connection for importing AWS API Gateway data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Create and test connection form

Field	Description
AWS API Gateway Connection Name	Name to identify the AWS API Gateway connection record. For example, `SG-AWS-API-Gateway connection`.

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Field	Description
Access Key	Access key ID of the IAM user that has permissions to interact with the AWS resources.
Secret Key	Secret access key that corresponds to the Access key ID required for authenticating the connection securely.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

6. **Optional:** Copy configuration properties from an existing AWS connection.

> **Note:**
> The Copy configuration properties activity is displayed only when an AWS connection is already set up on your instance.

a. In the **Setup** stage of the playbook, select the **Copy configuration properties** activity.

b. In the **AWS Connection** field, select the connection.
The values of the following properties are copied from the selected AWS connection:

- Standalone account ID
- Management account ID
- Gov cloud
- STS assume role
- AWS regions
- Config aggregator name
- Config aggregator account
- Config aggregator region

c. Select **Continue**.

d. Once the connection test is complete, select **Continue**.

7. Set the configuration properties for the connection.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. Fill in the property details.

> **Note:**
> If you select to copy the configuration properties from an existing AWS connection, the properties listed in the step 6.b are copied from the existing connection automatically.

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AWS API Gateway configuration properties

Property	Description
Management account ID or standalone account ID	
Management account ID	Management account ID associated with the AWS API Gateway account.
Standalone account ID	ID of a member account associated with the AWS API Gateway account.
STS assume role name and AWS regions	
STS assume role name	STS Assume Role name of the AWS account that is used for querying the `STS Assume Role` API to obtain the API credentials.
AWS regions	List of comma-separated regions where the AWS API Gateway resides.
Config aggregator setup	
Config aggregator account ID	AWS account ID where the aggregator resource type in the AWS Config service has been configured.
Config aggregator name	Name of the aggregator resource type in the AWS Config service.
Config aggregator region	Region where the aggregator resource type resides.
API usage data	
CollectUsageData	Option to enable usage data collection to retrieve API usage data over a specified duration.
Collection period in days	Duration in days for collecting API usage data.
Gov cloud setup	
Is gov cloud	Option to indicate that the connection setup is for the AWS GovCloud.

c. Select **Continue**.

8. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the **Managed API Rest** import schedule associated with your connection.

> **Note:**
> The connection name is prefixed to the schedule name.

c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.

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Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

API Service Graph Connector for AWS API Gateway

Target tables for storing API Service Graph Connector for AWS API Gateway data

Configure API Service Graph Connector for AWS API Gateway using the guided setup

Set up scheduled import jobs to pull in AWS API Gateway data into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

The authentication mechanism used by the connector is AWS Signature Type (HMAC Authentication Technique) with AWS Security Token Service (STS) token. For information about permissions, see the API Service Graph Connector for AWS API Gateway - Setup Instructions [KB1962734] article in the Now Support Knowledge Base.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.

Role required: admin

Procedure

1. Verify that the application scope is set to the API Service Graph Connector for AWS API Gateway application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **AWS API Gateway** > **Setup**.
3. On the Guided Setup page, select **Continue**.
4. Configure the authentication credentials to send requests to the AWS API Gateway.

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a. In the Configure the Connection and Credentials section of the API Service Graph Connector for AWS API Gateway page, select **Start**.

b. Configure the connection.

   i. Select the Configure AWS authentication credentials task.

   ii. In the **Name** field, enter a name for the authentication.

   `SGAwsApiCredentials` is the default credential alias name. You can add multiple AWS API Gateway instances. However, try not to modify the default connection alias.

   iii. Enter the access key ID and the secret access key in the **Access Key ID** and **Secret Access Key** fields respectively.

   The AWS access keys are long-term credentials for the IAM user and include two parts: an access key ID and a secret access key. You must use both the access key ID and the secret access key together to authenticate requests.

   iv. Select **Update**.

   v. Set the Configure AWS authentication credentials task to complete by selecting the **Mark as complete** check box and then select **Continue**.

c. Update the required configuration properties for an AWS API Gateway instance and test the connection.

   i. Select the Configure and Test AWS Account Details task.

   ii. In the Service Graph Connections section, review and modify the property details by selecting a property from the **Property** column in the Service Graph Connection Properties related list.

   You can configure the following properties:

   AccountId

   A numeric identifier of the AWS account ID.

   CollectionPeriod(days)

   Duration in days for collecting API usage data.

   CollectUsageData

   Enable usage data collection to retrieve API usage data over a specified duration.

   IsGovCloud

   Enable to indicate that the connection setup is for the AWS GovCloud.

   ConfigAggregatorAccountId

   AWS account ID where the aggregator resource type in the AWS Config service has been configured.

   Region(s)

   A list of comma-separated regions where the AWS API Gateway resides.

   PartitionSize

   Partition size for AWS managed APIs if the parallel loading is enabled.

   Accepts a numeric value greater than zero. If left empty, the value is automatically calculated.

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StandaloneAccountId

The ID of a member account associated with the AWS API Gateway account.

ConfigAggregatorName

The name of the aggregator resource type in the AWS Config service.

ManagementAccountId

The management account ID associated with the AWS API Gateway account.

ConfigAggregatorRegion

The region where the aggregator resource type resides.

StsRoleName

The STS Assume Role name of the AWS account that is used for querying the *`STS Assume Role`* API to obtain the API credentials.

iii. Select **Update** in the Service Graph Connection Properties section.

iv. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

v. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

vi. Set the Configure and Test AWS Account Details task to complete by selecting the **Mark as complete** check box and then select **Continue**.

5. **Optional:** Integrate with multiple AWS API Gateway instances.

a. In the Add Multiple Instances section of the API Service Graph Connector for AWS API Gateway page, select **Start**.

b. Enable creating data sources for the new AWS API Gateway connection.

i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.

ii. Select the Update Data Source Access task.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. From the application picker, select the API Service Graph Connector for AWS API Gateway application scope.

vii. Set the Update Data Source Access task to complete by selecting the **Mark as complete** check box and then select **Continue**.

c. Enable creating a scheduled import job for the new AWS API Gateway connection.

i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.

ii. Select the Update Data Scheduled Import Access task.

iii. To edit the record, select the **Global** application scope from the application picker.

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iv. In the Application Access related list of the Scheduled Data Import form, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. From the application picker, select the API Service Graph Connector for AWS API Gateway application scope.

vii. Set the Update Data Scheduled Import Access task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Clear the cache on the Data Source [sys_data_source] and Scheduled Data Imports [scheduled_import_set] tables.

i. Select the Clear Cache for Data Source and Scheduled Data Imports tables task.

ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
GlideCacheManager.flushTable("sys_data_source");
GlideTableManager.invalidateTable("scheduled_import_set");
GlideCacheManager.flushTable("scheduled_import_set");
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. From the application picker, select the API Service Graph Connector for AWS API Gateway application scope.

vi. Set the Clear Cache for Data Source and Scheduled Data Imports tables task to complete by selecting **Mark as Complete**.

e. Add another connection for the new AWS API Gateway instance.

i. Verify that the application scope is set to the API Service Graph Connector for AWS API Gateway application by using the application picker.

ii. Select the Add Another Connections task and then select **Click Here**.

iii. On the Connections page that opens in another browser tab, select **Add Connection**.

iv. In the Create Connection window, fill in the connection name, access key, and secret key details.

v. Select **Create Connection**.

vi. Close the Flow Designer and return to the guided setup tab.

vii. Set the Add Another Connections task to complete by selecting the **Mark as complete** check box and then select **Continue**.

f. Update the required configuration properties for the new AWS API Gateway connection and test the connection.

i. Select the Test New Connections task.

ii. Select the connection record you created in step 5.e.

iii. Test the connection by selecting the **Test Connection** related link.

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Testing the connection might take a few moments. The page is refreshed to show the test results.

iv. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test New Connections task to complete by selecting the **Mark as complete** check box and then select **Continue**.

6. Configure the scheduled job for the import of AWS API Gateway data.

a. In the Set up Scheduled Import Jobs section of the API Service Graph Connector for AWS API Gateway page, select **Start**.

b. Select the **Managed API Rest** scheduled job.
For multiple instances, select the scheduled job for the Managed API Rest data source.

c. On the Scheduled Data Import form, verify the field values for the scheduled job.

For more information, see Schedule a data import.

d. Select **Active** check box to activate the scheduled job for the Managed API Rest data source.

e. Select **Update**.

f. Set the Set up Scheduled Import Jobs task to complete by selecting the **Mark as complete** check box and then select **Continue**.

7. On the API Service Graph Connector for AWS API Gateway page, select **Complete** to save your changes.
8. In Complete setup dialog box, select **Complete** to complete the setup.
9. In the message box that appears, select **Done**.

Target tables for storing API Service Graph Connector for AWS API Gateway data

When you complete setting up the connection, you can configure the integration to periodically pull data from an AWS API Gateway service. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB classes.

AWS API Gateway [cmdb_ci_aws_api_gateway]

The following attributes in the AWS API Gateway [cmdb_ci_aws_api_gateway] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Operational status	operational_status

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Relationships created for AWS API Gateway

Parent class	Relationship type	Child class
AWS API Gateway [cmdb_ci_aws_api_gateway]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
AWS API Gateway [cmdb_ci_aws_api_gateway]	Reference	API Policy [api_policy]
AWS API Gateway [cmdb_ci_aws_api_gateway]	Reference	API Consumer [api_consumer]

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
Life Cycle Stage Status	life_cycle_stage_status
ID	id
Name	name
Version	version
Base URL	base_url
Operational status	operational_status
Life Cycle Stage	life_cycle_stage
Model ID	model_id
Type	type

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]
Managed API [cmdb_ci_managed_api]	Reference	API Deployment [api_deployment]

API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
Host	host

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Attribute label	Attribute name
Method	method
Path	path
URL	url
Authorization	authorization
Name	name
Operational status	operational_status
Protocol	protocol

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
ID	id
URL	url
Name	name
Operational status	operational_status
Type	type

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
Username	username
API Gateway	api_gateway

API Consumer Access [api_consumer_access]

The following attributes in the API Consumer Access [api_consumer_access] table are populated by collected data:

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Attribute label	Attribute name
API	api
API Consumer	api_consumer

API Deployment [api_deployment]

The following attributes in the API Deployment [api_deployment] table are populated by collected data:

Attribute label	Attribute name
Name	name
API	api

API Policy [api_policy]

The following attributes in the API Policy [api_policy] table are populated by collected data:

Attribute label	Attribute name
Name	name
Consumer	consumer
ID	id
Managed API	managed_api

Relationship created for API Policy

Parent class	Relationship type	Child class
API Policy [api_policy]	Reference	Managed API [cmdb_ci_managed_api]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Accessing the connection details of API Service Graph Connector for AWS API Gateway

You can access the connection details of the API Service Graph Connector for AWS API Gateway in a single view using the common connection framework included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the API Service Graph Connector for AWS API Gateway. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test

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the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an AWS API Gateway connection

Access the details of an AWS API Gateway connection configured for the API Service Graph Connector for AWS API Gateway.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AWS API Gateway** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

API Service Graph Connector for Azure API Management

Use the ServiceNow® API Service Graph Connector for Azure API Management to import API details from an Azure API Management application into the Configuration Management Database (CMDB).

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Key features

Import data into a normalized data model for consistency across other technologies.

Supported ServiceNow versions

- Washington DC
- Xanadu
- Yokohama

Use cases

You can use the API Service Graph Connector for Azure API Management to:

- Maintain an end-to-end inventory of exposed and backend APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints, and create compliance requirements to measure against.

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Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for Azure API Management using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

Data mapping

Data from the Azure API Management data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from an Azure API Management application.

The following table lists the data sources in the order they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for an Azure API Management application.

Data mapping for Azure API Management

Data source	Staging table	Target tables
API Management Services	SGA Azure API Management [sn_azure_api_gw_sga_azure_api_management]	Azure API Management Azure Subscription Cloud Service Account Resource Group DNS Alias
Managed API	SGA Azure Managed API [sn_azure_api_gw_sga_azure_managed_api]	Managed API
API Frontend Backend	SGA Azure API Frontend Backend [sn_azure_api_gw_sga_azure_api_frontend_backend_import]	API Frontend API Backend
API GraphQL Frontend Backend	SGA Azure API GraphQL Frontend Backend [sn_azure_api_gw_sga_azure_api_graphql_frontend_backend]	API Frontend API Backend
API Consumer	SGA Azure API Consumer [sn_azure_api_gw_sga_azure_api_consumer]	API Consumer

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Data mapping for Azure API Management (continued)

Data source	Staging table	Target tables
API Product	SGA Azure API Product [sn_azure_api_gw_sga_azure_api_product]	API Product Bundle
API Consumer Subscription	SGA Azure API Consumer Subscription [sn_azure_api_gw_sga_azure_api_subscription]	API Consumer Subscription
API Tag	API Tag [sn_azure_api_gw_api_tag]	Key Value
API Consumer Access	SGA Azure API Consumer Access [sn_azure_api_gw_sga_azure_managed_api]	API Consumer Access

For more information on where data is saved when pulling data from an Azure API Management application, see Target tables for storing API Service Graph Connector for Azure API Management data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Configure API Service Graph Connector for Azure API Management using SGC Central

Set up scheduled import jobs to pull in Azure API Management data into your CMDB.

Before you begin

Install API Service Graph Connector for Azure API Management version 1.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Obtain the OAuth credentials from your Azure administrator. Make a note of the following details:

- Application (client) ID
- Client Secret
- Directory (tenant) ID
- Connection URL

Role required: cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

> **Tip:**
> Alternatively, you can select **Create connection** on the All connections page.

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4. On the Create connection window, select the Azure API Management connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing Azure API Management data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Create and test connection form

Field	Description
Azure API Management Connection Name	Name to identify the Azure API Management connection record. For example, `Azure API Management Connection`.
Connection URL	Base URL to connect to the Azure API Management service. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
OAuth Client ID	Application (client) ID of your Azure client application as noted in the Before you begin section.
OAuth Client Secret	Client Secret of your Azure client application as noted in the Before you begin section.

OAuth Token URL	Token URL of your Azure client application.
	
	Based on the region of your Azure client application, enter the token URL in one of the following formats:
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`

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Field	Description

	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Azure client application as noted in the Before you begin section.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

7. Optional: Set the configuration properties for the connection.

> **Note:**
> To skip this step, select **Continue** for the **Set configuration properties** activity.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. Fill in the property details.

Azure API Management configuration properties

Property	Description
Azure API Management connection	
Discovery Scope	Discovery scope of the Azure client application. The available options are: **Management Group** Select **Management Group** when the ServiceNow service account has access to data within the Azure management group. **Subscription** Select **Subscription** when the ServiceNow service account has access to data within the Azure subscription only.
Subscription	
Subscription Id(s)	Subscription IDs of Azure API Management services. For multiple subscription IDs, separate them with commas. If the discovery scope is set to **Subscription** and this field is left blank, all subscriptions for the specified tenant in the credentials are discovered.

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Property	Description
Azure API Management connection	
Management Group	
Management Group Id(s)	Management group IDs of Azure API Management services. For multiple management groups, separate them with commas.
Get Nested Group Subscriptions	Option to enable retrieving data from all nested child subscriptions when **Management Group** is set as the discovery scope. Disable the property to exclude nested child subscriptions.
Optional Exclusive Configuration	
ExcludeServices	Azure API Management services that should be excluded from the connection. For multiple services, separate them with commas. All gateways except those listed in the *`ExcludeServices`* property are fetched.
ResourceGroups	Resource group name of Azure API Management services. For multiple resource groups, separate their names with commas. If you leave this field empty, the data sources within the connector import data from all the available resource groups.
Usage Data Configuration	
CollectUsageData	option to enable usage data collection to retrieve API usage data over a specified duration.

c. Select **Continue**.

8. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the **API Management Services** import schedule associated with your connection.

> **Note:**
> The connection name is prefixed to the schedule name.

c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.

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Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics

API Service Graph Connector for Azure API Management

Target tables for storing API Service Graph Connector for Azure API Management data

Configure API Service Graph Connector for Azure API Management using the guided setup

Set up scheduled import jobs to pull in Azure API Management data into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.

Obtain the OAuth credentials from your Azure administrator. Make a note of the following details:

- Application (client) ID
- Client Secret
- Directory (tenant) ID
- Connection URL

Role required: admin

Procedure

1. Verify that the application scope is set to the API Service Graph Connector for Azure API Management application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Azure API Management** > **Setup**.
3. On the API Service Graph Connector for Azure API Management page, verify that the **Quick Start** option is selected and then select **Continue**.

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4. Configure the authentication credentials to send requests to the Azure API Management application.

   a. In the Configure the Connection and Credentials section of the API Service Graph Connector for Azure API Management page, select **Start**.

   b. Configure the connection.

      i. Select the Configure Azure authentication credentials task.

      ii. Select **Click Here** to open the Connections page in a separate browser tab.

      iii. Search for and select **Edit** for Azure API Management Connection.

      iv. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Azure API Management Connection Name	Name to identify the Azure API Management connection record. `Azure API Management Connection` is the default credential alias name. You can add multiple Azure API Management instances. However, try not to modify the default connection name.

Connection URL	Base URL to connect to the Azure API Management service.
	
	Based on the region of your Azure client application, enter the URL in one of the following formats:
	▪ Global
	`https://management.azure.com`
	▪ US Government
	`htttps://management.usgovcloudapi.net`
	▪ China
	`https://management.chinacloudapi.cn`
	▪ Germany
	`https://management.microsoftazure.de/`

      v. In the Credential Information section of the Edit Connection window, fill in the fields.

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Credential Information

Field	Description
OAuth Client ID	Application (client) ID of your Azure client application as noted in the Before you begin section.
OAuth Client Secret	Client Secret of your Azure client application as noted in the Before you begin section.

OAuth Token URL	Token URL of your Azure client application.
	
	Based on the region of your Azure client application, enter the token URL in one of the following formats:
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	
	Where *<tenantid>* is the tenant ID of your Azure client application as noted in the Before you begin section.

vi. Select **Edit and Get OAuth Token**.

vii. Select **Update**.

viii. When the OAuth token flow is successfully completed, return to the guided setup page and set the Configure Azure authentication credentials task to complete by selecting the **Mark as complete** check box and then select **Continue**.

c. Configure a connection to manage Azure resources via Azure API Management.

i. Select the Configure Properties task.

ii. In the Service Graph Connection Properties related list, enter the values for the properties.

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Service Graph Connection Properties

Property	Description
CollectionPeriod(days)	Duration in days for collecting API usage data.
CollectUsageData	Enable usage data collection to retrieve API usage data over a specified duration.
Discovery Scope	Discovery scope of the Azure client application. The available options are: **Management Group** Select **Management Group** when the ServiceNow service account has access to data within the Azure management group. **Subscription** Select **Subscription** when the ServiceNow service account has access to data within the Azure subscription only.
ExcludeServices	Azure API Management services that should be excluded from the connection. For multiple services, separate them with commas. All gateways except those listed in the *`ExcludeServices`* property are fetched.
GetNestedGroupSubscriptions	Enable retrieving data from all nested child subscriptions when **Management Group** is set as the discovery scope. Set the property to `false` to exclude nested child subscriptions.
ManagementGroupId	Management group IDs of Azure API Management services. For multiple management groups, separate them with commas.
PartitionSize	Partition size for Azure managed APIs if parallel loading is enabled. Accepts a numeric value greater than zero. If left empty, the value is automatically calculated.
ResourceGroups	Resource group name of Azure API Management services. For multiple resource groups, separate their names with commas. If you leave this field empty, the data sources within the connector import data from all the available resource groups.
SubscriptionId	Subscription IDs of Azure API Management services.

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Property	Description
	For multiple subscription IDs, separate them with commas. If the discovery scope is set to **Subscription** and this field is left blank, all subscriptions for the specified tenant in the credentials are discovered.

Tip:
To enter a property value, double-click (or use the keyboard shortcut) to enter a value in the **Value** cell for the property.

iii. Set the Configure Properties task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Test the connection.

i. Select the Test Connection task.

ii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iii. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

5. **Optional:** Integrate with multiple Azure API Management instances.

a. In the Add Multiple Instances section of the API Service Graph Connector for Azure API Management page, select **Start**.

b. Enable creating data sources for the new Azure API Management connection.

i. Verify that you have edit permissions for the Datasource [sys_data_source] table.

ii. Select the Update Data Source Access task.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Data Source form that opens in another tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. From the application picker, select the **API Service Graph Connector for Azure API Management** application scope.

vii. Set the Update Data Source Access task to complete by selecting the **Mark as complete** check box and then select **Continue**.

c. Enable creating a scheduled import job for the new Azure API Management connection.

i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.

ii. Select the Update Scheduled Data Import Access task.

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iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Scheduled Data Import form, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. From the application picker, select the **API Service Graph Connector for Azure API Management** application scope.

vii. Set the Update Scheduled Data Import Access task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Clear the cache on the Data Source [sys_data_source] and Scheduled Data Imports [scheduled_import_set] tables.

i. Select the Clear Cache for Data Source and Scheduled Data Imports tables task.

ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
GlideCacheManager.flushTable("sys_data_source");
GlideTableManager.invalidateTable("scheduled_import_set");
GlideCacheManager.flushTable("scheduled_import_set");
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. From the application picker, select the **API Service Graph Connector for Azure API Management** application scope.

vi. Set the Clear Cache for Data Source and Scheduled Data Imports tables task to complete by selecting **Mark as Complete**.

e. Add another connection for the new Azure API Management instance.

i. Verify that the application scope is set to the **API Service Graph Connector for Azure API Management** application by using the application picker.

ii. Select the Add Another Connection task and then select **Click Here**.

iii. On the Connections page that opens in another browser tab, select **Add Connection**.

iv. In the Create Connection window, fill in the connection, credentials, and subscription ID details.

v. Select **Create and Get OAuth Token**.

vi. Close the Connections page and return to the guided setup page tab.

vii. Set the Add Another Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

f. Add properties for the new connection.

i. Verify that the application scope is set to the **API Service Graph Connector for Azure API Management** application by using the application picker.

ii. Select the Add Properties to New Connections task.

iii. From the **Name** column, select the connection name you created in step 5.e.

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iv. In the Service Graph Connection Properties related list, enter the values for the properties.

(Optional) For more information on properties, see 4.c.ii.

> **Tip:**
> To enter a property value, double-click (or use the keyboard shortcut) to enter a value in the **Value** cell for the property.

v. Set the Add Properties to New Connections task to complete by selecting the **Mark as complete** check box and then select **Continue**.

g. Test the new connection.

i. Select the Test New Connections task.

ii. From the **Name** column, select the connection name you created in step 5.e.

iii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iv. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test New Connections task to complete by selecting the **Mark as complete** check box and then select **Continue**.

6. Configure the scheduled job for the import of Azure API Management data.

a. In the Set up Scheduled Import Jobs section of the API Service Graph Connector for Azure API Management page, select **Start**.

b. Select the **API Management Services** scheduled job.
For a multiple instance setup, select the scheduled import created with the connection in step 5.e.

c. On the Scheduled Data Import form, verify the field values.

For more information, see Schedule a data import.

d. Select the **Active** check box to activate the scheduled job.

e. In the **Run** field, select **Periodically** to specify how often the job will run.

f. Select **Update**.

g. Set the Set up Scheduled Import Jobs task to complete by selecting the **Mark as complete** check box and then select **Continue**.

7. On the API Service Graph Connector for Azure API Management page, select **Complete** to save your changes.
8. In the Complete setup dialog box, select **Complete** to complete the setup.
9. In the message box that appears, select **Done**.

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Target tables for storing API Service Graph Connector for Azure API Management data

When you complete setting up the connection, you can configure the integration to periodically pull data from an Azure API Management application. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB classes.

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type
Operational status	operational_status

Relationship created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Contains::Contained by	Resource Group [cmdb_ci_resource_group]

Azure Subscription [cmdb_ci_azure_subscription]

The following attributes in the Azure Subscription [cmdb_ci_azure_subscription] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Operational status	operational_status

Azure API Management [cmdb_ci_azure_api_mgmt]

The following attributes in the Azure API Management [cmdb_ci_azure_api_mgmt] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Fully qualified domain name	fqdn
Gateway URL	gateway_url
Operational status	operational_status

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Attribute label	Attribute name
Version	version

Relationships created for Azure API Management

Parent class	Relationship type	Child class
Azure API Management [cmdb_ci_azure_api_mgmt]	Provides::Provided by	API Product Bundle [cmdb_ci_api_product_bundle]
Azure API Management [cmdb_ci_azure_api_mgmt]	Provides::Provided by	API Consumer Subscription [cmdb_ci_api_consumer_subscription]
Azure API Management [cmdb_ci_azure_api_mgmt]	Uses::Used by	DNS Alias [cmdb_ci_dns_alias]
Azure API Management [cmdb_ci_azure_api_mgmt]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
Azure API Management [cmdb_ci_azure_api_mgmt]	Reference	API Consumer [api_consumer]

Resource Group [cmdb_ci_resource_group]

The following attributes in the Resource Group [cmdb_ci_resource_group] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Operational status	operational_status

DNS Alias [cmdb_ci_dns_alias]

The following attributes in the DNS Alias [cmdb_ci_dns_alias] table are populated by collected data:

Attribute label	Attribute name
Name	name

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
ID	id
Minor Version	minor_version
Name	name

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Attribute label	Attribute name
Version	version
Base URL	base_url
Correlation ID	correlation_id
Description	short_description
Fully qualified domain name	fqdn
Operational status	operational_status
Type	type
Life Cycle Stage Status	life_cycle_stage_status
Life Cycle Stage	life_cycle_stage
Model ID	model_id

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Consumer Subscription [cmdb_ci_api_consumer_subscription] **Note:** Applies only when the Discovered Scope [discovered_scope] attribute value is set to `api`.

API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
API Minor Version	api_minor_version
API Version	api_version
Host	host
Method	method
Path	path
URL	url
Description	short_description

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Attribute label	Attribute name
Name	name
Operational status	operational_status

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
Host	host
ID	id **Note:** Applicable to GraphQL APIs only.
Method	method **Note:** Applicable to GraphQL APIs only.
Path	path
URL	url
Name	name
Operational status	operational_status

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
Discovered State	discovered_state
Email	email
Provider	provider
Registration Date	registration_date
Username	username

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API Product Bundle [cmdb_ci_api_product_bundle]

The following attributes in the API Product Bundle [cmdb_ci_api_product_bundle] table are populated by collected data:

Attribute label	Attribute name
ID	id
Discovered Access Type	discovered_access_type
Discovered Approval Type	discovered_approval_type
Discovered State	discovered_state
Name	name
Operational status	operational_status

Relationships created for API Product Bundle

Parent class	Relationship type	Child class
API Product Bundle [cmdb_ci_api_product_bundle]	Contains::Contained by	Managed API [cmdb_ci_managed_api]
API Product Bundle [cmdb_ci_api_product_bundle]	Used by::Uses	API Consumer Subscription [cmdb_ci_api_consumer_subscription]

API Consumer Subscription [cmdb_ci_api_consumer_subscription]

The following attributes in the API Consumer Subscription [cmdb_ci_api_consumer_subscription] table are populated by collected data:

Attribute label	Attribute name
ID	id
Creation Date	creation_date
Discovered Scope	discovered_scope
Name	name
Sys ID	sys_id
API Consumer	api_consumer
Operational status	operational_status

Relationship created for API Consumer Subscription

Parent class	Relationship type	Child class
API Consumer Subscription [cmdb_ci_api_consumer_subscription]	Reference	API Consumer Access [api_consumer_access]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

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Attribute label	Attribute name
Key	key
Value	value

API Consumer Access [api_consumer_access]

The following attributes in the API Consumer Access [api_consumer_access] table are populated by collected data:

Attribute label	Attribute name
API Consumer	api_consumer
Access type	access_type
API Product Bundle	api_product_bundle
State	state
API Consumer Subscription	api_consumer_subscription
API	api
Valid to	valid_to

Accessing the connection details of API Service Graph Connector for Azure API Management

You can access the connection details of the API Service Graph Connector for Azure API Management in a single view using the common connection framework included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the API Service Graph Connector for Azure API Management. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an Azure API Management connection

Access the details of an Azure API Management connection configured for the API Service Graph Connector for Azure API Management.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Azure API Management** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

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API Service Graph Connector for Kong Gateway

Use the ServiceNow® API Service Graph Connector for Kong Gateway to import API details from a Kong Gateway application into the Configuration Management Database (CMDB).

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Key features

Import data into a normalized data model for consistency across other technologies.

Supported ServiceNow versions

- Washington DC
- Xanadu
- Yokohama

Use cases

You can use the API Service Graph Connector for Kong Gateway to:

- Maintain an end-to-end inventory of exposed and backend APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints, and create compliance requirements.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The SGC Central view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for Kong Gateway using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

Data mapping

Data from the Kong Gateway data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from a Kong Gateway application.

The following table lists the data sources in the order they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for a Kong Gateway application.

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Data mapping for Kong Gateway

Data source	Staging table	Target tables
SG-Kong Gateway	SG-Kong Gateway [sn_kong_integ_sg_kong_gateway]	Kong Gateway
SG-Kong Workspaces	SG-Kong Workspaces [sn_kong_integ_sg_kong_workspaces]	Kong Workspace
SG-Kong Load Balancers	SG-Kong Load Balancers [sn_kong_integ_sg_kong_lbs]	Kong Load Balancer
SG-Kong Targets	SG-Kong Targets [sn_kong_integ_sg_kong_targets]	Kong Target Key Value
SG-Kong Services	SG-Kong Services [sn_kong_integ_sg_kong_services]	Managed API API Backend Key Value
SG-Kong Routes	SG-Kong Routes [sn_kong_integ_sg_kong_routes]	API Frontend
SG-Kong Consumers	SG-Kong Consumers [sn_kong_integ_sg_kong_consumers]	API Consumer
SG-Kong Plugins	SG-Kong Plugins [sn_kong_integ_sg_kong_plugins]	API Policy

For more information on where data is saved when pulling data from a Kong Gateway application, see Target tables for storing API Service Graph Connector for Kong Gateway data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Configure API Service Graph Connector for Kong Gateway using SGC Central

Set up scheduled import jobs to pull in Kong Gateway data into your Configuration Management Database (CMDB).

Before you begin

Install API Service Graph Connector for Kong Gateway version 2.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

Tip:
Alternatively, you can select **Create connection** on the All connections page.

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4. On the Create connection window, select the Kong connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Select a template for the authentication type to create a connection.

   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.

   b. Select a template type.
   - **Kong RBAC Authentication**: Select when using token-based authentication.
   - **Kong Basic Authentication**: Select when using basic authentication.

7. Enter connection details and test the API connection for importing Kong Gateway data.

   a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

   b. On the form, fill in the fields.

Configure and test connection form

Field	Description
Connection Name	Name to identify the Kong Gateway connection record.
Host Name	Admin URL address of the *Kong Admin* API server.
Protocol	Protocol used for the connection ensuring secured communication between the client and the Kong server.
Override default port	Port used by the *Kong Admin* API.
API Key	Authentication secret to connect to the Kong Gateway service. This field appears only when **Kong RBAC Authentication** is selected in the **Select alias template** activity.
User Name	User name required for authenticating requests to the *Kong Gateway Admin* API. This field appears only when **Kong Basic Authentication** is selected in the **Select alias template** activity.
Password	Password associated with the user name required for authenticating requests. This field appears only when **Kong Basic Authentication** is selected in the **Select alias template** activity.

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c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

8. **Optional:** Set the configuration properties for the connection.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. In the *`Exclude workspaces`* field, enter the workspace that must be excluded from import.

(Optional) For multiple workspaces, separate them with commas. For example: `workspace1,workspace2`. If you leave this field empty, the data sources within the connector import data from all the workspaces.

c. Select the **Import tags** check box, to ingest tags from the Kong Gateway service..
When selected, specify the key-value pair separator for tags in the **Tags value separator** field. If not selected, tags won't be fetched.

d. In the **Tags value separator** field, enter the separator for key and value in tags.
For example, if the tag value separator is set to `=`, the tag `env=prod` is saved with `env` as the key and `prod` as the value.

If left empty, no tags will be ingested.

e. Select **Continue**.

9. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-Kong Gateway** import schedule.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to check whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

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Related topics

API Service Graph Connector for Kong Gateway

Target tables for storing API Service Graph Connector for Kong Gateway data

Configure API Service Graph Connector for Kong Gateway using the guided setup

Set up scheduled import jobs to pull in Kong Gateway data into your Configuration Management Database (CMDB).

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the CMDB Workspace to configure the connection for the connector, as the guided setup method is being deprecated.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models store app.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.

For basic authentication, obtain the username and password required for authenticating requests to the *Kong Gateway Admin* API.

For token-based authentication, obtain the API key for connecting to the Kong Gateway service.

Role required: admin

Procedure

1. Verify that the application scope is set to the API Service Graph Connector for Kong Gateway application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Kong Gateway** > **Setup**.
3. Configure the authentication type, credentials, and HTTP connection details.

   a. In the Configure connection and credentials section of the Kong Gateway Integration with CMDB page, select **Get Started**.

   b. Configure the authentication type.

      i. For the Set authentication type task, select **Configure**.

      ii. Set the *Auth Type* property to one of the following values:

      - `Basic`: Basic authentication that uses a username and password.
      - `Token`: Token-based authentication that uses a username and password to retrieve a token.

      iii. Select **Update**.

      iv. Set the Set authentication type task to complete by selecting **Mark as Complete**.

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c. Configure the authentication credentials used for sending requests to the *Kong Gateway Admin* API.

i. For the Configure the connection task, select **Configure**.

ii. Based on the authentication type, select the connection type.

- For basic authentication, on the Connections page, search for and select **Kong Basic Authentication** and then select **View Details**.
- For token-based authentication, on the Connections page, search for and select **Kong RBAC Authentication** and then select **View Details**.

iii. Edit the basic authentication details available by default.

> **Note:**
> Skip this step if using token-based authentication.

1. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection Name	Name to identify the Kong Gateway connection record. `Kong Basic Authentication` is the default connection name. You can add multiple Kong Gateway instances. However, try not to modify the default connection name.
Host Name	Target domain name or IP address used to access the Kong Gateway instance.
Protocol	Protocol used for the connection ensuring secured communication between the client and the Kong server. This field is automatically set to `https`. Valid values are: ▪ http ▪ https
Override default port	Port used by the *Kong Admin* API.

2. In the Credential Information section of the Edit Connection window, fill in the fields.

Credential Information

Field	Description
User name	Username required for authenticating requests to the *Kong Gateway Admin* API as noted in the Before you begin section.

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Field	Description
Password	Password associated with the username required for authenticating requests as noted in the Before you begin section.

3. Select **Edit Connection**.

iv. Edit the token-based authentication details available by default.

> **Note:**
> Skip this step if using basic authentication.

1. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection Name	Name to identify the Kong Gateway connection record. `Kong RBAC Authentication` is the default connection name. You can add multiple Kong Gateway instances. However, try not to modify the default connection name.
Host Name	Target domain name or IP address used to access the Kong Gateway instance.
Protocol	Protocol used for the connection ensuring secured communication between the client and the Kong server. This field is automatically set to `https`. Valid values are: ▪ http ▪ https
Override default port	Port used by the *`Kong Admin`* API.

2. In the Credential Information section of the Edit Connection window, in the **API Key** field, enter the authentication secret to connect to the Kong Gateway service as noted in the Before you begin section.
3. Select **Edit Connection**.

v. Set the Configure the connection task to complete by selecting **Mark as Complete**.

d. Configure the properties to control the scope of data retrieval.

i. For the Set configuration properties task, select **Configure**.

ii. In the Service Graph Connection Properties related list, configure the properties.

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Properties

Property	Description
Exclude Workspaces	Name of the workspace to exclude. Entities in this workspace won't be populated in the Kong Gateway service. For multiple workspaces, separate them with commas. For example: `workspace1,workspace2`. If you leave this field empty, the data sources within the connector import data from all the workspaces.
Import Tags	Tags to ingest from the Kong Gateway service. For multiple tags, separate them with commas. When specified, enter the key-value pair separator for tags in the *`Tags Value Separator`* property. If not specified, tags won't be fetched.
Tags Value Separator	Separator for key and value in tags. For example, if the tag value separator is set to =, the tag `env=prod` is saved with `env` as the key and `prod` as the value. If left empty, no tags are ingested.

Note:
The *`Auth Type`*, *`Workspaces`*, and *`Load Balancers`* properties are populated automatically.

iii. Set the Set configuration properties task to complete by selecting **Mark as Complete**.

e. Test the connection.

i. For the Test connection task, select **Configure**.

ii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iii. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test connection task to complete by selecting **Mark as Complete**.

4. **Optional:** Add multiple instances.

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Note:
If you don't need to add multiple instances, you can skip this step.

a. In the Add multiple Instances section of the Kong Gateway Integration with CMDB page, select **Get Started**.

b. Enable creating data sources for the new Kong Gateway connection.

i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.

ii. For the Update data source access task, select **Configure**.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Update Data Source Access form, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. Select the API Service Graph Connector for Kong Gateway application by using the application picker.

vii. Set the Update data source access task to complete by selecting **Mark as Complete**.

c. To enable creating data sources for the new connection, clear the cache of the tables Data Source [sys_data_source] and Tables [sys_db_object].
To clear the cache:

i. For the Clear cache task, select **Configure**.

ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
      GlideCacheManager.flushTable("sys_data_source");
      GlideTableManager.invalidateTable("sys_db_object");
      GlideCacheManager.flushTable("sys_db_object");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. Select the API Service Graph Connector for Kong Gateway application by using the application picker.

vi. Set the Clear cache task to complete by selecting **Mark as Complete**.

d. Add a new connection.

i. For the Add another connection task, select **Configure**.

ii. Based on the authentication type, select the connection type.

- For basic authentication, on the Connections page, search for and select **Kong Basic Authentication** and then select **Add Connection**.
- For token-based authentication, on the Connections page, search for and select **Kong RBAC Authentication** and then select **Add Connection**.

iii. Fill in the basic authentication details.

Note:
Skip this step if using token-based authentication.

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1. In the Connection Information section of the Create Connection window, fill in the fields.

Connection Information

Field	Description
Connection Name	Name to identify the Kong Gateway connection record.
Host Name	Target domain name or IP address used to access the Kong Gateway instance.
Protocol	Protocol used for the connection ensuring secured communication between the client and the Kong server. This field is automatically set to `https`. Valid values are: ▪ http ▪ https
Override default port	Port used by the *`Kong Admin`* API.

2. In the Credential Information section of the Create Connection window, fill in the fields.

Credential Information

Field	Description
User name	Username required for authenticating requests to the *`Kong Gateway Admin`* API as noted in the Before you begin section.
Password	Password associated with the username required for authenticating requests as noted in the Before you begin section.

3. Select **Create Connection**.

iv. Fill in the token-based authentication details.

Note:
Skip this step if using basic authentication.

1. In the Connection Information section of the Create Connection window, fill in the fields.

Connection Information

Field	Description
Connection Name	Name to identify the Kong Gateway connection record.
Host Name	Target domain name or IP address used to access the Kong Gateway instance.
Protocol	Protocol used for the connection ensuring secured communication between the

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Field	Description
	client and the Kong server. This field is automatically set to `https`. Valid values are: ▪ http ▪ https
Override default port	Port used by the *`Kong Admin`* API.

2. In the Credential Information section of the Create Connection window, in the **API Key** field, enter the authentication secret to connect to the Kong Gateway service as noted in the Before you begin section.
3. Select **Create Connection**.

v. Set the Add another connection task to complete by selecting **Mark as Complete**.

e. Configure the properties for the new connection.

i. For the Set configuration properties for new connection task, select **Configure**.

ii. From the Name column, select the connection record of the new connection.

iii. In the Service Graph Connection Properties related list, configure the properties.

Properties

Property	Description
Exclude Workspaces	Name of the workspace to exclude. Entities in this workspace won't be populated in the Kong Gateway service. For multiple workspaces, separate them with commas. For example: `workspace1,workspace2`. If you leave this field empty, the data sources within the connector import data from all the workspaces.
Import Tags	Tags to ingest from the Kong Gateway service. For multiple tags, separate them with commas. When specified, enter the key-value pair separator for tags in the *`Tags Value Separator`* property. If not specified, tags won't be fetched.
Tags Value Separator	Separator for key and value in tags. (Optional) For example, if the tag value separator is set to =, the tag `env=prod` is saved with `env` as the key and `prod` as the value.

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Property	Description
	If left empty, no tags are ingested.

Note:
The *Auth Type*, *Workspaces*, and *Load Balancers* properties are populated automatically.

iv. Select **Update**.

v. Set the Set configuration properties for new connection task to complete by selecting **Mark as Complete**.

f. Test the new connection.

i. For the Test new connections task, select **Configure**.

ii. From the Name column, select the connection record of the new connection.

iii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iv. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test new connections task to complete by selecting **Mark as Complete**.

g. Repeat steps from 4.a until 4.f to add another instance.

5. Set up the scheduled import jobs.

a. In the Set up scheduled import jobs section of the Kong Gateway Integration with CMDB page, select **Get Started**.

b. For the Configure the scheduled import task, select **Configure**.

c. From the Name column, select the parent scheduled job **SG-Kong Gateway**.

d. On the Scheduled Data Import form, verify the field values for the scheduled job.

For more information, see Schedule a data import.

e. Select the **Active** check box to activate the SG-Kong Gateway scheduled import.

f. In the **Run** field, select **Periodically** to specify how often the job will run.

g. Select **Update**.

h. Set the Configure the scheduled import task to complete by selecting **Mark as Complete**.

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Target tables for storing API Service Graph Connector for Kong Gateway data

When you complete setting up the connection, you can configure the integration to periodically pull data from a Kong Gateway application. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB classes.

Kong Gateway [cmdb_ci_kong_gateway]

The following attributes in the Kong Gateway [cmdb_ci_kong_gateway] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Admin URL	admin_url
Database	database
Description	short_description
Version	version

Relationships created for Kong Gateway

Parent class	Relationship type	Child class
Kong Gateway [cmdb_ci_kong_gateway]	Provides::Provided by	Kong Load Balancer [cmdb_ci_kong_lb]
Kong Gateway [cmdb_ci_kong_gateway]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
Kong Gateway [cmdb_ci_kong_gateway]	Reference	Kong Workspace [kong_workspace]
Kong Gateway [cmdb_ci_kong_gateway]	Reference	API Policy [api_policy]
Kong Gateway [cmdb_ci_kong_gateway]	Reference	API Consumer [api_consumer]

Kong Workspace [kong_workspace]

The following attributes in the Kong Workspace [kong_workspace] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
API Gateway	api_gateway

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Relationship created for Kong Workspace

Parent class	Relationship type	Child class
Kong Workspace [kong_workspace]	Reference	Kong Gateway [cmdb_ci_kong_gateway]

API Policy [api_policy]

The following attributes in the API Policy [api_policy] table are populated by collected data:

Attribute label	Attribute name
Frontend	frontend
ID	id
Active	active
Name	name
Protocols	protocols
Managed API	managed_api
Consumer	consumer
API Gateway	api_gateway

Relationship created for API Policy

Parent class	Relationship type	Child class
API Policy [api_policy]	Reference	Kong Gateway [cmdb_ci_kong_gateway]

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
API Gateway	api_gateway
Custom ID	custom_id
Username	username

Relationship created for API Consumer

Parent class	Relationship type	Child class
API Consumer [api_consumer]	Reference	Kong Gateway [cmdb_ci_kong_gateway]

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Kong Load Balancer [cmdb_ci_kong_lb]

The following attributes in the Kong Load Balancer [cmdb_ci_kong_lb] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Algorithm	algorithm

Relationships created for Kong Load Balancer

Parent class	Relationship type	Child class
Kong Load Balancer [cmdb_ci_kong_lb]	Contains::Contained by	Kong Target [cmdb_ci_kong_target]
Kong Load Balancer [cmdb_ci_kong_lb]	Reference	Key Value [cmdb_key_value]

Kong Target [cmdb_ci_kong_target]

The following attributes in the Kong Target [cmdb_ci_kong_target] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Target	target

Relationship created for Kong Target

Parent class	Relationship type	Child class
Kong Target [cmdb_ci_kong_target]	Reference	Key Value [cmdb_key_value]

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
Life Cycle Stage	life_cycle_stage
Life Cycle Stage Status	life_cycle_stage_status
ID	id
Name	name

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Attribute label	Attribute name
Base URL	base_url
Type	type
Model ID	model_id

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]

API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
Host	host
ID	id
Method	method
Path	path
URL	url
Name	name
Protocol	protocol

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
Host	host
ID	id
Path	path
URL	url

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Attribute label	Attribute name
Name	name
Port	port
Protocol	protocol

Relationship created for API Backend

Parent class	Relationship type	Child class
API Backend [cmdb_ci_api_backend]	Uses::Used by	Kong Load Balancer [cmdb_ci_kong_lb]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Configuration item	configuration_item
Key	key
Value	value

Accessing the connection details of API Service Graph Connector for Kong Gateway

You can access the connection details of the API Service Graph Connector for Kong Gateway in a single view using the common connection framework included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the API Service Graph Connector for Kong Gateway. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Kong Gateway connection

Access the details of a Kong Gateway connection configured for the API Service Graph Connector for Kong Gateway.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Kong Gateway** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

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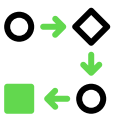
SGC Central

The ServiceNow® Service Graph Connector Central view also called as the SGC Central view in the CMDB Workspace enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections.

Get started

Explore  Learn about the benefits of SGC Central and how it is used.	Configure  Plan and configure your implementation.
Onboard  Onboard Service Graph Connectors to import third-part data into CMDB.	Reference  Get details about installed components.

Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring SGC Central

Learn about the SGC Central application with a sample workflow and review the benefits it can provide for different users in your organization.

SGC Central overview

With the SGC Central application you can discover and install integration-ready Service Graph Connectors, monitor their connection performance and insights, ensure complete visibility into discovered sources and processed data, and access tools and resources for diagnosing and resolving connection issues. You access the application from the SGC Central view in the CMDB Workspace.

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SGC Central users

Users

User	Description
Administrator	Users with the admin role can install and upgrade Service Graph Connectors, create a connection and configure connection properties, monitor connections and data imports, and manage connections.
CMDB installation administrator	Users with the cmdb_inst_admin role can access the SGC Central view in CMDB Workspace to view a list of Service Graph Connectors installed on a ServiceNow instance.They can also create a connection and configure connection properties, monitor connections and data imports, and manage connections..

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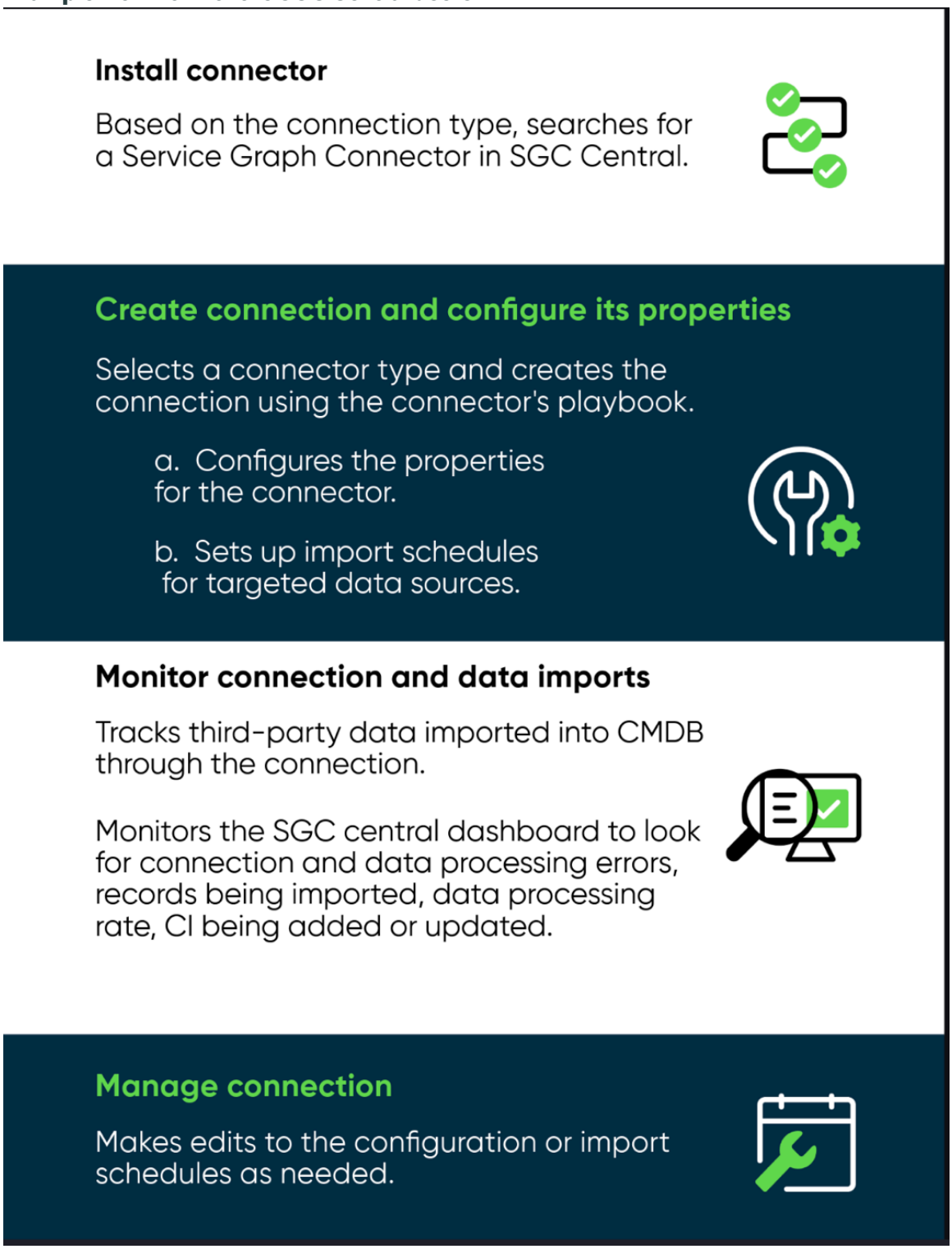
SGC Central workflow

Example workflow for the SGC Central users



A user with the admin or cmdb_inst_admin role uses SGC Central to perform the following tasks:

1. Based on the connection type, searches for a Service Graph Connector within the SGC Central view in CMDB Workspace.
2. Selects a connector type and creates the connection using the playbook available for the connector.

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a. Configures the properties for the connection.

b. Sets up import schedules for targeted data sources.

3. Tracks the third-party data imported by the system using the connection into CMDB.
4. Monitors the SGC Central dashboard for any errors in the connection or the data processing pipeline.
5. Makes edits to the configuration or import schedules if needed.

SGC Central benefits

SGC Central benefits

Benefit	Feature	Users
Visualize connection status	Integrated dashboard to gain instant insights into the connection status of your connectors and performance, keeping your connections running smoothly. In addition, quickly debug for seamless integration.	Administrator, CMDB installation administrator
Discover integration-ready connectors	Explore and install connectors based on the connection type requirements. See which connectors have new versions available and are eligible for upgrade.	Administrator
Manage connections intuitively	Create or modify connections to your needs.	Administrator, CMDB installation administrator

What to explore next

To learn more about configuring and using SGC Central, see:

- Configuring SGC Central
- Managing connections added for Service Graph Connectors in SGC Central
- SGC Central reference

Configuring SGC Central

Set up the SGC Central application for onboarding and maintaining Service Graph Connectors and monitoring the errors related to connections added using Service Graph Connectors.

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Configuration checklist

1. Install SGC Central.

> **Note:**
> If you don't see the SGC Central view in the CMDB Workspace, clear the browser cache and try accessing the view again.

2. Configure scheduled jobs for data collection.

> **Note:**
> If you don't see data on the SGC Central dashboard, run scheduled jobs to display data on the SGC Central dashboard.

3. Onboard Service Graph Connectors within SGC Central.
4. Configure the Service Graph Connector settings within SGC Central.

Install SGC Central

You can install the SGC Central application (sn_sgc_central) if you have the admin role. The application installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the SGC Central application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.
- Review the supported CMDB Workspace versions for the corresponding ServiceNow versions as listed in the following table.

ServiceNow versions and supported CMDB Workspace versions

ServiceNow versions	Supported CMDB Workspace versions
Xanadu	7.0.9 or later
Washington DC	6.2.0 or later
Vancouver	5.5.0 or later

Role required: admin

About this task

The following items are installed with SGC Central:

- Plugins
- Store applications
- Scheduled jobs
- Tables

For more information, see Components installed with SGC Central.

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the SGC Central application ((sn_sgc_central)) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.
6. Select **Install**.

Configuring scheduled jobs for SGC Central

You can configure scheduled jobs to automate data collection for tracking integration performance, errors, and processing status of Service Graph Connectors within the SGC Central application.

Scheduled jobs ensure that integration performance data is consistently gathered and available for reporting and analysis within SGC Central. For more information on configuring a scheduled job, see Scheduled jobs.

Types of scheduled jobs in SGC Central

SGC Central provides different scheduled jobs to meet various data collection needs:

SGC central collection

Collects score and metric data displayed on the SGC Central dashboard for the latest integration activity. This job runs daily automatically or as configured.

Note:
As a user with the admin role, you must run this scheduled job immediately after installing SGC Central and update its schedule based on your preferences to reflect the latest integration activity.

SGC central collection onDemand with lookback

Enables on-demand collection of historical integration data for analysis. The job collects scores for a lookback period of 30 days, meaning it gathers data from 30 days ago to today (0 days ago), enabling historical data collection for performance analysis.

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Note:
As a user with the admin role, you can run this scheduled job on demand, rather than on a daily schedule.

Exploring Service Graph Connectors in SGC Central

You can explore available options for onboarding and maintaining Service Graph Connectors within the SGC Central view of the CMDB Workspace.

Service Graph Connectors are integrations that facilitate data ingestion into the Configuration Management Database (CMDB) from various third-party sources. To learn more, see Getting started with Service Graph Connectors.

Options for maintaining Service Graph Connectors in SGC Central include:

- Updating an installed Service Graph Connector.
- Installing a Service Graph Connector using an available entitlement.
- Installing a Service Graph Connector from the ServiceNow Store.

Update an installed Service Graph Connector in SGC Central

Keep a Service Graph Connector up-to-date within SGC Central.

Before you begin
Role required: admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. Select **Explore connectors**.
4. In the Updates available section, review the updates that are available for a Service Graph Connector.
5. Update the connector.
   - Select a connector to access the connector in Application Manager and then install any updates.
   - Select **Install updates** to open Application Manager, and then view and install updates for a connector from the **Updates** tab.

   For more information, see Application Manager.

Install a Service Graph Connector with an available entitlement in SGC Central

Install a Service Graph Connector that matches an entitlement available in Application Manager from within the SGC Central view of the CMDB Workspace.

Before you begin
Role required: admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. Select **Explore connectors**.
4. In the Entitlements available section, select **Explore in Application Manager**.

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5. In Application Manager, review the entitlements and install a connector.
   For more information, see Application Manager.

Install a Service Graph Connector from ServiceNow Store in SGC Central

Explore ServiceNow Store to request and use a Service Graph Connector with no available entitlements from within the SGC Central view of the CMDB Workspace.

Before you begin
Role required: admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. Select **Explore connectors**.
4. In the Available from ServiceNow Store section, select **Explore in ServiceNow Store**.
5. On ServiceNow Store, review the list of Service Graph Connectors and install a connector.
   For more information, see the ServiceNow Store website.

Configuring Service Graph Connectors settings in SGC Central

You can view and configure settings for your Service Graph Connectors within the SGC Central view of the CMDB Workspace.

In SGC Central, you can configure Service Graph Connectors settings related to system properties. See Configure system properties for a Service Graph Connector in SGC Central.

Configure system properties for a Service Graph Connector in SGC Central

Configure system properties for a Service Graph Connector within the SGC Central view of the CMDB Workspace.

Before you begin
Role required: admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. Select **Settings**.
4. In the Browse system properties by connector section, select an available Service Graph Connector.

   Note:
   When you select a connector type, the application scope changes to the selected type.

5. On the system properties page of the Service Graph Connector, select a property from the **Name** column.
6. Review and modify the system property.
7. Select **Save**.
8. Repeat steps from 5 to 7 for any other property.

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Managing connections added for Service Graph Connectors in SGC Central

You can create and update connections added for Service Graph Connectors within the SGC Central view of the CMDB Workspace to ingest data into Configuration Management Database (CMDB) from third-party sources.

You can create and manage the connections for the following connectors:

- API Service Graph Connector for Apigee X
- API Service Graph Connector for AWS API Gateway
- API Service Graph Connector for Azure API Management
- Service Graph Connector for GCP
- API Service Graph Connector for Kong Gateway
- Service Graph Connector for AWS
- Service Graph Connector for Infoblox
- Service Graph Connector for Jamf
- Service Graph Connector for Microsoft Azure
- Service Graph Connector for Microsoft Defender Endpoint
- Service Graph Connector for Microsoft Intune
- Service Graph Connector for Microsoft SCCM
- Service Graph Connector for Observability - AppDynamics
- [store-future: BEGIN review]Service Graph Connector for Observability - Datadog[End]
- Service Graph Connector for Observability - Dynatrace
- Service Graph Connector for Observability - New Relic
- Service Graph Connector for SolarWinds
- Service Graph Connector for Tanium
- Service Graph Connector for Trellix
- Service Graph Connector for Wiz

What to do next

- Create a connection.

  Create a connection added for a Service Graph Connector within SGC Central.

- Update a connection.

  Update a connection using a Service Graph Connector within SGC Central.

- View a connection.

  View installed and draft connections that were added using Service Graph Connectors within SGC Central.

- Monitor and analyze connections.

  Monitor the installation, performance, and error handling of Service Graph Connectors from the Overview page in the Service Graph Connector Central view of the CMDB Workspace.

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- Access IntegrationHub ETL to create and manage ETL transform maps.

  Access the IntegrationHub ETL dashboard within SGC Central to manage ETL transform maps.

Perform initial setup tasks when creating a connection in SGC Central

Complete the prerequisites for setting up a connection for the first time using a Service Graph Connector within the SGC Central view of the CMDB Workspace.

Before you begin
Role required: admin

About this task
During the initial connection setup with a Service Graph Connector, a few tasks appear in the Prerequisites stage. Complete these tasks before proceeding to the next steps.

Procedure

1. Create data sources for the connection.
   a. Ensure that you have edit permissions for the Datasource [sys_data_source] table.
   b. In the **Prerequisites** stage of the playbook, select the **Update data source access** activity.
   c. Select **Update access**.
   d. To edit the record, select the **Global** application scope from the application picker.
   e. In the Application Access related list of the Data Source form, select the **Can create**, **Can update**, and **Can delete** check boxes.
   f. Select **Update**.
   g. From the application picker, select the application scope of the connector.
   h. After completing the **Update data source access** activity, select **Continue**.
2. Clear the cache on the Data Source [sys_data_source] table.
   a. In the **Prerequisites** stage of the playbook, select the **Clear cache** activity.
   b. Select **Run clear cache**.
   c. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
GlideCacheManager.flushTable("sys_data_source");
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

   d. Select **Run Script** to run the background script in the **global** scope.

      The script may take several minutes to execute.

   e. After the script is executed, select **Close**.
   f. From the application picker, select the application scope of the connector.
   g. After completing the **Clear cache** activity, select **Continue**.

Create a connection for a Service Graph Connector in SGC Central

Create a connection added for a Service Graph Connector within the SGC Central view of the CMDB Workspace.

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Before you begin
Role required: cmdb_inst_admin or admin

Procedure
1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Dashboard page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select a connector type and then follow the playbook instructions to create a connection.

   If the playbook experience isn't supported for a connector, follow the guided setup instructions.

   Note:
   - When you select a connector type, the application scope changes to the selected type.
   - When setting up a connection using a Service Graph Connector for the first time, you might need to complete the initial setup tasks. See Perform initial setup tasks when creating a connection in SGC Central.

Update a connection for a Service Graph Connector in SGC Central

Update a connection configured for a Service Graph Connector within the SGC Central view of the CMDB Workspace.

Before you begin
Role required: cmdb_inst_admin or admin

Procedure
1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. Select **All connections**.
4. Select the **Installed** tab.
5. Select a connection from the **Connection** column.

   Note:
   When you select a connection, the application scope changes to the selected connector type.

6. On the **Details** tab, review and modify the details for a connection.
7. Select **Update and test connection**.
8. **Optional:** Select a tab to view further details of the connection, such as data sources, import schedules, and any errors.
   Additional tabs might appear depending on the connector type.

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Viewing connections for a Service Graph Connector in SGC Central

You can view installed and draft connections that were added using Service Graph Connectors within the SGC Central view of the CMDB Workspace.

The following connection types are available for viewing:

- Installed connection (see View an installed connection in SGC Central.)
- Draft connection (see View a draft connection in SGC Central.)

View an installed connection in SGC Central

View the details of an installed connection that was added using a Service Graph Connector within the SGC Central view of the CMDB Workspace.

Before you begin

Role required: cmdb_inst_admin or admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. Select **All connections**.
4. Select the **Installed** tab.
5. Review the list of installed connections.
6. Select a connection from the **Connection** column to view the details, data sources, import schedules, and errors associated with the connection.

Note:
When you select a connection, the application scope changes to the selected connector type.

View a draft connection in SGC Central

View the details and resume setting up draft connections.

Before you begin

Role required: cmdb_inst_admin or admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. Select **All connections**.
4. Select the **Drafts** tab.
5. Review the list of draft connections.
6. Complete setting up the draft connections.
   - Select **Configure** to continue where a Service Graph Connector was last configured within SGC Central.
   - Select **Resume setup** to set up a single instance connector for the first time.

Note:
When you select a connection, the application scope changes to the selected connector type.

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Monitoring and analyzing connections added for Service Graph Connectors in SGC Central

The Overview page in the Service Graph Connector Central (SGC Central) view of the CMDB Workspace provides a centralized dashboard view for administrators to monitor the installation, performance, and error handling of Service Graph Connectors.

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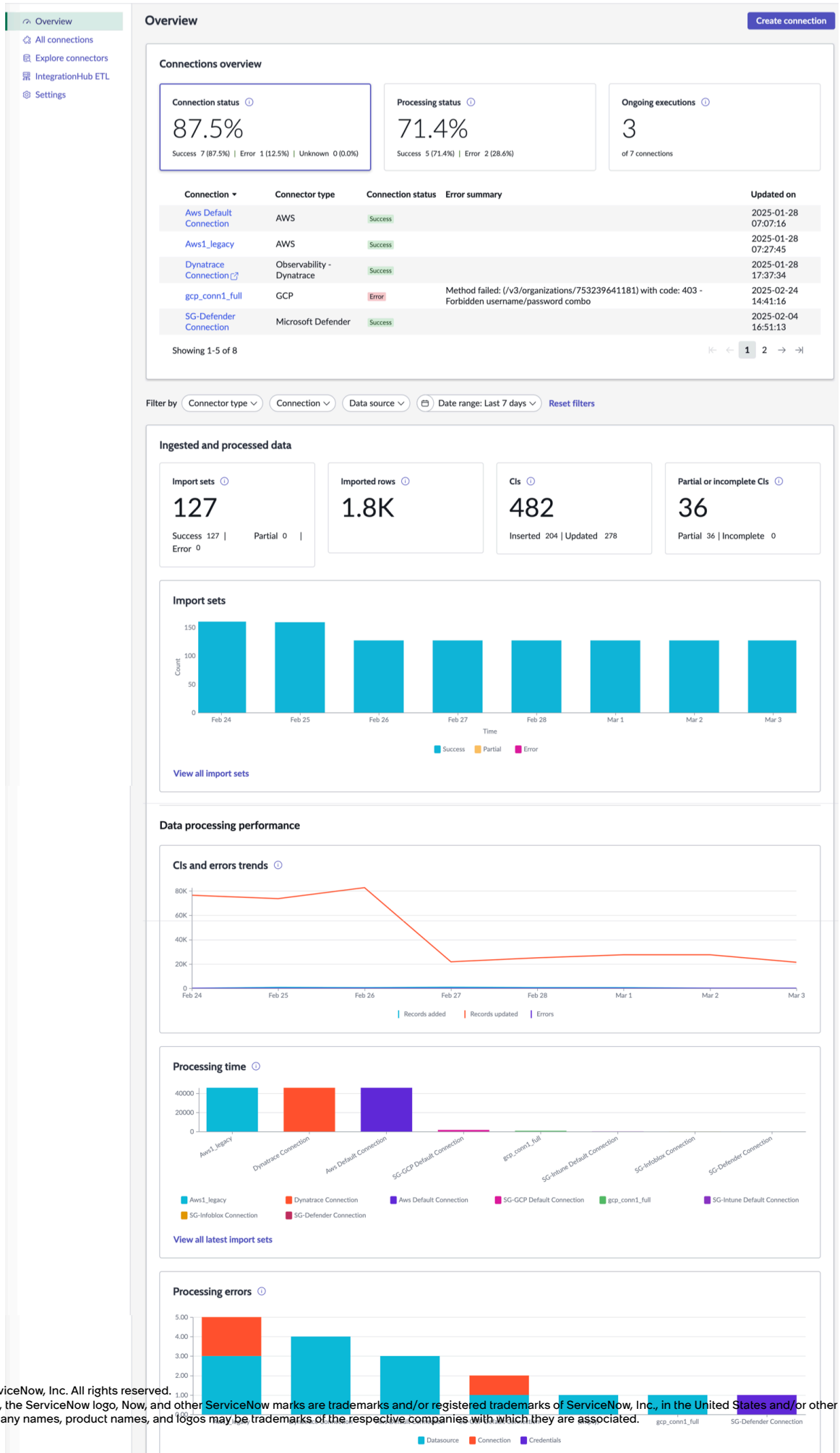

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Access the SGC Central Overview page

To open the dashboard, navigate to **CMDB Workspace** > **SGC Central**.

Required roles

- admin
- cmdb_inst_admin

Use cases

For examples of how different people in your organization would use this dashboard, see these use cases.

User	Dashboard use
Administrators or CMDB installation administrator	Proactively monitor, analyze, and optimize data imports to identify issues and track performance.

Overview page features

Use the Overview page to monitor and troubleshoot your Service Graph Connectors connections through dedicated sections, filters, indicators, and visual reports and gain insights on the performance of Service Graph Connectors.

Feature description

Feature	Description
Connections overview	Displays the current state of your configured Service Graph Connector connections, including status, execution results, and error summaries.
Ingested and processed data	Displays key metrics related to the data imported and processed from third-party applications.
Data processing performance	Displays how many configuration items (CIs) were added or updated over time, in addition to the number of processing errors.
Filters	Enables narrowing the data shown in graphs and metrics based on connector type, connection, data source, or date range.
Indicators	Enables viewing of high-level metrics that reflect the volume and quality of imported data and help identify issues such as incomplete or failed import set processing.
Reports	Enables real-time visualizations that provide insights into data ingestion, processing trends, and error categorization across your Service Graph Connector connections.

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Connections overview

Displays the current state of your configured Service Graph Connector connections, including status, execution results, and error summaries.

Connections overview section

Card	Description	Card summary table
Connection status	Percentage of connections tested successfully based on connection status, with the count of success, error, and unknown statuses.	The connection status summary table displays the following details: **Connection** Displays the name of the configured Service Graph Connector. Each entry links to more details about the connection. **Connector type** Displays the Service Graph Connector type as the integration source or platform for the connection. **Connection status** Displays the current state of each connection. Valid values include: **Success** All connections were configured and tested without errors. **Error** Connection configuration issues encountered during setup. **Error summary** Provides a short description of the most recent connection error, if any. **Updated on** Displays the timestamp of the last connection status update for each connection in the following format: `YYYY-MM-DD HH:MM:SS`.
Processing status	Percentage of connections for which all data import runs in the last import execution were successful, with the count of success and error statuses.	The processing status summary table displays the following details: **Connection**

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Connections overview section (continued)

Card	Description	Card summary table
	Note: Only import sets that encountered errors during their last execution are counted as processing errors and shown on the card.	Displays the name of the configured Service Graph Connector. Each entry links to more details about the connection. **Last processing status** Indicates the result of the most recent processing run. Valid values include: **Success** All scheduled jobs completed without errors. **Error** One or more jobs encountered issues during processing. **Activated schedules** Indicates the number of scheduled jobs that are activated for importing the data using the connection. **Processed** Indicates the total number of import set runs that were executed for the connection. **Success** Indicates how many of the processed import set runs completed successfully. **Error** Displays the number of import set runs that ended in an error, including those import sets that were canceled. **Error summary** Provides a short description of the most recent error, if any. The summary includes error type and cause. **Last processed on** Displays the timestamp of the last processing activity for the import set of the connection, including both successful and failed runs in the

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Connections overview section (continued)

Card	Description	Card summary table
		following format: YYYY - MM - DD HH : MM : SS.
Ongoing executions	Number of connections where data import execution is in progress.	The ongoing execution status summary table displays the following details: **Connection** Displays the name of the configured Service Graph Connector. Each entry links to more details about the connection. **Activated schedules** Indicates the number of scheduled jobs that are activated for importing the data using the connection. **In progress** Displays how many scheduled jobs are currently running for the connection. **Processed** Displays the number of completed executions, where data has been collected and processed according to the configured scheduled job. **Processing time** Indicates the total duration taken by the most recent completed import set execution in the following format YYYY - MM - DD HH : MM : SS.

Ingested and processed data

Displays key metrics related to the data imported and processed from third-party applications.

Ingested and processed data section

Card	Description	Indicators
Import sets	Number of import sets processed by data sources based on the selected filters, with the count of success, partial, and error statuses. Select the **View all import sets** link to view a complete list of processed import sets.	SGC.Integrations.ImportSet SGC.Fully.successful.ImportSet SGC.Part.success.ImportSet SGC.Fully.error.ImportSet

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Ingested and processed data section (continued)

Card	Description	Indicators
Imported rows	Count of rows imported across all import sets based on the selected filters. Select the **View all latest import set rows ingested** link to view a complete list of import set rows ingested.	SGC.Integrations.Importset.rows.ingested
CIs	Total CIs processed based on the selected filters, with the count of added and updated CIs. Select the **View all inserted and updated records** link to view a complete list of inserted and updated CIs.	None
Partial or incomplete CIs	Total CIs that are partial payloads based on the selected filters, with the count of partial and incomplete categories. Select the **View all partial and incomplete records** link to view a complete list of partial and incomplete CIs.	None

Data processing performance

Displays how many configuration items (CIs) were added or updated over time, in addition to the number of processing errors.

Data processing performance section

Card	Description	Indicators
CIs and errors trends	Daily trends for CIs that were added, updated, and any data processing errors occurred during data import process based on the selected filters.	Records added Records updated Errors
Processing time	Top 10 connections by the latest import set processing time. Select the **View all latest import sets** link to view a complete list of import sets.	None
Processing errors	Top 10 connections with the highest number of data processing errors, with a breakup by data source, connection, and credential issues.	None

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Data processing performance section (continued)

Card	Description	Indicators
	Select the **View all latest errors** link to view a complete list of processing errors.	

Filters

Enables narrowing the data shown in graphs and metrics based on connector type, connection, data source, or date range.

Name	Type	Description
Connector type	List	Filters a list of installed Service Graph Connectors.
Connection	List	Filters a list of connection records for the Service Graph Connectors.
Data source	List	Filters a list of data sources for the Service Graph Connectors.
Date range	Date	Filters the SGC Central dashboard data based on the date range selected.

Indicators

Enables viewing of high-level metrics that reflect the volume and quality of imported data and help identify issues such as incomplete or failed import set processing.

Records added

Total number of records that were inserted into the system on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_audit table. The score is calculated by counting the number of records updated on the specified day, based on operations that were marked as inserted in the audit log.

Records updated

Total number of records that were updated in the system on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_audit table. The score is calculated by counting the number of records updated on the specified day, based on operations that were marked as Updated in the audit log.

Records added or updated

Total number of records that were added or updated in the system on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_audit table. The score is calculated by counting the number of records inserted or updated on the specified day, based on operations that were marked as Inserted or Updated in the audit log.

Errors

Total number of errors categorized under credentials, data source, or connection issues that occurred during integration executions on the previous day, as recorded

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in the sn_cmdb_int_util_cmdb_integration_execution_error table. The score is calculated by counting the number of errors on the specified day.

SGC.processing.errors

Number of processing errors categorized under data source issues that occurred during integration executions on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_error table. The score is calculated by counting the number of errors on the specified day.

SGC.connection.errors

Total number of errors categorized under credentials or connection issues that occurred during integration executions on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_error table. The score is calculated by counting the number of errors on the specified day.

SGC.Integrations.ImportSet

Total number of import sets that were either completed successfully or encountered errors during their transformation process on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated by counting the total number of import sets on the specified day.

SGC.Fully.successful.ImportSet

Total number of import sets that were completed successfully during their transformation process on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated according to this formula: `Count of import sets with Errors = 0`.

SGC.Fully.error.ImportSet

Total number of import sets that completed with errors during their transformation process on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated according to this formula: `Count of import sets with Errors ≠ 0 and Rows = Errors`.

SGC.Part.success.ImportSet

Total number of import sets that completed with some errors where the number of rows processed differs from the number of errors reported on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated according to this formula: `Count of import sets with Errors ≠ 0 and Rows ≠ Errors`.

SGC.Integrations.Importset.rows.ingested

Total number of rows ingested for the import sets on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution table. The score is calculated according to this formula: `Sum of rows ingested`.

SGC.Integrations.Processing Rate

Average processing rate of import sets based on the total number of rows processed and the total processing time (in hours) for the import sets that either completed successfully or encountered errors on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution table. The score is calculated according to this formula: `Sum of rows processed/Total time (in hours)`.

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Reports

Enables real-time visualizations that provide insights into data ingestion, processing trends, and error categorization across your Service Graph Connector connections.

Title	Type	Source table	Description
Affected CIs and errors	Relative compare ( )	CMDB Integration Execution Error [sn_cmdb_int_util_cmdb_integration_execution_error]	Displays configuration items (CIs) added, updated, and cumulative errors occurred during data import over time.
Error breakdown	Column ( )	CMDB Integration Execution Error [sn_cmdb_int_util_cmdb_integration_execution_error]	Displays the count of errors grouped over time.
Import set rows ingested	Single score (42)	CMDB Integration Execution Import Set [sn_cmdb_int_util_cmdb_integration_execution_import_set]	Displays the number of import set rows ingested in a day.
Import set processing rate	Single score (42)	CMDB Integration Execution [sn_cmdb_int_util_cmdb_integration_execution]	Displays the average rate at which an import set processes data within an hour.
Records added or updated	Single score (42)	CMDB Integration Execution Audit [sn_cmdb_int_util_cmdb_integration_execution_audit]	Displays the number of records that were added or updated in CI classes.
Total import sets	Single score (42)	CMDB Integration Execution Import Set [sn_cmdb_int_util_cmdb_integration_execution_import_set]	Displays the number of import sets initiated by data sources in the given time frame and the count of import sets categorized by their status.
Updated classes	Column ( )	CMDB Integration Execution Audit [sn_cmdb_int_util_cmdb_integration_execution_audit]	Displays the breakdown of updated CIs for a class.

Accessing the IntegrationHub ETL dashboard in SGC Central

You can access the IntegrationHub ETL dashboard within the SGC Central view of the CMDB Workspace to manage ETL transform maps.

IntegrationHub ETL is a tool for creating and managing ETL transform maps to integrate third-party data into the CMDB or non-CMDB tables. Select **Go to IntegrationHub ETL Home** to view the IntegrationHub ETL home page.

To learn about the IntegrationHub ETL store app, see IntegrationHub ETL.

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Access IntegrationHub ETL in SGC Central

The IntegrationHub ETL dashboard provides a centralized platform for monitoring ETL processes within the SGC Central view of the CMDB Workspace.

Before you begin

Role required: admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. Select **IntegrationHub ETL**.
4. In the ETL definitions section of the IntegrationHub ETL page, select a category to view more details about the selected ETL definition.

ETL definitions

Category	Description
Total	Total number of ETL definitions configured within the system.
Active	Number of ETL processes that are currently active and running.
Scheduled	Number of ETL processes that are scheduled for future execution.

5. To open the home page of the IntegrationHub ETL store app, select **Go to IntegrationHub ETL Home**.

SGC Central reference

Reference topics provide additional information about SGC Central components.

Components installed with SGC Central

Several types of components are installed with activation of the SGC Central (sn_sgc_central) plugin, including tables, user roles, and scheduled jobs.

Scheduled jobs installed

Scheduled job	Description
SGC central collection	Reads from the imports brought in by the connectors and updates the dashboard data.
SGC central collection onDemand with lookback	Collects historical data for the lookback period from when the data is retrieved for connectors. The default lookback period is set to 30 days.

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Tables installed

Table	Description
Connection Record Tabs [sn_sgc_central_connection_record_tabs]	Includes the tabs displayed on the page to edit connection, including default tabs like Details, Data Sources, Scheduled Imports, and Errors, and additional tabs specific to individual connectors, arranged by order.
Connection property config [sn_sgc_central_conn_prop_config]	Stores the connection property fields for the Connection Properties tab displayed on the page to create or edit a connection, including group ordering, descriptions, mandatory fields, and default values for auto-population.
Service Graph Connection Trigger [sn_sgc_central_service_graph_connection_trigger]	Stores the trigger record to initialize playbook context in the create connection flow when a new record is inserted. The playbook is selected based on the referred metadata record's application scope field that is the Service Graph Connector scope.
Service Graph Connector [sn_sgc_central_service_graph_connector]	Stores Service Graph Connector details such as scope, app ID, and associated provider.
SGC Installed Connection [sn_sgc_central_st_installed_connection]	Stores all installed or draft connections, including details such as connection, processing status, last run, and import frequency information.
SGC IntegrationHub ETL [sn_sgc_central_st_integrationhub_etl]	Stores the Extract Transform Load (ETL) list for display under the IntegrationHub ETL list view in SGC Central.

ServiceNow Store applications installed

Application	Description
Integration Commons for CMDB (sn_cmdb_int_util)	Contains the CMDB Integrations Dashboard and a set of Robust Transform Engine (RTE) transforms and script includes.
CMDB Workspace (sn_cmdb_ws)	Provides a single place to access CMDB-focused features including SGC Central.

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Domain separation and SGC Central

Domain separation is unsupported for SGC Central. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

For more information on support levels, see Application support for domain separation.

Related topics

Domain separation for service providers

Conversational Interfaces

Enable users to engage with live agents, virtual agents, or both using ServiceNow® Conversational Interfaces. These interfaces provide tools for creating and managing optimal conversational experiences for users in the chat channels that they prefer.

Get started with Conversational Interfaces

Select a tile to get started with Conversational Interfaces products and tools.

Conversational Interfaces Console  Use the Conversational Interfaces Console to install and configure conversational tools.	Virtual Agent  Augment customer service with a virtual agent that handles common support issues using pre-built conversations and automated workflows.	**Now Assist in Virtual Agent**  Use generative AI skills to enhance the requester experience in Virtual Agent.
Agent Chat  Provide your agents with a workspace that has built-in productivity features for engaging with customers.	Sidebar  Provide your agents with a way to collaborate with others when working on a Workspace task-based or interaction-based record.	Conversational Interfaces Diagnostic Tool  Diagnose issues with low-performing conversations.

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Additional Resources for Conversational Interfaces



Manage and enhance your Conversational Interfaces experience

Conversational Interfaces Console

Explore, implement, and maintain your Conversational Interfaces using a home-page or console experience. All the settings and configurations you need to set up and launch your interfaces, such as Virtual Agent and Agent Chat, are consolidated in the ServiceNow® Conversational Interfaces console.

For an introduction to the Conversational Interfaces console, and to get familiar with the product, watch this video. Getting Started with the Conversational Interfaces console.

Get started

Explore



Learn about the Conversational Interfaces Console concepts and features.

Install



Install Virtual Agent and pre-built conversations.

Configure



Select conversation settings for Virtual Agent, Agent Chat, and Sidebar

Reference



Get technical information about records in the Interactions table and data management in Conversational Interfaces.

Exploring Conversational Interfaces Console

The Conversational Interfaces applications enable your users to engage with live agents, virtual agents, or both. These interfaces provide tools for creating and managing optimal conversational experiences for your users, in the chat channels that they prefer.

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If you are new to Conversational Interfaces and haven't implemented or used Virtual Agent yet, you can access the Conversational Interfaces Console application to explore all available features.

For existing users, you can access the Conversational Interfaces console application to discover added enhancements or advanced-level features.

Conversational Interfaces console advantages

Implement Conversational Interfaces to support your users with virtual and live agents through the chat channels they prefer. Increase the productivity of your IT organization by deflecting the more common, easier to resolve user issues, to a 24/7-available Virtual Agent bot. The Conversational Interfaces console makes it easy for you to quickly get started and work towards achieving positive outcomes with your implementation.

Navigate through an intelligent experience that is uniquely tailored to where you are as a Conversational Interfaces user. The Conversational Interfaces console is ideal for first-time users who have never installed or configured Conversational Interfaces, to the most experienced user looking to expand full capabilities and maintain existing implementations.

Conversational Interfaces console provides the following features:

- Guided experience modules that walk you through essential tasks, such as adding your bot to a portal, branding and customizing your bot, setting up bot greetings, collecting metrics, and more.
- Access to helpful resources and videos to help you plan your virtual or human agent conversational experience.
- General settings for both Virtual Agent and Agent Chat, as well as settings specific to each application.
- Bot performance metrics for recent conversations.
- Progress panel that shows you what has been configured on your instance.

Navigate to **All** > **Conversational Interfaces** > **Home** to start exploring its features.

Note:
The Conversational Interfaces console is also available in the Omni-Experience Standard Feature Set app from the ServiceNow Store. Existing customers don't need to install it from the store. However, subsequent updates will be available there. Visit the ServiceNow Store website for more information. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Monitoring and managing Conversational Interfaces applications

Use the Conversational Interfaces Home page to monitor the performance of recent conversations or test your bot. Plugin update notices will alert you when a feature update is ready.

Your bot's performance

Review the performance of recent live conversations from the Conversational Interfaces console. For more details, select **View details in VA Analytics** to open the Conversational Analytics Dashboard.

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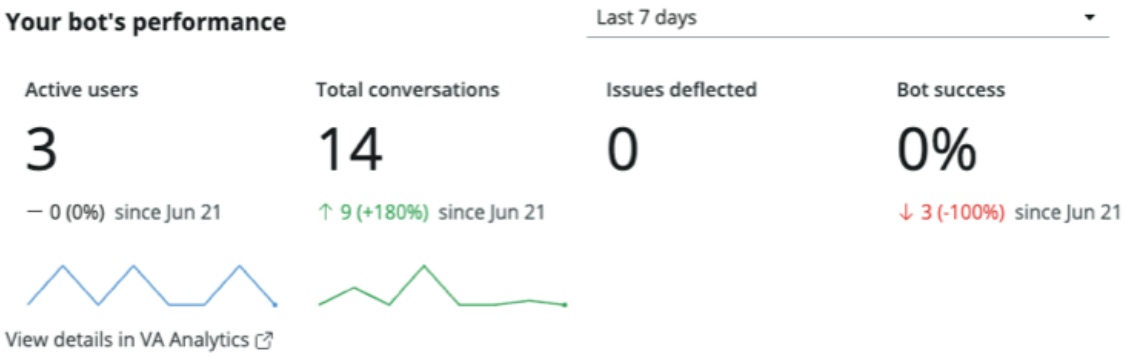
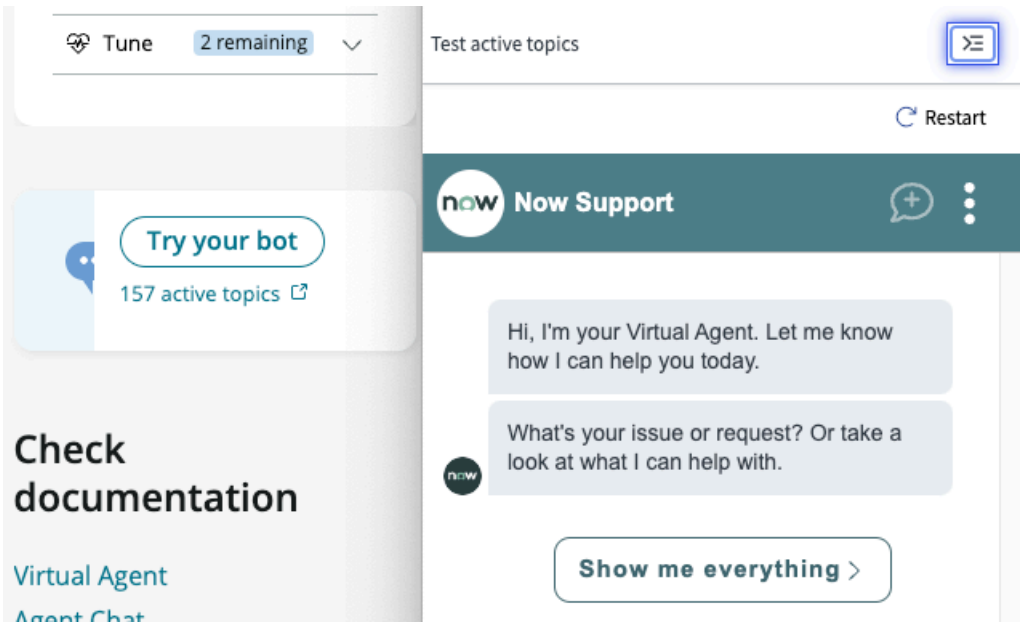


Test your bot

Select **Try your bot** to open a conversation in a new window and test the active topics. Enter a request and send it to start a conversation with the bot. The number of active topics is indicated for your information.



Update plugins

Notifications on the Conversational Interfaces console let you know when to update an installed plugin. Select **Update plugin** to update it from the ServiceNow Store.

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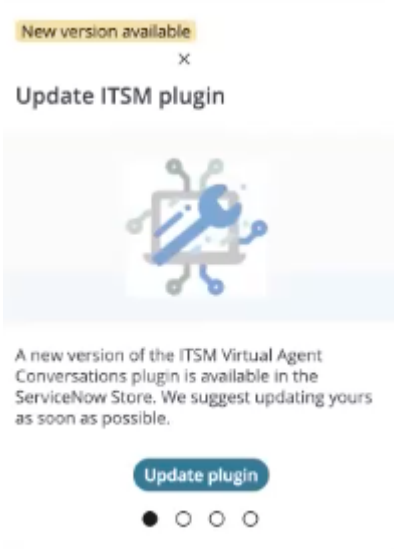

Channels in Conversational Interfaces

The various ways in which your end users engage with virtual and live agents are called channels. In Conversational Interfaces, users and agents converse through channels that have specific communication modes: chat mode for real-time conversations and messaging mode for long-running conversations.

Conversation channels provide your end users and agents with different options for interacting. These options are based on when your users and agents are available to connect, and the chat applications used in your business environment. There are two types of channels: chat channels and messaging channels.

Chat channels

Chat channels support two-way conversations in real time. These conversations may involve a user and a live agent or a user and a virtual agent. This mode of conversation is synchronous, and the user is guaranteed a response. Supported chat channels let your end users and agents interact based on the chat applications (clients) that they're using and when they're available to connect.

The following channels are supported for synchronous chat:

- Service Portal (mweb) web client
- Mobile web (mweb) client
- Conversational Integration with Microsoft Teams
- Conversational Integration with Slack
- Conversational Integration with Workplace from Facebook
- Conversational Integration with Alexa
- Conversational Integration with WhatsApp (powered by Twilio)
- Conversational Integration with LINE
- Conversational Integration with Facebook Messenger

Messaging channels

Messaging channels let end users and agents communicate over longer periods of time, especially when one party isn't online. This mode of chat is asynchronous and happens at the parties' convenience.

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When your end users and agents must communicate over longer periods without being online concurrently, pre-built messaging channels let them chat asynchronously, at their convenience.

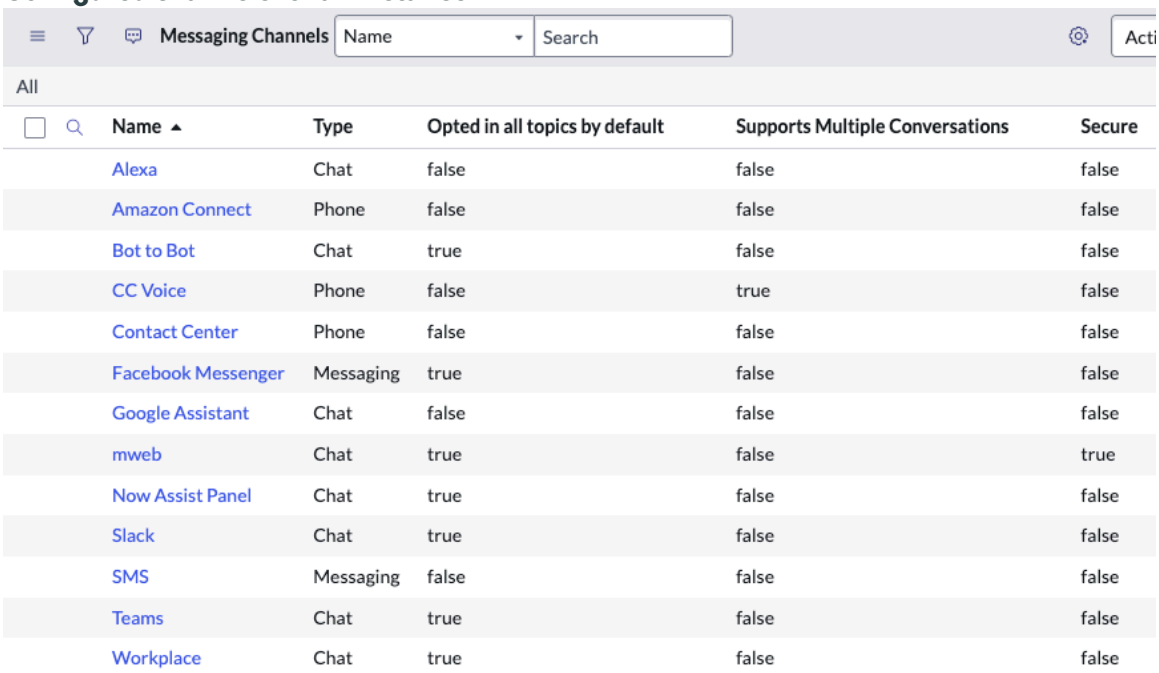
The following channels are available for asynchronous chat:

- Mobile web (mweb) client: Configure this channel for iOS, Android, and desktop devices for asynchronous chat
- Now Assist panel : Used by Now Assist panel .
- SMS channel: Used by Conversational SMS Integration with Twilio

Messaging Channels table

Messaging channels are defined in the Messaging Channels table [sys_cs_channel]. If you're using the custom chat integration framework to create custom chat integrations, you can specify the channel mode for those integrations—either chat or messaging. For channels such as the mweb channel, you can choose either chat or messaging as well.

Configured channels for an instance


Messaging Channels | Name | Search | Acti

All

Name	Type	Opted in all topics by default	Supports Multiple Conversations	Secure
Alexa	Chat	false	false	false
Amazon Connect	Phone	false	false	false
Bot to Bot	Chat	true	false	false
CC Voice	Phone	false	true	false
Contact Center	Phone	false	false	false
Facebook Messenger	Messaging	true	false	false
Google Assistant	Chat	false	false	false
mweb	Chat	true	false	true
Now Assist Panel	Chat	true	false	false
Slack	Chat	true	false	false
SMS	Messaging	false	false	false
Teams	Chat	true	false	false
Workplace	Chat	true	false	false

Live agent support by channel

Not all channels may be suitable for live agent support. For example, you may want to disable support for the Bot-to-Bot and voice channels. Live agent support is enabled by default, but admins can change this setting in the Messaging Channels [sys_cs_channel] table. For details, see Disable live agent support for a channel.

Chat and messaging features

The Conversational Interfaces channels offer basic features that make it easy for your agents and end users to stay connected:

- Message indicators that inform your users of new and unread messages received when they're away from chat or when they've been offline.
- Typing indicators that show a chat participant is responding.

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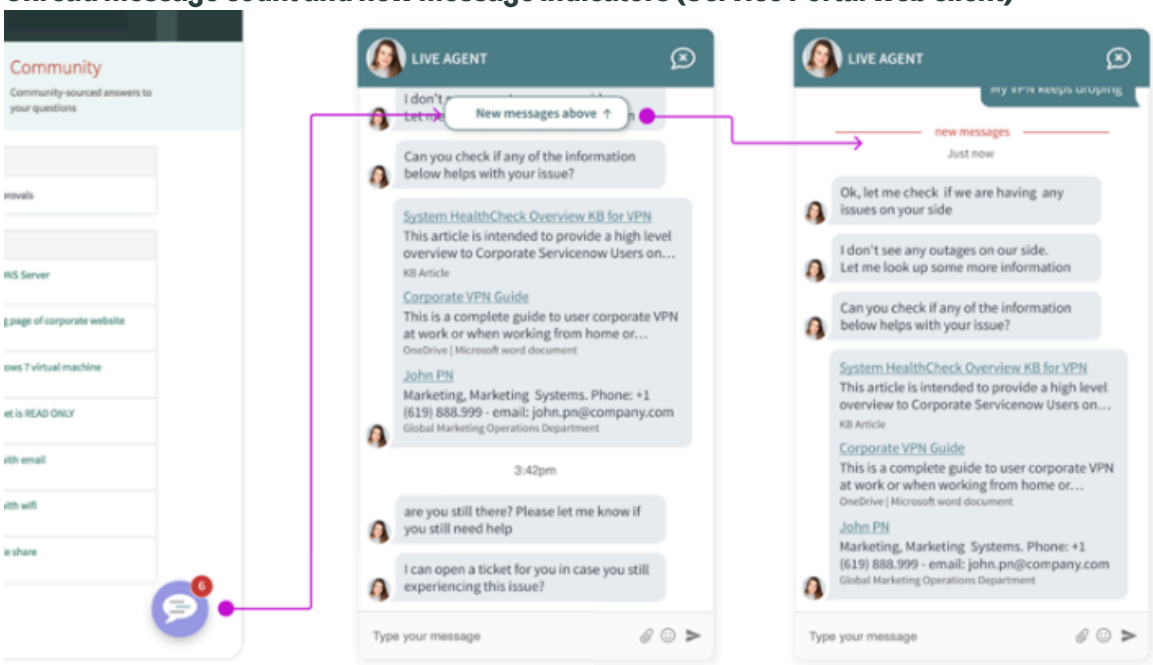
- System messages, displayed to users and agents that provide information about the conversation state.
- Secure handling of sensitive data, such as passwords or account numbers. This data is masked when users enter the information, and it cannot be viewed by others.
- Automatic closing of idle chat or messaging conversations.

New and unread message indicators

End users receive new message indicators on chat and messaging channels when they're offline. Users can be anonymous (guests) or known (authenticated). The unread message count is displayed on the chat widget.

In asynchronous chat, the unread message count reflects the number of any offline messages sent by a live agent and any simple notifications received.

Unread message count and new message indicators (Service Portal web client)



Message indicators are displayed as follows:

- There is no limit on the number of unread messages. Up to 50 unread messages can be viewed at a given time. Messages can span multiple conversations, either open (current) or closed (past) conversations.
- When users open the chat client, they're shown the last message received. They can scroll up or down to read the unread messages, as directed by the **New messages above** button or **New messages below** button.
- A new messages separator line is displayed between the read and unread messages.
- When a user closes and reopens the chat window, the messages displayed are considered as "read" even though the user might not have reviewed them.

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System messages

During active conversations with live or virtual agents, certain system messages inform users and agents about the conversation state. For example, if a user is engaged in live chat, but doesn't respond within a certain amount of time, a conversation timeout message is displayed: `The conversation is timing out, are you still there?`

You can change base system messages by editing their related system properties in Chat Settings in the Conversational Interfaces console.

Disable live agent support for a channel

Add the *`disable_live_agent`* property to the Channel Properties related list to exclude it from live agent support.

Before you begin

Role required: admin

About this task

The *`disable_live_agent`* property is replacing the *`com.glide.cs.exclude.liveagent.support`* system property to indicate that the channel doesn't support a live agent. If the *`disable_live_agent`* parameter is not set for the channel, the older system property will still be honored for the time being.

Procedure

1. Navigate to **All**, and then enter `sys_cs_channel.list` in the filter.
2. Select a channel name in the table.
   For example, select **Alexa**.
3. In the **Channel Properties** related list, select **New**.
4. On the Custom Adapter Property New record form, fill in the fields.

Field	Description
Name	Enter `disable_live_agent`.
Value	Enter `true`.

5. Select **Submit**.

Result

The *`disable_live_agent`* parameter displays in the Channel Properties related list.

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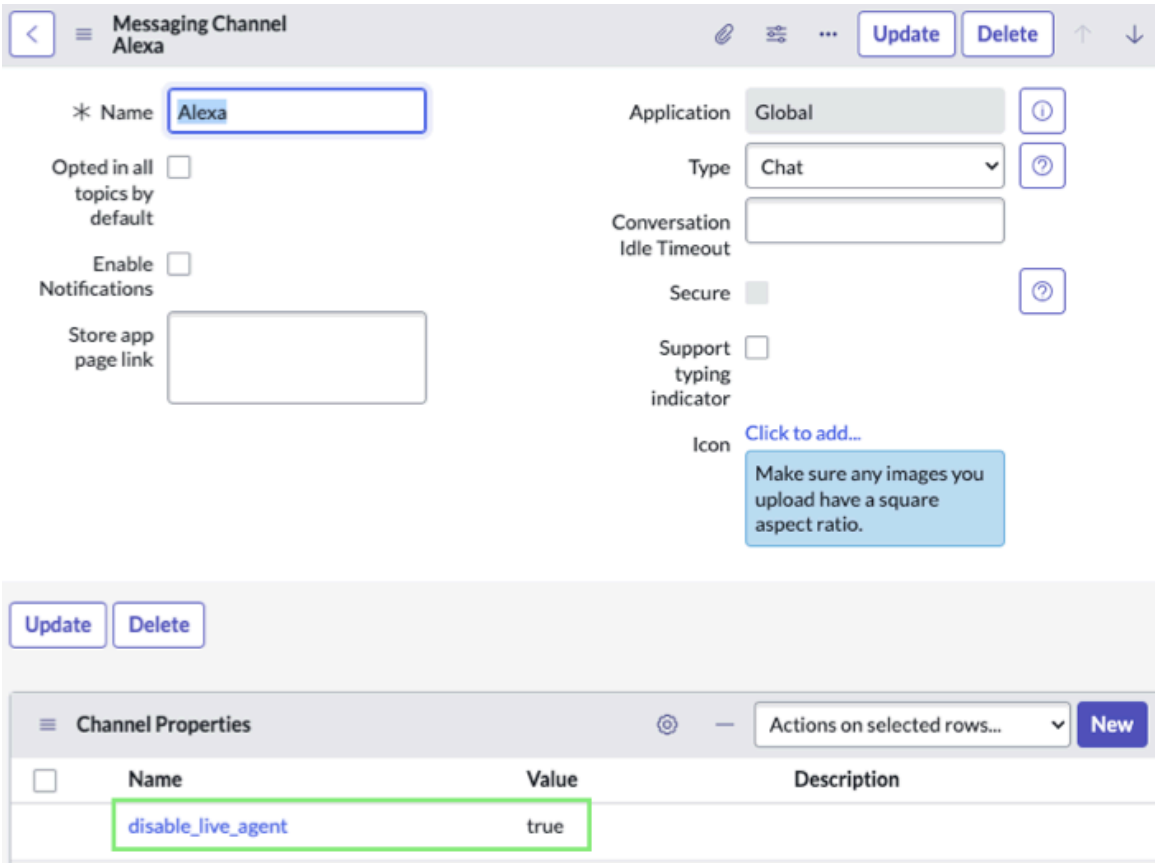

Using Asynchronous Chat in messaging channels

Enable your organization or brand to maintain constant engagement with end users. With Asynchronous Chat, your agents and end users can participate in long-running conversations without being online concurrently. Agents can also proactively contact users whenever there is useful information to share, such as important alerts or updates.

With Asynchronous Chat, end users and agents can engage in conversations that might span several hours or even days. These conversations run on messaging channels that allow your users and agents to communicate at different times and to resume conversations where they left off. Users can respond at their convenience and are no longer limited to working with agents only during customer support hours.

Long-running conversations are supported on channels that are designated as messaging channels in the Messaging Channel [sys_cs_channel] table. Messaging channels provided with your base system include the SMS channel, which is used by the ServiceNow Conversational SMS Integration with Twilio app and the ServiceNow Conversational SMS service channel app.

Starting with the Rome release, you can also configure the web (mweb) channel, which includes the iOS, Android, and desktop devices, as a messaging channel instead of a chat channel. For configuration details, see Configure asynchronous chat for the web channel.

Note:
The web chat and mweb channels are the only channels that support both chat and messaging mode, depending on your need. Web chat can only be set up in one mode on any given instance. The Asynchronous Chat feature specifically refers to the mweb channel in messaging mode.

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Requirements

Asynchronous chat requires certain plugins and ServiceNow applications from the ServiceNow Store.

Plugins and ServiceNow apps required for asynchronous chat

Plugin or ServiceNow app	Description
Glide Conversation Server [com.glide.cs]	Enables Virtual Agent functionality handled by the Conversation Server, including conversation settings and the Virtual Agent web client plugin (com.glide.cs.sn-va-web-client-app). The Conversation Server is included with Virtual Agent Lite, which is provided with your base system. For full Virtual Agent functionality, see Activate Glide Virtual Agent, which is available by subscription.
Conversational Messaging [com.glide.messaging.awa]	Enables features for conversational messaging, such as messaging actions in Workspace. For details, see Activate Conversational Messaging.
Now Mobile app (Version 12.2)	Enables users to submit incidents and requests, manage tasks, and request help from Agent Chat (and Virtual Agent if using Virtual Agent). End users install the Now Mobile app for iOS or Android systems from the Apple App Store or the Google Play store, respectively.
Agent-initiated Messaging Interface (Version 3.0)	Supports agent-initiated conversations in messaging channels. This ServiceNow app, available from the ServiceNow Store, also installs the Conversational Messaging plugin (com.glide.messaging.awa).

How Asynchronous Chat works

Asynchronous Chat provides various features to help you improve the conversational experience for your users and agents, such as:

- Message indicators that inform users of new and unread messages received when they're away from the chat window or when they've been offline.
- System messages, displayed to users and agents, that are tailored to either messaging or chat channels.
- Idle conversation timeout period that admins can adjust for messaging channels, as needed.
- Proactive messaging capability that enables agents to initiate communication with users

The following sections explain how these features work for Asynchronous Chat.

New and unread message indicators

End users can receive messages on a messaging channel, even when they're offline. Users can be anonymous (guests) or known (authenticated). The unread message count is displayed on

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the chat widget. The unread message count reflects the number of any offline messages that were sent by a live agent and any simple notifications received.

Unread message count and new message indicators



- There is no limit on the number of unread messages. Up to 50 unread messages can be viewed at a given time. Messages can span multiple conversations, either open (current) or closed (past) conversations.
- When users open the chat client, they land on the very last message received. They can scroll up or down to read the unread messages, as directed by a **New messages above** button or **New messages below** button.
- A new messages separator line displays between the read and unread messages.
- When users close and re-open the chat window, the messages displayed are considered as "read" even though users might not have reviewed them.

System messages

Certain system messages that are displayed to users and agents in chat mode are not applicable in messaging mode, and are suppressed as needed. The following table identifies system messages that are displayed or suppressed, depending on the mode.

System messages displayed in messaging and chat modes

System message	Messaging mode (web and mobile)	Chat mode
X has closed the support session. [Displayed when either the agent or user closes the chat session]	Displayed	Displayed
The support session was closed. [Displayed when the chat session was not closed by the agent or user]	Suppressed	Displayed
X has entered the chat.	Suppressed	Displayed
Thank you for contacting support. I am looking into your question and will be with you shortly.	Displayed	Displayed
The conversation is timing out, are you still there? [Controlling idle live chat sessions controlled by the *com.glide.cs.idle_chat_reminder_message* system property]	Suppressed	Displayed

Idle conversations and messaging actions in messaging channels

In chat channels, the default idle conversation timeout period for Virtual Agent and Live Agent conversations is two hours (7200 seconds). However, for Live Agent conversations in messaging channels, certain messaging actions are automatically applied, which affects how

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idle conversations are handled. In messaging channels, when a requester hasn't responded to an agent message within two days, the conversation state changes to Closed Abandoned and the message is closed. For more information on messaging actions, see Configure messaging actions.

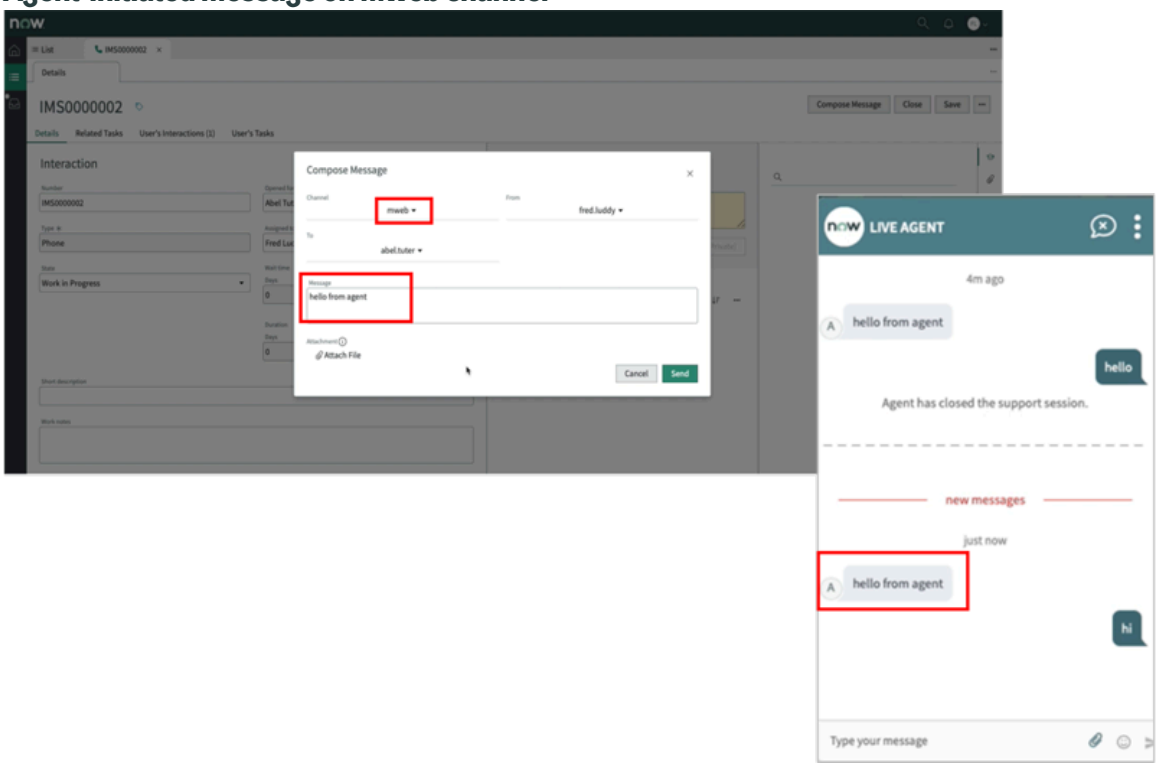
As admins, you can override the conversation idle timeout period per channel by setting the value in the **Conversation Idle Timeout** field in the Messaging Channels [sys_cs_channel] table. For details, see Override the conversation timeout period by channel.

Proactive messaging

Using the Agent-initiated messaging interface, agents can proactively communicate with end users to share relevant or helpful information. When agents initiate messaging from the mweb channel in Asynchronous Chat, your users have the option to respond immediately and engage in a two-way conversational experience. Proactive messaging with the mweb channel has the following capabilities:

- **Compose Message** feature that agents use to create and send messages to selected users. Messages can contain links and file attachments.
- When a user replies to a message, the ongoing interaction context is retained, providing the agent with the information needed to maintain the conversation.

Agent-initiated message on mweb channel



For more information on agent-intiated messages, see Install agent-initiated messaging interface.

End user experience in live agent conversations

When a user starts the web client after having received offline messages from a specific agent, for example Agent A, the conversation is in live agent mode:

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- If Agent A is available, the user can resume the conversation with Agent A.
- If Agent A is not available, but Agent B is, depending on the agent reassignment settings, the chat window displays Agent B's name and avatar and the conversation resumes.
- If no agents are available, the conversation is routed to an agent based on the Queue Max Wait Time. If there isn't a wait time, the conversation waits until an agent becomes available.

Configure asynchronous chat for the web channel

Set the web client as a messaging channel for asynchronous chat.

Before you begin

Role required: virtual_agent_admin or admin

About this task

The base system web channel, mweb, is automatically configured as a chat channel for web and mobile clients. To use the web channel as a messaging channel, change the channel **Type** in the Messaging Channel [sys_cs_channel] table.

Procedure

1. Navigate to **All** and in the Navigation filter, enter `sys_cs_channel.list`.
2. In the Messaging Channel form, select the mweb record and double click the **Type** field.
3. Change the Type to Messaging.
4. Save the value.

Result

The mweb channel is set to messaging mode. To help manage long-running conversations, the system automatically performs certain messaging actions in messaging mode:

- Requester message without agent response (agent experience): If an agent hasn't responded to a requester within 30 minutes, the agent receives a reminder that a message from an end user needs a response.
- Agent message without requester response: If a requester hasn't responded to an agent message after two days, the conversation state in the Interaction record is automatically set to closed abandoned.

For more information on messaging actions, see Configure messaging actions. For details on Virtual Agent and Live Agent idle conversation timeouts and conversation states, see Closing Virtual Agent and Agent Chat conversations and Virtual Agent interaction records.

Installing Conversational Interfaces components

Use the Conversational Interfaces Home page to install Virtual Agent and related plugins. Once installed, select a card to customize your bot or set up Agent Chat.

If you've never installed Virtual Agent, the Conversational Interfaces console prompts you to do so first. The layout of the **Home** page may vary, depending on which features you have installed and configured.

Install Virtual Agent

To begin, you must install the Virtual Agent plugin. Select **Get Virtual Agent plugin** to install it.

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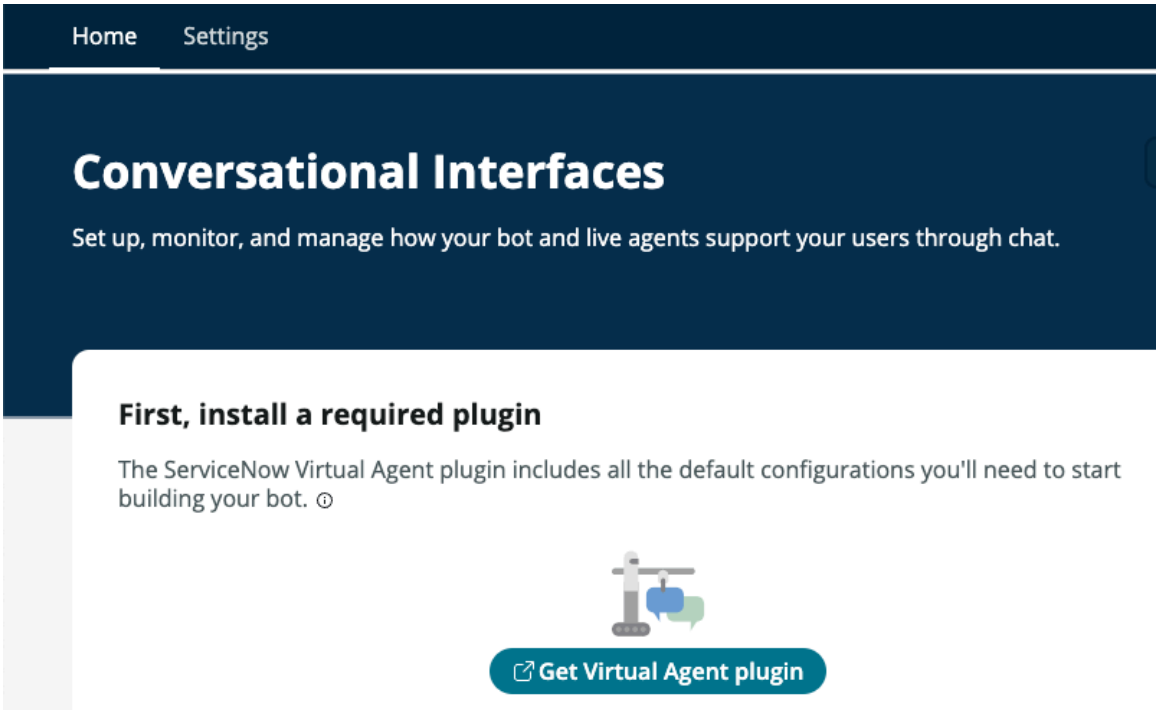
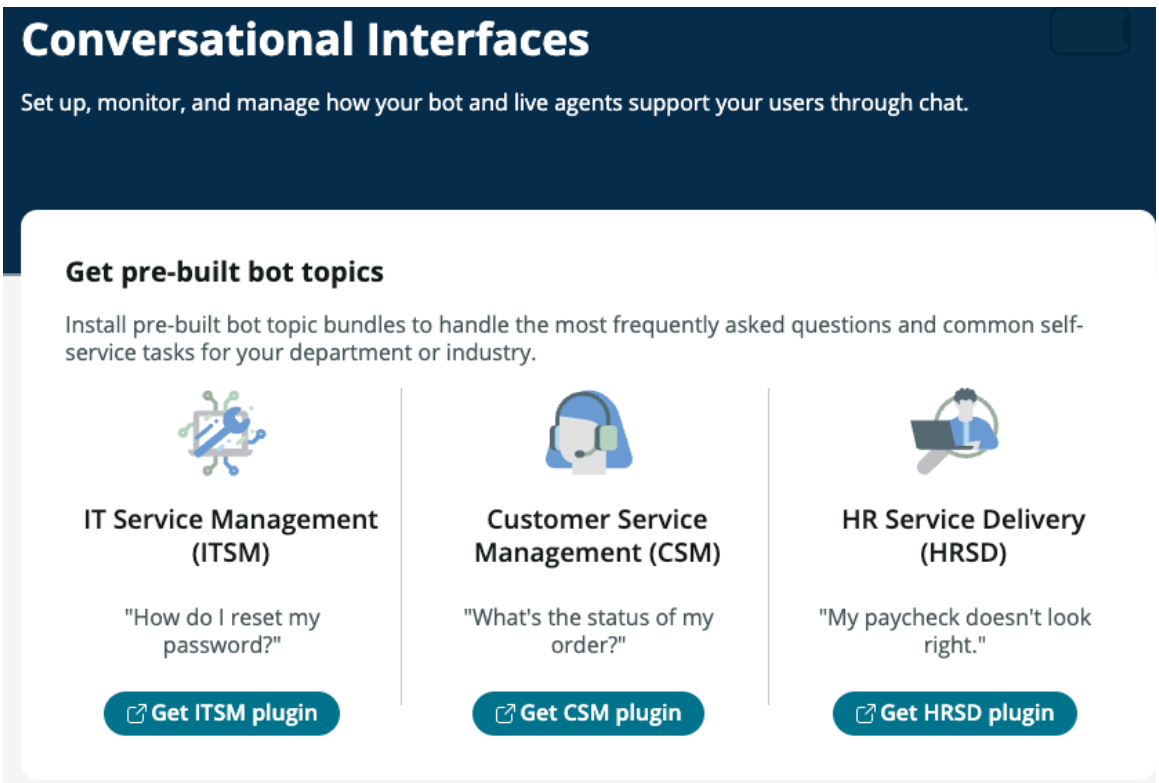


Get pre-built bot topics

Activate plugins that provide the pre-built topic conversations you want to use to handle common user requests. For example, IT-related support issues, such as resetting a password or HR-related issues such as requesting a leave of absence. For more information, see Prebuilt Virtual Agent topics, topic blocks, and ServiceNow NLU models.



Here's what you can do next

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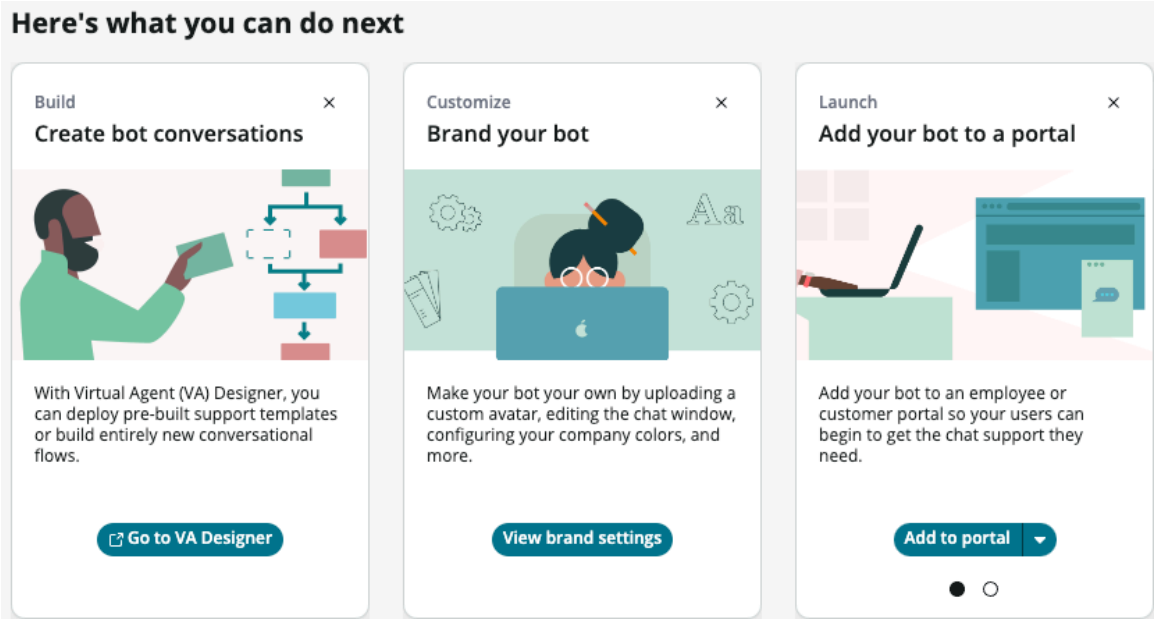
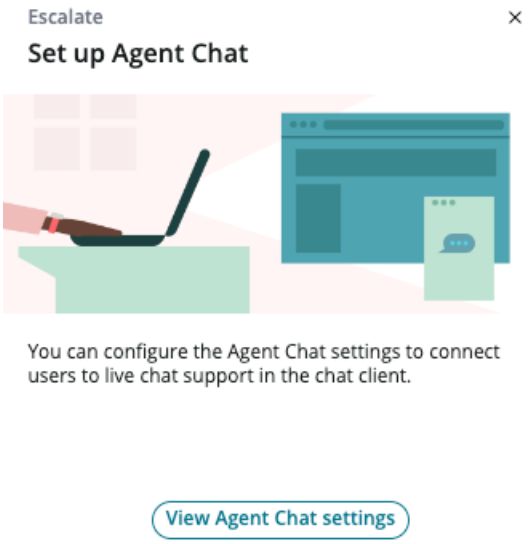
Explore popular Virtual Agent settings from the Conversational Interfaces Home page. Next steps typically include branding your bot, adding it to a portal that your users can access, and creating conversations in Virtual Agent Designer.



Before implementing your Conversational Interfaces, take some time to ask and answer a few important questions meant to help you envision the Conversational Interfaces experience you need and want for your business. Browse the **Get the essentials for your Virtual Agent** section for more options.

Set up Agent Chat

Activate and set up live agent support. Set up agent names and avatars, set agent status messages, and determine whether agents can view user chat history.



Install Sidebar

Provide live agents with a way to collaborate with others while they work on a Workspace task-based or interaction-based record.

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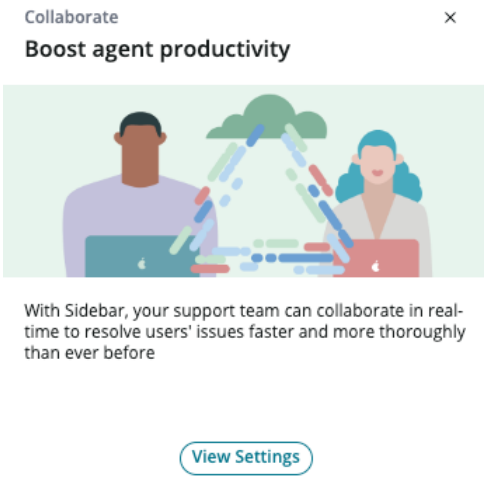
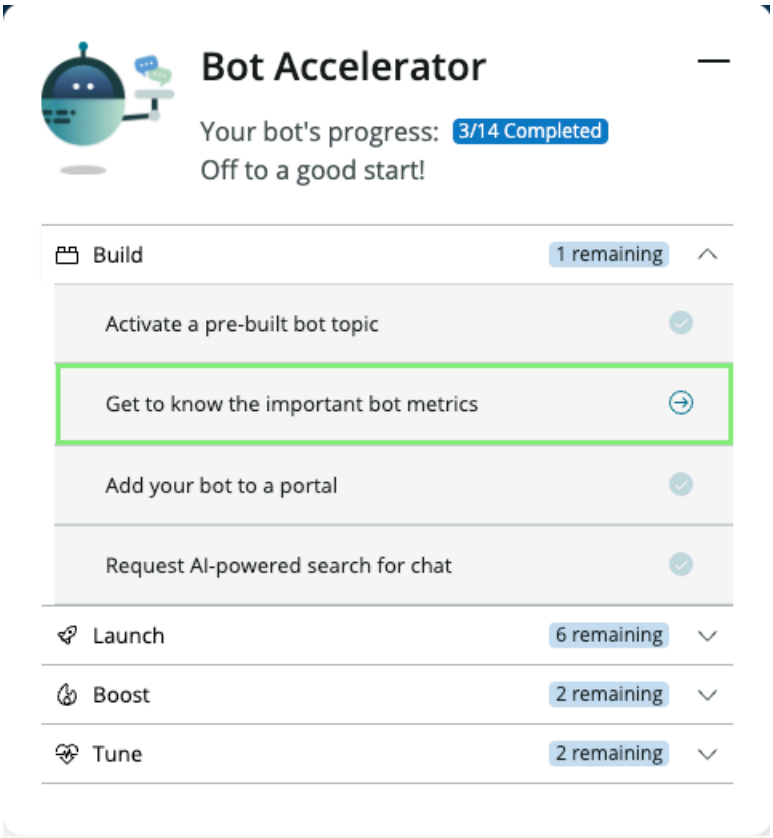


Bot Accelerator progress panel

The progress panel quickly shows you what has been configured and what tools remain unconfigured or inactive.



Configuring Conversational Interfaces

You can use the Conversational Interfaces console and the **Chat Settings** option in the **Home** page to explore and configure general chat functionality and set up Virtual Agent and Agent Chat features.

Configuring Conversational Interfaces

Use the cards on the Conversational Interfaces console to set up features for Virtual Agent and Agent Chat. The cards automatically sort each time you visit and unaddressed features appear first.

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For more information, select the question mark at the top right. This opens a contextual help panel.



Now Assist in Virtual Agent cards

Card	Description
Create a Virtual Agent with Now Assist, using an LLM model and generative AI skills. 	To create a virtual agent using Now Assist, select **Get started** to display the Assistants screen. For more information, see Manage LLM virtual agents on the Assistants screen.
Create a Virtual Agent with NLU, which contains default settings and setup topics. 	To create a virtual agent using an NLU model: **1.** Select **Get started** to open a new window with the plugin screen where you can install the com.glide.cs.chatbot plugin. For more information, see Activate Virtual Agent. **2.** After the plugin is installed, return to the previous window and refresh it using your browser's refresh button. **3.** Select **Settings** to display the CI Admin Experience settings page. **4.** In the left-hand panel, select **Virtual Agent** to configure your settings and NLU models. For more information, see Configuring Virtual Agent.
Monitor your Now Assist in Virtual Agent 	To view Virtual Agent analytics for existing LLM virtual agents, select **View performance**. For more information, see Analyzing Now Assist in Virtual Agent. To manage existing LLM virtual agents, select **Manage assistants** to display the Assistants

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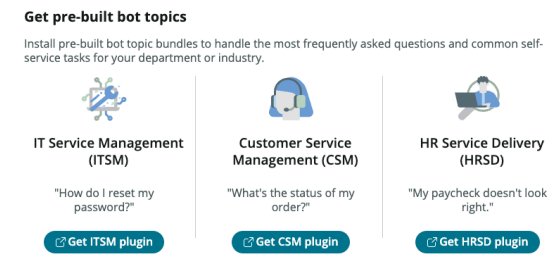
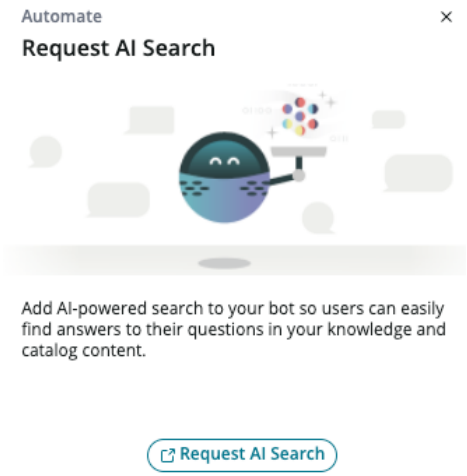
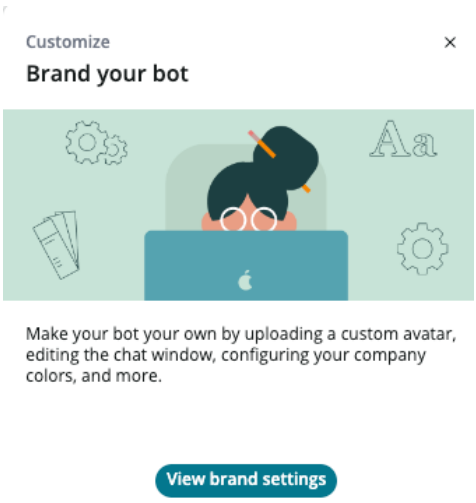
Now Assist in Virtual Agent cards (continued)

Card	Description
	screen. For more information, see Manage LLM virtual agents on the Assistants screen.

Chat configuration cards

Card	Feature	Description
	Get pre-built topics	Teach your bot to handle additional requests using pre-built conversation topics.
	Request AI Search	Give your users the power to search for answers to their questions or solutions to their requests by adding AI Search to your Virtual Agent bot.
	Brand your bot	Customize your bot by selecting the colors and icons, and add a logo that reflects your company's portal.

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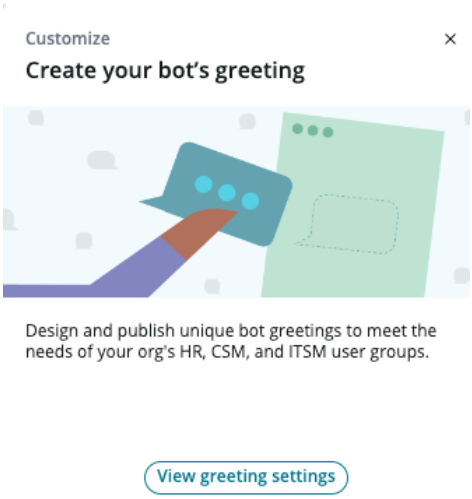
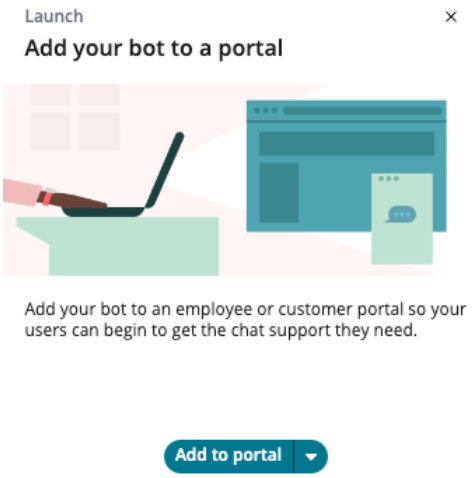
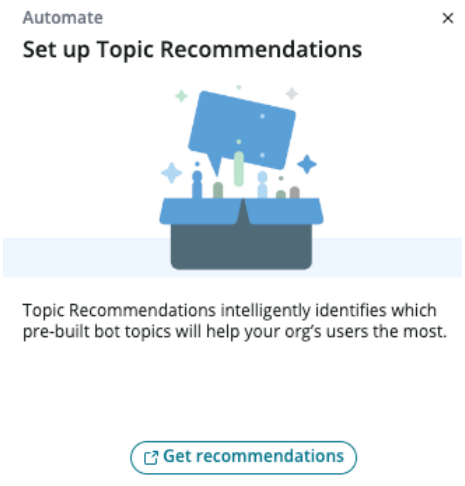
Chat configuration cards (continued)

Card	Feature	Description
	Create your bot's greeting	Customize your bot by choosing how it greets and interacts with your users.
	Add your bot to a portal	Choose where you want your Virtual Agent bot to live by adding it to a portal.
	Set up Topic Recommendations	Get recommended topics based on analyses of existing support requests.

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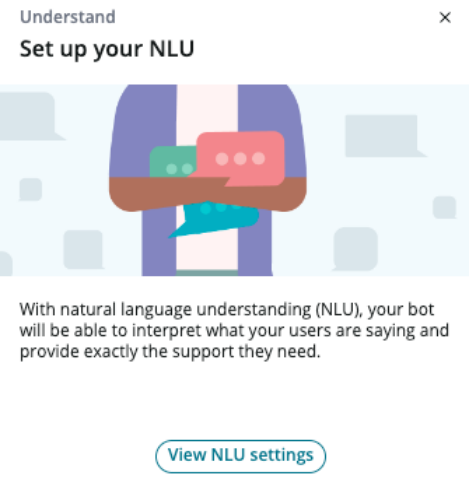
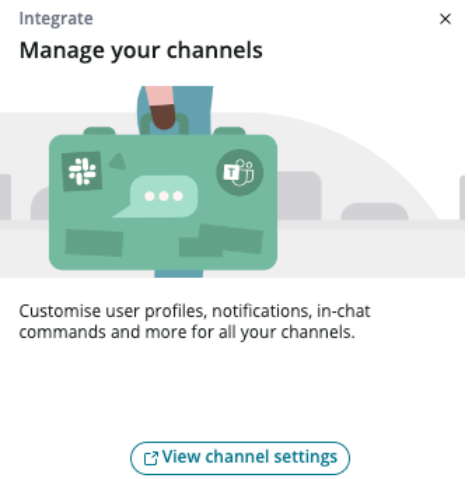
Chat configuration cards (continued)

Card	Feature	Description
	Capture conversational metrics	Use the Conversational Analytics Dashboard to collect interaction metrics to evaluate your bot's performance.
	Set up Natural Language Understanding (NLU)	Help your bot better understand a user's intent. For details, see Advantages of natural language models over keywords.
	Virtual Agent integration with messaging apps	Add your bot to other channels, such as a Conversational Integration with Slack or Microsoft Teams.

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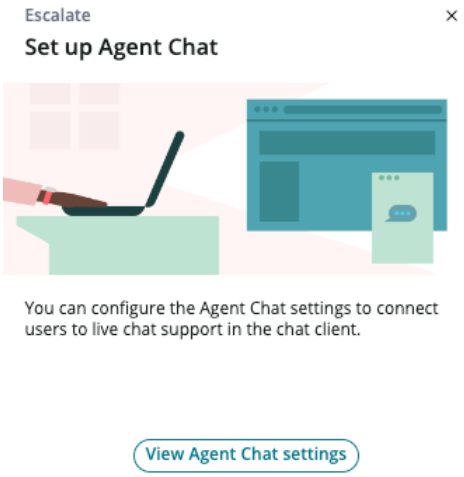
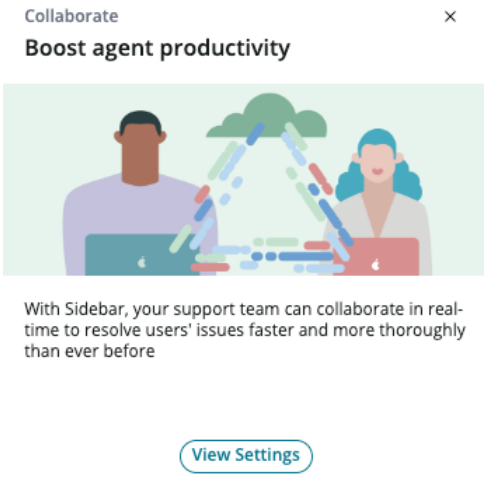
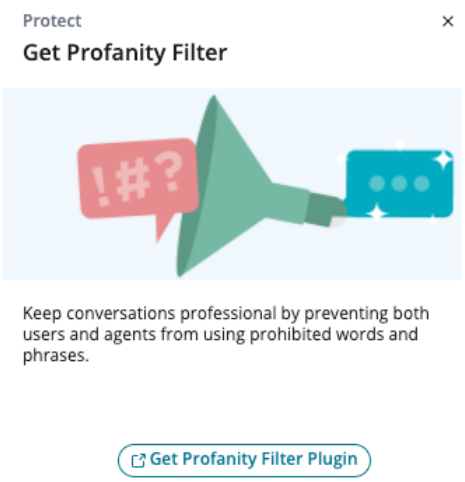
Chat configuration cards (continued)

Card	Feature	Description
	Set up Agent Chat	Connect users to live chat support in the chat client they are using.
	Setting up Sidebar	Provide live agents with a way to collaborate with others while they work on a Workspace task-based or interaction-based record.
	Install and configure the Profanity Filter plugin for Agent Chat	Prevent live agents from sending messages with inappropriate or profane language to requesters.

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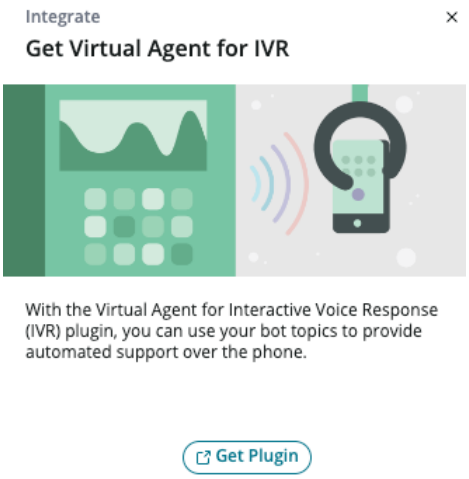
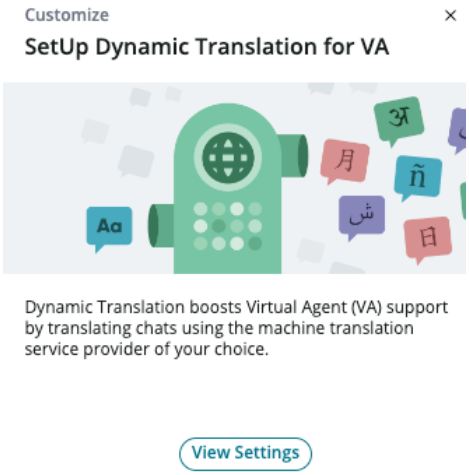
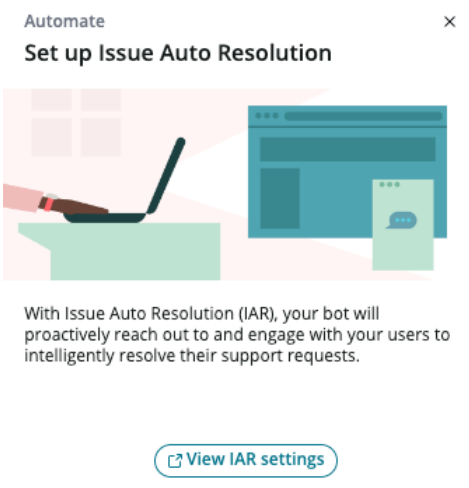
Chat configuration cards (continued)

Card	Feature	Description
	Install Conversational IVR with Amazon Connect	Enable user conversations with a bot using the phone channel.
	Using language detection and dynamic machine translation in Virtual Agent	Enable a combination of language detection and machine translation for Virtual Agent to improve the chat experience for diverse users.
	Set up Issue Auto Resolution	Provide users with immediate self-service by using machine learning to intelligently deliver Virtual Agent topics, Knowledge articles, and catalog items.

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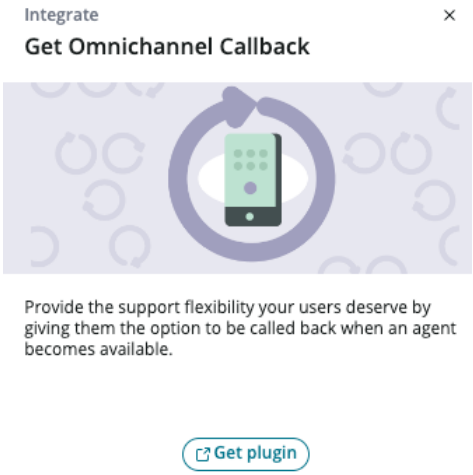
Chat configuration cards (continued)

Card	Feature	Description
	Install Omnichannel Callback	Enable other ServiceNow® apps to display or announce callback options to users.

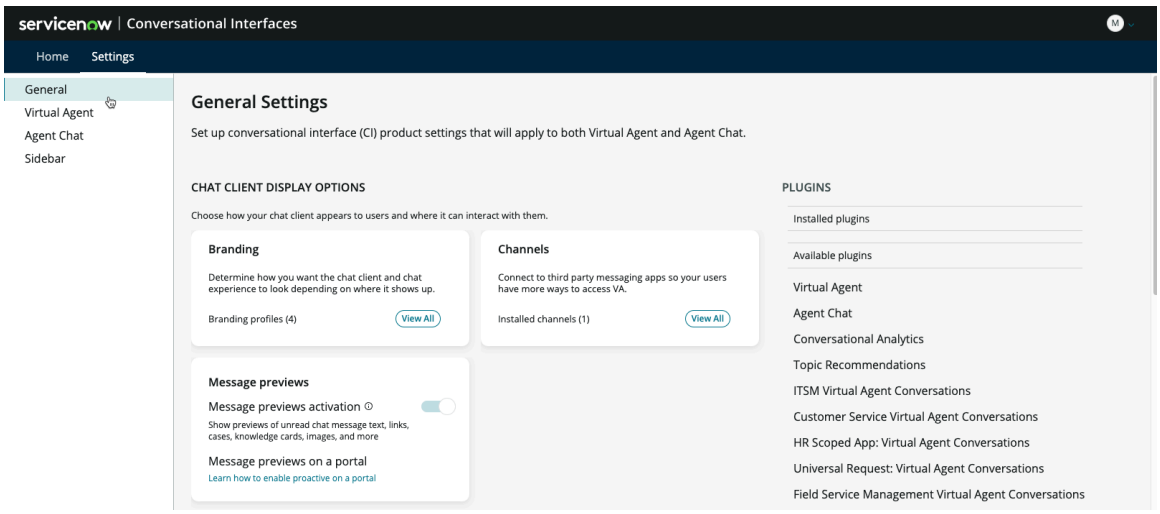
Assistants

The Assistants screen appears when you select the **Assistants** tab on the Conversational Interfaces home screen.

Chat settings

The **Chat Settings** tab opens with the **General** tab selected. This tab contains general settings that apply to all Conversational Interfaces applications. The currently installed plugins and available plugins that you can activate are listed as links. Select a link for more information or to start an activation process.

The **Virtual Agent**, **Agent Chat**, and **Sidebar** tabs in the left navigation pane open configuration settings pages for each application.



For more information about these settings, see the following topics:

- General settings
- Virtual Agent settings

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- Agent Chat settings
- Sidebar settings

Finding configuration settings from earlier releases in Conversational Interfaces console

If you upgraded from a previous release, you will find that configuration settings and forms for Virtual Agent and Agent Chat can be accessed from the Conversational Interfaces console page.

Use the following table to find where Virtual Agent and Agent Chat configuration forms and settings used in previous releases are located in the Conversational Interfaces console and **Chat Settings**.

For example, the former Chat Setup form is now Agent Chat Settings, which you can access from the **Set up Agent Chat** card in Conversational Interfaces console (navigate to **All** > **Conversational Interfaces** > **Home**) or through the **Chat Settings** tab on the Home page.

Configuration forms and settings for Virtual Agent and Agent Chat

Configuration form or setting in previous release	Conversational Interfaces console action card	Chat Settings
Chat client		
Branding and Chat menu **[Conversational Interfaces** > **Branding and Chat Menu]**	Edit your bot's look and feel	Branding in General Settings **[All** > **Conversational Interfaces** > **Settings]**
Messaging Apps Integration for Microsoft Teams, Slack, and Workplace from Facebook **[Conversational Interfaces** > **Messaging Apps Integration**] - Still available in application navigator under **Conversational Interfaces**	Add your bot to other channels	Channels in General Settings **[All** > **Conversational Interfaces** > **Settings]**
Chat Setup **[Conversational Interfaces** > **Chat Setup]**	Set up Agent Chat	• Agent Chat settings **[All** > **Conversational Interfaces** > **Settings** > **Agent Chat]** • Enable notifications moved to Virtual Agent settings **[All** > > **Conversational Interfaces** > **Settings** > **Virtual Agent]**

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Configuration forms and settings for Virtual Agent and Agent Chat (continued)

Configuration form or setting in previous release	Conversational Interfaces console action card	Chat Settings
Context related list in Chat Setup **[Conversational Interfaces** > **Chat Setup]**	No card	Context variables in General Settings **[All** > **Conversational Interfaces** > **Settings]**
System Messages related list in Chat Setup **[Conversational Interfaces** > **Chat Setup]**	No card	System messages in General Settings **[All** > **Conversational Interfaces** > **Settings**]
URL Navigation related list in Chat Setup **[Conversational Interfaces** > **Chat Setup]**	No card	URL navigation in General Settings **[All** > **Conversational Interfaces** > **Settings]**
Conversation routing		
Pre-chat Survey **[Conversational Interfaces** > **Pre-Chat Survey]**]	No card	Pre-chat surveys in General Settings **[All** > **Conversational Interfaces** > **Settings]**
Context Topic intent **[Conversational Interfaces** > **Context Topic Intent]**	No card	Topic context intent in General Settings **[All** > **Conversational Interfaces** > **Settings]**
Virtual Agent		
Topic Recommendations **[Conversational Interfaces** > **Virtual Agent** > **Topic Recommendations]** - Option still available in application navigator under **Conversational Interfaces**	Get recommended topics	Topic Recommendations in Virtual Agent settings **[All** > **Conversational Interfaces** > **Settings** > **Virtual Agent]**
Recommendation Settings **[Conversational Interfaces** > **Virtual Agent** > **Recommendation Settings]**]- Option still available in application navigator under **Conversational Interfaces**	No card	Topic Recommendations in Virtual Agent settings **[All** > **Conversational Interfaces** > **Settings** > **Virtual Agent]**

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Configuration forms and settings for Virtual Agent and Agent Chat (continued)

Configuration form or setting in previous release	Conversational Interfaces console action card	Chat Settings
NLU settings tab in General Settings **[Conversational Interfaces** > **Virtual Agent** > **General Settings]**	Set up NLU	Natural Language Understanding in Virtual Agent settings **[All** > **Conversational Interfaces** > **Settings** > **Virtual Agent]**
Incident Auto-Resolution **[Conversational Interfaces** > **Incident Auto-Resolution** > • **Setup** • **Configuration** • **Simulation]** Options are still available in application navigator under **Conversational Interfaces**	Set up Auto Resolution	Issue Auto Resolution (IAR) in Virtual Agent settings **[All** > **Conversational Interfaces** > **Settings** > **Virtual Agent]**
Deflection Settings tab in General Settings **[Conversational Interfaces** > **Virtual Agent** > **General Settings]**	No card	Deflection Metrics in Virtual Agent settings **[All** > **Conversational Interfaces** > **Settings** > **Virtual Agent]**
Custom Greetings and Setup **[Conversational Interfaces** > **Virtual Agent** > **Custom Greetings and Setup]**	Choose how your bot greets users	Custom greetings and setup in Virtual Agent settings **[All** > **Conversational Interfaces** > **Settings** > **Virtual Agent]**
Metrics		
Conversational Analytics **[Conversational Interfaces** > **Conversational Analytics** > • **Virtual Agent Dashboard** • **Event Configuration** • **Formula Override]**	Collect interaction metrics	No setting

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Configuration forms and settings for Virtual Agent and Agent Chat (continued)

Configuration form or setting in previous release	Conversational Interfaces console action card	Chat Settings
Options are still available in application navigator under **Conversational Interfaces**		

General chat settings

Use the Conversational Interfaces Console to set up the basic chat features shared by Virtual Agent and Agent Chat.

General chat settings

I want to...	See these topics
Chat Client Display Options	
Brand my bot	Branding your chat client
Preview new or unread messages in a minimized chat window	Enable message preview on the web client
Conversation Routing	
Configure my bot to run in third-party messaging apps	Virtual Agent integration with messaging apps.
Create pre-chat surveys	Define pre-chat survey configurations
Create and use context variables to store chat-related information	Configure context variables for storing chat-related information
Display or announce callback options to users through other ServiceNow apps	Omnichannel Callback
Configure topic context intents	Define topic context intent configurations
System Actions	
Modify system chat messages	Change Virtual Agent and Agent Chat system messages
Specify how links open from the chat window	URL navigation in Conversational Interfaces
Configure my bot to detect sensitive data	Configuring Sensitive Data Handler
Send email summaries of unread messages to users when they are inactive	Sending missed chat activity emails

Manage LLM virtual agents on the Assistants screen

Create, edit, and turn on/off LLM virtual agents from the Assistants screen.

Before you begin

Role required: virtual_agent_admin

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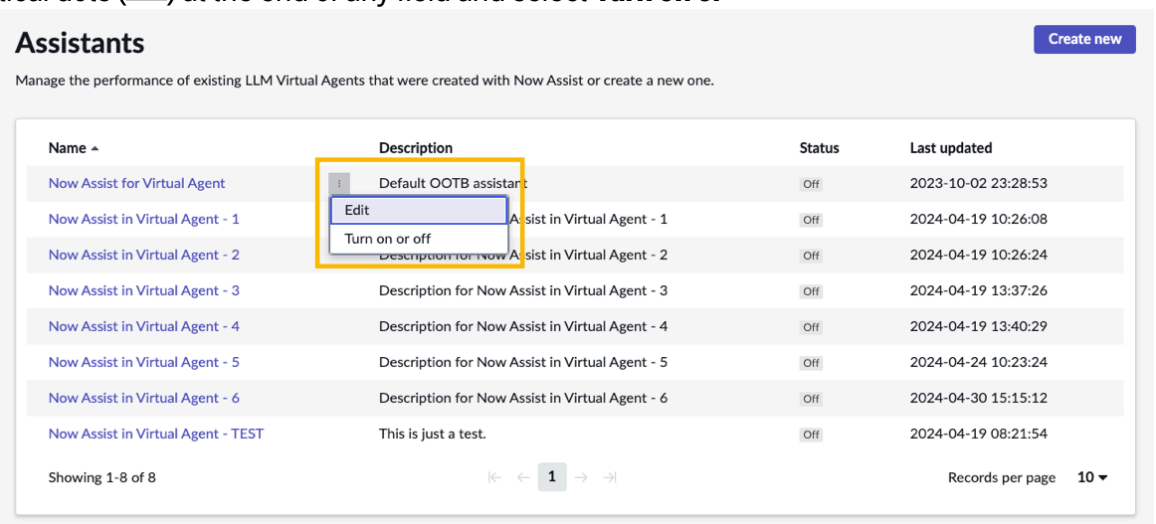
Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Assistants**.
2. The Assistants screen displays existing LLM virtual agents with these fields:

Field	Description
Name	Virtual agent's name.
Description	Description of the virtual agent.
Status	Is the virtual agent active.
Last updated	Date and time the virtual agent was most recently updated.

3. To create a new virtual agent, select **Create new** to display the Now Assist for Virtual Agent Overview screen.
   Follow the screens to create a new virtual agent. For more information, see Configuring Now Assist in Virtual Agent.
4. To edit an existing virtual agent, select the virtual agent's name or select the three vertical dots ( ) at the end of any field and select **Edit**.
   If Virtual Agent is completely configured, the Now Assist for Virtual Agent Review screen displays. For more information, see Configuring Now Assist in Virtual Agent. If Virtual Agent is not completely configured, the last unfinished step in the Virtual Agent guided setup displays. For more information, see Installing Conversational Interfaces components.
5. To turn an existing virtual agent on or off, select the three vertical dots ( ) at the end of any field and select **Turn on or off**.



Add your bot to a portal

Give your users a place to interact with your bot and human agents. Choose a Service Portal chat configuration provided with your base system, such as the Service Portal Agent Chat configuration used for Agent Chat and Virtual Agent. Your end users can initiate and maintain a bot or Agent Chat conversation in any page of the portal.

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Before you begin

Activate the Glide Virtual Agent (com.glide.cs.chatbot) or the Agent Chat (com.glide.interaction.awa) plugin. You can activate the Glide Virtual Agent plugin only if you have a subscription.

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Home**.
2. Under **Add your bot to a portal**, select **Add to portal** to configure the base system portal. For example, to configure the portal used for Agent Chat and Virtual Agent, select Service Portal Agent Chat Config.
3. On the form, update the portal configuration.

Field	Description
Active	Option to make the configuration active. The base system Service Portal configurations are automatically active.
Name	Unique name for the configuration record.
Portals	The portals in which you would like to use this chat configuration. If no portal is selected, the configuration applies to all portals in the system.
Application	Read-only application scope for the record.
Public	Option to make the portal available to users before they log in.
Roles	Roles that a user must have to use the portal. If you don't select a role, Agent Chat and Virtual Agent is available to all users regardless of their role.
Order	Number that indicates the order in which the configurations should run. Only one configuration applies per portal. If there are multiple configurations on a portal, the system runs the first configuration found from lowest to highest.
Server script	A script that passes page and widget data to an Agent Chat conversation when a user initiates the conversation. For example, pass a field to the chat conversation to enable Agent Chat to access the value. Data passed in this script is available to every page in the portal associated with this record. This script has access to the GlideSPScriptable API. **Note:** The portal suffix, page ID, and language are automatically available to Agent Chat and do not require a custom script. Sys ID and table are automatically available to Agent Chat when they are present in the URL. The following example returns an object containing the list of catalogs associated with the portal to the current conversation.

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Field	Description
	`(function ($sp) { return { catalogs: $sp.getValue('catalogs') }; })($sp);` When Agent Chat opens in an `iframe` HTML element, the list of catalogs is included in the `iframe` URL. Parameters from this field override any conflicting page data passed to Agent Chat.

4. Select **Update**.

Result

Your end users can initiate and maintain an Agent Chat or Virtual Agent conversation from any page in the selected portal.

What to do next

See your portal in action

Return to Conversational Interfaces Home and under **Add your bot to a portal**, select the second navigation dot at the bottom of the card. When the card changes to **Interact with your bot**, use the **Open portal** menu to select the portal to view. When the specified portal page opens, select the chat icon in the lower right corner to start a bot conversation.

Configure other Service Portal Agent Chat features

In Service Portal, you can customize the Agent Chat button and pass page data to Agent Chat. For more information, see Configure Agent Chat in Service Portal.

Branding your chat client

Customize your chat interface with your own brand, including company logo and bot avatar, UI color schemes, fonts, and the chat support menu displayed to your users.

Note:
For new customers onboarding from Vancouver onward, the web client is only accessible to authenticated users by default. To allow unauthenticated users to access the web client, enable **Public access** in **Conversational Interfaces** > **Settings** > **General**. For more information, see Enable public access to the web client.

Multiple branding configurations

You can create any number of branding configurations for an instance. These branding configurations apply to the web chat and mobile clients and don't apply to the Conversational Integrations for Slack, Microsoft Teams, Workplace by Facebook, and Facebook Messenger.

Note:
Branding for bots in the Conversational Integration with Microsoft Teams is available through the Microsoft Teams app customization feature. For details, see MS Teams branding for the conversational integration in Now Community. For information about branding bots in Slack, see Configure branding for your Virtual Agent bot in Slack.

The default branding configuration includes the Virtual Agent bot, which has a ServiceNow avatar. If you want additional branded bots, create a user profile for each bot in the User [sys_user] table. Give your bot a unique user ID, name (for example, Acme), upload the photo

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(image) for your bot avatar, and make your bot active. For details on adding users to your instance, see Create a user.

Once created, you then select the bot to be used in a configuration. A branded bot can be used in a single configuration or in multiple branding configurations.

Supported branding items

Conversational Interfaces provides a default branding configuration that you can customize. To change the default configuration, create other branding configurations, or modify the chat (support) menu, gather and prepare the following files and information:

Organization images

Images of company logos to be used in your chat windows. If you're using Virtual Agent, the images of avatars to be used for branded bots.

Images must be in .jpg, .png, .bmp, .gif, .jpeg, .ico, or .svg file format. The images can be high resolution, but the image display is scaled based on the aspect ratio. Keep in mind that if chat is run in its own browser window, a thumbnail of the branding logo displays automatically in the browser tab.

Colors and fonts

Colors and fonts used for the various user interface items, such as chat bubbles, buttons, and notifications displayed.

If you want to change the color of interface items, determine the Hex number or RGBA color for those items. When you specify the Hex or RBGA colors during configuration, you can immediately see your changes in the example chat window. To learn more about Hex numbers and RGB color specifications, see HTML Color Names (W3CSchools).

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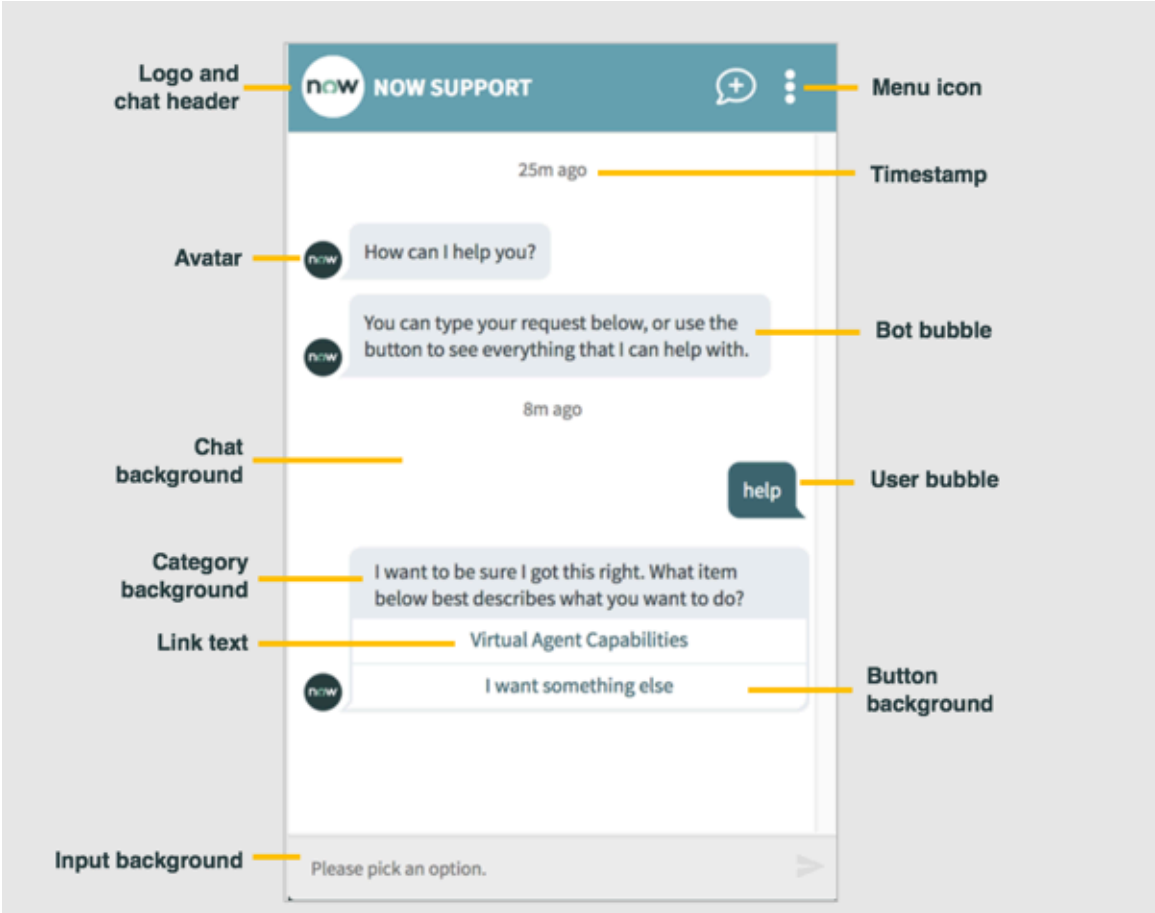
UI items in the chat window



Chat menu items

Contact information for your support organization, such as support call hours, call center support phone number, and support email address. You can customize information in the support menu by adding or changing menu items, including the text and icons displayed. You can also control the visibility of the menu items (show or hide menu options).

You can also change the default menu icons or add icons for new menu items. The icons must be in .svg file format. For better resolution, use a single-color icon.

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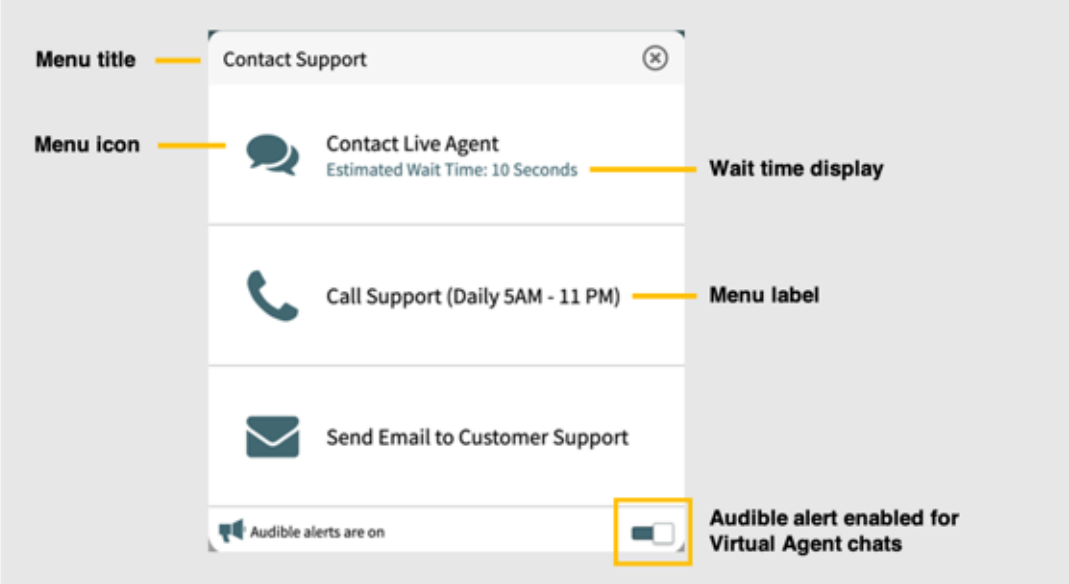
Chat menu



Create a new user for a branded bot

The default branding configuration includes the Virtual Agent bot, which has a ServiceNow avatar. To create a new bot with your own branding, create an active user profile for the bot and link it to a Live Profile.

Before you begin

Role required: admin

About this task

If you want to create a new branded bot, create an active user profile for each bot in the User [sys_user] table. Then create a bot profile record by adding this user to the Live Profile [live_profile] table.

Procedure

1. Create a user for the bot.
   Include an image (avatar) for your bot when you create the user. Also ensure that the user is active.
2. Navigate to **All**, and then enter `live_profile.list` in the filter.
3. Select **New**.
4. On the form, fill in the fields.

Field	Description
Name	Unique name for the bot profile.
Type	Type of live profile. Select **User**.
Document	Table associated with the profile. **a.** Select the Search icon ( ). **b.** In the Select the document dialog box, specify the following information:

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Field	Description
	▪ **Table name**: Select **User [sys_user]**. ▪ **Document**: Select the name of the user you created for the bot. **c.** Select **OK**.
Photo	Image (avatar) for the bot profile.
Description	Text that describes the live profile.

5. Select **Submit**.

Result
You can associate the bot profile with a new branding configuration. For details, see Set up your Virtual Agent bot's branding.

Set up your Virtual Agent bot's branding

Create different Virtual Agent branding configurations for the various organizations that use your instance. These configurations apply to the web-based chat and mobile clients only.

Before you begin
If you're using ServiceNow® mobile, make sure you set up Virtual Agent for mobile chat. For details, see Configure Virtual Agent for a ServiceNow mobile application.

Check for updates and improvements to the Omni-Experience Standard Feature Set application on the ServiceNow Store.

Note:
Branding for bots in the Conversational Integration with Microsoft Teams is available through the Microsoft Teams app customization feature. For details, see MS Teams branding for the conversational integration in Now Community. Branding for bots in Slack is available as well. For details, see Configure branding for your Virtual Agent bot in Slack.

Role required: virtual_agent_admin or admin

Procedure
1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Under the **Display Options** section, select **View All** next to **Branding**.
3. Select **New** to create a branding configuration or select the branding configuration record to be updated.
4. On the form, fill in the fields.

Label	Description
Branding name	Name of the branding configuration. Create a new branding configuration or select one of the available choices. For the Washington DC release, the choices include: ○ Polaris-Dark ○ Polaris-Light
Chat Header	Text string that identifies your company or organization in the chat window. For example: Acme Support.

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Label	Description
Minimum delay between bot messages (ms)	Minimum delay, in milliseconds (ms), that occurs between bot responses. The default delay is 500 ms.
Minimum delay before displaying typing animation (ms)	Minimum delay, in milliseconds (ms), that occurs before showing the animation ellipsis indicating the bot is processing user input.
Menu Title	Name of the support menu. The default title is Contact Support.
Branding key	Read-only sys_id of the configuration, which reflects the **Branding name** you entered. The key is in lower case letters with spaces replaced by underscore characters.
Bot Profile	List that opens the Live Profile form to select or create a new bot user profile, which includes the bot picture (avatar). ○ To review and edit the Virtual Agent bot profile, click the information icon. ▪ To change the Virtual Agent bot photo or description, click **Edit record** in the message at the top of the page. ▪ In the Live Profile form, modify the fields and click **Update**. ○ To choose or change the bot for the configuration, select the search icon and click the **Bot Profile** field. Choose the bot profile that you created in a previous step.
Chat Header Logo	Logo image that displays in the chat header. If live chat is run in a browser window, the logo also displays in the browser tab. The chat header logo is set to 42x42 pixels, and the chat message logo is set to 24x24 pixels. An uploaded image that is smaller than these dimensions will appear stretched. A larger image will be scaled down. ○ To add a logo, select **Attach Image** and use the file finder to choose the image. ○ To change the logo, select **View image**. From the file finder, select the new logo file and click **OK**. The updated logo displays below this field. ○ To remove the logo, select the trash icon. The file is immediately deleted.

5. Select **Save**.
   From here, you can adjust the color, icons, and font type and size of the chat client to match your brand. For example, you can:
   - Change the color of items
   - Customize the icons
   - Customize the fonts used in the chat
6. To change the color of items in the chat window, select the **Colors** tab.

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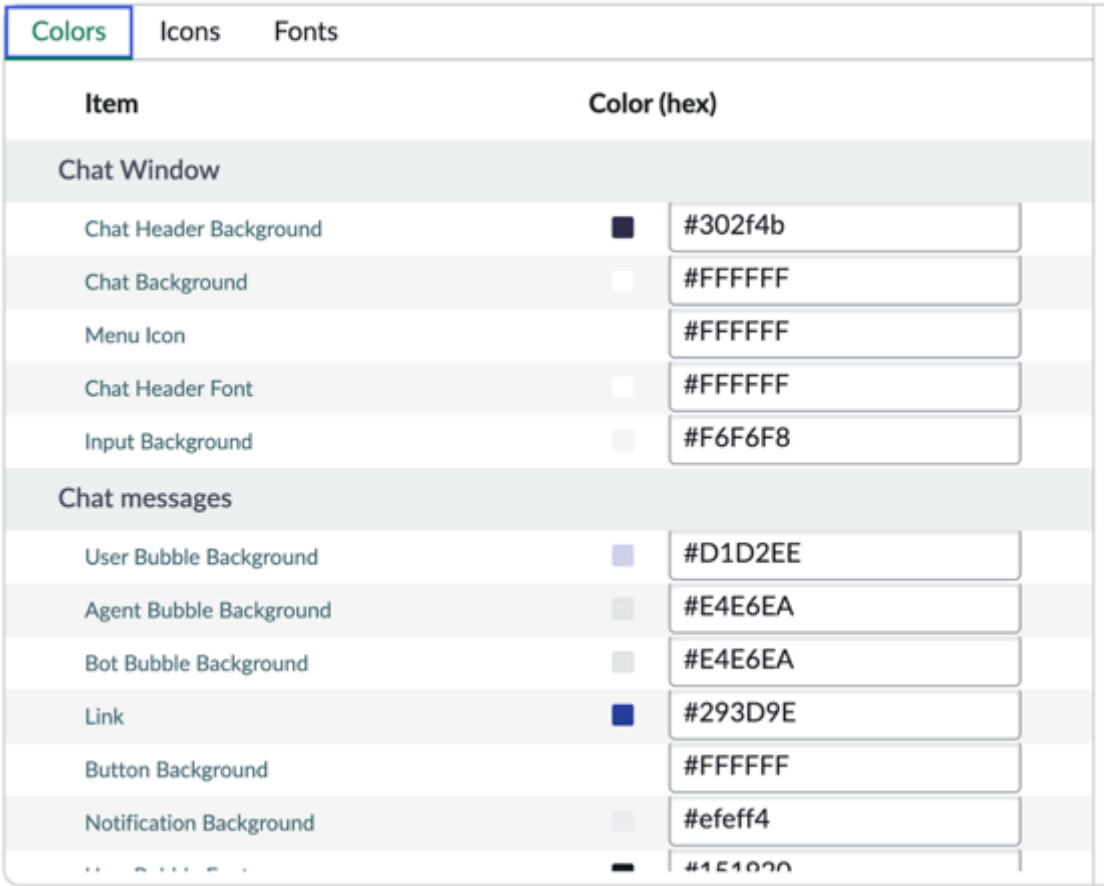

Select an item and specify the Hex or red blue green alpha (RGBA) colors you want to use for that item. When you do so, the example chat window shows a preview of your changes.

Customize color for each item

Label	Description
Chat window	
Chat Header Background	Background color of the chat header.
Chat Background	Background color of the chat window.
Menu Icon	Color of the menu icon, which provides user options to end a conversation or contact customer support.
Chat Header Font	Font color of text in the chat header.
Input Background	Background color of the user input bar.
Chat messages	
User Bubble Background	Background color of the user chat bubble.
Agent Bubble Background	Background color of the live agent chat bubble.

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Label	Description
Bot Bubble Background	Background color of the bot chat bubble.
Link	Color of links presented in the conversation.
Button Background	Background color of buttons used in the conversation.
Notification Background	Background color of Virtual Agent notifications delivered in the web chat client.
User Bubble Font	Font color of text in the user chat bubble.
Agent Bubble Font	Font color of text in the live agent chat bubble.
Bot Bubble Font	Font color of text in the bot chat bubble.
Link turned off	Color of links turned off in the conversation.
Notification Text	Font color of Virtual Agent notifications delivered in the web chat client.
Others	
System message	Color of general system messages displayed in the conversation.
Category background	Background color of the heading above a list of topics.
Separator	Color of the dashed line that separates each conversation in the Preview window.
Time Stamp	Color of the timestamp displayed when significant activity occurs during a conversation, such as a record being created.
Category font	Font color of text in the category heading.
Loading Animation	Color of the animated dots that indicate the system is processing information.

7. To customize the chat icons in the chat window, select the **Icons** tab.

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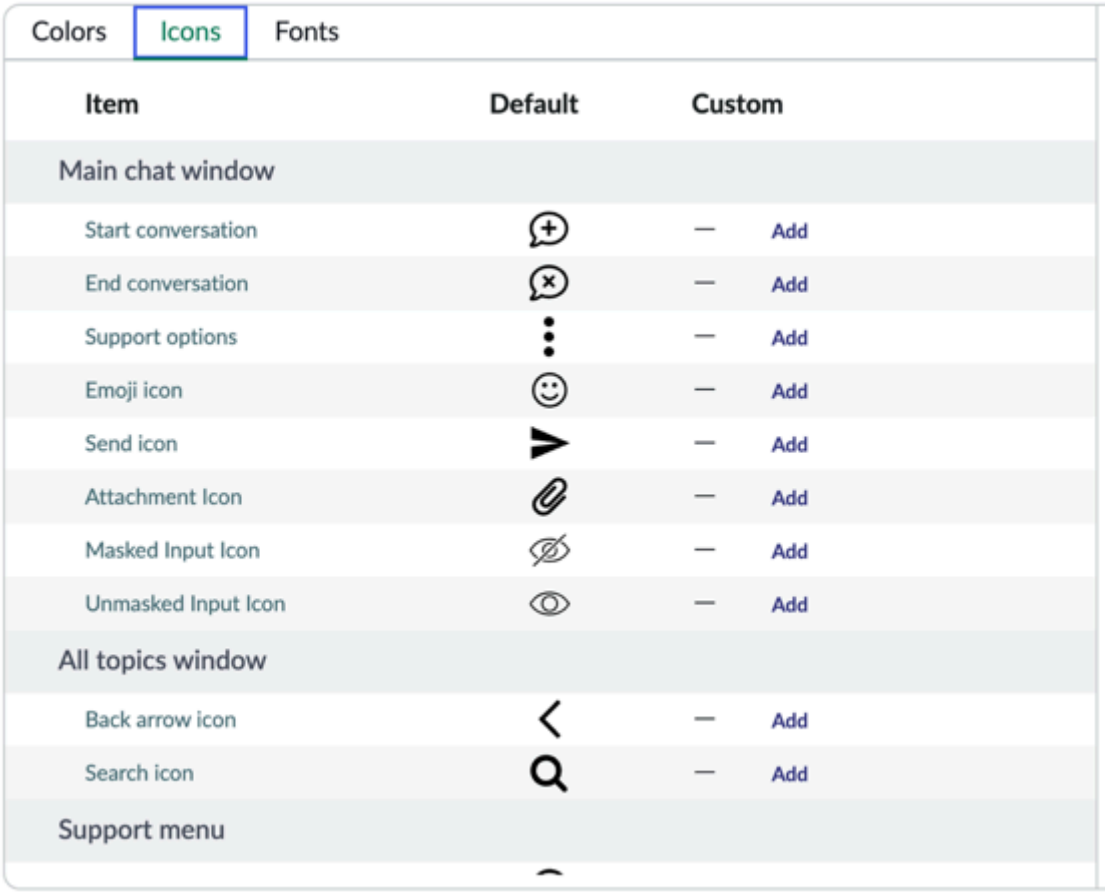

You can customize the icons on four different chat screens: the main chat screen, the all topics screen, the support menu, and the end conversation screen. Use this tab to do the following:

- Add a custom icon: Select **Add** for the icon, and then select **Attach image**. After choosing the image file, select **Apply**.
- Replace a custom icon: Select **Replace** for the icon. Select the trash can icon to delete the current image, and then upload a new one.
- Revert to the system default icon: Select **Remove** for the icon.

> **Note:**
> You can't remove system default icons.

When you specify the icons during configuration, the example chat window shows a preview of your changes.

> **Note:**
> Unlike other settings on the branding page, icon changes take effect on the web client as soon as you select **Apply**. Other changes don't take effect until you select **Save** at the top of the page.
>
> Valid file formats are .jpg, .png, .bmp, .gif, .jpeg, .ico, and .svg.

8. **Optional:** Customize the font type and font size.

   (Optional) The available branding configurations (for example, Polaris-Light or Polaris-Dark) are located here.

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Note:
This feature is only available after you've installed and updated the Omni-Experience Standard Feature Set to the latest version through the ServiceNow® Store.

To customize the fonts shown in the chat, select the **Fonts** tab.

To change the font type, choose one of the following methods:

a. Select the fonts you want to use.
From the **chat header text** drop-down list, select the font you want to use for the header.

Do the same for the **chat body text.**

You will see an example of the new font.

b. Download the fonts from a URL.
From the **Add custom font** drop-down list, select **From URL**, specify the URL, and apply the changes.

c. Upload the fonts you want to add from an attached file.
From the **Add custom font** drop-down list, select **Upload font**, specify the path to the file you want to attach, and apply the changes.

(Optional) To change the font size for the chat header and the chat body, do the following:

a. From the **Font body size** dropdown, choose the Regular, Large, or Extra Large font size.

b. From the **Font header size** dropdown, choose the Regular, Large, or Extra Large font size.

Note:
These changes do not apply to custom controls you have added to the chat widget. Custom controls must be updated separately.

c. Preview the changes in your chat window on your portal or website.

9. To update the Contact support menu, scroll down to the **Menu Items** section.



You can change the icons, labels, visibility, and display order of the Email, Chat, and Phone menu items. You can also add custom options to the menu.

a. In the **Menu Items** section, do any of the following:

- To edit a menu item, select the record icon.
- To add a new menu item, select **New**.
- To delete a menu item, select the record icon. In the record, select the More Actions icon , and then select **Delete**.

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For each menu entry, fill in the fields.

Field	Description
Label	Text string that describes the menu type. The labels for the default menu types in the Global application scope are: ▪ Email - Option that opens the default email. Default label: **Send Email to Customer Support** ▪ Chat – Option for chatting with a live agent. Default label: **Contact Live Agent** for Chat type ▪ Phone - Option that indicates when phone support is available. Default label: **Call Support—(Daily 5AM - 11PM)** The label text can be up to 75 characters in length.
Type	Type of menu item. For example, if you're adding a menu item that is a link to specific information such as a help page, select the `Link` Type. The menu item types are: ▪ Email: Option for contacting support through email. ▪ Link: Option for a link to a web page ▪ Chat: Option for contacting a live agent through chat. ▪ Text: Option for setting a text string ▪ Phone: Option for contacting support by phone
Value	The menu type value. For example, the **Value** for Email is the email address of the support group. The values for the default menu types are: ▪ Email: Email address of the support group. For example: support@example.com. ▪ Phone: Phone number of your call support organization. ▪ Email: Email address of your support organization. **Note:** The chat menu type doesn't have a value.
Visible	Option that makes the item visible in the Contact support menu. Clear this option to hide the menu item.
Display default icon	Option that indicates the default icon for the item is visible in the menu. Clear this option to add, change, or delete a menu icon.

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Field	Description
	▪ To add an icon for a new menu item, select **View image**. From the file finder, choose your icon file and select **OK**. The uploaded icon displays below the **Icon** field. ▪ To change an icon, in the **Icon** field select **Update**. From the file finder, select the new logo file and click **OK**. The updated Icon displays below this field. ▪ To remove the icon, select **trash** icon. The file is immediately deleted.
Order	Number that identifies the sequence in which the item appears in the Contact support menu. The number 1 indicates that the item is the first option listed in the menu.
Application	Global.

b. When you complete the **Menu Item** section for a menu type, select **Save.**.

10. Do one of the following to apply the branding configuration:

- Apply the branding configuration to a destination page. Enter the system parameter `sysparm_branding_key` with the branding key in the web client URL. For example:

  `https://<your-instance-name>service-now.com/$sn-va-web-client-app.do?sysparm_branding_key=acme`

  In this example, `acme` is the key of the branding configuration to be used.

- Apply the branding configuration to an embedded web client. Enter the system parameter `sysparm_branding_key` with the branding key in the URL for the embedded web client. For example:

  `https://<your-instance-name>service-now.com/$sn-va-web-client-app_embed.do?sysparm_branding_key=acme`

  In this example, `acme` is the key of the branding configuration to be used.

- Apply the branding configuration to a Service Portal Agent Chat Configuration. In the server script that passes page and widget data to an Agent Chat (Virtual Agent or Live Agent) conversation, specify the branding key to be used. Items passed in this script are available to all pages in the portal. For details on setting up Service Portal Agent Chat, see . Add your bot to a portal.

  For example, the following Service Portal Agent Chat Configuration for the Knowledge Portal uses the chat branding key, `custom_1`.

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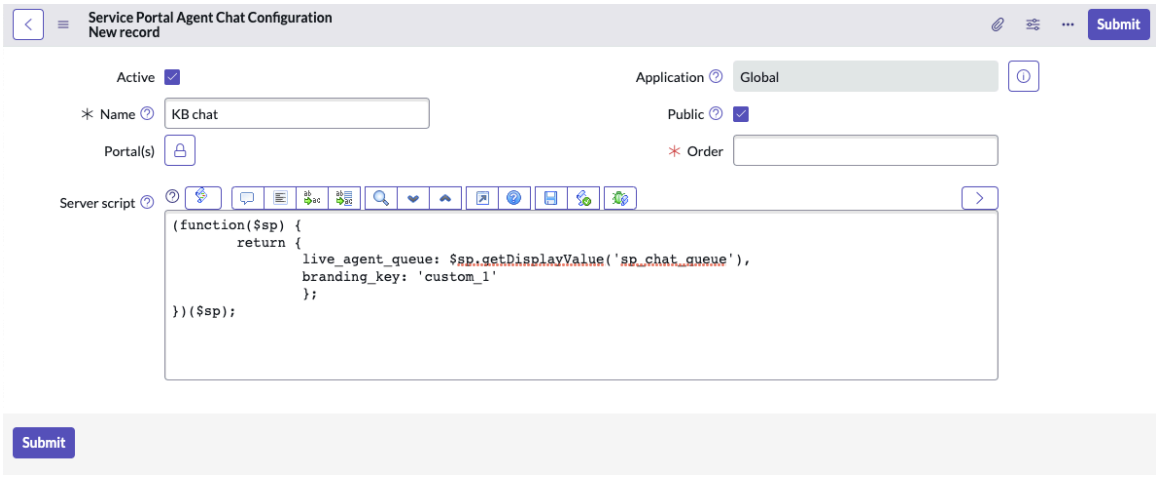


Note:
There are other Service Portal Agent Chat features that you can configure, such as customizing the Agent Chat button in your portal. For more information on customizing the Agent Chat widget in Service Portal, see Configure Agent Chat in Service Portal.

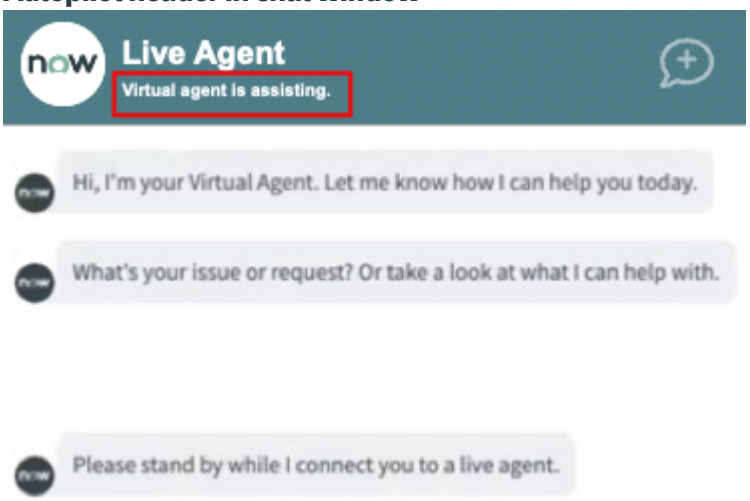
11. **Optional:** If you're using Conversation Autopilot with your branded bot, specify the branded bot name displayed in the chat window during Autopilot sessions by changing system properties as follows.

    a. Navigate to **All** > **Conversational Interfaces** > **Settings**.

    b. Under the **System actions** section, select **View All** next to **System messages**.

    c. Change the **Value** field of the *com.glide.cs.autopilot.client_initiated_header* system property to specify the branded bot name instead of the Virtual Agent bot name displayed in the header of the chat window.

Autopilot header in chat window



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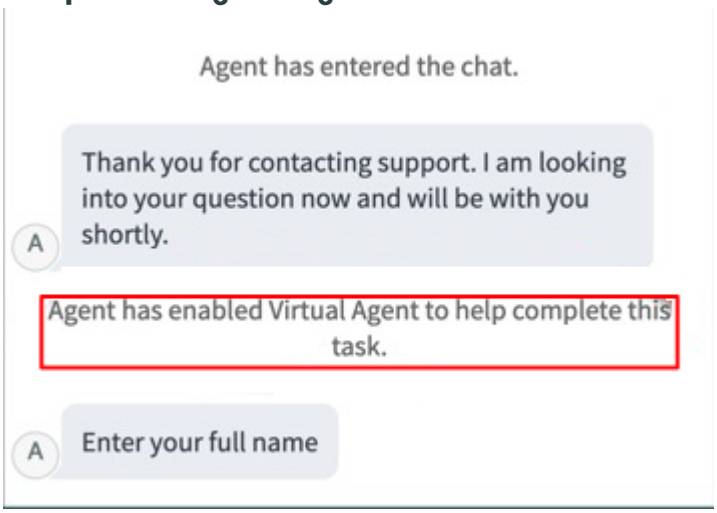
d. Update the *com.glide.cs.autopilot.client_initiated_message* system property to specify the branded bot name displayed to the requester during the conversation.

Autopilot message during the conversation



Enable message preview on the web client

Admins can allow their end users to see a preview of any new or unread messages waiting for them when the chat window is minimized.

Before you begin

This feature is only available after you've installed and updated the Omni-Experience Standard Feature Set to the latest version through the ServiceNow Store.

Set the com.glide.cs.advanced-chat-popover system property to True. This system property enables the smart chat component on the Service Portal. By default, the property is set to False.

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **General**.
2. Under **Display options**, enable **Message preview**.
   A message displays confirming that the setting has been saved.

Result

When message preview is enabled, and the chat window is minimized, the end user sees a message preview badge icon in the minimized chat window. The message preview badge icon lets the user know that there are new or unread messages, and how many. In this example, the end user has one new or unread message.

A message preview pane shows the first new or unread message next to the badge icon. The message is based the conversation. For example, if the user needed help with using the laptop, the message preview pane could be similar to the following image.

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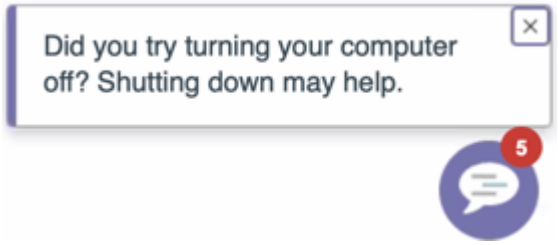


The end user can either:

- Click the message preview pane to continue the conversation in the chat, or
- Close the message preview pane.

The badge icon appears only when there are new or unread messages. The badge icon is updated every 10 seconds, and displays the first new or unread message.

Enable public access to the web client

Enable public access to the Virtual Agent web client for portals.

Before you begin

Role required: admin

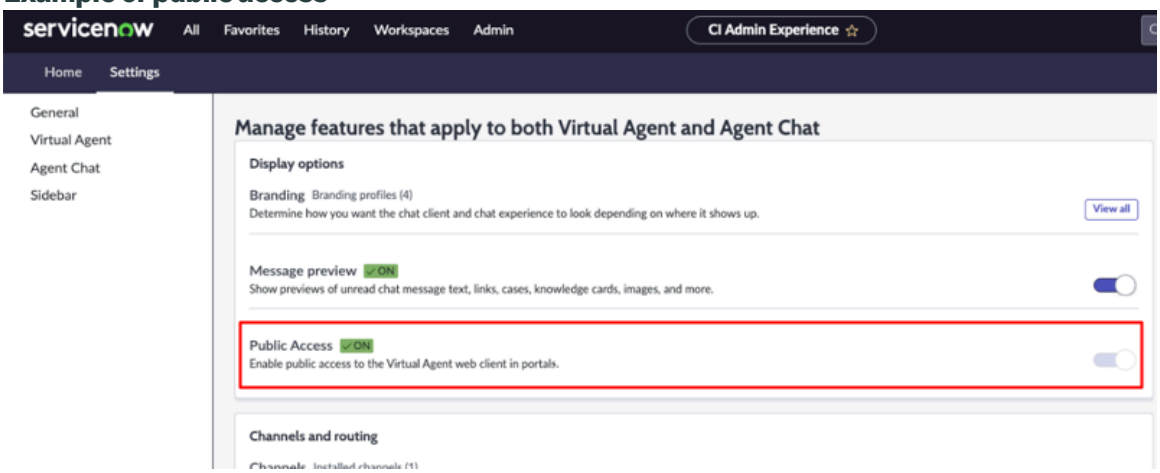
About this task

Public access to the Virtual Agent web client defaults to off. Use the following steps to allow public access to the web client for only portals.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **General**.
2. Under **Display options**, enable **Public access**.

Example of public access



A message displays confirming that the setting has been saved.

Configure context variables for storing chat-related information

Specify chat context variables, also called Live Agent chat variables, for storing chat-related information, such as pre-chat survey responses. These variables contain contextual information that can be used to determine topic intent or control how chats are routed to live agents. You can also define variables to capture contextual information passed in Virtual Agent topic scripts to share with live agents.

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Before you begin

Virtual Agent provides pre-built context variables. Before you add a variable, review the list of available Live Agent context variables.

Role required: virtual_agent_admin or admin

About this task

You can use context variables in scripts or with the condition builder. For example, you can reference context variables in the **Live agent** area in the topic **Properties** tab when creating a topic. When a condition is applied to a topic, it must return as true to display to the user.

For details about using context variables in topic scripts, see Virtual Agent scripts. For information about learning to use context variables, see Tutorial: Route interactions by context. For descriptions of Live Agent context variables, see Live agent chat context variables.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Under **Context variables**, select **View All**.
3. On the Context Variables page, select **New** to add a variable.
4. On the form, fill in the fields.

Field	Description
Name	Name of the context variable to be created.
Script Variable Name	Live Agent variable name, which is automatically created from the **Name**. The variable name begins with `LiveAgent`.
Table	Name of the ServiceNow table associated with the context variable. Select a table from the list.
Record	Option to associate the context variable to a record in the specified table. If you selected a table, this option is automatically selected.
Value	Script that determines the information stored in the context variable.

5. Select **Save**.
   The context variable is now available for use.

Live agent chat context variables

Use chat context variables to pass certain information from the topic to share with a live agent or to control how bot conversations are routed to live agents. Virtual Agent includes some default variables, and you can define new ones.

Note:
The Interaction table is part of the interaction management framework, which is activated through the Interactions Management plugin (com.glide.interaction). This plugin is included with the Agent Chat (com.glide.interaction.awa) and Connect Support (com.glide.connect.support) plugins.

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Live Agent variables included with Virtual Agent

Variable	Description
application	Application scope of the chat. For example, *Global*, *HR*, *CSM*, or *ITSM*.
auto_resolution_context_id	If Auto Resolution is enabled, the ID of the record created when a requester is redirected to Virtual Agent.
case	Case ID (from the [sn_customerservice_case] table) that is used with the Customer Service Management application when a case is related to the chat.
csp_category	Category defined in the Consumer Service portal in the CSM application (requires the com.glide.service-portal.consumer-portal plugin). For more information, see Using the Consumer Service Portal.
csp_email	Requester's email address, as entered in a pre-chat survey on the Consumer Service Portal.
csp_first_name	Requester's first name, as entered in a pre-chat survey on the Consumer Service Portal.
csp_last_name	Requester's last name, as entered in a pre-chat survey on the Consumer Service Portal.
devicetype	Type of device being used for the chat. For example, *mweb* (web client), *android*, or *ios*.
esc_pre_chat_ask_a_question	Requester response to a pre-chat survey selection from within the HR Service Delivery application ESC view of the HR Case record.
experience_name	Name assigned to the Live Agent experience.
hr_topic_id	ID of the current topic. Used in Advanced Work Assignment to determine which HR queue to transfer the user for live agent chat.
interaction_account	Used with CSM chats that are initiated by B2B users who are tracked as contacts for a particular account. Corresponds with the *Account* field on the Interaction [interaction] table, which references the Accounts [customer_account] table.
interaction_consumer	Used with CSM chats that are initiated by B2C users who are tracked as consumers. Matches the interaction.consumer field referencing the csm_consumer table. Corresponds with the

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Live Agent variables included with Virtual Agent (continued)

Variable	Description
	Consumer field on the Interaction [interaction] table, which references the Consumers [csm_consumer] table.
interaction_contact	Used with CSM chats that are initiated by B2B users who are tracked as contacts for a particular account. Corresponds with the *Contact* field on the Interaction [interaction] table, which references the Contacts [customer_contact] table.
interaction_id	Sys_id of the interaction record associated with the chat session. For more information, see Virtual Agent interaction records.
language	Two-letter language code for the requester's chat. **Note:** Language values use ISO standard two-character language codes. For more information, see ISO 639.1 language codes.
mandatory_skills	Required skills and skill level for an agent. For example, German language proficiency with an associated high skill level may be required for German-speaking requesters. You can define mandatory skills and activate skill levels in Advanced Work Assignment. For more information, see Configure agent assignment rules.
optional_skills	Skills and skill levels that would be useful for a given chat scenario. You can define optional skills in Advanced Work Assignment. For more information, see Configure agent assignment rules.
page	The specific page (within a portal) that the chat was accessed from.
portal	Name of the portal that the chat was accessed from.
post_assessment_instance	Reference to the post-chat survey (Assessment Instances [asmt_assessment_instance] table), if there is one.
post_chat_survey_name	Name of a post-chat survey that is used to gather feedback from the requester. For information about creating surveys, see Create chat surveys.

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Live Agent variables included with Virtual Agent (continued)

Variable	Description
	For information about creating surveys in Connect Chat, see Configure a survey in Connect Chat support.
pre_assessment_instance	Reference to the pre-chat survey (Assessment Instances [asmt_assessment_instance] table), if there is one.
pre_chat_survey_name	Name of a pre-chat survey that is used to gather information from the requester. For information about creating surveys, see Create chat surveys. To learn more about how chat context variables from pre-chat surveys are used in Advanced Work Assignment to route work to live agents, see Work item queues. For information about creating surveys in Connect Chat, see Configure a survey in Connect Chat support.
queue	Sys_id of the pre-built Connect Support chat queue (deprecated).
search_text	Search terms entered by the requester. Used to search Virtual Agent topics.
short_description	Used to set the short description in the interaction record associated with the chat.
sys_id	Sys_id of a record that relates to the interaction. Typically, this is the record being viewed in the portal when the chat is requested.
table	Table containing the record that relates to the interaction. Typically, this is the record being viewed in the portal when the chat is requested.
url	URL from which the request originates.

Additional resources

- How to transfer a chat to a specific queue using context variables
- Virtual Agent and Natural Language Understanding (NLU) community forum
- Conversational Interfaces Academy

Change Virtual Agent and Agent Chat system messages

Customize the default system messages displayed during Virtual Agent conversations and Agent Chat.

Before you begin
Role required: virtual_agent_admin or admin

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About this task

Use **System messages** in Chat Settings to change the properties that control standard chat messages displayed in your instance. If you're using Virtual Agent and Agent Chat, the **System Messages** list displays properties for both Virtual Agent and Agent Chat messages. If you're using Agent Chat only, the **System Messages** list displays only the properties relevant to Agent Chat.

Note:
While the web client uses the Messages table [sys_ui_message] to configure the greeting and closing messages, third-party Conversational Integrations (such as Microsoft Teams) use system messages. To change them, modify these messages in System Messages as follows:

- For greetings that call `vaSystem.getTopicSelectionMessage()`, modify the value of `com.glide.cs.topic_picker_msg`.
- For closings that call `vaSystem.endConversation()`, modify the value of `com.glide.cs.conversation_ended_msg`.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Under **System messages**, select **View All**.
3. In the System Messages list, select the property record for the message you want to change.
4. In the **Value** field, enter the new message text and select **Save**.
   Any changes are immediately applied to the system messages displayed in your instance.

URL navigation in Conversational Interfaces

Use URL navigation settings to specify where and how chat links open. You can configure certain links to open in a specific portal. You can also specify the link target, such as a popup window.

Your base system instance provides default portals in which chat links to records from certain ServiceNow tables are opened automatically. For example, Service Portal is the default portal used to display knowledge records from the Knowledge [kbknowledge] table and also catalog items from the Catalog Item [sc_cat_item] table.

Use **URL navigation** in Chat Settings to change these default mappings, as well as define custom mappings that map a portal URL to a specified ServiceNow table. The portal configurations apply to the web client, chat channels, and messaging channels.

How URL navigation works

To determine the portals to be used for chat links, the system evaluates the following information in the order listed:

1. `sysparm` portal parameter - If you specified a sysparm_portal parameter in the instance URL for the web client, that portal is used.
2. Topic script variable - If you specified a portal in a topic script variable, that portal is used.
3. Default portal for Provider Channel Identity - If you specified a default portal in the Provider Channel Identity [sys_cs_provider_application] table for pre-built chat integrations or custom chat integrations, that portal is used. The default portal applies to the chat and messaging channels for the provider. For details on configuring the Provider Channel Identity, see Create a channel identifier for your custom chat integration in Custom chat integration framework.
4. Default portal for a table - Uses the portal value in the default portal mapping listed in **URL navigation** Chat Setting.

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5. Global default portal - If you defined a global default portal using the *com.glide.cs.url_redirect.default.portal* system property, that global portal is used.
6. Service Portal - If you didn't define a global portal using the *com.glide.cs.url_redirect.default.portal* property, Service Portal is used.

Legacy URL mappings defined in previous releases (fallback method)

If you previously added the *com.glide.cs.portal_url_mapping.default.<portal_value>.<table_name>* property to create URL mappings that were used instead of the default URL mappings, those properties are retained after you upgrade to the Washington DC release. However, you can now view the mappings using **URL navigation** in Chat Settings or the URL Navigation [sys_cs_portal_url_mapping] table. There are two types of URL mappings.

Default mappings

All system properties with the format *com.glide.cs.portal_url_mapping.portal.<table_name>* that define the default portal used for certain ServiceNow tables.

Default URL mapping properties

Property	Description
com.glide.cs.portal_url_mapping.portal.kb_knowledge	Default portal context (URL mapping) to use for Knowledge Base articles. • Type: string • Default value: sp (Service Portal)
com.glide.cs.portal_url_mapping.portal.sc_cat_item	Default portal context (URL mapping) to use for Service Catalog items. • Type: string • Default value: sp (Service Portal)
com.glide.cs.portal_url_mapping.portal.sys_user	Default portal context (URL mapping) for sys_user records. • Type: string • Default value: esc (Employee Service Center)

Custom mappings

All system properties that define a portal and table combination using the format *com.glide.cs.portal_url_mapping.<portal_name>.<table_name>*. These mappings are retained as custom mappings. When the portal or table is specified with *_default*, it indicates that any portal or table is used.

The system determines the URL for custom mappings by evaluating the following values:

- Portal and table/parent table
- Portal and any table

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- Any portal and table/parent table
- Any portal and any table

Custom URL mapping properties

Property	Description
com.glide.cs.portal_url_mapping._default_kb_knowledge	Default for Knowledge URL mapping. • Type: string • Value:/{{portal}}?id=kb_article&sys_id={{data.sys_id}}
com.glide.cs.portal_url_mapping._default_sc_cat_item	Default for Catalog Item URL mapping. • Type: string • Value: /{{portal}}?sys_id={{data.sys_id}}&id={{data.table_name}}&table={{data.table_n
com.glide.cs.portal_url_mapping._default_sys_user	Default for User URL mapping. • Type: string • Value: /{{portal}}?id=user_profile&sys_id={{data.sys_id}}
com.glide.cs.portal_url_mapping._default_default	Default mapping for records other than knowledge articles, Service Catalog items, People (sys_user) records, publication records, and task records. • Type: string • Value: /{{portal}}?sys_id={{data.sys_id}}&id=form&table={{data.table_name}}

Smart links

As an admin, you can specify the target for URL links based on patterns that you specify. For example, if you want all KB articles to open in a new window, you can configure the mapping in general chat settings. For more information, see Create a smart link preference.

Configure URL navigation for chat links

Configure the portals in which links to ServiceNow records in Live Agent and Virtual Agent conversations are opened, including links in output cards and cards for Virtual Agent notifications and AI Search results.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Under **URL navigation,** select **View All**.
3. On the URL Navigation page, do one of the following:
   - To create a new custom mapping, select **New**.
   - To change a default or custom mapping, select the record to be updated.
   - If you have multiple mapping records to be updated, click the box to the left of the mapping record to be updated and select **Edit**. The preview pane opens and shows the URL Navigation fields that you can change in the selected records.
4. Complete or update the URL Navigation fields.

Field	Description
Description	Name of the portal for a particular table record.
Type	Type of portal mapping: ○ Default Mapping: Default portal mapped to the following ServiceNow tables: ▪ Service Portal - Catalog Item [sc_cat_item] table ▪ Service Portal - Knowledge [kb_knowledge] table ▪ Employee Center Portal - User [sys_user] table ○ Custom Mapping: Portal URL definition that identifies a portal and ServiceNow table combination, which is entered in the **Value** field.
Table	ServiceNow table that maps to the portal. Select a table from the list of tables.
Application	Name of the application to which this URL mapping belongs.
Portal	Portal to be used in the mapping. Select a portal from the list of portals.
Value	For new custom mappings, specify the combination of portal and table values to form the link. For example, the following value maps knowledge articles to the CSP portal: `/csp?id=kbarticle&sys_id={{data.sys_id}}` If you're changing a custom mapping that was defined in a previous release using the *`com.glide.cs.portal_url_mapping._default.<table>`* system property, you do not need to specify a **Value**.

5. Select **Save** to enter a new mapping or update an existing mapping.

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Create a smart link preference

Create smart links to specify where a URL should open. For example, the URL could open in a new browser window, in a new browser tab, in the chat window, or in a pop-up window.

Before you begin

Role required: virtual_agent_admin or admin

About this task

If you (as an admin) have enabled URL navigation on the page, you can specify patterns for where and how the links open in the chat windows. End users see the URL links based on the patterns you've specified.

For example, you can set these URL "smart links" to open in a new browser window, in a new browser tab, in the chat window, or in a pop-up window. If you specify a pop-up window, you can set the size of the window your end users see.

Smart links can be used in chats with live agents.

Error messages display for channels that don't support smart links.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Under the **System actions** section, select **View All** next to **URL navigation**.
3. Select the **Target Location** tab.
4. Select **New**.
5. On the form, fill in the fields.

Field	Description
Description	The purpose of the smart link.
Where to open	Where to open the link. Choose one of the following options: ○ **New Browser Tab**: Opens the link in a new browser tab. ○ **Load in Place:**: Opens the link in the current location. ○ **Parent**: Opens the link at the highest or parent level. ○ **Popup**: Opens the link in a pop-up window and lets you specify the pop-up window size. ○ **Raise Event**: In the web client only, prevents the default select behavior, avoiding a page navigation (the chat is kept open).
Order	Number that indicates the order in which smart link preferences run. If there are multiple preferences, the system runs the first smart link preference found, from lowest to highest order.
URL Pattern	URL pattern that uses regular expression quantifiers. If the regular expression is invalid, an error message is shown. 
Condition mode	Expression logic to specify a condition for applying the smart link preference.

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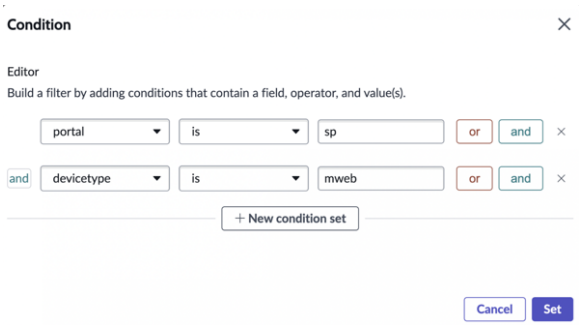
Field	Description
	Select either: ○ Simple, or ○ Advanced
Set conditions **Note:** Applies only if you select the Simple condition mode.	If you select the **Simple** condition mode, use the condition builder to add or edit the condition. The condition builder specifies that the smart link is only applicable to links in the Service Portal when they're accessed on the web client.  ○ **devicetype**: Refers to the channel. In the Washington DC release, only the web client (*mweb*) is supported. The mobile web client isn't supported currently. ○ **portal**: Represents a specific portal. Specify the portal URL suffix in the condition. Navigate to **All** > **Service Portal** > **Portals** to view portals and their suffixes ○ Select **Set**.

Script
Note: Applies only if you select the Advanced condition mode.
	If you select the **Advanced** condition mode, use the script editor to create or edit a JavaScript condition statement. When the end user selects the link, the component triggers a Window: message event. As a developer, if you see the Window: message event, you can decide how to handle the navigation. For example:
	`window.addEventListener('message', e => {`
	`  if (e.data.type === 'SMART_LINK_CLICKED') {`
	`  console.log(e.data);`
	`  /**`
	`  {`
	`  type: 'SMART_LINK_CLICKED',`
	`  src: 'https://domain.com/link/src'`
	`  }`
	`  */`
	`  }`
	`});`

6. Select **Save**.

What to do next

If you would like to enable smart link preference for Microsoft Teams, you must first Configure link authentication and opening experience in Microsoft Teams and then Configure smart links in Microsoft Teams

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Create chat surveys

Use Survey Designer to build conversational questionnaires for gathering pre-chat information and post-chat feedback from end users. These questionnaires run in the chat client for Virtual Agent and Agent Chat.

Before you begin

Identify the information that you want from your requesters, such as their name or email address. If you're collecting pre-chat information, determine whether certain survey responses should be stored as chat context variables so that you can use that information for topic discovery or routing chats to certain work item queues. Before you build your survey, configure the context variables for storing responses to certain survey questions. You will map these chat context variables to the appropriate questions in your survey.

Role required: survey_admin or admin

About this task

You define, configure, and publish conversational questionnaires (surveys) using Survey Designer. You can use various survey controls to define the content of your questionnaires. For details on the survey controls available, see Survey designer elements to see how the controls are rendered in the survey. For example, the Choice control provides a multiple choice selection to your users.

The survey controls map to corresponding Virtual Agent Designer input controls that render the survey as a conversation in the chat client. For examples on how Virtual Agent Designer input controls are rendered in run-time conversations, see Virtual Agent Designer user input controls. The following table identifies the survey controls supported in Virtual Agent Designer.

Survey controls that map to Virtual Agent Designer input controls

Survey Designer controls	Comparable Virtual Agent Designer user input controls
Attachment	Image
Boolean	Boolean
Choice	Static Choice
Date	Date Time
Date/Time	Date Time
Number	Text input
Percentage	Text input
Scale	Static Choice
Numeric scale	Static Choice
String	Text
Image scale	Carousel
Reference	Not supported
Multiple selection	Not supported
Ranking	Not supported
Template	Not supported

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Procedure

1. Navigate to **All** > **Survey** > **Survey Designer**.
2. Select the **Configuration** tab and configure the survey.
   As you configure your survey, remember the following:
   - If you want an introduction note and end note to begin and end your survey, enter your content in the **Introduction** and **End note** fields.
   - Select the **Chat Survey** option to enable conversational questionnaires. This option also enables the display of the **Context** option in the Properties form for each survey control.
   - Click **Save**.

   For details, see Configure a survey in the survey designer.
3. Click the **Design** tab and give your survey a **Name**.
   As you design your survey questions, remember the following:
   - To create a question, drag a data type icon from the Controls palette and drop it into the category container. Give each question a **Name** and click the gear icon to open the Properties form for the control.
   - In the Properties form, complete the fields as needed to define the control.
     - If you enable the **Mandatory** option, users are required to answer the survey question. If you leave this field blank, users can skip the question in the survey.
     - If you want to store the user response to this question, enter the chat context variable in the **Context** field.
   - Click **Save**.

   For details, see Create a question in the survey.
4. When you are finished defining the questions in your survey, select **Preview** to review your survey.
5. When you are satisfied with the survey, select **Save and Publish**.
   Your survey is listed in the Assessment Metric Types [asmt_metric_type] table.

What to do next

Define the pre-chat and post-chat survey configurations that control the surveys to be presented to your requesters.

Define pre-chat survey configurations

Use pre-chat surveys to capture preliminary information from a customer. You can define a configuration that determines the pre-chat survey to be presented to your customers. From the responses received, Advanced Work Assignment routes chat conversations to appropriate queues and groups.

Before you begin

Create the chat survey to be used in this pre-chat survey configuration.

Role required: admin

About this task

Apply the conditions that determine the pre-chat questionnaire to be presented to your requesters.

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Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Under **Pre-chat surveys** on the **General** tab, select **View all**.
3. On the Chat Surveys page, select **New** to create a new chat survey configuration or select the configuration you want to update.
4. Under **Details**, enter or change the settings.

Field	Description
Name	Unique name for this pre-chat survey configuration.
Active	Option that activates this pre-chat survey configuration.
Show Summary	Option that asks requesters if they want to see a summary of the survey responses they entered.
Order	Number that indicates the order in which survey configurations run. If there are multiple pre-chat survey configurations, the system runs the first survey configuration found, from lowest to highest order.
Condition mode	Type of condition to be used to control the conversational survey presented to requesters. ○ **Advanced**: Specify a JavaScript scripted condition. ○ **Simple**: Specify a condition using the condition builder.
Condition	Condition that controls when the survey configuration is used. Select **Set Condition** to specify the conditions.
Survey	List of the pre-chat surveys available. Choose the survey to be presented to the requester.

5. Select **Save**.

Result

When a requester completes the pre-chat survey, the user is transferred either to a live agent if Agent Chat is set as the fulfiller interface or a virtual agent if Virtual Agent is set as the fulfiller. The user's pre-chat responses are stored as context in the chat interaction record. Before entering into a chat conversation, the assigned agent can review the context of the issue.

Define post-chat survey configurations

Control the post-chat questionnaire displayed to your requesters to gather feedback on their experience with live agents. You configure the post-chat surveys to be used for chat queues defined in Advanced Work Assignment.

Before you begin

- Activate the Agent Chat plugin (com.glide.interaction.awa) if Advanced Work Assignment is not already installed.
- In AWA, configure the chat service channel and the work item queues.
- Determine the post-chat survey to be displayed to your requesters.

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- Review the existing chat surveys available in the Assessment Metric Types [asmt_metric_type] table by navigating to **All** > **Survey View** > **View Surveys**. You can use a pre-built feedback survey, such as the survey for Virtual Agent feedback (a pre-built Virtual Agent setup topic).
- If you need different post-chat surveys, create them using Survey Designer. For details, see Create chat surveys.

Role required: admin

Procedure

1. Navigate to **All** > **Advanced Work Assignment** > **Settings** > **Queues**.
2. Select the queue (that uses the Chat service channel) to which the post-chat survey configuration applies.
3. Go to the **Post Chat Survey** related list, and then select **New**.
   If the Post Chat Survey list doesn't display, you may need to add it to the form.
4. On the form, fill in the fields.

Field	Description
Name	Unique name for this post-chat survey configuration.
Active	Option that enables this post-chat survey configuration.
Show Summary	Survey option that asks requesters if they want to see a summary of the survey responses they entered.
Order	Number that indicates the order in which survey configurations run. If there are multiple chat survey configurations, the system runs the first survey found, from lowest to highest order.
Requester ended	Option that specifies if the post chat survey should always run regardless of who ends the chat. ○ True: Survey should run when either the requester or the agent ends the chat. ○ False: Survey should run only when the agent ends the chat.
Condition mode	Type of condition that determines the conversational survey presented to requesters. ○ Simple: Specify a condition using the condition builder. ○ Advanced: Specify a JavaScript scripted condition.
Condition	Condition that determines the conversational survey displayed to requesters. Use the condition builder to select the conditions to be applied. The fields available for selection are based on the Chat service channel.
Script	JavaScript condition statement that specifies the condition for using this chat survey. The condition must evaluate to true.
Survey	List of the chat surveys available. Choose the post-chat survey to be presented to your requesters.

5. Select **Submit**.

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Result
When a live agent ends the chat session, the post-chat survey (configured for the chat queue) is presented to the requester. When the requester submits the post-chat survey, the chat session ends for the requester. The Interaction Related Records list stores the post-survey chat results and creates a related record that links the assessment to the live agent (fulfiller).

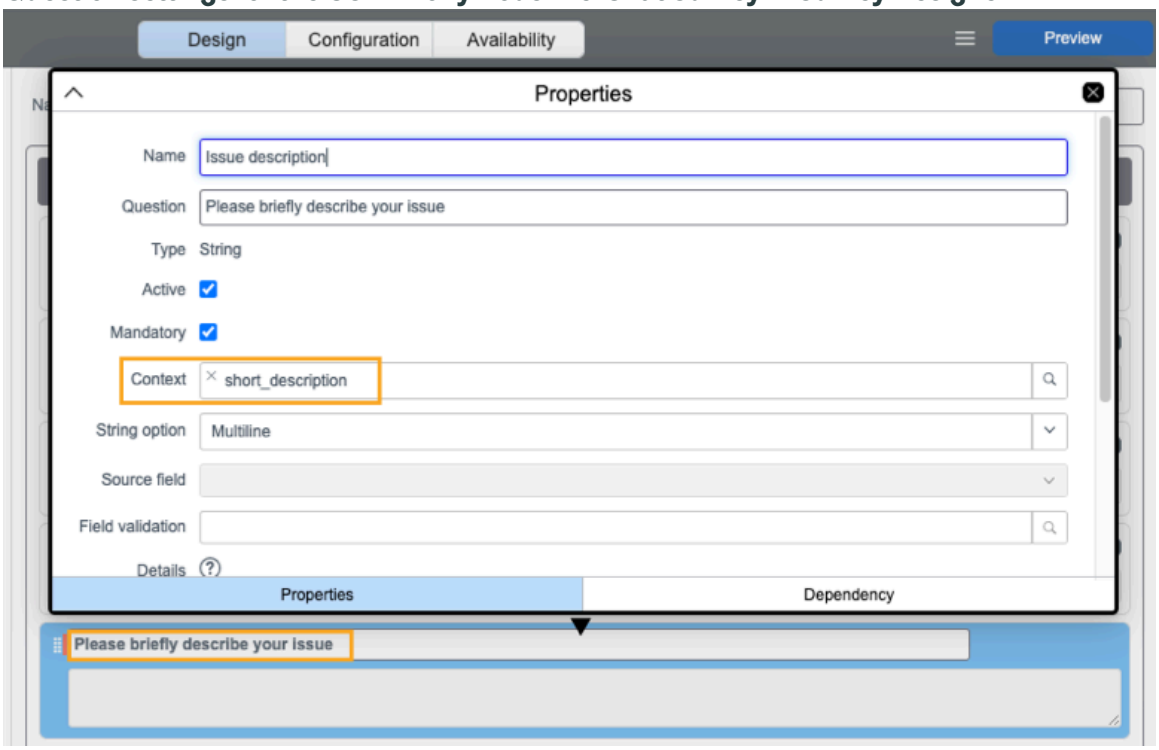
Using pre-chat surveys with context variables for topic discovery

Capture user input from pre-chat surveys to use as utterances or keywords for topic discovery.

If you're using a pre-chat survey, you can use information supplied by the user to direct them to the appropriate Virtual Agent topic without asking them to choose from a list of available topics.

A good example of this is the CSP Anonymous Pre-Chat Survey, which is included with the Customer Service Management (CSM) application. This survey applies to guest users on the CSP portal. In addition to asking for the user's name and email address, the last question asks the user to briefly describe the issue. The answer is mapped to the short_description field in the question settings. This is the context for the user's answer.

Question settings for the CSP Anonymous Pre-Chat Survey in Survey Designer



The user response can be passed to Virtual Agent for use in topic discovery. In order to do this, you must create a record for it in General Chat Settings.

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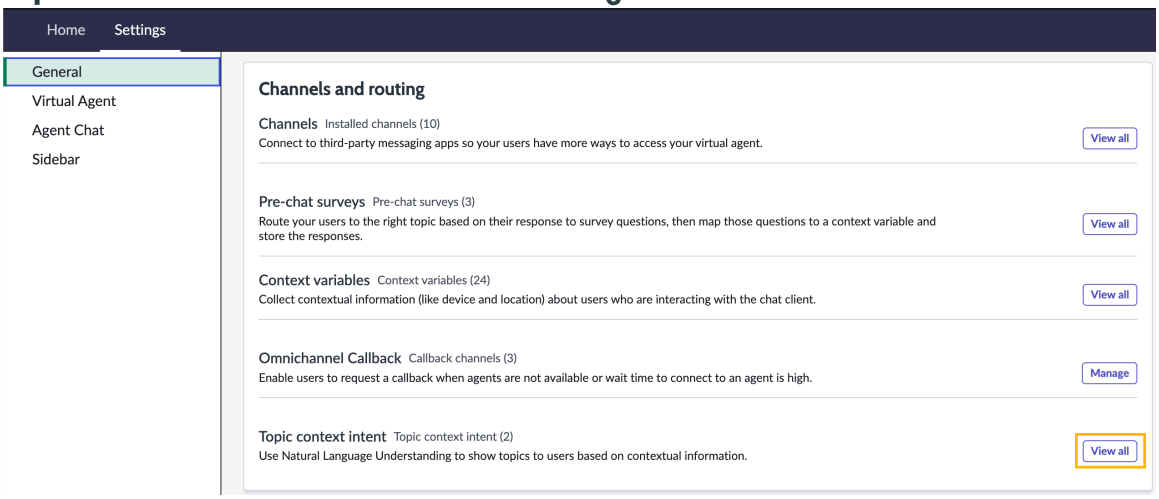
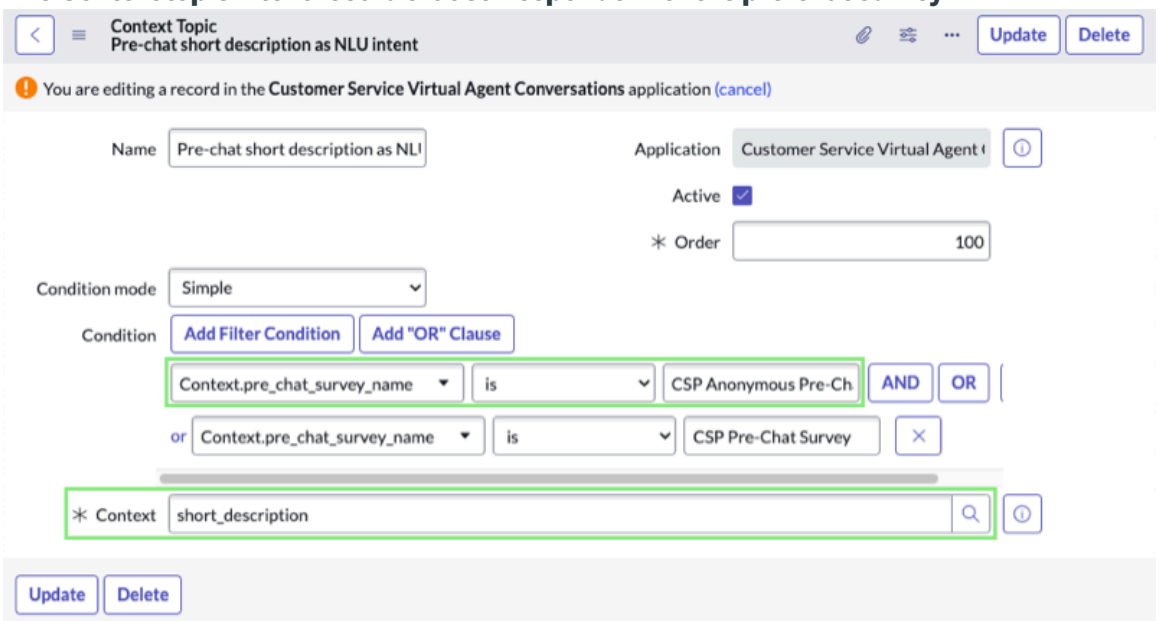
Topic context intent card in General Chat Settings



The Pre-chat short description as NLU intent record allows the CSP Anonymous Pre-Chat Survey input to function a bit like an NLU intent. When the survey runs, the interaction's short_description is used as the search text for the conversation. Virtual Agent uses this input for topic discovery so that users don't have to select a topic from the Greetings screen.

The Context topic intent record that corresponds with the pre-chat survey



Define topic context intent configurations

Use pre-chat survey information to determine the appropriate Virtual Agent conversation topic automatically displayed to end users (requesters), rather than prompting them to choose from a list of conversation topics.

Before you begin

- Configure the chat context variables for storing user answers to specific questions in your chat surveys.
- As you create your chat survey, map a survey question to a new or existing chat context variable. The variable stores the user response that Virtual Agent uses to determine topic context intent and the conversation topic displayed.
- Role required: virtual_agent_ admin or admin

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About this task

Create a context topic intent to specify conditions that determine which Virtual Agent conversation topic is displayed after a user answers a pre-chat survey. The context topic intent uses data collected by the survey to find an appropriate topic for the user.

For example, a pre-chat survey asks the user "What problem are you having with your computer?" and maps their answer to a context variable called "problem" in the survey. The variable passes from the survey to the topic context intent. Instead of the chat going directly to topic discovery, the variable stored in the intent is used as an utterance to feed into the Virtual Agent for topic discovery.

You can define conditions in a topic context intent to limit topic discovery, such as restricting the "problem" variable in the preceding example to only feed to ITSM VA conversations. The Context Topic [sys_cs_context_topic] table is used to map your variables for intent discovery, after the pre-chat survey has been executed.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Under **Topic context intent**, select **View All**.
3. In the Context Topic page, select **New** or the configuration to be modified.
4. On the form, fill in the fields.

Field	Description
Name	Name of the configuration for topic context intent (topic discovery).
Active	Option that activates this topic intent configuration.
Order	Order in which Virtual Agent evaluates topic intent configurations to find a matching condition for displaying the topic. Virtual Agent reviews the configuration that has the lowest order value first.
Condition mode	Type of condition that determines how the topic intent configuration is to be applied. ○ Simple: Specify a condition using the condition builder. ○ Advanced: Specify a JavaScript scripted condition.
Condition	Condition for applying the specified context variable that displays the corresponding conversation topic. Select **Set conditions** to enter the condition filter. If no condition is specified, the specified context variable applies to all conversations.
Script	JavaScript condition statement for applying the specified context variable that displays the corresponding conversation topic. The condition must evaluate to true.

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Field	Description
[Displayed when **Condition mode** is set to Advanced]	
Context	Chat context variable that stores the user response to a specific survey question and used to determine the topic intent.

5. Select **Save**.

Result

The context topic intent configuration is added to the Context Topic [sys_cs_context_topic] table. Virtual Agent displays the appropriate conversation topic to users based on the context intent configuration.

Conversational Interfaces Guided Setup

Use the Conversational Interfaces Guided Setup to create a personalized setup process for just the conversational interface features you need. The Conversational Interfaces Guided Setup starts with a survey and creates a personalized task list based on your survey responses.

Before you begin

The system admin role is required to activate the plugins and store applications. However, AWA admins and Virtual Agent admins can complete additional setup tasks for their respective solutions.

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Conversational Interfaces Guided Setup**.
   The Conversational Interfaces Guided Setup page appears.
2. Review the sections Getting started and Things to consider for setup, which provide information on the setup process and highlight various items to think about before implementing Virtual Agent, Agent Chat, or both.
   Also consider whether you want to run Quick setup to get your agents running in as little as 30 minutes, in a minimal number of steps. Manual setup involves a comprehensive series of steps to set up your agents and may take a couple of hours or several days to complete, based on your configuration.
3. Select **Get Started**.
4. In Customize your setup, select **Get Started** and then **Configure** to start your personalized setup.
5. Select the type of agents that you're using and the type of setup (Quick or Manual).

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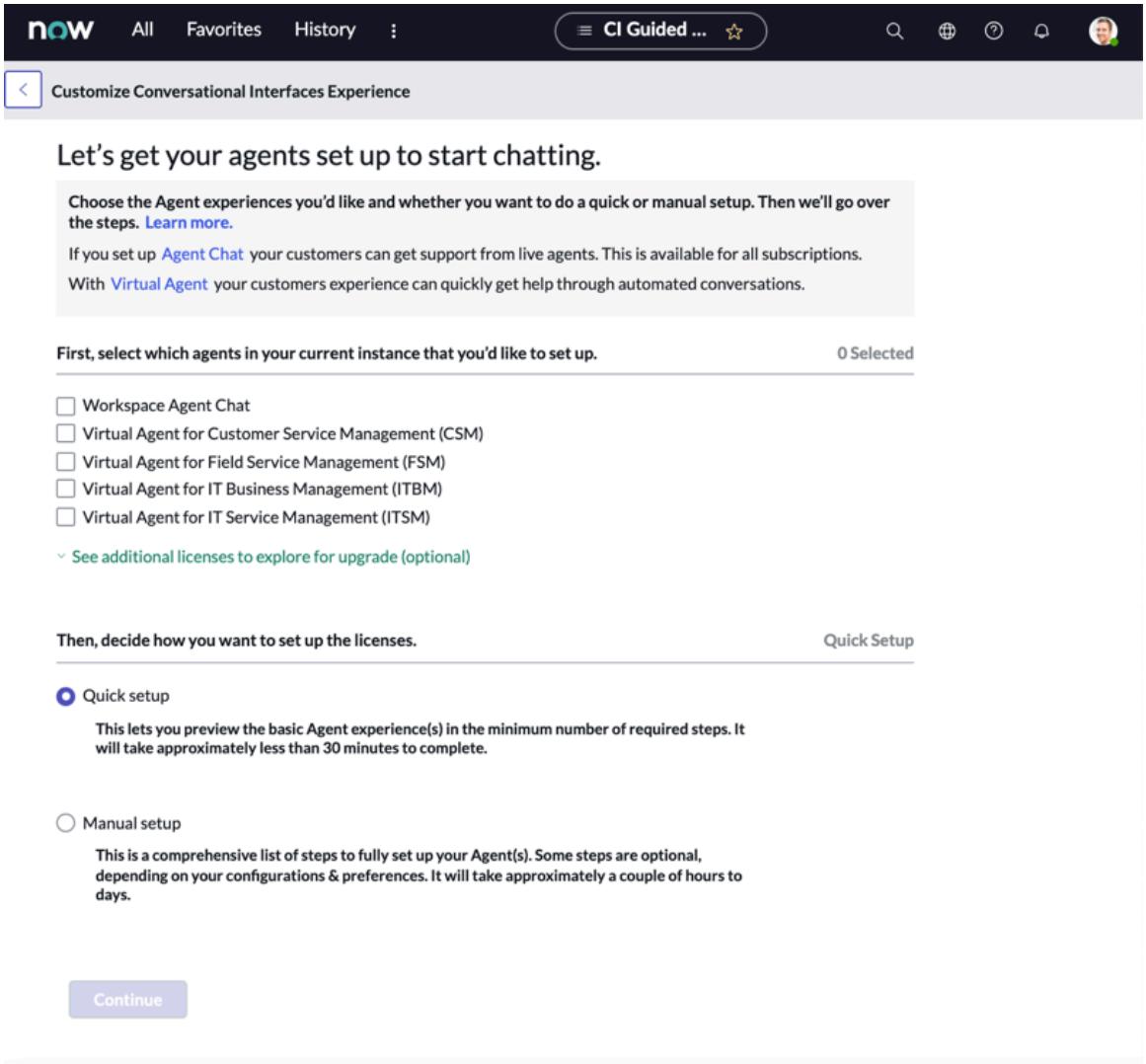

6. Select **Continue** and complete the subsequent setup tasks.

What to do next

After you've completed the setup tasks, you and your topic authors can explore the functionality provided with Virtual Agent, such as reviewing pre-built conversations and creating or updating conversation topics for your end users.

Related topics

Guided Setup

Conversational Interfaces reference

Conversational Interfaces reference topics provide shared technical descriptions of features that apply to Virtual Agent and Agent Chat, such as the Interactions table.

Data management in Conversational Interfaces

Use data management tools, such as table cleaners, to maintain Conversational Interfaces tables.

Virtual Agent table cleaning

Virtual Agent has a data retention policy that automatically deletes records from certain base system tables when they reach a specific age, to prevent tables from growing to an

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unmanageable size. Some Virtual Agent and related Conversational Interfaces tables are not automatically cleaned. You can activate table cleaning for the following tables.

Conversational Interfaces tables that need cleaning

Table label	Table name	Description	Default record age (seconds)
Chat Server Analytics	sys_cs_analytics	Server records that include sys IDs for messages, threads, conversations, users, and events.	7,776,000
Conversations	sys_cs_conversation	Conversation details, including topic definition, device used, and consumer (user). **Note:** Table cleaner also automatically deletes the related records for the following: • Conversation Messages • Conversation Tasks • Conversation Members • Session bindings • Profane message logs if using the Profanity Filter	5,184,000
Message Last Reads	sys_cs_message_last_read	Message IDs of the last messages read by users in chat and messaging channels.	15,552,000
CI Analytics	sys_ci_analytics	Conversation details used in Conversational Analytics. If the conversation ID is available, table cleaner removes closed, complete, and faulted conversations from the Conversations [sys_cs_conversation] table.	604,800

The Auto Flushes [sys_auto_flush] table lists the base system tables and their corresponding record ages. When table cleaning is activated, the Table Cleaner scheduled job triggers the table cleaner to remove the records that meet the default record age. If needed, you can change the record age for a table and specify any conditions to filter the records to be removed. For details, see Activate table cleaning for Virtual Agent tables.

If a table has related child tables, the table cleaner automatically performs a cascade delete to remove the related child tables. For example, when table cleaning is activated for the

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Conversation [sys_cs_conversation] table, the table cleaner runs automatically when the table is 60 days (5,184,000 seconds) old. The table cleaner also performs a cascade delete to remove the related child tables. To learn more about table cleaning in the ServiceNow AI Platform, see Table cleaner.

Activate table cleaning for Virtual Agent tables

Activate table cleaning for certain tables used in Virtual Agent and Conversational Interfaces.

Before you begin

Role required: admin

About this task

You can activate table cleaning for these Virtual Agent and Conversational Interfaces tables:

- Chat Server [sys_cs_analytics]
- Conversations [sys_cs_conversation]
- Message Last Reads [sys_cs_message_last_read]
- Ci Analytics [sys_ci_analytics]

Procedure

1. Open the Auto Flush [sys_auto_flush] table by typing `sys_auto_flush.list` in the filter navigator.
2. Select the table to be activated for cleaning.
3. Change the fields in the form as needed.

Auto Flush form

Field	Description
Age in seconds	The time, in seconds, that specifies when records in the table are to be deleted. To change the age, enter the new value in seconds.
Active	Option to activate or deactivate table cleaning for this table. Select this option to activate table cleaning.
Cascade delete	Option to activate or deactivate table cleaning for related tables. Some tables may have child tables that are also automatically cleaned.
Conditions	Condition builder for specifying filter conditions that define the records to be removed.

4. Select **Update**.

The Table Cleaner scheduled job automatically runs the cleaner when the table records meet the specified record age and any conditions that you set for them.

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Interaction Insights table

User sentiment analysis prepares agents for the tone of incoming conversations. Business rules can be created based on this value and agents can take appropriate actions on the chat, whether it comes from Virtual Agent, another live agent, or from a queue.

Both synchronous and asynchronous channels support sentiment analysis. Use Task Intelligence to set up sentiment analysis.

When configured, sentiment analysis is performed at the end of a Virtual Agent or live agent conversation. The user sentiment is stored in the Interaction Insights [sys_cs_interaction_insight] table.

Interaction Insights table

Field	Description
Interaction	The sys ID for the conversation in the Interactions [interaction] table.
Sentiment	Shows the sentiment level of the interaction, if sentiment analysis is enabled on the instance. This value can be shown to agents in the Agent Chat interface. Business rules can be created based on this value at handoff (Virtual Agent to live agent, live agent to live agent, or live agent to queue). Valid values are as follows: • Positive • Neutral • Negative • null (no value assessed)
Sentiment Normalized	Sentiment score between -0.5 (negative sentiment) and 0.5 (positive sentiment). You can modify these values by adjusting the *com.glide.cs.neutral_sentiment_max_value* and *com.glide.cs.neutral_sentiment_min_value* system parameters.
Type	Type of analysis performed. For example, *Sentiment*.
User	Name of the agent or Virtual Agent.
User Type	Type of user. For example, *Agent*.

Virtual Agent

Unlock your enterprise productivity with ServiceNow® Virtual Agent. Provide your employees and customers with a friendly messaging interface, featuring pre-built conversations powered by artificial intelligence.

https://player.vimeo.com/video/988245428?badge=0&autopause=0&player_id=0&app_id=58479

Get started with ServiceNow AI Platform Virtual Agent

Select a tile to get started with ServiceNow AI Platform Virtual Agent.

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Explore



Learn how employees, customers, and agents use Virtual Agent.

Plan and configure



Plan and configure your Virtual Agent implementation.

Build and deploy



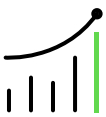
Design and build automated conversations and reusable topic components.

Integrate and maintain



Extend Virtual Agent capabilities by integrating with other applications.

Analyze



Improve and refine Virtual Agent interactions using deep insights into conversational data.

Reference



Get Virtual Agent Designer interface descriptions and Virtual Agent technical details.

Get started with Virtual Agent for specific businesses

To explore Virtual Agent for IT Service Management, Customer Service Management, or HR Service Delivery, select a business tile to learn more.

Virtual Agent for IT Service Management



Predefined Virtual Agent topics to help your employees complete common IT-related tasks.

Virtual Agent for Customer Service Management



Predefined Virtual Agent topics to help your customers complete common self-service tasks.

Virtual Agent for HR Service Delivery



Predefined Virtual Agent topics to help your employees complete common HR-related tasks.

Virtual Agent for Workplace Service Delivery



Predefined Virtual Agent topics to help your employees complete common workplace-related tasks.

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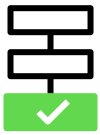
Virtual Agent for Field Service Management	Virtual Agent for Project Portfolio Management	Virtual Agent for Legal Service Delivery	
			
Predefined Virtual Agent topics to help your customers complete common field service management tasks.	Predefined Virtual Agent topics to help your customers complete common Project Portfolio Management tasks.	Predefined Virtual Agent topics to help your customers complete common legal-service tasks.	

Additional resources

- Virtual Agent and Natural Language Understanding (NLU) community forum
- Conversational Interfaces Academy

Note:
We improve performance and the user experience by tracking aggregate in-app activity, including interaction with our app. This tracking is focused on aggregated technical information rather than personal information.

Exploring Virtual Agent

The ServiceNow Virtual Agent platform provides user assistance through conversations within an intelligent messaging interface. Design and build automated conversations with an out-of-the-box system that help your users quickly obtain information, make decisions, and perform common work tasks with Virtual Agent.

Overview

Virtual Agent helps solve ordinary issues and delivers results for common requests, leaving your agents and technicians free to focus on more complex user issues. You can change the look and feel of the chat experience to suit each audience for your business, including running your chatbot in a variety of common or custom messaging channels. Monitor your bot's success with the Conversational Analytics dashboard.

When you add Now Assist in Virtual Agent skills, your developers have access to large language model (LLM) topic discovery. The Now Assist topics skill includes LLM-enabled controls that make topic authoring easier so that you can deliver self-service solutions more quickly.

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Pre-built Virtual Agent topics

Pre-built Virtual Agent topics are available from the ServiceNow Store. These topics are designed to handle common issues that can occur and are customized for ServiceNow workflows. Available plugins include the following:

- ITSM Virtual Agent conversations
- Customer Service Virtual Agent conversations
- HR Service Delivery Virtual Agent conversations

Virtual Agent and Virtual Agent Lite

The Virtual Agent platform is available as a professional subscription or in a limited version (Virtual Agent Lite) that is automatically included with the ServiceNow AI Platform®.

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Virtual Agent Professional provides all the core functionality for creating and deploying Virtual Agent conversations. Virtual Agent includes the following features, which are automatically installed with the Glide Virtual Agent plugin (com.glide.cs.chatbot):

- Virtual Agent Designer (supports Natural Language Understanding (NLU) in Virtual Agent conversations)
- Virtual Agent web client
- Virtual Agent notifications
- Conversational custom chat integration framework
- Conversational Interfaces console for admin configuration
- Topic Recommendations (ServiceNow Store app)
- Conversational Analytics (ServiceNow Store app)

Virtual Agent Lite provides a limited (trial) version of Virtual Agent for ITSM standard customers. For more information, see Virtual Agent Lite.

Virtual Agent benefits

Benefit	Feature	Role
Use a conversation designer to build and test conversations without scripting or advanced skills. Drag and drop elements on the graphical canvas to see the entire flow. Go further with branching, looping, and scripting.	Virtual Agent Designer	virtual_agent_admin or admin
Use LLM topic discovery instead of Natural Language Understanding (NLU) or keywords to create more conversational experiences. Now Assist in Virtual Agent uses LLMs and generative AI skills to improve deflection rates and reduce the amount of time-consuming work that NLU topic discovery requires.	Now Assist in Virtual Agent LLM topic discovery in Virtual Agent	virtual_agent_admin or admin
Create custom chat experiences for users from where they run Virtual Agent.	Configuring Now Assist in Virtual Agent Branding your chat client Setting up chat experiences for Virtual Agent users	virtual_agent_admin or admin
Seamlessly transfer the entire conversation history and context to the right human agent so they can quickly address any escalations and resolve user issues.	Using Virtual Agent with a live agent	virtual_agent_admin or admin

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Benefit	Feature	Role
Connect to where your employees and customers already are—in web portals, Now® Mobile apps, and collaboration tools like Slack, Microsoft Teams, Facebook Messenger consumer app, Workplace from Facebook enterprise messaging app, and any other popular chat or messaging app.	Integrating Virtual Agent with other channels	virtual_agent_admin or admin
Analyze the performance of Virtual Agent through preconfigured dashboards.	Analyzing Virtual Agent performance	virtual_agent_admin or admin
Deliver real-time alerts and status updates to employees, including actionable notifications and SMS notifications. Deliver notifications via all supported channels, including web, Slack, Workplace, and SMS. You can quickly collect feedback for critical decisions and resolve requests faster.	Configuring Virtual Agent notifications	virtual_agent_admin or admin
Serve your international Virtual Agent users, regardless of their language and locale.	Localization options for Virtual Agent	virtual_agent_admin or admin
Integrate with other ServiceNow AI Platform applications, such as AI Search. Use Flow Designer to add automated workflows to conversation topics, and access many third-party services using Integration Hub spokes.	Improving the user experience with AI Search Integrating Virtual Agent with Flow Designer workflows Integration Hub	virtual_agent_admin or admin
The Virtual Agent API enables developers, advanced users, and admins to use Virtual Agent as a standalone or secondary bot in your chat environment. Use Virtual Agent Bot Interconnect as the primary bot in a diverse chat environment.	Using Virtual Agent API Using Virtual Agent Bot Interconnect in your configuration	virtual_agent_admin or admin

Note:
For developer training, go to the Developer's Portal (login required). Navigate to **Learn** > **Courses** > **Virtual Agent**.

Virtual Agent web client interface

The Virtual Agent web client interface captures an automated messaging session between Virtual Agent and the user. Users can see a list of all the topics that the bot can help with, enter a request, request a transfer to a live agent, send and receive attachments, and receive visual and/or audio notifications.

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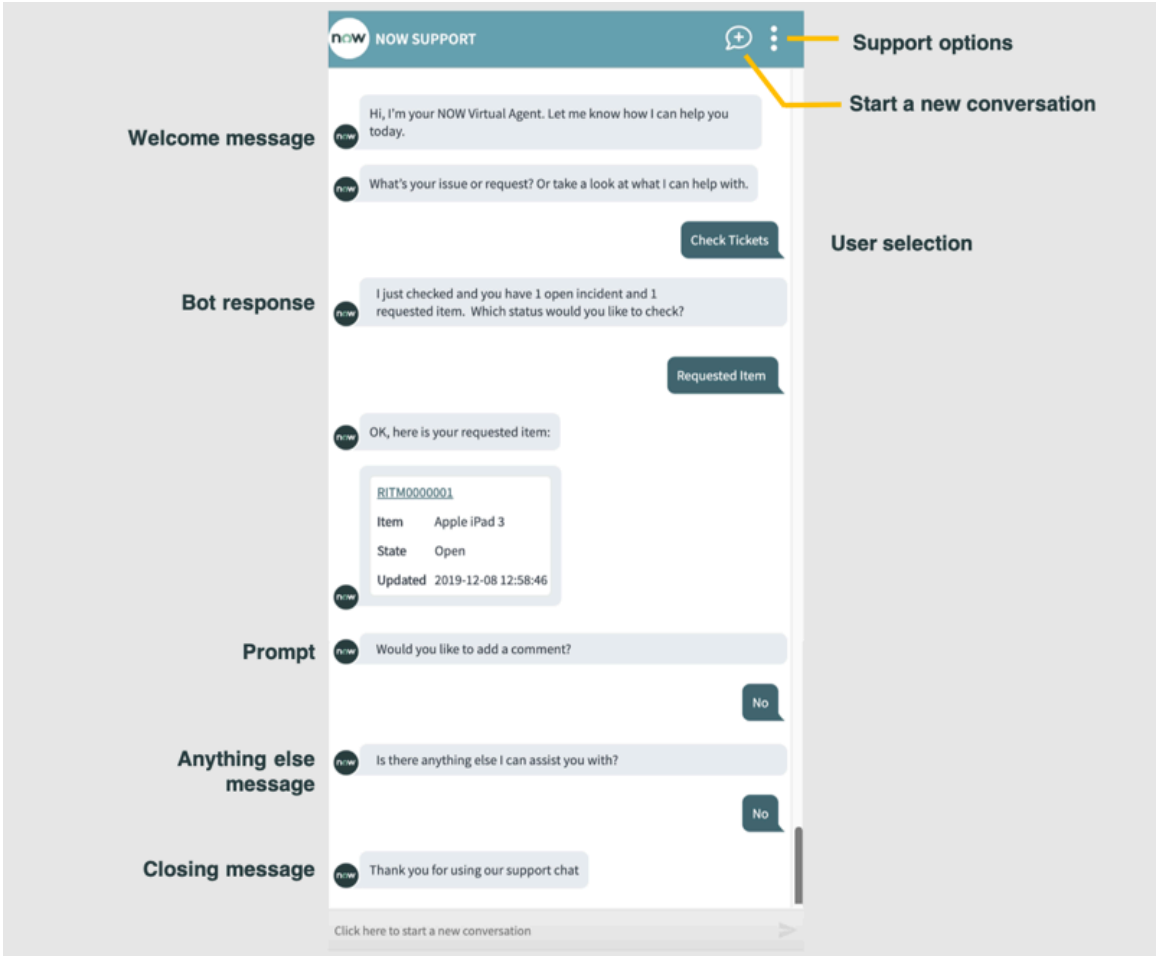
The web client interface uses the Service Portal web widget, which you can configure for custom service portals. This widget is available in the CSM, HR Service Delivery, and ITSM Service Portals.

Simple conversation example — web client



A simple conversation typically includes the following elements:

- Default welcome message from the virtual agent, followed by the first prompt for the conversation. The initial prompt asks the user to type a question or to choose from a list of available topics.
- User response to the first prompt. In this example, the user chooses the topic for checking an IT ticket.
- Series of prompts, acknowledgments, and responses exchanged between the virtual agent and the user until the users reach their goals or complete their tasks. You can use different rich controls in bot prompts, for example, choice lists with buttons or a carousel of images to select an item.
- Closing message to end the conversation.

When your users start a conversation with the bot, they can enter a request or see a list of everything that the bot can help with. If they choose to see everything, the chat window displays all topics available to the user. Your users can use the search box to filter the list of topics.

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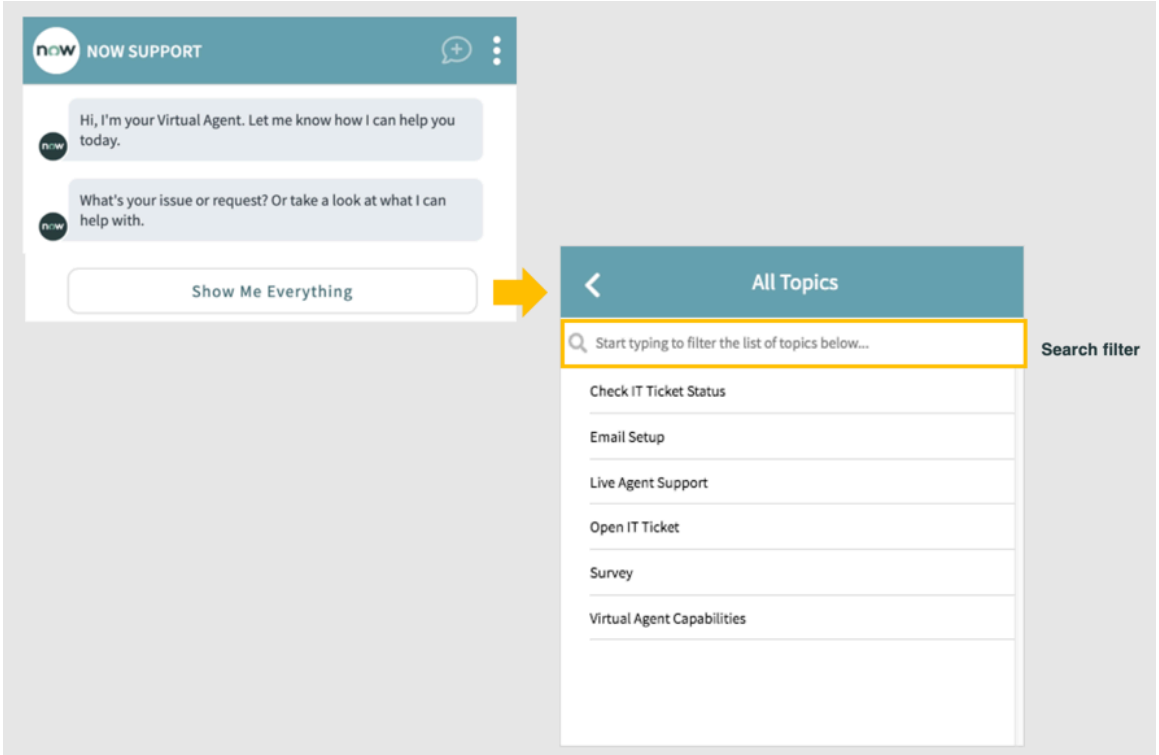
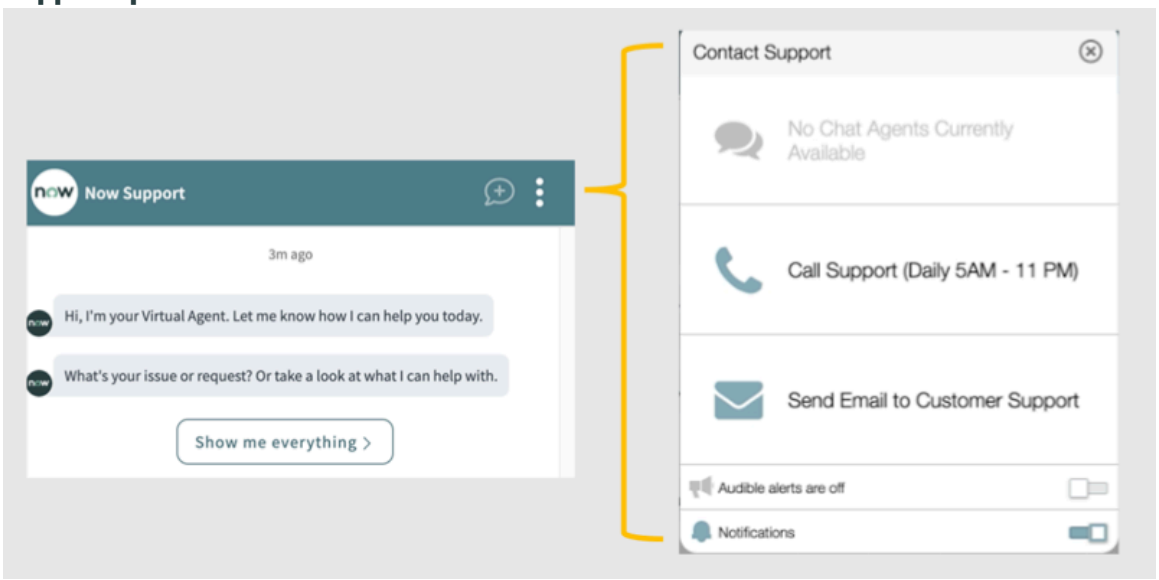
See all topics



The conversational interface offers your users several options to manage the conversation. Users can stop the current conversation and start a new one, contact support to access a live agent for immediate assistance, and control audible alerts for chats.

Support options menu



When users transfer to a live agent, the chat window header changes to indicate that they are now interacting with a live agent. The attachment and send icons are available in the chat window for uploading an image, text, or PDF file and sending it to the agent.

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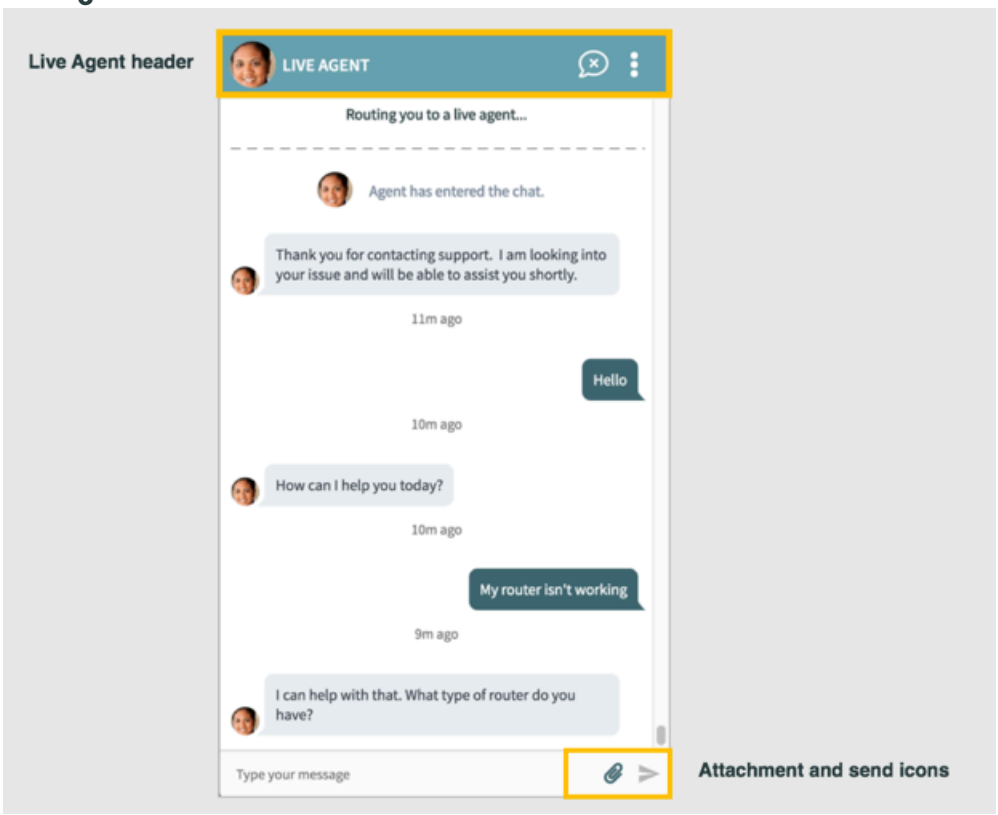
Live agent transfer



During live chat, users can attach a file of any type (for example an image, text, or PDF file) and send it to the agent. The system automatically performs a virus scan on the file attachment. If the scan is successful, the file is sent to the agent.

- If the scan fails, a message informs the user that the scan did not pass so that the user can correct the file and then upload the file again.
- If the upload and virus scan process times out (the upload takes too long), a message tells the user that the file couldn't be processed and to try the file upload again.

Note:
Most chat clients support file attachment uploads. However, the mobile chat client only supports file attachment uploads in bot conversations. Users cannot upload files in mobile chat with a live agent.

Your users automatically receive audio and visual alerts when they receive a message from a live agent or virtual agent.

- The visual indicator displays the number of messages received, next to the chat icon in the Service Portal window. When the user opens the chat, the indicator number closes.

New message alerts



- Your authenticated end users can enable or disable audible alerts of chats through the toggle switch on the chat menu (Contact Support).
- Authenticated end users can also enable or disable the delivery of notifications through the toggle switch on the chat menu (Contact Support).
- The default sound notification uses the sn_va_web_client_alert.mp3 audio file.

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- You can change the sound that requesters hear by uploading your own audio file. For details, see Manage audio files.
- To turn off the audio notification for your instance, use the system parameter `sysparm_disable_audio_notifications=true`. For example: `https://<your-instance name>.service-now.com/nav_to.do?sysparm_disable_audio_notifications=true`

Quick start for Virtual Agent

Using the Conversational Interfaces console, you can quickly add Virtual Agent to a portal, configure branding, personalize the greeting, and begin to use pre-built ITSM Virtual Agent conversations.

If you have a license for a Now Assist product, you can also quickly deploy Now Assist skills in Virtual Agent in a matter of minutes. For details, see Configuring Now Assist in Virtual Agent.

Before you begin

If you have a license for Virtual Agent, the following sections will help you get started and create conversations for your organization quickly.

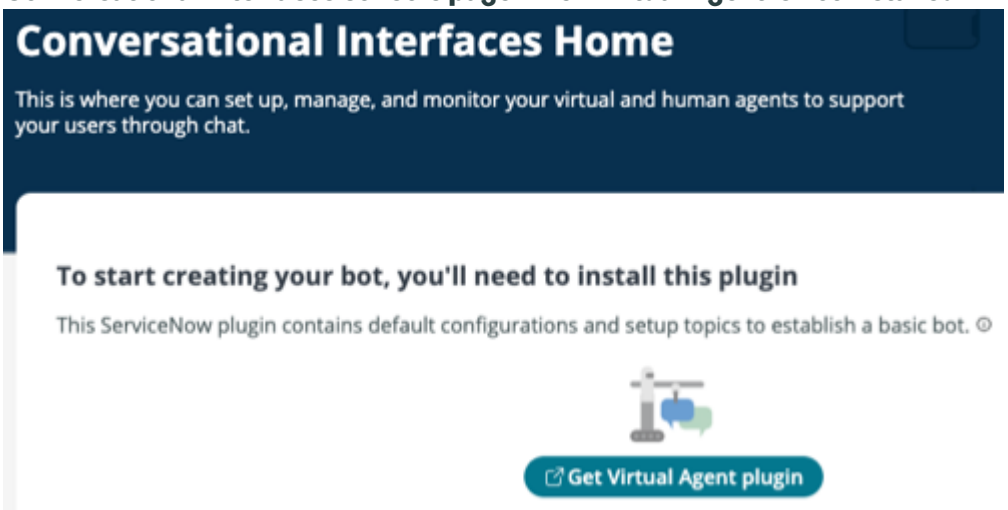
If you do not have a license for Virtual Agent, you can try Virtual Agent Lite, which comes preinstalled. For information about getting started with Virtual Agent Lite, see Quick start for Virtual Agent Lite.

Use the Conversational Interfaces console application to activate and configure Virtual Agent quickly. For more information about the Conversational Interfaces console, see Conversational Interfaces Console.

Step 1: Activate Virtual Agent and recommended store plugins

If Virtual Agent has not been activated on your instance, you will need to install it.

Conversational Interfaces console page when Virtual Agent is not installed



1. Navigate to **All** > **Conversational Interfaces** > **Home**.
2. If Virtual Agent is not installed, select **Get Virtual Agent plugin** on the home page.
3. When prompted, select **Start install**.

   The Applications page opens with Virtual Agent (com.glide.cs.chatbot) selected.

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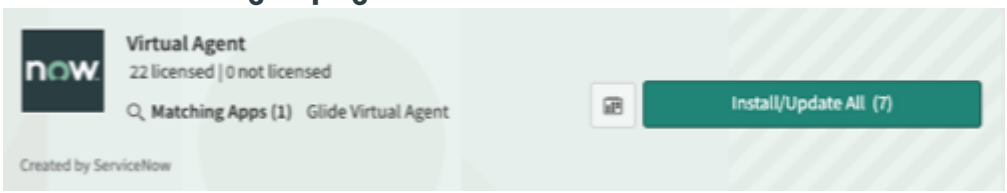
Install the Virtual Agent plugin



   a. If you have a Virtual Agent license, select **Install/Update All**.

   b. In the dialog box, select **Install** to begin.

4. Under Choose what type of requests you want your bot to support, select **Get ITSM plugin**.

Install the ITSM Virtual Agent Conversations plugin



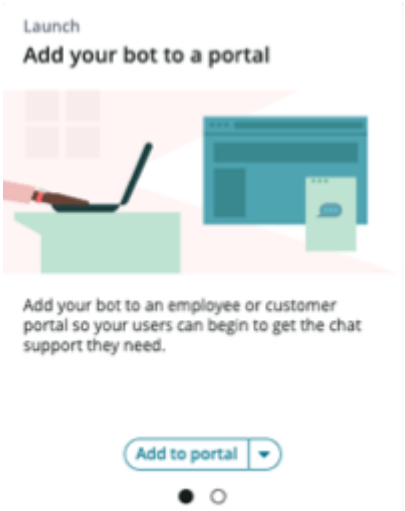
5. Follow the directions in the ServiceNow Store and select **Opt-in** when prompted.
6. Repeat steps 3 and 4 to install additional plugins. Otherwise, continue to the next section.

Step 2: Make Virtual Agent available to users

Add a chat entry to the menu of your web portal. You can add Virtual Agent to additional portals later.

1. Navigate to **All** > **Conversational Interfaces** > **Home**.
2. Under Add your bot to a portal, select **Add to portal**.

Add your bot to a portal tile on the Conversational Interfaces console page



3. Fill in the form for Service Portal Agent Chat Configuration.

   Type a name and unlock the **Portal(s)** field to specify one or more portals for your virtual agent. Type a number in the **Order** field to specify where to include Virtual Agent on the menu.

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a. In the **Name** field, type a name for the configuration.

b. Select the **Portal** lock icon to open it.

c. Select the search icon, and then select a portal.

d. In the **Order** field, type a number to indicate the order that the configurations should run.

Only one configuration applies per portal. If there are multiple configurations on a portal, the system runs the first configuration found from lowest to highest.

4. Select **Submit**.

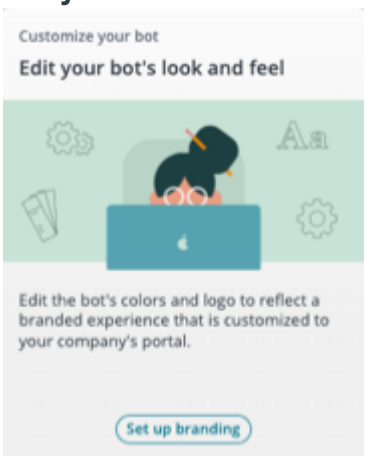
For more detailed information, see Add your bot to a portal.

Step 3: Customize the look and feel of Virtual Agent

You can change the way Virtual Agent looks to the end user. You can change the colors, add your company logo, and change the icon that represents your bot.

1. Navigate to **All** > **Conversational Interfaces** > **Home**.
2. Under Edit your bot's look and feel, select **Set up branding**.

Edit your bot's look and feel tile on the Conversational Interfaces console page



The Branding settings page opens.

3. Select **New** or the name of an existing branding record.
4. On the form, fill in the fields.
5. Select **Save**.
6. Apply the branding configuration as described in Set up your Virtual Agent bot's branding.

Step 4: Get recommended topics

The Topic Recommendations app lets you evaluate the common use cases that Virtual Agent can help resolve or deflect. You can use Topic Recommendations with Virtual Agent topics that use either keyword or NLU topic discovery.

1. Navigate to **All** > **Conversational Interfaces** > **Home**.
2. Under Set up Topic Recommendations, select **Get Recommendations**.

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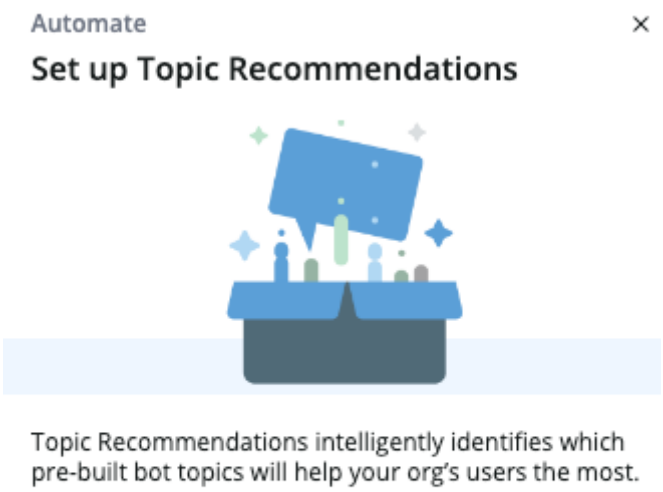
Set up topic recommendations



The Topic Recommendations page opens.

3. Use the Quick start for Topic Recommendations to configure and get topic recommendations based on your company's data.

Explore further

As you work with Virtual Agent, you can expand its capabilities by implementing other features. For example, you can do the following:

- Setting up chat experiences for Virtual Agent users
- Create new Virtual Agent topics
- Change Virtual Agent and Agent Chat system messages
- Enable AI Search
- Implement Natural Language Understanding (NLU)
- Use Virtual Agent with a live agent
- Localize Virtual Agent topics

Example Asset Refresh Virtual Agent conversation with notifications

Virtual Agent can automate many workflows, and a number of common solutions are available when you install Virtual Agent and related plugins, such as ITSM Virtual Agent Conversations.

Overview

For an overview of the Asset Refresh workflow from the user perspective, watch this video.

Automate workflows with Virtual Agent. In this example, a user is notified that it's time to get a new tablet. The Virtual Agent workflow helps him order a replacement.

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Pre-built components in Virtual Agent

Virtual Agent comes with a basic configuration that includes common greetings, NLU intents, reusable logic, and pre-built conversations. Using these building blocks, you can quickly put together workflows to handle some of the most common organizational needs, including the following:

- Resetting a password
- IT Self-Service
- IT troubleshooting
- HR queries and employee profile updates
- Customer Service queries and requests

To help you understand the possibilities, the Asset Refresh example uses pre-built topic blocks that are included in the ITSM Virtual Agent Conversations plugin. These topic blocks do most of the "heavy lifting" in the topic.

Asset Refresh workflow

The purpose of the Asset Refresh topic is to automate hardware upgrades for your employees. If your organization's policy is to replace computers or tablets every two years, then you can create a business rule that says when a user has had an asset for two years, the asset should move to the *`In maintenance`* state. You can create a notification that is triggered by this change of state in the Hardware table. In our example, the asset owner receives the notification and is instructed to upgrade their asset.

The Asset Refresh Virtual Agent topic provides the action for the notification. When the user selects the link in the notification, they proceed to the workflow in Virtual Agent. This example topic contains the primary flow (helping the user upgrade their hardware) and two secondary flows that ensure that the user's needs are met.

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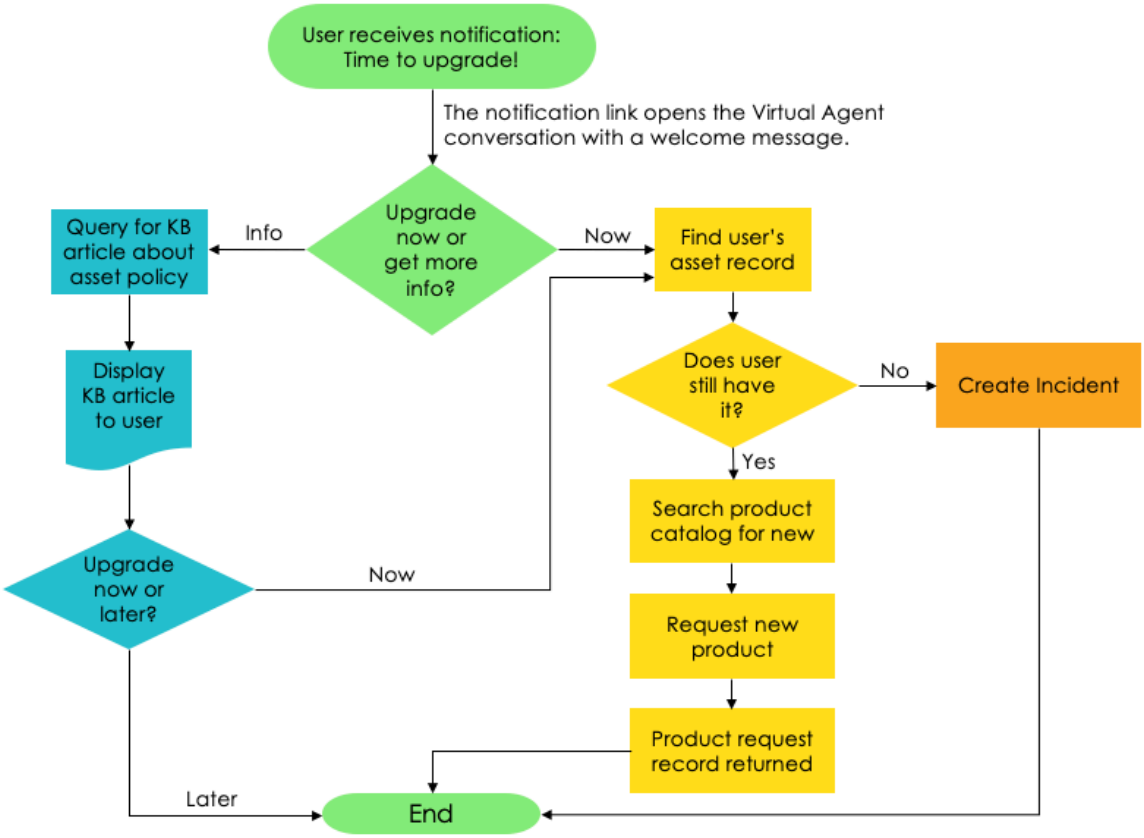

After a greeting message, Virtual Agent asks the user if they want to upgrade now or get more information. If they choose to upgrade now, they are directed through the primary flow. Virtual Agent uses the Lookup utility to find the expiring asset that is assigned to the user. Then Virtual Agent makes sure the user still has the asset. If they do not, Virtual Agent uses the Create Incident topic block to open an Incident to resolve the problem. If the user still has the asset, Virtual Agent uses the Search Catalog Item topic block to find a replacement. The Request Catalog Item topic block is used to request it. The request is sent to the user, and the workflow ends.

If the user chooses to get more information, the AI Search topic block returns one or more specific KB articles that explain the organization's policy. Once the user has viewed these, they are given the option to upgrade now or later. If they choose to upgrade now, they are redirected through the primary workflow; otherwise, the conversation ends.

Creating the Asset Refresh example workflow

The following topics describe how to use Virtual Agent Designer and actionable notifications to create the Asset Refresh workflow. Follow these steps in order.

1. Create the Asset Refresh topic in Virtual Agent Designer.
2. Create the Open Incident workflow in the Asset Refresh topic.
3. Create the More Information workflow in the Asset Refresh topic.
4. Create the notification for the Asset Refresh topic.
5. Associate content with the Asset Refresh notification.

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Create the Asset Refresh topic in Virtual Agent Designer

Create the topic in Virtual Agent Designer using topic blocks that come with the ITSM Virtual Agent Conversations plugin. When the user receives a notification that it's time to upgrade, they will be directed to this topic.

Before you begin

Install the following applications:

- Glide Virtual Agent plugin (com.glide.cs.chatbot)

  You must have a subscription for Virtual Agent before you can activate the Glide Virtual Agent plugin.

- Enable Natural Language Understanding (NLU), if not already enabled (recommended).
- ITSM Virtual Agent Conversations (available in the ServiceNow® Store)

  If this application is already installed, check the ServiceNow Store for an updated version before you begin.

Determine the application scope for your Virtual Agent topic and actionable notification. They don't have to reside in the same application scope, but it can be easier to maintain if they do.

Publish the following ITSM Virtual Agent components. If you're using an application scope other than ITSM Virtual Agent Conversations, you should duplicate and publish these topic blocks in the scope you intend to use. To do this, change your application scope, and then duplicate the topic blocks in Virtual Agent Designer.

- Create Incident topic block
- Request Catalog Item topic block
- AI Search topic block
- Search Catalog Item topic block

Role required: virtual_agent_admin or admin

About this task

For more information about building topics and the Virtual Agent Designer interface, see the following topics:

- Getting started with Virtual Agent Designer
- Create a Virtual Agent topic
- Virtual Agent Designer controls
- Virtual Agent Designer interface reference

Tip:
Look through existing conversations to ensure you are not duplicating effort, and familiarize yourself with Virtual Agent and the flow of topics. Additionally, it may be helpful to outline the flow of a conversation before building it in Virtual Agent Designer.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. On the Topics page, select **Create**.

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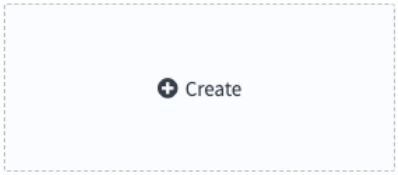
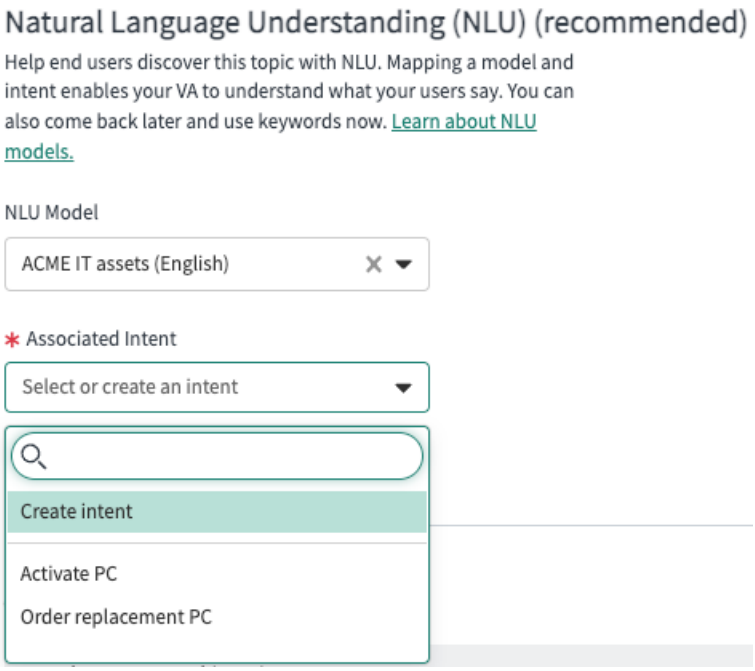


3. On the Create a topic form, set up your topic.

   a. Enter a name, such as `Asset Refresh`.

   b. If NLU is enabled, select an existing model, or create a new one.

   c. Select or create an intent for the NLU model.



   For descriptions of all field values, see Create a topic form.

   d. Select **Create**.

   The **Flow** tab appears with Start and End nodes. For an overview of this screen and its components, see Topic Flow tab.

4. Create your initial message to greet the user.

   a. From the Components area, drag a Text bot response node onto the canvas.

   b. Select the node to view the properties palette.

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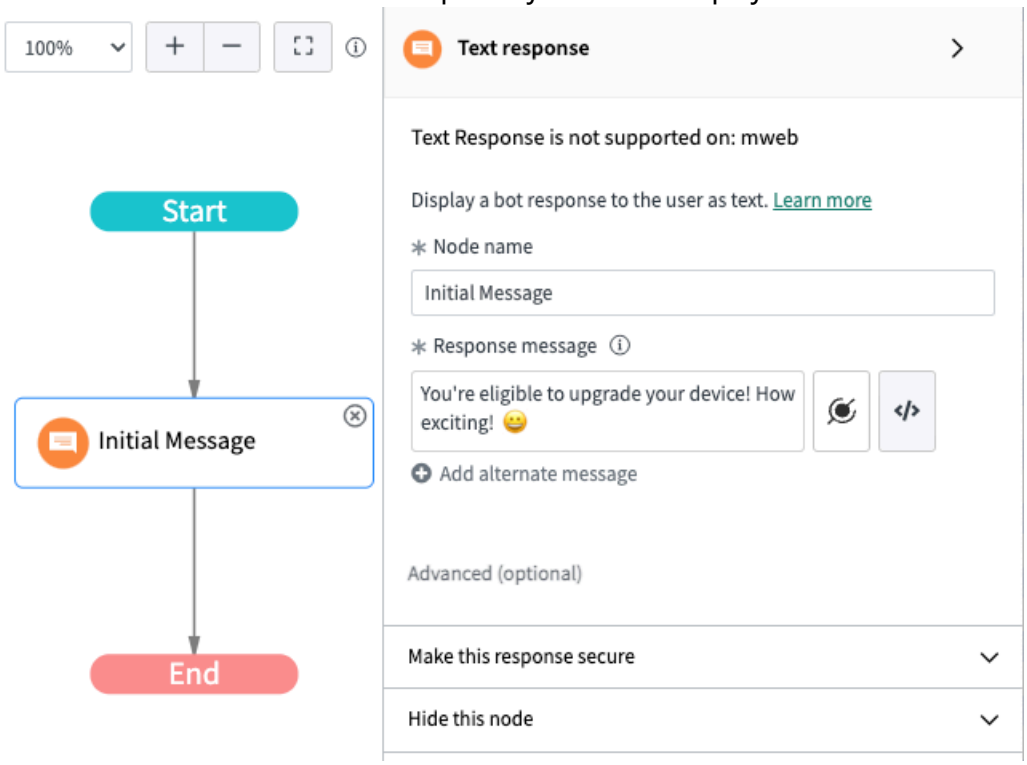
c. Enter a name for the node and the response you want to display to the user.



5. Ask the user if they want to proceed with the asset refresh.

a. From the Components area, drag a Static choice input node onto the canvas.

b. In the properties palette, enter the following information:

- A unique name, such as `Continue or Defer`.
- A text prompt, such as `What would you like to do next? Learn more, or continue with the upgrade?`
- In the Choices area, provide a text prompt for each choice and a value for that choice, so you can refer to it later on.

  For example, your choices might be `Learn more` and `Continue with upgrade`. The values should make sense as variable names. For example, `info` and `upgrade`.

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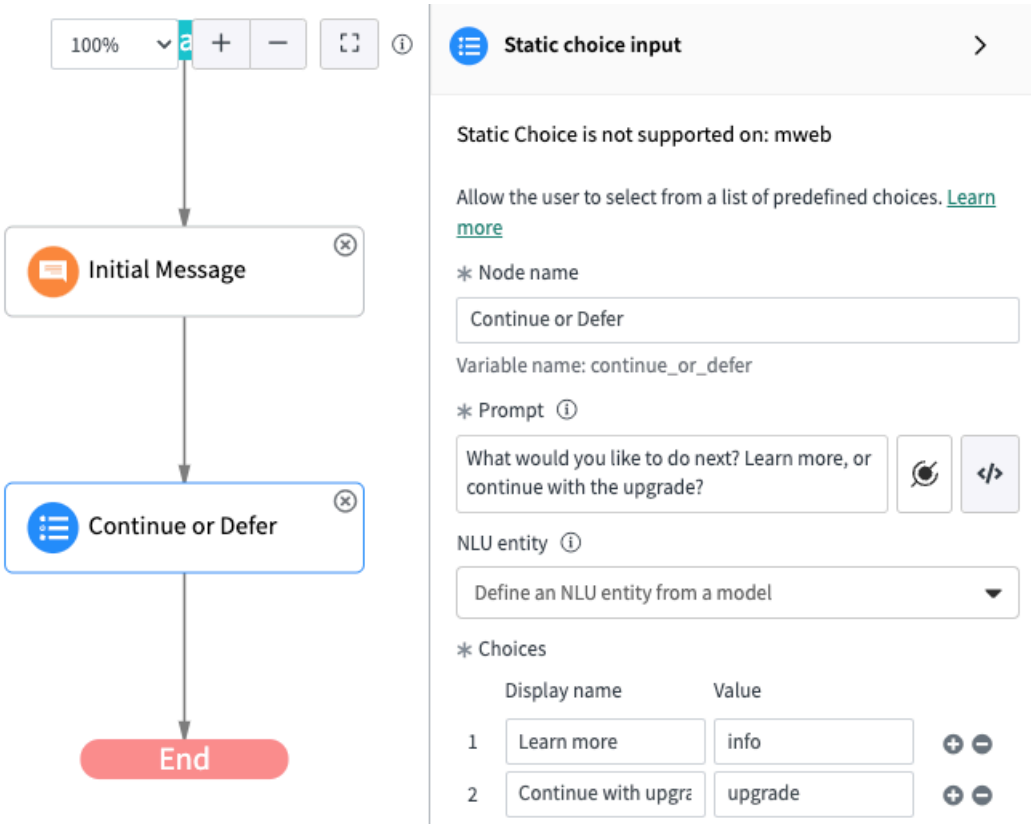

6. Add a Decision utility to handle the user's choice.

a. From the Components area, drag a Decision utility onto the canvas.

b. Select the plus icon to add a second branch.

c. Name each branch to correspond with the decisions (info and upgrade).

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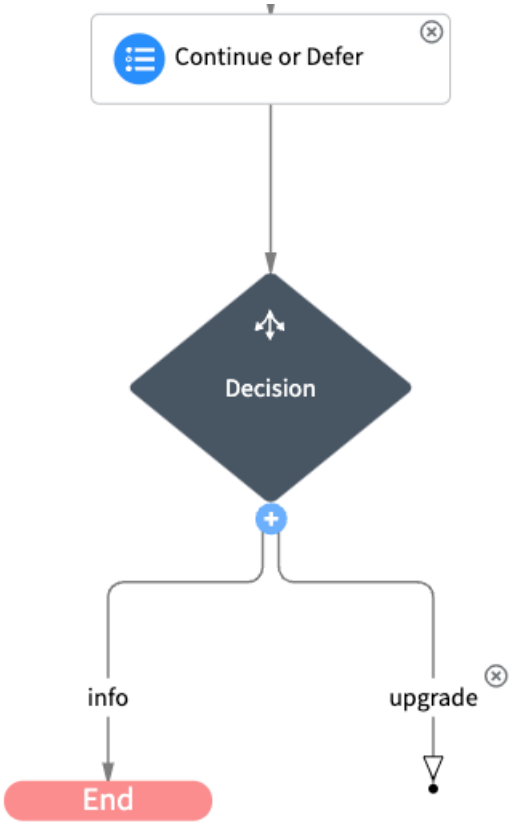
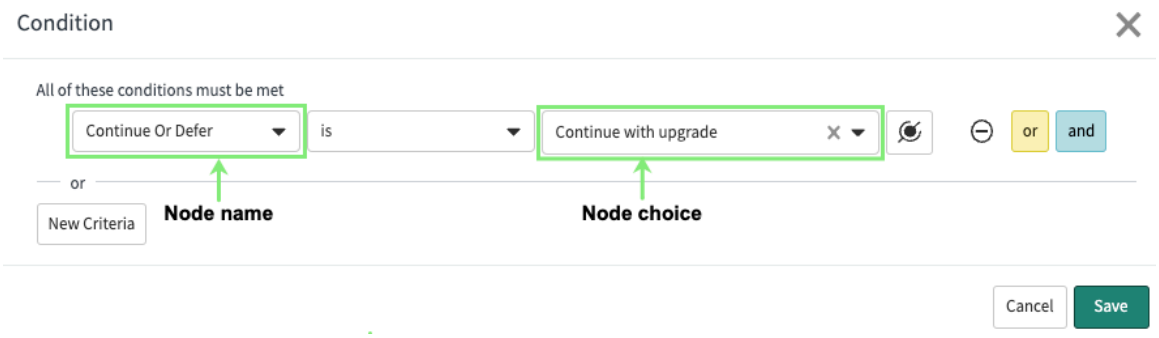


d. For each branch, select it and then use the Branch Condition area to indicate which option the branch will follow.



7. For the upgrade branch, add a Lookup utility node to confirm that the user still has the asset.

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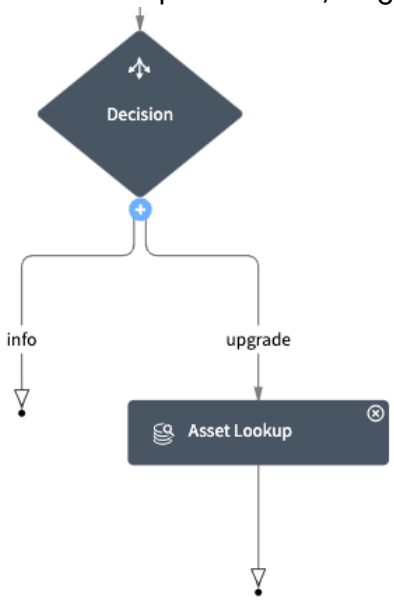
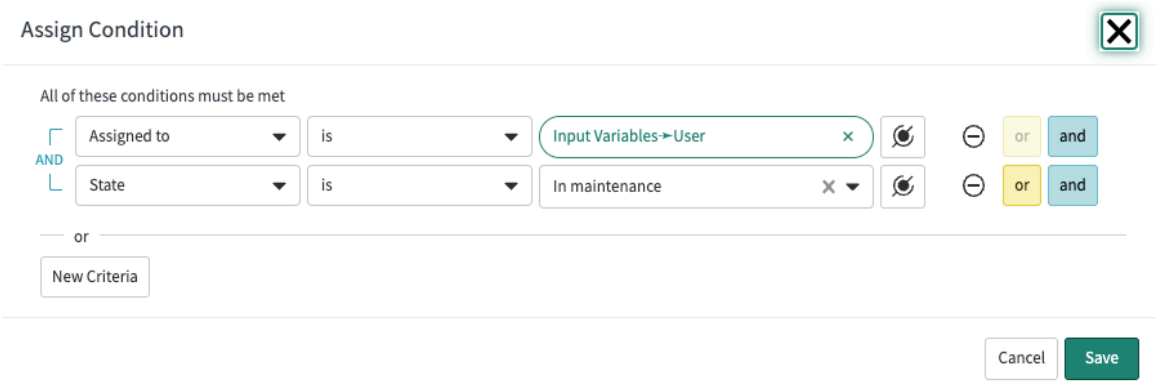
a. From the Components area, drag a Lookup utility onto the canvas.



b. In the properties palette, specify the following information:

- A unique name, such as `Asset Lookup`.
- The table name: **Asset [alm_asset]**
- In the Condition builder, select **Assigned to**, and then dot-walk to **Input Variables > User**. Select **and** to include **State > is > In maintenance**.

  The asset state will tie into the notification you send the user for this asset refresh.



8. Ask the user if they still have the asset.

a. From the Components area, drag a Boolean input node onto the canvas.
The Boolean node automatically asks if you want to add a Decision utility with two paths. Select **Yes**. A Decision node appears in the flow with values of **true** and **false**. Both are already mapped to the Boolean node.

b. Add a user prompt.

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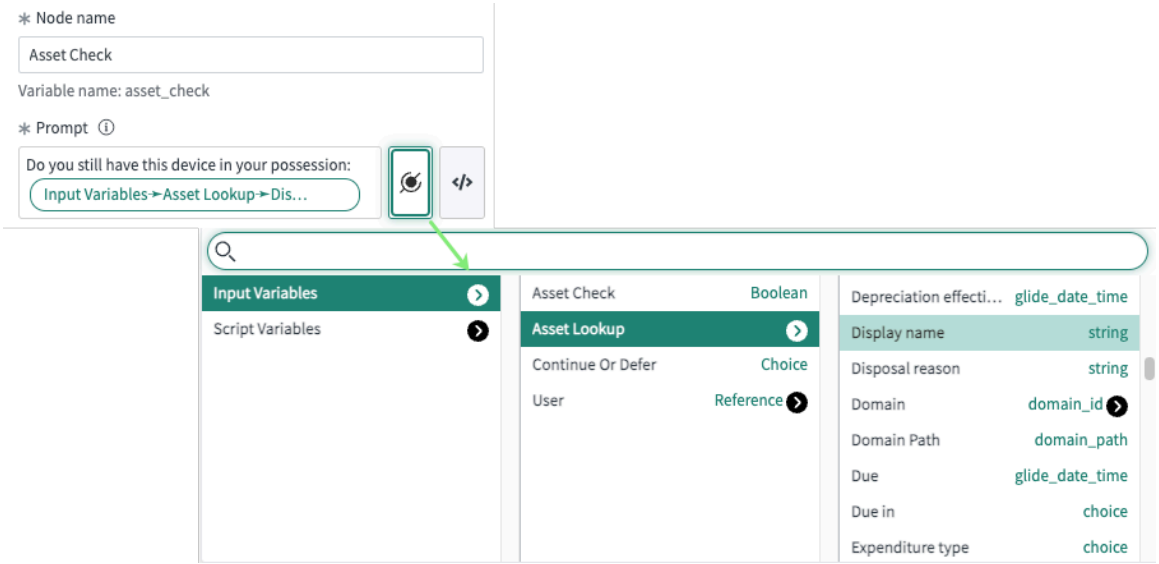
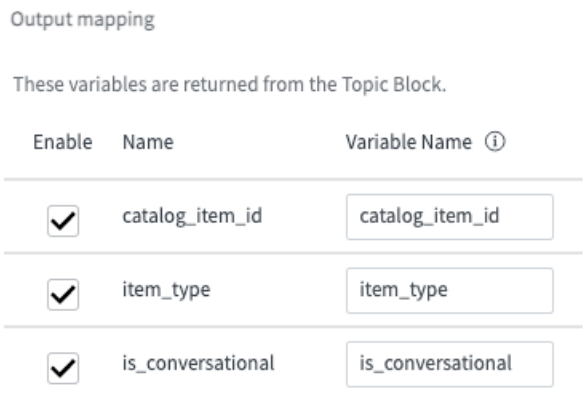
Use dot-walking to refer to the asset found by the Asset Lookup node.



9. If the user still has the asset (the Boolean response is **true**), we want to search for it in the catalog.
   a. From the Components area, drag the Topic Block utility onto the Asset Check **true** branch on the canvas.
   b. In the properties palette, select **Search Catalog Item** for the Topic block.
   c. Under Input mapping, use dot-walking to specify the **query_term** parameter from the Asset Lookup node (Input Variables > Asset Lookup > Display name).

   The catalog search will provide these output variables by default, shown under Output mapping.



10. Request the upgraded item.
    a. From the Components area, drag the Topic Block utility onto the canvas beneath the Search Catalog Item topic block.
    b. In the properties palette, select **Request Catalog Item** for the Topic block.

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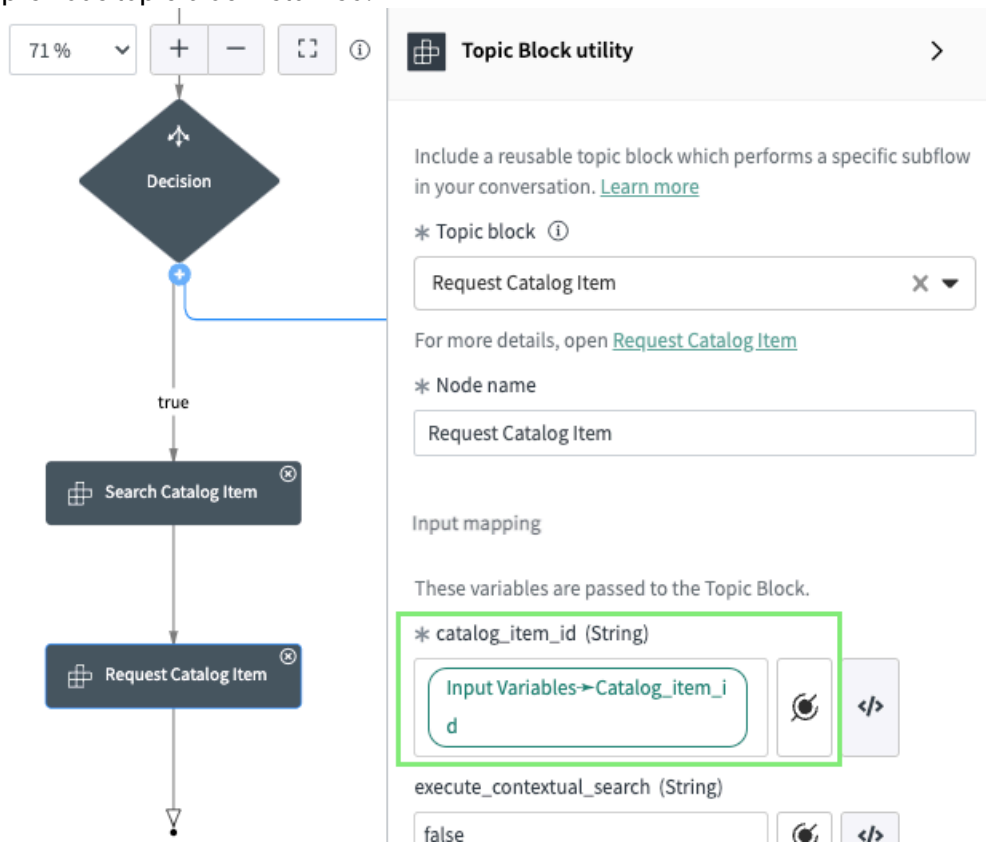
c. In the Input mapping area, use dot-walking to specify the *catalog_item_id* that the previous topic block returned.



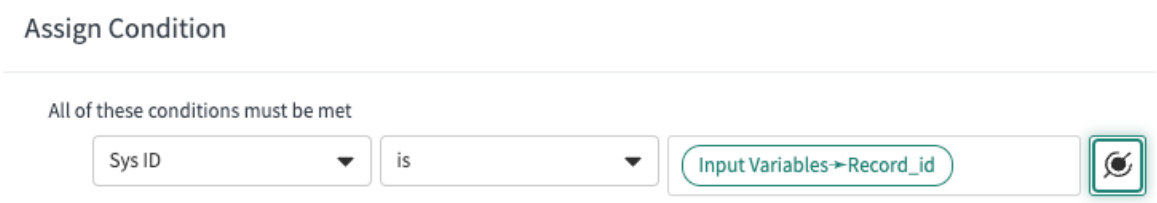
This topic block returns output variables as well. The user will be able to select variables for their new device, as well. You can configure these variables in Service Catalog.

11. Ask the user to confirm their choice of device.

a. From the Components area, drag the Card bot response node onto the canvas beneath the Request Catalog Item topic block.

b. In the properties palette, specify the following information:

- A unique name, such as `Device Request Record`.
- Card type: **Record**
- Populate this card by referencing: **Table**
- Table name: **Requested Item [sc_req_item]**
- In the Condition builder, add **Sys ID is Input Variables>Record_id**.



- In the **fields** area, select the record columns to display in the card to the user.

  For example, specify **Number**, **Short description**, and **Estimated delivery**.

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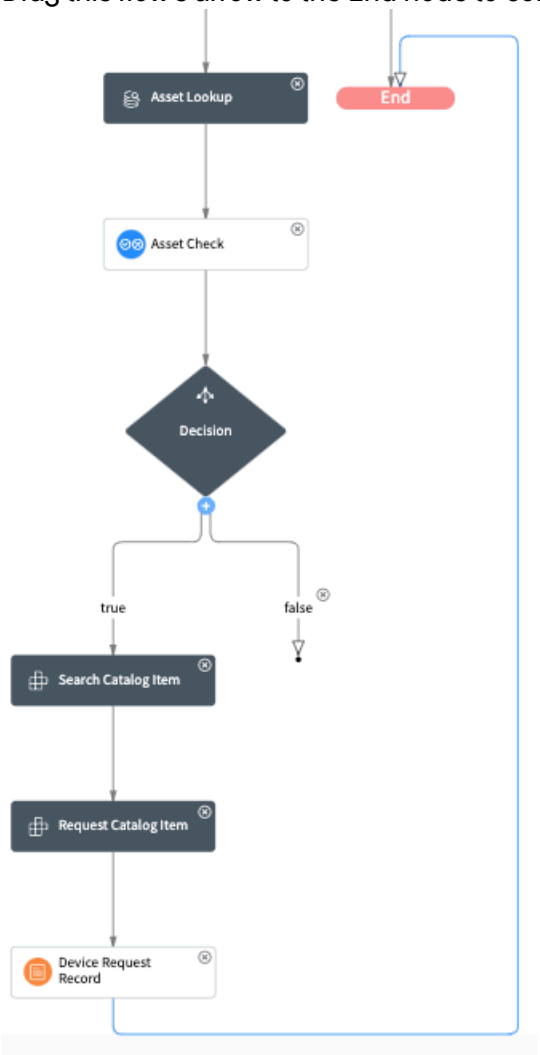
12. Drag this flow's arrow to the End node to complete this part of the workflow.



13. Select **Save**.

What to do next

Create the Open Incident workflow in the Asset Refresh topic

Related topics

Maximizing code reuse with topic blocks

Create the Open Incident workflow in the Asset Refresh topic

Each Decision branch introduces additional workflows. After creating our main Asset Refresh workflow, we need to ensure that the user can get help if something goes wrong. In this example, we will help the user create an incident.

Before you begin

Create the Asset Refresh topic in Virtual Agent Designer

Role required: virtual_agent_admin or admin

Procedure

1. Open the Asset Refresh topic in Virtual Agent Designer.
2. Return to the **false** decision branch after the Asset Check Boolean question that you asked the user.

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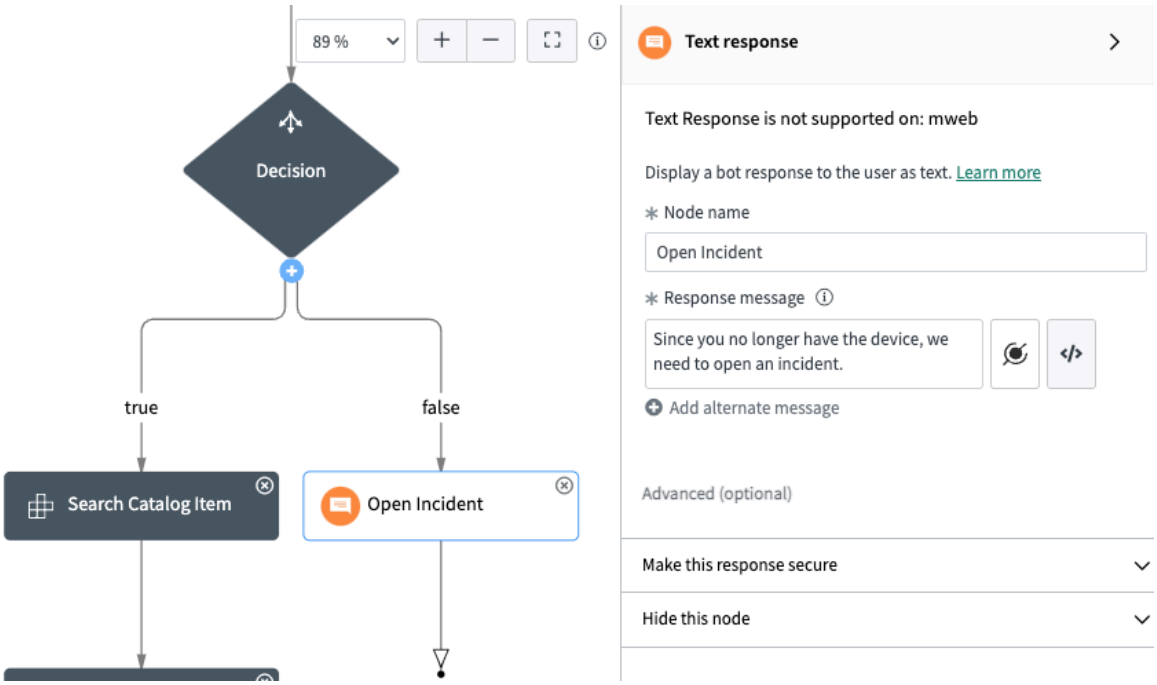
a. From the Components area, drag a Text bot response node onto the **false** branch on the canvas.

b. Select the node to view the properties palette.

c. Enter a name for the node and the response you want to display to the user.

For example, name the node `Open Incident`. For the **Response message**, type `Since you no longer have the device, we need to open an incident.`



3. Add a Topic Block utility to node to create the incident.

a. From the Components area, drag a Topic Block utility node onto the canvas.

b. In the properties palette, select **Create Incident** for the Topic block.

c. Under Input mapping, use dot-walking to specify the **caller** and **short_description** parameters.

- For the caller, specify Input Variables > User.
- For the short description, specify Input Variables > Asset Lookup > Asset tag.

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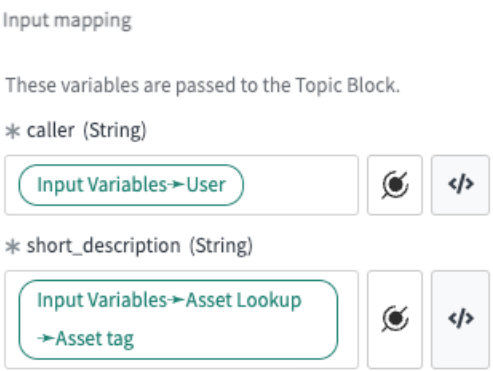
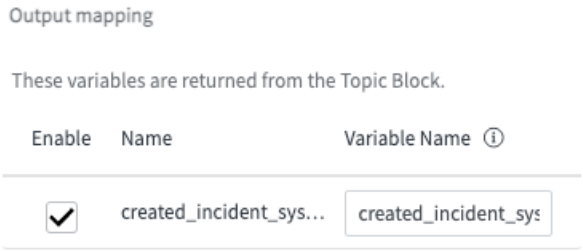


d. Under Output mapping, make sure to enable the created_incident_sys_id variable.



4. Drag this flow's arrow to the End node to complete this part of the workflow.
5. Select **Save**.

What to do next

Create the More Information workflow in the Asset Refresh topic

Create the More Information workflow in the Asset Refresh topic

In our example, we must provide the workflow for the "more information" Decision branch. If the user wants to learn more before upgrading, we can point them to a specific KB article explaining how your organization's policy works.

Before you begin

- Create the Asset Refresh topic in Virtual Agent Designer
- Create the Open Incident workflow in the Asset Refresh topic

Role required: virtual_agent_admin or admin

Procedure

1. Open the Asset Refresh topic in Virtual Agent Designer.
2. Return to the **info** decision branch after the Continue or Defer static choice node where you first prompted the user to continue or get more information.

   a. From the Components area, drag a Topic Block utility node onto the canvas.

   b. In the properties palette, select **AI Search** for the Topic block.

   c. Under Input mapping, specify the search term.

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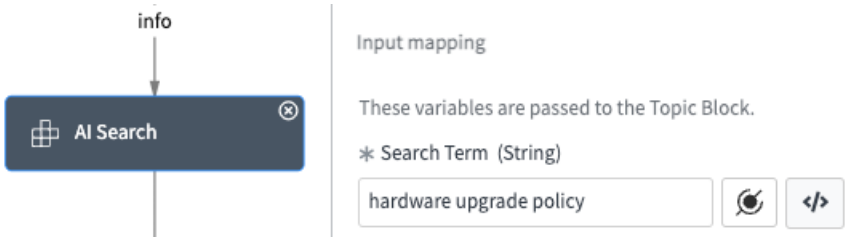
For example, enter `hardware upgrade policy`.

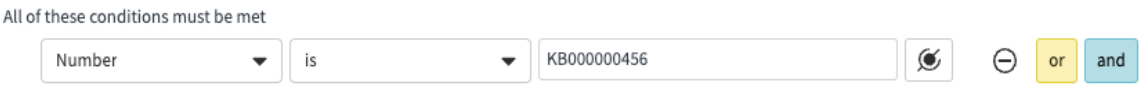


3. Show the results of the search to the user.

a. From the Components area, drag a Card bot response node onto the canvas.

b. In the properties palette, specify the following information:

- A unique name, such as `Upgrade KB Articles`.
- Card type: **Record**
- Populate this card by referencing: **Table**
- Table name: **Knowledge Article [sn_km_mr_st_kb_knowledge]**
- In the Condition builder, restrict the results to specific internal KB numbers that describe the policy, such as **Number is KB000000456**.



- In the **fields** area, select **Content** for a single KB article, or **Short description** if multiple records are returned.

4. Once the user has read the KB article, give them the option to continue with the upgrade.

a. From the Components area, drag a Static choice input node onto the canvas.

b. In the properties palette, enter the following information:

- A unique name, such as `Upgrade Next Steps`.
- A text prompt, such as `Would you like to upgrade now?`

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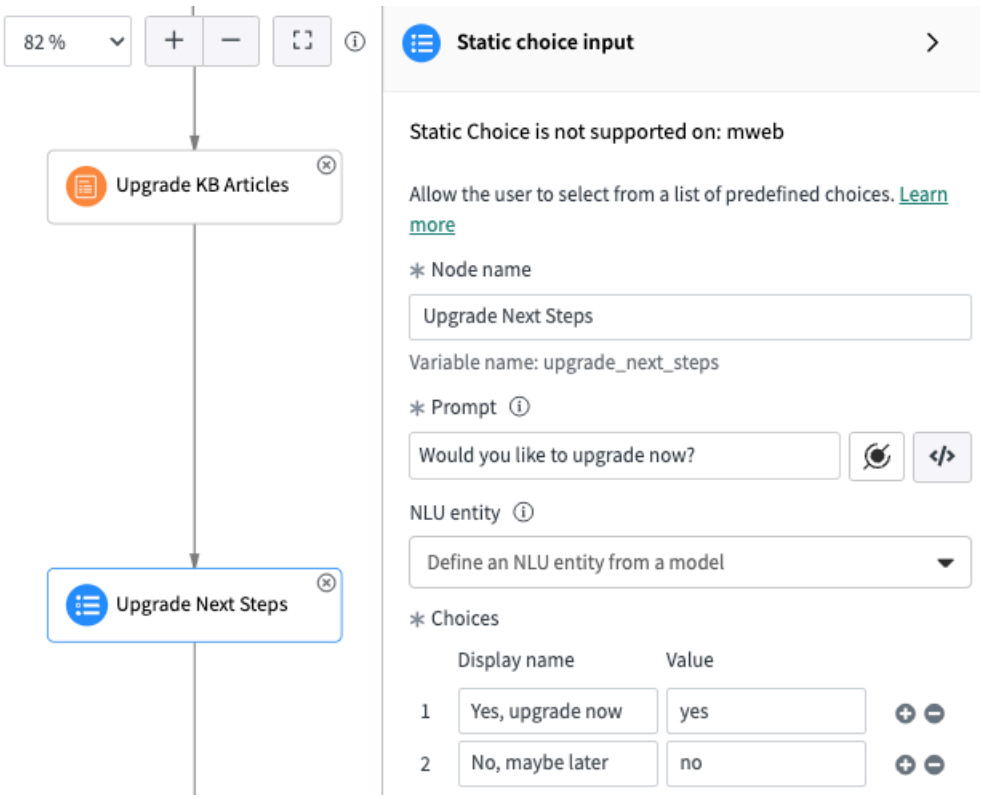
- In the Choices area, provide a text prompt for each choice and a value for that choice, so you can refer to it later on.

  For example, your choices might be `Yes, upgrade now` and `No, maybe later`. The values should make sense as variable names. For example, `yes` and `no`.



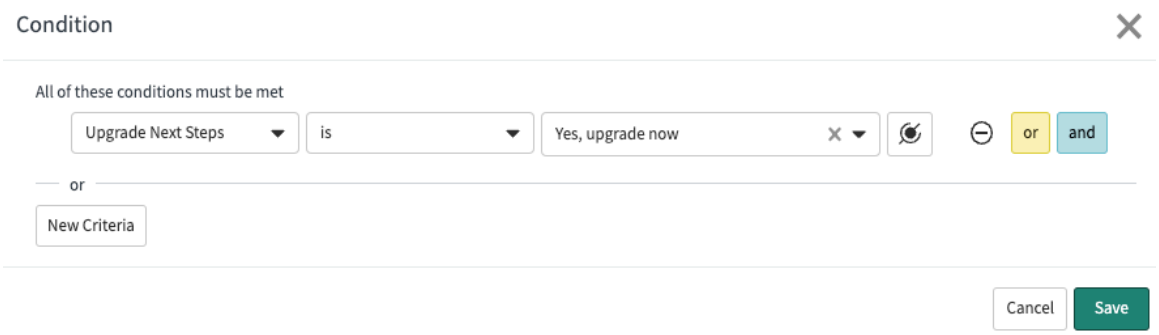
5. Add a Decision utility to handle the user's choice.

a. From the Components area, drag a Decision utility onto the canvas.

b. Select the plus icon to add a second branch.

c. Name each branch to correspond with the static choice node decisions (yes and no).

d. For each branch, select it and then use the Branch Condition area to indicate which option the branch will follow.



e. Drag the `no` flow's arrow to the End node to complete this part of the workflow.

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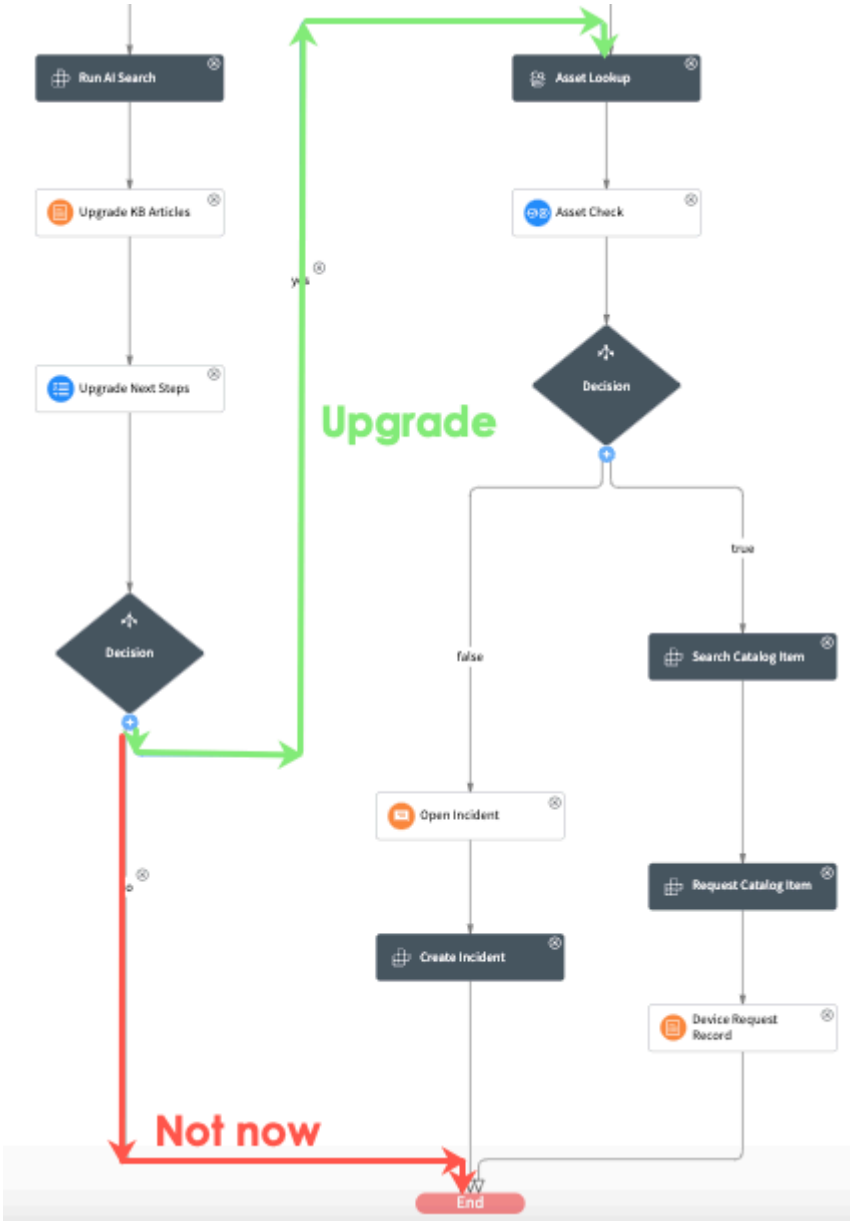
f. Drag the yes flow's arrow to the Asset Lookup node to bring the user to the upgrade workflow.



6. Select **Save**.

Result

Your topic is ready to test. Test the topic, making sure you go through each possible workflow in the conversation and make any needed adjustments.

For more information about testing topics, see Testing NLU/Keyword topics. If you're using NLU discovery, add utterances to the intent and train and test your NLU model.

When you're finished, publish the topic.

What to do next

Create the notification for the Asset Refresh topic

Related topics

Improving the user experience with AI Search

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Create the notification for the Asset Refresh topic

Create an actionable notification to trigger the Asset Refresh Virtual Agent example topic you just created. The user will automatically receive the notification when it's time for them to order a new hardware asset.

Before you begin

Publish the Asset Refresh topic. Change the application scope in your instance to the same application you used to create your Asset Refresh topic. Ideally, the notification should be in the same application scope as your Virtual Agent topic.

Role required: virtual_agent_admin or admin

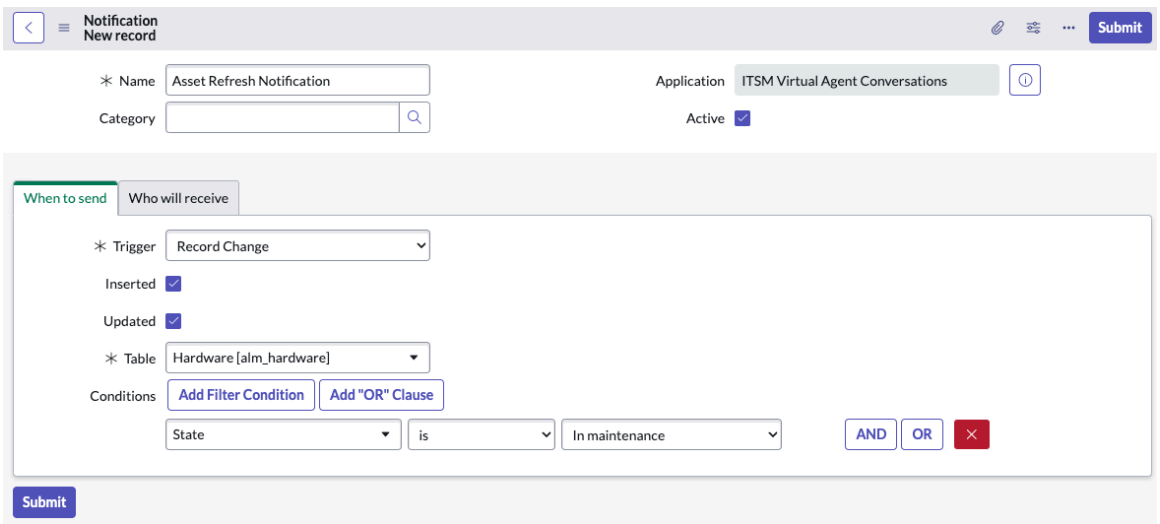
About this task

The ServiceNow AI Platform and ITSM Virtual Agent Conversations come with pre-built actionable notifications, and you can also create your own. For more information, see Notifications.

Tip:
On the Notifications page, you can view only the actionable notifications that come with ITSM Virtual Agent Conversations by filtering the list on **Application is ITSM Virtual Agent Conversations**.

Procedure

1. Navigate to **All** > **System Notification** > **Provider** > **Notifications**.
2. Select **New**.
3. In the **Name** field, provide a unique name, such as `Asset Refresh Notification`.
4. On the **When to send** tab, specify the trigger that will send the notification.
   a. For the Trigger, specify **Record Change**.
   b. For the Table, specify the **Hardware [alm_hardware]**.
   c. For the Conditions, specify **State > is > In maintenance**.
   When assets in the hardware table are available for refresh, they're moved to the *`In maintenance`* state on this example instance. You can specify filter conditions based on the business rules for your instance.



5. Select the **Who will receive** tab to configure the recipient of the notification.

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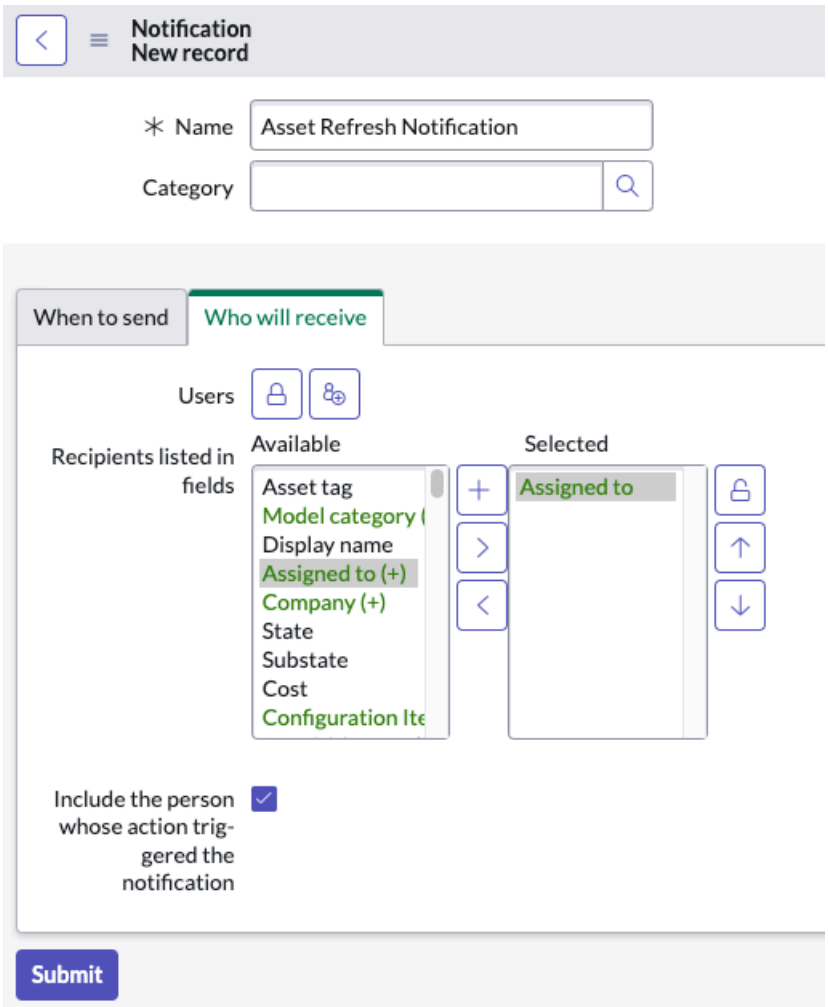
a. Select the lock icon next to **Recipients listed in fields**.

b. In the **Available** list, select **Assigned to**, and then select the right arrow icon to move it to the **Selected** column.



6. Select **Submit**.

What to do next

Associate content with the Asset Refresh notification

Related topics

ITSM Virtual Agent pre-built actionable notifications

Associate content with the Asset Refresh notification

After creating the actionable notification for the Asset Refresh topic, go back into the notification and add content. This links the notification with the Virtual Agent topic that you created.

Before you begin

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **System Notification** > **Provider** > **Notifications**.
2. Select the Asset Refresh Notification to open the record.
   New fields for content are available in the record.

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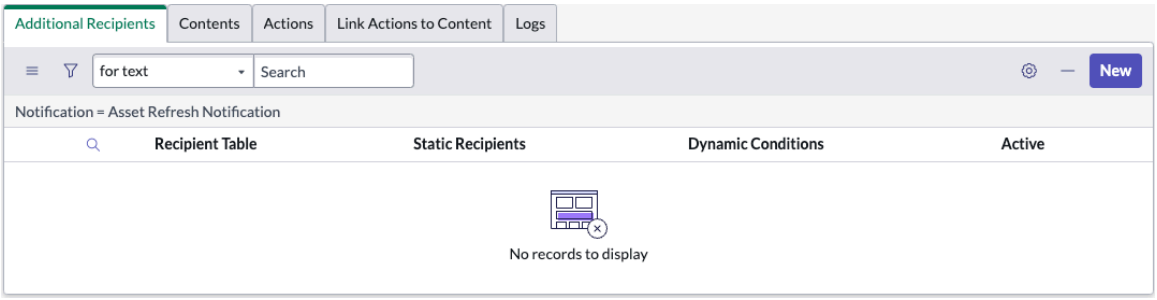

3. Select the **Contents** tab and create the content for the notification.

   a. Select **New Provider Content**.

   b. When prompted for the type of notification content, select **Virtual Agent Content - Chat**.

   c. On the form, fill in the fields.

Notification Content - Virtual Agent form

Field	Description
Name	Unique name for the content. For example, enter `Asset Refresh Notification Content`.
Notification	By default, **Asset Refresh Notification**.
Format tab	
Type	Select **Simple**.
Table	Specify **Hardware [alm_hardware]**.
Message tab	
Advanced	Leave this option unselected.
Message heading	A suitable heading for the notification, such as `Upgrade your device`.
Message	The contents of your message letting the user know that it's time for them to upgrade. You can customize the message using variables in the record for a more personal touch.
Channels tab	
Delivery channels	Select **mweb**, which is the default channel for Virtual Agent. You can configure other channels to run Virtual Agent as well. For more information, see Integrating Virtual Agent with other channels.

   d. Select **Submit**.

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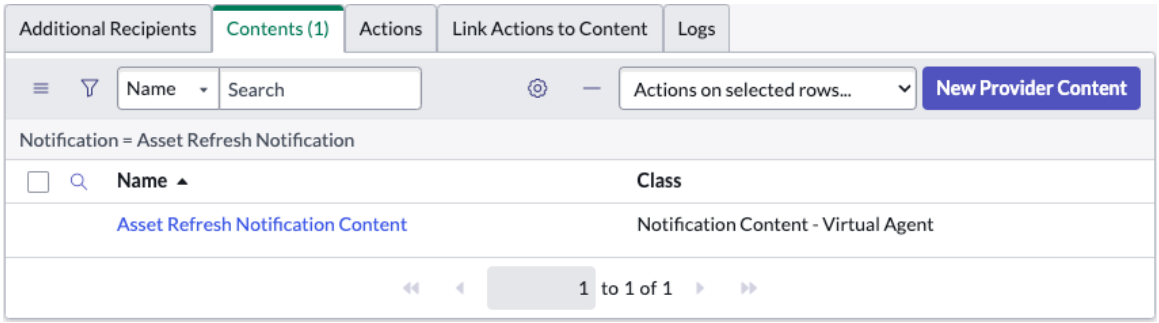


4. On the Asset Refresh Notification record, select the **Actions** tab and create the action.

   a. Select **New Provider Action**.

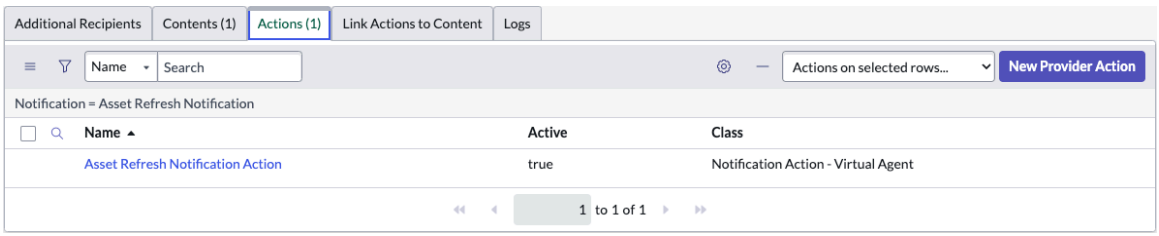
   b. When prompted for the type of notification action, select **Virtual Agent**.

   c. On the form, fill in the fields.

Notification Action - Virtual Agent form

Field	Description
Name	Unique name for this action. For example, enter `Asset Refresh Notification Action`.
Notification	By default, **Asset Refresh Notification**.
Active	Ensure this option is selected.
Topic	The name of the published Asset Refresh Virtual Agent topic you created in previous steps.

   d. Select **Submit**.



5. On the Asset Refresh Notification record, select the **Link Actions to Content** tab to map the actions to the content.

   a. Select **New**.

   b. On the form, fill in the fields.

Actionable Content form

Field	Description
Name	Unique name for the actionable content. For example, enter `Asset Refresh Actionable Content`.
Notification	By default, **Asset Refresh Notification**.

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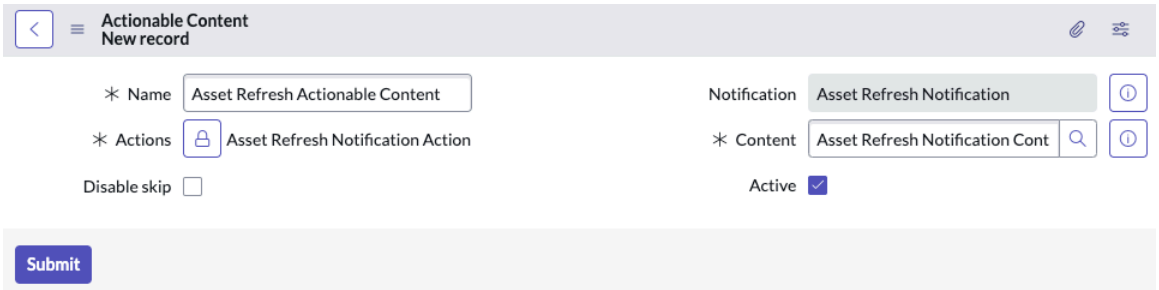
Field	Description
Actions	Select the lock icon ( ), and then type in the search field or select the search icon ( ) to locate the action you created on the **Actions** tab in the previous step.
Content	The name of the Asset Refresh provider content record you created on the **Contents** tab in a previous step.
Disable skip	Leave this option unselected.
Active	Leave this option selected.



c. Select **Submit**.

LLM topic discovery in Virtual Agent

Large language models (LLMs) enable Virtual Agent to process user statements in plain language. Conversations that use LLMs can outperform those conversations that use Natural Language Understanding (NLU), with easier setup.

How LLMs work in Virtual Agent

When you create a topic in Virtual Agent Designer, you can select LLM as the model type for your topic whenever Now Assist in Virtual Agent is turned on. Virtual Agent then uses LLM generative AI to discover topics that match the user's intent.

Unlike NLU topics, LLMs don't require models, intents, or keywords to be linked to the topic. LLMs can discover topics and perform language-related tasks, such as text generation for case summaries and resolution notes, without months of training on NLU models. Overall, you can create, configure, and deploy LLM topics faster than working with NLU.

With LLMs, Virtual Agent can do the following:

- Perform topic discovery without needing a singular declared intent in a given topic.
- Find intents without backup keywords as in NLU modeling.
- Extract entity values without prior mapping as in NLU modeling.
- Handle multiple conversation topic switches in a single conversation session.

Topic discovery

With LLM topic discovery, topic authors no longer need to create and maintain complex NLU models and intents with backup keywords. The LLM does all of the heavy lifting for you. The only requirement is a robust, plain language topic description on the **Properties** tab in Virtual Agent Designer. The LLM uses this description to find the best topic match for the user utterance. If there are multiple potential matches, the user will see a list of topics to choose from.

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For example, if a user asks Virtual Agent to calculate a ride share fee, the LLM matches the user utterance with an existing topic that can calculate the ride share with a tip.

Entity extraction

With LLM topics, the LLM has all the information needed to determine if an utterance has the information to fulfill a request. Unlike NLU models, you don't need to associate entities with a user input node or add nodeless NLU entities as input variables to a topic. The LLM simply finds the entity that most closely fits the user intent.

Topic switching

Topic switching is faster and easier with LLMs compared to NLU topics. The LLM processes your requests to change intent made in natural language, and activates the appropriate topic.

For example, if you start a conversation by asking for a mobile phone, you don't have to cancel the order first or restart the conversation. Instead, you can ask Virtual Agent to order a laptop instead. Virtual Agent immediately switches from the mobile phone topic to the laptop topic. Topic switching can be done during a query, but not within a catalog ordering flow.

Additional resources

- Now Assist in Virtual Agent
- LLM assistants

Natural Language Understanding (NLU) topic discovery in Virtual Agent

Apply Natural Language Understanding (NLU) models that enable Virtual Agent to process user statements in automated conversations. An NLU model provides information that your virtual agent uses to determine what users want to do and to extract relevant values from their input. With NLU, Virtual Agent can offer a more natural and engaging conversational experience.

NLU components

ServiceNow NLU can learn the syntax, semantics, and vocabulary of your company using the data in your ServiceNow instance. Use NLU Workbench, the NLU model builder, and the NLU inference service to enable the system to learn and respond to user intent.

The following elements work together to identify what the user wants to do so that a solution can be found:

Model groups

A model group supports a given application, user roles, and languages. For example, you may have a model that supports the Search feature and another model that supports Virtual Agent. Typically, a model group contains multiple intents.

For more information, see Model management.

Intents

Intents represent actions. They describe what the user wants to do or what your application can handle. Intents can pertain to any of the following:

- Functions, such as resetting a password or ordering an item.
- Domains, such as healthcare, financial, or government.
- Customers, such as the US Army, Wells Fargo, or Boeing.

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In Virtual Agent, a single intent is mapped to one conversation topic.

For more information, see NLU intents.

Utterances

Instead of keywords, you enter natural language examples, called utterances. Utterances help NLU to evaluate word meanings and contexts so it can infer user or system actions. Example utterances might include the following:

- Reset my password.
- Change password.
- I don't remember my password.
- Forgot my password.
- My password needs to be reset.

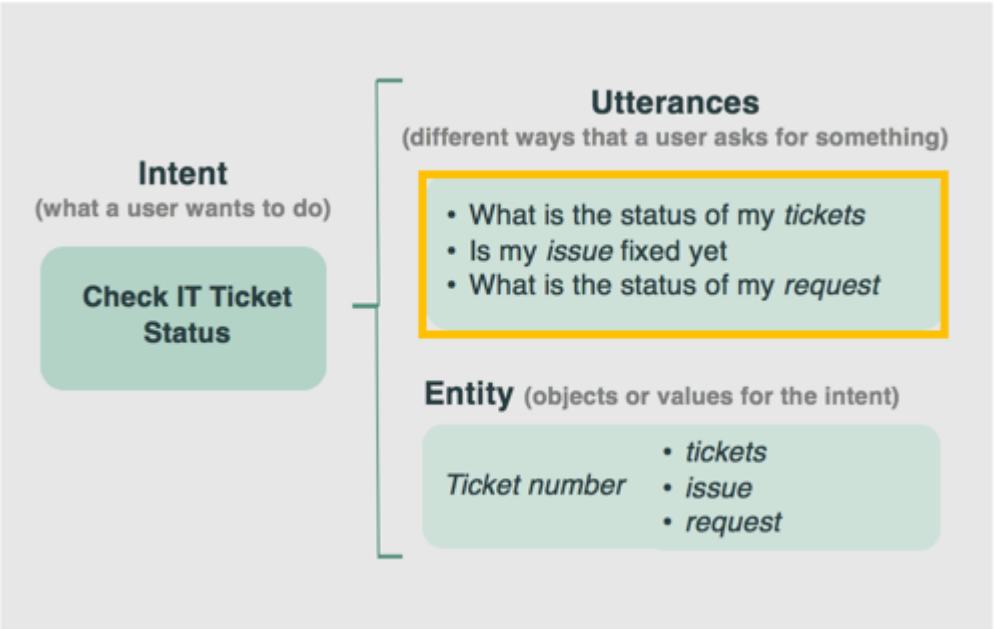
Entities

Entities represent the object of (or context for) the action. You can define them for individual intents. NLU can match defined entities with user input to slot-fill the values. Slot-filling can eliminate the need to ask some questions within a topic flow. There are three basic types of entities that you can define:

- Common or system entities, such as date, time, currency, location, quantity, people, or organization.
- Entities based on ServiceNow records, such as a case number.
- Company- or domain-specific entities, such as meeting rooms, company policies, and so forth.

For more information, see NLU entities.

Example intent definition in an NLU model group



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How NLU models work in Virtual Agent

When you create or update topics in Virtual Agent Designer, you specify the NLU model and intent that Virtual Agent uses to find the appropriate conversation topic for fulfilling the intent.

Virtual Agent supports models from different services. You can use the following providers:

- ServiceNow NLU models that you create using NLU Workbench.

  ServiceNow provides pre-built (read-only) NLU models and topics for various ServiceNow business applications, such as Customer Service Management, HR Service Delivery, and ITSM. You can use the intents defined in these pre-built models and reuse them when you create your own models.

- If you're using IBM Watson Assistant as your NLU service provider, NLU intents and entities are created in IBM Watson Assistant.
- If you're using Microsoft LUIS as your NLU service provider, NLU intents and entities are defined in the Microsoft Language Understanding Intelligent Service (LUIS).
- If you're using Google Dialogflow ES as your NLU service provider, NLU intents and entities are defined in the Google Cloud platform.

Note:
Virtual Agent supports only one NLU service provider per instance.

With NLU models, your virtual agent can do the following:

- Perform topic discovery.
- Designate backup keywords in case an intent is not matched.
- Extract entity values.
- Handle conversation switching in a conversation session.

These capabilities are explained in the following sections.

Topic discovery

When users provide an utterance, the utterance is a statement that is associated with a specific intent. Virtual Agent processes these utterances to launch the appropriate conversation topic. Each topic has a single intent that you specify in Virtual Agent Designer.

During the topic discovery process, intents are matched to topics. Virtual Agent returns the most relevant topics for a user's request. The topic discovery process returns the following results to a user:

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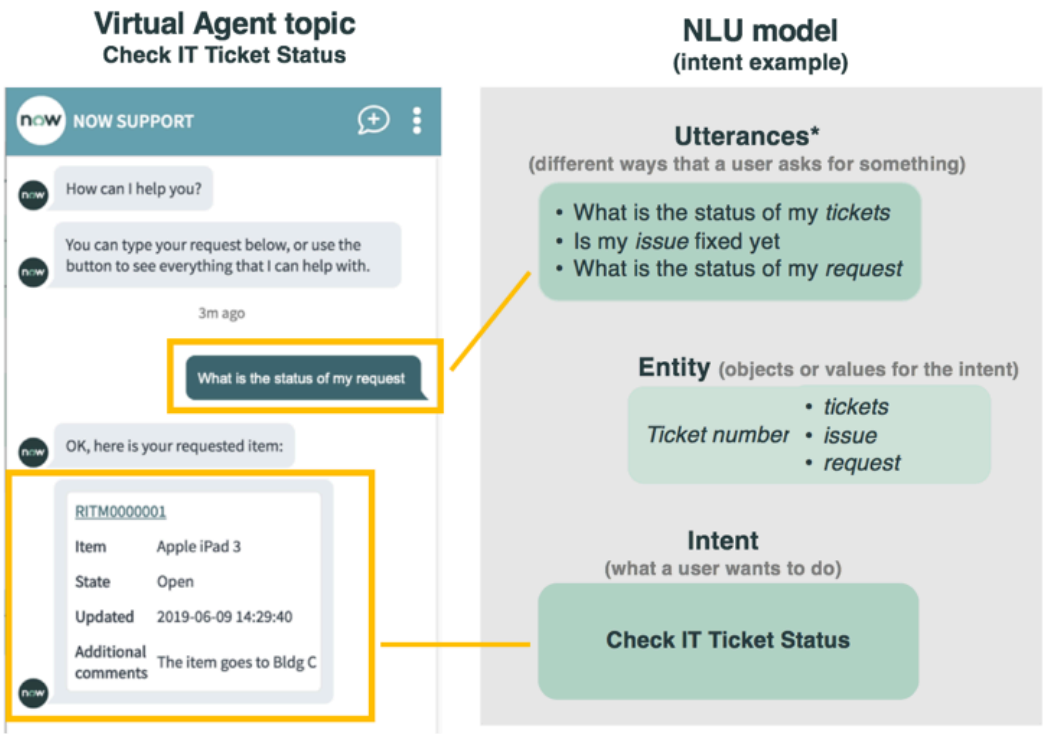
- Single match: When a user utterance directly matches an intent (topic), the topic runs automatically.

A user request matches an utterance in an intent



*Virtual Agent runs the topic that maps to the intent and utterance

- Multiple matches: When a user utterance matches more than one intent, Virtual Agent returns a choice list of the relevant matches so that the user can choose the appropriate topic.

A user request matches utterances in multiple intents



Note:
If there are multiple matches, Virtual Agent returns three intents by default. You can change the number of topics returned by using the `com.glide.cs.max_number_display_topics` system property.

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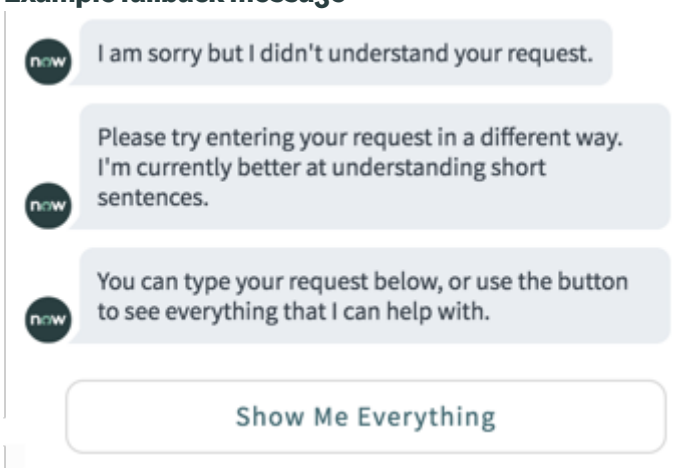
- No matches: When Virtual Agent can't find a matching intent, it uses AI Search to generate search results that display relevant links to Q&A knowledge articles, Service Catalog items, or person (user) records.

  This feature is controlled by the AI Search Fallback setup topic and the Virtual Agent search configurations, which are enabled by default in chat experiences. To learn more about the AI Search results generated, see Virtual Agent integration with AI Search.

  If you disable the AI Search Fallback setup topic, Virtual Agent automatically displays a fallback error message that enables the user to select a topic or enter a different request.

  Example fallback message

  For details about how the AI Search Fallback setup topic and the fallback response (the fallback setup topic) work, see Setting up chat experiences for Virtual Agent users.

For detailed information about NLU topic discovery, see Natural Language Understanding topic discovery logic in Virtual Agent.

Topic discovery with backup keywords

When you create or update topics, you can also optionally specify keywords that Virtual Agent uses to determine the topic if NLU doesn't return a matching intent and topic. Virtual Agent uses keywords in the following situations:

- No topics (intents) are discovered.
- The appropriate topic (intent) can't be determined because too many topics (intents) are discovered.
- The language of the topic and intent is not currently supported in NLU.

Note:
If Virtual Agent can't determine the topic based on NLU or the keyword, it falls back on the AI Search capability to deliver relevant results. The AI Search capability must be enabled.

Entity extraction

With NLU models, Virtual Agent can determine when user statements in a conversation contain important information to fulfill a task or goal. Entities identify the information that Virtual Agent can extract from the conversation, such as an object or a person's name. To extract the appropriate values, Virtual Agent uses the entity information that is associated with an intent that is defined in the NLU model.

When designing your topic, you can use entities as follows:

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- Associate an entity with a user input node on the **Flow** tab. You can specify whether Virtual Agent asks the user to confirm the slot-filled entity value or to skip the node.
- Add nodeless NLU entities as input variables to a topic. These variables can be slot-filled from NLU service provider predictions or provided outside of the scope of the topic.

Conversation switching

Users engaged in a Virtual Agent conversation can switch topics anytime during the conversation. For example, a user might be updating an item in the user's employee profile. But before completing the update, that user might ask to order an item instead. Virtual Agent can find and run the appropriate topic based on the user's request. You can enable users who switched topics to resume the original conversation.

Another example is when a user might ask a casual question or engage in small talk. The question might be unrelated to the original request. By reviewing the intents defined in the NLU model, Virtual Agent can match and launch the appropriate conversation for the switched topic.

ServiceNow NLU multi-language support and integration with Virtual Agent Designer

If you're using ServiceNow NLU, you can map an NLU model group and an associated intent to a topic. You can also update, train, and test the associated NLU model from within Virtual Agent Designer. As you work on a topic, you can also improve or modify the utterances and the associated entities for an intent without leaving the interface.

ServiceNow NLU model groups contain a primary language and secondary languages. Use the primary language to author your topic, which can then be translated into the secondary languages within the group. For more information, see Multilingual model management.

As you work on your topics, Virtual Agent Designer provides language-mapping views for previewing and testing topics with their associated language-specific models. For more information, see Localizing Virtual Agent conversations.

Advantages of natural language models over keywords

Natural language models help Virtual Agent to process human language based on context and your company's data. In this way, what the user needs can be more accurately matched with a corresponding topic. Virtual Agent supports large language models (LLMs) and Natural Language Understanding (NLU).

Language is difficult

Keyword matching has its limitations. For example, sometimes an apple is a piece of fruit, and sometimes it's an electronic device. Context matters, and so does intent. Natural language models are designed to deal with the following problems:

- There are multiple ways to describe the same thing.

  Examples: `Office password reset` or `Reset my password for Office`

- Expressions can be ambiguous.

  Example: `Server reporting mail missing after migration`. What is missing, the server or the mail?

- Contextual information is essential.

  Example: `activate London instance in staging`

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- Words can acquire new meanings over time.

  For example, a `cell` can pertain to biology or a cell phone.

- Slang, acronyms, and industry idioms can be difficult to interpret.

  Example: `set up SSO on the dev instance`

- Error messages are often hard to understand.

Virtual Agent provides two kinds of natural language topic discovery. You can use both in your instance, but only one at a time in any given chat.

LLM topic discovery in Virtual Agent

Use LLMs to discover topics and access generative AI capabilities without building complex models, intents, or entities.

Natural Language Understanding (NLU) topic discovery in Virtual Agent

Use ServiceNow NLU or a supported provider to discover topics.

Dialog Acts for Virtual Agent

As part of the Vancouver release, the Dialog Acts feature expands natural language communication with Virtual Agent, leading to more fluid conversations between user and agent.

How Dialog Acts works

Dialog Acts interprets and applies user inputs during a Virtual Agent conversation. With this feature active, you engage with Virtual Agent in your own natural language, instead of selecting replies based on prompts in the topic.

For example, if you request a laptop in a Virtual Agent conversation, you use the topic prompts to select a manufacturer, screen size, and amount of RAM. Without Dialog Acts, you change specifications only by following the prompts in the topic, potentially taking more time to loop through a Virtual Agent conversation as you reset your options. With Dialog Acts, if you change your mind about any of the laptop's specifications before finishing the request, you can input an utterance such as, "Actually, I need 8 GB of RAM." If your input matches the Natural Language Understanding (NLU) model closely enough, the specifications are changed immediately, even if you're on a different point in the topic. If the input doesn't match, it's added to a list of ignorable utterances.

User utterances are stored in the Open NLU Predict State Tracking [open_nlu_predict_state_tracking] table, while feedback is tracked by the Open NLU Predict Dialog Act Feedback [open_nlu_predict_dialog_act_feedback] table. Languages are tracked in the Open NLU Driver Languages [open_nlu_driver_language] table. In the current release, English is the sole language support for Dialog Acts.

Activating Dialog Acts

Activate Dialog Acts by toggling the **Enable Dialog Acts** switch in the Create a topic form or the Topic Properties tab. When activated, a second **Confirm modified values** toggle appears. Use this switch to provide a prompt confirming that a variable is to be changed based on your utterances.

Considerations for implementing Dialog Acts

The Dialog Acts feature is available as long as NLU is active for the instance and the topic. However, at least one of the preconfigured responses must be Active for the Dialog Acts toggles

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in the Topic Properties tab to be available. Dialog Acts can work without a model intent, but it can't select an entity if the topic is not associated with that model or intent.

Decision nodes can be modified by a condition or script to skip reprompting by Dialog Acts. However, the **Modify Dialog Acts** toggle doesn't work if there are multiple date-time nodes on a topic.

Available Dialog Acts responses

The current release includes the following types of responses, stored in the Open NLU Dialog Acts [open_nlu_dialog_act] table:

Dialog Acts response types

Type	Description
Modify	Alter a variable recorded previously.
Affirm	Confirm a variable.
Negate	Decline confirming a variable.

Implement NLU in Virtual Agent

Create and maintain NLU model groups and intents that map to your conversation topics in Virtual Agent. You can create and edit model groups in NLU Workbench or from topics in Virtual Agent Designer.

Before you begin

Activate the plugins for Glide Virtual Agent and any pre-built topics that you want to use.

Role required: virtual_agent_admin or admin

About this task

When authoring conversations for an NLU instance, be aware of the following guidelines:

- Verify that you are in the appropriate application scope before you create or update a topic. For example, if you are creating ITSM topics, verify that you are in the **ITSM Virtual Agent Conversations** scope, and not the scope for the ITSM NLU Model for Virtual Agent Conversations.
- Specify the **NLU Model** and **Associated Intent** for the topic in the Topic Properties tab. If you want to allow topic switching in the conversation session, enable **Resume topic flow**.

  Note:
  A topic can map to only one intent in an NLU model. Once you select an intent for a topic, the intent is no longer available for use in other topics.

- Set the NLU entity properties in the property sheet for each input control that you add to the conversation flow. The entity properties identify the entity associated with the node, a switch for allowing text input for the control (prompt), and another switch for confirming the slot-filled entity value that Virtual Agent extracts.

Procedure

1. View the Virtual Agent General Settings, and change your NLU service provider, if needed.

   If you're using a different NLU service provider supported by Virtual Agent, configure it as described in one of the following topics:

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- IBM Watson Assistant Intent and Entity integration
- Microsoft LUIS Intent and Entity integration
- Google DialogFlow Essentials (ES) Intent and Entity integration

2. **Optional:** If you're supporting conversations in other languages, enable NLU languages in Virtual Agent settings.
3. Associate a model group and intent with each Virtual Agent topic in your instance. You can do this in the following ways:
   - Add NLU to an existing Virtual Agent keyword topic.
   - Create or map model groups and intents when you create a new topic.
   - Preview and test the pre-built ServiceNow topics in Virtual Agent Designer.

     Determine whether you want to use any of the topics, then duplicate them as needed.
   - Run Topic Recommendations reports for your instance to identify pre-built Virtual Agent topics and intents that you can quickly implement in your organization.
4. Test the topic.
5. When you're ready to deploy a topic, publish the topic.

Result
The topic state changes to **Active**.

Virtual Agent Lite

Virtual Agent Lite is a limited version of Virtual Agent that is available to ITSM standard customers.

About Virtual Agent Lite

Use Virtual Agent Lite, to implement a virtual agent that provides IT service assistance using several pre-built ITSM conversations. As with Virtual Agent, you can set up and configure the chat clients for your end users. Use Virtual Agent Designer to review, duplicate, and publish the pre-built conversation topics for your end users.

Virtual Agent Lite is preinstalled in your instance. To use it, you must install ITSM Virtual Agent Conversation Topics Lite, which provides several pre-built conversations for common IT support requests. These keyword-based conversations run in the web chat client and also in Virtual Agent messaging integrations for the following channels:

- Slack
- Microsoft Teams
- Workplace by Facebook
- Facebook Messenger

Virtual Agent Lite features

For Washington DC, the Virtual Agent Designer features available in Virtual Agent Lite include the following:

- Localization Framework integration.

  The Localization Framework is used in multi-language topic authoring and translations. The Localization Framework is installed automatically with Virtual Agent. Activate the ServiceNow® plugin for each language you want to support. For more information, see Activate a language.

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In Virtual Agent Lite, information in the **Languages** tab is read-only.

- Control topic discovery and visibility.

  The **Active** option of the header includes two options (toggle switches). Admins and topic authors can use these options to do one or both of the following:

  - Enable Virtual Agent to discover topics for use in chats.
  - Include a topic in the **All Topics** menu. This menu lists all of the topics that are available for use.

  For more information about using these options, see Control topic discovery and visibility.

After using Virtual Agent Lite, you can upgrade to Virtual Agent to access all of the features. Contact your ServiceNow account representative for upgrade information.

Virtual Agent Lite limitations

Virtual Agent Lite has the following limitations:

- Virtual Agent Designer limitations: Virtual Agent Lite only supports conversation topics in the ITSM self-service category (including related topic blocks) and the platform setup topics. This means you can't do the following:
  - Create new topics, topic blocks, or custom controls.
  - Specify the conditions that control how or when the topics are used.
  - Specify the Live Agent (chat) variables that provide context for conversations.
  - Enable the **Available for Agent Autopilot** toggle switch.

  Note:
  A lock icon displays next to the Virtual Agent Designer fields that are not available in Virtual Agent Lite.

- Keyword-based conversations: Virtual Agent Lite only supports keyword-based conversations. Natural Language Understanding (NLU) models and NLU-enabled topics aren't supported. This means that related NLU features, such as topic switching and multi-language NLU models, are also not supported. Language support is available for conversations through ServiceNow AI Platform language internationalization.
- Virtual Agent tables: Virtual Agent tables are read only for admins and Virtual Agent admins.
- Localized content: Translated content is read-only. You can't add new translations or localize content. The **Languages** tab displays a banner asking users to contact their Account Executive for more information about upgrading to the latest release.
- Custom channels: You can't run Virtual Agent Lite topics in any custom chat channels (created through custom chat integrations), except for the supported Virtual Agent integrations for Slack, Microsoft Teams, Workplace by Facebook, and Facebook Messenger applications.
- Virtual Agent notifications: You can receive only simple and non-actionable notifications. Actionable notifications are not supported with Virtual Agent Lite.
- Virtual Agent Analytics Dashboard: This feature is not available in Virtual Agent Lite.

What to do

Set up and configure Virtual Agent Lite. For details, see Quick start for Virtual Agent Lite.

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Quick start for Virtual Agent Lite

Virtual Agent Lite comes pre-installed, so all you have to do to try it is activate the ITSM Virtual Agent Conversation Topics Lite plugin and set it up.

Before you begin

If you plan to integrate Virtual Agent Lite with Slack, Microsoft Teams, Workplace, or Facebook Messenger apps, you must be an administrator for those messaging apps.

Role required: virtual_agent_admin or admin

Procedure

1. Activate the ITSM Virtual Agent Conversation Topics Lite plugin:
   a. Navigate to **All** > **Plugins**.
   b. In the Search field, type `ITSM Virtual Agent`.
   c. Find the entry for ITSM Virtual Agent Conversation Topics Lite (com.snc.itsm.virtualagent.lite), and then click **Activate**.
2. **Optional:** Configure Virtual Agent Lite for additional portals.
   Virtual Agent Lite appears in the Service portal by default. For more information about configuring the Service portal, see Service Portal events.
3. Preview and test ITSM Virtual Agent Lite topics in Virtual Agent Designer.
   Two topics are available for use with Virtual Agent Lite.
4. Duplicate and publish ITSM Virtual Agent Lite topics.
   Users can now access Virtual Agent Lite topics.

Preview and test ITSM Virtual Agent Lite topics

Run a pre-built IT Service Management (ITSM) Virtual Agent Lite topic to decide whether you want to deploy it to your end users. ITSM

Before you begin

Activate the plugin for ITSM Virtual Agent Conversation Topics Lite (com.snc.itsm.virtualagent.lite).

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the **Category** filter, select **ITSM Self Service Lite** to show only the ITSM Virtual Agent Lite conversations.
   Two pre-built topics are available: Check IT Ticket Status and Report IT Issue.
3. Select the topic that you want to preview.
   In the **Flow** tab, the Virtual Agent Designer canvas opens with a read-only view of the topic flow. You can resize the canvas to see the nodes in the flow, but you can't add or change controls and their related property sheets.

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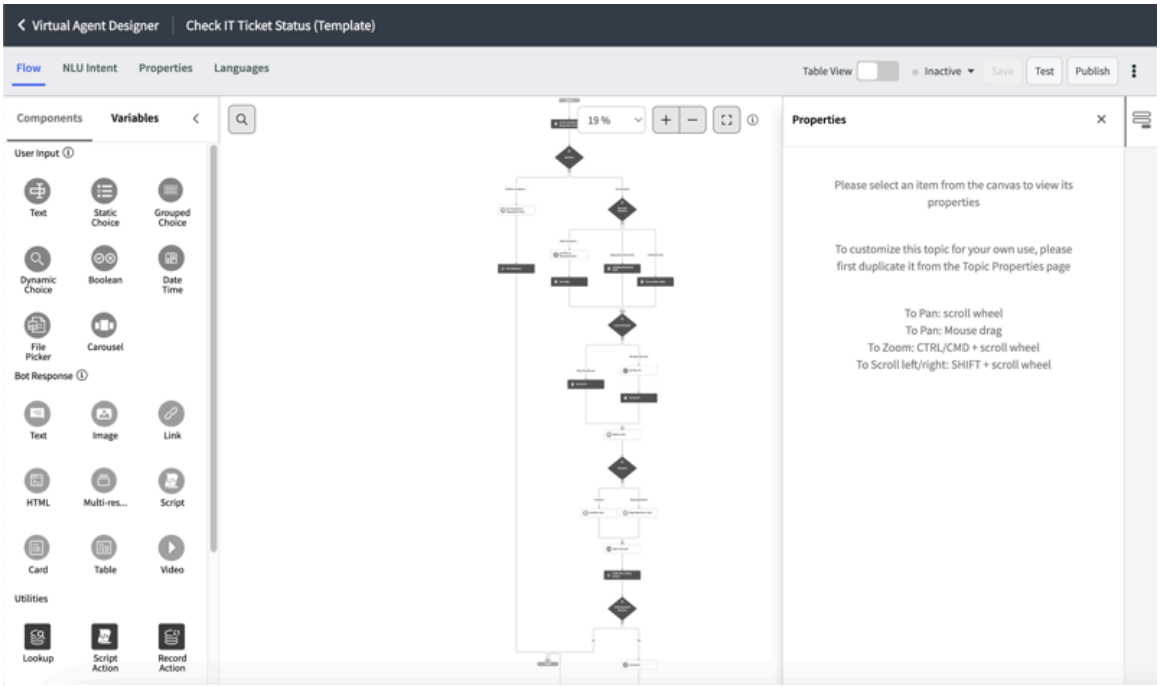

4. Select **Test** to run the conversation in a test chat window.
   For example, if you're testing the Check Ticket Status topic, the test chat window runs the conversation and lets you respond to the prompts displayed. You can also view the test logs to

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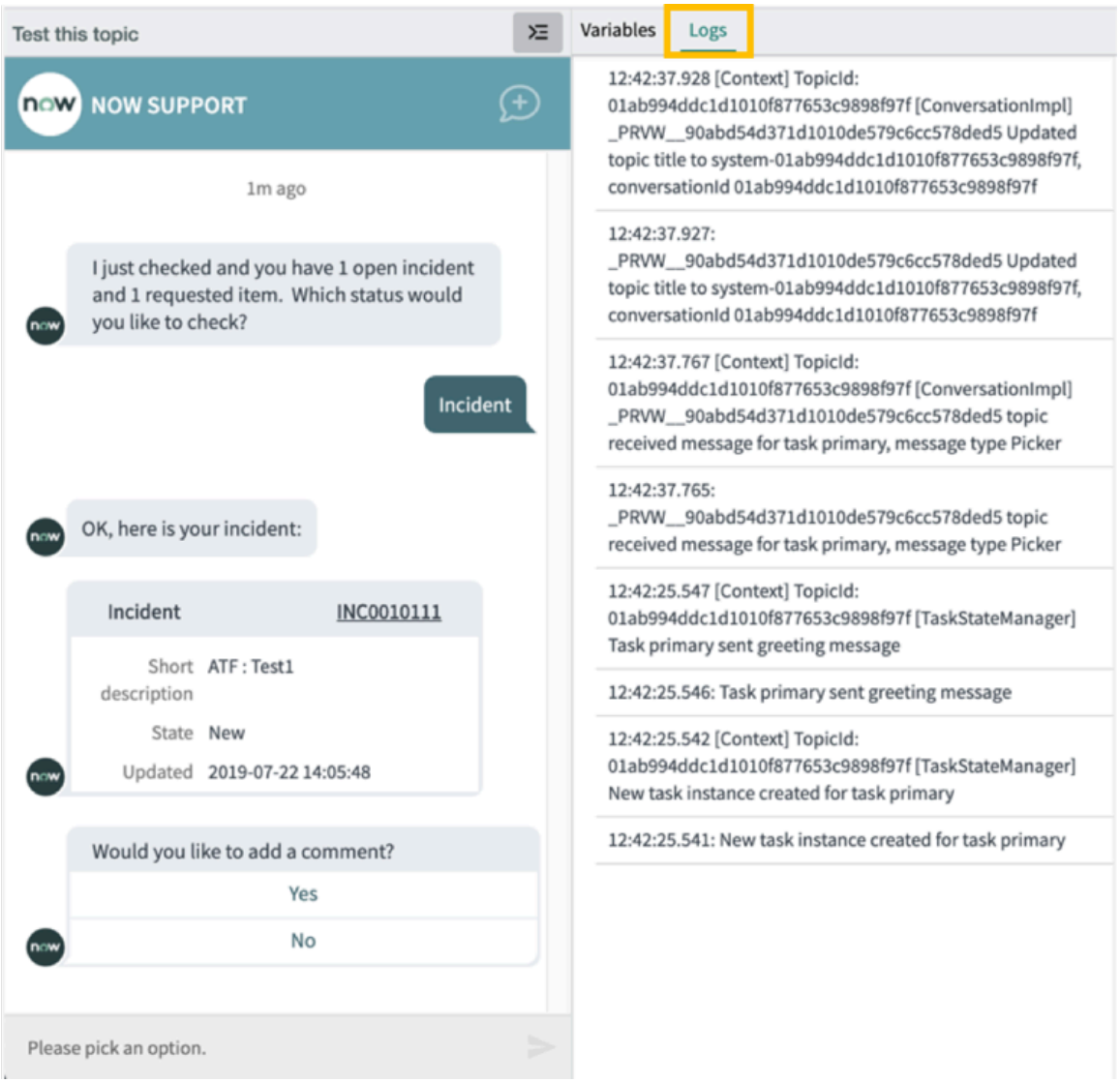
see the messages logged and conversation tasks performed during the conversation, as well as the variables used in the conversation.



What to do next

If you'd like to deploy a topic, duplicate and publish the topic so that it's available to your users.

Duplicate and publish Virtual Agent Lite topics

Copy and publish a pre-built ITSM Virtual Agent Lite topic to deploy it to your users.

Before you begin

Preview (test) the pre-built ITSM Virtual Agent Lite topics.

Role required: virtual_agent_admin or admin

Procedure

1. In the topic that you've tested, select **Duplicate** in the triple-dot icon on the Virtual Agent Designer header bar.
   a. In the pop-up window, enter the name of your duplicated topic.
   b. Select **Save**.
   The **Topic Properties** page (**Properties** tab) for your duplicated topic opens.

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Note:
You can duplicate a pre-built topic but you can't duplicate a copy of a pre-built topic.

2. Change these property fields as needed:

Property	Description
Description	A brief explanation of the topic.
Keywords	A word or phrase that is associated with and activates the topic. You can add, change, or delete keywords.
Roles	Roles that an end user must have to view and run the topic. If a topic is public (available to users, including guest users, who are not authenticated in ServiceNow), select only the Public role.

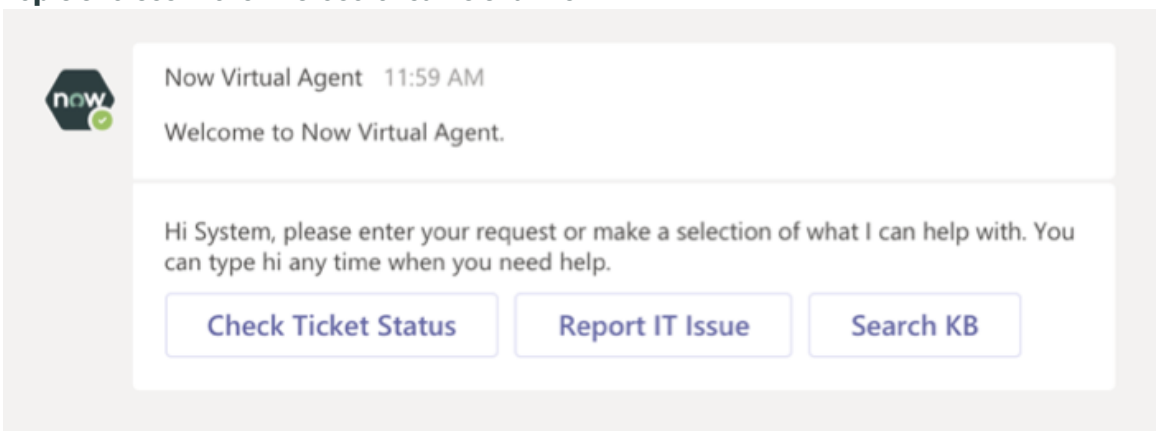
3. Select **Save**, and then select the triple-dot icon followed by **Publish**, to make the topic active and available in your chat clients.

Result

When your users run Virtual Agent, the chat client displays the published topics in the topic selection menu. If there are three or fewer topics available to the user, the menu items (topics) are displayed as buttons.

For example, in the Microsoft Teams integration, the topic selection menu displays these three topics as buttons.

Topic choices in the Microsoft Teams channel



Configuring Virtual Agent

Configure the Virtual Agent features, components, and integrations that you need to provide support to your employees, IT teams, and customers.

Use the Conversational Interfaces Console to activate and configure Virtual Agent. Some of the general settings in the console are shared with other applications, such as Agent Chat.

General chat settings

I want to...	See these topics
Chat Client Display Options	

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General chat settings (continued)

I want to...	See these topics
Brand my bot	Branding your chat client
Preview new or unread messages in a minimized chat window	Enable message preview on the web client
Conversation Routing	
Configure my bot to run in third-party messaging apps	Virtual Agent integration with messaging apps.
Create pre-chat surveys	Define pre-chat survey configurations
Create and use context variables to store chat-related information	Configure context variables for storing chat-related information
Display or announce callback options to users through other ServiceNow apps	Omnichannel Callback
Configure topic context intents	Define topic context intent configurations
System Actions	
Modify system chat messages	Change Virtual Agent and Agent Chat system messages
Specify how links open from the chat window	URL navigation in Conversational Interfaces
Configure my bot to detect sensitive data	Configuring Sensitive Data Handler
Send email summaries of unread messages to users when they are inactive	Sending missed chat activity emails

Virtual Agent settings

I want to...	See these topics
Get recommendations for Virtual Agent topics based on my data	Quick start for Topic Recommendations
Configure performance tracking for Virtual Agent topics	Create deflection configurations and patterns
Use Natural Language Understanding (NLU) for topic discovery	Configure Natural Language Understanding in Virtual Agent Creating models (using NLU Workbench)
Create custom greetings and setup topics	Configure a Virtual Agent chat experience
Determine which issues are routed to Virtual Agent first	Configure and run an Issue Auto Resolution simulation
Send notifications to users in Virtual Agent	Configuring Virtual Agent notifications

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Virtual Agent settings (continued)

I want to...	See these topics
	Enable Virtual Agent notifications
Use AI Search to return fallback results for Virtual Agent	Improving the user experience with AI Search
Detect and dynamically translate Virtual Agent topics into a different language	Using language detection and dynamic machine translation in Virtual Agent

Virtual Agent security

Platform hardening for your instance is leveraged by Virtual Agent, so you should follow the overall platform hardening recommendations. For details, see Secure your instance.

For security details about Virtual Agent, refer to the following topics:

- Virtual agent embedded client content security policy (instance security hardening)
- Virtual agent embedded client X-Frame-Options (instance security hardening)

Activate Virtual Agent

You can activate the Glide Virtual Agent plugin (com.glide.cs.chatbot) if you have the admin role. This plugin automatically activates other necessary plugins if they are not already active.

Before you begin

Role required: admin

About this task

You must have a subscription for Virtual Agent before you can activate the Glide Virtual Agent plugin.

Plugins automatically installed with Glide Virtual Agent

Plugin	Description
Conversational Analytics [com.sn.conversational.analytics]	Enables the ServiceNow Conversational Analytics app. **Note:** Subsequent updates for the Conversational Analytics app must be installed from the ServiceNow Store.
Integration - Multiple Provider Single Sign-On Installer [com.snc.integration.sso.multi.installer]	Enables authentication for multiple identity providers (IDPs) using SAML or OpenID connect(OIDC).
Localization Framework Installer [com.glide.localization_framework.installer]	Provides the framework for localization of Virtual Agent conversations.
NLU Model for Virtual Agent Setup Topics	Installs the NLU model for Virtual Agent Setup topics.

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Plugins automatically installed with Glide Virtual Agent (continued)

Plugin	Description
[com.glide.cs.nlu.topics]	
Proxy Agent to the ServiceNow Natural Language Understanding Server [com.glide.nlu.intent.discovery]	Activates the connection to the ServiceNow NLU server for NLU intent discovery. Used by Virtual Agent and other clients. Activates: • NLU Workbench - Core [com.glide.nlu] • Predictive Intelligence [com.glide.platform_ml] • Proxy agent for connecting to NLU providers [com.glide.nlu.proxy] - Proxy agent for connecting to NLU providers
Proxy Agent to the IBM Watson Natural Language Understanding server [com.glide.nlu.ibmwatson.intent.discovery]	Activates the IBM Watson Assistant Intent and Entity integration, which enables Virtual Agent to use intents, entities, and utterances defined in IBM Watson Assistant.
Proxy Agent to the Microsoft LUIS Natural Language Understanding server [com.glide.nlu.msluis.intent.discovery]	Activates the Microsoft LUIS integration, which enables Virtual Agent to use intents, entities, and utterances defined in the Microsoft Language Understanding Intelligent Service (LUIS).
Proxy Agent to the Google Dialogflow ES Natural Language Understanding server [com.glide.nlu.googledialogflow.es.intent.discovery]	Activates the Google Dialogflow ES integration, which enables Virtual Agent to use intents, entities, and utterances defined in Google Dialogflow ES.
Topic Recommendations [com.snc.va_topic_recommender]	Enables the ServiceNow Topic Recommendations app. **Note:** Subsequent updates for the Topic Recommendations app must be installed from the ServiceNow Store.
Virtual Agent integration with actionable notifications com.glide.cs.actionable.notification	Enables ServiceNow actionable notifications on Virtual Agent channels.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Glide Virtual Agent plugin (com.glide.cs.chatbot) using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel. For more information, see Request a plugin.

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3. Select **Install**, and then in the Activate Plugin dialog box, select **Activate**.

> **Note:**
> When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

What to do next

Activate additional Virtual Agent plugins for related features, such as the plugins for predefined Virtual Agent topics.

Installed with Virtual Agent

Various types of components are installed with activation of the Glide Virtual Agent [com.glide.cs.chatbot] plugin, including tables and user roles.

> **Note:**
> The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application .

Roles installed

With the Virtual Agent Administrator [virtual_agent_admin] role, users can create and manage topics (bot conversations), using Virtual Agent Designer.

- If using Natural Language Understanding, the NLU admin role is included.
- If the Virtual Agent admin is granted access to AI Search-related tables, the search application administrator role [search_application_admin] is included.
- If the Virtual Agent admin is granted access to Entity View Action Mapper tables, the EVAM admin role [evam_admin] is included.
- For multilanguage support, the localization_requestor role is included by default. For more information, see Localization Framework roles .
- For more information on the roles contained in virtual_agent_admin, see Virtual Agent roles.

Users installed

The Glide Conversation Server plugin (com.glide.cs) automatically installs a virtual agent user (virtual.agent) in the User [sys_user] table. Ongoing Virtual Agent interactions are assigned to this virtual agent user. If you're using Advanced Work Assignment (AWA), interactions assigned to the virtual agent user are not routed by AWA. The virtual agent user is also used in the default web chat branding settings to associate a virtual agent user profile with a bot avatar.

Tables installed

Table	Description
Adapter Configurations [sys_cs_adapter_configuration]	Stores records for default keywords, labels, and message values for third-party messaging integrations.
Adapter Configuration Page [sys_cs_adapter_configuration_page]	Stores the configuration for third-party messaging integrations. This table is the root table for:

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Table	Description
	• Configurations - Slack Integration [sys_cs_adapter_configuration_page_slack] • Configurations - Teams Integration [sys_cs_adapter_configuration_page_teams] • Configurations - Workplace Integration [sys_cs_adapter_configuration_page_workplace] • Configurations - Facebook Messenger Integration [sys_cs_adapter_configuration_page_messenger]
Adapter Message [sys_cs_adapter_message]	Stores adapter messages.
Brandings [sys_cs_branding_setup]	Stores different branding configurations for the web-based chat client used in an instance.
Client Adapter [sys_cs_client_adapter]	Stores each adapter state.
Consumer Channel [sys_cs_consumer_channel]	Stores consumer channel information.
Consumer Device Context [sys_cs_consumer_device_context]	Stores consumer device context information.
Context Topics [sys_cs_context_topic]	Stores different configurations for determining the appropriate conversation topic displayed to end users based on their pre-chat survey answers.
Conversation [sys_cs_conversation]	Stores a record for each conversation on the instance. Each record includes the Conversation Task [sys_cs_conversation_task] and Conversation Message [sys_cs_message] related lists, which show all the topics run and associated messages presented in the conversation.
Conversation Consumer [sys_cs_consumer]	Stores a record representing the user in a conversation, and references the associated sys_user record for that user.
Conversation Server Field Script Validators [sys_cs_field_script_validator]	Stores text format validation rules and default error messages. Read-only.
Custom Controls [sys_cs_custom_control]	Identifies custom controls.

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Table	Description
Custom Control Definitions [sys_cs_custom_control_definition]	Binds a client type (for example, web or mobile) to a custom control.
Conversation Media [sys_cs_media]	Media attached to conversations are stored in sys_attachment, and associated to this table.
Conversation Message [sys_cs_message]	Stores a record for each message in a conversation. Shows the messages displayed for each topic in the conversation flow.
Conversation Server Connect Hand-off [sys_cs_connect_handoff]	Stores mapping of Virtual Agent conversations and Connect/Workspace conversations.
Conversation Session [sys_cs_session]	Stores a record for each conversation.
Conversation Task [sys_cs_conversation_task]	Stores a record for each conversation task. Each record shows the conversation flow, which can include multiple topics that are run during the conversation.
Conversation Task FDIH Invocations [sys_cs_fdih_invocation]	Tracks the state of a call to a Flow Designer action or subflow in a conversation.
Conversation Vendor [sys_cs_vendor]	Stores vendor information.
CS Consumer Account [sys_cs_consumer_account]	Stores third-party user information.
Custom Greetings and Setup [sys_cs_context_profile]	Stores a profile record for context-driven chat experiences. Contains customizations in the following child tables: • Setup topics [sys_cs_context_profile_topic] - Stores the setup topics used for each setup topic type. • Promoted topics [sys_cs_context_profile_promotion] - Stores the topics that are highlighted in the Virtual Agent client. • Search Profiles [sys_cs_context_profile_search] - Stores the AI search profile for the associated chat experience.
Custom Controls [sys_cs_custom_control]	Stores the custom input and response controls.

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Table	Description
Custom Control Definitions [sys_cs_custom_control_definition]	Binds a client type (for example web chat client) to a custom control. Stores the channel, domain, and user interface component defined for a custom control.
General Settings [sys_cs_general_settings]	Stores the records for the NLU configuration.
Live Agent Setup [sys_cs_live_agent_setup]	Stores the Live Agent setup with queue information.
Live Agent Support Queue Cache [sys_cs_support_queue_cache]	The database cache used for support queue wait times.
Open NLU Drivers [open_nlu_driver]	Stores the records of the NLU service providers used in the instance. Identifies the base system NLU provider and other services installed, such as IBM Watson NLU.
Open NLU Driver Http Connections [open_nlu_driver_http_connection]	Stores all the HTTP connection references for the NLU service provider.
Open NLU Driver Languages [open_nlu_driver_language]	Lists the language codes for the NLU service providers (ServiceNow NLU, IBM Watson Assistant, and MS LUIS). Identifies the driver codes and associated languages.
Open NLU Predict Entity Feedbacks [open_nlu_predict_entity_feedback]	Stores the disposition taken by an application in response to an NLU entity prediction result. For example, in Virtual Agent the goal is to map a predicted NLU entity to an input variable in a Virtual Agent topic.
Open NLU Predict Intent Feedbacks [open_nlu_predict_intent_feedback]	Stores the disposition taken by an application in response to an NLU intent prediction result. For example, in Virtual Agent the goal is to map a predicted NLU intent to a Virtual Agent topic.
Published Topic [sys_cb_design_topic]	Stores design topic definitions and references the runtime topic.
Session Binding [sys_cs_session_binding]	Stores session binding and AMB channel information.
Configurations - Slack Integration [sys_cs_adapter_configuration_page_slack]	Extends the sys_cs_adapter_configuration_page table. Stores the configuration for the Slack messaging application.
Configurations - Facebook Messenger Integration	Extends the sys_cs_adapter_configuration page table. Stores the configuration for the Facebook Messenger messaging application.

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Table	Description
[sys_cs_adapter_configuration_page_messenger]	
Teams Adapter Configuration Page [sys_cs_adapter_configuration_page_teams]	Extends the sys_cs_adapter_configuration_page table. Stores the adapter configuration for the Microsoft Teams messaging application.
Workplace Adapter Configuration Page [sys_cs_adapter_configuration_page_workplace]	Extends the sys_cs_adapter_configuration_page table. Stores the adapter configuration for the Workplace messaging application.
Vendor Client Adapter Configuration [sys_cs_vendor_client_adapter_configuration]	Stores the adapter configuration for third-party messaging applications.
Topic [sys_cb_topic]	Stores a record for each topic (design-time definition).
Topic [sys_cs_topic]	Stores an instance of a topic from sys_cb_topic at run time. Records on this table are cleaned every 12 hours.
Topic Category [sys_cb_topic_category]	Stores all the categories that identify the different types of topics, such as setup topics and small talk topics. Also includes custom categories defined by admins.
Topic Library Usages [sys_cs_topic_library_usage]	Stores references to published topic blocks.
Vendor Context Configuration [sys_cs_vendor_context_configuration]	Stores vendor-specific device context information.
Virtual Agent Context [sys_cs_virtual_agent_context]	Stores Virtual Agent context variables.

Properties installed

Property	Description
com.glide.cs.branding.msg_delay	Minimum delay between bot messages
com.glide.cs.branding.type_presence_delay	Minimum delay before displaying typing animation
com.glide.cs.conversation_faulted_reason	Message that displays the following default message when a conversation has faulted: `It seems that you have left the conversation.`
com.glide.cs.general.error_message	Generic error message

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Property	Description
com.glide.cs.general.live_agent_handoff_error_message	Error message when no live agent has been set up
com.glide.cs.general.live_agent_handoff_message	Message to display when handing over to a live agent
com.glide.cs.general.support_email	General support email
com.glide.cs.general.support_hours	General support hours
com.glide.cs.general.support_phone	General support phone
com.glide.cs.global_configuration	The sys_id of the default configuration page (sys_cs_configuration_page)
com.glide.cs.javascript.reserved_words	Reserved words in JavaScript that should not be used as vaInputs names or vaVars names
com.glide.cs.live_agent_queue	The chat queue that users transfer to when a conversation transitions from a virtual agent to a live agent. This default queue is used unless the topic specifies a specific queue to use.
com.glide.cs.suggest.minimum_characters	The minimum number of characters the user must enter in a keyword search before partial matching, phonetic matching, and spellcheck begin to function.
com.glide.cs.suggest.enable_partial_search	Enables partial matching searches on topic searches when set to true.
com.glide.cs.suggest.enable_phonetic_search	Enables phonetic searching on topic searches when set to true.
com.glide.cs.suggest.enable_spell_check	Enables alternate search spellings on topic searches when set to true.

Virtual Agent roles

Virtual Agent adds several roles for users operating as Virtual Agent administrators.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Role description

Roles that are installed with Virtual Agent are listed below with the following information:

Role title [name]

Name of the role. Text within brackets matches the **Name** field in the Roles [sys_user_role] table.

Description

Description of the role and its intended use.

Contains Roles

List of roles contained within the role.

Groups

List of groups this role is assigned to by default.

Considerations

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Warnings or other considerations for administrators.

Installed roles

Note:

Simplify user administration by creating groups that contain all the roles necessary for specific personas rather than to individual users. You can then assign individual users to those groups. When users transition to new roles, you can then re-assign their group memberships, and avoid scenarios where users retain unexpected roles.

For details on the administration of users, groups, and roles, see User Administration.

Issue auto resolution administrator [iar_admin]

Configures the delivery of automated task resolution messages in Virtual Agent, email, or SMS.

Contains Roles

List of roles contained within the role.

- *evam_admin*
- *search_application_admin*

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Chat survey administrator [chat_survey_admin]

Controls and configures post-chat surveys for gathering feedback on user experience, or for chat queues defined in Advanced Work Assignment.

Contains Roles

List of roles contained within the role: survey_admin.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Action Designer [action_designer]

Launches the Action Designer app, to automate tasks with sequences of related steps.

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Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

EVAM administrator [evam_admin]

Accesses Entity View Action Mapping, to standardize display of different data sources in cards or lists.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Virtual Agent branding [va_branding]

Fetches branding settings via scripted rest API.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

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Activity subscriptions administrator [actsub_admin]

Creates subscribable objects and subscribes to activities on those objects.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Action Designer [action_designer]

Launches the Action Designer app, to automate tasks with sequences of related steps.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

EVAM administrator [evam_admin]

Accesses Entity View Action Mapping, to standardize display of different data sources in cards or lists.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Virtual Agent branding [va_branding]

Fetches branding settings via scripted rest API.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Activity subscriptions administrator [actsub_admin]

Creates subscribable objects and subscribes to activities on those objects.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Flow designer [flow_designer]

Launches the Flow Designer app, to create multi-step workflows.

Contains Roles

List of roles contained within the role.

- *decision_table_reader*
- *flow_operator*
- *rest_api_builder*

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Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Automated testing framework designer [atf_test_designer]

Creates and runs automated tests to confirm proper instance function after making changes to the instance.

Contains Roles

List of roles contained within the role: impersonator.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

NLU Administrator [nlu_admin]

Creates NLU models and associated intents in the NLU Workbench.

Contains Roles

List of roles contained within the role.

- *sn_nlu_workbench.nlu_feedback_admin*
- *nlu_editor*
- *nlu_user*

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

External application installation administrator [external_app_install_admin]

Installs external apps such as Slack, Microsoft Teams, and Workplace.

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Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Any user assigned this role can alter or delete topics created in the Virtual Agent Designer system, including topics that other topics refer to or have as dependencies.

Automated Customer Experiences (ACE) user [sn_ace.ace_user]

Accesses and reads ACE records.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Conversational Interfaces guided setup administrator [sn_ci_gs_content.ci_guided_setup_admin]

Creates a guided setup to assist users with planning the roll-out of Conversational Interfaces materials, and performs the basic configurations to go live.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Localization requestor [localization_requestor]

Creates translation requests, and views completed translations in the Localization Framework.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Self-service manager [sn_ssa_core.self_service_manager]

Performs CRUD operations on Pattern and Activity configuration and the Deflection data tables.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Image administrator [image_admin]

Manages image files on the Images [db_image] table.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Search application administrator [search_application_admin]

Inserts data into, updates, and deletes search-UX related configuration tables including: [sys_search_context_config], [sys_search_source], [m2m_search_context_config_search_source], [sys_search_facet], and [sys_search_filter]. The AI Search administrator [ais_admin] role is included in this role to perform AI Search configuration.

Contains Roles

List of roles contained within the role.

- *ais_admin*
- *personalize_dictionary*

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Chat analytics administrator [chat_analytics_admin]

Sets up the Conversational Analytics dashboard, reconfigures its contents, and creates funnels to review performance of conversation flows.

Contains Roles

List of roles contained within the role: chat_analytics_viewer.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Additional plugins for Virtual Agent

After activating Virtual Agent, you can activate additional plugins to enable other features for conversation design.

You must have the admin role to activate these additional plugins. For details, see Activate a plugin.

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Plugin	Description
• Human Resources Service Delivery: HR Service Delivery Virtual Agent Conversations [sn_hr_va] available through the ServiceNow Store • ITSM Virtual Agent conversations [sn_itsm_va] available through the ServiceNow Store • CSM Virtual Agent conversations [com.sn_csm.virtualagent]	Enables predefined Virtual Agent conversations, reusable topic blocks, and prebuilt ServiceNow NLU models for the Customer Service Management, HR Service Delivery, and IT Service Management applications. • Requires the Glide Virtual Agent (com.glide.cs.chatbot) plugin to be activated. • Automatically activates the NLU Workbench (com.snc.nlu_studio) plugin. • Automatically activates the Service Management Virtual Agent Topic Blocks (com.glideapp.cs.sm_topic_blocks) plugin. Includes common topic blocks such as contextual search.
NLU Workbench [com.snc.nlu_studio]	Enables the creation of custom ServiceNow Natural Language Understanding (NLU) models used by Virtual Agent.
NLU Workbench - Advanced Features [com.snc.nlu.workbench.advanced]	Expands the functionality of NLU Workbench by providing conflict review, batch testing, and model performance features. Available from the ServiceNow® Store.
Conversational Analytics Dashboard [com.sn.conversational.analytics]	Provides insights into user interactions so you can see how well Virtual Agent understood and resolved user issues.

Prebuilt Virtual Agent topics, topic blocks, and ServiceNow NLU models

Prebuilt Virtual Agent conversations (topics), reusable topic blocks, and ServiceNow NLU models are available for the Virtual Agent platform and various business applications, such as Customer Service Management, HR Service Delivery, IT Service Management, and more.

These pre-defined conversations help users with common self-service tasks in each business area, such as creating or updating cases or providing answers to frequently asked questions. Prebuilt topic blocks are reusable components (similar to subflows) that perform a specific function or task and can be added to a conversation topic. Prebuilt NLU models define the business-specific language understanding needed for Virtual Agent to understand and process user requests. Each NLU intent in a model maps to a single Virtual Agent conversation topic.

Summaries of prebuilt topics and topic blocks

For more information on the Virtual Agent prebuilt topics and topic blocks provided by various ServiceNow applications, refer to the documentation for those applications. For example, the CSM, HRSD, and ITSM applications provide information on their prebuilt topics in the following sections:

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Predefined topics and topic blocks	Activated by
Customer Service Virtual Agent conversations	com.sn_csm.virtualagent
Human Resources Virtual Agent conversations	Request the HR Service Delivery Virtual Agent Conversations from the ServiceNow Store. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
ITSM Virtual Agent Conversations	Request ITSM Virtual Agent and the ITSM NLU Model for Virtual Agent Conversations from the ServiceNow Store. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
Virtual Agent Platform topics and topic blocks • Virtual Agent Designer setup topics • Virtual Agent platform topic blocks (such as Agent Availability, AI Search, and FAQ Conversation Builder)	com.glide.cs.chatbot

Note:
The plugins for the CSM, HR Service Delivery, and ITSM predefined conversations also install their prebuilt ServiceNow NLU models and topic blocks. The Glide Virtual Agent plugin installs the prebuilt NLU model for setup topics, as well as platform topic blocks.

After installing the plugins or apps, you can preview (test) the topics and topic blocks using Virtual Agent Designer. You can review the intents, utterances, and entities in the prebuilt NLU models using ServiceNow NLU Workbench or within Virtual Agent Designer if your NLU-enabled topics are associated with intents in ServiceNow NLU models.

Working with prebuilt topics and topic blocks in Virtual Agent Designer

- Previewing topics and topic blocks – After you install the plugins for prebuilt topics, admins or Virtual Agent admins can access the prebuilt topics and topic blocks in the Topics page. Select the topic and in the **Flow** tab, select **Test**. Review the conversation as it runs in the test window to determine the topics and topic blocks that you want to use.
- Using prebuilt topics and topic blocks – Although prebuilt topics and topic blocks are read only and can't be changed, you can reuse them by duplicating and modifying them as needed.

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After you test a duplicated topic and are ready to deploy it to your Virtual Agent clients, publish the topic. Similarly, after testing a duplicated topic block, publish it to make it available for use in conversation (calling) topics.

For details on creating, testing (previewing), duplicating, and publishing a topic, see Getting started with Virtual Agent Designer. For details on working with topic blocks, see Maximizing code reuse with topic blocks.

Working with prebuilt ServiceNow NLU models in ServiceNow NLU Workbench

- Reviewing a prebuilt NLU model – After you install the plugins for predefined topics, you can view the prebuilt models in NLU Workbench. The prebuilt NLU models for ServiceNow applications define the intents, entities, and utterances used for the predefined topics. These models are also trained and published. You can also review the utterances for a prebuilt model in Virtual Agent Designer. However to copy a prebuilt model, you use NLU Workbench.
- Duplicating prebuilt NLU models – Although prebuilt NLU models are read only and can't be edited, you can Duplicate an NLU model prebuilt NLU models to create your own NLU models and Import an NLU intent from prebuilt models or other NLU models that you create in NLU Workbench.

For details on creating, training, and publishing ServiceNow NLU models, see Natural Language Understanding.

Setting up chat experiences for Virtual Agent users

Create different chat experiences for your end users based on the context in which they initiate a conversation with Virtual Agent.

How chat experiences work

A chat experience defines the structure of a bot conversation (setup topics), an initial set of topics displayed to users (promoted topics), and the AI Search configurations for displaying search results in conversations. Virtual Agent provides a preconfigured, default chat experience that you (admins and topic authors) can use to control the user experience with Virtual Agent.

You can configure the default chat experience and also create custom chat experiences, tailored to the context in which different users run Virtual Agent, such as the service portal or channel that they're using. Custom chat experiences inherit the default chat experience settings, but you can override the defaults as needed for a given context.

Note:
If you're using Virtual Agent Lite, you can configure certain setup topics in the default chat experience but you can't create custom chat experiences.

A chat experience consists of the following:

Setup topics

Virtual Agent provides common conversational elements, such as a welcome greeting to begin a conversation and a conversation closing, and automatically includes them in virtual agent conversations. These pre-built elements, called setup topics, are part of a basic conversation structure that is applied to all your conversations. They are installed with Virtual Agent and Virtual Agent Lite.

These setup topics run automatically at appropriate points in a conversation, based on the context, utterances (if NLU is enabled), or keywords that users enter during the conversation.

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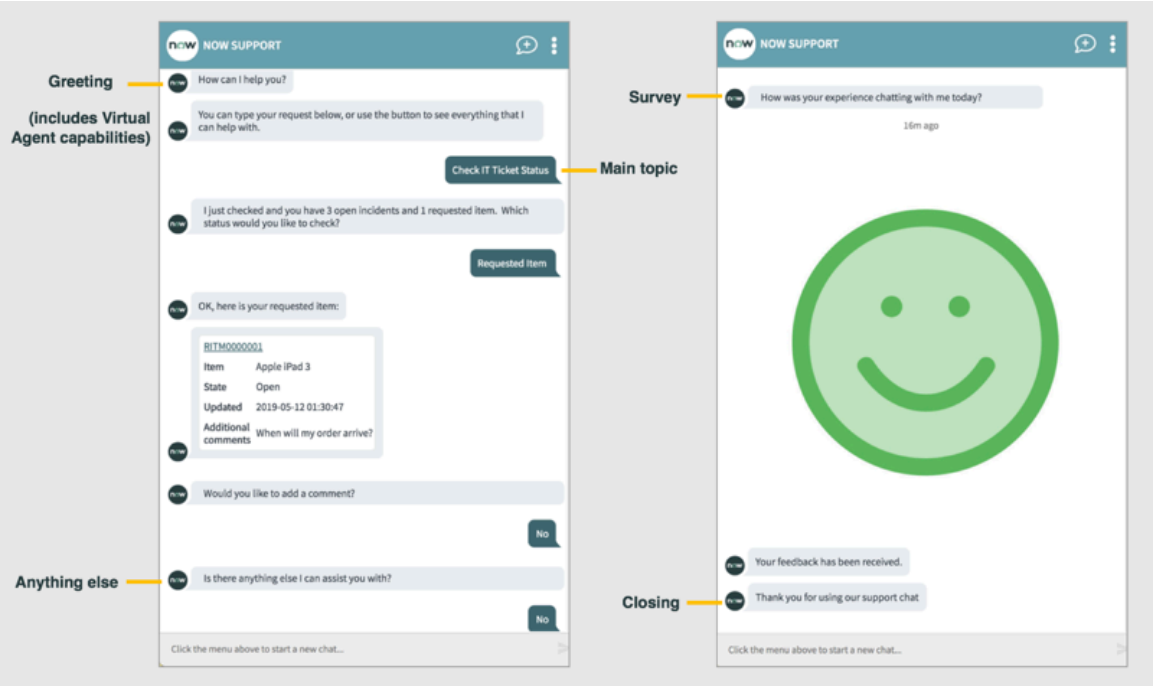
Example setup topics in a conversation



Virtual Agent provides the following types of pre-built setup topics:

Setup topic	Description
Greeting	Presents a welcome greeting to users, and asks users to enter a request or see what items it can assist with.
Provide Virtual Agent Feedback	Displays a survey to get user feedback on the conversational experience, before the conversation ends.
Live Agent Support	Enables users to request a live agent transfer and view items that the live agent can assist with.
Virtual Agent Capabilities	Presents a list of what the virtual agent can help with.
Error Handling Topic	Displays a standard error message when an unrecoverable system error occurs and transfers the user to a live agent.
Closing Conversation	Displays a closing message that ends the conversation.
AI Search Fallback	Generates AI Search results for a user when Virtual Agent can't find a matching intent and topic or keyword.
Fallback Topic	Presents standard messages that ask the user to enter another request or select a different topic when the virtual agent does not understand a user entry or selection.
Anything Else Topic	After completing a task or request, virtual agent asks if the user needs further assistance with another request or task.

The setup topics have corresponding intents (set in the pre-built NLU model for setup topics) and also keywords. Virtual Agent recognizes the utterances or

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keywords that users can enter to run certain setup topics, such as the Virtual Agent Capabilities (help) topic or the Live Agent support topic.

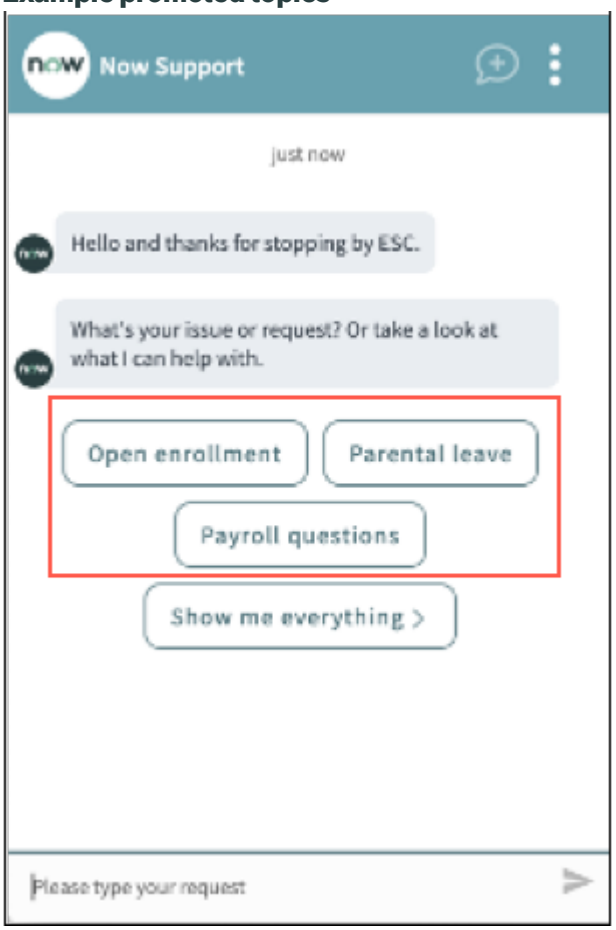
You can preview (test) the pre-built setup topics to see how they work. In the Topics page of Virtual Agent Designer, use the **Type** filter to list the Setup Topics and select the setup topics to test. Pre-built topics are read-only, but you can duplicate, customize (modify) if needed, and publish them.

Promoted topics

You can display a collection of up to six topics that are relevant to your users, displayed before the **Show me everything** button in the chat window. You can use these promoted topics in a chat experience to give your users quick and convenient access to the topics used for a given context.

Note:
Promoted topics may not be supported on all clients.

Example promoted topics



Search profile

A search profile defines how Virtual Agent search results are generated through the AI Search application and how the results are displayed to users. Virtual Agent uses a default search application that controls the data source for searches and a UI configuration (set in the Entity View Action Mapping application) that controls the search results displayed in Genius cards and multi-link output. These configurations also apply to search results generated as a fallback when Virtual Agent can't determine the appropriate topic. For more information, see Improving the user experience with AI Search.

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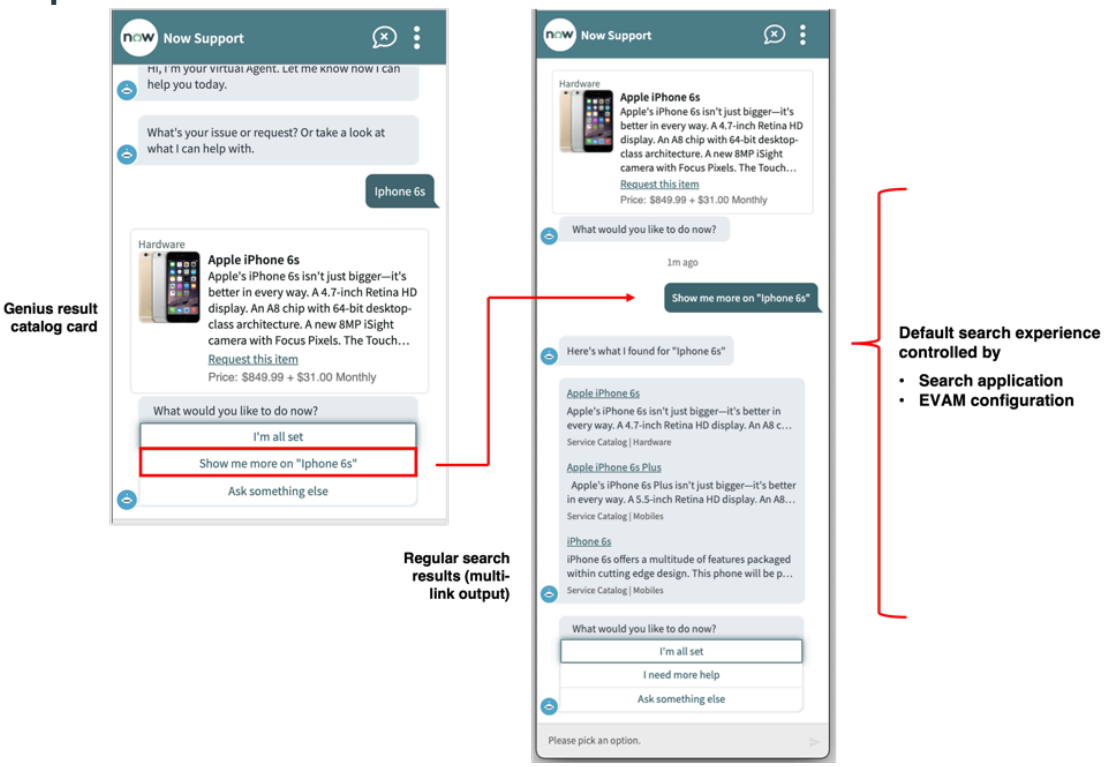
Example AI Search result



Get started with chat experiences

Navigate to **All** > **Conversational Interfaces** > **Settings**, and then select **Virtual Agent**. Use the **Custom Greetings and Setup** tile to manage the default and custom chat experiences. You can do the following:

- Configure the default chat experience, including the setup topics, promoted topics, and search criteria used. For example, you can activate the Virtual Agent Feedback setup topic so that it is applied to all your bot conversations.
- Create different custom chat experiences based on the context in which your end users run Virtual Agent. The settings that you define in a custom chat experience override the default chat experience.

Working with setup topics

Setup topics are part of a standard conversation structure applied to all your conversations, such as the welcome greeting or fallback responses. Setup topics run at the appropriate spot in a conversation based on the context, keywords, or utterances entered by the user, and any conditions that are specified for the setup topic.

You define setup topics in a Virtual Agent Designer chat experience using the Custom Greetings and Setup option. A chat experience sets the context in which users run Virtual Agent. This context includes:

- Setup topics applied to bot conversations.
- A small list of topics, called promoted topics, initially displayed in the chat window.
- AI Search configuration used to display AI Search results for your users.

For more information on chat experiences, see Setting up chat experiences for Virtual Agent users. For details on configuring a chat experience, see Configure a Virtual Agent chat experience.

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Note:
Setup topics in conversations are discoverable (via topic discovery) only when they're configured in a Virtual Agent chat experience using the **Custom Greetings and Setup** option. If any setup topics are not included in a chat experience, those setup topics are not listed in the chat window's All Topics menu (topic picker) and cannot be discovered by Virtual Agent.

Setup topics run during a conversation as follows.

1. Conversation beginning: Virtual Agent presents the Greeting topic and the list of available topics (Virtual Agent capabilities) that the user can select.

   Note:
   If you want the chat window to immediately take users to a live agent, do not select the Live Agent Support topic as a greeting. Instead, use the system method to transfer to a live agent.

2. Conversation body: These setup topics are presented at different points in the conversation depending on the context:
   - User requests help: Virtual Agent presents the Explore help topic (Virtual Agent capabilities).
   - User enters a request or keyword that Virtual Agent doesn't understand: Virtual Agent presents the Fallback topic, unless the AI Search fallback topic is enabled.
   - If the AI Search Fallback topic is enabled and the user enters a request or keyword but Virtual Agent can't find a matching topic or keyword, or finds too many topics to determine the matching topic: Virtual Agent runs AI Search to generate relevant search results for the user. If the AI Search results do not help the user, or if the AI Search Fallback setup topic is not activated, Virtual Agent runs the Fallback topic.
   - An unrecoverable system error occurs during conversation: Virtual Agent runs the Error Handling topic, and then transfers the user to a live agent.
   - User requests a transfer to live agent: Virtual Agent runs the Live Agent topic, which transfers the user to a live agent.
   - After a task or user request is completed: Virtual Agent runs the Anything else topic to ask if the user wants to continue with another request or task.
3. Conversation ending:
   - If the user doesn't want further assistance after a task or the request is completed, Virtual Agent presents the Survey topic for feedback on the conversational experience.
   - After the survey, Virtual Agent confirms that the feedback has been received, and runs the Closing topic to end the conversation.

The default setup topics are read-only and have topic names with a period at the end of the setup topic name, such as **Greeting**. You can create your own custom setup topics by duplicating a setup topic and changing it as needed. You can also change prompts or add other controls to the topic, just as you might when creating other topics.

If you want a closing message to be different from the default Closing topic, create a custom setup topic that contains the revised closing text. You also need to create an intent for that custom setup topic in the NLU model for setup topics, or define topic keywords in the Topic Properties page. You can then select the custom setup topic to be used in a custom chat experience instead of using a default setup topic.

The following table provides examples of the pre-built setup topics in the default chat experience.

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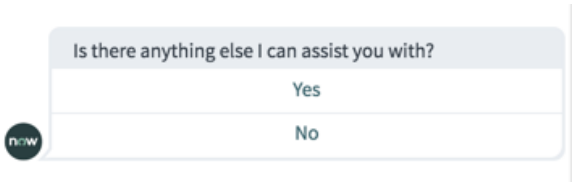
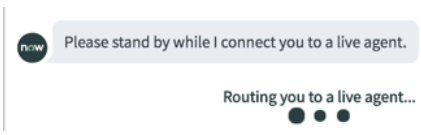
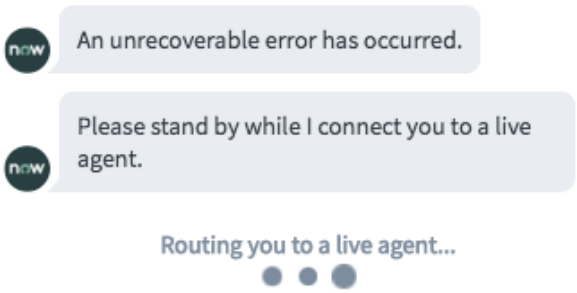
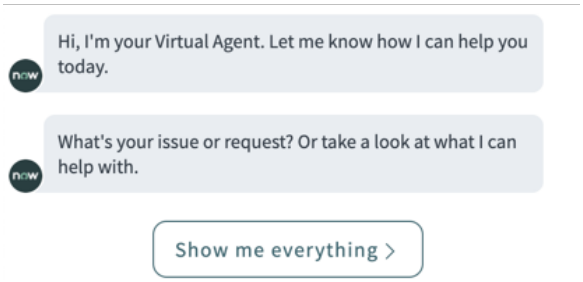
Setup topic type	Setup topic name and description
Anything else	Anything Else Topic. Virtual Agent asks users if they need further assistance.  If users select **Yes**, Virtual Agent returns a list of related items that it can help with.
Live agent	Live Agent Support. Tells users that a live agent transfer is in process: 
Error	Error Handling Topic. Displays a generic error message to the user when the Virtual Agent encounters a problem that it can't resolve (unrecoverable system error) and transfers the user to a live agent. 
Greeting	Greetings. Starts a conversation by greeting users and giving them the option to enter a request or see the items that the Virtual Agent can assist with. 

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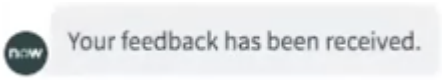
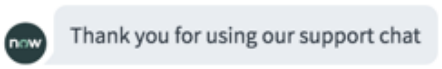
Setup topic type	Setup topic name and description
	Note: The pre-built setup topics include a personalized greeting called the Dynamic Greeting Topic, which welcomes the user by name. To change the default greetings topic, double click **Setup topic name** and then choose the personalized greeting from the list of available setup topics.
Survey	Virtual Agent Feedback topic. Gathers user feedback on the conversational experience with the Virtual Agent. The survey setup topic displays randomly in 33% of your Virtual Agent conversations. The survey topic includes an introductory sentence that admins can customize as needed. The survey then presents a choice list with options users can select to describe their experience. **Example survey feedback choices**  After the users provide their feedback, a message confirms that their feedback has been received:  **Note:** To change the probability (percentage) that the survey setup topic occurs in your conversations, change the value in the *com.glide.cs.survey.probability* system property. To display the survey setup topic randomly in 50% of your Virtual Agent conversations, set the **Value** to 0.50.
Closing	Closing Conversation. Displays a closing message to the user that ends the conversation: 
AI Search fallback	AI Search Fallback. When enabled, this setup topic uses AI Search search to generate fallback AI Search results when Virtual Agent can't find a matching intent or it finds too many intents and can't determine the appropriate topic to display to a user.
Fallback	Fallback Topic. Displays a standard message to the user when:

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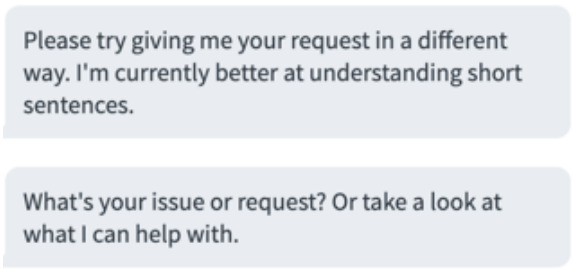
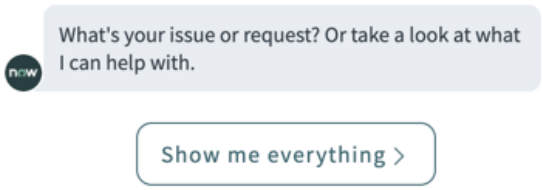
Setup topic type	Setup topic name and description
	• When virtual agent doesn't understand a user utterance or keyword and the AI Search fallback setup topic is not enabled in the chat experience. AI Search fallback topic was deactivated in the chat experience, and the virtual agent doesn't understand a user statement or keyword. • Users indicate that the AI Search results aren't helpful. 
Explore help	Virtual Agent Capabilities. Enables users to ask for assistance during a conversation and view a list of items that the Virtual Agent can assist with (Virtual Agent capabilities). 

Change text in the Show me everything button

Configure the text in the **Show me everything** button displayed in the chat window to control the display of the initial greetings and the **Show me everything** button in Virtual Agent conversations. Edit the message in the System Properties [sys_properties] table, or in a copy of the Greetings setup topic.

Before you begin

If you're updating the Greetings setup topic in Virtual Agent Designer, first Create a copy of the Greetings setup topic, since the prebuilt Greetings setup topic is read-only.

Role required: virtual_agent_admin or admin

About this task

You can change the Virtual Agent greeting message by either updating the default greeting through the System Properties [sys_properties] table, or changing the message in the Greetings setup topic in Virtual Agent Designer.

If you change the message in the System Properties table, the default greetings setup topic (and any custom greetings topics that don't override the default **Show me everything**) all show the updated message. If you change the greeting message through Virtual Agent Designer, you can make more targeted changes, such as a message for an HR-based greeting topic.

The Greetings setup topic contains the Send Topic Picker script action, which controls the text in the **Show me everything** button. To change the text, edit the Send Topic Picker script action in the copy of the Greetings setup topic.

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Procedure

Navigate to **All** and use one of the following methods.

Result
If you follow the System Properties method, your change to the greeting message is shown in all Virtual Agent conversations. If you follow the Virtual Agent Designer method, your change is shown in conversations related to the Greetings setup topic.

What to do next
If you customized your Greetings topic, add it to the default chat experience or to a new custom chat experience that you created. For details, see Configure a Virtual Agent chat experience.

Hide or reveal the Show me everything button

Set properties to hide or reveal the **Show me everything** button in Virtual Agent conversations that use LLM (large language model) and NLU/Keyword (Natural Language Understanding) topic discovery.

Before you begin
Role required: vitual_agent_admin or admin

About this task
By default, the greeting portion of a Virtual Agent conversation includes a **Show me everything** button, which brings up the entire list of available Virtual Agent topics and a search filter. Use the following steps to toggle the **Show me everything** button for LLM and NLU/Keyword topic discovery, respectively.

Procedure

Use either of the following methods, depending on whether you are working with LLM or NLU topics.

Result
The **Show me everything** button is removed from the greeting messages in your Virtual Agent conversations.

Change the Virtual Agent greeting messages in the Greeting setup topic

The Virtual Agent greeting setup topic provides default greeting messages for your conversations. Customize these greetings by adding system properties that change the default welcome message and the top selection message prompting users to enter an issue or request.

Before you begin
Role required: virtual_agent_admin or admin

About this task
Starting with the Orlando release, the *com.glide.cs.general.welcome_message* and *com.glide.cs.general.top_selection_message* properties are no longer automatically installed with Virtual Agent. These properties define the greeting messages used in the Greeting setup topic.

In the Orlando release, the default Greeting setup topic was updated. If you upgraded from the New York release, these properties are retained so that you can continue using the original Greeting setup topic. If you want to use the updated Greeting setup topic, delete the *com.glide.cs.general.welcome_message* and

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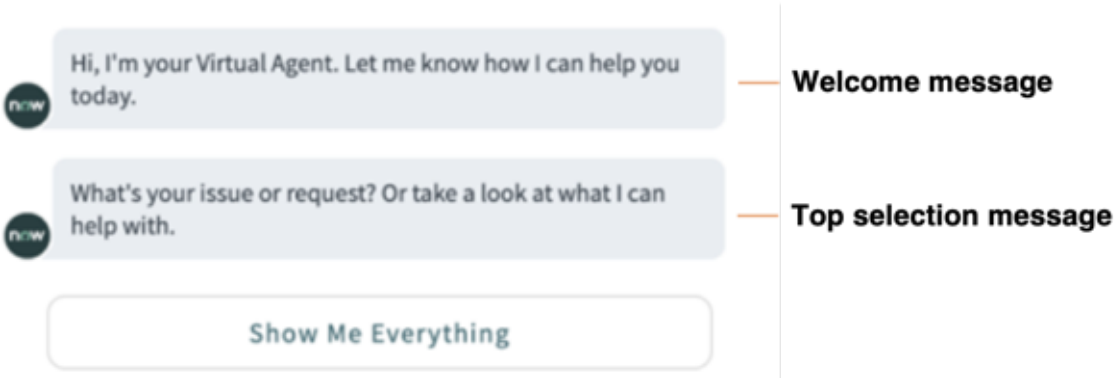
com.glide.cs.general.top_selection_message system properties that contain the original Greeting messages.

Note:
These properties aren't present in the base system, but creating them enables you to override these messages. The custom messages that that you create only appear with NLU/Keyword topics.

For new customers, the updated Greeting setup topic (see the following example) is the default. If you want to change the default message text in the Greeting setup topic, add these system properties to the System Property [sys_properties] table:

- *com.glide.cs.general.welcome_message*: Change the default welcome message
- *com.glide.cs.general.top_selection_message*: Change the top selection message that displays after the welcome message

Default messages in Greeting setup topic (starting with the Orlando release)



Procedure

1. Navigate to **All**, and then enter `sys_properties.list` in the filter.
2. Select **New** to add the *com.glide.cs.general.welcome_message* property.
   a. On the form, complete the following fields.

Field	Value
Name	Enter the system property name: `com.glide.cs.general.welcome_message`
Description	Enter an explanation for this property: `Welcome message`
Type	Select `string`.
Value	Enter the greeting text. For example: `How can I help you?`

   b. Select **Submit**.
3. In the System Properties table, select **New** to add the *com.glide.cs.general.top_selection_message* property.

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a. On the form, complete the following fields.

Field	Value
Name	Enter the system property name: `com.glide.cs.general.top_selection_message`
Description	Enter an explanation for this property: `Top selection message`
Type	Select `string`.
Value	Enter the text that specifies the next selection action that the user can make after the welcome message is presented to the user. For example: `You can enter your request below, or use the button to see everything that I can help with.`

b. Select **Submit**.

Configure a Virtual Agent chat experience

Change the preconfigured Virtual Agent default chat experience or create a custom chat experience for your users. You can configure setup topics, specify promoted topics, and if needed, change the search profile.

Before you begin

If you want to specify custom setup topics or promoted topics that are displayed to your users in the chat window, make those topics active (published) so that they're available for configuration in the chat experience.

Role required: virtual_agent_admin or admin

About this task

The default chat experience provides the default settings for the setup topics and the Virtual Agent search configurations in your instance. A custom chat experience uses the default settings from the default chat experience, but you can override them as needed. Defining a chat experience includes the following steps:

1. Configure setup topics.
   - Activate setup topics that are not initially enabled, such as the Anything else, Survey topic, and AI Search Fallback topic types.

     Note:
     If you upgraded from the Quebec release, the AI Search Fallback topic is deactivated by default. Enable it to return AI Search results as a fallback when Virtual Agent can't determine intents, topics, or keywords.

   - If you want setup topics to be included in topic discovery and listed in the All topics menu, be sure to include those setup topics in the default or a custom chat experience.
   - Deactivate setup topics if you don't want them to run in your conversations.
2. Promote up to six topics that are initially displayed to your users, above the **Show me everything** button in the chat window. Promoted topics are supported only on the web and mobile clients.
3. Change the Search Application configuration in the Search Profile, if needed.

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Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select **Virtual Agent** and under Custom Greetings and Setup, select **View All**.
3. Define the chat experience.
   Do one of the following:
   - To change the setup topics, promoted topics, or AI Search setting in the default chat experience, proceed to Step 5 or 6, depending on what you want to change.

     Note:
     The settings for the default chat experience are preconfigured (read-only).

   - To define a new experience, select **New** and complete the fields in Custom Greetings and Setup. Then proceed to Step 4.
   - To edit a custom experience, select the custom experience record and select **Edit** to update Custom Greetings and Setup.

Custom Greetings and Setup

Field	Description
Name	Name of the chat experience.
Description	Brief description (purpose) of the chat experience, for example ESC portal.
Active	Option that activates or deactivates the chat experience. The chat experience is active (enabled) by default. To deactivate the chat experience, clear this option.
Order	Order value that Virtual Agent uses to determine which chat experience to apply. The default chat experience has an Order value of 1000. Virtual Agent checks all the chat experiences, and if there is more than one match, the experience with the lowest order value (<1000) is applied.
Provide the context	
Condition Mode	Options for specifying the chat experience context: ○ **Simple**: A no-code condition builder to specify the context. This is the mode for the default chat experience. ○ **Advanced**: A JavaScript scripted condition that specifies the context. The condition must evaluate to true.
Condition	Condition builder for specifying the experience context. See the list of the available context variables that can be specified.

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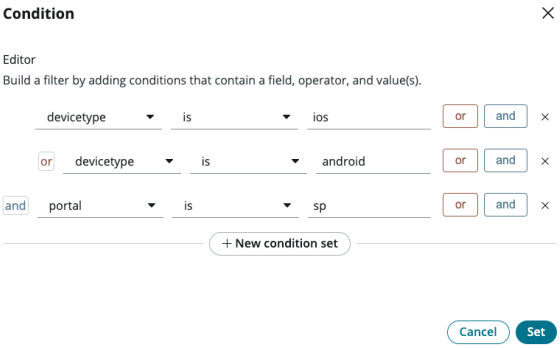
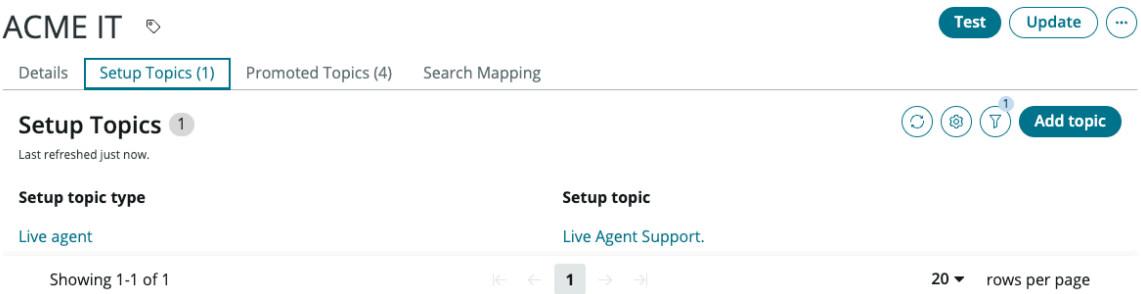
Field	Description
	For example, a Simple, no-code condition might specify the devicetype (ios or android) and the portal to which it applies. In this case, the condition applies to the Service Portal (sp). 
Script	Script editor for specifying the condition in a script, if you selected Advanced as the **Condition Mode**.

4. Select **Create custom experience** if this is a new custom chat experience.
   - The settings for the setup and promoted topics are empty. The setup topics and promoted topics specified for the default chat experience are used automatically, unless you override them by adding new topics or changing them in your custom experience.
   - To change the setup topics, promoted topics, or AI search settings in the default experience, proceed to the next steps.
5. Select the **Setup Topics** tab.
   The default experience for new instances automatically includes most of the pre-built setup topics in your conversations, except for the Anything else and Survey topics. If you upgraded from the Quebec or Rome release, the AI Search fallback topic type is also not active.

   Note:
   the Live Agent and Virtual Agent Feedback topics are not listed in the Virtual Agent topic picker (All Topics) menu by default. You must associate a setup topic type to a setup topic as part of the default or custom chat experience.

   Select **Update** to apply your changes.



6. Select the **Promoted Topics** tab to configure promoted topics.
   Specify up to six Virtual Agent topics to be initially displayed in the chat window.

   Note:
   Promoted topics are supported only on the web and mobile clients.

   a. For each topic to be promoted, select **Add topic**.

   b. On the form, fill in the fields.

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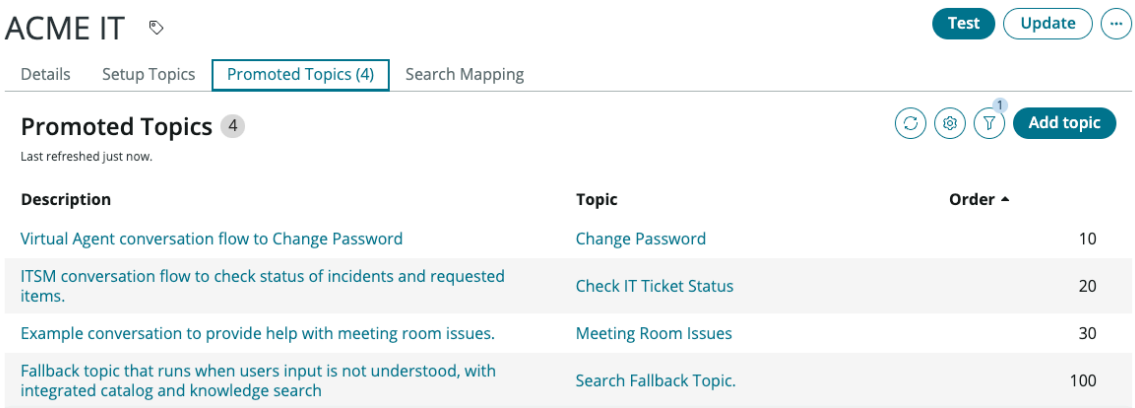
Field	Description
Topic	The topic to be promoted.
Order	A number that indicates the order in which the topic is listed in the chat window.

c. Select **Submit**.

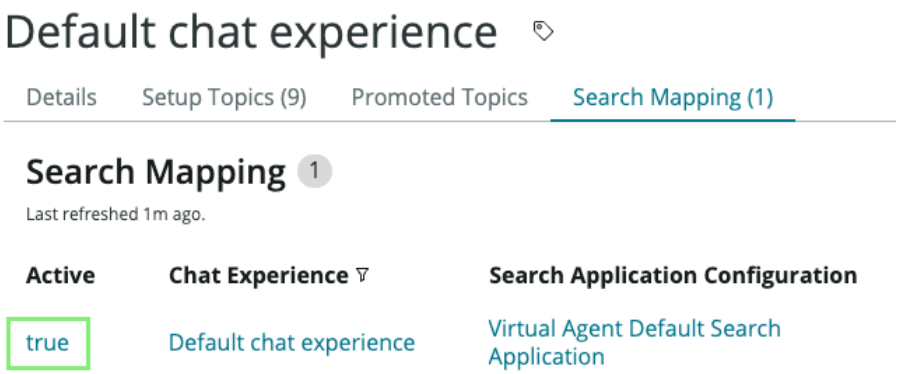
d. If needed, select **Test** to see how the promoted topics are displayed in the chat window.



7. Select the **Search Mapping** tab to change the search application for the chat experience. The default mapping consists of the Search Application Configuration and the Search UI (EVAM) Configuration for Virtual Agent.

> **Note:**
> The Virtual Agent Default Search Application Configuration is tied to a search profile that does not provide Person card results.

a. Select the value in the **Active** column to open the Search Profile record.



b. To change the **Search Application Configuration**, select a configuration from the list of available Search Application Configurations.

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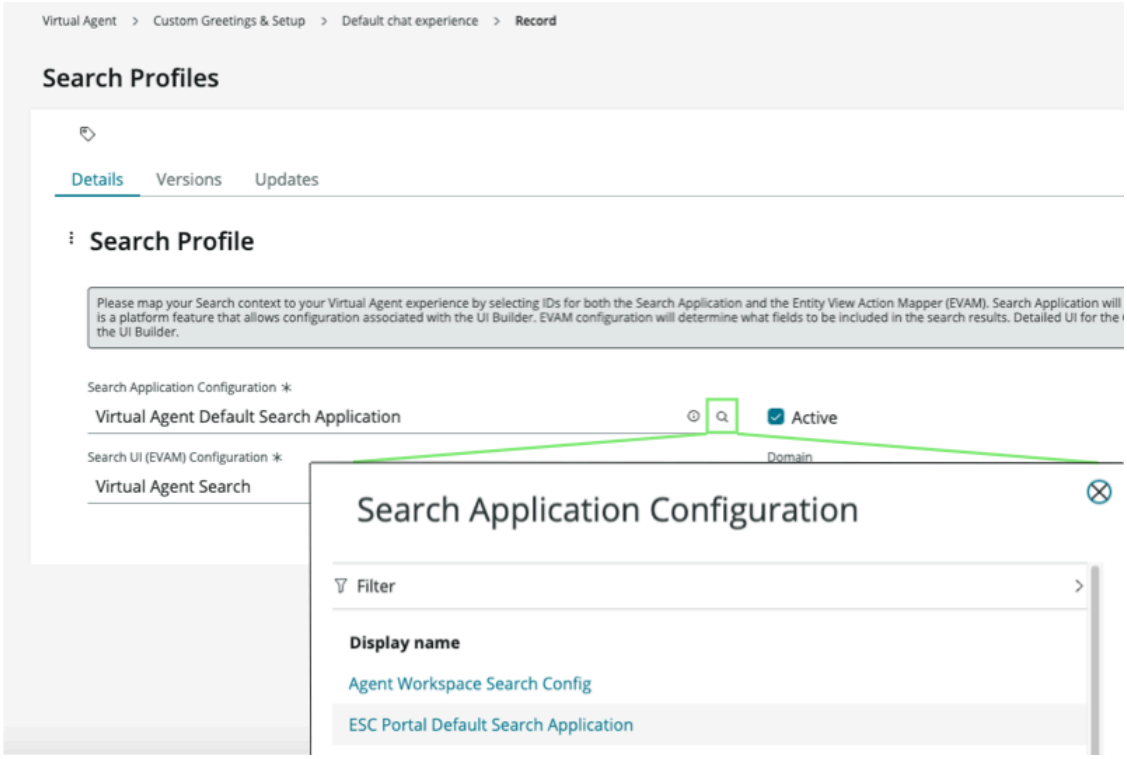

c. Select **Update**.

> **Note:**
> Although you can change the **Search UI (EVAM) Configuration**, the Virtual Agent Search (EVAM) configuration provides the appropriate card views and lists of Virtual Agent search results. If you want to create your own EVAM configuration for use, see Create an EVAM definition.

Test chat experiences

After you create or modify a Virtual Agent chat experience, you can test (simulate) it to verify that it works as expected.

Before you begin

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**, and select the **Virtual Agent** tab.
2. Under **Custom greetings and setup**, select **View All**.
3. Select the chat experience and view the profile.
4. In the header bar, select **Test**, which automatically opens the chat test window and the associated tabs that display processing details.
   The items that you defined for the chat experience, such as custom setup topics or promoted topics, run in the test window. The following example shows the custom greeting setup topic and promoted topics defined for the ESC portal.

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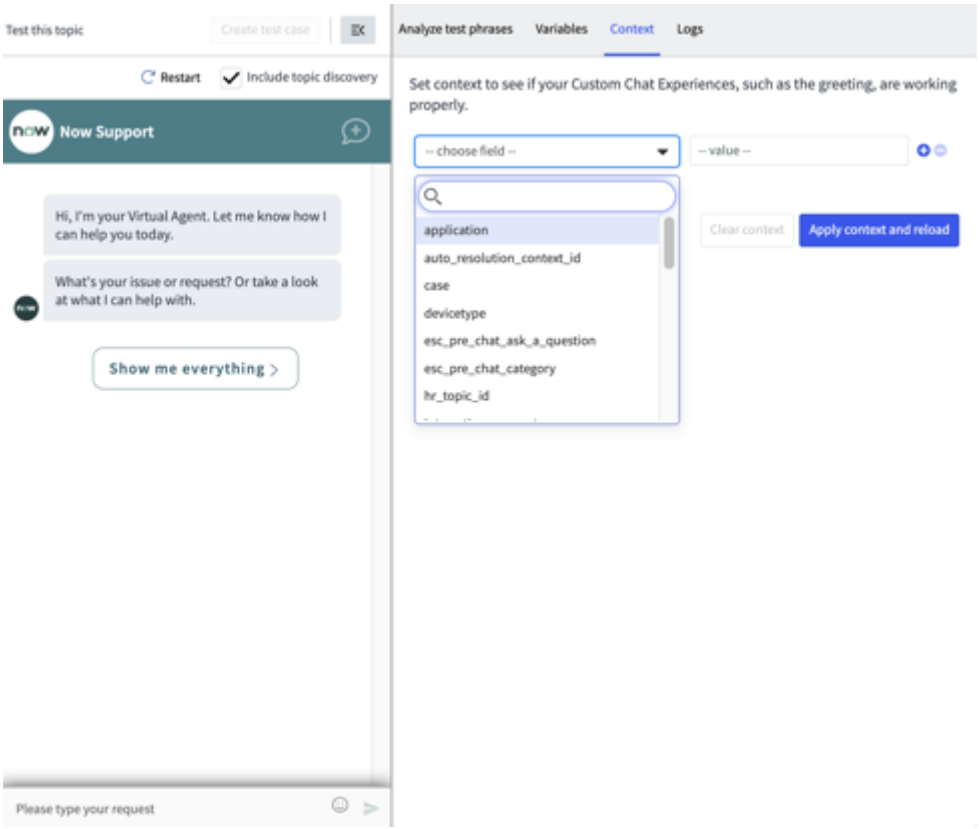

5. To specify a different context, do the following:

   a. In the **Test this topic** window, select **Include topic discovery**.
   The **Context** tab appears.

   b. In the **Context** tab, choose a context from the list of variables (these context variables are defined in Chat Settings).
   For example, you could select portal from the list of variables and enter the portal name, `IT Express`.

   c. Select **Apply context and reload**.

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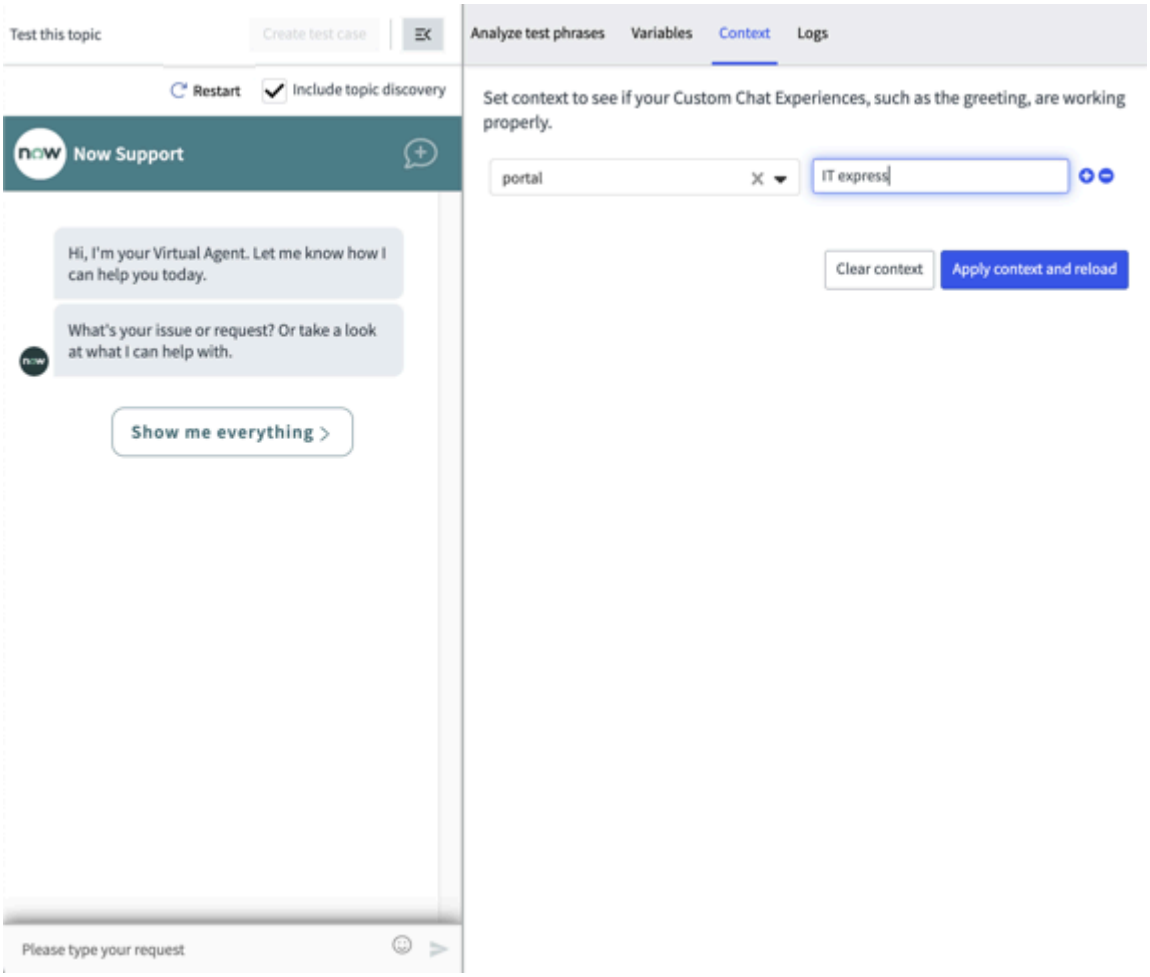
The items that you defined for the chat experience, such as custom setup topics or promoted topics, run in the test window.



Configuring the Portable Virtual Agent Web Client

The Portable Web Client is a chat widget that can run on third-party web pages, in the service portal, or in UI Builder portals.

The Portable Web Client is a new Seismic component that makes it easy to add Virtual Agent chat to your page. It simplifies configuration and provides the following features:

- Easily configurable
- Simpler single sign-on (SSO) authentication flow
- Connect to Service Portal Agent Chat
- System parameters and context variables work the same as before

Prerequisites for using the Portable Virtual Agent web client

The Portable Web Client uses an inline frame element (iframe). The third-party website must be under the same parent domain as your ServiceNow® instance. For example, `site1.company.com` and `site2.company.com` share the same parent domain. If you're embedding the web client on any subdomain that is not shared with your ServiceNow instance, the URL must be a custom instance URL. Due to increased browser security, the web client may fail to load if you don't use a custom URL.

Before you begin, do the following:

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1. Activate the custom URL plugin (com.snc.customurl) in your instance.
2. Add the custom URL (that you previously purchased and registered) to your instance.

Note:
To learn more about using custom URLs, see Associating custom URLs to your instance.

Using SSO authentication with the Portable Virtual Agent web client

After you embed the Virtual Agent client, you can optionally trigger SSO authentication from the web client, but only when your instance is set up to use an external SSO provider. Your hosting site must also use the same SSO provider as your instance. For details on setting SSO providers, see External single sign-on (SSO).

To trigger SSO authentication, create a JavaScript script that defines conditions for running authentication and redirects users to a web client page that you specify. You also specify the allowed URLs that can be passed in this script, by identifying them in the *com.glide.cs.web_client_login_redirect_urls* system property. Specify the full redirect URLs or the host part of the URL, such as `https://example.com`.

This procedure requires that you set values for the following two system properties:

- *com.glide.cs.embed.csp_frame_ancestors*
- *com.glide.cs.embed.xframe_options* (IE 11 only)

These properties determine the security policy for the embedded web client, namely how browsers render and secure HTML content for Virtual Agent and Live Agent chat, in an iframe, before you embed the web chat client. The HTTP header directives that you specify tell the browser whether a page can be embedded on certain domains to mitigate clickjacking attempts. Setting both properties ensures that there are security directives for major browsers and also older browsers, such as Internet Explorer.

Note:
If you're using the Content Management System (CMS) application to create custom interfaces for the ServiceNow AI Platform and ServiceNow® applications, be aware that it does not support Virtual Agent.

Related topics

Configure the Portable Virtual Agent web client

Add the Portable Virtual Agent web client to a third-party website

Configure the Portable Virtual Agent web client

Configure the Portable Web Client chat widget to run Virtual Agent on third-party web pages.

Before you begin

Note:
For new customers onboarding from Vancouver onward, the web client is only accessible to authenticated users by default. To allow unauthenticated users to access the web client, you must enable the sn_va_web_client_app_embed page for public access. For more information, see Make UI pages public or private.

Role required: admin

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About this task

ServiceNow only supports the Portable Virtual Agent when the top-level domain and domain name match the site that is loading the web client. SSO is only supported through the service-now.com URL. Anything beyond that will require custom solution and implementation.

Procedure

1. Navigate to **All**, and then enter `sys_properties.list` in the filter.
2. In the System Properties [sys_properties] table, search for the *`com.glide.cs.embed.csp_frame_ancestors`* property by name.
3. Click the property name to open the form and specify the directive values.

Field	Description
Type	**string** This is the default value.
Value	Source value of the HTTP header directive: `Content-Security-Policy: frame-ancestors<source>`This property applies to most major browsers, except for Internet Explorer. Specify one or more sources, including the following: ○ **'self'**: Indicates that the origin is the same as the page being served. For example, if the value is *`'self' http://mywebsite.com`*, then the iframe is embedded within the parent domain as well as mywebsite.com. This is the default value. ○ **host-source**: The domains in which the external web page can be embedded. Specify the Internet host site by name, IP address, or optional URL and/or port number. Site address can start with a wildcard (asterisk) character. Example value: **http://*.example.com** ○ **scheme-source**: A schema. For example: **http:** or **https:** ○ **none**: No matching URLs.

For more information about source values that you can specify, see CSP:frame-ancestors and Virtual agent embedded client content security policy (instance security hardening) in Instance Security Hardening Settings.

4. Return to the System Properties [sys_properties] table to search for the *`com.glide.cs.embed.xframe_options`* property by name.
5. Click the property name to open the form and specify the directive values.

Field	Description
Type	**string** This is the default value.
Value	Value of the of the X-Frame-Options header directive, to indicate whether the browser can render an external web page in a frame. Specify one of the following values:

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Field	Description
	○ **sameorigin**: Displays the page in a frame that has the same origin as the page itself. This is the default value. This property applies to older browsers, such as Internet Explorer 11. Example value: **allow from https://example.com** ○ **deny**: Does not display the page in a frame. ○ **allow-from uri**: Displays the page only in a frame on the specified origin. **Note:** This value no longer works in modern browsers.

For more information about source values that you can specify, see X-Frame-Options and Virtual agent embedded client X-Frame-Options (instance security hardening) in Instance Security Hardening Settings.

6. Configure CORS Rules for the REST API to give access across domains.
This rule gives the web domain you specify the rights to call the API that gives it access to the chat widget on the web page without a security restraint. All domains must share a common parent domain. Also, you must create a new CORS Rule for each subdomain that you want to support.

   a. Navigate to **All** > **System Web Services** > **REST** > **CORS Rules**.

   b. Click **New**.

   c. On the form, fill in the fields.

Field	Description
Name	Unique name for the rule.
Application	Scope of the application. **Global** is the default value.
REST API	Name of the REST API. Select **Conversation Consumer Account [now/cs]**.
Domain	The domain for your website. For example: **https://mycompany.com** If you have multiple subdomains for your website, you must create a CORS Rule for each. For example, **support.mycompany.com** and **products.mycompany.com** would require two separate CORS Rules. **Note:** Wildcards are not allowed.
Max age	The number of seconds to cache the client session. After an initial CORS request, further requests from the same client within the specified time do not require a preflight message. If you do not specify a value, the default value of **0** indicates that all requests require a preflight message.

   d. On the **HTTP Methods** tab, select **GET**.
The Portable Web Client will only receive requests.

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e. Click **Submit**.

f. **Optional:** Repeat these steps if you want to add the Portable Web Client to another subdomain on your website.

7. **Optional:** Create a JavaScript script that uses the *window.postMessage()* method (Web API) to define event conditions that trigger SSO authentication in a user interface page and returns users to a web client page that you specify.
To redirect users to a web client page, use the following string: `"https://<your-instance>.service-now.com/sn_va_web_client_login.do?sysparm_redirect_uri=' + encodeURIComponent(<your-page>)`

Note:
Before you run the script, use the *com.glide.cs.web_client_login_redirect_urls* system property to specify the URLs that can be passed in the script. The redirection works only when you specify one or more allowed URLs in the property value. Specify the full redirect URLs or the host part of the URL. For example: `https://example.com`.

Example script

```
<script>
    window.addEventListener("message", function(e) {
       // redirect to SSO login if the web client logs in but
 is logged in as a guest user(unauthenticated)
      if(e.data.type==="SESSION_CREATED" &&
 e.data.authenticated === false)
        window.location.href =
 "https://<your-instance>.service-now.com/sn_va_web_client_logi
n.do?sysparm_redirect_uri=<' + encodeURIComponent(<your-page>);

      // redirect to SSO login if the ServiceNow platform logs
 out from underneath the web client
      if(e.data.type==="SESSION_LOGGED_OUT")
        window.location.href =
 "https://<your-instance>service-now.com/"https://<your-instanc
e>service-now.com/sn_va_web_client_login.do?sysparm_redirect_ur
i=' + encodeURIComponent(<your-page>);
    });
  </script>
```

In this example, authentication is triggered in the specified instance when the SESSION_CREATED or SESSION_LOGGED_OUT events occur. After authentication (when the SSO credentials for users are accepted), users are redirected to the embedded web client page that you specified in `sn_va-web_client_login.do?sysparm_redirect_uri=' + encodeURIComponent(<your-page>)`, as long as you also specified the page URL in the *com.glide.cs.web_client_login_redirect_urls* property.

What to do next

Add the Portable Virtual Agent web client to a third-party website.

Add the Portable Virtual Agent web client to a third-party website

To use the Portable Web Client chat widget for Virtual Agent on third-party web pages, add the necessary code to your web page.

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Before you begin

Configure the Portable Virtual Agent web client prior to completing this topic's steps.

For additional information, review the How to embed Virtual Agent in an external site article on the ServiceNow Community site.

Role required: virtual_agent_admin or admin

Procedure

Import and instantiate this script reference to the page header to create a ServiceNow chat instance on your external page header:

Note:
In the script reference example, site1.example.com refers to the URL for your ServiceNow instance.

```
<script type="module" >
      import ServiceNowChat from
 "https://site1.example.com/uxasset/externals/now-requestor-chat
-popover-app/index.jsdbx?sysparm_substitute=false";
      var chat = new ServiceNowChat({ instance:
 "https://site1.example.com/", });
    </script>
```

Tip:
If your organization uses a custom domain name, input the custom domain name as the instance property, rather than the ServiceNow domain name, to ensure that browser results are consistent among multiple browsers.

Example with configuration

```
const chat = new ServiceNowChat({
 instance: 'https://site1.example.com',
 context: {
  skip_load_history: 1
 },
 branding: {
  bgColor: '#333',
  primaryColor: '#000',
  hoverColor: '#EFEFEF',
  activeColor: '#AAA',
  openIcon: 'custom-open.svg',
  closeIcon: 'custom-close.svg',
  sizeMultiplier: 1.6
 },
 offsetX: 50,
 offsetY: 50,
 position: 'left',
 translations: {
  'Open dialog': 'Open chat',
  'Open Chat. {0} unread message(s)': 'Click to open',
  'Close chat.': 'Click to close',
 },
});
```

JSON configuration schema

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```
{
    instance: <string> - url to your instance, must be
 of the same domain (sub-domain)
    context: <object> - sys_parm variables to pass into
 the iframe
    branding: <object> - branding settings
          bgColor: <rgb|hex> - can take an rgb tuple,
 ie: '56,56,56' or a 3 or 6 hex color code, ie: #333 or
 #efefef.  background color of button
    primaryColor: <rgb|hex> - font color
    hoverColor: <rgb|hex> - hover background color of
 button
    activeColor: <rgb|hex> - click / active background
 color of button
    openIcon: <string> - name of the uploaded custom
 icon in settings
    closeIcon: <string> - name of the uploaded custom
 icon in settings
   offsetX: <integer> - distance in pixels the button
 moves along the x-axis
   offsetY: <integer> - distance in pixels the button
 moves along the y-axis
   position: <enum: left|right> - position left or
 right side of screen
   translations: <object> - contains label mappings for
 translations or label changes
    'Open dialog': <string> - replacement text for
 accessibility
    'Open Chat. {0} unread messages(s)': <string> -
 replacement text for tooltip
    'Close chat.': <string> - replacement text for
 tooltip
}
```

Embed the Virtual Agent web client in an external web page (legacy method)

Load the Virtual Agent web client interface in an external web page by using an inline frame element (iframe). You can also optionally enable the single sign-on (SSO) authentication process to run automatically for guest users who are using the web client and are not logged in.

Before you begin

Important:
Consider adding the Portable Virtual Agent Web Client to your web page instead. It reduces code complexity and is easier to implement. It also includes standard chat features, such as click actions for launching or closing the chat. For details, see Add the Portable Virtual Agent web client to a third-party website.

- In the iframe, you specify the URL of the instance to be embedded. If you're embedding the web client on any page that is not on your ServiceNow instance, the URL must be a custom instance URL. Due to increased browser security, the web client may fail to load if you don't use a custom URL. To learn more about using custom URLs, see Associating custom URLs to your instance.

  To use a custom URL, do the following:

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- Activate the custom url plugin (com.snc.customurl) in your instance.
- Add the custom URL (that you previously purchased and registered) to your instance.

Note:
The Virtual Agent web client does not work from an iframe in Safari by default. Apple blocks cross-origin iframes (when the domain of the URL used in the iframe does not match the domain of the website itself).

- After you embed the Virtual Agent client, you can optionally trigger SSO authentication from the web client, but only when your instance is set up to use an external SSO provider. Your hosting site must also use the same SSO provider as your instance. For details on setting SSO providers, see External single sign-on (SSO).

  To trigger SSO authentication, you create a JavaScript script that defines conditions for running authentication and redirects users to a web client page that you specify (see Step 2 below). You also specify the allowed URLs that can be passed in this script, by identifying them in the *com.glide.cs.web_client_login_redirect_urls* system property. Specify the full redirect URLs or the host part of the URL, such as `https://example.com`.

Role required: admin

About this task

This procedure requires that you set values for the following two system properties:

- *com.glide.cs.embed.csp_frame_ancestors*
- *com.glide.cs.embed.xframe_options*

These properties determine the security policy for the embedded web client, namely how browsers render and secure HTML content for Virtual Agent and Live Agent chat, in an iframe, before you embed the web chat client.

To generate SSO authentication for your guest users, you can create a script that uses the `window.postMessage()` method (Web API) to trigger authentication and specify the URL where users are redirected after authentication. For more information on this method and Window objects, see Window.postMessage().

Note:
If you're using the Content Management System (CMS) application to create custom interfaces for the ServiceNow AI Platform and ServiceNow® applications, be aware that it does not support Virtual Agent.

Procedure

1. Set both the *com.glide.cs.embed.csp_frame_ancestors* and *com.glide.cs.embed.xframe_options* system properties to specify the HTTP header directives for securing the iframe contents.
   The HTTP header directives tell the browser whether a page can be embedded on certain domains to mitigate clickjacking attempts. Setting both properties ensures that there are security directives for major browsers and also older browsers, such as Internet Explorer.

   a. In the navigation filter, enter `sys_properties.list`.

   b. In the System Property [sys_properties] table, search for the *com.glide.cs.embed.csp_frame_ancestors* property by name.

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Note:
This property sets the source value of the HTTP header directive: `Content-Security-Policy:frame-ancestors<source>`. Use the `host-source` value to specify the domains in which the external web page can be embedded. This property applies to most major browsers, except for Internet Explorer.

c. Click the property name to open the form and specify the directive values.

System Property: com.glide.cs.embed.csp_frame_ancestors

Field	Description
Type	**string** This is the default value.
Value	Specify one or more sources, including: ▪ **'self'**: Indicates that the origin is the same as the page being served. For example, if the value is *'self' http://mywebsite.com*, then the iframe is embedded within the parent domain as well as mywebsite.com. This is the default value. ▪ **host-source**: The domains in which the external web page can be embedded. Specify the Internet host site by name, IP address, or optional URL and/or port number. Site address can start with a wildcard (asterisk) character. Example value: **http://*.example.com** ▪ **scheme-source**: A schema. For example: **http:** or **https:** ▪ **none**: No matching URLs.

For more information about source values that you can specify, see CSP:frame-ancestors and Virtual agent embedded client content security policy (instance security hardening) in Instance Security Hardening Settings.

d. Return to the System Property [sys_properties] table to search for the *com.glide.cs.embed.xframe_options* property by name.

Note:
This property sets the value of the of the X-Frame-Options header directive, to indicate whether the browser can render an external web page in a frame. Use the default `sameorigin` value to specify the domains in which the external web page can be embedded. This property applies to older browsers, such as Internet Explorer 11.

e. Click the property name to open the form and specify the directive values.

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System Property: com.glide.cs.embed.xframe_options

Field	Description
Type	string. Default value.
Value	Specify a value, including: ▪ `sameorigin`. Default value. Displays the page in a frame that has the same origin as the page itself. Example value: allow from https://example.com. ▪ `deny`. Does not display the page in a frame. ▪ `allow-from uri`. Displays the page only in a frame on the specified origin. **Note:** This value no longer works in modern browsers.

For more information about source values that you can specify, see X-Frame-Options and Virtual agent embedded client X-Frame-Options (instance security hardening) in Instance Security Hardening Settings.

2. After associating your ServiceNow instance to a custom URL, create the iframe element and specify the custom URL in the inline element (iframe) used to embed the Virtual Agent client in an external web page: `"https://<your-domain>.com/sn_va_web_client_app_embed.do"`

   Note: Your instance may have multiple custom URLs, but only one instance URL. You must use your custom instance URL only.

   For example:

```
<iframe id="sn_va_web_client"
    title="ServiceNow Virtual Agent Client"
    width="600"
    height="900"

 src="https://<your-domain>.com/sn_va_web_client_app_embed.do">
"https://<your-domain>.com/"https://<your-domain>.com/</iframe>
```

   Note: Use the `?sysparm_skip_load_history=true` parameter at the end of the URL to load the interface without the conversation history.

3. **Optional:** Create a JavaScript script that uses the `window.postMessage()` method (Web API) to define event conditions that trigger SSO authentication in a user interface page and returns users to a web client page that you specify.
   To redirect users to a web client page, use this string: `"https://<your-instance>.service-now.com/sn_va_web_client_login.do?sysparm_redirect_uri=' + encodeURIComponent(<your-page>)`

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Note:
Before you run the script, use the *com.glide.cs.web_client_login_redirect_urls* system property to specify the URLs that can be passed in the script. The redirection works only when you specify one or more allowed URLs in the property value. Specify the full redirect URLs or the host part of the URL, such as `https://example.com`.

Example script:

```
<script>
    window.addEventListener("message", function(e) {
       // redirect to SSO login if the web client logs in but
 is logged in as a guest user(unauthenticated)
      if(e.data.type==="SESSION_CREATED" &&
 e.data.authenticated === false)
        window.location.href =
 "https://<your-instance>.service-now.com/sn_va_web_client_logi
n.do?sysparm_redirect_uri="+ encodeURIComponent(location.href);

      // redirect to SSO login if the ServiceNow platform logs
 out from underneath the web client
      if(e.data.type==="SESSION_LOGGED_OUT")
        window.location.href =
 "https://<your-instance>service-now.com/sn_va_web_client_login
.do?sysparm_redirect_uri=" + encodeURIComponent(location.href);
    });
  </script>
```

In this example, authentication is triggered in the specified instance when the SESSION_CREATED or SESSION_LOGGED_OUT events occur. After authentication (when the SSO credentials for users are accepted), users are redirected to the embedded web client page that you specified in `sn_va-web_client_login.do?sysparm_redirect_uri=' + encodeURIComponent(<your-page>)`, as long as you also specified the page URL in the *com.glide.cs.web_client_login_redirect_urls* property.

Configure Virtual Agent for a ServiceNow mobile application

Virtual Agent provides optimized templates for the mobile experience. Configure a service portal to run Virtual Agent on a ServiceNow mobile application.

Before you begin

Install the required plugins:

- Virtual Agent (com.glide.cs.chatbot)
- Conversational Messaging (com.glide.messaging.awa)
- Core ServiceNow® mobile plugins

For more information, see Mobile plugins.

Role required: admin

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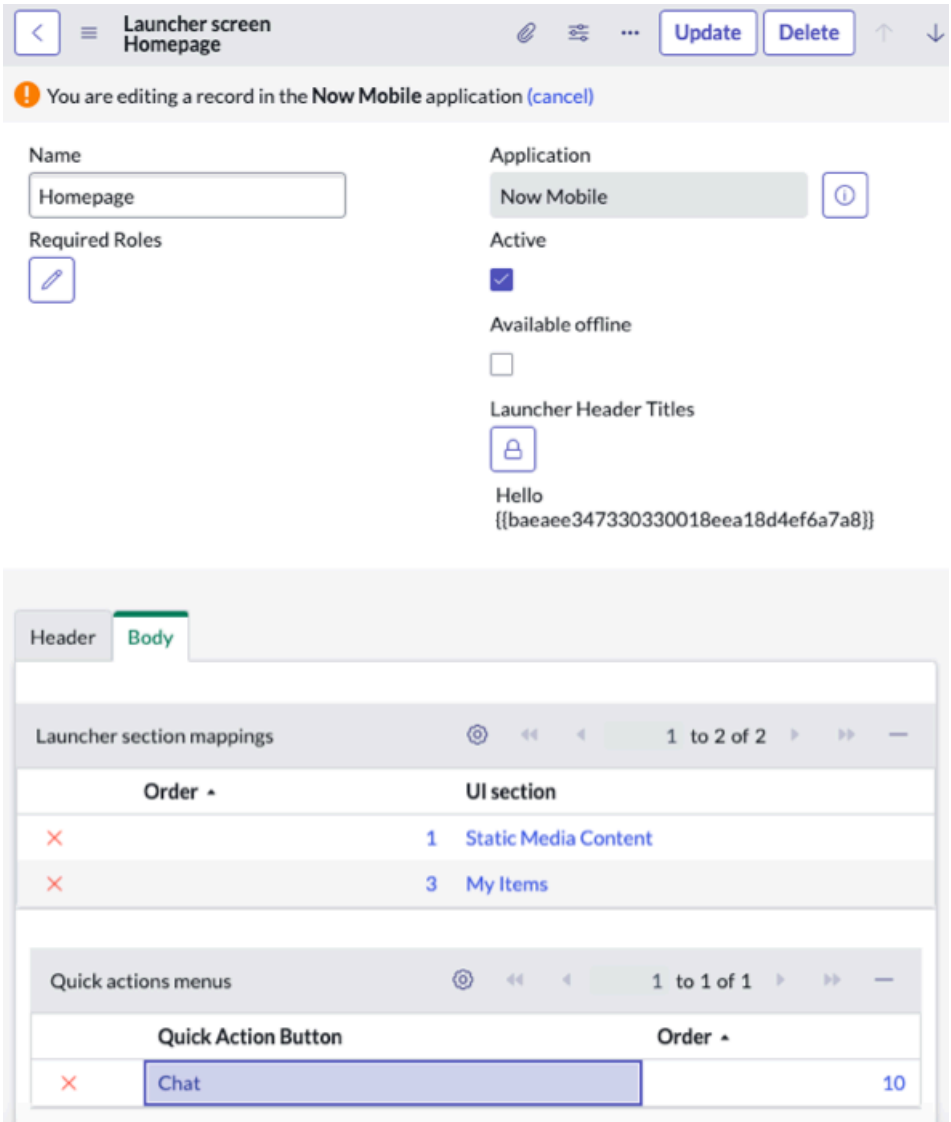
Procedure

1. Install the corresponding mobile plugins for each application that you want to use in Virtual Agent.
   For example, if you're using Virtual Agent ITSM conversations, install the ITSM Mobile Agent (sn_itsm_mobile_agt) plugin as well. For more information, see Mobile plugins for ServiceNow Agent.
2. Navigate to **All** > **Now Mobile App** > **Applet Launchers**.
3. Click the **Homepage** record.

   If prompted, click the link at the top of the page to edit the record.
4. Click the **Body** tab.

   Launcher screen Homepage record



5. Click **Chat** under **Quick Action Button** to open the record.
   If you don't see a Chat entry, add it as follows:

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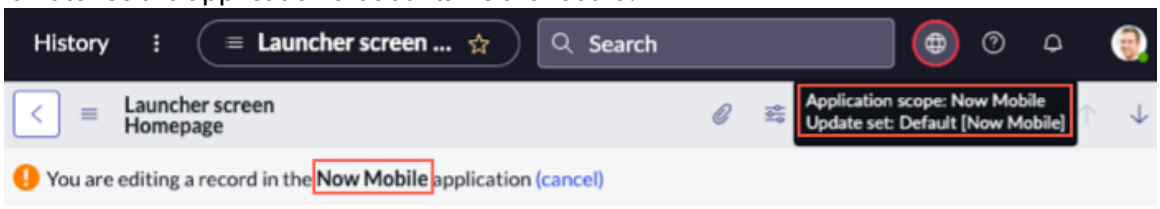
a. In the Unified Navigation bar, click the scope icon and change the application scope so that it matches the application that contains the record.



b. Click the back button to return to the previous page.

c. Click the **Homepage** record.

d. Click the **Body** tab.

e. Under **Quick Action Button**, double-click **Insert a new row**.

f. Type `Chat`, and then press Enter or click the save icon.

g. Click **Update**.

6. Fill in the Chat form as follows.

Note:
If prompted, click the link at the top of the page to edit the record.

a. In the **Function** field, select **Agent Chat**.

b. Click the info icon ⓘ on the **Function** field and verify that **Chat Launcher** is set in the **Type** field (this is the default setting).

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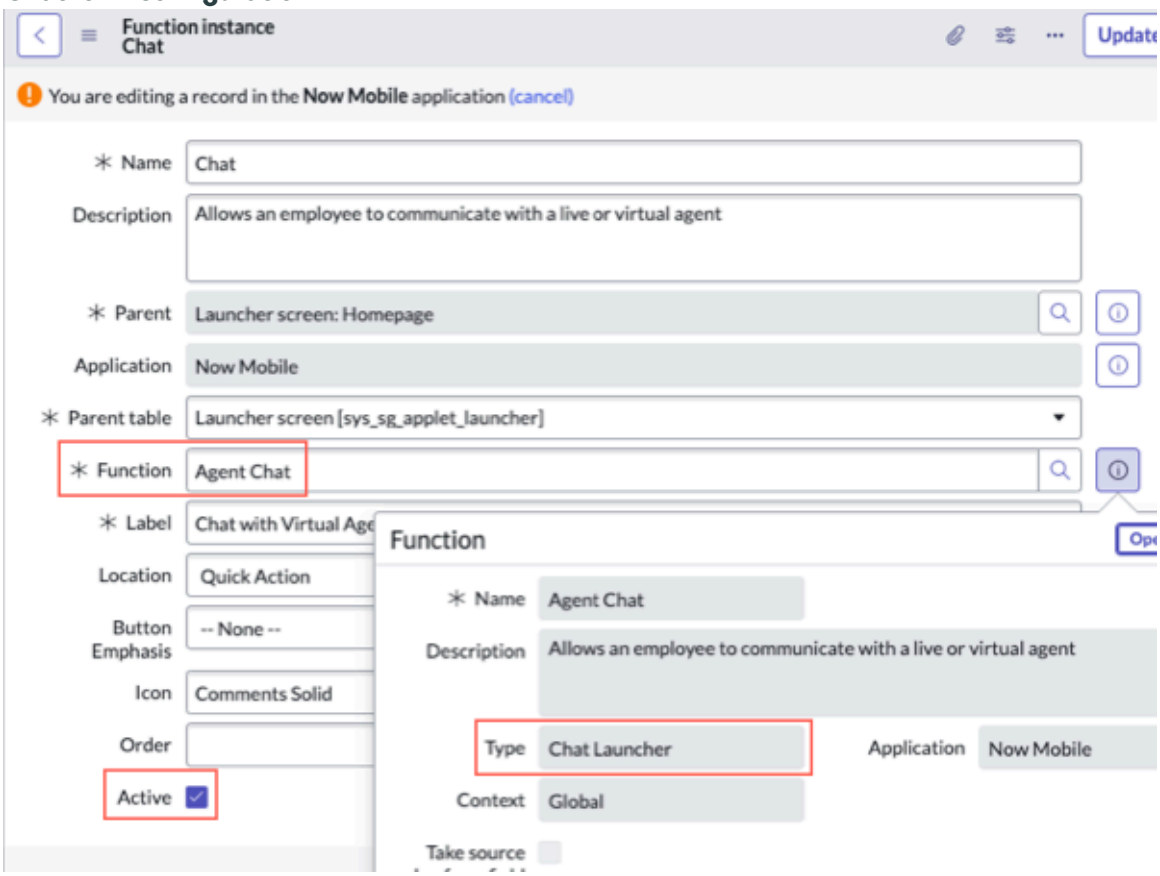
c. Select the **Active** check box.

d. Click **Update**.

Chat form configuration



Result

Depending on the device and the patch version of the server instance, end users can access the Virtual Agent chat icon in the bottom-right or top-right corner of the app. Tap the plus icon or the chat icon to start a conversation.

The topics you create in Virtual Agent Designer can be used in both the web and mobile clients, as well as any other channels you may configure. Virtual Agent output components are already optimized for Android and iOS, including image and video cards, link unfurling, AI Search results, and Virtual Agent notifications.

What to do next

To enable Now Assist in native Virtual Agent, see Configuring Now Assist in Virtual Agent.

Now Mobile notification of unread chat and Virtual Agent messages

When Now® Mobile app users navigate away from the app after starting an active conversation, they can automatically receive Virtual Agent mobile push notifications informing them of new, unread chat messages and#Virtual Agent notifications that have arrived.

Now Mobile users might need to leave an active conversation for various reasons. They could be waiting for an available agent and decide to handle other tasks instead. Or, they could be engaged in a long-running (asynchronous) conversation and do not need to be online concurrently with an agent. Now Mobile users can check Virtual Agent push notifications to get timely information about their current conversations when they're away from the app. These push notifications enable them to stay engaged with live and virtual agents and avoid unnecessary conversation closures (timeouts).

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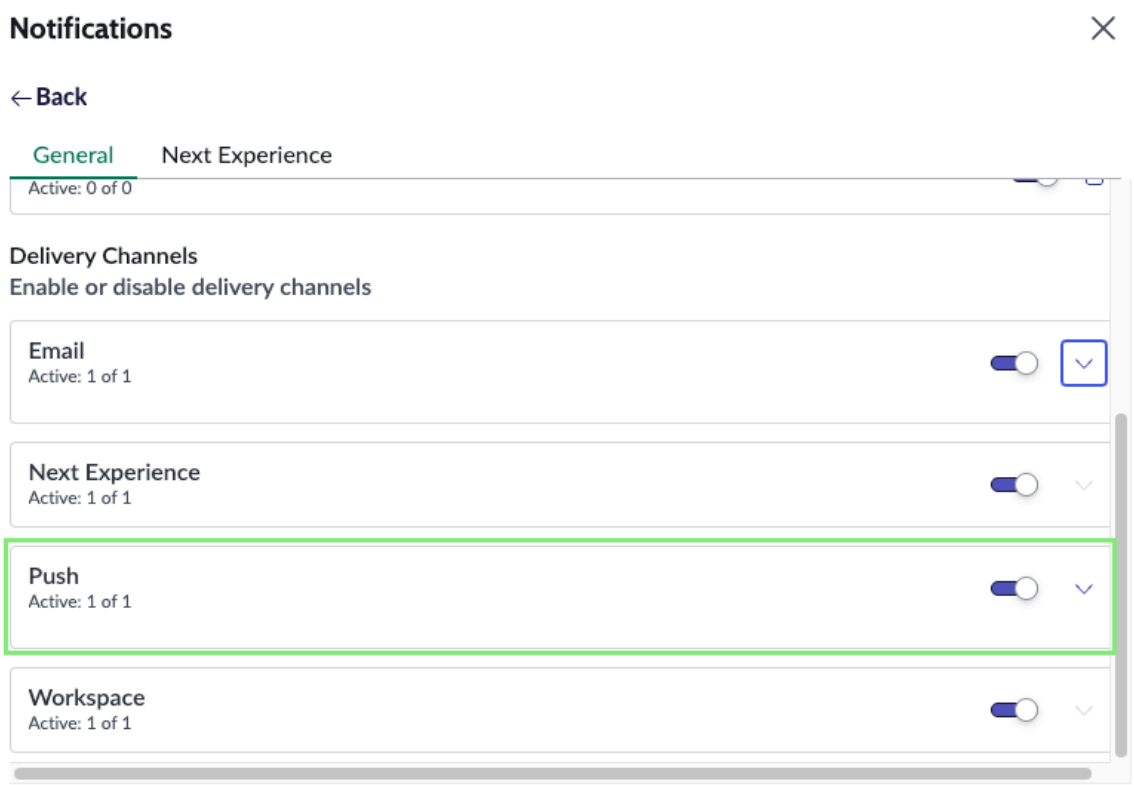
Enabling Virtual Agent message push notifications

To receive Virtual Agent mobile push notifications, your users must enable push notifications for the Now Mobile app on their iOS or Android devices.

In base system instances, the Virtual Agent Message Push notification is automatically enabled for all Now Mobile users. Users can modify their notification preferences by navigating to **All** > **Self-Service** > **My Notification Preferences**.



How Virtual Agent mobile push notifications work

Virtual Agent push notifications display information about incoming, unread chat messages from agents and any Virtual Agent messages. The push notifications are listed in the notification center (lock screen) of mobile devices. Users tap a push notification in the list to open the Now Mobile app and continue the corresponding conversation.

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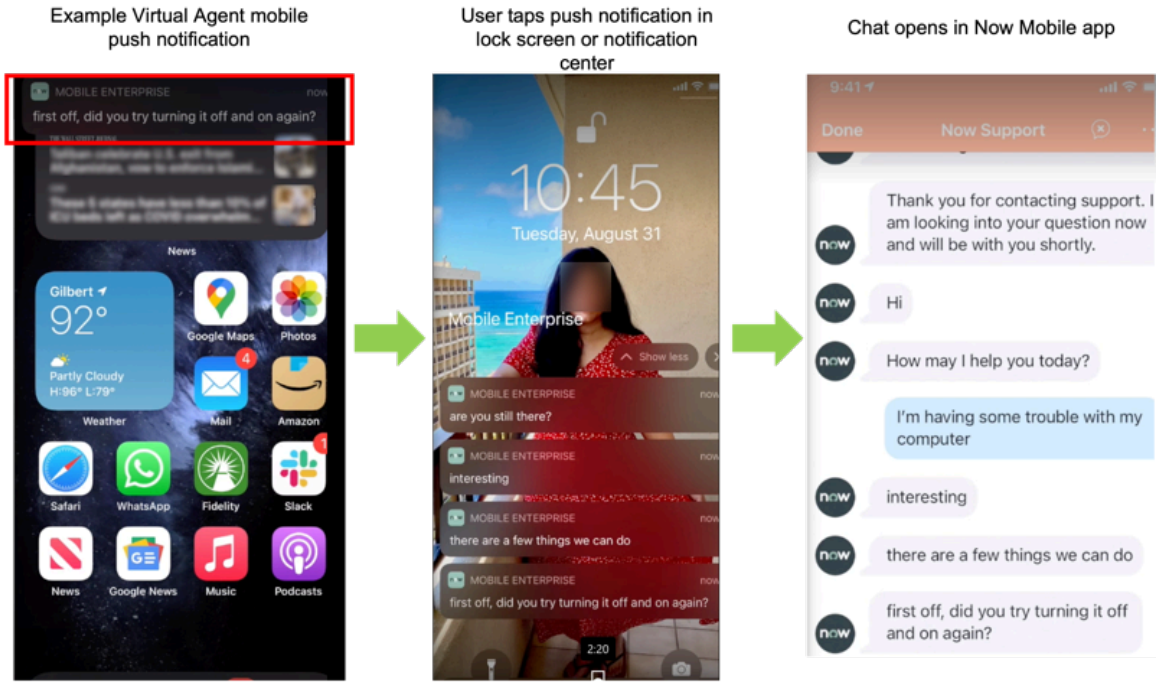
Example Virtual Agent push notifications in the Now Mobile app



Note:
Virtual Agent push notifications are not displayed under the **notifications** tab in the Now Mobile app. These push notifications also do not generate associated badge numbers on the Now Mobile app icon. However, badge numbers are displayed on the Virtual Agent quick launch icon within the app.

To process unread chat or Virtual Agent messages and deliver them to Now Mobile users, the system does the following:

- Checks which user accounts are registered to receive push notifications.
- Determines the mobile clients (devices) that are not in use.
- Runs the *`Generate Virtual Agent Push Notification`* scheduled job every 60 seconds to:
  - Identify and batch new unread messages.
  - Add unread messages records to the Push Notifications [sys_cs_message_notification] table, which generates the Virtual Agent push notifications.
  - Delivers Virtual Agent push notifications to Now Mobile users away from the app.

    Depending on when the *`Generate Virtual Agent Push Notification`* scheduled job processes new unread messages, push notifications might not arrive in the order that they were generated, and it might take slightly longer than one minute for push notifications to arrive.

Virtual Agent push notification message content

The content of Virtual Agent push notification messages sent to Now Mobile users reflects the actual text from the live or virtual agent. If a text representation of the message, such as a rich control, cannot be generated, the text `New Message` is displayed instead.

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Note:
System action messages that are displayed to users during live chat or virtual agent conversations are not included in Virtual Agent push notifications or in the count of unread messages. The exception is the system message for the live agent timeout: `The conversation is timing out, are you still there?` This message is sent as a push notification since it is time-sensitive and informs users that the conversation might be closed if they do not respond.

View and modify Virtual Agent style templates

Virtual Agent provides optimized templates for the mobile experience. You can view and modify the style sheets in the Adapter Cards [sys_cs_adapter_card] table.

Before you begin
Role required: virtual_agent_admin or admin

Procedure

1. Click **All**, and then enter `sys_cs_adapter_card.list` in the navigation filter. The Adapter Cards page opens.
2. Click an entry in the **Card Name** column.
3. Click the name of the channel you want to view in the embedded list. For example, click **iOS** or **Android Device** to view the corresponding style sheet.
4. Make any changes in the **Template Definition** field.
5. Click **Update**.

Multiple active conversations for Virtual Agent

As of the Washington DC release, Virtual Agent (VA) features the ability to have multiple conversations at the same time, separated and directed by chosen context.

Overview

Virtual Agent messages commonly follow one conversation with a shared history that persists on all VA clients, and thus all portals. For example, if you're conversing with Virtual Agent in a Service Portal (SP) portal context, the same conversation is shown in an Employee Service Center (ESC) portal. The multiple active conversations feature expands the reach of Virtual Agent by eliminating the one-conversation limit. By configuring their Virtual Agent conversations based on context, customers can choose to share or restrict any or all content between concurrent conversations on differing portals.

Each Virtual Agent conversation is fully independent, with no overlap between chats. For example, a conversation in SP will be entirely different from ESC. Each conversation also has its own transcript. You must set up context values for Natural Language Understanding (NLU) chats, while Large Language Model (LLM) chats are automatically configured for multiple active conversations based on each portal. An administrator can activate an LLM assistant for each portal by using guided setup configurations. (For more information on configuring Virtual Agent conversations, see Conversational Interfaces Guided Setup.)

Benefits of multiple active conversations

Previously, if a user was engaged in a conversation with a virtual agent, the chat would take place in a single context. Switching contexts involved a risk of exposing sensitive information by carrying over the entire chat history to the other portal. For example, if you have an HR conversation in the HR portal, then brought up an IT request, the chat continues in the IT portal. However, this request also brings the HR conversation history into the IT portal with it.

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Alternatively, admins can activate the *skip_load_history* system parameter to avoid exposure risk, but the initial conversation closes when the chat continues on the IT portal.

To exclude conversation history between portals, use the following procedure:

1. Navigate to **All** > **Service Portal** > **Agent Chat**.
2. Select the Agent Chat Configuration for which you want to set the context value.
3. In the Server Script window, add the line `skip_load_history: true` to load conversations without the conversation history.

Note:
The script syntax may differ depending on the configuration.

The multiple active conversations feature bypasses the skip_load_history method, and enables continuous engagement with Virtual Agent chat, by routing selected notifications and topics to their configured contexts only. Users don't need scripting or extensive customization, and they can conduct conversations without interruption or information exposure in the wrong context. With portals and notification contexts aligned, users receive information appropriate to their context, including incident updates and other relevant data.

Considerations for using multiple active conversations

Implementing multiple active conversations should happen in the following order: Admins should define portal consumer context values, set or update a default context, activate the multiple active conversations system, and finally, configure notifications sent to portals. However, if the delivered Service Portal context is sufficient, admins can skip configuring and setting values.

Topics can be created within a portal context. If the portal context maps to consumer account context, then topics map to consumer account contexts.

Set NLU portal consumer context values for multiple active conversations

Use context values to determine which portals receive certain messages and notifications for users in that portal.

Before you begin

Activate Virtual Agent. For more information, see Activate Virtual Agent.

Configure your Agent Chat system for your portal or portals. See Configure Agent Chat in a portal for more information.

Role required: virtual_agent_admin or admin

About this task

With consumer context added to a portal configuration, that portal acts as context for multiple active conversations with Virtual Agent.

Note:
These instructions are for configuring Natural Language Understanding (NLU) conversations. Large Language Model (LLM) conversations are configured for multiple active conversations based on portals, with no configuration necessary.

Procedure

1. Navigate to **All** > **Service Portal** > **Agent Chat**.
2. Select the Agent Chat Configuration for which you want to set the context value.

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3. In the Server Script window, add the line `consumer_account_context: 'VALUE',` replacing `VALUE` with your desired consumer account context.

Server script example



Note:

The syntax of the account context line depends on how the configuration is set up. For example, some configurations use an equal sign versus a colon. In the case of the *esc* context, there are also two relevant chat configurations.

Values that are defined or created in a script aren't displayed to an admin as a selection for use elsewhere in the system.

4. Select **Update**.

What to do next

Set a default context for your conversations. See Set a default NLU context value for multiple active conversations for more information.

Set a default NLU context value for multiple active conversations

Use consumer account context values to define where Virtual Agent messages are directed by default when using the multiple active conversations feature.

Before you begin

Define values for portal consumer contexts. For more information, see Set NLU portal consumer context values for multiple active conversations.

Configure context values that align Virtual Agent and your portals. See Configure Agent Chat in a portal for more information.

Role required: virtual_agent_admin or admin.

About this task

You can create as many context values as you need. One consumer account context must always be set to `Yes` to provide a default content area. The default acts as a fallback for the web client when the portal setup doesn't include context. The default is also used as the context for mobile conversations, which only support one conversation at a time. Context values are stored in the Conversation Consumer Account Context [sys_cs_consumer_account_context] table. (The CS Consumer Account [sys_cs_consumer_account] table Installed with Virtual Agent shows whether third-party users in your instance have a context assigned to them.)

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Note:
These instructions are for configuring Natural Language Understanding (NLU) conversations. Large Language Model (LLM) conversations are configured for multiple active conversations based on portals, with no configuration necessary.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **Virtual Agent**.
2. Under **multiple active conversations**, select **View settings**.

   Note:
   The delivered default value for consumer account contexts is `sp`.

3. Select **New**.
4. On the form, fill in the fields.

Consumer Account Contexts form

Field	Description
Name	Name of the context value (also used as reference in the backend).
Short Description	Description for the context (displayed on the Conversational Interfaces card when the default value is shown).
Is Default Consumer Account Context	Option to make this context value the default for your Virtual Agent conversations. **Note:** Only one consumer account context can be set as the default. Setting a new one as a default automatically resets the last context to `False`.

5. Select **Save**.

What to do next
Activate the multiple active conversations system. For more information, see Activate multiple active conversations in Virtual Agent.

Activate multiple active conversations in Virtual Agent

Use the multiple active conversations system, in combination with defined context values and a default portal, to handle concurrent conversations with Virtual Agent.

Before you begin
A default context is necessary to start out with the multiple active conversations system. See Set a default NLU context value for multiple active conversations for more information.

Role required: virtual_agent_admin or admin

About this task
Virtual Agent includes settings that let multiple conversations be carried out with the same user across multiple portals. Users can also receive updates and notifications sent to any number of portals (determined by an administrator) anywhere in their instance on ServiceNow AI Platform.

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The multiple active conversations feature is inactive by default in Virtual Agent until toggled on. As of the Vancouver release, multiple active conversations are available through the web client; other channels may be incorporated in future.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **Virtual Agent**.
2. Under **multiple active conversations**, select **Manage settings**.
3. Select **Activate**.
4. Select **Save**.

What to do next

With multiple active conversations activated, you can also send notifications from Virtual Agent to portals using the feature. See Route Virtual Agent NLU notifications through multiple portals for more information.

Route Virtual Agent NLU notifications through multiple portals

Send notifications and other Virtual Agent messages through as many portals as desired.

Before you begin

The multiple active conversations feature includes the ability to send notifications on incidents. You can configure your notifications to go to only one conversation on a specific portal, or to any number of concurrent conversations.

Activate multiple active conversations in Virtual Agent

Configure a delivery channel for Virtual Agent notification

Role required: virtual_agent_admin or admin

Note:
These instructions are for configuring Natural Language Understanding (NLU) conversations. Large Language Model (LLM) conversations are configured for multiple active conversations based on portals, with no configuration necessary.

Procedure

1. Navigate to **All** > **sys_notification_va_content.list**.
   A list of Virtual Agent Notification Contents appears.
2. Select the Notification Content that you want to send through multiple portals.
   For example, to receive comments on Incidents, select the Incident commented Notification Content.
3. Under the **Channels** tab, confirm that the Consumer account contexts pane is available after activating multiple active conversations for the web client.
   The Default Consumer Account Context will be visible in the pane.

   Note:
   This string should also match the portal where the conversation will be directed. For example, the SP portal will also be the name of the Consumer account context.

4. To add a context, on the **Select target record** line, input the string matching the desired Consumer account context.

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Note:
This string should also match the portal where the conversation will be directed. For example, the SP portal will also be the name of the Consumer account context.

5. To remove a context, select it in the Consumer account contexts pane, then select the **X**.
6. Select **Update**.

Result
Messages with multiple contexts will now be sent through Virtual Agent to users at their matching portals.

Configuring Virtual Agent notifications

Send ServiceNow notifications directly to users via the Virtual Agent chatbot on supported messaging channels. Notifications can be simple informational messages for review, or actionable messages with buttons that users can select to perform certain actions.

Notifications are sent to recipients via the Virtual Agent bot in the web client, pre-built messaging integrations (for example, SMS Twilio, Slack, Microsoft Teams, Workplace from Facebook services, and Facebook Messenger messaging platform), and custom chat integrations.

Notification functionality is included with the Glide Virtual Agent (com.glide.cs.chatbot) plugin and also with Virtual Agent Lite, which is included with the ServiceNow AI Platform. However, Virtual Agent Lite users can receive only simple notifications, while Virtual Agent users can receive both actionable notifications and simple notifications. Users with no associated ServiceNow profiles in the [sys_user] table can receive non-actionable Virtual Agent notifications.

How Virtual Agent notifications work

As an admin, you can define different types of notifications that have specific layouts and content. You can also customize certain aspects of notification content, such as the message heading and message content.

Simple notifications

The content can be a standard informational message, record card, or an image card. Simple notifications are delivered to users immediately, even when they're engaged in a conversation with a virtual or live agent.

Actionable notifications

These notifications have buttons that enable the recipient to perform certain actions, such as adding a comment or requesting a live agent. When you create an actionable notification, you associate an action with a published Virtual Agent topic, a scriptable action, or a flow action that handles the action to be performed. To encourage users to act on a notification, admin users can choose to remove the **Skip** option. If the user still doesn't act, the conversation will be completed as inactive.

Note:
The notifications are actionable only when there is an associated link action to its content.

Actionable notifications are delivered to users when they're not in an active conversation with a virtual or live agent. A queue stores actionable notifications that are waiting to be delivered, for up to eight hours by default.

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Actionable notifications are best suited for conversational purposes, for use cases such as:

- Password reset
- Incident update
- Approval request
- Course survey
- Service follow-ups and surveys
- Employee onboarding follow-ups

When a topic conversation completes, Virtual Agent automatically prompts the user to view pending notifications (if any). Admins can suppress this prompt by setting the *com.glide.cs.show_pending_notifications_prompt* property on the System Properties table to false.

Notifications with dynamic content

You can personalize Virtual Agent notifications by adding dynamic content to message headers and messages. For record- and event-based notifications, you use parameter substitution to specify the variables that identify the record values (from the notification table) to be included in the content.

Advanced notifications with dynamic content

You can create Virtual Agent notifications that use a script to add dynamic content in message headers and messages. The content can come from multiple data sources and include third-party services, such as URL shortening.

Variables in notifications

You can pass information to a completed survey when the notification is triggered. Context is defined by the script found in the notification topic. This script cannot be modified.

```
vaVars.global_notification_context =
  JSON.stringify({
    'tableName': table_name,
        'tableSysId': sys_id,
        'actionId': actionId,
        'eventParm1': eventParm1,
        'eventParm2': eventParm2});
```

Notifications are triggered by records updates or by creating a platform event in the event queue. `actionId` is the ID number for the action. The platform event takes in the `eventParm1` and `eventParm2` parameters. If a notification is triggered, the parameters are passed to the topic. To capture the notification incident number in your topic, use the following script.

```
var notificationContext =
 JSON.parse(vaVars.global_notification_context);
vaVars.sysId = notificationContext.tableSysId;
varVars.tableName = notificationContext.tableName;
```

Notification processing

Virtual Agent notifications have certain processing controls and limitations, such as the maximum number of recipients allowed per notification and the number of notifications that can be sent per day. The following table identifies these processing controls and the system properties that can be used to change their default values.

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Virtual Agent notification processing controls and limitations

Notification processing control or limitation	Default value	Associated system property
Maximum number of recipients per notification per channel	100,000 recipients	*com.glide.cs.per_notification_us* Max limit: None **Note:** • If there are more recipients than the configured number, warning messages are displayed to reduce the recipient list while you're configuring the notification and when the notification is delivered. The warnings are displayed only when there is Virtual Agent content associated with the notification. • Recipient limits may apply to third-party delivery channels based on the level of service or subscription.
Maximum number of notifications per day, per channel	100,000 notifications	*com.glide.cs.daily_notification_* Max limit: None **Note:** Rate limits may apply to third-party delivery channels based on the level of service or subscription.
Lifespan of actionable notifications (a queue stores actionable notifications that are waiting to be delivered)	8 hours	*com.glide.cs.idle_actionable_not* **Note:** You can specify a maximum value of 72 hours.
Allow access to notification card content and parameter	False (not enabled)	*com.glide.cs.notification_record*

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Virtual Agent notification processing controls and limitations (continued)

Notification processing control or limitation	Default value	Associated system property
substitutions in notification headings and messages		**Note:** This property does not apply to advanced notifications.

Notification experience for end users

The notification experience for end users depends on the type of notification that they're receiving. End users can also manage how their notifications are delivered by subscribing to or unsubscribing from notifications.

- Simple message notifications - These notifications are delivered immediately to the end user, even when the user is chatting with a bot or live agent. The user sees the incoming message but can continue with the current conversation.
- Actionable notifications - These notifications are delivered only when the user is not in an active conversation with a virtual or live agent. When users complete their conversation with a bot or live agent, they can use the **Show notification** command to view a list of pending notifications, which displays the heading of each notification. Users can select a pending notification to review, then perform the appropriate action for the notification, or skip the action.

User subscriptions for notifications

End users can subscribe or unsubscribe to notifications on the channel that they're using. For example, the chat menu provides a toggle switch that users can use to subscribe or unsubscribe to notifications on the web channel.

In the conversational integrations for Slack, Microsoft Teams, Workplace from Facebook services, end users manage their notification subscriptions by using the **Subscribe** and **Unsubscribe** commands.

What to do next

Create Virtual Agent notifications

Create a notification that is sent directly to users via the Virtual Agent chatbot. The notification specifies when users receive the notification (triggers for the notification) and who receives it (recipients with and without accounts in the User [sys_user] table).

Before you begin

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **System Notification** > **Provider** > **Notifications** and select **New**.
2. On the form, fill in the fields.

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Notifications form

Field	Description
Name	Name of the notification.
Table	Table to receive notifications about.
Application	Application scope of the notification.
Type	Type of the notification.
Category	Category of the notification. For Virtual Agent, it's chat.
Active	Option to activate the notification. The notification is active by default.
Trigger	
Triggered By	System action that triggers the notification. You can choose to send the notification after a record is changed or after an event is triggered.
Inserted	Option to send the notification after a record is inserted. This field appears when you select **Record Change** in the **Triggered By** field.
Updated	Option to send the notification after a record is updated. This field appears when you select **Record Change** in the **Triggered By** field.
Event	Event that triggers the notification. For example, to send a notification after an incident is closed or resolved, you would select the *`incident.inactive`* event. By default, this event is logged in the system each time a user resolves or closes an incident. This field appears when you select **Event** in the **Triggered By** field.
Conditions	Filter to specify the table records that users receive notifications about. For example, to send notifications about top-priority incidents, you would select **Incident [incident]** in the **Table** field and set the conditions to **[Priority] [is] [1 - Critical]**.
Recipients	
Users	Users who receive the notification. Add users from the static User ([sys_user] table or its extension tables) to define recipients for the notification. **Note:** You can define the recipients for notifications only for chat channels using this field.
Recipients in fields	Record fields that include recipients who receive the notification. For example, to send the notification to the record assignee, select **Assigned to**.

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Field	Description
	Add recipients from the User [sys_user] table or its extension tables to trigger the notification. **Note:** You can define the recipients for notifications for both chat channels and messaging channels using this field.
Is originating user included?	Option to include the user who changed the record or triggered the event.

3. Select **Submit**.

Note: Use the **Submit** button for Virtual Agent notifications. The **Submit and Add Common Content** button is for other use cases.

What to do next

- Create additional recipients for Virtual Agent notifications.
- Define the notification contents.

Create additional recipients for Virtual Agent notifications

Create and define additional recipients for a Virtual Agent notification to be delivered on chat channels or messaging channels.

Before you begin

Role required: admin

About this task

- The admin can define recipients under the Additional Recipients related list for messaging channels.

Note: Selecting the channel (chat channel or messaging channel) is a prerequisite to defining the content for the notification.

- The admin can define recipients under the Additional Recipients related list for chat and messaging channels using a dynamic condition.

Procedure

1. Navigate to **All** > **System Notification** > **Provider** > **Notifications** and select the notification that you want to create additional recipients for.
2. In the Additional Recipients related list, click **New**.
3. On the form, fill in the fields.

Additional Notification Recipients form

Field	Description
Notification	Identifier of the notification.

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Field	Description
	The notification name is auto-populated.
Recipient Table	The scope of the recipient record for the notification. The **Recipient Table** field is auto-populated with the user [sys_user] as the default value.
Application	The scope of the recipient record.
Active	Option to activate the notification for the defined additional recipients.
Static Recipients	Names of the recipients from the scope of the selected recipient table.
Dynamic Recipients	
Dynamic Conditions	Dynamic filter conditions for the defined recipients. The dynamic condition is applicable for both messaging and chat channels. This dynamic condition enables you to define the recipients list for a group of users to send a notification. Click the refresh icon ( ) next to the **records match condition** link to update the exact number of records matching the latest filter condition. By default, it shows the total number of records in the current table. **Note:** Only one active record can be added for a particular recipient table. If you want to add another record for the recipient table, you must deactivate the current record.

4. Click **Submit**.

Define Virtual Agent notification contents

Create the content for a Virtual Agent notification delivered in a chat or messaging channel.

Before you begin

- Images for image cards must be 400 pixels wide or larger and must be in .jpg, .png, .bmp, .gif, .ico, or .svg format.
- If you're upgrading from an earlier release and want ACLs observed for data displayed in record cards and parameter substitutions in chat notifications, set the *com.glide.cs.notification_record_access_check* system property to true. The default value for this system property is false, which means that data is delivered regardless of the user's access level.

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Note:
This property does not apply to advanced notifications.

- Role required: virtual_agent_admin or admin

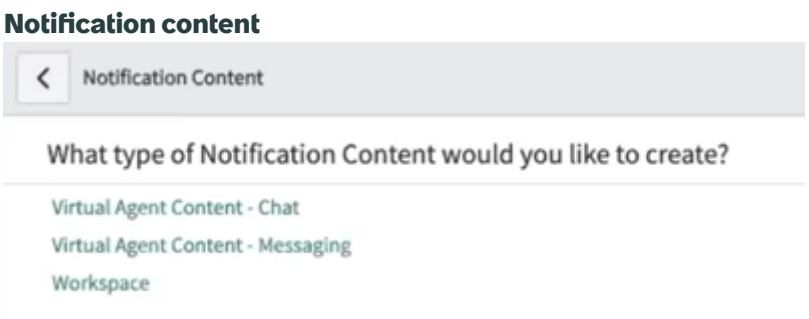
About this task

You can personalize Virtual Agent notifications by using parameter substitution to add dynamic content to the message header and message. When adding dynamic content to your notifications, you specify the variables that identify the record values to be included in the content. You can add dynamic content to the following types of notifications:

- Record-based notifications - Use the `${<variable_name>}` format in your content to specify a variable that represents a record value from the table used for the notification. For example, if you want to customize the message heading for a notification that uses the Incident table and you want to include the incident **Priority** in the message, use the **Select variable** column to select the variable for incident priority.
- Event-based notifications - Use the `${event.parm1}` and `${event.parm2}` format to specify event-specific parameters that pass record information in the notification content. To learn more about event parameters and how they work, see Events.
- Advanced notifications - Modify a script provided for advanced notification use cases to specify dynamic content from different data sources and identify third-party services, such as URL shortening for streamlining links in the content.

Procedure

1. Navigate to **All** > **System Notification** > **Provider** > **Notifications** and select the notification for which you're defining or updating content.
2. Do one of the following:
   - If you're defining new content, navigate to the **Notification Contents** related list, select **New Provider Content**, and go to step 3.
   - If you're updating content, navigate to the **Notification Contents** related list, select the content to be updated, and go to step 4.
3. Select the Virtual Agent content type:
   - **Virtual Agent Content - Chat**: The notification is for chat channels.
   - **Virtual Agent Content - Messaging**: The notification is for a messaging channel, such as SMS.



4. Provide or update the notification content:

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a. On the form, fill in the fields for the chat or messaging notification:

Notification Content - Virtual Agent Chat or Virtual Agent Messaging

Field	Description
Name	Name of the notification content.
Notification	Notification that is associated with the content. This field is populated automatically with the notification that you created.
Type	Notification layout: ▪ **Simple**: A message-only notification, that contains information for review. ▪ **Record card**: A notification that contains information about a particular record in a table. ▪ **Image card**: A notification that contains images.
Table	(For Record Cards) Table to receive notifications about. This field is populated automatically with the table defined in the notification.
Fields	(For Record Cards) Fields to be displayed in the notification. For example, if you select **Comments and Work notes**, the notification includes the comments and work notes that users have added to the record.
Application	Application scope of the notification content.
Active	Option to activate the notification content.
Enable link	(For Record Cards) Option to add a link to the record.
Advanced	Option that opens the script editor for entering a script that returns dynamic content for notification heading and message content pulled from multiple data sources.
Script	(For advanced notification content) Script that you can edit to specify dynamic content from various data sources, including third-party services (such as URL shortening), to be used in the message heading and message content.
Message heading	Text that appears at the top of the message. The default message heading is: `A notification has arrived. You can continue the conversation after viewing the notification.` If you want to create a custom heading with dynamic content, enter the heading text and specify the variables used in the text: ▪ For record-based notifications: Expand the **Select variables** column and choose the variables for the record values to be included in the heading. The variables map to records in the table used for the notification. For example: `An incident has been assigned to you with Priority: ${priority}`

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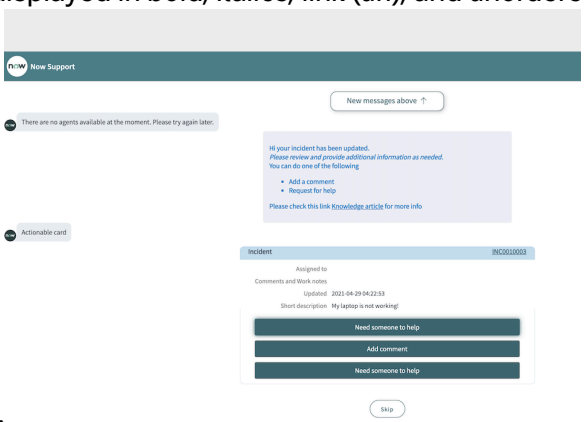
Field	Description
	▪ For event-based notifications: Specify the `${event.parm1}` and `${event.parm2}` variables to identify event-specific parameters that pass record information in the notification content.
Message	Content of the message with rich text format. If you want to create a custom message with dynamic content, enter the message text and specify the variables used in the text: ▪ For record-based notifications: Expand the **Select variables** column and choose the variables for the record values to be included in the message. The variables map to records in the table used for the notification. For example: `Here's a brief description of your assigned incident: ${short_description}` ▪ For event-based notifications: Specify the `${event.parm1}` and `${event.parm2}` variables to identify event-specific parameters that pass record information in the notification content. A notification message defined with rich text format is displayed in bold, italics, link (url), and unordered  list. When users click the URL in the message, they are redirected to the destination as per the portal configuration.
Image Source	(For Image Cards) Option for selecting the image to be displayed in the notification: ▪ **Upload image**: Add the image by uploading. ▪ **URL**: Specify the URL for the image.
Image	(For Image Cards) Image displayed in the card. ▪ To add the image, select **Click to add**. From the file finder, choose your image file and select **OK**. ▪ To change the image, select **Update**. From the file finder, select the new image file and select **OK**. ▪ To remove the image, select **Delete**. The file is immediately deleted.

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Field	Description
Image alt text	(For Image Cards) Alternative text for the image to be displayed in the card.

Note:
To create or update the messaging notification details, navigate to the **Delivery Channel** related list and complete the form. For more information, see Configure a delivery channel for Virtual Agent notification.

b. Select **Submit** or **Update**.

What to do next

- To configure a delivery channel, see Configure a delivery channel for Virtual Agent notification.
- If you're creating an actionable notification, see Define the actions.

Configure a delivery channel for Virtual Agent notification

Configure a delivery channel for Virtual Agent notifications by specifying the messaging channel information to send notifications to users.

Before you begin

Ensure that a messaging channel is configured in your instance. Virtual Agent admins can only select one or more chat channels for the notification from the list of chat channels associated with the instance.

Role required: virtual_agent_admin

About this task

Use the delivery channel to support multiple channels for the same notification content.
The procedure to configure delivery channels depends on the channel type. There are two notification channel types: Messaging channels and chat channels. For more information about channels, see Channels in Conversational Interfaces.

Delivery channels are also part of multiple active conversations in Virtual Agent. See Route Virtual Agent NLU notifications through multiple portals for more information.

Procedure

1. Navigate to **All** > **System Notification** > **Provider** > **Notifications**.
2. Select the notification for which you want to define or update content.
3. In the notification Contents related list, open the notification content.
4. Follow the procedure according to the channel type for the notification that you're configuring.
   - To update delivery channels for messaging content, select **New** in the Delivery Channels related list.
   - To update delivery channels for chat content, select the **Add/Remove multiple** option in the Delivery Channels related list.

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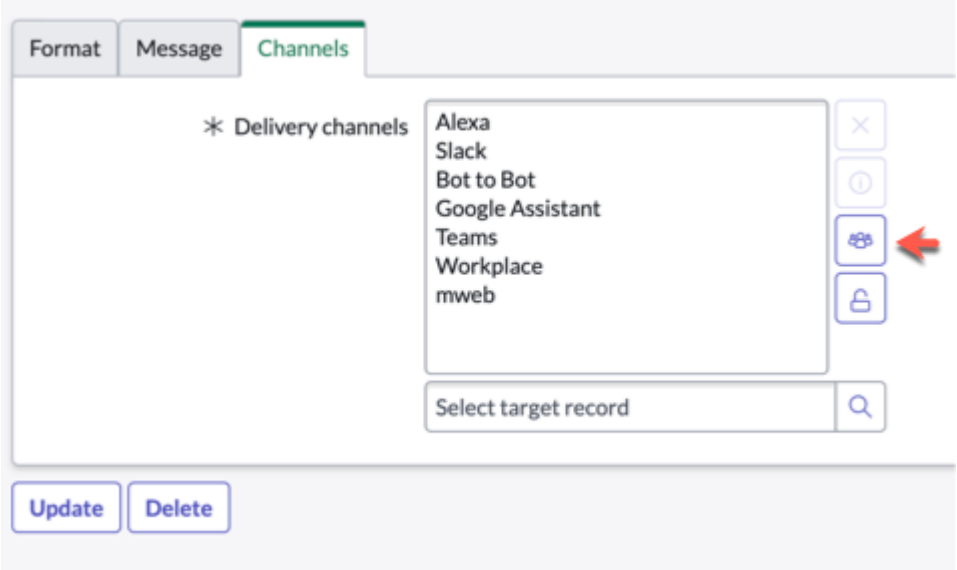

Use the arrows to add or remove specific delivery channels from your Selected Delivery Channels list. When you've defined all applicable delivery channels, select **Save**.

Note:
If no specific chat channel is defined, notifications are triggered to all available chat channels by default. Virtual Agent admins can modify the chat channels associated with a notification at any time.

5. On the form, fill in the fields.

Delivery channel form

Field	Description
Notification Content	Reference of the notification content pre-populates for the delivery channel.
Active	Option to activate the delivery channel.
Connection	Connection record for the messaging channel configured in the instance.
Send From	Provider application for the selected messaging channel.
Send To (Table)	Name of the table that you want to send the notifications to.
Send To (Field)	Name of the field that you want to send the notifications to. This field is optional.

6. Select **Submit** (new notification records) or **Update** (existing notification records).

Define Virtual Agent notification actions

Create the actions for a Virtual Agent chat or messaging channel to send actionable notifications.

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Before you begin

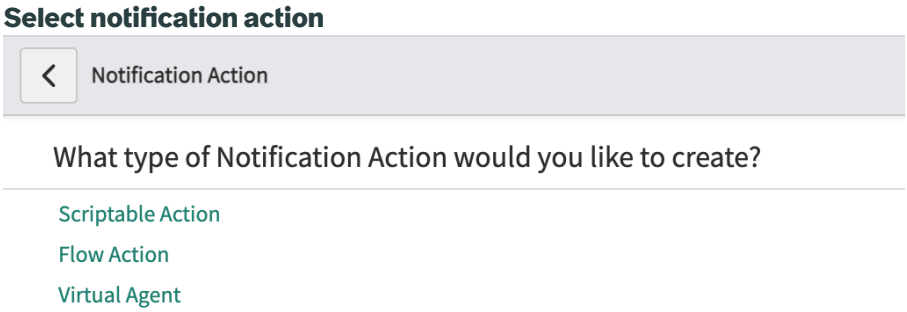
- An action requires an associated, published (active) Virtual Agent topic, a Scriptable action, or a Flow action which can perform the action represented by a button in the notification, such as talk to an agent (live agent support) or bot feedback (Virtual Agent feedback). Consider working with your topic authors to determine the appropriate topics and corresponding actions. For more information about designing the Virtual Agent topics, see Getting started with Virtual Agent Designer.

  Note:
  Scriptable actions and Flow actions are asynchronous and are executed when you select the action without a Virtual Agent topic. You can select either an existing flow that is defined or coordinate with the flow authors to send actionable notifications.

- Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **System Notification** > **Provider** > **Notifications** and select the notification for which you are defining actions.
2. Navigate to the **Notification Actions** related list and select **New Provider Action**.
3. Select a notification action.



4. On the form, fill in the fields to define the notification actions.

Notification Content - Actions

Field	Description
Name	Name of the notification action. For example, Talk to an agent.
Notification	Notification that is associated with the action. This field is populated automatically with the notification that you created.
Async	Option to enable the action execution without blocking the current request. Both Script and Flow actions in Virtual Agent are asynchronous.
Model Type	Type of actions that are configured. For example, NLU/Keyword topic or LLM topic. If a user selects LLM, that action will be sent to an LLM enabled Virtual Agent. If NLU is selected, that action will only be for an NLU enabled Virtual Agent.
Topic	Virtual Agent topic that handles this notification action.

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Field	Description
	Note: Virtual Agent Pro is required to send a topic with actionable notification.
Script	Script to execute the notification action. The script filed is available only when you select Scriptable notification action. **Note:** The Scriptable Action is available only for Virtual Agent Pro users.
Application	Application scope of the notification content.
Active	Option to activate the notification content.
Choose Flow or Action	
Flow	Flow to trigger the sequence of the notification action. **Note:** ○ You cannot choose the flow if you provided the action. ○ The Flow field appears only when you select Flow notification action. ○ The Flow Action is available only for Virtual Agent Pro users.
Action	Action to use the correct table and field configuration for the notification action. **Note:** ○ You cannot choose the action if you provided the Flow. ○ The Action field appears only when you select the Flow notification action. ○ The Flow Action is available only for Virtual Agent Pro users.
Inputs	
Script	Script to pass inputs to a flow action. This Script field appears when you select the Flow notification action.

5. Select **Submit**.
6. To define another action for the notification, repeat steps 3 through 5.

What to do next

Define link actions to notification content.

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Define the Virtual Agent link actions to notification content

Create the link actions for Virtual Agent notification content to be delivered in a chat or messaging channel as actionable notifications.

Before you begin

- Ensure that you have activated the Glide Virtual Agent plugin (com.glide.cs.chatbot).

> **Note:**
> Only Virtual Agent Pro customers can associate actions with notification contents and receive actionable notifications.

- Role required: virtual_agent_admin or admin.

About this task

Notification content, with no associated link actions, is delivered as a non-actionable notification.

Procedure

1. Navigate to **All** > **System Notification** > **Provider** > **Notifications** and select the notification for which you're defining the link actions.
2. In the Link Actions related list, select **New**.
3. On the form, fill in the fields.

Actionable Content form

Field	Description
Name	Name of the link action.
Actions	Notification action that the link action is created to. You can select one or more notification actions for a notification and also put them in the order that you want them to be shown on the notification.
Actions listed in event parm1	Actions listed in an event parameter. Users and actions cannot both be passed into the parameter. For example, if you input a sys_id of a user in event param1, the user is considered in the output.
Application	Application scope of the notification content.
Notification	Notification that is associated with the content. This field is populated automatically with the notification that you created.
Content	Notification content for the link action created.
Active	Option to activate the notification content.
Actions listed in event parm2	Actions listed in an event parameter.

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Field	Description
	Users and actions cannot both be passed into the parameter. For example, if you input a sys_id of a user in event param2, the user is considered in the output.

4. Select **Submit**.
5. To define another link action for the notification content, repeat steps 3 and 4.

> **Note:**
> Only a single notification with active content is supported for a provider. However, if the content for the notification is not active, you can define the secondary content for the notification and make that content active.

6. **Optional:** To remove the **Skip** action from an actionable notification, do the following steps:

   a. Select the notification and open the Link Actions to Content related list.

   b. Select the Actionable Content and select the **Disable skip** option.

   > **Note:**
   > This option only displays when the Content Type is Virtual Agent.

What to do next
Enable Virtual Agent notifications. For more information, seeEnable Virtual Agent notifications.

Enable Virtual Agent notifications

Enable Virtual Agent notifications so that your end users can receive notifications in supported Virtual Agent channels.

Before you begin
Role required: virtual_agent_admin or admin

Procedure

Enable notifications for your users in the appropriate channel:

Channel	Description
Web client	a. Navigate to **All** > **Conversational Interfaces** > **Settings**. b. Select **Virtual Agent**.

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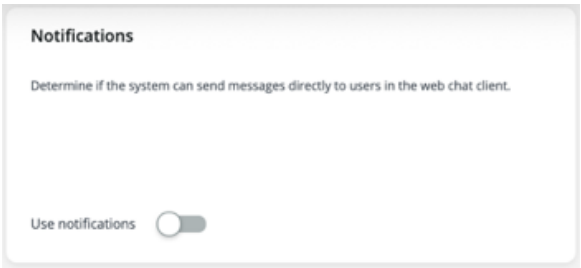
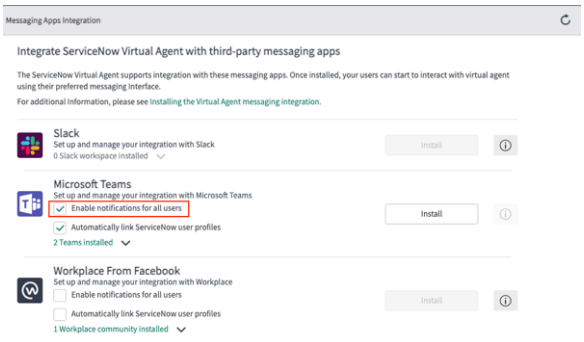
Channel	Description
	c. Under **Notifications**, slide the **Use notifications** toggle switch to enable notifications.  **Note:** You can also change the notification text color and background in chat branding configurations. For details, see Set up your Virtual Agent bot's branding.
Slack, Microsoft Teams, or Workplace messaging integrations	**a.** Navigate to **All** > **Conversational Interfaces** > **Channels and Integrations**. **b.** For the appropriate messaging integration, select **Enable notifications for all users**. 
Custom chat integration	**a.** Navigate to **All** and in the filter navigator, enter `sys_cs_channel.list`. **b.** In Messaging Channels, select the custom integration record to update. **c.** Select **Enable Notifications** to activate notifications. **d.** Select **Update**. For more information on configuring custom chat integrations, seeConversational custom chat integrations.

Notifications are sent to recipients via the Virtual Agent bot in the channels that you enabled.

Create cross-scope access privileges for topic blocks and custom controls

Enable topic authors and developers to access Virtual Agent topic blocks and custom controls from other scoped applications.

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Before you begin
Role required: admin

About this task
Developers and topic authors may need to access topic blocks and custom controls created in other application scopes. To give them access, define cross-scope privilege records for the appropriate applications. For more information on cross-scope privileges, see Cross-scope privilege record.

Procedure
1. Activate the Virtual Agent conversation plugins for the applications that are the source and target scopes, for example the CSM (com.sn_csm.virtualagent) or ITSM Virtual Agent (com.snc.itsm.virtualagent) plugins.
2. Set your application scope (the Source scope requesting access) using the application picker.
3. Navigate to **All** > **System Applications** > **Application Cross-Scope Access** and select **New**.
4. On the Cross scope privilege form, complete the following fields.

Field	Value
Source scope	Application requesting access to another application's resources.
Target Scope	Application whose resources are being requested (the scope with the topic blocks or custom controls).
Target Name	Name of the object being requested: sys_cs_topic
Target Type	Table
Operation	Read
Status	Authorization for this record: Allowed

5. Select **Submit**.

Result
The cross-scope privilege is listed in the Cross scope privileges [sys_scope_privilege] table. Topic authors or developers can access the topic blocks or custom controls from the target scope.

Configure Natural Language Understanding in Virtual Agent

Configure Natural Language Understanding (NLU) in Virtual Agent to identify the NLU service provider for your instance. You can also specify the languages of NLU models used during conversation design, based on the languages supported by your NLU provider and the ServiceNow AI Platform®.

Before you begin
You can select only one NLU service provider for your instance. Virtual Agent supports the following NLU services:

- **ServiceNow NLU** (default): Create your models, intents, and entities in Virtual Agent Designer and NLU Workbench.
- **IBM Watson Assistant**: Configure the IBM Watson Assistant intent and entity integration so that Virtual Agent can access IBM Watson Assistant NLU model information.

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- **Microsoft LUIS**: Configure the Microsoft LUIS Intent and Entity integration so that Virtual Agent can access Microsoft LUIS NLU model information.
- **Google DialogFlow Essentials (ES)**: Configure the Google DialogFlow ES intent and entity integration so that Virtual Agent can access Google Dialogflow ES NLU model information.

The **Activate** toggle switch for NLU is toggled on for all new Virtual Agent activations and the **NLU Service Provider** defaults to **ServiceNow NLU**. The **Activate** toggle switch is toggled off for Virtual Agent Lite. If you upgraded from the previous release, Virtual Agent retains the NLU settings and integration information for your NLU service provider.

Role required: virtual_agent_admin or admin

About this task

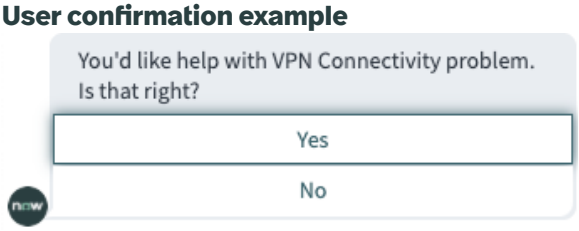
The NLU-enabled topics that you preview, create, or update in Virtual Agent Designer must use NLU models created in the NLU service that you select here. For example, if you specify ServiceNow as the service provider, you can view and access topics that use ServiceNow NLU model groups.

Similarly, to work on NLU topics in multiple languages, the languages must be enabled in your NLU service and added to your model groups. For more information, see Multilingual model management.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Click **Virtual Agent**.
3. Under Natural Language Understanding (NLU), click **View Settings**.
4. On the form, fill in the fields.

Natural Language Understanding (NLU) form

Field	Description
NLU Service Provider	Available NLU service providers for intent and entity extraction. The Supported NLU Languages list is displayed. It shows all of the language plugins that have been installed. For **ServiceNow NLU**, English is enabled to **true** by default. This field is automatically set to **ServiceNow NLU**.
Ask user if topic VA chose is correct	Option to prompt the user to confirm that the matched intent is correct. This option enables user confirmation only on initial intent discovery. When enabled, Virtual Agent asks the user for confirmation before continuing to the automatically selected topic content. Enabling this field triggers the **Intent confirmation message** field. **User confirmation example** 

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Field	Description
	If the user selects **No** for an initial intent, then Virtual Agent runs the global fallback topic. If the user selects **No** for an automatically selected intent in mid-topic, then Virtual Agent returns to the topic that the user was in.
Ask user if switched topic is correct	Option to prompt the user to confirm that the switched intent is correct. This option is enabled by default and prompts user confirmation only when the user triggers an intent switch in mid-topic. When enabled, Virtual Agent asks the user for confirmation before continuing to the switched topic content. Enabling this field triggers the **Intent confirmation message** field.

5. Edit the **Intent confirmation message** field, if needed.

   Text entered in this field is shown to the user to confirm that the matched intent is correct.

6. If you plan to use language-specific NLU models, enable the languages in the Supported NLU Languages list.
   A language is enabled if the Enabled column displays **true**. For more information, see Enable NLU languages in Virtual Agent settings.
7. Click **Save**.

Result

When you create or update a topic in Virtual Agent Designer, you can choose NLU models available for your specified NLU provider and the specified languages, if applicable. You can also set the NLU entity properties for the input controls that you add to your topic flow.

Configure IBM Watson Assistant as the NLU provider for Virtual Agent

Use the intents, entities, and utterances defined in IBM Watson Assistant and apply them as an NLU model for your Virtual Agent conversations.

Before you begin

In IBM Watson Assistant, do the following:

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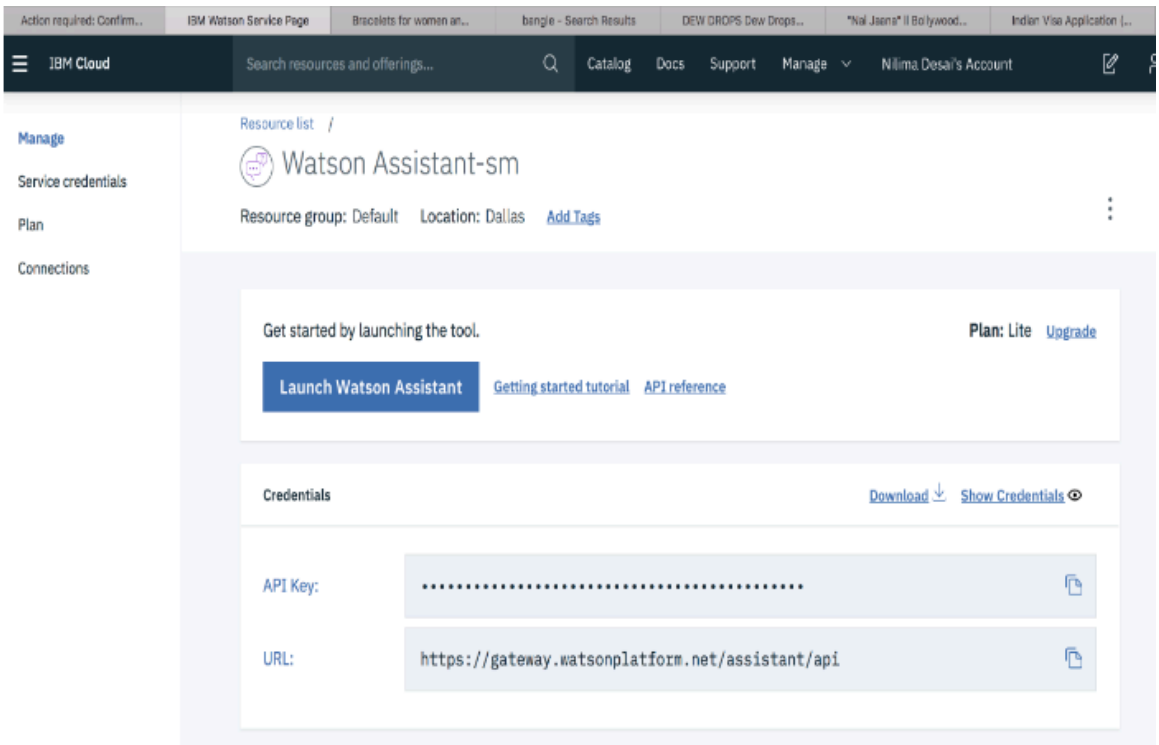
- In your IBM account, create a Resource Link in the AI (Artificial Intelligence) category. Once you have created the Resource Link, you should see the API key and URL:



- In your workspace, define the intents, entities, and utterances for your NLU model.
- Locate your workspace credentials and copy the workspace **Password**, which you must provide when setting your credentials during configuration.

In your ServiceNow instance, make sure that the Glide Virtual Agent plugin (com.glide.cs.chatbot) is activated. This plugin installs the proxy agent for the IBM Watson Natural Language Understanding server plugin (com.glide.nlu.ibmwatson.intent.discovery), which is needed for this integration.

Role required: admin

About this task

Configuring the IBM Watson Assistant integration involves providing IBM Watson Assistant credentials for authentication. You can set only one NLU service provider for your instance.

> **Note:**
> If you upgraded from a previous release, the upgrade process automatically retains the IBM Watson Assistant workspace **Password** that you provided.

As of the Quebec release, Virtual Agent supports legacy version 1 URLs only:

- Models: `https://<IBM HOST>/assistant/api/{{api_version}}/workspaces?version={{published_version}}`
- Intents: `https://<IBM HOST>/assistant/api/{{api_version}}/workspaces/{{model_id}}/intents?version={{published_version}}&page_limit=1000`

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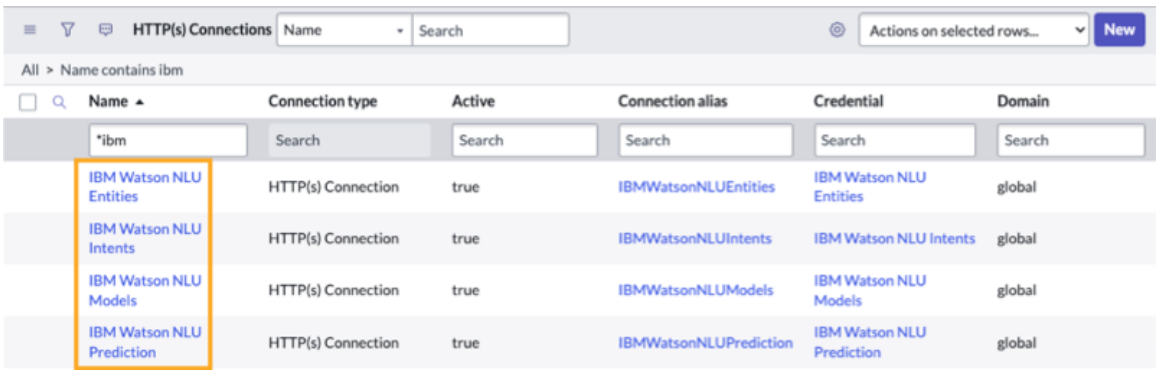
- Entities: `https://<IBM HOST>/assistant/api/{{api_version}}/workspaces/{{model_id}}/entities?version={{published_version}}`
- Prediction: `https://<IBM HOST>/assistant/api/{{api_version}}/workspaces/{{model_id}}/message?version={{published_version}}`

Procedure

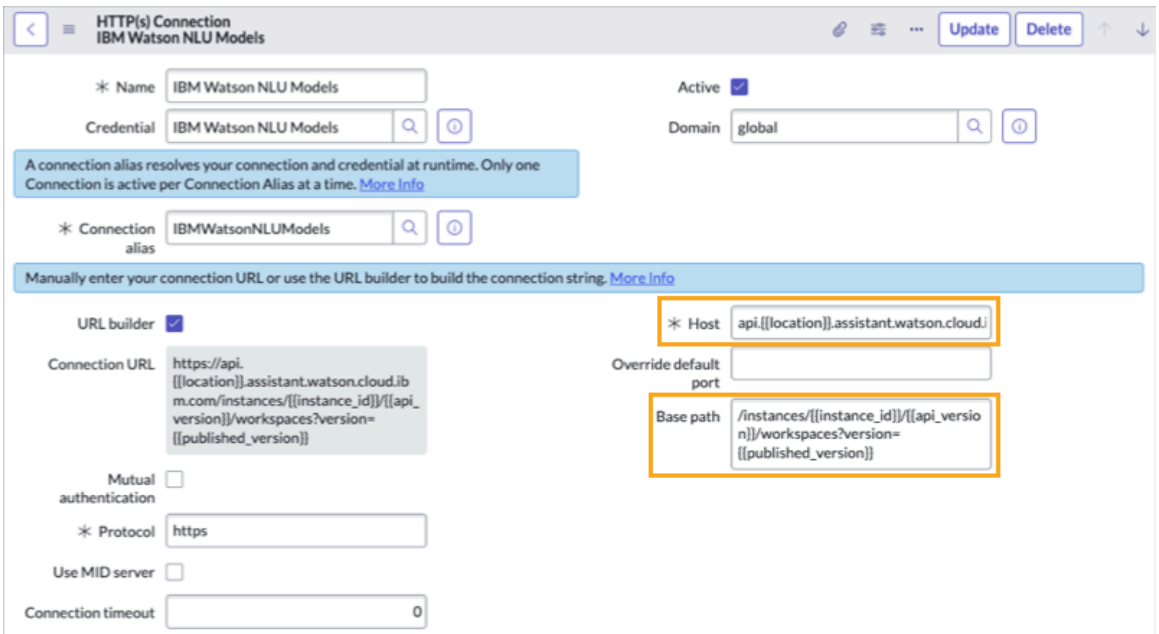
1. Set the IBM Watson endpoint in your ServiceNow instance for each of the following HTTP(s) Connections records:
   - IBM Watson NLU Models
   - IBM Watson NLU Intents
   - IBM Watson NLU Entities
   - IBM Watson NLU Prediction

   a. Navigate to **All**, and then enter `http_connection.list` in the filter.

   b. In the HTTP(s) Connections page, select an IBM Watson entry in the Name column to open the record.



   c. Edit the URL in the **Host** and **Base path** fields to reflect the endpoint in your IBM Watson NLU account.



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d. Select **Update**.

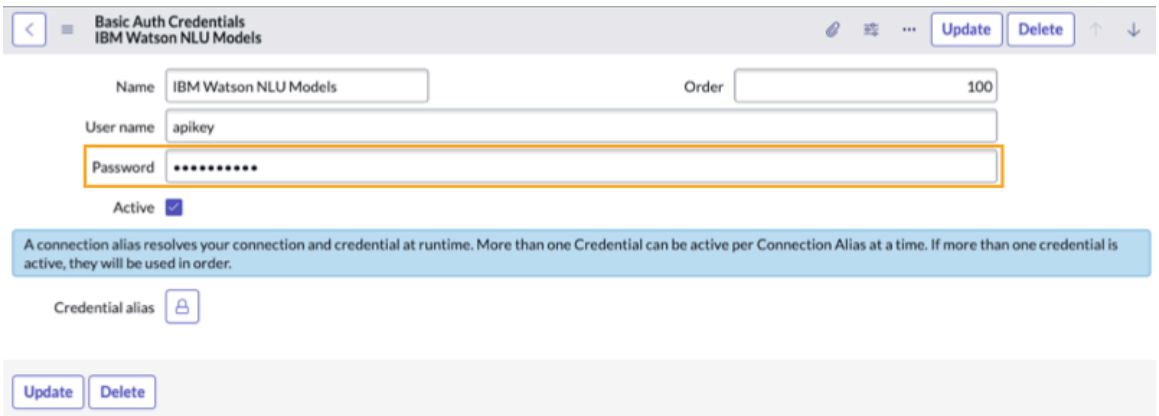
e. Repeat these steps for the remaining IBM Watson records.

2. Add the IBM Watson NLU API key in your ServiceNow instance for each of the following Basic Auth Credentials records:
   - IBM Watson NLU Models
   - IBM Watson NLU Intents
   - IBM Watson NLU Entities
   - IBM Watson NLU Prediction

a. Navigate to **All**, and then enter `basic_auth_credentials.list` in the filter.

b. In the Basic Auth Credentials page, select an IBM Watson entry in the Name column to open the record.

c. In the **Password** field, enter the IBM Watson NLU API key.



d. Select **Update**.

e. Repeat these steps for the remaining IBM Watson records.

3. Make the IBM Watson NLU service active.

a. Navigate to **All**, and then enter `open_nlu_driver.list` in the filter.

b. In the Open NLU Drivers table, locate the IBM Watson Script record and in the **Active** field, set the value to true.

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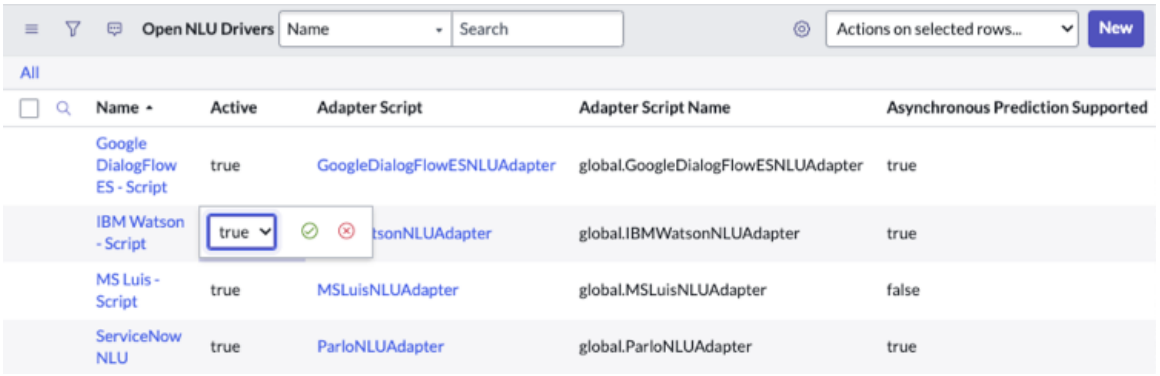

Activating this setting adds **IBM Watson - Script active** to the list of available NLU services in Virtual Agent settings.

4. To enable NLU in your instance, navigate to **Conversational Interfaces** > **Settings**, and then do the following:

   a. Click **Virtual Agent**.

   b. Under Natural Language Understanding (NLU), click **View Settings**.

   c. Slide the **Activate** toggle switch to enable Natural Language Understanding.

   d. In the **NLU service provider** list, select **IBM Watson - Script**.

   e. If you plan to use language-specific NLU models, enable the languages in the Supported NLU Languages list.
   A language is enabled if the Enabled column displays **true**. For more information, see Enable NLU languages in Virtual Agent settings.

   f. Click **Save**.

   IBM Watson Assistant is the NLU service provider for your instance.

Configure Microsoft LUIS as the NLU provider for Virtual Agent

Use the intents, entities, and utterances defined in a Microsoft Language Understanding Intelligent Service (LUIS) application and apply them as an NLU model for your Virtual Agent conversations.

Before you begin

In Microsoft LUIS, do the following:

- Sign in to the LUIS portal and create an application to be used as an NLU model (requires a Microsoft Azure account.)
- Locate and copy these Microsoft LUIS keys:
  - Authoring key that was automatically generated when you created your Microsoft LUIS account. The authoring key provides the authentication needed for your LUIS applications and for creating, training, and publishing them. You can find the authoring key by signing into LUIS, selecting your user account, and opening Account Settings.

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- Prediction endpoint runtime key that you assigned to the resource for your Microsoft LUIS application. Virtual Agent accesses the LUIS runtime query prediction endpoint through this key.

  Note:
  If you are using more than one LUIS application (NLU model), you must provide the prediction endpoint runtime key for each application that you create.

In your ServiceNow instance, do the following:

- Make sure that the Glide Virtual Agent plugin is activated, as it installs the Proxy Agent to the Microsoft LUIS Natural Language Understanding server plugin (com.glide.nlu.msluis.intent.discovery) needed for this integration. If you upgraded from a previous release, the upgrade process automatically retains the LUIS keys that you provided.
- Role required: admin

About this task

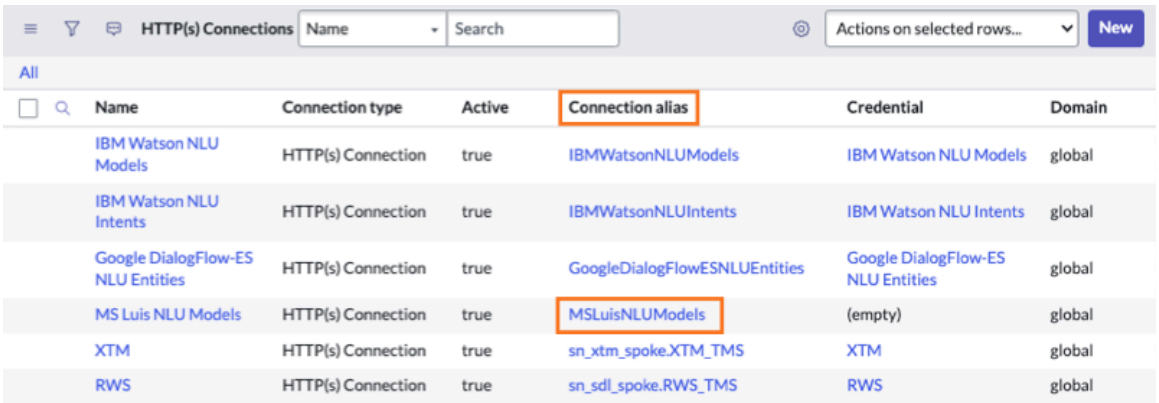
You can set only one NLU service provider for your instance.

Procedure

1. To set the credential passwords for the LUIS NLU model, entities, intents, and prediction information, do the following:

   a. Navigate to **All**, and then enter `http_connection.list` in the filter.

   b. In the HTTP(s) Connections page, select **MSLuisNLUModels** in the Connection alias column to open the record.



Name	Connection type	Active	Connection alias	Credential	Domain
IBM Watson NLU Models	HTTP(s) Connection	true	IBMWatsonNLUModels	IBM Watson NLU Models	global
IBM Watson NLU Intents	HTTP(s) Connection	true	IBMWatsonNLUIntents	IBM Watson NLU Intents	global
Google DialogFlow-ES NLU Entities	HTTP(s) Connection	true	GoogleDialogFlowESNLUEntities	Google DialogFlow-ES NLU Entities	global
MS Luis NLU Models	HTTP(s) Connection	true	MSLuisNLUModels	(empty)	global
XTM	HTTP(s) Connection	true	sn_xtm_spoke.XTM_TMS	XTM	global
RWS	HTTP(s) Connection	true	sn_sdl_spoke.RWS_TMS	RWS	global

   c. In the Connection & Credential Aliases for MSLuisNLUModels page, go to the Connection Attributes related list.

   d. Find the Credential Password attribute, and then double-select in the **Default value** column to edit the value.

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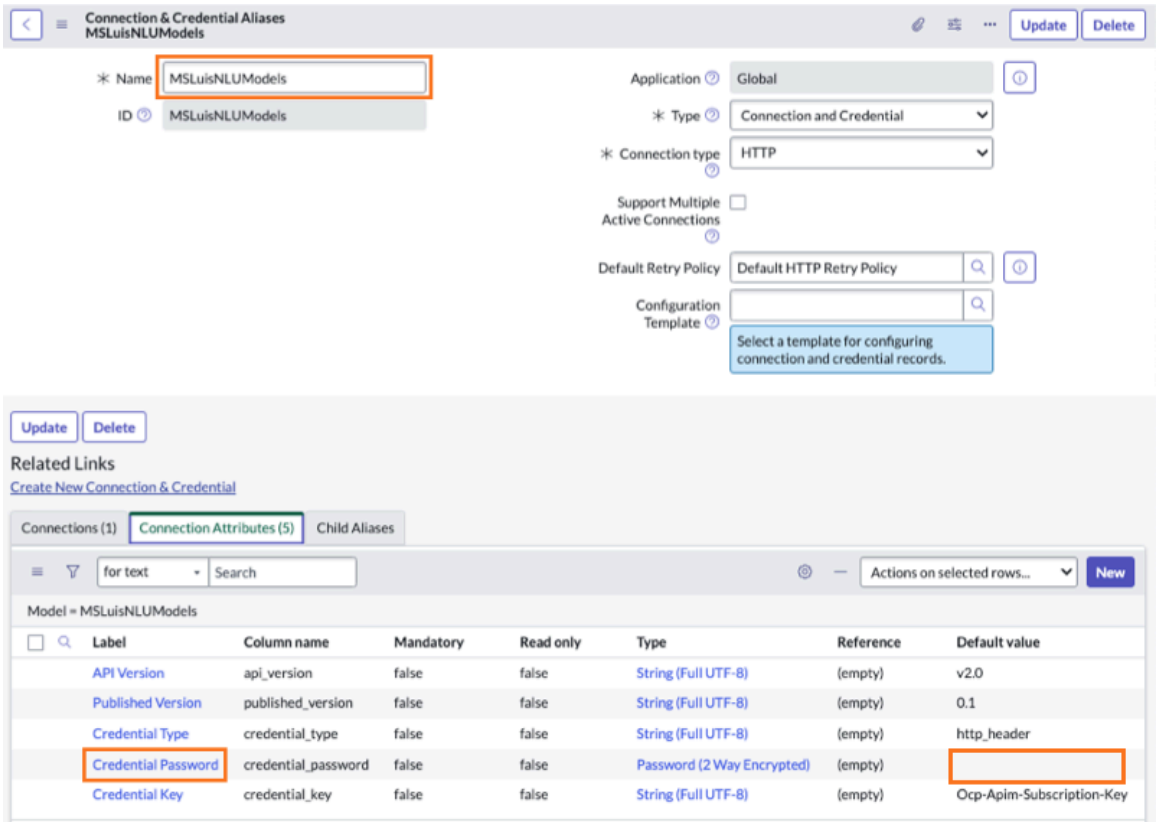

e. Enter the MS LUIS authoring key in the **Default value** field, and then select the save icon.

f. Return to the HTTP(s) Connections page and repeat these steps to add the MS LUIS authoring key as the default value in the following Connection aliases:

- MSLuisNLUCustomEntities
- MSLuisNLUPrebuiltEntities
- MSLuisNLUIntents
- MSLuisNLUPrediction

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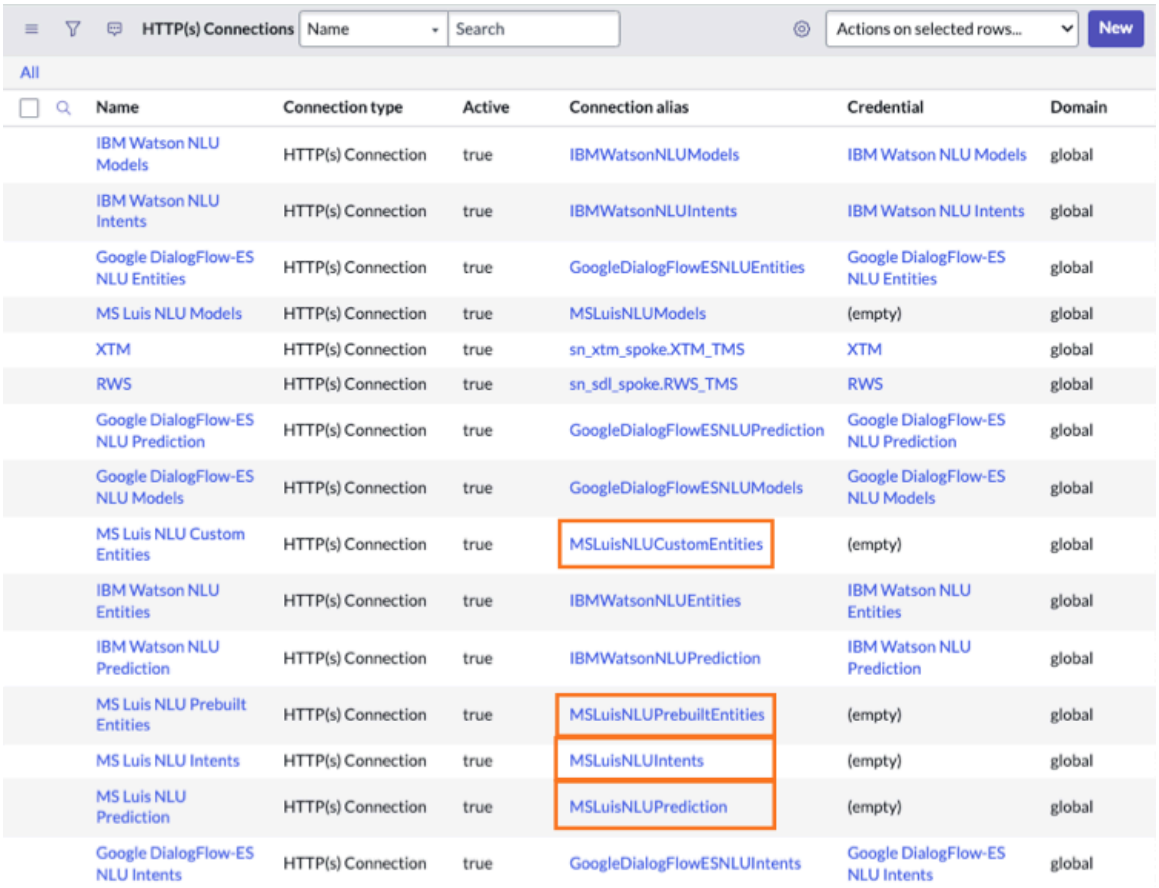


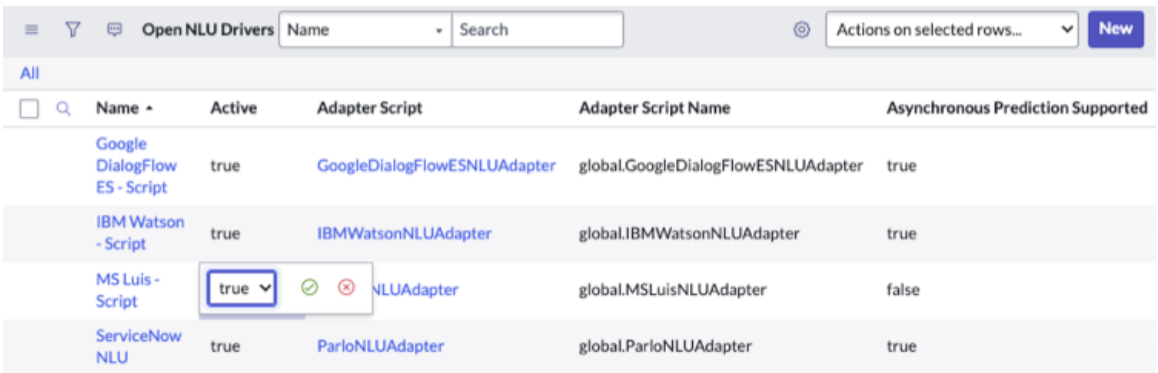
Name	Connection type	Active	Connection alias	Credential	Domain
IBM Watson NLU Models	HTTP(s) Connection	true	IBMWatsonNLUModels	IBM Watson NLU Models	global
IBM Watson NLU Intents	HTTP(s) Connection	true	IBMWatsonNLUIntents	IBM Watson NLU Intents	global
Google DialogFlow-ES NLU Entities	HTTP(s) Connection	true	GoogleDialogFlowESNLUEntities	Google DialogFlow-ES NLU Entities	global
MS Luis NLU Models	HTTP(s) Connection	true	MSLuisNLUModels	(empty)	global
XTM	HTTP(s) Connection	true	sn_xtm_spoke.XTM_TMS	XTM	global
RWS	HTTP(s) Connection	true	sn_sdl_spoke.RWS_TMS	RWS	global
Google DialogFlow-ES NLU Prediction	HTTP(s) Connection	true	GoogleDialogFlowESNLUPrediction	Google DialogFlow-ES NLU Prediction	global
Google DialogFlow-ES NLU Models	HTTP(s) Connection	true	GoogleDialogFlowESNLUModels	Google DialogFlow-ES NLU Models	global
MS Luis NLU Custom Entities	HTTP(s) Connection	true	MSLuisNLUCustomEntities	(empty)	global
IBM Watson NLU Entities	HTTP(s) Connection	true	IBMWatsonNLUEntities	IBM Watson NLU Entities	global
IBM Watson NLU Prediction	HTTP(s) Connection	true	IBMWatsonNLUPrediction	IBM Watson NLU Prediction	global
MS Luis NLU Prebuilt Entities	HTTP(s) Connection	true	MSLuisNLUPrebuiltEntities	(empty)	global
MS Luis NLU Intents	HTTP(s) Connection	true	MSLuisNLUIntents	(empty)	global
MS Luis NLU Prediction	HTTP(s) Connection	true	MSLuisNLUPrediction	(empty)	global
Google DialogFlow-ES NLU Intents	HTTP(s) Connection	true	GoogleDialogFlowESNLUIntents	Google DialogFlow-ES NLU Intents	global

Note:
Repeat these steps for each Microsoft LUIS application that you use as an NLU model. Each application has its own prediction endpoint runtime key that you must provide.

2. Make the LUIS NLU service active.

   a. Navigate to **All**, and then enter `open_nlu_driver.list` in the filter.

   b. In the Open NLU Drivers table, set the **Active** field value for the **MS Luis Script** record to **true**.



Name	Active	Adapter Script	Adapter Script Name	Asynchronous Prediction Supported
Google DialogFlow ES - Script	true	GoogleDialogFlowESNLUAdapter	global.GoogleDialogFlowESNLUAdapter	true
IBM Watson - Script	true	IBMWatsonNLUAdapter	global.IBMWatsonNLUAdapter	true
MS Luis - Script	true	NLUAdapter	global.MSLuisNLUAdapter	false
ServiceNow NLU	true	ParloNLUAdapter	global.ParloNLUAdapter	true

Note:
Activating this setting adds **MS Luis - Script** to the list of available NLU services in Virtual Agent settings.

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3. To enable NLU in your instance, navigate to **Conversational Interfaces** > **Settings**, and then do the following:

   a. Select **Virtual Agent**.

   b. Under Natural Language Understanding (NLU), select **View Settings**.

   c. Slide the **Activate** toggle switch to enable Natural Language Understanding.

   d. In the **NLU Service Provider** list, select **MS Luis - Script**.

   e. If you plan to use language-specific NLU models, enable the languages in the Supported NLU Languages list.
   A language is enabled if the Enabled column displays **true**. For more information, see Enable NLU languages in Virtual Agent settings.

   f. Select **Save**.

   Microsoft LUIS is now the NLU service provider for your instance.

Configure Google Dialogflow ES as the NLU provider for Virtual Agent

Use the intents, entities, and utterances defined in Google Dialogflow ES. Apply them as an NLU model for your Virtual Agent conversations.

Configuring the Google Dialogflow ES integration involves providing Google Dialogflow credentials for authentication. You can set only one NLU service provider for your instance.

Requirements

This NLU configuration requires the following:

- A Washington DC ServiceNow instance
- A Google Dialogflow ES agent with defined intents, entities, and utterances

  For more information, see the Google Dialogflow ES documentation.

  Note:
  A Google Dialogflow agent is similar to a ServiceNow model. Currently, Virtual Agent only supports one Google Dialogflow ES agent per instance.

- Access to the Google Cloud platform
- The Glide Virtual Agent [com.glide.cs.chatbot] plugin must be installed on your ServiceNow instance.

  The following plugins are installed with Glide Virtual Agent by default:

  - com.snc.integration.sso.multi.installer: Integration - Multiple Provider Single Sign-On Installer
  - com.glide.nlu.googledialogflow.es.intent.discovery: Proxy agent to the Google Dialogflow ES Natural Language Understanding server

Create a service account and private key in Google Dialogflow ES

To use Google Dialogflow as your NLU provider for Virtual Agent, create a service account and private key for your agent in Google Dialogflow.

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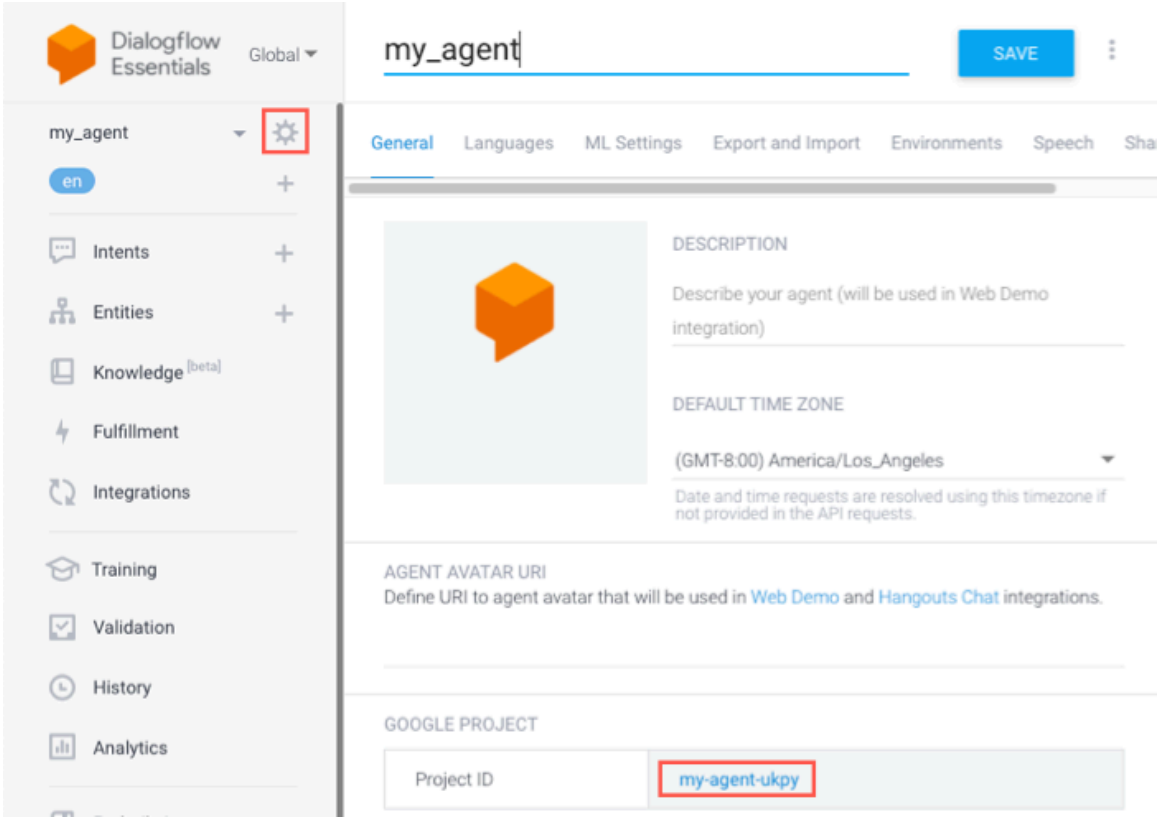
Before you begin

Create an agent in Google Dialogflow.

Role required: admin

Procedure

1. Log in to your Google Dialogflow account.
2. Click the agent settings icon, and then click the project ID on the **General** tab.



3. On the Google Cloud dashboard, click **Go to project settings**.

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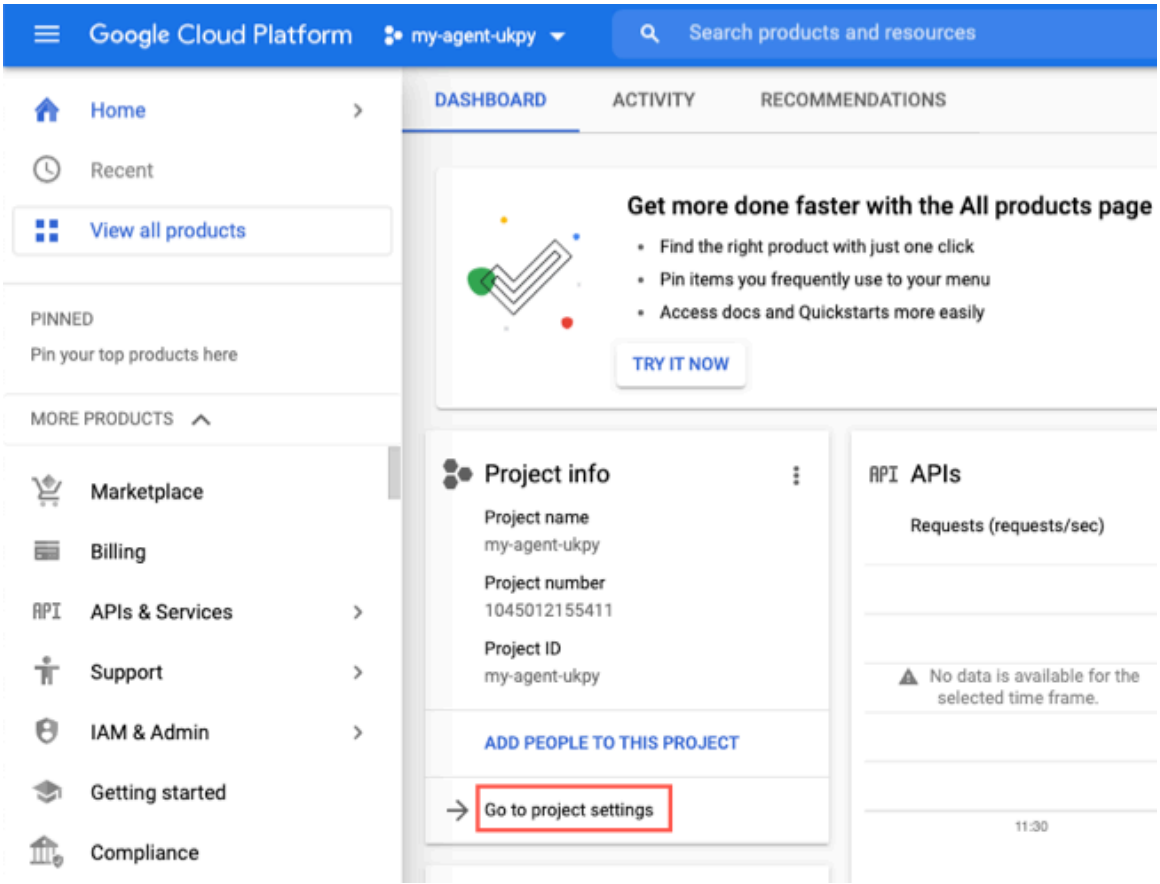
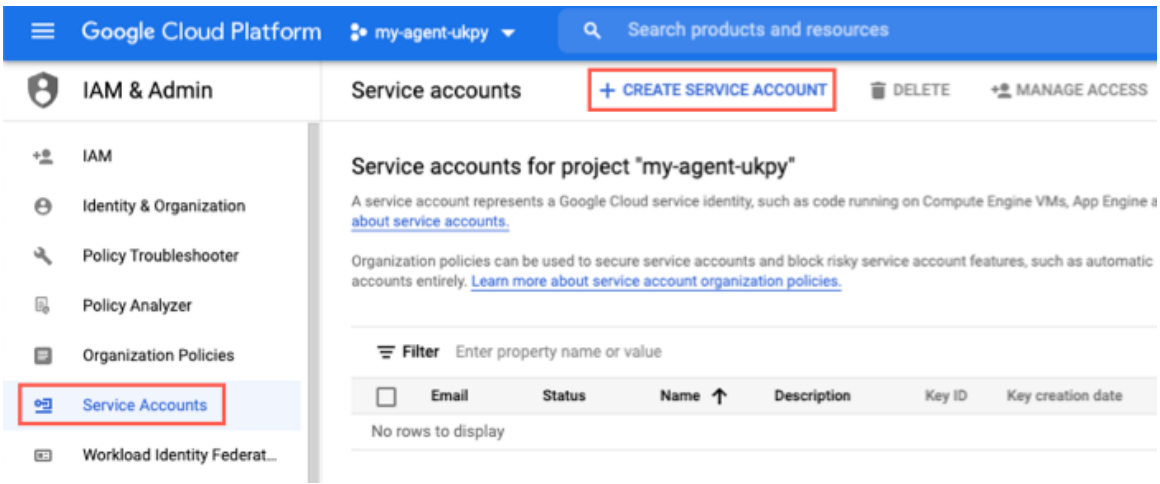


4. On the IAM & Admin page, click **Service Accounts**.
5. Click **+ Create Service Account**.



6. Provide a name, and then click **Create and Continue**.
7. Under the Grant this service account access to project section, select **Owner** as the role.

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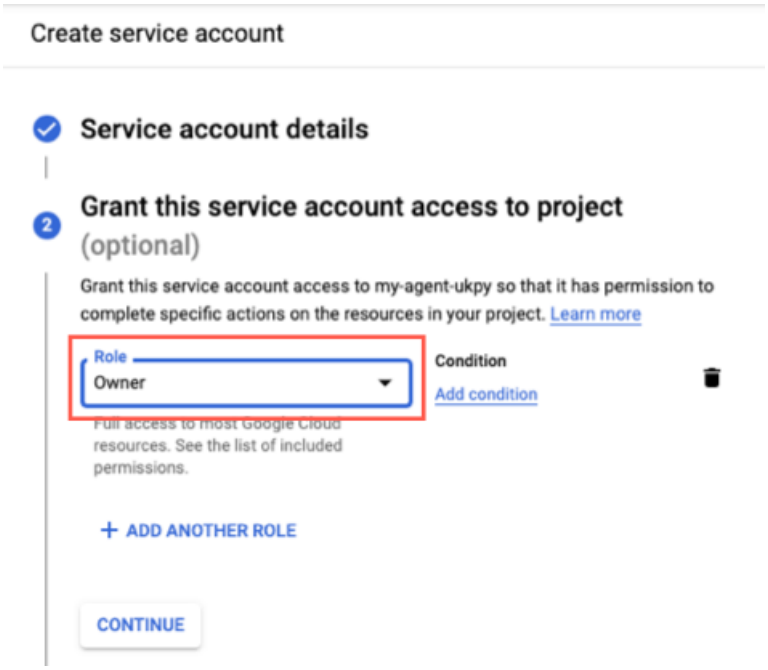
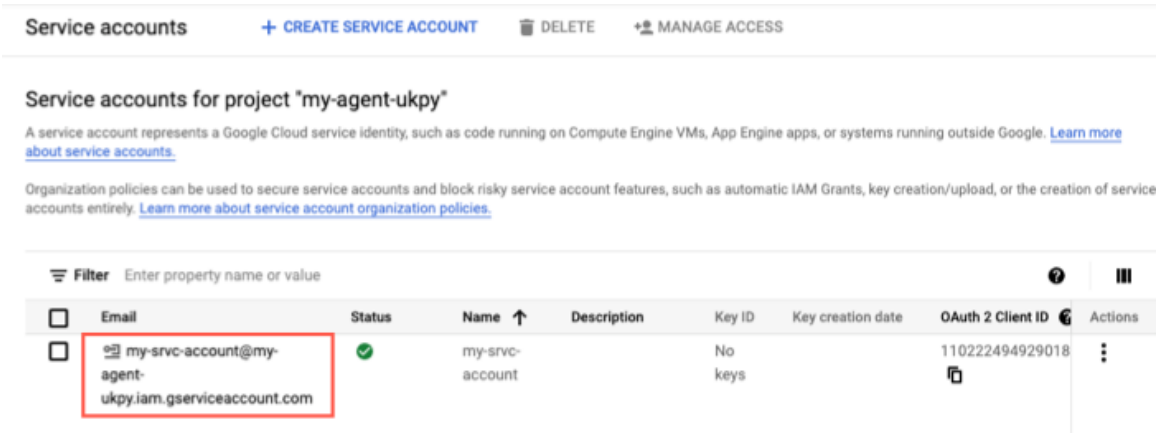


8. Click **Continue**.
9. Click **Done**.
10. In the **Email** column, click the link for the record.



The Service account details page opens.

11. Copy the Email and the Unique ID and save them for a later step.

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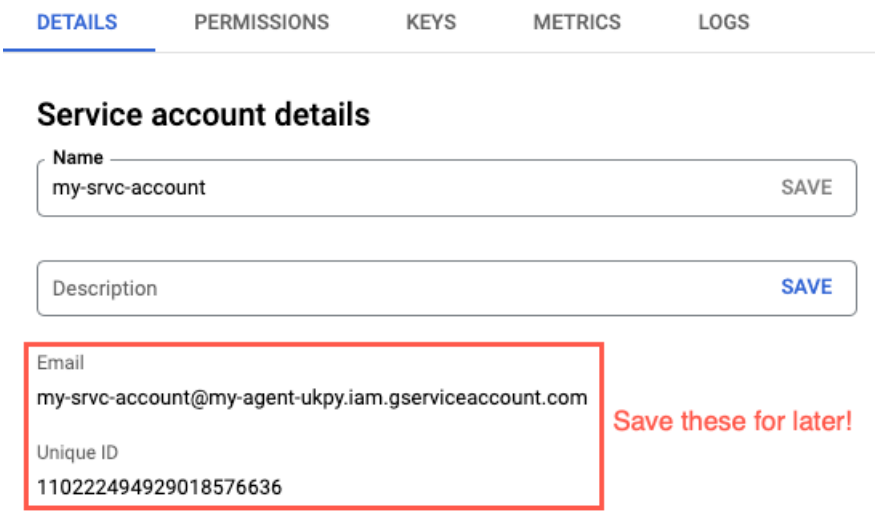
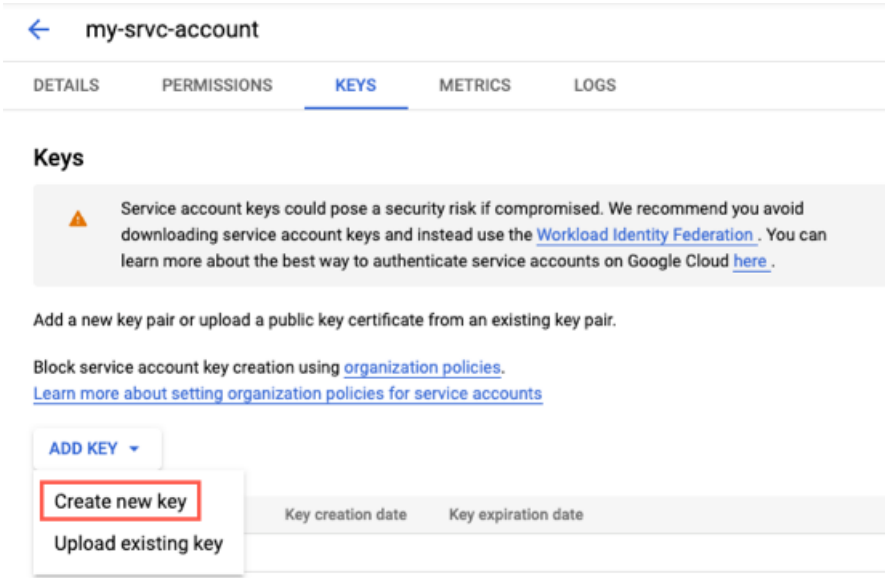


12. On the Service account details page, click the **Keys** tab.
13. Click **Add Key** > **Create new key**.



14. When prompted for the key type, select **P12**, and then click **Create**.
    The P12 file is downloaded to your computer.
15. Make note of the private key password (`notasecret`).

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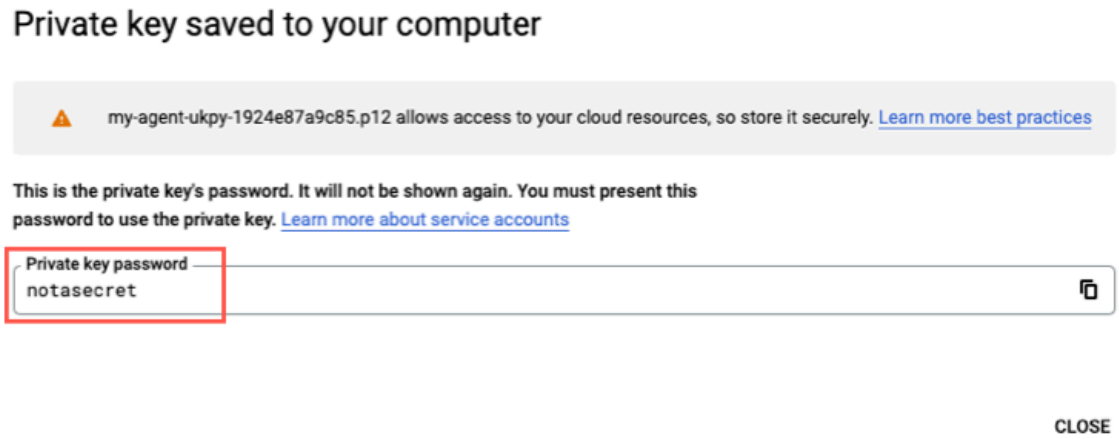
You will need this password in a later step.

Private key password example



Generate a Java Keystore (JKS) file and configure security on your ServiceNow instance

To use Google Dialogflow as your NLU provider for Virtual Agent, use the private key you downloaded to generate a JKS file and set up authentication in your ServiceNow instance.

Before you begin

Make sure the Java Development Kit (JDK) is installed on the system.

Role required: admin

About this task

Note:
Google Dialogflow uses OAuth2.0 for authentication.

Procedure

1. Open a command shell window.
2. To create a JKS file from the P12 file, do the following:

   a. Run the following command:

   ```
   keytool -importkeystore
    -srckeystore /local_dir/myprivatekey.p12 -srcstoretype
    pkcs12 -destkeystore /local_dir/myprivatekey.jks
    -deststoretype JKS
   ```

   In this example, `/local_dir/myprivatekey.p12` points to the private key that you downloaded in the previous step.

   b. When prompted, enter `notasecret` for the destination keystore password and the source keystore password.
   `notasecret` is the private key password you noted from the previous step. You will enter this password three times.

   A JKS file is created in the same directory.
3. In your ServiceNow instance, add the JKS file to the Google Dialogflow X.509 certificate record:

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a. Navigate to **All**, and then enter `sys_certificate.list` in the filter.

b. Select Google Dialogflow X.509 Certificate to open the record.

c. On the form, fill in the fields as follows.

Field	Value
Type	Select **Java Key Store**.
Key store password	Enter the private key password that you specified when creating the JKS file (`notasecret`).
Active	Select this option to activate the certificate.

d. Select the attachment icon and upload the JKS file to the record.

e. Under Related Links, select **Validate Stores/Certificates**.
You should see a `Valid key_store` message.

f. Select **Update**.

4. In your ServiceNow instance, update the Google Dialogflow JWT (JSON Web Token) Keystore alias record.

a. Navigate to **All**, and then enter `jwt_keystore_aliases.list` in the filter.

b. Select Google Dialogflow JWT Keystore to open the record.

c. On the form, fill in the fields as follows.

Field	Value
Signing Keystore	Select **Google DialogFlow X.509 Certificate**.
Signing Algorithm	Select **RSA 256**.
Signing Key	Enter the private key password that you specified when creating the JKS file (`notasecret`).
Key Id	Leave this field empty.

d. Select **Update**.

5. In your ServiceNow instance, update the Google Dialogflow JWT provider record.

a. Navigate to **All**, and then enter `jwt_provider.list` in the filter.

b. Select Google Dialogflow JWT Provider to open the record.

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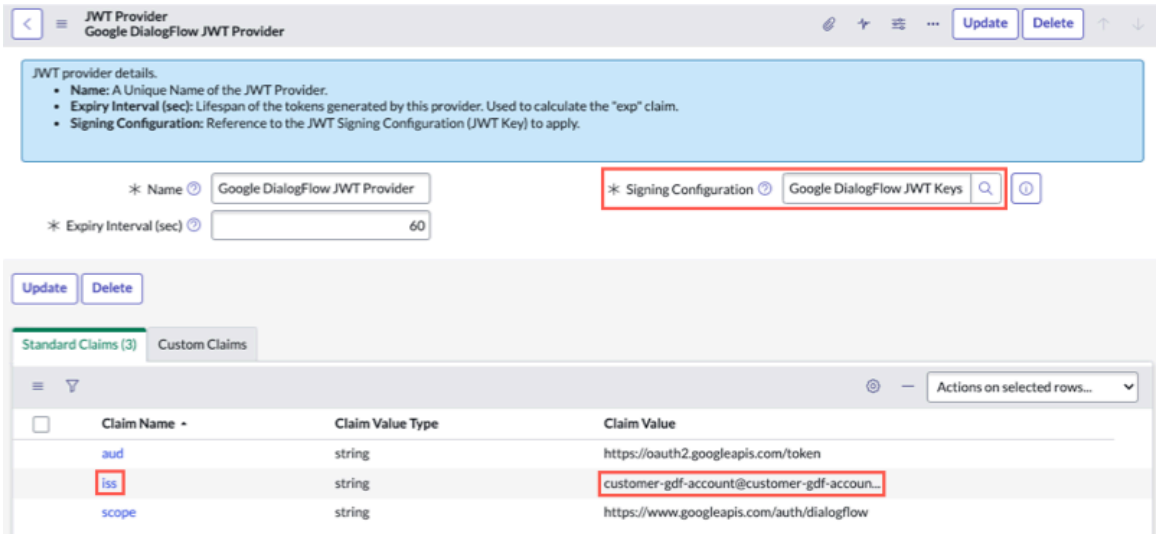
c. In the **Signing Configuration** field, select **Google DialogFlow JWT Keystore**.

d. In the Standard Claims related list, enter the email address for your Google Dialogflow agent service account as the **Claim Value** for the **iss** entry.



For more information, refer to Create a service account and private key in Google Dialogflow ES.

e. Select **Update**.

6. In your ServiceNow instance, update the Google Dialogflow NLU OAuth Provider record:

a. Navigate to **All**, and then enter `oauth_entity.list` in the filter.

b. Select Google Dialogflow NLU to open the record.

c. On the form, fill in the fields as follows.

Field	Value
Client ID	Enter the unique ID for your Google Dialogflow agent service account that you saved from a previous step.
Client Secret	Enter the private key password that you specified when creating the JKS file (`notasecret`).
Default Grant Type	Select **JWT Bearer**.

d. Select **Update**.

7. In your ServiceNow instance, update the **GoogleDialogFlowESNLUPrediction** system alias.

a. Navigate to **All**, and then enter `sys_alias.list` in the filter.

b. Select **GoogleDialogFlowESNLUPrediction** to open the record.

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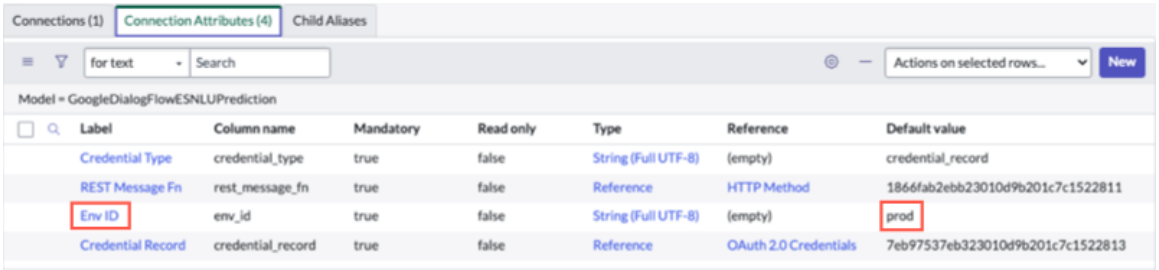
c. Select the **Connection Attributes** tab and find the **EnvID** record.

d. In the **Default value** column, update the value with the name of the Google Dialogflow environment where the agent was published.
The default value is *prod*.



e. Select **Update**.

8. Specify Google Dialogflow ES as your NLU provider in Virtual Agent.
For more information, see Configure Natural Language Understanding in Virtual Agent.

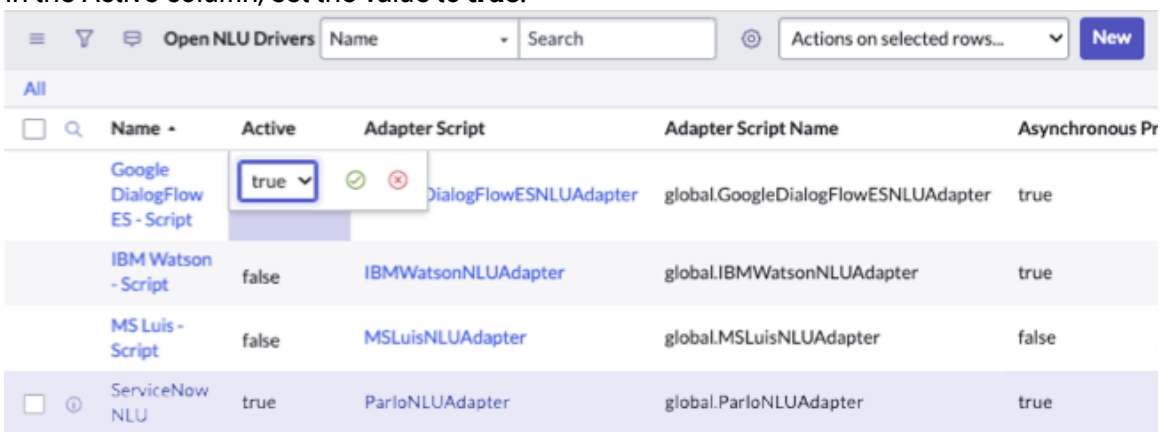
Activate the Google Dialogflow ES service and enable it in your instance

When you activate the Google Dialogflow ES service in the Open NLU Drivers [open_nlu_driver] table, the service becomes available as an option in Virtual Agent NLU settings.

Before you begin
Role required: admin

Procedure

1. Navigate to **All**, and then enter `open_nlu_driver.list` in the filter.
2. In the Open NLU Drivers table, locate the Google Dialogflow ES Script record.
3. In the Active column, set the value to **true**.



4. To enable NLU in your instance, navigate to **Conversational Interfaces** > **Settings**, and then do the following:

a. Click **Virtual Agent**.

b. Under Natural Language Understanding (NLU), click **View Settings**.

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c. Slide the **Activate** toggle switch to enable Natural Language Understanding.

d. In the NLU service provider list, select **Google Dialogflow ES - Script**.

e. If you plan to use language-specific NLU models, enable the languages in the Supported NLU Languages list.
A language is enabled if the Enabled column displays **true**. For more information, see Enable NLU languages in Virtual Agent settings.

f. Click **Save**.

Result
Google Dialogflow ES is the NLU service provider for your instance.

Test Virtual Agent with Google Dialogflow ES NLU in Virtual Agent Designer

Test topic discovery with Google Dialogflow and Virtual Agent in the Virtual Agent Designer interface.

Before you begin
Check the following:

- Ensure that your Google Dialogflow agent (model) is published as a version with the most recent changes.

  For more information, see Versions and environments in the Google Dialogflow documentation.

- Ensure that at least one topic is mapped to an existing Google Dialogflow agent (model) and intent.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, click **Test Active Topics**.
3. Type an utterance that should trigger the Google Dialogflow intent that is mapped to the topic.
4. To test entity slot-filling, do the following:
   a. On the **Flow** tab, add a Text user input node.
   b. Select an entity for the **NLU entity** field.

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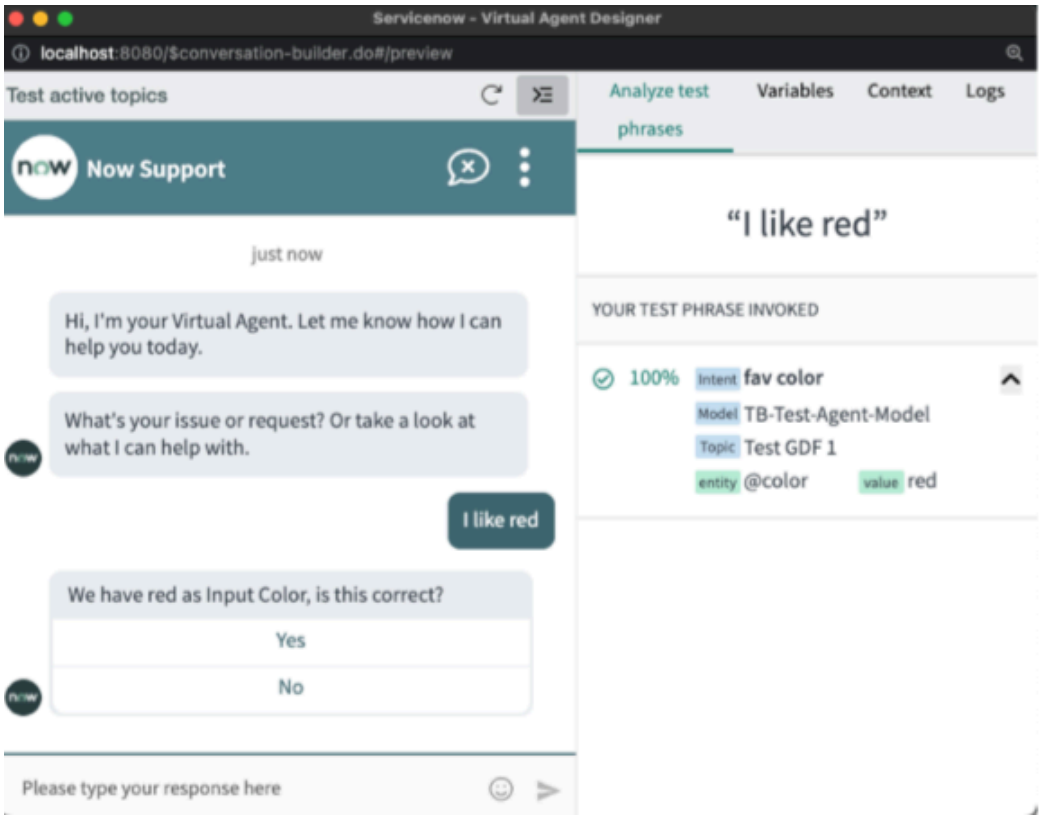
Ensure that the entity you select is configured in your Google Dialogflow ES agent. When a matching utterance is entered in the Test this topic window, the topic should be triggered, and the entity should slot-fill automatically.



Enhanced natural language handling of user inputs in NLU topic discovery

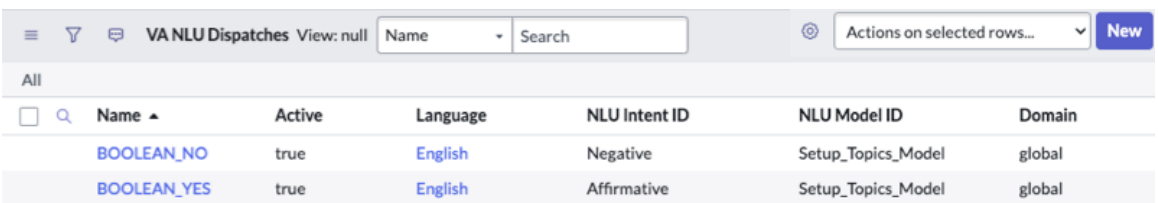
Give Virtual Agent the capability of recognizing natural variations on `yes` and `no` from the user, such as `sure` or `nope`. By defining a range of boolean responses as affirmative or negative, Virtual Agent doesn't have to prompt the user to restate their preference.

When Virtual Agent doesn't understand unexpected user input, it prompts the user again for information that it can understand. Starting with the Tokyo release, Virtual Agent can understand natural variations in boolean "yes/no" responses, such as `yep` or `nah`.

Natural language handling in ServiceNow NLU

The VA NLU Dispatches [sys_cs_nlu_dispatch] table stores the names of the model and intents that handle utterance variations.

For ServiceNow® NLU, the Setup Topics Model is already configured to handle boolean user inputs in English. There are two records in the table, **BOOLEAN_NO** and **BOOLEAN_YES**, which are mapped to the **Negative** and **Affirmative** intents in the Setup Topics Model.



Name	Active	Language	NLU Intent ID	NLU Model ID	Domain
BOOLEAN_NO	true	English	Negative	Setup_Topics_Model	global
BOOLEAN_YES	true	English	Affirmative	Setup_Topics_Model	global

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The Setup Topics Model and intents are read only, so if you need to modify the intents or add additional intents in other languages, create a new model with new intents. You can update the existing entries and add new ones to the table.

Setting up natural language handling for third-party NLU providers

If you are using IBM Watson, Microsoft LUIS, or Google Dialogflow for NLU topic discovery, add entries for the corresponding model and intents in the VA NLU Dispatches table, as described in Configure enhanced natural language user input handling.

Changing the confidence threshold

The confidence threshold for boolean inputs is defined in the *com.glide.cs.dialog.boolean_threshold* system property. The default value is *0.9*. For more information, see Add a system property.

Configure enhanced natural language user input handling

Add enhanced natural language handling for boolean user responses to your Virtual Agent environment. If you're using additional languages or third-party NLU providers, specify the model and intents that define variations in yes/no utterances for your bot.

Before you begin

In your NLU provider, create a model with two intents, or add two intents to an existing model. One intent should contain affirmative or "yes" utterances. The other intent should contain negative or "no" utterances.

If your environment supports multiple languages, create models and intents for each language.

Role required: virtual_agent_admin or admin

About this task

The default entries in this table apply to ServiceNow NLU for English only. If you want to implement natural language handling in other languages, add new entries to the table for each language.

Procedure

1. Navigate to **All**, and then enter `sys_cs_nlu_dispatch.list` in the filter.
2. Select **New** or an existing entry that you want to modify.
   Alternatively, select **New** to add an entry for another language or third-party NLU provider.
3. On the form, fill in the fields.

Field	Description
NLU Model ID	Name of the model that contains the defining intents for the boolean responses.
Name	Value name that represents the type of user input being configured. The following values are valid:

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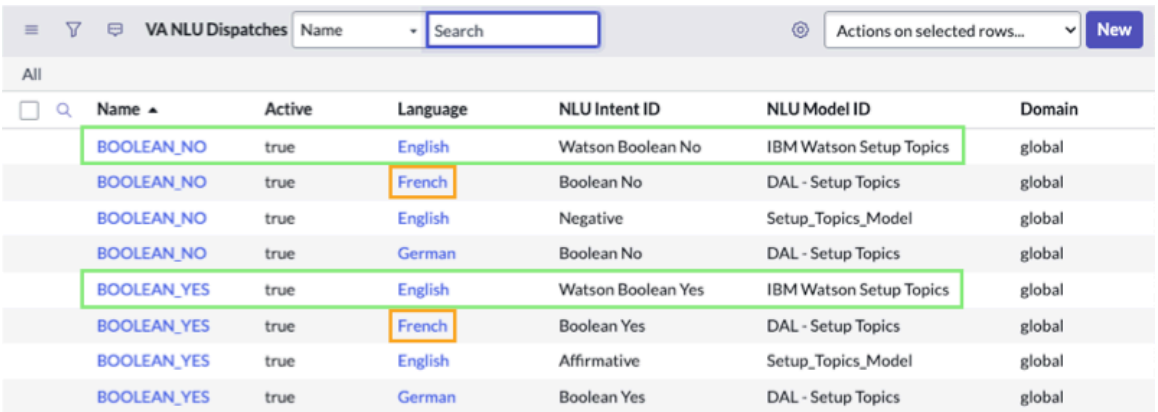
Field	Description
	○ **BOOLEAN_NO**: Maps to utterances that express a "no" response to a yes/no question. ○ **BOOLEAN_YES**: Maps to utterances that express a "yes" response to a yes/no question.
Active	Option that enables enhanced natural language user responses on your instance.
NLU Intent ID	Name of the corresponding intent for the boolean option. By default, the intent for BOOLEAN_NO is Negative. The intent for BOOLEAN_YES is Affirmative. If you need to make changes, create a new model with these intents, and then specify the new intent in this field.
Language	Language of the intent. English for ServiceNow NLU is configured by default. If you need to support other languages,you can add a row in the table for each supported language.

4. Select **Submit** or **Update**.

Result

Depending on your environment, your configuration may contain entries for other languages (such as French or German in the example below) or for other NLU providers, such as IBM Watson.



Name	Active	Language	NLU Intent ID	NLU Model ID	Domain
BOOLEAN_NO	true	English	Watson Boolean No	IBM Watson Setup Topics	global
BOOLEAN_NO	true	French	Boolean No	DAL - Setup Topics	global
BOOLEAN_NO	true	English	Negative	Setup_Topics_Model	global
BOOLEAN_NO	true	German	Boolean No	DAL - Setup Topics	global
BOOLEAN_YES	true	English	Watson Boolean Yes	IBM Watson Setup Topics	global
BOOLEAN_YES	true	French	Boolean Yes	DAL - Setup Topics	global
BOOLEAN_YES	true	English	Affirmative	Setup_Topics_Model	global
BOOLEAN_YES	true	German	Boolean Yes	DAL - Setup Topics	global

Create or modify custom categories

Create or change custom categories for organizing and grouping related Virtual Agent objects, such as topics. You can also make category labels visible in the Topic picker menu displayed to end users.

Before you begin

Role required: virtual_agent_admin or admin

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About this task

Use topic categories to group related conversation topics. When your create or update a topic, you can assign one or more categories to which the topic belongs. You can also view your topics by category in Virtual Agent Designer.

For your end users, you can make the custom category label visible in the Topic picker menu so that associated topics are displayed by category.

Before you create a new category, review the existing categories (**All** > **Conversational Interfaces** > **Virtual Agent** > **Categories**) to determine if you need a new category.

Note:
Pre-built topics have associated, default categories that can't be changed or deleted. Also, you can delete a custom category only when the category does not have any topics assigned to it.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Categories**.
2. Select **New** to create a custom category or select a category record to change it.

Field	Description
Name	Label for the category.
Description	Brief description of the category purpose.
Application	Application scope of the category.
Visible to end user	Option to display the category label in the Topic picker menu for end users. **Note:** ○ If you upgraded from a previous release, existing category labels are set to not visible. ○ This option does not control the topics displayed within the category. At the topic level, use the **Condition** field in the Topic Properties page to set conditions that control when a topic is displayed to end users.

3. Select **Submit** or **Update**.
   The topic category appears in the following items:
   - **Category** list collector (slushbucket) on the Topic Properties page in Virtual Agent Designer so that you can assign one or more categories to a topic.
   - **Category** filter on the Topics page, so that you can view topics by category.
   - Topic cards on the Topics page, for topics that have assigned categories.

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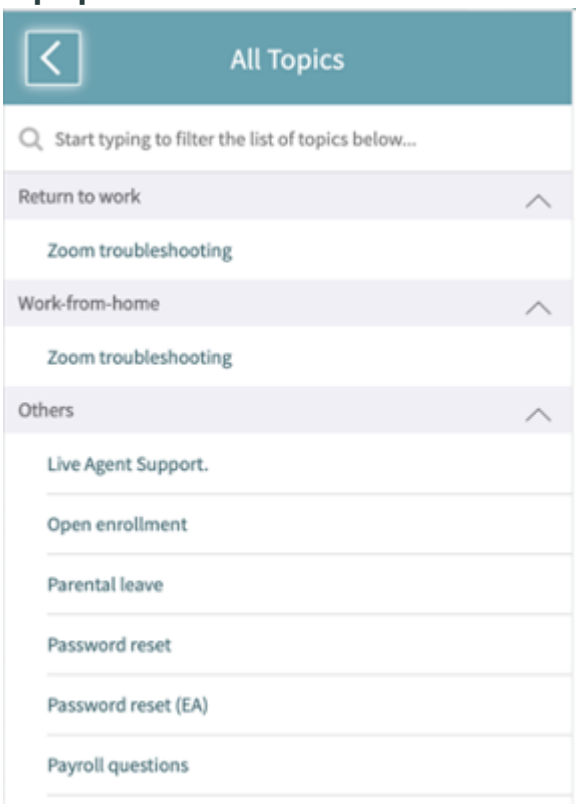
- Topic picker menu displayed to end users, if you made the category visible. Topics with multiple categories are displayed in the appropriate categories. Topics without categories are listed in the Others category.

Topic picker menu



4. To delete a topic category, open the category record and click **Delete**.
   If there are no topics associated with the category, the category is deleted. It is no longer listed in the **Category** field on the Topics Properties page and in the **Category** filter on the Topics page in Virtual Agent Designer.

Building and deploying Virtual Agent

Convert the time your agents and technicians spend handling low-impact user requests into an intelligently managed interaction. Enable Virtual Agent with NLU to understand the intent of what people are looking for and provide them with more relevant answers.

You can quickly deploy AI-powered chatbot conversations using customizable templates for the most common enterprise IT, HR, and customer service scenarios. You can design, build, and test conversations with Virtual Agent Designer.

Using Virtual Agent Topic Recommendations

Use the Topic Recommendations app to identify pre-built Virtual Agent topics that can be quickly implemented in your organization. Topic Recommendations uses Intent Discovery to analyze data from your organization and to find relevant pre-built topics that your organization can benefit from, and new topics that would be useful to create.

The Topic Recommendations app lets you evaluate the common use cases that Virtual Agent can help resolve or deflect. You can use Topic Recommendations with Virtual Agent topics that use either keyword or NLU topic discovery. Use it to do the following:

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1. Choose the ServiceNow data to analyze (configure analysis).
2. Analyze your existing data (run the analysis you configured).
3. Review the analysis results and use pre-built solutions:
   - Duplicate a pre-built topic suggestion, such as a topic from ITSM Virtual Agent Conversations (available from the ServiceNow Store).
   - [NLU only] Add an intent to your model and a new empty topic. You must provide the flow for the new topic in Virtual Agent Designer.

The Topic Recommendations app requires NLU Workbench and ITSM Virtual Agent Conversations from the ServiceNow Store. The Washington DC release of Topic Recommendations supports only ITSM Virtual Agent recommendations. Although Topic Recommendations uses NLU Workbench for machine learning purposes, it does not require that NLU be enabled in Virtual Agent.

For information about the apps that are automatically installed with Topic Recommendations, see Update Topic Recommendations.

Required plugins

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Topic Recommendations requires the following plugins and ServiceNow Store applications. Ensure that they are activated before you install Topic Recommendations.

Required ServiceNow plugins

Glide Virtual Agent (com.glide.cs.chatbot)

Activates all the plugins needed to run Virtual Agent Pro. For details, see Activate Virtual Agent.

> **Note:**
> Starting with the San Diego release, the Topic Recommendations app is automatically installed when you initially activate the Glide Virtual Agent plugin (com.glide.cs.chatbot). Subsequent updates for this app must be installed from the ServiceNow Store.

NLU Workbench (NLU topic discovery only)

Activates the plugins needed to run Natural Language Understanding in your instance. For more information, see Activate the NLU Workbench.

Required ServiceNow Store applications

Intent Discovery (NLU discovery only)

Identifies user intents from analyzing incident/case data. To learn more, see Intent Discovery.

ITSM Virtual Agent Conversations

Provides pre-built IT service management conversations to help your organization quickly deploy automated self-service conversations. For more information, see ITSM Virtual Agent.

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Items installed with Topic Recommendations

The following items are installed with Topic Recommendations:

- Scheduled jobs: *Run Topic Recommendation Reports* for running Topic Recommendation reports at scheduled times.
- The following tables are installed:

Table	Description
Default settings for Topic Recommendations [sn_topic_recommend_default_setting]	The source data (table and text field), taxonomy, and filters used when running a Topic Recommendations analysis
Installed recommended topics [sn_topic_recommend_topic_staging]	Topics generated for recommended topics

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

What to do

- Get started with Topic Recommendations
- Define default recommendation settings
- Run a Topic Recommendation analysis
- Add recommended topics and intents to Virtual Agent
- Link a topic recommendation to an existing Virtual Agent topic
- Unlink a topic recommendation from an existing Virtual Agent topic
- Troubleshoot issues with Topic Recommendations

Update Topic Recommendations

You can install updates to the Topic Recommendations application (com.snc.va_topic_recommender) if you have the admin role.

Before you begin

Starting with the Tokyo release, the Topic Recommendations store app is automatically installed with Virtual Agent. When using Topic Recommendations, the app checks the ServiceNow Store and notifies you when an update is available.

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Topic Recommendations**.
   If an update is available, a notification displays on the Topic Recommendations page.

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2. Select **View update**.

> **Note:**
> Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

3. Follow the instructions on the ServiceNow Store website to request an update for Topic Recommendations on your instance.

Quick start for Topic Recommendations

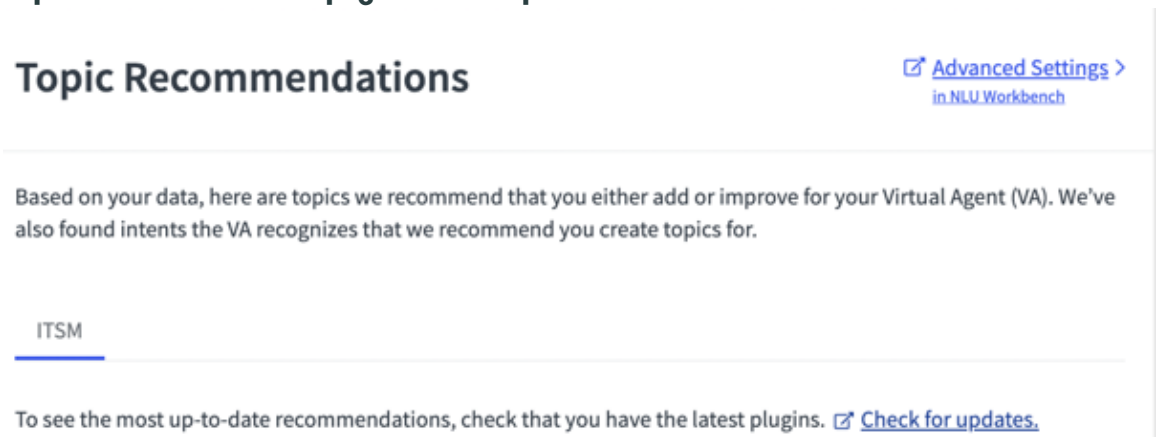
To get recommended topics based on your data, configure analysis reports, run the reports, and then review the results. You can either add new topics to Virtual Agent or link a recommendation to an existing topic.

The Topic Recommendations page appears in your instance at **All** > **Conversational Interfaces** > **Virtual Agent** > **Topic Recommendations**.

Step 1: Configure analysis reports based on ServiceNow data

Until you define analysis reports, the Topic Recommendations page is empty.

Topic Recommendations page with no reports defined



Each analysis report is based on the following:

- Data source: The ServiceNow data that you want to analyze. The options are: Incident [incident] table, Request [sc_request] table, Live Agent chat transcripts, and Virtual Agent fallback utterances.
- The field to analyze: A selected field (with a string data type) in the data source table to analyze. For example, the **Short description** field.
- Taxonomy: The business application that includes the data sets. When you install ITSM Virtual Agent Conversations, the Incident and Request data sets are installed by default. As additional data sets for applications become available, the data sets are displayed as a taxonomy on the page after they're installed on an instance.

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You can also add conditions to your analysis reports and configure them to run on a schedule. When new recommendations are available, a notification appears in the Virtual Agent Designer Topics page.

Configure analysis reports for Topic Recommendations in Virtual Agent settings. For details, see Configure analysis reports for Topic Recommendations.

Step 2: Run an analysis report

Run all configured analysis reports together or selectively run one at a time from the Topic Recommendations page.

During analysis, the Topic Recommendations app does the following:

- Uses Intent Discovery to review your data source, comparing your data source against the related taxonomy for your business application. Intent Discovery matches the data field specified in your data set to intents in the taxonomy.
- Maps the matched intents to pre-built topics in Virtual Agent. If intents don't have associated pre-built topics, the app recommends them as new topics that you can build because they were requested frequently enough by your users.
- Displays the analysis results as topic cards in the Topic Recommendations page.

For more information, see Run a Topic Recommendation analysis.

Step 3: Review report results and add or link topics and intents

Results are sorted into the following groups:

- Topics that Virtual Agent can handle: Recommendations in this group can be addressed with a pre-built topic.

  When you add this type of recommendation to Virtual Agent, the matched pre-built topic is duplicated in your instance. You can then modify, test, and publish the added topic using Virtual Agent Designer.

- User intents that need topic flows: Recommendations in this group match a ServiceNow NLU intent.

  When you add this type of recommendation to Virtual Agent, an empty topic is created and mapped to the matched intent in the model that you specify. You can then open the topic in Virtual Agent Designer and create a flow for the new topic.

The results are displayed in descending order of matches to your data source. The top 20 intent matches are displayed. If there are more than 20 intents, you can view them in NLU Workbench.

For more information about adding a recommendation to Virtual Agent, see Add recommended topics and intents to Virtual Agent. You can also link a recommendation to an existing topic.

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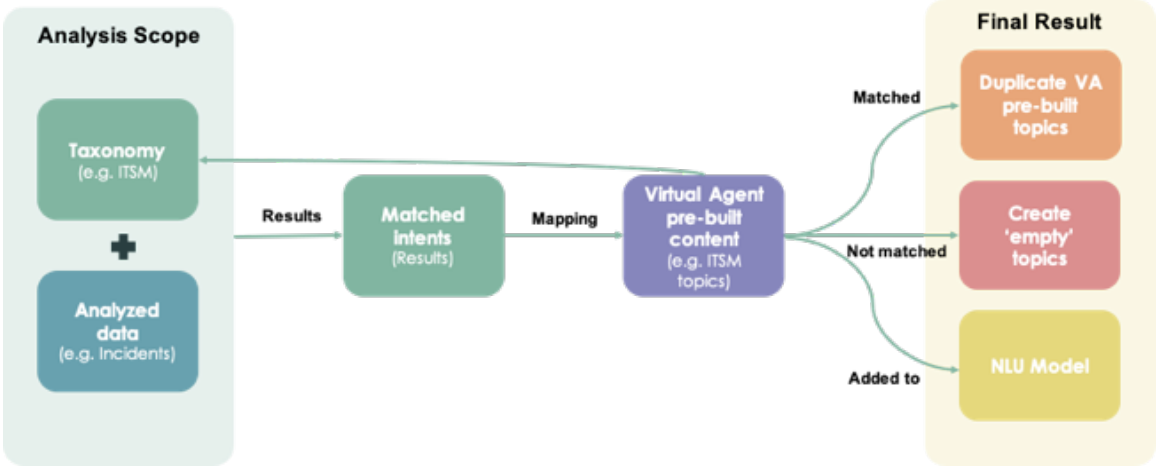
Mapping recommendations to Virtual Agent topics



Configure analysis reports for Topic Recommendations

To generate Topic Recommendations, specify a default data source (ServiceNow table and field) and the conditions for filtering the data records.

Before you begin

Role required: virtual_agent_admin or admin

About this task

When configuring analysis reports, consider the following:

- You can define only one setting per data table and taxonomy pair.
- Two data sets for the ITSM taxonomy (Incident and Requests) are provided by default, but you can define your own data sources.
- In the Washington DC release, Topic Recommendations requires a minimum of 10,000 records in your analysis scope (data source). This minimum provides a reasonably sized data set to achieve a certain level of quality in the analyses.
- Keep your analysis scope (data source) under 300,000 records. In the Washington DC release, this is the maximum number allowed. This limit maximizes the performance of the analysis report.
- You can schedule analysis reports to run automatically at specified intervals.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select **Virtual Agent**.
3. Under Topic Recommendations, click **View all**.
4. Select **New**.
5. On the form, fill in the fields.
   For details, see Topic Recommendations settings.
6. Select **Save**.

Result

The data source that you defined for a given table and taxonomy displays as a section on the Topic Recommendations page. You can now run a topic recommendation analysis.

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Run a Topic Recommendation analysis

Generate a report that analyzes a given data source and identifies the appropriate Virtual Agent pre-built topics that you can implement. For intents that do not have matching pre-built topics, the report identifies the user intents (topics) that you can create.

Before you begin

Verify that the appropriate Virtual Agent conversation plugins are activated so that the Topic Recommendations app can identify the appropriate pre-built topics.

You can use the **Check for updates** link on the Topic Recommendations page to check which plugins are installed.

Make sure you configure analysis reports first.

Role required: virtual_agent_admin or admin

About this task

The analysis process takes about 15 minutes or less to return recommendation results. In the Washington DC release, Topic Recommendations requires a minimum of 10,000 records in the data source and will only process a maximum of 300,000 records. Use filters in the settings page to reduce the number of records in the data source, if needed.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Topic Recommendations**.
2. In the Topic Recommendations page, go to the data source to be analyzed and trigger the analysis.
   - If the view is set to **All**, do the following:
     a. Select **Get new recommendations**.
     b. In the dialog box, select the sources you want to get reports for.

        If a check box is unavailable, a report may already be running, or the amount of data to analyze might be outside of the minimum or maximum allowed.

     c. Select **Get new recommendations**.
   - If the view is set to **By Source**, do the following:
     a. Select **Run analysis** or **Refresh** in the source status bar.
     b. Modify any settings in the dialog box, and then select **Get recommendations**.

   A message indicates that the topic-finding process has started and the approximate time for recommendation results. The page or status bar displays `Analysis in progress`. You can review other items while the analysis runs.

   Note:
   Changing the settings here affects only this analysis. The default settings for the recommendation are preserved. To change the default settings, see Configure analysis reports for Topic Recommendations.

3. When the report completes, review the analysis results for the data set.

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The results display as cards in two sections: **Topics that VA can handle** for pre-built topics and **User intents that need topic flows** for intents and corresponding topics that can be created.

> **Tip:**
> To view details about a pre-built topic or user intent, select the card, and then click the Info icon (ⓘ) to open an overlay card. For more information, see Topic Recommendations cards.

What to do next

You can add a Topic Recommendation as a new topic or link it to an existing topic. You can also hide a recommendation from the list in aggregate view.

Add recommended topics and intents to Virtual Agent

After you run and review a Topic Recommendations report, select the pre-built topics and suggested intents to add to Virtual Agent.

Before you begin

Role required: virtual_agent_admin or admin

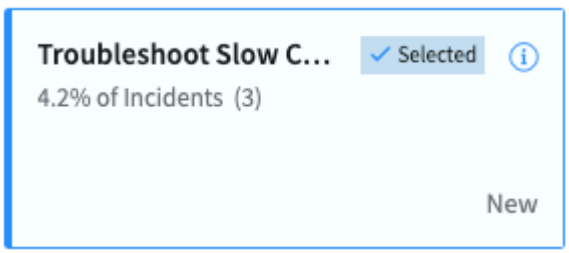
About this task

When you add a recommended topic to Virtual Agent, the Topic Recommendations app automatically does the following:

- Duplicates the pre-built topics that you selected.
- Creates empty topics for the intents you selected.
- If you're using ServiceNow NLU:
  - Creates a new NLU model if it doesn't exist.
  - Updates and trains the NLU model with the added intents.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Topic Recommendations**.
2. Go to the analysis results for your data source.
3. Select one or more topic and intent cards to be added to Virtual Agent, and then click **Add to VA**.
   Selected cards are highlighted in blue and display as **Selected**, as shown in the following example.



4. If you're using ServiceNow NLU, select one of the following options in the **Model** list:
   - **Create new model**

     Select this option to create a new model group. If other languages are enabled for your instance, select the languages to add as secondary models in the group. Click **make primary** for the primary language in the group.

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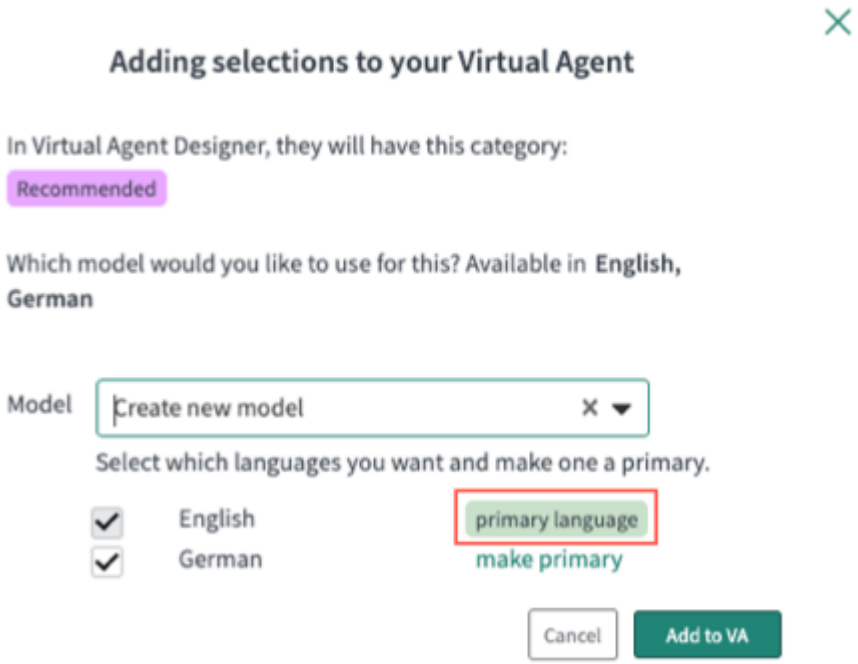
Adding selected recommendations to a new model group

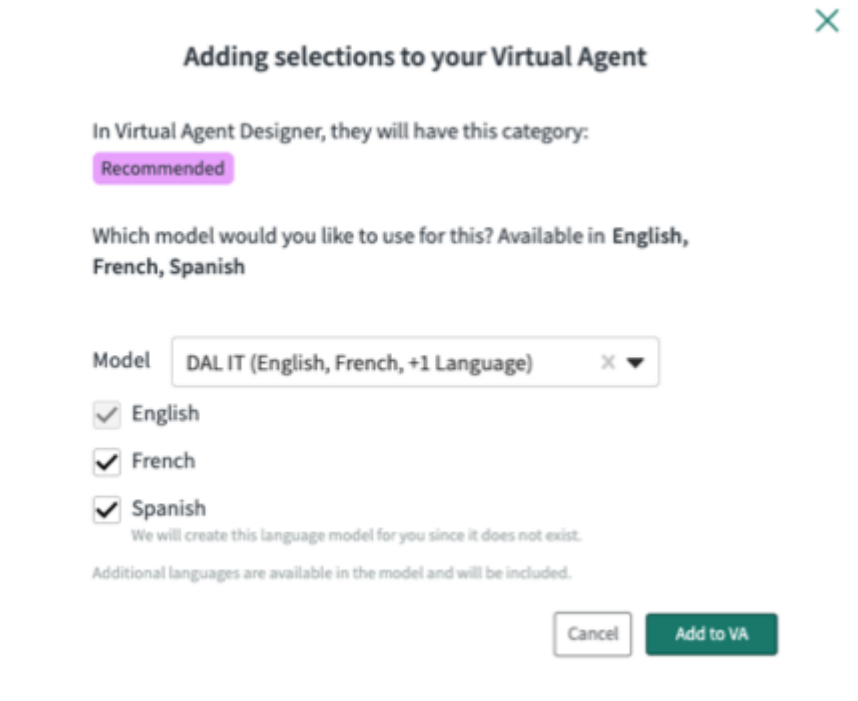


For more information about model groups, see Multilingual model management.

- An existing model name

  If other languages are enabled for your instance, select the languages to add as secondary models in the group.

Adding selected recommendations to an existing model group



5. Select **Add to VA**.

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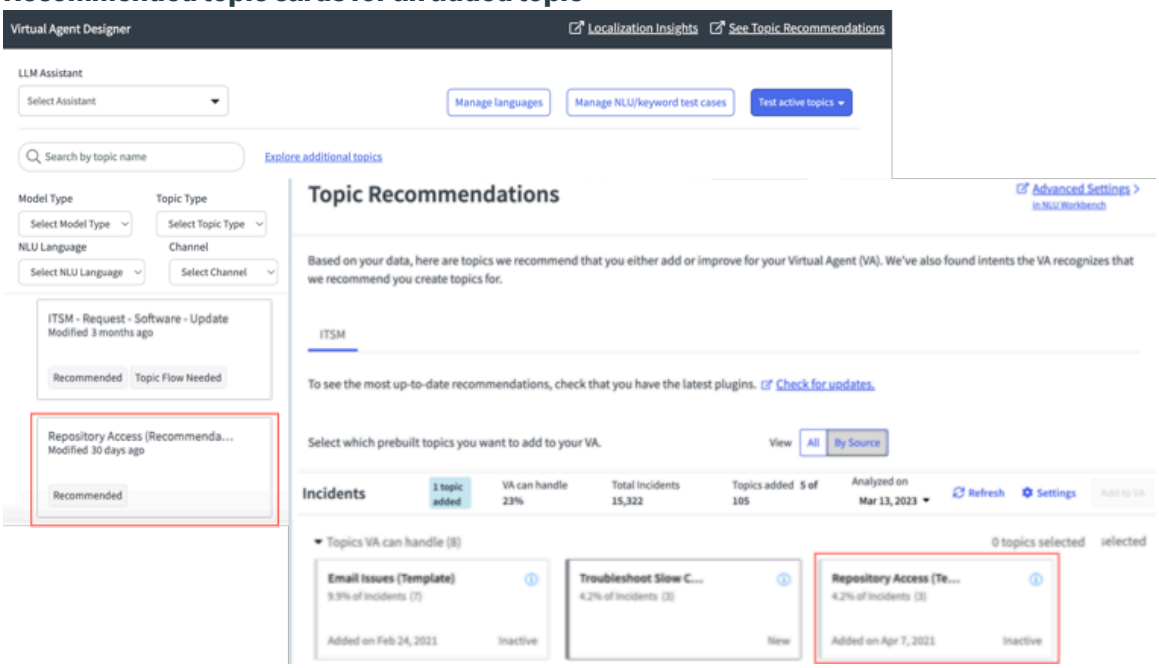
Result

For recommended pre-built topics, Virtual Agent duplicates the topic (but removes the *Template* portion of the file name). For recommended intents, Virtual Agent creates a new topic mapped to the intent. These topics are added to the **Recommended** category in the Virtual Agent Designer Topics page.

In the Topic recommendations page, the topic card shows the date it was added and its status (**Active** or **Inactive**). To open the new topic from the Topic Recommendations page, click the info icon to open the overlay card. Click the open link icon to open the topic in Virtual Agent Designer.

Recommended topic cards for an added topic



Link a topic recommendation to an existing Virtual Agent topic

Instead of creating a new topic from a topic recommendation, you can link it to an existing topic. This lets Virtual Agent know that you have a topic that addresses the recommendation.

Before you begin

Role required: virtual_agent_admin or admin

About this task

If you continue to get recommendations for an active topic after linking it, the topic probably needs improvement.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Topic Recommendations**.
2. Select the info icon to open the overlay card for a topic that has a **New** status.
3. At the bottom of the overlay card, select **Here's how to link to an existing topic**.
   Select the link as shown in the following example.

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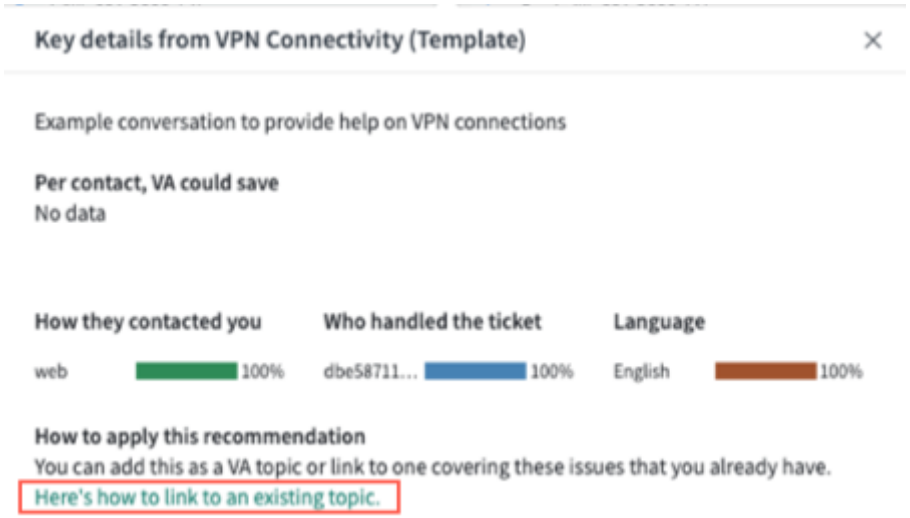
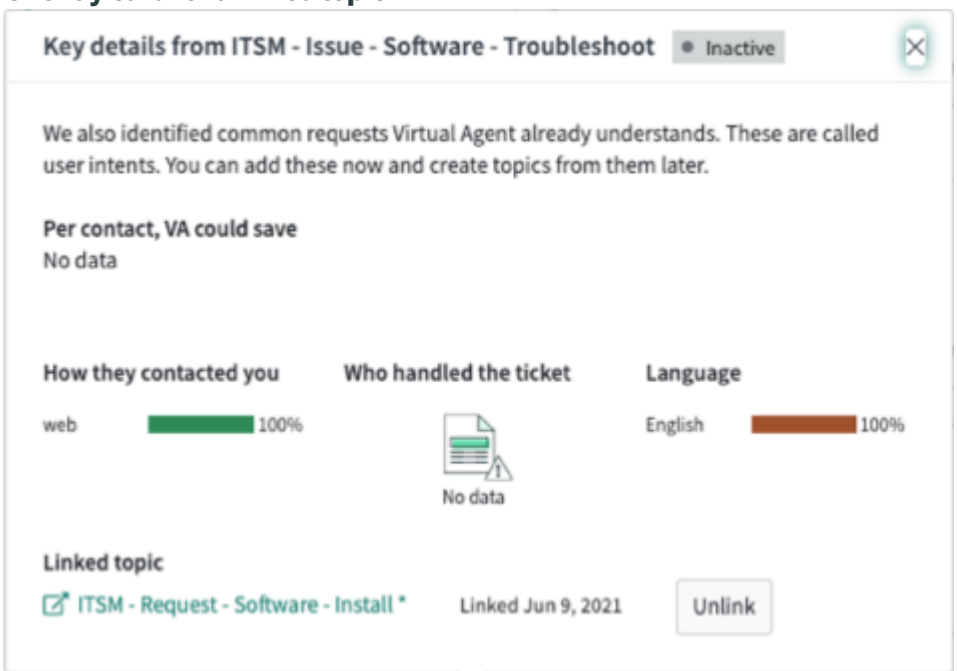


4. In the dialog box, select a topic in the **Find topic to link** list.
5. Select **Link topic**.

Result

The overlay card shows that the recommendation is linked, as well as the date this occurred.

Overlay card for a linked topic



If a topic recommendation continues to appear in your analysis results after you linked it to a topic, you may want to revisit the topic to improve its effectiveness.

You can also unlink a topic recommendation from a Virtual Agent topic.

Unlink a topic recommendation from a Virtual Agent topic

You can unlink a topic recommendation from a topic. This lets you link it to a new or alternate topic.

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Before you begin

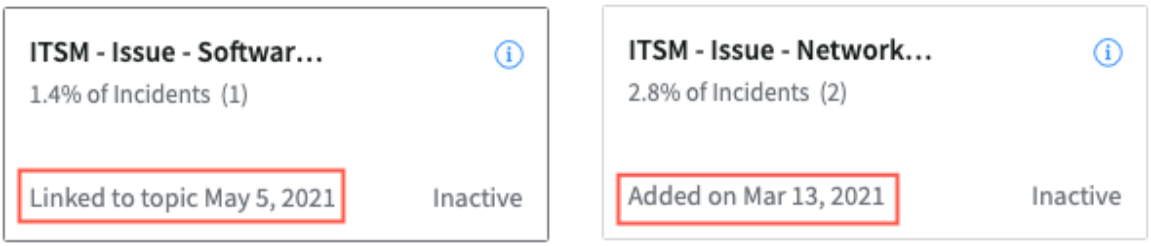
Role required: virtual_agent_admin or admin

About this task

You can either add a recommendation as a new topic or link it to an existing topic. If you link it to an existing topic, you can always unlink it later if you need to. Added topic recommendations create an empty topic that you provide with a workflow, so you can't unlink them using this method.

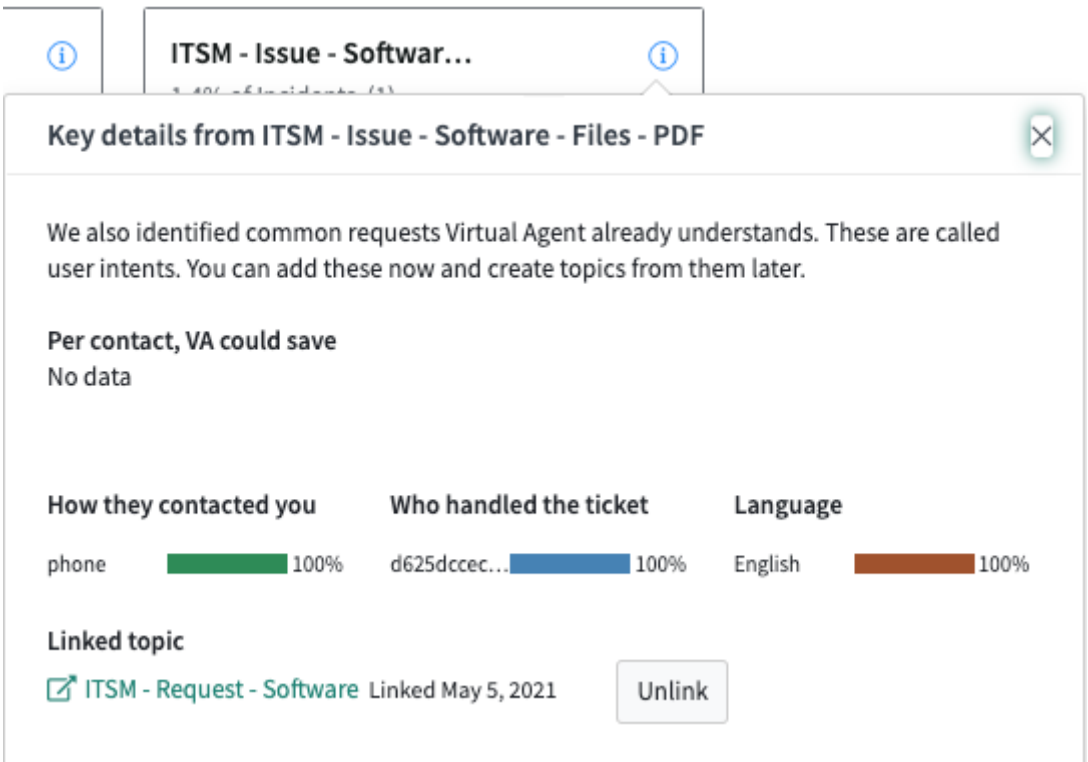
The following example shows the difference between a linked recommendation and an added recommendation.

Example of linked and added cards in the Topic Recommendations page



Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Topic Recommendations**.
2. Select the info icon (ⓘ) to open the overlay card for a linked topic.



3. Select **Unlink**.

Result

Unlinked recommendations are set to **New** status. You can link it to another topic, or add it to Virtual Agent as a new topic.

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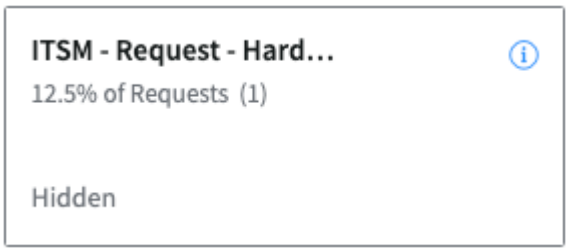
Note:
If you added a topic to Virtual Agent for a recommendation, it is not shown as linked, so you can't unlink it. To reset an added recommendation as **New**, delete the topic that was added in Virtual Agent Designer.

Hide a topic recommendation

You can choose to ignore a topic recommendation by hiding it. Doing so hides it for everyone on the instance. You can still view hidden recommendations and show it again later.

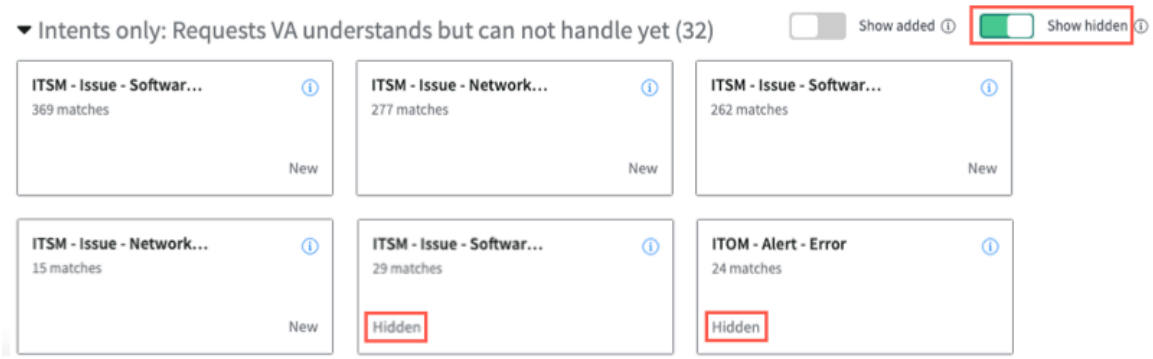
Before you begin
Role required: virtual_agent_admin or admin

About this task
Topic recommendations are hidden only when **View** is set to **All** (aggregate view). Hidden recommendation cards will still display when **View** is set to **By Source**. The status on the card is **Hidden**.



Procedure
1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Topic Recommendations**.
2. Select the info icon (ⓘ) to open the overlay card for a topic that has a New status.
3. Select **Hide**.

Result
The recommendation is hidden from the list. To view hidden recommendations, slide the **Show hidden** toggle switch to enable it.



To return a recommendation's status to New, select the info icon (ⓘ) to open the overlay card for the topic, and then select **Don't hide**.

Troubleshoot issues with Topic Recommendations

Investigate and resolve unexpected behavior with Topic Recommendations, or find answers to common questions.

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For information about using Topic Recommendations, see Quick start for Topic Recommendations.

Note:
Topic Recommendations tries to train the model when you add new topics to Virtual Agent. If an error occurs during training, the topic is still added, but the model remains in a draft state.

Issue	Solution
Topic Recommendations page is blank	No analysis reports have been configured. Configure an analysis report. You can also install or activate ITSM Virtual Agent Conversations, which will add default configurations to Topic Recommendations. For more information, see Set up ITSM Virtual Agent.
Error when adding topics to Virtual Agent	Check the error log for details: 1. Navigate to **All** > **System Logs** > **System Log** > **Errors**. 2. Find the entry that has a value of **sn_topic_recommend** in the Source column. The Message field displays the error. **Note:** If model training fails while adding topics, Topic Recommendations will ignore those errors and continue to add your recommendations. In this case, you will be notified that the models are in draft state.
Reports have intent matches, but no pre-built topic matches	Make sure ITSM Virtual Agent Conversations is installed and activated for the instance. If the app is installed, then none of the pre-built topics address the issues found in your reports. For more information, see Set up ITSM Virtual Agent.
Analysis reports are not available in production instances	This is the expected behavior. Analysis reports and Intent Discovery are designed to live in one instance only. Added topics and NLU models are made available in a "new" instance, but the Topic Recommendations reports do not move between instances.
Analysis report is stuck and says "Analysis in progress"	Check the status in the Discovery Report Definitions table: 1. Navigate to **All** > **sn_nlu_discovery_report_definition.list**. 2. Sort the table on the Created column, and then find the name of the affected analysis definition. 3. If the Status column is empty, the analysis failed. Try running it again. You can also navigate to **NLU Workbench** > **Intent Discovery** to see if something went wrong in the intent discovery process. For more information, see Intent Discovery.

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Issue	Solution
Adding new topics takes longer than expected	Try the following: • Navigate to **All** > **sn_topic_recommend_topic_staging.list** and view the Status column to see what stage topic generation is in. Training models can take some time. • Navigate to **All** > **System Logs** > **Events** to see which event ran last or if the event is queued. • If the reason for failure is not clear, navigate to **All** > **sn_topic_recommend_topic_staging.list** and change the value of the Status field to `Error`. You can then try to add the recommendation again.
Can't generate a report with less than 10,000 or more than 300,000 records	Topic Recommendations currently supports a minimum of 10,000 records and a maximum of 300,000 records. This is done for performance and to ensure a statistically significant data set.
Model is not preselected in the app	If you are upgrading from Quebec and this is your use of the Topic Recommendations app, you must select a model. Once you select a model, Topic Recommendations preserves the selection.
Unmigrated model support	While you are encouraged to migrate your models to groups, Topic Recommendations does not require models to be grouped.
Unlinked topics	You don't have to link all recommendations. Topic linking is a way to "acknowledge" a recommendation if you have an existing topic.
The **Topics/ Requests VA Can Handle** tab is not displayed	System property `glide.ui.escape_all_script` is not set to True. Navigate to **ALL > sys_properties.list** (or **ALL sys_properties_list.do**). Search for and select `glide.ui.escape_all_script`, then set its Value to **True**.

Topic Recommendations interface reference

The Topic Recommendations app provides two main pages: a configuration page and the Topic Recommendations page, where you find any recommended topics.

For more information about the Topic Recommendations user interface, see the following topics:

- Topic Recommendations settings
- Topic Recommendations page
- Topic Recommendations cards

Topic Recommendations settings

Use the Topic Recommendations settings page to configure analysis reports based on your ServiceNow® data.

You can find the Topic Recommendations settings in the Conversational Interfaces Chat Settings (**All** > **Conversational Interfaces** > **Settings**) under Virtual Agent. When you first install Topic Recommendations, nothing is configured, so the settings page appears empty.

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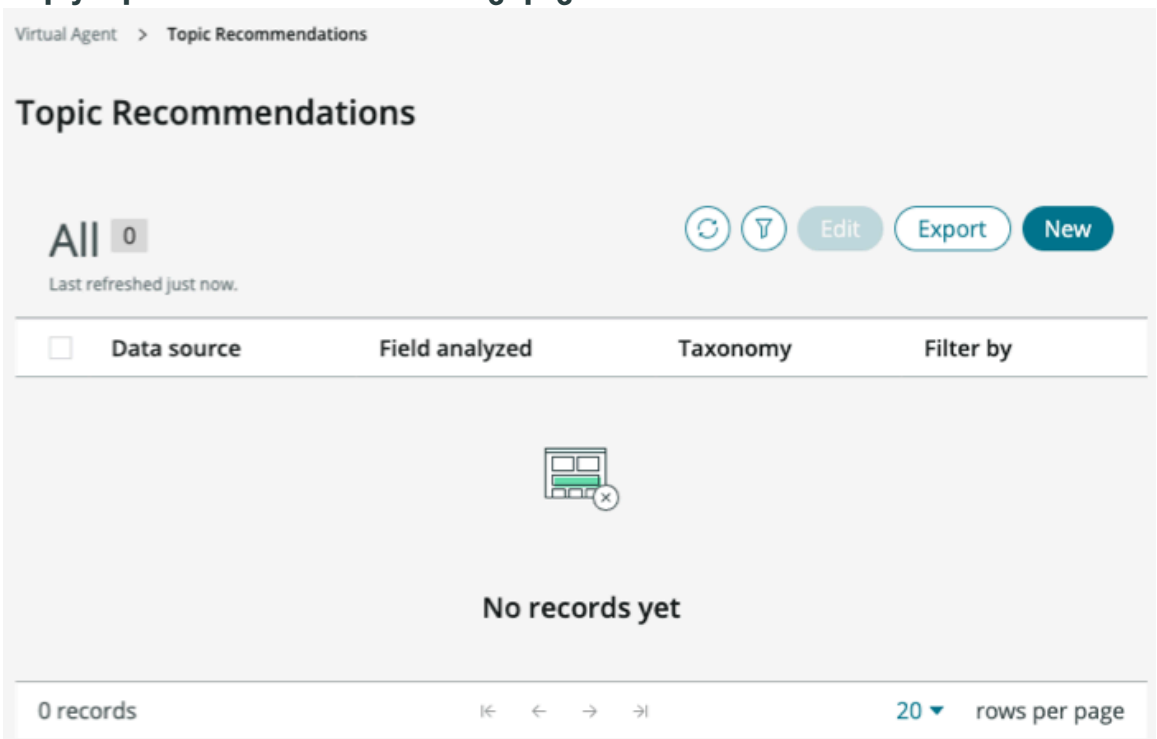
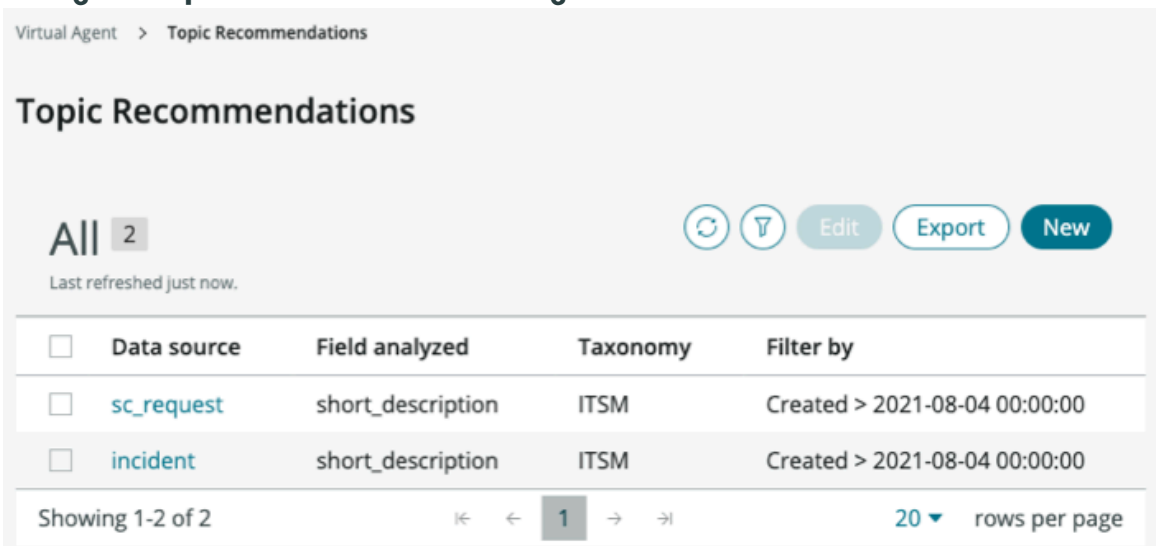
Empty Topic Recommendations settings page



Once configured, you can view or edit analysis reports on this page.

Configured Topic Recommendations settings



Topic Recommendations analysis settings

When you create or edit a Topic Recommendations analysis record, specify the information in the following form.

Default settings for Topic Recommendations

Field	Description
Data source	ServiceNow table that contains the data to be analyzed.

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Default settings for Topic Recommendations (continued)

Field	Description
Field analyzed	Field (string column) in the table to be analyzed. For example, the **Short description** in the Incident table.
Taxonomy	Comprehensive list of intents for a specific business application, such as ITSM.
Filter by	Condition builder for filtering the records to be analyzed. Click **Set conditions** to open the condition builder. The default filter is **[Created] [after] [Last 90 days]**.
Frequency	The schedule for running the analysis, which is triggered through the Run Topic Recommendation Reports scheduled job: • None • Every Month • Every 3 Months • Every 6 Months • Every 12 Months **Note:** If you're using a non-production instance for testing, set the analysis schedule in your production instance so that it and your analysis history are retained. The intent discovery process works best in a single instance, where data is not promoted between instances.

Related topics

Configure analysis reports for Topic Recommendations

Topic Recommendations page

Use the Topic Recommendations page to run analysis reports, view recommendations, add topics to Virtual Agent, or link a recommendation to an existing topic.

View all recommendations (aggregate view)

Topic Recommendations shows all results in this view by default. This view allows you to run or refresh analysis reports for all configured sources at one time. The configured sources for the recommendations are listed as hyperlinks. Click the link to open the settings for the report. If a recommendation has a New status, you can select it, and then click **Add to VA**.

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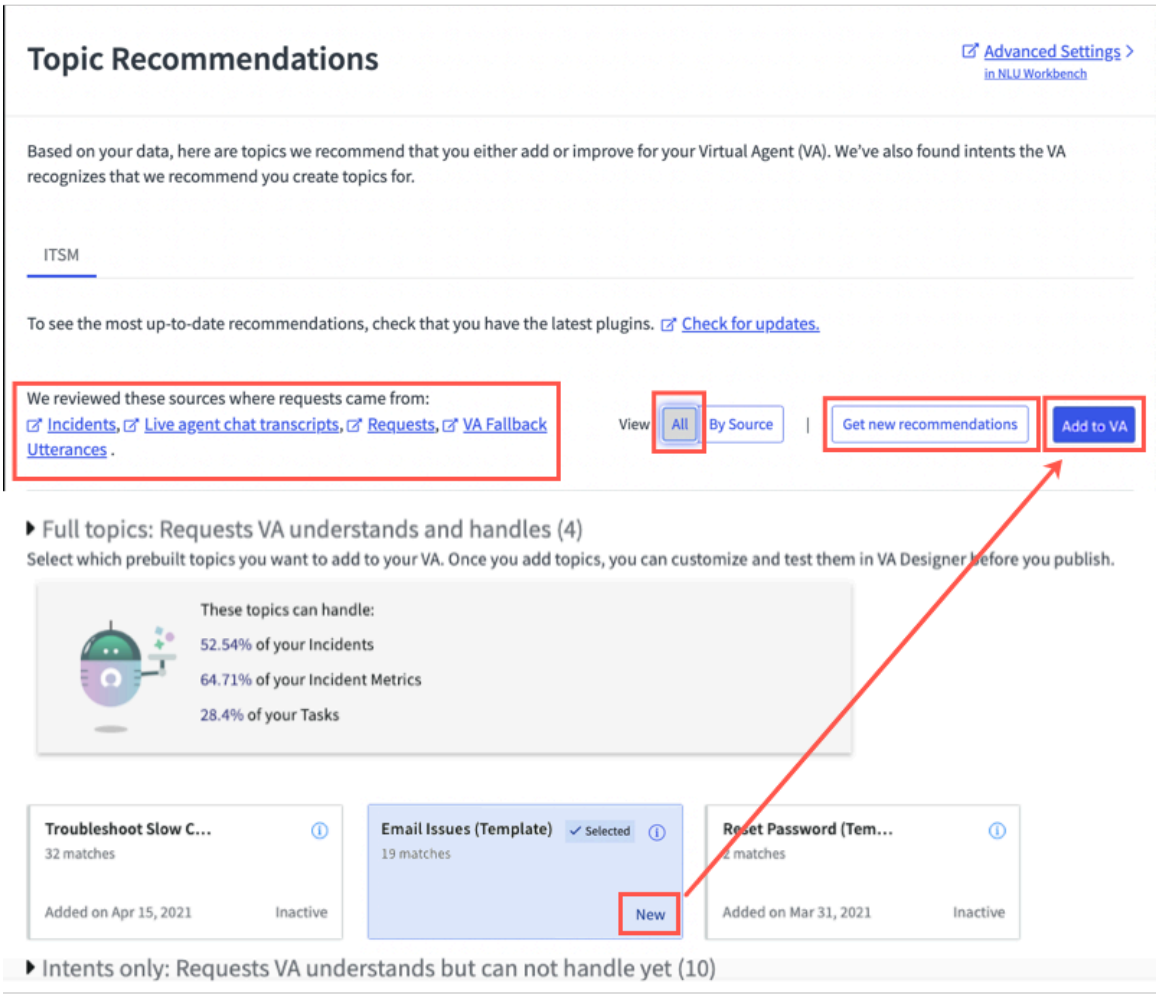
Default (aggregate) view



View recommendations by source

You can view topic recommendations by their data source. This lets you run a new analysis or refresh an existing analysis for a single data source, rather than running all of them at once. Click **Settings** to view the report's settings. If a recommendation has a New status, you can select it, and then click **Add to VA**.

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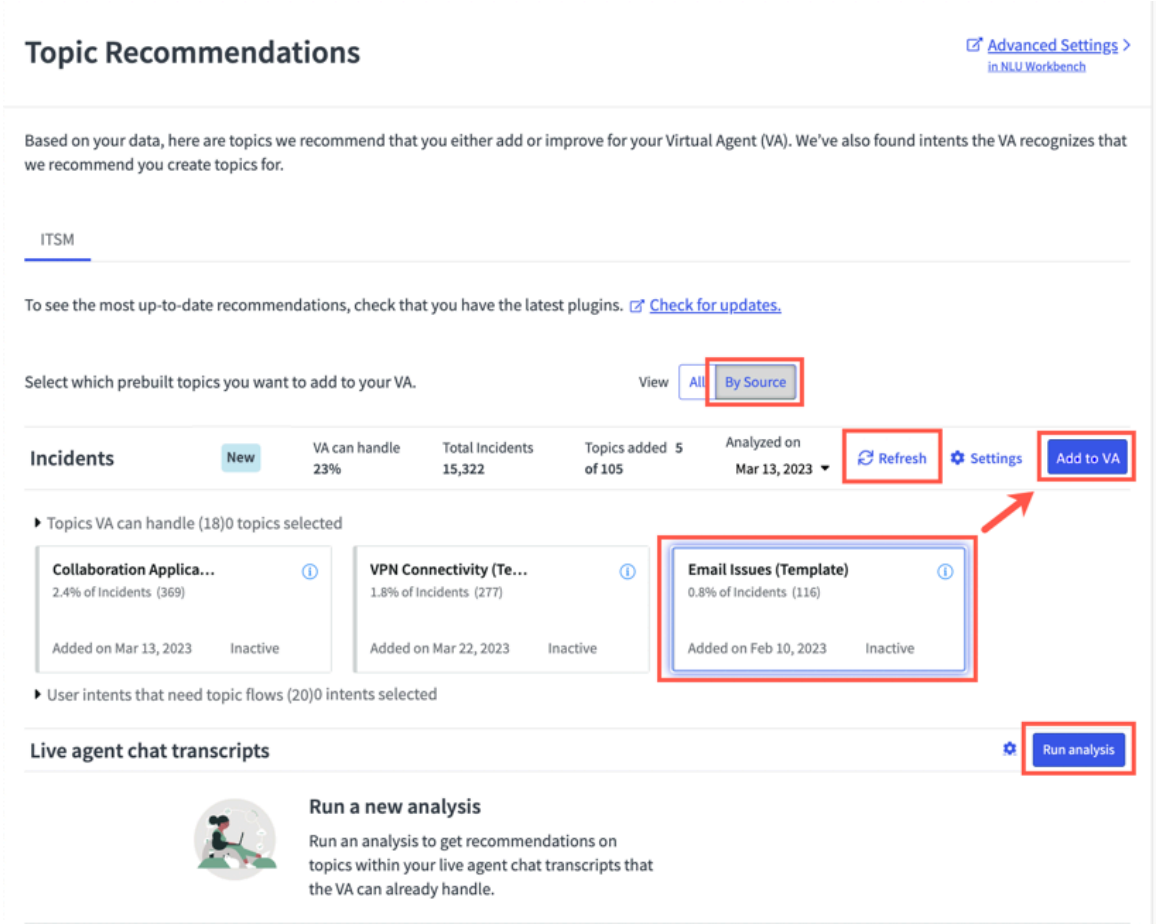
Topic Recommendations page in source view



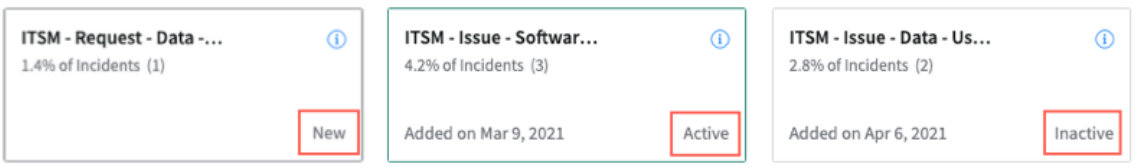
Topic Recommendations cards

Recommended topic and intent cards display the status of the recommendation, allowing you to track them more easily over time.

Card status

Topic and intent recommendations appear as cards. The status lets you know what action has been taken, if any, for each recommendation.

Example intent recommendation cards



Topic and intent card statuses

Status	Description
New	Topic or intent has never been added to Virtual Agent. Cards with **New** status have a dark gray border.
Active	Topic or intent was added to Virtual Agent or linked to an existing topic and published. Cards with **Active** status have a green border.

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Topic and intent card statuses (continued)

Status	Description
	If you keep getting recommendations for an Active topic, it probably needs improvement.
Inactive	Topic or intent was added to Virtual Agent but never published, or it was linked to an existing, unpublished topic. Cards with **Inactive** status have a light gray border. If you keep getting recommendations for an Inactive topic, take steps to publish it and make it active.
Hidden	Topic or intent was not added to Virtual Agent, but it was marked as hidden from the aggregate view and has a status of **Hidden**.

Overlay cards

To get more details about a pre-built topic or user intent, select the recommendation card, and then click the info icon to open an overlay card.

The overlay card includes a description of the pre-built topic or user intent and the following information, which can provide insight into why the topic or intent was recommended.

Label	Description
Per contact, VA could save	How long it takes for Virtual Agent to resolve an intent (displayed in minutes).
How they contacted you	The way in which users engaged with support. For example, **phone** or **email**.
Who handled the ticket	The assignment group.
Language	The languages of users interacting with support for this issue.
Topic completion	Graph that shows a snapshot of topic completion over a window of time. This information displays for active topics only.
Status area	
This section displays one of the following statuses.	
How to apply this recommendation	Suggestions for an unused recommendation. You can do one of the following: • Select the card, and then click **Add to VA** to create a new topic. • Link the recommendation to an existing topic.
Added topic recommendation	Displays the name of the topic that was added for the recommendation, as well as the date when it was added. Click the open link icon to view the topic in Virtual Agent Designer.
Linked topic	Displays the name of the topic that was linked, as well as the date when the recommendation was linked.

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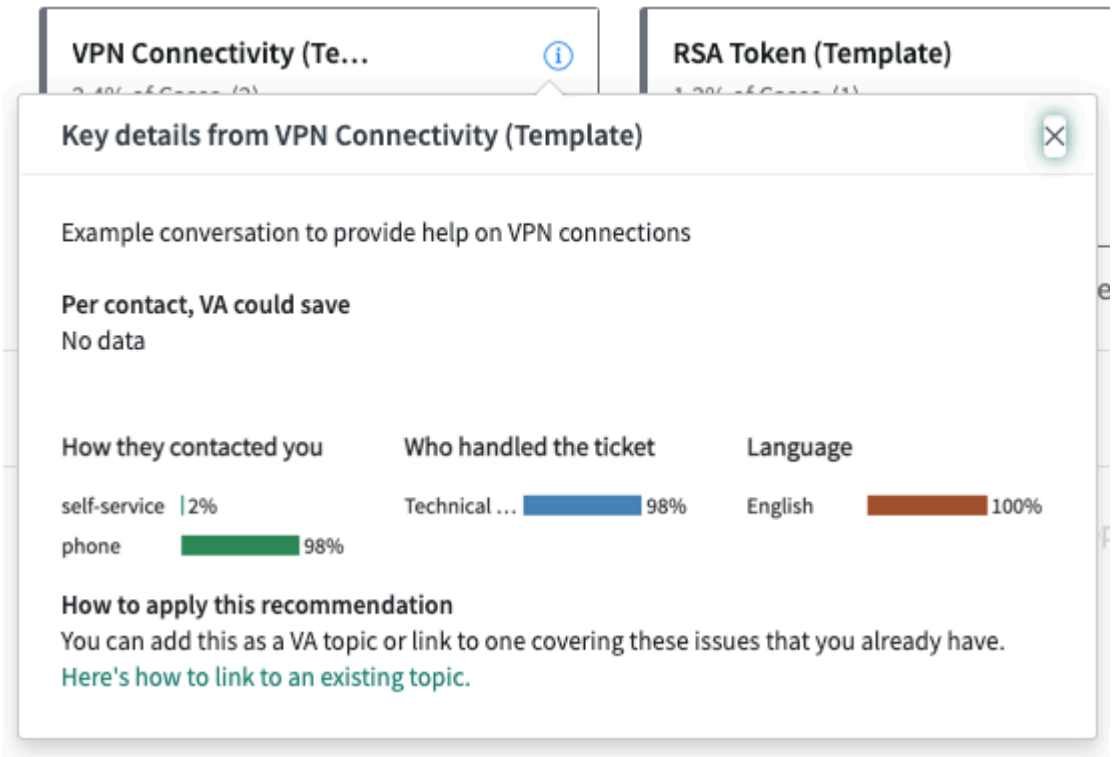
Label	Description
	Click the open link icon to view the associated topic in Virtual Agent Designer. You can also unlink the topic from the recommendation.

Example overlay card



Using Issue Auto Resolution

You can proactively deflect issues and expedite the resolution process for your agent and user with the Issue Auto Resolution (IAR) application. Through machine learning and Natural Language Understanding (NLU), users get immediate self-service and can access Virtual Agent topics, Knowledge articles, and catalog items.

How Issue Auto Resolution works

When a user creates an issue, the Issue Auto Resolution application uses machine learning and NLU to identify the criticality of the issue, the intent, and an appropriate Virtual Agent topic for an automatic resolution. If a Virtual Agent topic isn't found, Issue Auto Resolution does an AI Search to return the most appropriate Knowledge articles, FAQs, or catalog content. The deflection content is then delivered to the user through the configured response channel, such as email, short messaging service (SMS), or Virtual Agent.

Issue Auto Resolution Admin Console

As an administrator, you use the IAR Admin Console to set up the Issue Auto Resolution application, review how configurations may perform based on historical data (simulations), and track performance. You can also see the total cases processed, the solutions identified by the Issue Auto Resolution application, and the cases closed by the user.

To view the IAR Admin Console, navigate to **All> Issue Auto Resolution> Overview**. The Overview page contains an FAQ section that provides tips for how certain features work. You can also find a section where you can upgrade your IAR.

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Issue Auto Resolution use cases

To learn more about the use cases for Issue Auto Resolution for ITSM and HR Service Delivery, see Issue Auto Resolution for ITSM Virtual Agent and Issue Auto Resolution for HR Service Delivery.

Configure and run an Issue Auto Resolution simulation

Use the incident data from your organization to run simulations from the matching intents that the Issue Auto Resolution application based its predictions on from the case descriptions.

Before you begin

Role required: virtual_agent_admin or admin

About this task

You can run multiple simulations for a Issue Auto Resolution (IAR) configuration. You can also do the following tasks:

- Cancel a simulation: Stop a simulation in progress.
- Refresh simulation status: Check the status of a simulation in progress.
- Delete a simulation: Delete a simulation configuration, but not while a simulation is running.

Procedure

1. Configure and configure an IAR simulation.

   a. Navigate to **All** > **Issue Auto Resolution** > **Simulations** > **.**.

   b. Select **New** or **Create new simulation** if you don't have an existing simulation.

   c. On the form, fill in the fields.

Create new simulation

Field	Description
Name	Name of the simulation configuration.
Auto Resolution configuration	Table that contains the records to be simulated. The default configuration is for incidents.
State	Simulation status: ▪ **Ready**: Simulation is ready to run. ▪ **Running**: Simulation is in progress. ▪ **Canceled**: Simulation stopped. ▪ **Complete**: Simulation finished. ▪ **Error**: Simulation encountered a processing error, but continues the simulation for the next set of records.
Record set	Condition that identifies the records evaluated in the simulation. For example: **[Active] [is] [true]**. This condition is automatically filled in with the conditions that you specify in your incident

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Field	Description
	configuration, but you can modify the conditions as needed. **Note:** Record sets that return a large number of records can take longer to simulate. To reduce the simulation time, consider changing the record set to return a smaller number of records. 50,000 is the maximum record limit for each simulation run.

d. Select **Save**.

2. After the new simulation is created, select **Run**.
   The simulation may take a bit more time depending on the number of records that you have. After a run is completed, you see the **Latest resolution potential** and other simulation results.
3. To specify a time and schedule to run the simulation instead of manually running one, select **Enable scheduled job**.
   You can run the simulation on a daily, weekly, or monthly basis at a specific time, in hours, minutes, and seconds. After you set up the schedule, select **Save**. To cancel your scheduled job, disable **Automatically run this simulation**. For each simulation run, the following information is displayed:

Simulation results

Field	Description
Start time	Date and time that the simulation started.
Completed time	Date and time that the simulation ended.
Progress	Percentage of the simulation performed.
Latest trained version	Version number of the machine learning model used for the simulation.
State	Status of the simulation: ○ Complete: Simulation completed its run. ○ Ready: Simulation is ready to run. ○ Running: Simulation is in progress. ○ Canceled: Simulation stopped. ○ Complete: Simulation finished. ○ Error: Simulation encountered an error.
Total records	Total number of records evaluated in the simulation.
Resolution rate (%)	Percentage of cases that the simulation has predicted that match active intents with active topics.

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4. View the simulation details of the individual run by selecting the link within **Runs > Start time**.

Run details

Field	Description
Resolution potential	Percentage of incidents that have active intents and are mapped to active topics.
Inactive topics	Virtual Agent topics currently mapped to intents that aren't active and not visible to users. Select an active topic by using the intent to topic map table in the IAR configuration, or go to Virtual Agent Designer to activate the topic.
Mapped intents: Active	Intent that was successfully predicted from the case description and is active in your intent to topic map table.
Mapped intents: Inactive	Predicted intents that are available but not active in your intent to topic map table.
No intents found	Description in the records didn't match any of the intents available.
Unmapped intents	Intent that was successfully predicted from the case description, but the intent itself hasn't been added to the intent to topic map table in the configuration. To increase the coverage for those incidents, add those additional intents to the table.

Issue Auto Resolution configuration settings

Learn about the different configuration settings that you can use for the Issue Auto Resolution (IAR) application. For example, you can see the status of your Issue Auto Resolution configurations and decide to turn off or edit each configuration setting to fit your organization's needs.

The following tables show the configuration settings that are available for Issue Auto Resolution

Note:

To modify your settings, navigate to **All > Issue Auto Resolution> Settings**.

Task configuration

Specify the tables, defaults, and task templates while processing the task.

Setting	Definition
Table	Name of the table for the Issue Auto Resolution application to process.
Invocation type	Trigger for theIssue Auto Resolution application either through a business rule when the case is created or an API on demand.

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Task configuration

Specify the tables, defaults, and task templates while processing the task.

(continued)

Setting	Definition
Assign to	Assignee for the case that is being processed by the Issue Auto Resolution application.
Requester	User requesting assistance on the issue.
Task assignment template	Template that sets the fields and values when it's being assigned to the user.
Task resolution template	Template that sets the fields and values when the user indicates that the issue is resolved.
Task completion template	Template that sets the fields and values during the interim state while the matched topic conversation flow runs.
Unresolved task template	Template that sets the fields and values when the end user requests agent assistance.

Entry & exit criteria

Set the entry & exit criteria for issues processed through an IAR.

Setting	Definition
Entry conditions	Records that are processed for the Issue Auto Resolution application. Only the issues that match the entry condition are processed by the Issue Auto Resolution application.
Exit conditions	Condition where the Issue Auto Resolution application stops processing when the machine learning process is complete.

Machine learning model settings

Select the machine learning models to be used by IAR. Choose a training language that you want to use and train the model for intent identification when required. The machine learning model contains English, Spanish, French, German, Japanese, Dutch, Italian, and Portuguese. To configure new languages for a user, add the language(s) in **Training detailsTraining language***, then select* **Train***. For more accurate intent prediction, tune and publish your model before turning on IAR. See Issue Auto Resolution Tuning in NLU*

Setting	Definition
Training language	Language in which the training must be performed for the machine learning model.
Configuration languages	Overview of the machine learning models associated with the Issue Auto Resolution configuration.

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Select the machine learning models to be used by IAR. Choose a training language that you want to use and train the model for intent identification when required. The machine learning model contains English, Spanish, French, German, Japanese, Dutch, Italian, and Portuguese. To configure new languages for a user, add the language(s) in **Training detailsTraining language***, then select* **Train***. For more accurate intent prediction, tune and publish your model before turning on IAR. See Issue Auto Resolution Tuning in NLU*

(continued)

Setting	Definition
Retrain frequency	Interval in which the machine model must be retrained with the training data.
Advanced	Advanced settings that you can enable.
Prediction fields	List of fields used as input for processing the issue.
Pre-processing extension	Server script to perform data cleanup or manipulation on the issue before it's processed by machine learning APIs. The pre-processing script is available only when your enable the Advanced setting.
Post-processing extension	Server script to perform additional actions on the results from machine learning APIs. The post-processing script is available only when you enable the Advanced setting.

AI Search settings

Setting	Definition
Apply AI Search	AI search results that are delivered if relevant Virtual Agent topics aren't found.
Search application	Detailed AI search settings, including the search source, number of search results to retrieve, and more.
Search results portal	Portal to be used in links while delivering recommendations to the users on any response channel.
AI Search display topic	Virtual Agent topic that performs AI search and presents the results.
EVAM definition	Definition of how search results from different data sources are displayed for the end users in cards and lists.

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Intent to topic map settings

Enter your intent and topic map to configure your resolutions using "true" or "false". Hover over and select "true" or "false" to edit.

Setting	Definition
Intent to topic map	List of intents and their associated Virtual Agent topics. When an issue is identified, the corresponding topic is delivered to the user for automatic resolution.

AI Search settings

Setting	Definition
Apply AI Search	AI search results that are delivered if relevant Virtual Agent topics aren't found.
Search application	Detailed AI search settings, including the search source, number of search results to retrieve, and more.
Search results portal	Portal to be used in links when delivering recommendations to the users on any response channel.
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Response channels settings

Admin users and users with the iar_admin role can configure where to deliver the resolutions, using Virtual Agent, Email, or SMS.

When at least one intent to topic map is active, the VA response channel is mandatory. When AI Search is enabled, one of the three response channels needs to be mandatory: email, SMS, or VA.

When VA is selected as a response channel, the user will also receive an additional comment on the portal prompting them to open VA to respond to the notification. Email templates have also been updated to show a preview of AI Search topics to give end users a better idea of the content itself in the email.

These are the pre-requisites for response channels.

- **To add Virtual Agent as a response channel, install Glide Virtual Agent and enable Virtual Agent on Service Portal. Notifications must be enabled on at least one active channel. Depending on your organization's needs, admin users can also install Conversational Integration with Microsoft Teams on Slack.**
- **To add email as a response channel, ensure email sending is enabled in Notifications. To learn more about setting up email notifications, see Outbound mail configuration.**
- **To add SMS as a response channel, install the Twilio Notify app and set up the Conversational SMS Integration with Twilio.**

Setting	Definition
Follow up sequence	Options on how to deliver the deflection content to your users: • **All**: Delivers the deflection content to the user on all available response channels. • **First match**: Delivers the deflection content on an active channel where the user is available, in the order defined by the response channels list.
Response channels	List of available response channels to send the user deflection content. When you set the **Follow up sequence** to **First match**, the response channel order determines the channel that is used to contact the user. You can adjust the order number to change the priority sequence. You must set up the email properties to set **Email** as an active channel.

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- **To add SMS as a response channel, install the Twilio Notify app and set up the Conversational SMS Integration with Twilio.**

(continued)

Setting	Definition
	The Glide Virtual Agent plugin is required, and Virtual Agent notifications must be enabled to set Chatbot as an active response channel. You must configure Twilio Notify to set SMS as an active response channel.
Initial recommendation email	Email template used to deliver the deflection content to users when the AI search recommendations are found.
Catalog submitted email	Email template used to notify users when a catalog item is submitted from recommendations made by the Issue Auto Resolution application.
Notify SMS phone	Twilio Notify phone number to be used to deliver SMS to users.
Initial recommendation SMS	SMS template used to deliver the deflection content to users when AI search recommendations are found.
Catalog submitted SMS	SMS template used to notify users when a catalog item is submitted from

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- **To add SMS as a response channel, install the Twilio Notify app and set up the Conversational SMS Integration with Twilio.**

(continued)

Setting	Definition
	recommendations made by the Issue Auto Resolution application.

SLA & reminders

You can select if you wish to use the SLA engine versus the Task SLA.

Setting	Definition
Use SLA engine	Task-based SLA engine that provides additional flexibility and functionality.
Auto resolution reminders	List of reminders and the Email and SMS templates used to deliver reminders. SLA percentage at which to send the reminder using the Email and SMS templates. To send automatic resolution reminders, you must set **Use SLA engine** to **true**. **Note:**

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SLA & reminders

You can select if you wish to use the SLA engine versus the Task SLA.

(continued)

Setting	Definition
	The SMS Notification template is only available when the Notify app is installed.
Task SLA	Duration that an issue is assigned to the Issue Auto Resolution application before it's automatically reassigned to a live agent, if not yet resolved.

Review

Setting	Definition
Review	Opportunity to review your configuration before you select **Enable IAR**.

Issue Auto Resolution diagnostic chat

Admin users can initiate a chat conversation to troubleshoot the settings and functionality of Issue Auto Resolution if an issue arises that wasn't addressed as expected.

Enabling diagnostic chat

To enable the Issue Auto Resolution diagnostic tool, an admin user must set certain Restricted Caller access records to **Allowed** on the Restricted Caller Access Privileges table.

To identify the records to allow, follow these steps:

1. Navigate to **All** > **System Applications** > **Application Restricted Caller Access**.
2. Filter the records by `Source=76fec17dc0e1d5d0f877e9d0ea777a12` (Script Include: IARIssueNotAssignedDiagnostic).
3. Navigate to each record and change the status to **Allowed**.

Diagnostic conversation flows

The admin user enters `IAR` in the chat window to initiate a conversation about Issue Auto Resolution, and then selects one of two issues:

- An Incident or case isn't getting assigned to the Bot user.
- An Incident or case isn't going through Issue Auto Resolution.

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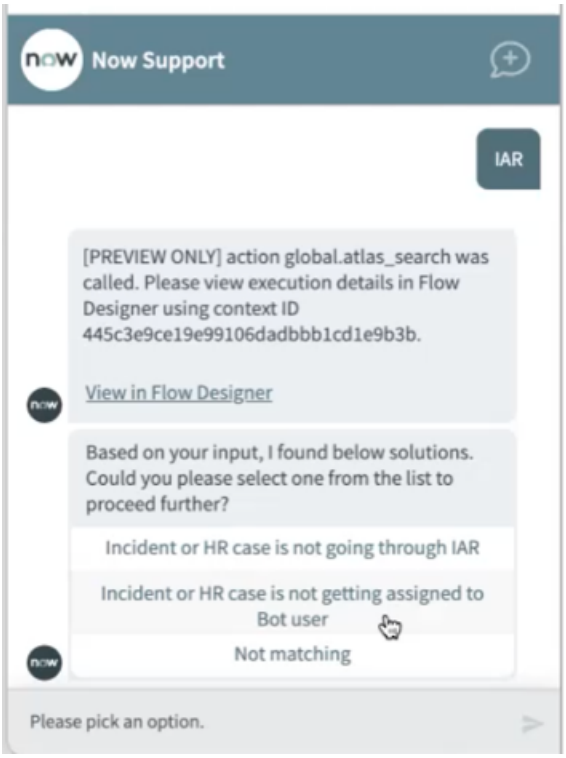
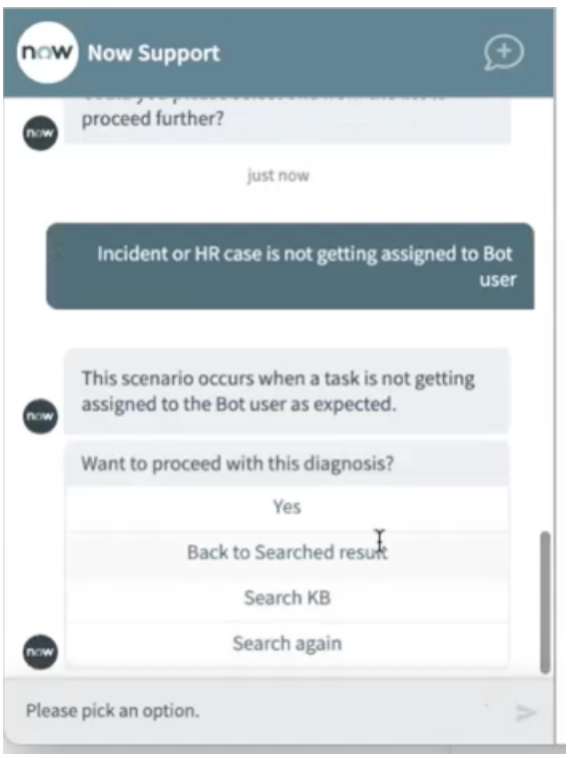


Conversation flow: Incident or HR case is not getting assigned to bot user

1. Confirm your selection, return to search, or search KB articles.



2. Select the type of case or Incident with which you need help, or choose to search all Issue Auto Resolution configurations.

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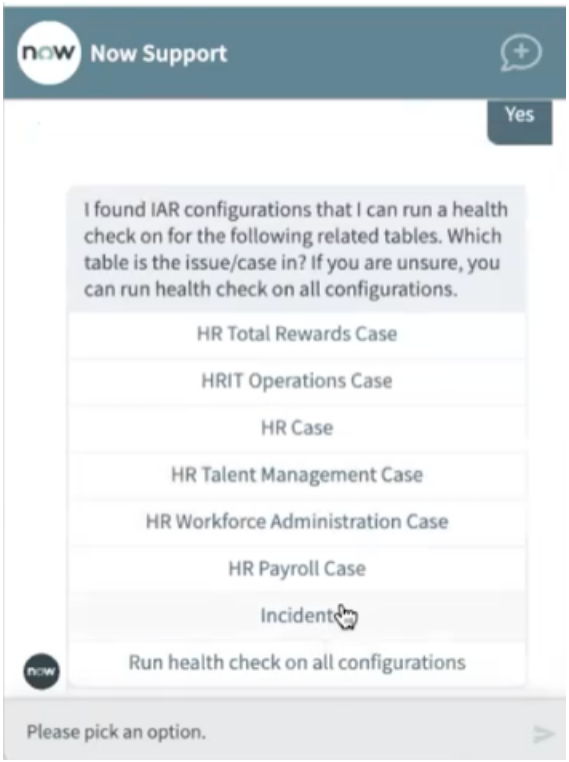

3. The diagnostic tool performs an analysis on Issue Auto Resolution configuration and settings and displays the results. The diagnostic confirms the following conditions:
   - The prediction server is up.
   - There are existing Issue Auto Resolution configurations.
   - The configurations are active.

   A health check for the selected configuration type also runs to determine if the Incident or case is properly configured for Issue Auto Resolution. The diagnostic for an Incident checks the following conditions:
   - Issue Auto Resolution configuration is active.
   - Language configuration is active.
   - There is an active response channel.
   - There is an active intent topic map for the Incident configuration.

   The diagnostic for a case additionally checks that AI Search has been enabled and doesn't check for an intent topic map. If all the settings are correct and the issue persists, the user can choose to continue the conversation.

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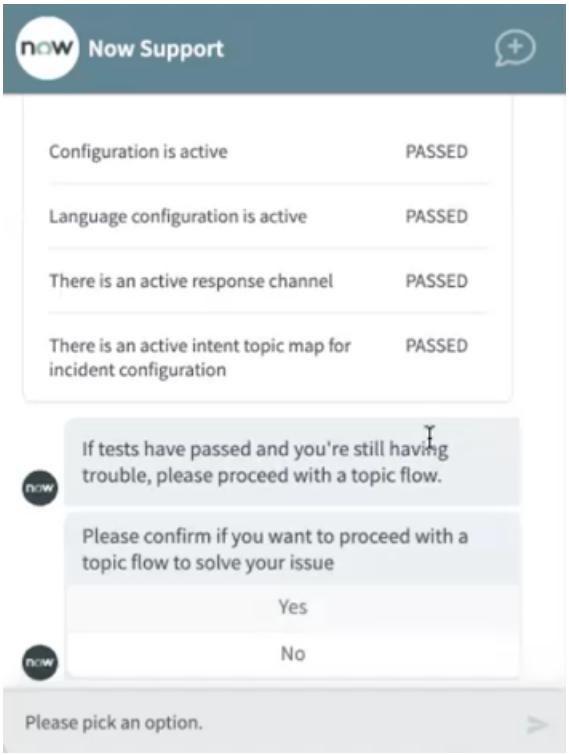
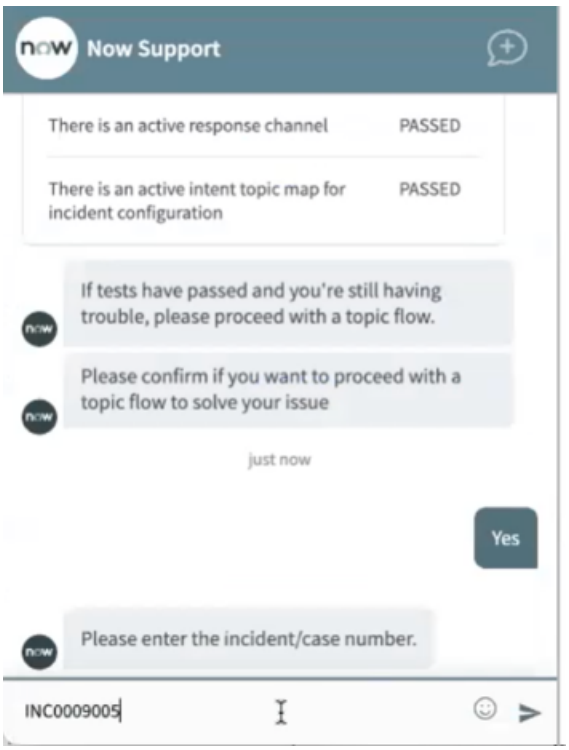


4. Enter the Incident or case number and confirm it's correct.



The bot asks you to confirm the number you entered.

5. The diagnostic tool analyzes the issue to determine if the following conditions are met:

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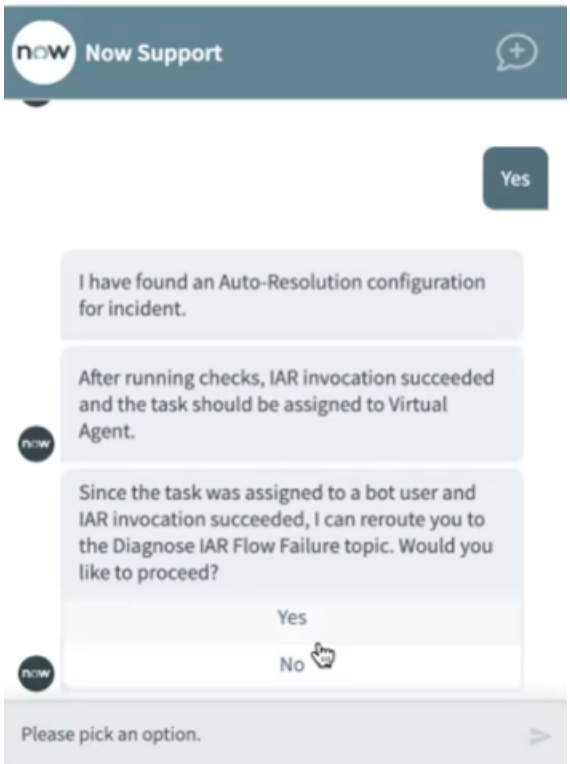
- The trigger condition on the configuration matches the Incident or case values.
- The business rule order is the highest.
- There's only one trigger business rule for Issue Auto Resolution on the Incident or case table and it's active.

If the suggestions don't resolve the issue, you can choose to run further analysis.

Conversation flow: An Incident or case is not going through Issue Auto Resolution

1. Confirm your choice to proceed diagnosing a functionality issue with Issue Auto Resolution.



2. The diagnostic tool checks the following conditions:

- The intent prediction was successful (Incidents only).
- The criticality is correct and AI Search is active (cases only).
- A notification was sent.
- The end user responded to the notification.

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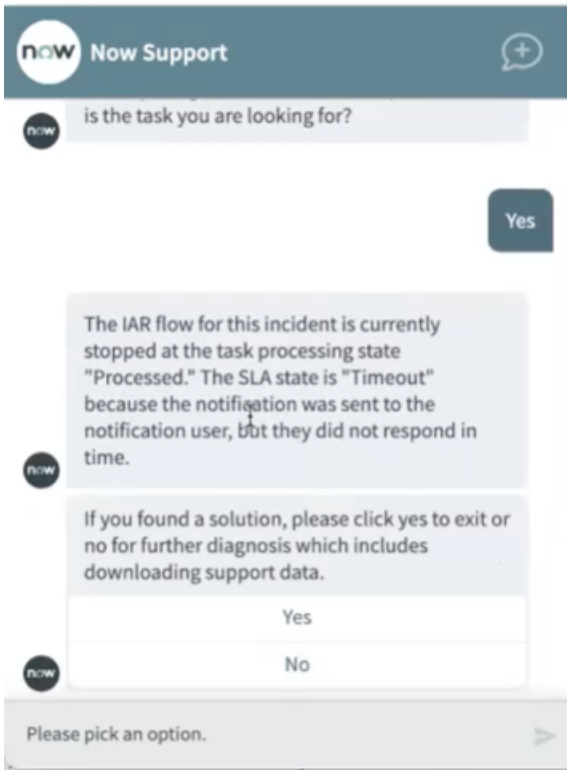
If any of these checks reveal an issue, the diagnostic tool displays a possible solution. Indicate whether these solutions resolved the issue, or choose to perform further analysis.



Related topics

Conversational Interfaces Diagnostic Tool

Getting started with Virtual Agent Designer

The Virtual Agent Designer is a diagram tool for creating and managing topics, which are blueprints for conversations between a virtual agent and user. You can design topics that help your users resolve common work issues or guide them through self-service tasks.

Virtual Agent conversations are defined in a topic. When building a topic, there are various components (controls) that you can use to build the logic of a conversation, as well as the responses that the user sees.

Virtual Agent can use either generative AI, Natural Language Understanding (NLU), or keywords to match the user's request with the appropriate conversation or topic. You can use generative AI through Now Assist in Virtual Agent to match the user's request with the desired conversation or topic. Now Assist in Virtual Agent uses large language models (LLMs) and generative AI skills to improve deflection rates and reduce the amount of time-consuming work that Natural Language Understanding (NLU) topic discovery requires. With Now Assist in Virtual Agent, you can test and publish your models from within Virtual Agent Designer.

With keyword topic discovery, the topic author associates keywords with the topic. With NLU topic discovery, the topic author associates the topic with an intent within an NLU model. An intent describes what the user wants to achieve. User utterances are matched with intents to determine the most appropriate topic for the user. Associating a topic with a model and intent is called mapping.

If you're using ServiceNow NLU, then Virtual Agent Designer integrates with NLU Workbench so that you can map topics to new or existing models and intents without leaving the interface. In

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addition, you can also modify utterances, test, train, and publish your models from within Virtual Agent Designer.

Virtual Agent Designer Topics page

When you open Virtual Agent Designer, the Topics landing page lists the objects in your instance. These objects include topics, topic blocks, custom controls, setup topics, and small talk topics. The Topics page lets you access, create, and edit these objects in Virtual Agent Designer.

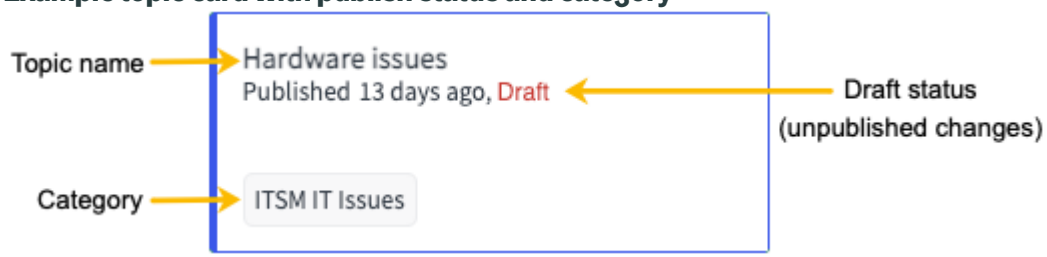
You can also test and preview active topics to verify that they work as intended. You can also sort and search for topics. When you have many topics, use the sort filters to quickly organize and find your topics. For more information, see Virtual Agent Designer Topics page.

Each topic card identifies the object and provides the following basic information:

- Name: Object name. If the object is a topic block or custom control, the icon for the object type is also displayed.
- Published status: Time (minutes, hours, days, or months) that the item was last published and state. The status also indicates if the object is read-only.

  Source template: Pre-built topics include the word `template` in the name. You can duplicate these predefined conversation templates and use them.
- Draft state: If you update a published item but have not yet republished it, the Published status is marked as Draft. This lets you quickly identify the items that are still in progress.
- Modified: Time (minutes, hours, days, or months) that the item was last updated.
- Category: Type of group to which the topic or object belongs.

Example topic card with publish status and category



Topic properties

Use the topic **Properties** tab to identify a Virtual Agent object and how it is used. The properties you can specify depend on the method of topic discovery used in your instance: LLM, NLU, or keywords. For example, if you enable NLU in the **General Settings** page, the **Properties** tab includes fields for identifying the NLU model and intent for the topic. Or if you've enabled Now Assist and are working with an LLM topic, the **Properties** tab includes fields for what you want the topic to do and which assistant(s) to use.

Use the Properties tab to do the following:

- Specify the name and type of object, such as topic, topic block, custom control, and so forth).
- Specify the model type, purpose of the topic, and which assistant(s) can run this topic for Now Assist customers.
- Control who uses the topic and what channels it can run in.
- Associate live agent variables with a topic.
- Add keywords to the topic or map the topic to a ServiceNow NLU model and intent.

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For more information, see Topic Properties tab.

Topic flow

When you create or update a topic, topic block, or custom control, you build the conversation flow in the **Flow** tab. In the default view, the flow looks like a diagram. Use the controls for user inputs, bot responses, and utilities to define the flow. The status of the topic and NLU model (if used) appears in the upper-right corner of the window.

The **Table View** option in Virtual Agent Designer displays the nodes in your conversation flow as a table, rather than as a diagram. Each node is identified in a corresponding row in the table. You can add, change, or delete nodes using these table rows.

For example, instead of dragging and dropping controls onto the canvas, you can select **Add new node** to insert a node into the appropriate row in the table. When you focus on a particular row (node), the corresponding property sheet for the node displays.

As you create or update your design, you might find it helpful to switch between the diagram view and the Table View using the **Table View** option. If your conversation contains many nodes, Table View lets you review all the nodes in your conversation quickly. You can use the **Search table** option to quickly find a particular node or control.

Use this tab to do the following:

- Design the flow of your topic.
- Define script variables for a topic.
- Use system-derived entities in your topic.
- Add nodeless NLU entities to your topic flow.

For more information, see Topic Flow tab.

NLU model and intent mappings

If you enabled NLU on your instance, the **NLU Intent** tab is available for your topics in Virtual Agent Designer. Once you've bound the topic to a model and intent on the **Properties** tab, you can use the **NLU Intent** tab to do the following:

- Review and edit utterances and associated entities.
- Train, test, and publish your NLU model.

  Test the topic model with user utterances to see if it triggers the appropriate intent and topic. You can also test entity recognition.

Note:
The virtual_agent_admin role includes the nlu_admin role, which enables topic authors to work on ServiceNow models.

For more information about this tab, see Topic NLU Intent tab.

Topic languages

The **Languages** tab displays the topic's translation status for languages that have been activated on the instance. If you're using NLU, you can also review the language mappings for that topic.

Use the **Languages** tab to do the following:

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- View translation status for activated language plugins.
- View and test the topic in a specific language.
- Edit the topic translations.
- Request topic translations in additional languages.
- View or modify NLU language mappings and entity mapping.

  For more information, see NLU model mapping in Virtual Agent Designer.

For more information about this tab, see Topic Languages tab.

Designing a Virtual Agent topic

Walk through the design of an example Virtual Agent topic that enables users to view incidents they submitted. The example highlights various design controls that can be used to build the conversation flow.

Using Virtual Agent tools and features, you can develop conversations that address many issues that can be resolved without human intervention. Once you become familiar with the product and its capabilities, your creativity is one of the most important tools for developing conversations.

To get started more quickly, the following resources are available for Virtual Agent:

Pre-built Virtual Agent topics, topic blocks, and ServiceNow NLU models

These pre-defined conversations help users with common self-service tasks in each business area, such as creating or updating cases or providing answers to frequently asked questions. Duplicate the pre-built topics you want to use, and then customize them for your organization.

Virtual Agent Topic Recommendations

Use the Topic Recommendations app to identify pre-built Virtual Agent topics that can be quickly implemented in your organization. Topic Recommendations uses Intent Discovery to analyze data from your organization and to find relevant pre-built topics that your organization can benefit from, and new topics that would be useful to create.

Getting started with conversation design

Use Virtual Agent Designer controls and reusable conversational elements to create the dialogue for your conversations between Virtual Agent and the end user. Before you begin, make sure you do the following:

Identify the use case for a conversation.

Determine who will use a conversation topic and the goal, such as solving a user problem or assisting with a self-service task. Besides gathering key requirements for your topic, identify the information that you need from the user to complete the goal.

For example, you can review your support requests over time and other available metrics to determine common issues, use cases, and customer requests or goals. From there, you can predict recurring requests or issues that a virtual agent could help with.

Determine the structure of a conversation.

As you think about your conversation flow, identify the direct path to resolution. Then consider alternate paths where the conversation might branch, depending

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on the information supplied by the user. Consider how to handle each branch and whether users might loop back to an earlier point in the conversation.

Conversations have a beginning (the greeting), a middle, and an end, which may include a survey or an incident number to follow up on. In the middle, consider how the user might need to switch topics, depending on the issue.

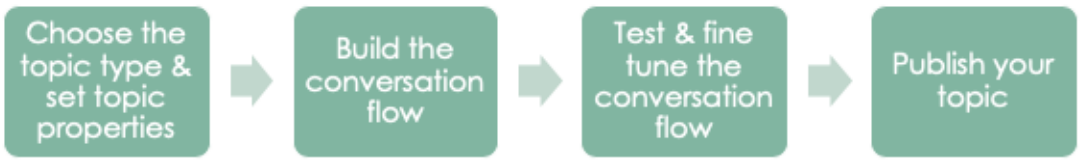
If you're using Natural Language Understanding (NLU), consider scenarios where a user might want to switch topics during a conversation session. For example, a user might want to change topics entirely. Or a user might get sidetracked and ask a question that seems out of context, maybe to engage in "small talk" with the virtual agent. Determine whether you want to let the user resume the original conversation after switching topics during the conversation.

You can also review the pre-built setup topics, conversation topics, and topic blocks (reusable subflows that perform certain design steps and logic). Determine whether you can use these pre-built items and consider customizing them as needed.

Understand the design process in Virtual Agent Designer

When you create a topic in Virtual Agent Designer, the design process involves these basic steps:

Topic design process



The topic properties determine the different ways in which a topic is designed and used. For example, you can control who uses the topic and any conditions that affect how or when the topic is used. If you're using ServiceNow Natural Language Understanding (NLU), you can associate an NLU model and intent with your topic. For details on the properties that you define for various objects, see Create a Virtual Agent topic, Create a reusable topic block, and Create a custom control.

Have knowledge in the following areas (what to know before you begin).

- General knowledge of the ServiceNow platform and application table structures.
- If you're using NLU, an understanding of how intents, entities, and utterances are used in your NLU models.
- If you're using scripts in conversation design, an understanding of HTML, JavaScript, and REST integrations.

Plan the structure of a conversation

The first step in implementing a Virtual Agent topic is to decide what the topic covers. Consider the intended audience and what you want the audience to accomplish when using the conversation. For this example, the goal of this example topic is to create a flow that enables end users to see the status of incidents they submitted. The topic includes an option for the user to add a comment to the incident.

With this goal in mind, the topic needs the following elements:

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- A prompt for the user to select an incident
- An output showing the status of the incident
- A prompt to ask if the user wants to leave a comment
- A utility control to branch the conversation on that answer
- A prompt for the user to enter a comment
- A utility control to add the user input as a comment in the incident

Build the conversation flow with Virtual Agent controls

The conversation will look similar to the following dialogue flow.

Important:
This flow is intended to give you a general idea of how a completed flow looks. Keep in mind that you will be building your topic incrementally and testing your topic frequently, so it's not necessary to build the entire layout first. Make sure to consider both functionality and user experience in your testing.

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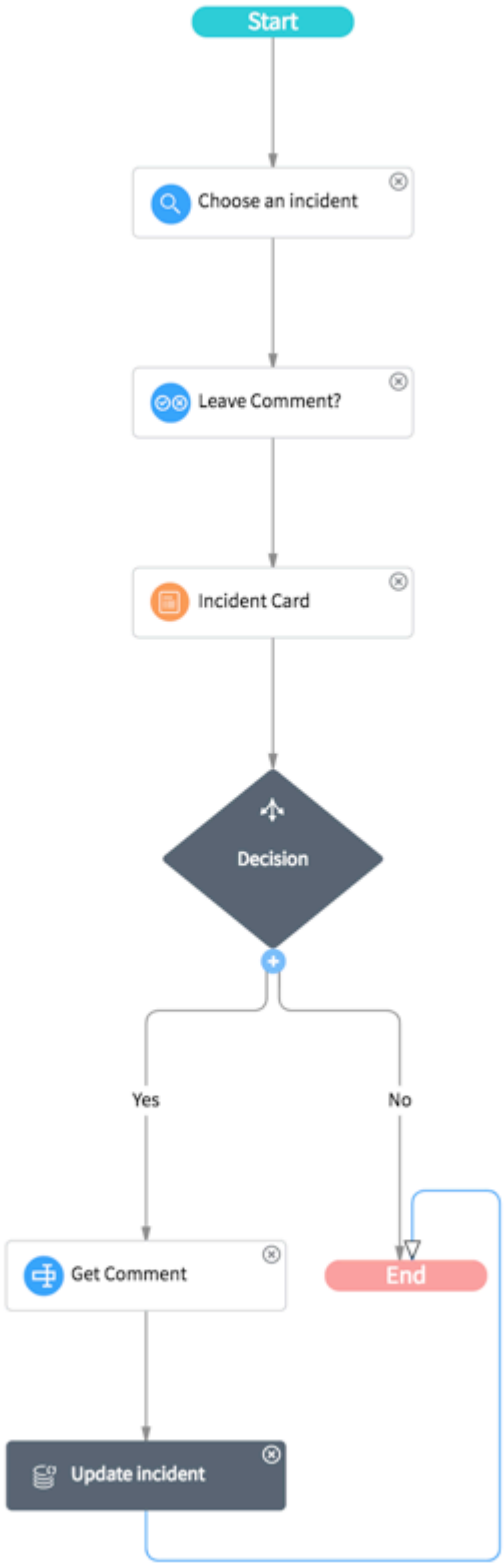
A completed conversation flow



Configure controls within the conversation

This example begins with defining the conversation flow in Virtual Agent Designer, after the topic properties have been set. The conversation begins with a Start node and finishes with an End node.

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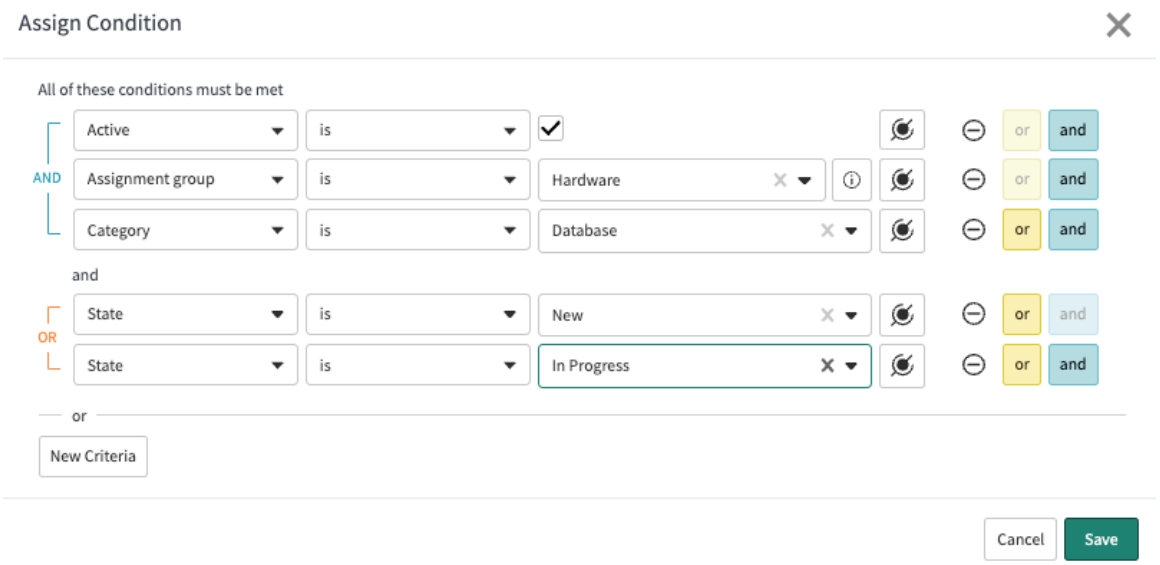
1. In Virtual Agent Designer, add a **Dynamic Choice** control to the conversation flow. This control is used to select the incident.
   a. Enter `Choose an incident` for the **Node name** property. The variable name `choose_an_incident` is automatically generated for the control.
   b. In the **Prompt** property, enter the text the user sees before selecting an incident.
   c. In the **Populate choices by** property, select *Record*.
   d. In the **Table** property, select *Incident [incident]*.
   e. In the **Filter choices** property, select the **Condition** option, and create a condition:
      - Active is true AND Assignment group is Hardware AND Category is Database

        AND

      - State is New OR State is In Progress

An example condition builder



2. Add a *Card* control to the flow. This control shows information from the record selected by the **Dynamic Choice** in the previous step.
   a. Enter `Status Card` for the **Node name** property.
   b. In the **Card type** property, select *Record*.
   c. In the **Record** property, select *Choose an Incident*. This choice refers to the Dynamic Choice control created in the previous step, so the data displayed comes from the record chosen there.
   d. In the **fields** control, select a field. The choices available are the available fields on the chosen record. In this case, you can see the fields on the incident table.
   e. After a field has been selected, click the *Add Field* option to add additional fields to the card. To delete fields from the card, click the delete icon to the right of the field.
3. Add a *Boolean* control to the flow. This control is used to prompt the customer with a yes/no question. In this case, the control checks whether the user wants to leave a comment on the selected incident record.

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a. Enter `Leave Comment?` for the **Node name** property. The variable name `leave_comment_` is automatically generated for the control.

b. In the **Prompt** property, enter the text the user sees before the prompt. In this case, ask users whether they want to leave a comment on the incident.

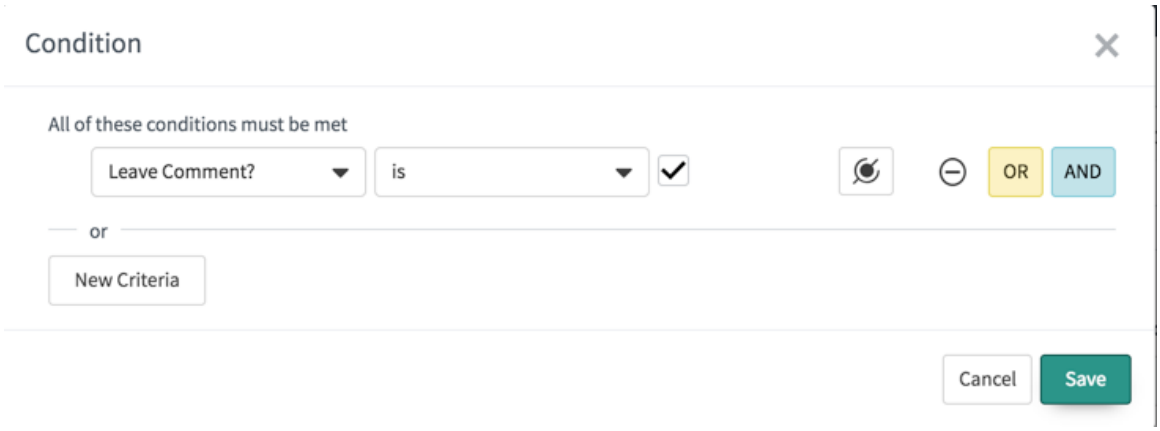
4. Add a *Decision* control to the flow. This control branches the conversation into two possible paths. The path the conversation follows depends on the choice the user made in the previous step.

a. There are no properties on the decision control; however, there are properties on the branches below the decision. By default, there is a single branch labeled *Always*. Click the blue plus icon at the bottom of the decision control. A second branch appears that is also labeled *Always*.

b. Click one of the branches to access the properties for this branch.

c. Change the name to `Leave Comment`.

d. In the condition property, select the **Condition** option and click the **Add Condition** button. Use the condition builder to create a condition as shown in the following screen shot.



If the value of the **Leave Comment?** is *true*, this condition is met. This variable is the variable from the Boolean control in the previous step. If the user chose *Yes* at that prompt, the conversation follows this branch.

e. Click the other branch of the decision to access the properties for this branch.

f. Change the name to `No Comment`.

g. In the condition property, select the **Condition** option and click the **Add Condition** button. Use the condition builder to create a condition as shown in the following screen shot.



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If the value of the **Leave Comment?** is *false*, this condition is met. This variable is the variable from the Boolean control in the previous step. If the user chose *No* at that prompt, the conversation follows this branch.

h. One of the two branches you have created points to the **End** node of the conversation. The second branch should also lead to this node. Click the arrow at the bottom of that branch and drag it to the **End** node.

5. Add a **Text Input** control to the *Leave Comment* branch of the conversation. This control is used to request text input from the user.
   a. Enter `Get Comment` for the **Node name** property. The variable name `get_comment` is automatically generated for the control.
   b. In the **Prompt** property, enter the text the user sees before the prompt. In this case, ask the user for the text of the comment.
   c. Optionally, you can enter a value in the **Advanced** > **Confirmation messages** > **Input completion confirmation** property. This value appears after the user enters a comment.
6. Add a **Record Action** control to the conversation below the *Get Comment* control. This control is used to add the text entered into the previous control as a comment on the selected incident.
   a. Enter `Update Incident` for the **Node name** property.
   b. In the **Action Type** property, select *Update a Record*.
   c. In the **Record** property, select *Choose an Incident*. This choice refers to the *Dynamic Choice* control created in the previous step, so the record chosen there is the one that this Record Action control updates.
   d. In the **Field** property, click *Add Field*. You can select and give values to fields from this record in the pop-up window that appears.



   e. Select the *Additional Comments* field from the list.
   f. Click the data pill picker icon ( ), and then select the *Get Comment* input variable from the list. This option refers to the value entered by the user in the **Text Input** control in the previous step.
   g. Click **Save**.

Test the conversation

Use the **Test** button to test the flow of the conversation. Preview topics often throughout the design process to find errors or unexpected behavior quickly. For further information on identifying and resolving issues with topics, see Debug a Virtual Agent topic.

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Create a Virtual Agent topic

Use Virtual Agent Designer to create and modify Virtual Agent topics (conversations). Build your topic to meet a specific objective or goal, such as fulfilling a user's request or helping a user complete a task.

Before you begin

Do the following:

- Review Getting started with Virtual Agent Designer.
- Configure Virtual Agent settings. For example, if you're creating Natural Language Understanding (NLU) topics, configure NLU settings. For more information, see Configure Natural Language Understanding in Virtual Agent. If you're creating large language model (LLM) topics, turn on Now Assist in Virtual Agent. For more information, see Configuring Now Assist in Virtual Agent.
- Plan your conversation before you begin. For more information, see Designing a Virtual Agent topic.
- Verify that you're in the appropriate application scope before you create or update a topic. For example, if you're creating ITSM topics, verify that you're in the **ITSM Virtual Agent Conversations** scope (and not the scope for the ITSM NLU Model for Virtual Agent Conversations). For details, see Change the application scope in Virtual Agent Designer.

Role required: virtual_agent_admin or admin

About this task

The topic is in the Inactive state until you publish it. Publishing a topic changes the topic state to Active and automatically deploys the topic to your Virtual Agent clients.

The Large Language Model (LLM) topic type is faster and easier to set up compared to using Natural Language Understanding. You don't have to select NLU intents or train NLU models for your virtual agent. For more information, see LLM topic discovery in Virtual Agent.

When NLU is enabled, the Set up Natural Language Understanding (NLU) section is displayed in the Topic Properties page. You can use this section to specify the associated NLU model and intent for the topic. You can also optionally specify keywords that Virtual Agent can use as a fallback if NLU doesn't return a matching intent and topic. For more information, see Natural Language Understanding (NLU) topic discovery in Virtual Agent.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, select **Create**.
3. On the form, fill in the fields.
   For a description of the field values, see the Create a topic form.
4. Select **Create**.
5. On the **Flow** tab, build the conversation flow.

Flow steps	Description
Add controls	To create the topic flow:

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Flow steps	Description
	a. Select the controls for user inputs, bot responses, or utilities from the palette and drop them onto the canvas. When you add a control to the canvas, it becomes a node in the conversation flow. **b.** For each node, complete the corresponding property sheet. In the topic header bar, select **Save**. The topic header bar displays a `Saving in progress...` message. The toast message `Successfully saved your topic` appears in the lower-right corner afterward for 4 seconds, and can be closed by selecting the **X** in the message. For details about each control and the corresponding properties that you define, see User inputs, Bot responses, and Utilities. As you add controls, watch for a yellow warning badge or a red error badge in the corner of the control. The number on the badge indicates the number of issues in that control, such as missing mandatory information in the property sheet. (Highlighting a badge or the "Incomplete" banner at the top of the property sheet details the items in need of correction.)
Move a node	Select the node, drag it to the new location in the flow, and Select **Save**.
Delete a node	Select the **X** in the upper right corner of the node. In the topic header bar, select **Save**. The topic header bar displays a `Saving in progress...` message. The toast message `Successfully saved your topic` appears in the lower-right corner afterward for 4 seconds, and can be closed by selecting the **X** in the message. **Note:** You can't delete a node that has a script variable used by subsequent JavaScript expressions in the flow. Also, you can delete a decision node only when it has a single branch.

6. Select **Test** in the header bar to test your topic in a chat window.
   You can review test results in the adjoining tabs. For detailed information, see LLM topic testing and Testing NLU/Keyword topics.

   If the Now Assist panel or Microsoft Teams is configured for your environment, preview options for those channels display in the Test button list. Select **Preview in Now Assist panel** or **Preview in Microsoft Teams** in the list to test your topic in those environments. For more information, see Integrating Virtual Agent with enterprise messaging apps.

7. When you're finished with the topic, select the More actions on Topics icon ( ) in the topic header bar, then select **Save**.
   The topic is in the Inactive state until you publish it.
   The topic header bar displays a `Saving in progress...` message. The toast message `Successfully saved your topic` appears in the lower-right corner afterward for 4 seconds, and can be closed by selecting the **X** in the message.

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What to do next

Publish the topic to deploy the topic to your Virtual Agent clients. The topic state changes to Active.

If you created a topic that might be frequently used in certain contexts (environments), consider promoting the topic as part of the default or custom chat experience.

NLU model mapping in Virtual Agent Designer

ServiceNow® model groups help you to manage the localization of both topics and Natural Language Understanding (NLU) models more easily. You can map Virtual Agent topics to a new or existing model group directly from Virtual Agent Designer.

A topic is a Virtual Agent conversation. Users find the appropriate conversation using either keyword or NLU topic discovery. If you're using NLU for topic discovery, this means that your topic is associated with an NLU intent, which contains potential user utterances and other information. When a topic is associated with an intent, it's mapped to that intent. An NLU model is a group of related intents.

When you create or edit a topic and have ServiceNow NLU turned on, then you can do the following in Virtual Agent Designer:

- Map the topic to an existing model and intent.
- Map the topic to an existing model and create an intent.

  Mappings are created for all languages that have been activated in NLU Settings as well. For more information, see Configure Natural Language Understanding in Virtual Agent.

- Create and map the topic to a new model and intent.

  If more than one language has been activated in NLU Settings, mappings are automatically created for secondary languages in the new model group. For more information, see Topic mapping to a multilingual NLU model group.

For example, when creating a topic, you can select the NLU model and its associated intent. In the following Company email issues topic, the selected model from the NLU Model drop-down list is the **ITSM NLU for Virtual Agent (11 languages)** model. After selecting the NLU model, the intent list refreshes and you can select your preferred intent. This action maps the NLU intent to this topic. You can change the NLU model and intent selections later on through the topic's **Properties** tab, if needed.

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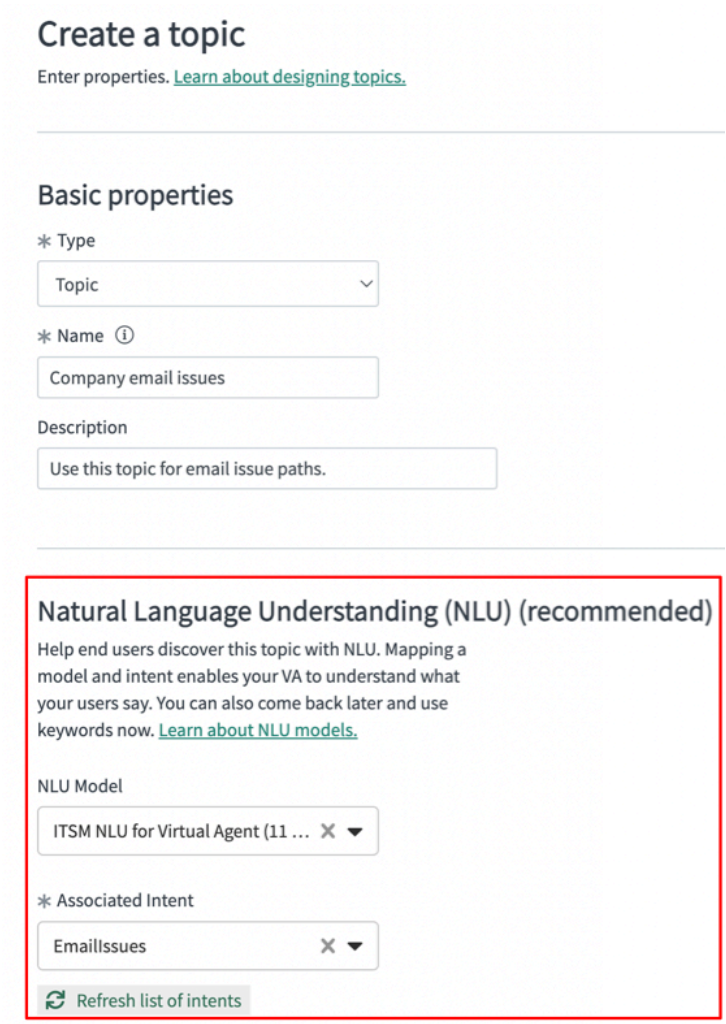

Topic mapping to a multilingual NLU model group

When you map a topic to a multilingual model group in Virtual Agent Designer, the topic mappings for enabled languages are set up automatically.

Model groups contain a primary language model, such as English, and secondary language models. Secondary models are translated copies of the primary model, where each secondary model uses a different language. Any supported language can be the primary language for a primary model or the secondary language for a secondary model. The language is reflected in the model name. For example, FR for French, DE for German, JA for Japanese, and ES for Spanish.

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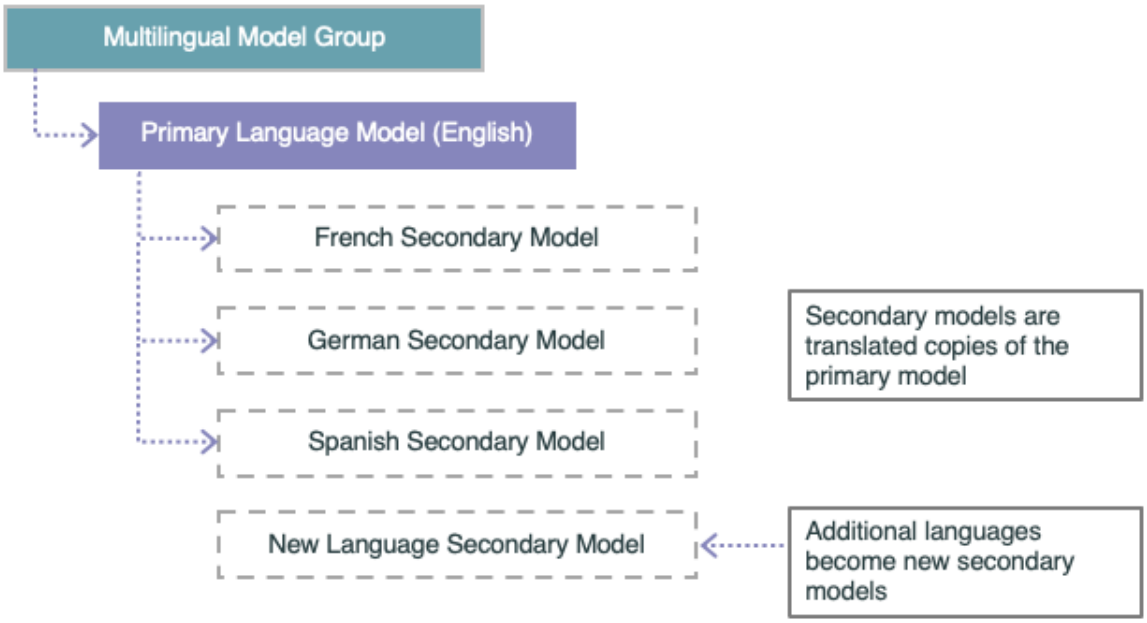
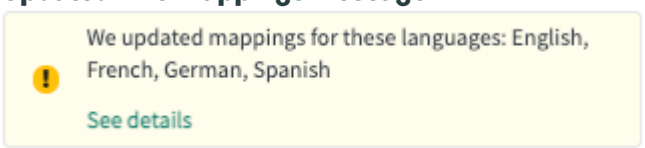
Multilingual model groups contain one primary language model and multiple secondary language models



You can view or change the model and intent mappings on the topic **Properties** tab. You can review secondary language mapping on the topic **Languages** tab.

Because secondary model content is only a translated copy of its primary model content, the secondary language mappings must always point to the same model group as the primary language. For this reason, if you map a language in a topic to a model that is part of a multilingual model group, then all of the topic mappings are updated to use the language models in that group. Virtual Agent Designer informs you of the change.

Updated NLU mappings message



Note:
You can map single-language models to a topic as long as there is no conflict with the corresponding language models in the group.

If you create a model group in NLU Workbench, you can specify the primary language. If you create a model from within Virtual Agent Designer, the primary language is determined by the user session language. For example, if you create a new model in a German user session, the primary language of the model group will be German.

Model groups make it easier to maintain your topics. For more information about NLU model groups, see Multilingual model management.

Note:
If a model contains only a single language, that language is considered to be the primary language. The topic is mapped to the model and specified intent only. If more than one language has been activated in NLU Settings, those languages are not mapped to the model. To use the topic in other languages, map them to other models manually on the **Languages** tab. For more information, see Map a topic to a secondary NLU model.

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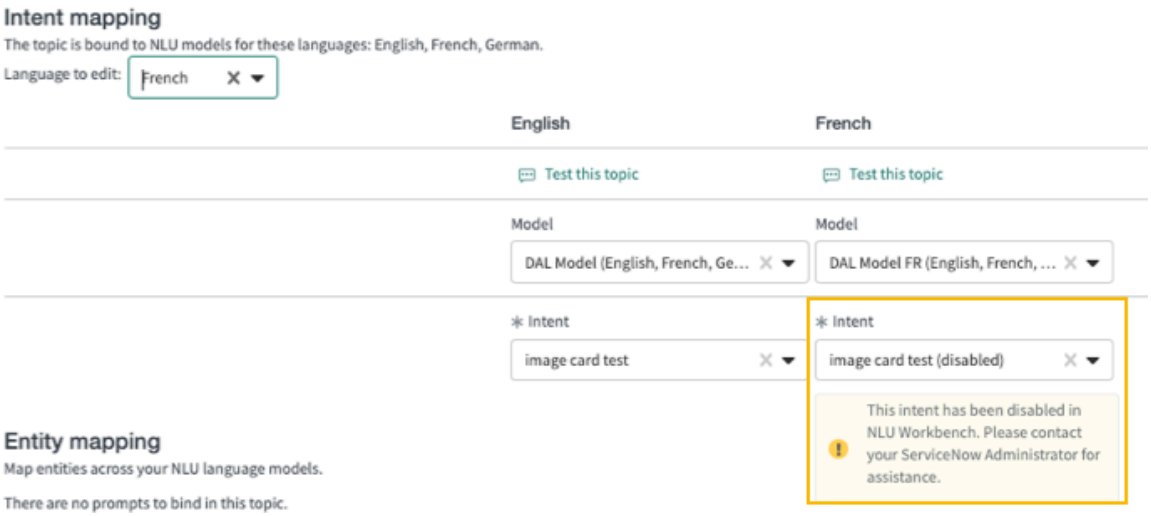
Handling disabled intents within a model

If an intent for the primary language within the model group is disabled, the primary intent displays as disabled in Virtual Agent Designer. When the primary language is disabled, the intent is still mapped to the topic, but all secondary intents are also shown as disabled. This is because the secondary languages are always dependent on the primary language within a model. If an intent for one or more secondary languages is disabled, the other languages remain active. Virtual Agent Designer displays messaging to indicate that some intents are currently disabled.

Topic with a disabled French intent on the Languages tab



To allow topic discovery for the language, enable the intent in NLU Workbench. For more information, see Enable or disable a secondary model intent.

Avoiding model conflicts

In order to avoid conflicts, Virtual Agent Designer may not display all of the existing models when you create or modify topics. Virtual Agent Designer does the following:

- Only displays model groups that contain language models that reflect the user's current session.
- Shows a warning if the selected model group has language mappings that will change existing language mappings, whether in another model group or in a single-language model.
- Automatically maps intents in each language model in the group to the topic.
- Ensures that duplicate model names or intent names are not used.
- If a topic is mapped to a multilingual model group, hides single-language model groups on the **NLU Language Mapping** tab.

If languages in a topic are mapped to intents in more than one model group, conflicts may occur. An intent can only be mapped to one topic. If this situation occurs when you attempt to publish a topic, Virtual Agent Designer displays an error message.

Modify NLU utterances and entities for a Virtual Agent topic

View, test, and modify NLU utterances for a Virtual Agent topic on the **NLU Intent** tab in Virtual Agent Designer.

Before you begin

If the topic is not currently mapped to a model and intent, the NLU Tab is not available. Specify a model and intent on the **Properties** tab in Virtual Agent Designer.

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Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Open a topic and view the **NLU Intent** tab.
3. On the **Utterances** tab, you can do the following:
   - Type a new utterance in the box, and then click **Add**.
   - Click the pencil icon to edit an utterance.

     When you are done making changes, click **Save**.
4. **Optional:** Associate entities with words in utterances.
   Entities represent the context for the action. For example, common industry terms can be defined as entities to clarify the context. Universal system entities may include known elements like date and time or currency. NLU can match defined entities with user input to slot-fill the values. There are five types of entities you can define. For detailed information, see NLU entities.
5. Click **Save** in the header bar.

What to do next

After making changes, you can train, test, and publish the model from this tab.

Add NLU to an existing keyword topic

Create and map an NLU model group and intent for the topic from Virtual Agent Designer.

Before you begin

Configure NLU on the instance in Virtual Agent General Settings.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Open an existing topic.
3. Select the **Properties** tab.
4. In the **NLU Model** field, do one of the following:

   Note:
   If the **NLU model** field does not appear and you have Now Assist enabled, ensure that you haven't selected an LLM topic. Navigate back to the Topics page and select a topic that has the **Model Type** set to **NLU/Keywords**.

   - Choose an existing model.
   - Select **Create Model** to create a new model group.
     a. In the **Model Name** field, enter a name for the new model group.
     b. In the **Intent name** field, accept the default value or enter a name for the new intent.

     Note:
     New models are created in **Draft** state.
5. In the **Associated Intent** field, do one of the following:

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- Choose an existing intent.
- Select **Create intent** to create a new intent.

  In the **Intent Name** field, accept the default value or enter a name for the new intent.

6. **Optional:** In the **Keywords** field, enter key phrases or terms that users enter to initiate the conversation with the Virtual Agent.
   Press **Enter** after each phrase. Keywords are also used for languages that are currently not available in NLU.
7. Select the **NLU Intent** tab, and then add utterances and associate entities with them.
   For more information about adding utterances, see Create an NLU intent. For more information about defining entities, see Entities.
8. Make any other changes on the **Flow** tab, such as associating entities with a node or adding entities as input variables for the topic.
9. When you're finished with the topic, select **Save** in the topic header bar.

Result
The modified topic is in the inactive state until you publish it.

Add nodeless NLU entities as input variables to a topic

You can add nodeless NLU entities as input variables to a topic if NLU is enabled for Virtual Agent. These variables can be slot-filled from NLU service provider predictions or provided outside of the scope of the topic.

Before you begin
Role required: virtual_agent_admin or admin

About this task
If a custom control prompts a user for a date and the user mentioned a date in their initial utterance, you can capture that without prompting the user again. To prompt the user when not slot-filled, use input controls.

For more information about NLU entities, see Entities. For more information about system entities, see NLU system entities.

Procedure
1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Open a topic and view the **Flow** tab.
3. In the Variables sidebar, click the **Input** plus icon.
4. On the form, fill in the fields.

Add Input Variable dialog box

Field	Description
Input Types	Data type of the input. The fields on the dialog box change according to your choice. ○ **String**: Alphanumeric text. Shows the **Input format** field. Choose plain text or a conforming rule, depending on the type of data. ○ **True/False**: Boolean value, either yes or no. ○ **Date Time**: Date, time, or both. Shows the **Input format** field.

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Field	Description
	○ **Static Choice**: Defined user choices. Shows **Display name** and **Value to store** field pairs. ○ **Dynamic Choice**: Choice of table records. Shows **Populate choices by**, **Table**, and **Filter choices** fields. The value can be either conditional or scripted. For details, see Input data types in Virtual Agent topics.
Name	Name of the variable for the entity. Variable names must be unique within the scope of a topic. The name appears as a variable when used in dot walking.
NLU Entity	The NLU entity associated with the node. This could be a pre-built Virtual Agent entity that you import into the model, a system entity (such as DURATION, TIME, or MONEY), or a custom entity that you created.
String data type properties	
Input format	Text format that is validated when a user enters certain text items. If the user doesn't enter the expected format, an error message indicates that the format is not valid and asks the user to reenter the text. Choose the format of the text item to be validated: ○ Text: Any text string (no validation) ○ Email: Format that consists of an email prefix (user name), @ symbol, and domain. ○ IP address (IPV4, IPV6): Data communication delivery format for Internet Protocol version 4 or version 6. ○ Phone number (E.164): Internationally recognized standard phone number format. ○ URL: Web address format ○ Custom: Script that provides a text validation rule for a custom text format and the related error messages displayed when the expected format is not entered. **Note:** For phone and IP address format examples, see E.164 phone formats and IP address field types.
Date Time data type properties	
Input format	Type of Date Time control to be displayed. Select one of the following formats: ○ **Date**: Shows only the monthly calendar for the user to select the date. ○ **DateTime**: Shows both a monthly calendar and time picker. ○ **Time**: Shows only the time picker for the user to select the time (hours and minutes).
Static Choice data type properties	
Choices	Enter two or more choices as follows:

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Field	Description
[For Static Choice data type]	○ **Display name**: Short phrase or text that appears to the user for that choice. ○ **Value to store**: The string that is stored in the variable when the corresponding choice is selected.
Dynamic Choice data type properties	
Populate choices by	Type of dynamic variable to be used. Select one of the following options: ○ **Record**: Returns records from the table selected. The values for these options are GlideRecord objects. ○ **Script**: Expression that returns an array of options.
Table [Record values only]	If you selected **Record** as the method to populate choices, select the table to be searched.
Filter choices [Record values only]	Select one of the following: ○ **Condition Builder**: Creates a filter used to select a subset of records from the table. ○ **Script**: Defines the enumeration list for the options (choice list) to be displayed. The name value pair is stored as a string object.

5. Click **Save**.

   NLU entities appear alongside topic input variables in the Variables sidebar.



> **Note:**
>
> You can remove a slot-filled value to prompt the user again (unbind it from the initial input value). For more information, read about the `vaInputs.myvar.unbindEntity();` method in Virtual Agent scripts.

Branch a Virtual Agent conversation with a Decision utility

Your conversations may need to branch depending on end user input or choices. Use the Decision utility to branch the conversation when certain conditions are met.

Before you begin

For more information about the Decision utility, see Decision utility.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Open a topic and view the **Flow** tab.
3. Drag the **Decision** utility onto the canvas.

   The **Decision** utility node added to the canvas has a single branch named **Always** by default.

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Note:
If you insert a **Boolean** user input control, you're prompted to add a **Decision** utility directly after the Boolean node on the canvas. Selecting **Yes** on the Boolean node's Decision utility prompt automatically generates two branches named *True* and *False*. The two branches conditions are automatically set through the condition builder.

4. Click the plus sign (**+**) under the node.
   A second branch named **Always** is added below the Decision utility node.
5. Click the plus sign (**+**) under the node to add additional branches.
6. Click a branch label, and then specify the branch properties in the form.

Field	Description
Name	Unique name for the branch.
Condition	Expression logic to specify a condition for following this branch in the conversation. The condition must evaluate to true. ○ **Condition**: Use the Condition builder to add or edit conditions. ○ **Script**: Use the script editor to create or edit a script that contains a condition statement.

7. Define the properties for each branch in the Decision utility.
8. When you're finished with the topic, click **Save** in the topic header bar.

Insert a header card in a Static Choice or Dynamic Choice control

When you create a Virtual Agent topic, you can include images and YouTube videos on Static Choice and Dynamic Choice user input controls.

Before you begin
Role required: virtual_agent_admin or admin

Procedure
1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer** and open a topic or create a new one.
2. On the Flow tab, drag a Static Choice or a Dynamic Choice user input control onto the canvas.
3. On the Properties sheet, go to **Advanced (optional)**, and then expand the **Header card** section.
4. Slide the **Insert** toggle switch to enable it.

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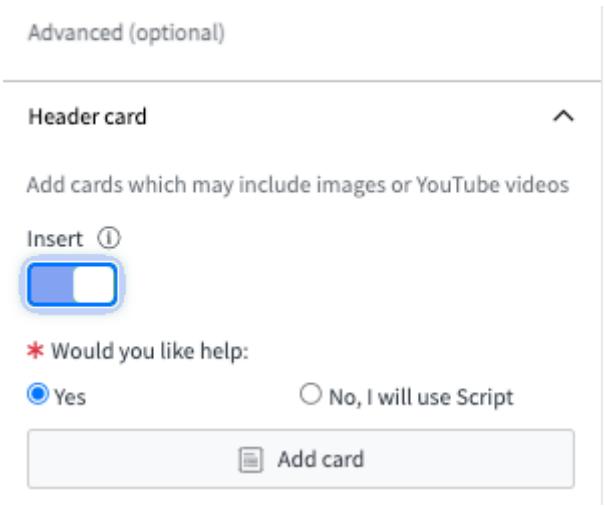
Insert a header card



5. Under *Would you like help?*, select either **Yes** or **No, I will use a script**.
   - If you selected **Yes**, select **Add card** and complete the following form fields.

Add card dialog box

Field	Description
Card type	Type of header card: ▪ Large image with text ▪ Small image with text ▪ Youtube Video Card The fields in the dialog box change according to your choice.
Title	Image or video title. You can enter it directly in the text field or use a data pill or script to provide the value.
Title Link	The URL to use for the video title hyperlink. You can enter it directly in the text field or use a data pill or script to provide the value. If this field is empty, the title displays as plain text. This field is only available for the YouTube video card option.
Description	Brief description of the image or video.
Image URL Link	URL link for the image. You can enter it directly in the text field or use a data pill or script to provide the value. You can also select **Upload Image** to upload the image. This field is only available for the large and small image card options.
Image alt text	Alternative, screen-readable text that describes the image. It's used for accessibility programs. This field is only available for the large and small image card options.
Youtube Video ID	The alphanumeric string at the end of the YouTube URL. For example, in the URL `https://www.youtube.com/watch?v=AacDp2mUQ1I` the YouTube video ID is `AacDp2mUQ1I`.

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Field	Description
	This field is only available for the YouTube video card option.

- If you selected **No, I will use Script**, select **Add script** to input a script to display your desired media, following the example in the script dialog box.

  Header Card script example

```
function() {
    /*
        var cardName = "Large image with text";
        var cardData = {
            title: 'Choose color',
            description: 'choose the right color of
 the flowers in the image',
            image:
 'https://homepages.cae.wisc.edu/~ece533/images/tuli
ps.png',
            imageAlt: 'Choose color'
        }
        var template = "";
        if
 (vaSystem.isAMBClient(vaContext.deviceType))
            template =
 vaSystem.fillTemplateFromData(cardName,
 JSON.stringify(cardData));
     return {
         cardTemplate: template,
         cardName: cardName,
         cardData: JSON.stringify(cardData),
         renderStyle: "card"
     };
    */
    }
```

6. Select **Save**.

Change the application scope in Virtual Agent Designer

Set the application scope before you create or update a topic. For example, if you're creating ITSM topics, verify that you're in the **ITSM Virtual Agent Conversations** scope (and not the scope for the ITSM NLU Model for Virtual Agent Conversations).

Before you begin

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. On the Topics page, select the Globe icon in the navigation bar.
3. Select **Application Scope**, and then choose the appropriate scope for your conversations.

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For example, select **HR Service Delivery Virtual Agent Conversations**.

Note:
If you're using domain separation, you can change the domain you're working in. Select **Domain scope: global** to change the domain. Any topics created within a domain are restricted to users of that domain. For more information, see Domain separation and Virtual Agent.

Result

When the scope is not Global, the Globe icon displays with a red ring:  . Select it again to change the scope.

Define script variables for a topic

Use the Variables sidebar to define script variables for a topic. Script variables can store information that is not found in ServiceNow tables. This information can then be shared elsewhere in a topic.

Before you begin
Role required: virtual_agent_admin or admin

About this task
For more information about writing scripts for Virtual Agent, see Virtual Agent scripts.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, open an existing topic or create a new one.
   The **Flow** tab displays the conversation flow.
3. In the Variables sidebar, click the **Script** plus icon.
4. On the form, fill in the fields.

Add Script Variable dialog box

Field	Description
Variable name	Name of the variable. The name is case-sensitive. Spaces in the name are replaced with an underscore character.
Default value	Default value for the variable. You can use either a static value or a script that specifies a dynamic value for this variable.

5. Click **Save**.

Create a small talk topic

Build small talk topics that let Virtual Agent engage in casual conversation with users. A small talk topic provides a response to a casual question that users might ask during a conversation, such as the time or date. A small talk topic can occur anytime within a conversation session and can be unrelated to the original conversation intent.

Before you begin
Define the corresponding intent for a small talk topic in the appropriate NLU model.

Role required: virtual_agent_admin or admin

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About this task

Small talk topics are NLU-based conversations that diverge from the original bot conversation, usually to provide answers or information to casual questions that end users might ask. For example, you can create small talk topics that provide the current weather or time of day. When users engage with the bot through a small talk topic, they can return to the original conversation topic.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, click **+ Create.**
3. For the Type, select **Small Talk**.
4. Follow the steps for creating a topic, including the NLU-related properties.
   Note the following:
   - When you set the topic properties in the Properties page, set the following NLU properties for the small talk topic:

Field	Description
NLU Model	Model that defines the intent for this small talk topic.
Associated intent	Intent defined in the NLU model for this small talk topic.

   - When you complete your small talk topic, remember to publish it when you are ready to deploy it to your Virtual Agent clients.

Control topic discovery and visibility

Admins and topic authors can enable Virtual Agent to discover topics for use in chats, include a topic in the list users see, or both. The topics can be setup topics and small talk topics.

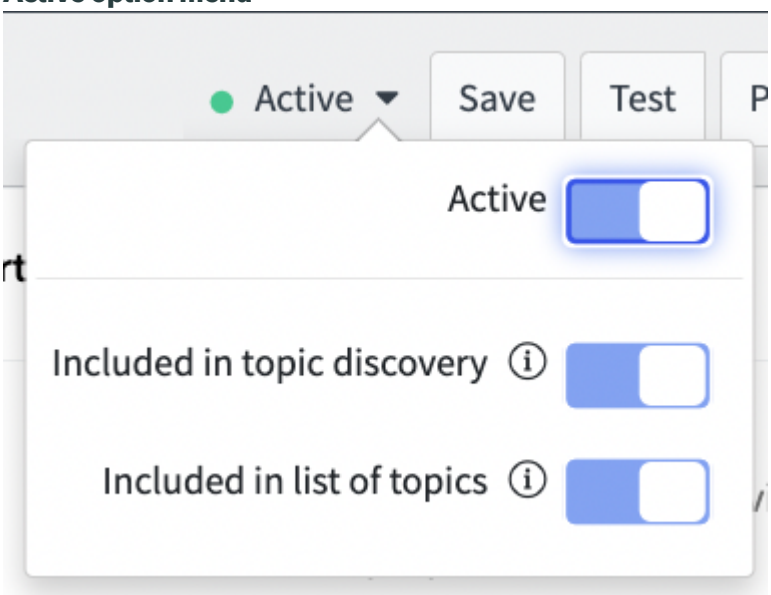
Before you begin

Role required: virtual_agent_admin or admin

About this task

Virtual Agent Designer includes two options in the **Active** option of the header bar.

Active option menu



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Admins or topic authors can use these options to manage the active topics as follows:

- Include the topic in topic discovery.

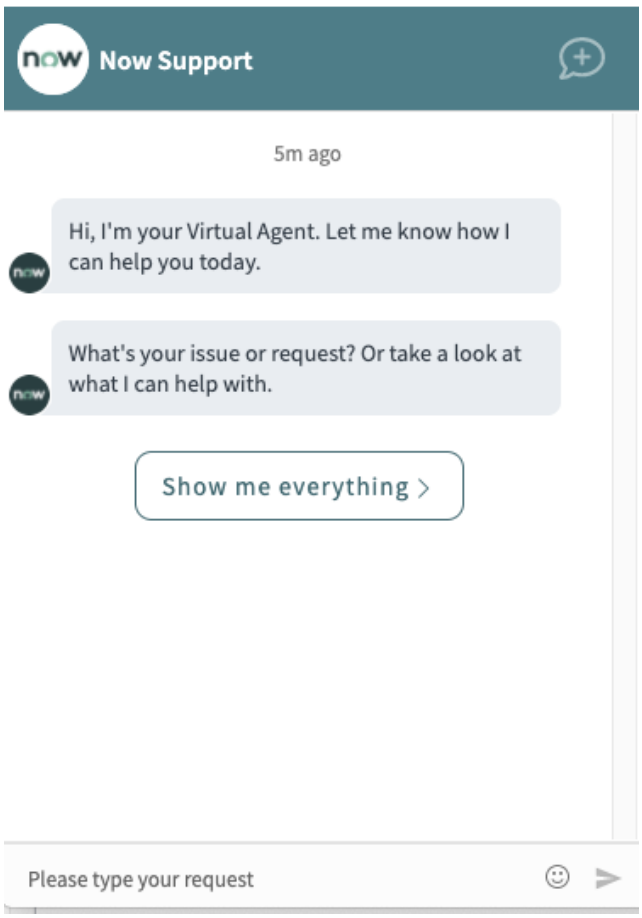
  By selecting **Included in topic discovery**, admins or topic authors can enable Virtual Agent to discover the topic by using keyword or Natural Language Understanding (NLU) discovery.

  Note:
  If these methods don't generate search results, or Virtual Agent can't determine the appropriate conversation to display, use AI Search as a fall-back method.

- Include the topic in the list of topics available for use.

  By selecting **Included in list of topics**, admins or topic authors can include the topic in the **All Topics** menu. The **All Topics** menu lists all of the topics available for use.

  To see the **All Topics** menu, first select **Show me everything** in the chat window.



You should then see the **All Topics** menu.

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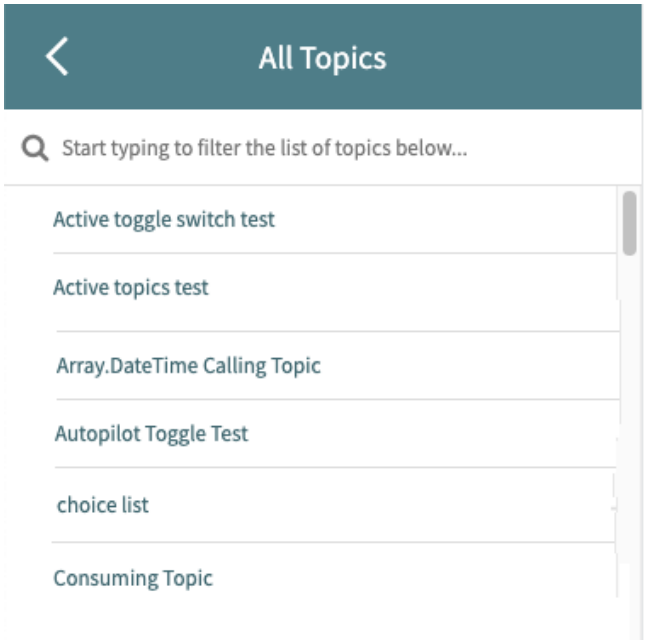
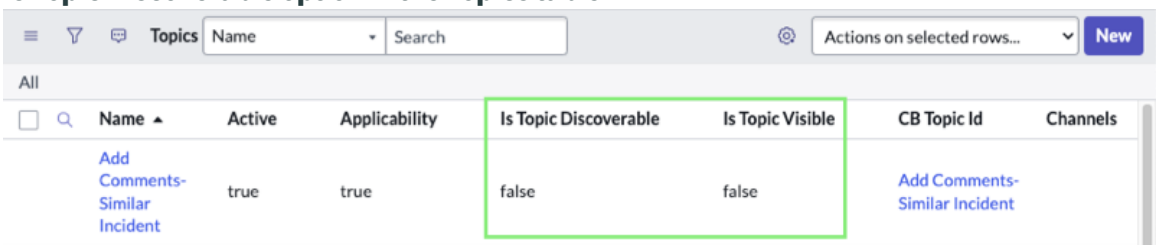


The options you select automatically update the corresponding property in the Topics [sys_cs_topic] table. For example, if you've enabled **Included in topic discovery**, the **Is Topic Discoverable** property in the Topics [sys_cs_topic] table is set to true.

Is Topic Discoverable option in the Topics table



Note:
If the fields are not visible, you can configure the form layout to show them.

Procedure

1. Create a Virtual Agent topic.
2. Select the **Active** option in the header bar.

   Note:
   Selecting this option also publishes the topic.

3. Select the options you want to use, or accept the default settings.
   Some options are enabled or disabled by default, based on the type of topic.

Default settings by topic

	Options	
	Included in Topic Discovery	Included in the list of topics
Topics	Enabled	Enabled
Setup topics	Disabled	Enabled

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	Options	
	Included in Topic Discovery	Included in the list of topics
Small talk topics	Disabled	Enabled

4. Select **Save**.
5. **Optional:** Select **Test** to test the topic.

Result
Depending on the options enabled, Virtual Agent can discover the topic, the topic is included in the **All Topics** menu in the chat window, or both.

Use system-derived entities in a topic

Associate system-derived entities such as such as date, time, duration, or location with a node in a topic.

Before you begin
Create the Booking Reservations NLU model and system entities (`FromLocation` and `ToLocation`) as described in Create a system-derived entity. In this example procedure, you will create a topic that can slot fill locations that are used in an utterance.

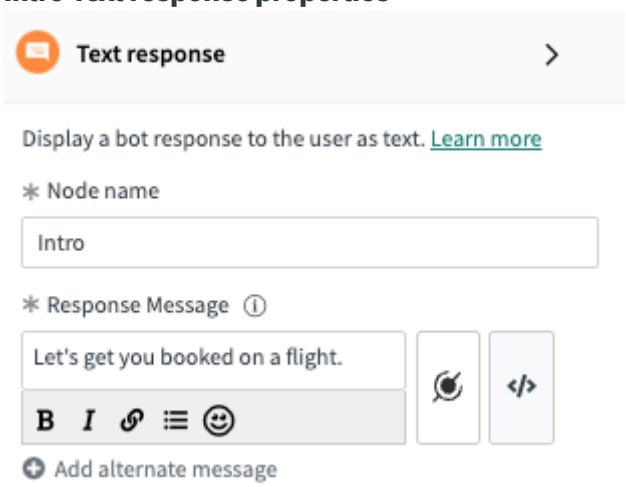
Role required: virtual_agent_admin or admin

Procedure
1. Create a new topic called `Booking Reservations`.
   When completing the **Properties** tab, make sure that you choose the Booking Reservations NLU model that you created in an earlier exercise.
2. Drag a Text bot response component onto the canvas, and then select it.
   In the properties sheet, fill in the fields.

Response Properties sheet

Field	Description
Node name	Type `Intro`.
Response Message	Type `Let's get you booked on a flight.`

Intro Text response properties



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3. Drag a Text user input component onto the canvas.
   In the properties sheet, fill in the fields.

User Input Properties sheet

Field	Description
Node name	Type `Fromwhere`.
Prompt	Type `Where are you departing from?`
Input format	Select **Text**. This doesn't restrict the input format.
NLU entity	Select `FromLocation`. This list only shows existing entities, such as system entities or entities that you created for the model.
Do not ask users to confirm recognized entity	Select this option to avoid having Virtual Agent ask the user to confirm the location.
Advanced (optional)	
Topic switching	
Enable NLU to switch topics	Slide this toggle switch to enable topic switching.

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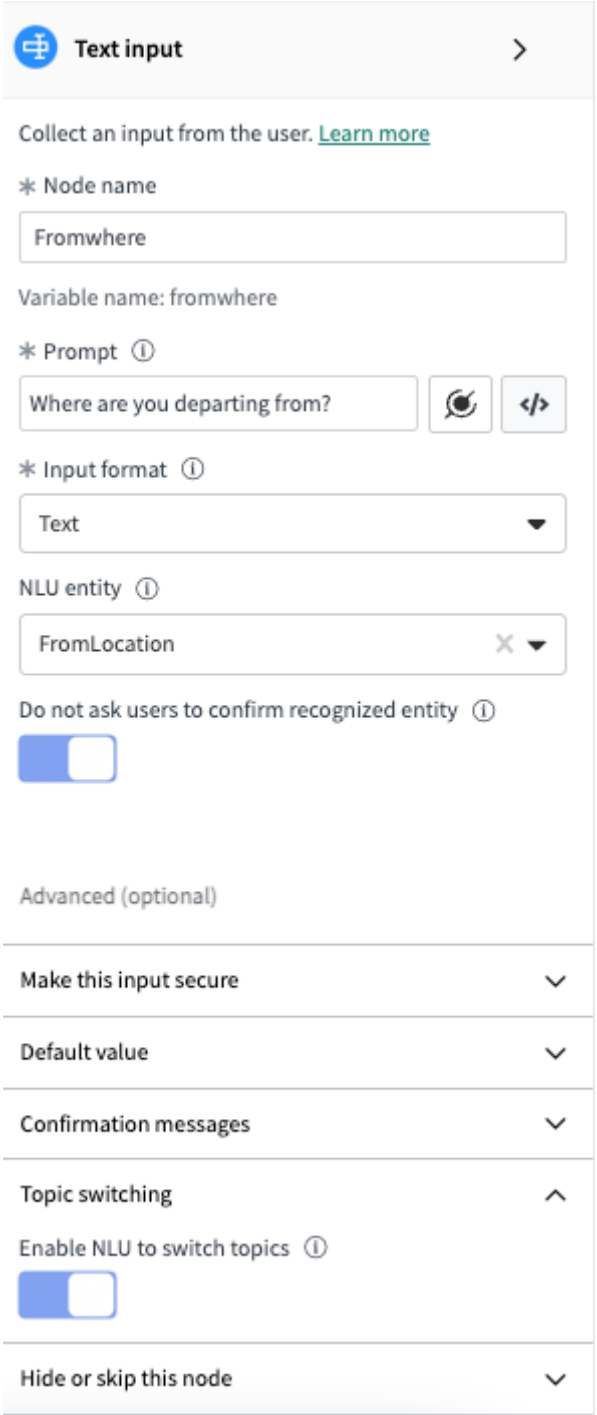
Fromwhere Text user input response properties



4. Drag another Text user input component onto the canvas.
   In the properties sheet, fill in the fields.

Field	Description
Node name	Type `Towhere`.
Prompt	Type `Where are you heading?`
Input format	Select **Text**. This doesn't restrict the input format.
NLU Entity	Select `ToLocation`.

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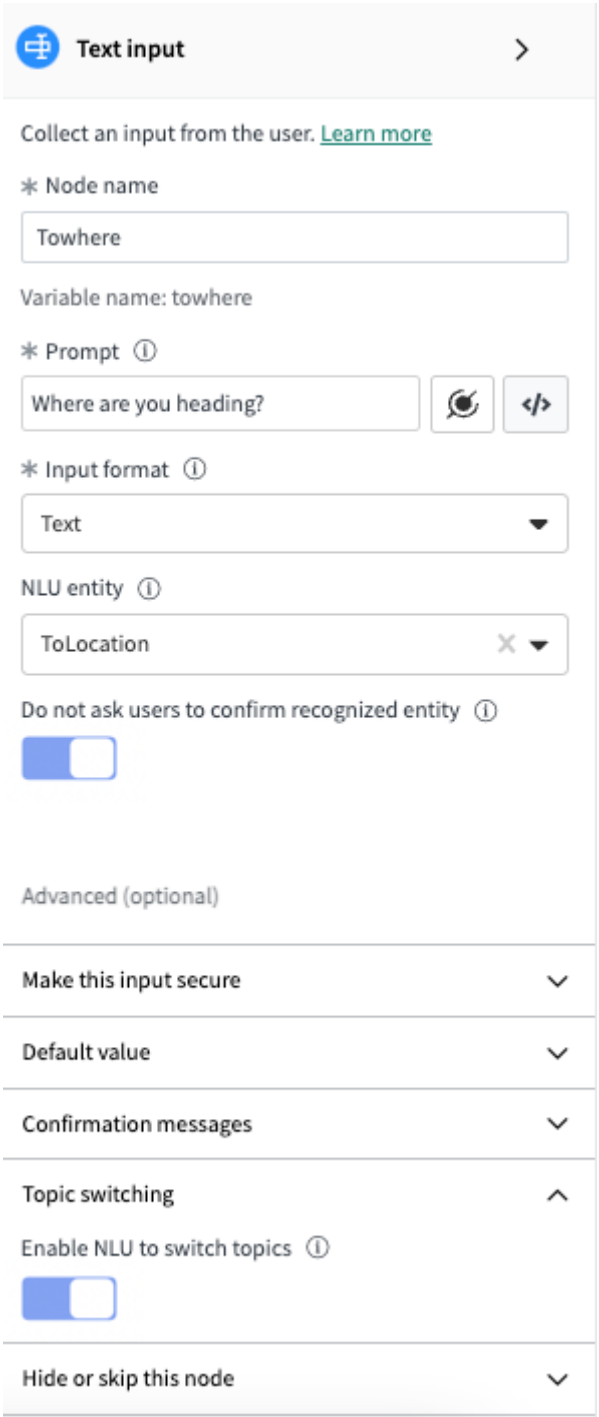
Field	Description
	This list only shows existing entities, such as system entities or entities that you created for the model.
Do not ask users to confirm recognized entity	Select this option to avoid having Virtual Agent ask the user to confirm the location.
Advanced (optional)	
Topic switching	
Enable NLU to switch topics	Slide this toggle switch to enable topic switching.

Towhere Text user input response properties



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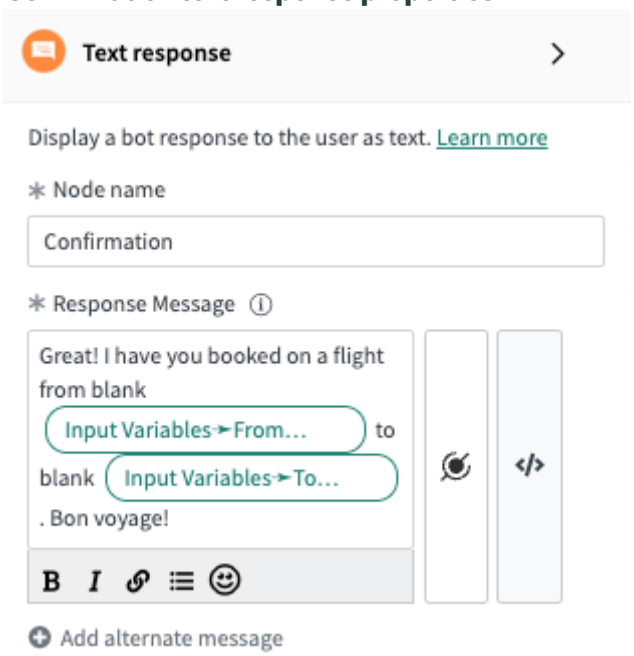
5. Drag another Text bot response component onto the canvas, and then select it.
In the properties sheet, fill in the fields.

Field	Description
Node name	Type `Confirmation`.
Response Message	Type `Great! I have you booked on a flight from [Fromwhere] to [Towhere]. Bon voyage!` Use dot-walking to replace `[Fromwhere]` and `[Towhere]` with the input variables you created in the previous nodes.

Confirmation text response properties



6. Click **Save**.

What to do next

Use additional system-derived entities for your Booking a Reservation topic. For example, you can use system-derived entities to capture the dates that the user wants to travel.
For more information about default system entities, see NLU system entities.

LLM topic migration

The topic migration workflow enables you to convert your existing Natural Language Understanding (NLU) and keyword topics into new large language model (LLM) topics.

Now Assist capabilities bring generative AI to Virtual Agent using LLM topics. With topic migration, there's no need to manually recreate all your NLU and keyword topics to be LLM topics. You can select the topics that you want to migrate into LLM topics from your existing NLU and keyword topics. Migrating NLU and keyword topics doesn't change the original NLU or keyword topics. A copy of the existing topic is created during topic migration, but the new topic's **Model Type** field is set to LLM and includes LLM-compatible nodes and descriptions.

All types of topics can be migrated from the NLU/Keyword model type to the LLM model type during topic migration, including the following object types:

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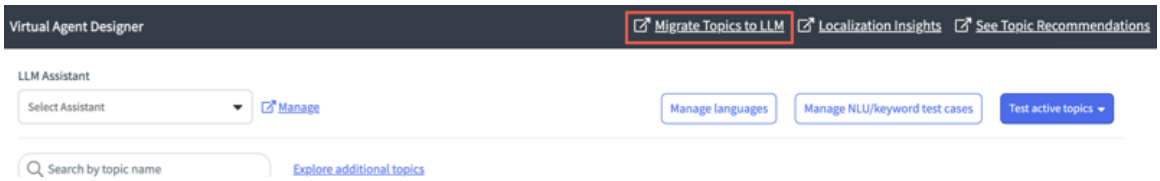
- Topic
- Topic block
- Setup topic
- Small talk
- Custom input control
- Custom response control

If no migration issues occur, the preceding object types can all optionally be published except the topic block. Although dynamic topic blocks can be optionally published, the topic block type is automatically published after it's been migrated.

Roles and accessibility

Users with the virtual_agent_admin role or sn_vad_genai.topic_migration_admin role can work with topic migration. Topic migration is accessible through Virtual Agent Designer in the **Migrate Topics to LLM** option.



Topic descriptions

When migrating NLU topics to LLM topics, you can choose whether you want to have generative AI create your LLM topic descriptions. When on the Settings page of the topic migration workflow, you can choose to **Keep current topic descriptions?**. The **Keep current topic descriptions?** option is off by default. When this setting is off, generative AI pulls either NLU intent utterances or keywords from topics to create LLM topic descriptions during the migration process. If the topic is associated with an intent, a maximum of 10 utterances are pulled into the LLM topic's **Detail description** field under an `Additional instructions` value. When this setting is on, generative AI doesn't create LLM topic descriptions and your existing NLU and keyword topic descriptions migrate into your new LLM topics. Migrating existing topic descriptions can result in issues if the existing topic doesn't have a description.

The **Detail description** field is required for LLM topics but not for NLU/keyword topics. If a new LLM topic is migrated over with an empty description, you must add a description prior to that topic being published. Regardless of how topic descriptions migrate, you can edit topic descriptions during the Publish (optional) page of the topic migration workflow by double-clicking (or use the keyboard shortcut) the text in the Description column. For more information on editing topic descriptions, see Migrate NLU topics to LLM topics. For examples of strong topic descriptions, see LLM topic and node description examples.

Node descriptions

Although NLU topics' node names migrate exactly as-is during migration, the node descriptions can vary. NLU input nodes use the **Prompt** field. LLM input nodes use the **Detail description** field. During topic migration, the value in the **Prompt** field migrates into the **Detail description** field's value. How the value migrates can vary depending on if that value included text-only, scripts, or data pills. Refer to the following table to view how the values migrate differently and compare examples.

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How the Prompt field's value migrates to the Detail description field's value

NLU Prompt field value	LLM Detail description field value
Contains text	Migrates text as-is. For example, if the NLU **Prompt** field's value is `Enter the incident number`, then the LLM **Detail description** field's value is also `Enter the incident number`.
Contains script or data pill	Migrates using the following template: `Collect + Node name`. For example, if you have an NLU node named `Get incident number` and the **Prompt** field's value contains a script or data pill, then the migrated LLM node's **Detail description** field's value is `Collect Get incident number`.

If the topics that you plan to migrate include scripts or data pills in their existing **Prompt** field, review and update the LLM **Detail description** field after migration for each affected topic. A warning message of `Add relevant detail description` appears for LLM topics on the Virtual Agent Designer canvas for each node that migrated with the template of `Collect + Node name`. Updating the description to something more accurate and descriptive improves your users' experience of interacting with the Virtual Agent. For an example of a strong node description, see LLM topic and node description examples.

The following entities can be migrated from NLU nodes to LLM nodes:

- simple
- mapped
- pattern
- system-derived

If an NLU node is mapped to an entity, those utterances' entities are added to the LLM node's **Detail description** field under an `Additional instructions:` make-shift header value. The `Additional instructions:` content differs slightly depending on the type of entity that is migrated. The layout of the **Detail description** field value resembles something like the following:

- `[Prior NLU Prompt field value]` if the value was text-only and not a script or data pill.
- `[Additional instructions: For this input, the data should be extracted from the user input if it has a value from this list of words: [simple entity word list].`

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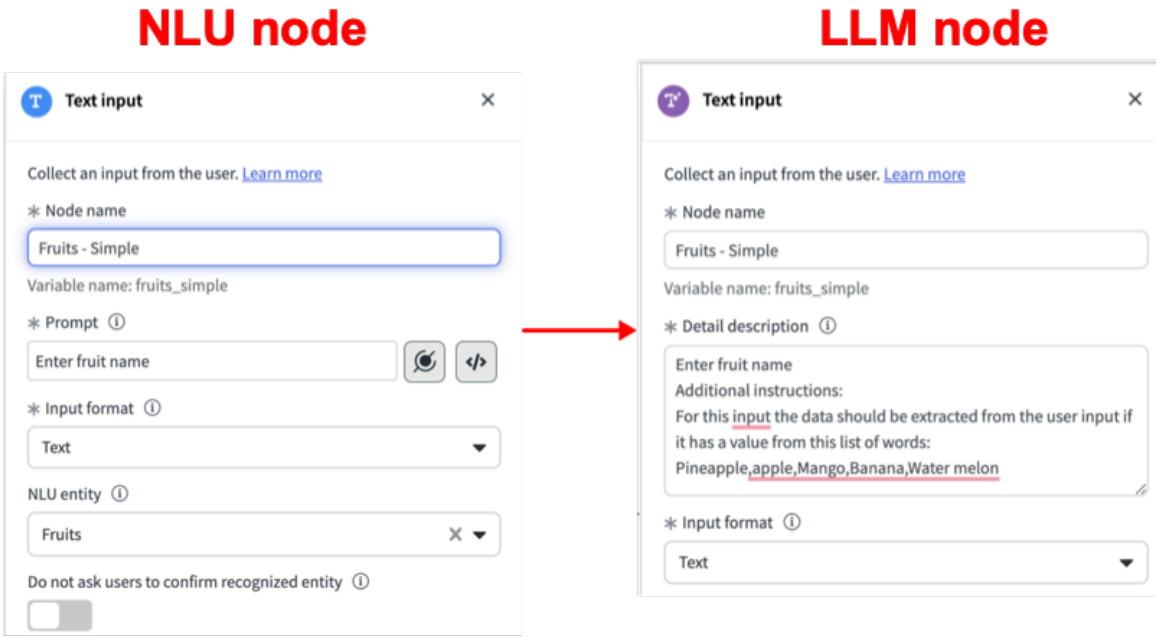
Example of an NLU node with associated entities migrating to an LLM node



Migration issues

You can access migration issue data either by searching for `topic_migration_execution_item.list` in the Navigation pane or downloading the .CSV file version of the table. After you've migrated topics, the downloadable .CSV file is accessible through the **Review migration log** option in the topic migration's Migrate topics page. For more information about migration issues, see NLU to LLM migration log.

Migrate NLU topics to LLM topics

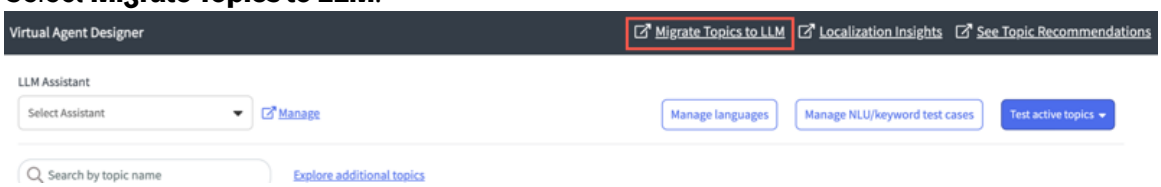
Migrate one or more of your existing Natural Language Understanding (NLU) or keyword topics into new large language model (LLM) topics while maintaining your original NLU/keyword topics. After migration is complete, choose whether to publish your new LLM topics.

Before you begin

Role required: virtual_agent_admin or sn_vad_genai.topic_migration_admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Select **Migrate Topics to LLM**.



The Topic Migration workflow page opens in a new browser tab.

3. Review and determine which NLU and keyword topics you want to migrate into LLM topics on the Select topics page.

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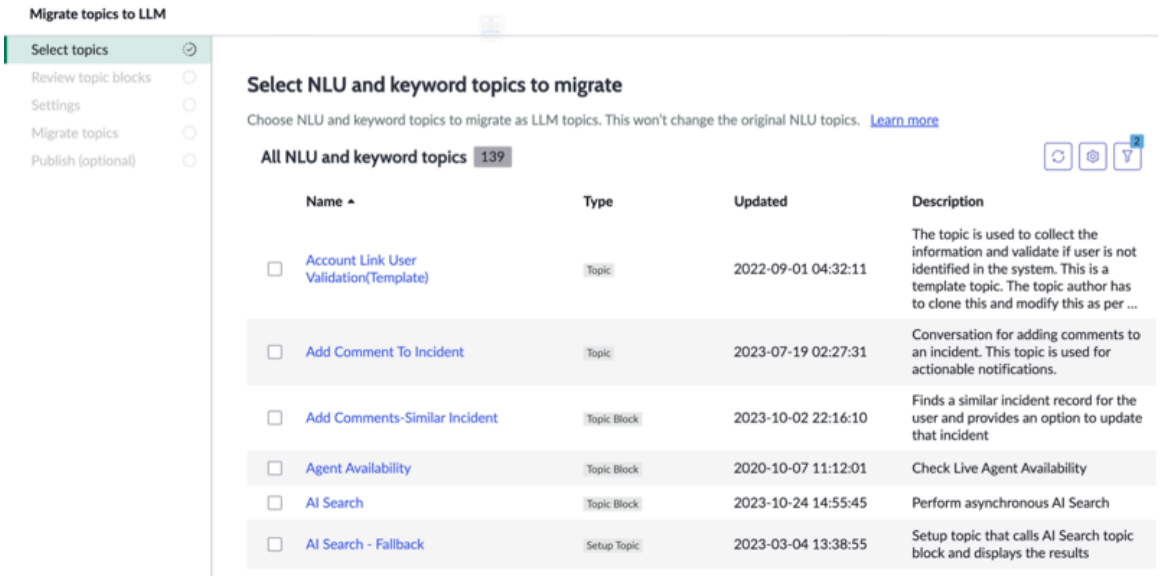


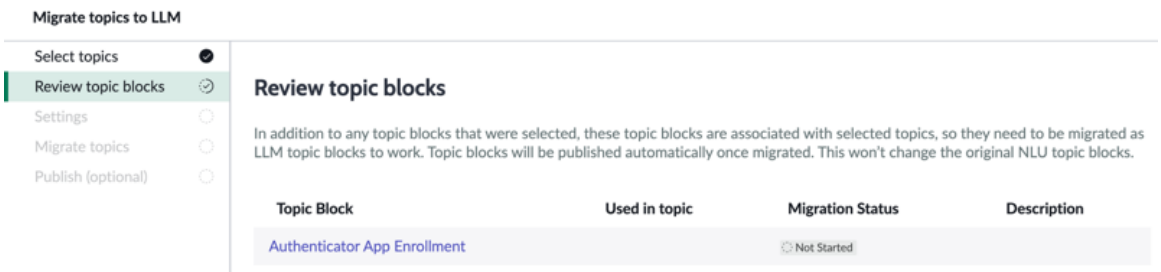
Tip:
Select the link in the Name column to review the topic in the Virtual Agent Designer canvas in a new browser tab. Migrate fewer than 50 topics at one time to allow yourself enough time to review the topics.

4. Select which NLU and keyword topics you want to migrate, and then select **Next** on the Select topics page.

Important:
If you leave the topic migration workflow, you are unable to return to where you left off and you must restart the process.

5. Review the affected topic blocks, and then select **Next** on the Review topic blocks page.

   Only topic blocks and topic blocks associated with the selected topics are displayed in this list. Topic blocks used in dynamic topic blocks must be manually selected for migration. You can select the link in the Topic Block column to view the topic block in the Virtual Agent Designer canvas in a new browser tab.



Note:
If no topic blocks were selected or associated with the selected topics, select **Next** to continue.

6. Choose which settings to apply to all topics migrating to LLM, and then select **Next** on the Settings page.

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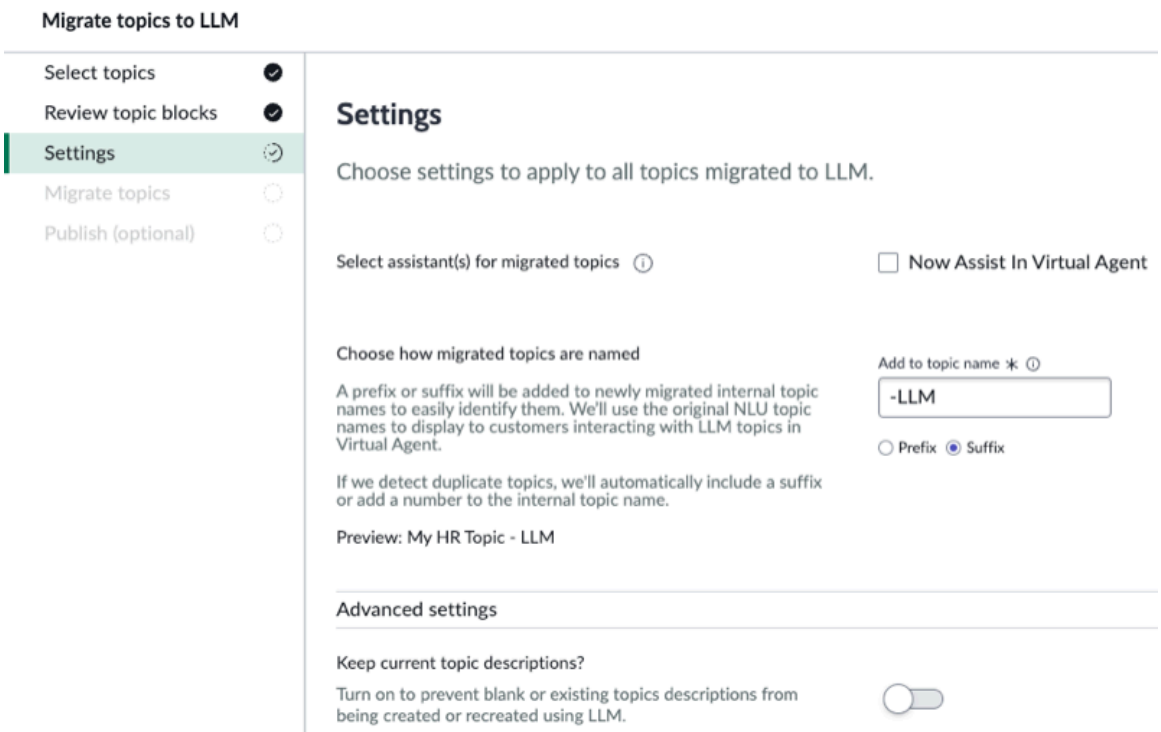
Settings field description

Field	Description
Select assistant(s) for migrated topics	Migrated LLM topics are associated with these assistants.
Choose how migrated topics are named	Newly migrated topics include the value entered in the **Add to internal topic name** field as either a prefix or suffix (default). This option only affects the migrated topics' **Internal name** value and not the topics' **Display name** value. The original NLU topic name is used as the **Display name** to customers interacting with LLM topics in Virtual Agent.
Keep current topic descriptions?	Current topic descriptions are used as the LLM topic descriptions rather than using generative AI to create topic descriptions for migrated LLM topics. This field is turned off by default. If this field is turned on, and there was no topic description in the original NLU topic, a topic description must be manually added to the new LLM topic before publication.



7. Review the topics for migration on the Migrate topics page, and then select **Next** to begin migration.

Note:
Leave the browser window open until the migration process is complete.

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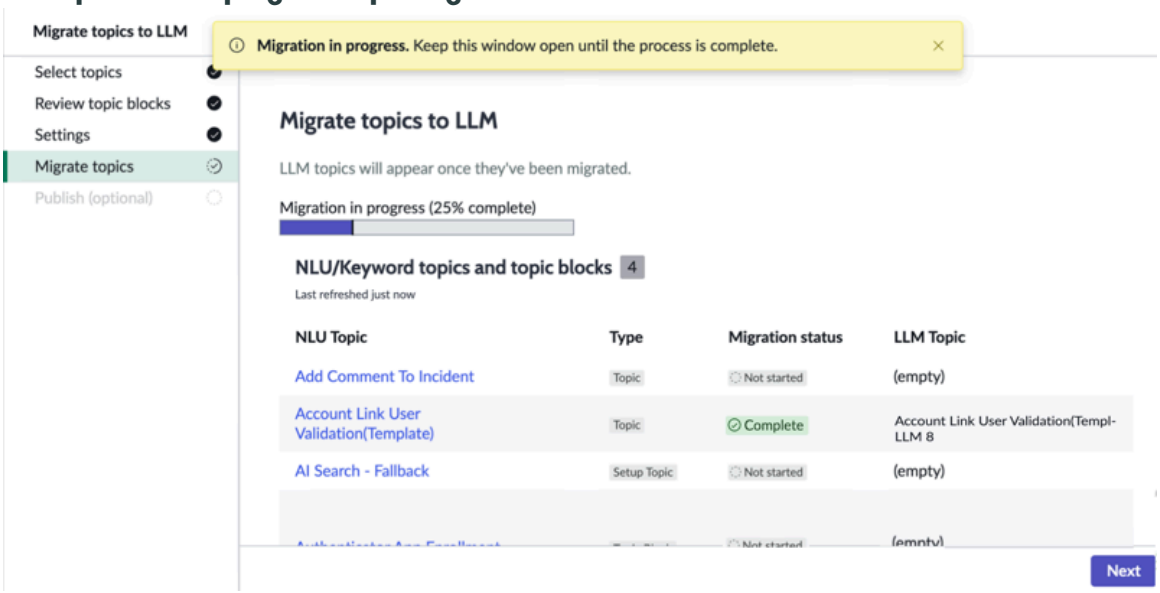
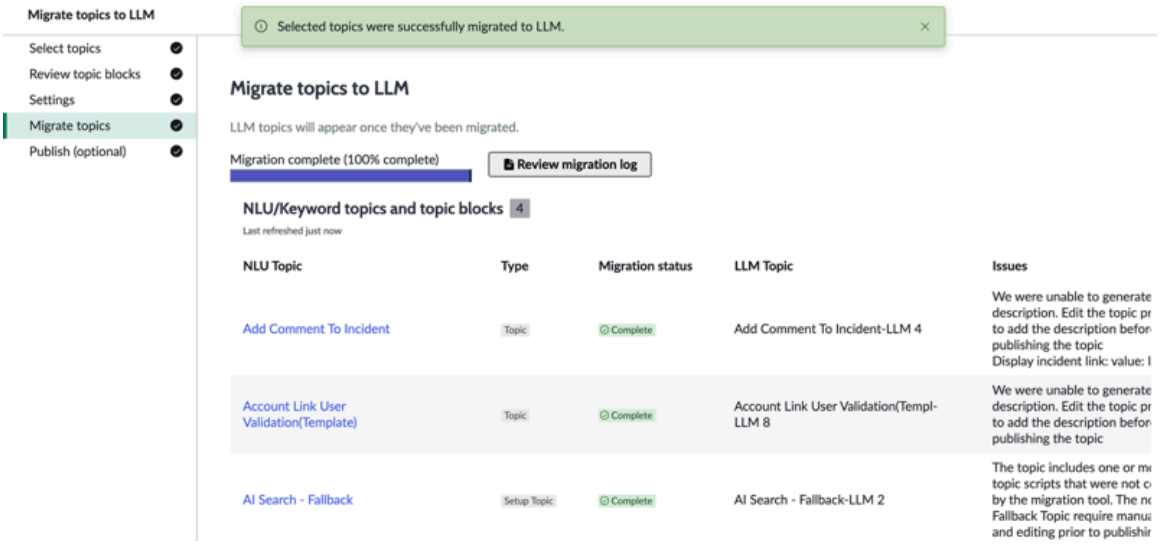
Example of an in-progress topic migration



Example of a completed topic migration



The migration complete progression bar appears and displays a dynamic percentage of completeness. During migration, the Migration status column updates dynamically with the values changing from `Not started` to either `Failed` or `Complete`. After migration is complete, you can choose to select **Review migration log** or **Next**. Selecting **Review migration log** downloads a .CSV file of the Topic Migration Execution Items [topic_migration_execution_item.list] table data. For more information on this table data, see NLU to LLM migration log. Selecting **Next** directs you to the Publish (optional) page.

8. **Optional:** Continue to the Publish (optional) page by selecting **Next**.
9. **Optional:** Review and edit topic descriptions on the Publish (optional) page by double-clicking (or use the keyboard shortcut) the text in the Description column and pressing **Enter** to save the updated description.

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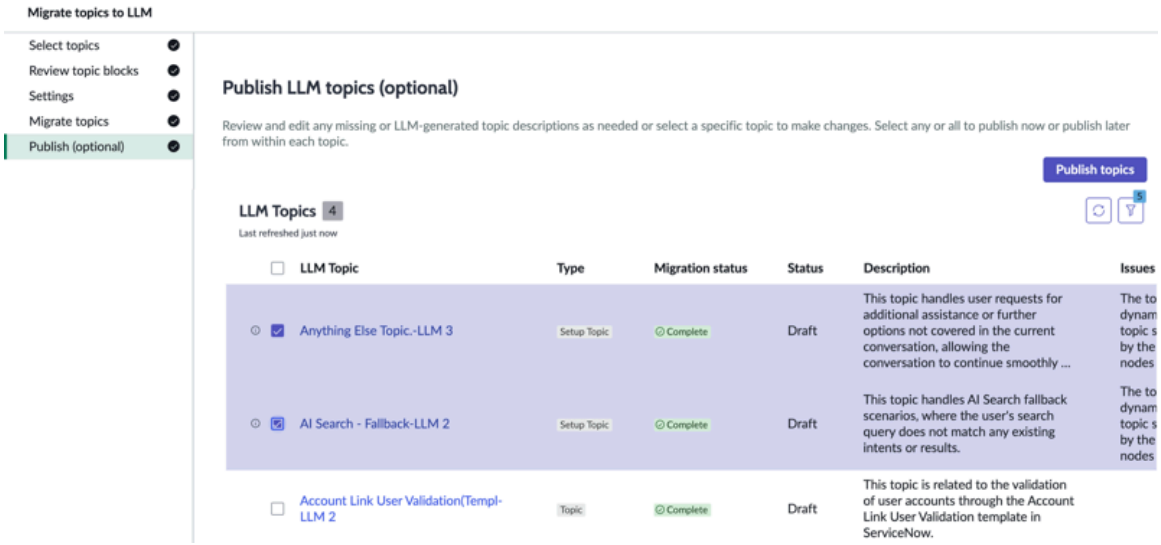
Tip:
If you select the LLM topic link, you are redirected to that topic in Virtual Agent Designer through a new browser tab or window. Any edits that you make in Virtual Agent Designer are reflected in the topic migration's Publish (optional) page. If you edit and save the updated description, but don't publish the topic, the updated description remains visible in Virtual Agent Designer. For additional information about strong LLM topic descriptions, see LLM topic and node description examples.

10. **Optional:** Select each LLM Topic check box that you want to publish, and then select **Publish topics**.



You receive a `Selected topics were successfully published` output message. The topics that you migrated, but didn't select to publish, continue to appear on this page until you navigate away from the topic migration workflow.

11. **Optional:** Exit the topic migration workflow by selecting **Close**.
You're redirected to the Virtual Agent Designer Topics page.

What to do next

After you navigate away from the topic migration workflow, the topics that you migrated, but didn't publish, can be managed and published from the Virtual Agent Designer canvas. If you choose to migrate other topics in the future, the topic migration workflow restarts from the beginning.

NLU to LLM migration log

The Topic Migration Execution Items [topic_migration_execution_item.list] table includes data when migrating Natural Language Understanding (NLU) topics to large language model (LLM) topics such as the migration status, migration issues, and migrated or published topic information.

You can access this topic migration data either by searching for `topic_migration_execution_item.list` in the Navigation pane or downloading the .CSV file version of the table. After you've migrated topics, the downloadable .CSV file is accessible through the **Review migration log** option in the topic migration workflow's Migrate topics page.

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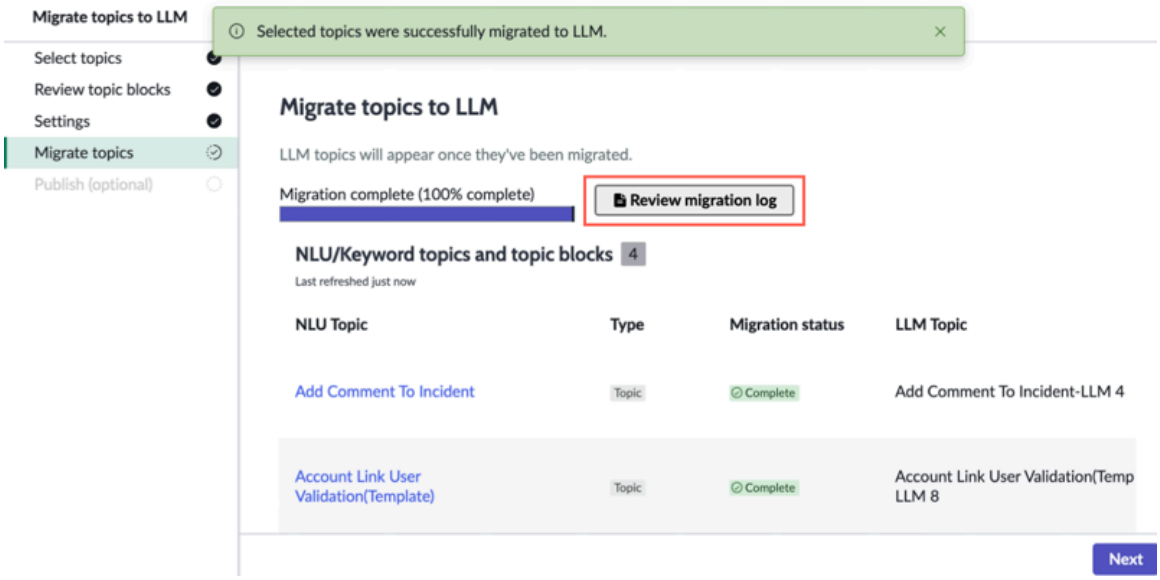
Example of the Review migration log option



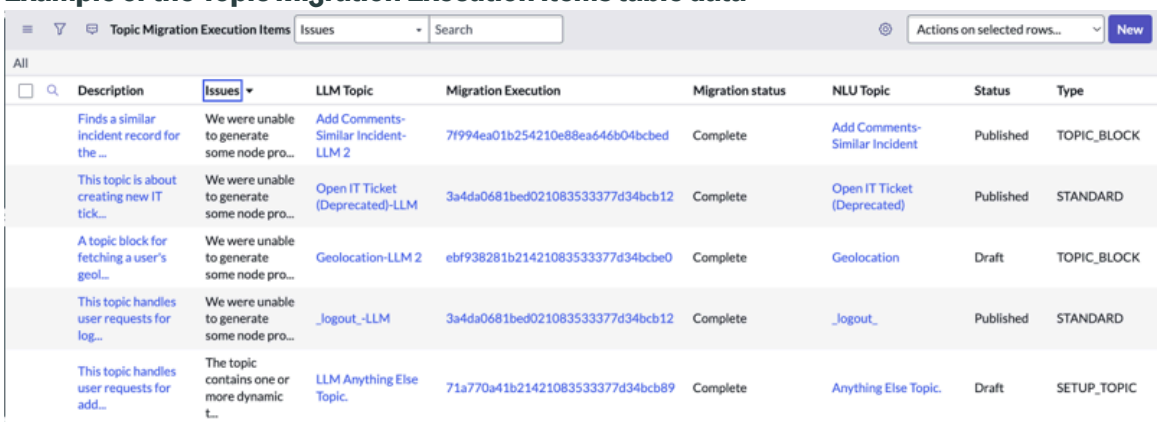
The Topic Migration Execution Items [topic_migration_execution_item.list] table defaults to include the following columns:

- Description
- Issues
- LLM Topic
- Migration Execution

> **Note:**
> The **Migration Execution** column includes the unique ID that is generated for each migration batch. For example, when 10 topics are migrated at the same time, the table contains 10 topic rows with each row containing the same migration execution value.

- Migration status
- NLU Topic
- Status
- Type

Example of the Topic Migration Execution Items table data



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Generic issues may occur during the topic migration process. The following table includes specific, common issues that you may encounter in the Issues column and whether the issue blocks the topic from being published.

Issues column details

Types of issues	Issues column value	Can the topic be published?
Node-level issues: These issues are validation error messages that can include missing fields such as name, description, and so on.	`Some topic properties couldn’t be generated. To publish, manually review and edit the following nodes: [list of node names]`	No. The issue must be corrected before the topic can be published.
Script-level issues: These issues occur whenever an NLU input node has a script or data pill in the **Prompt** field.	`Some topic properties couldn’t be generated because the topic used a script. To publish, manually review and edit the following nodes: [list of node names]`	Yes. Topics with this issue can be published because `Collect [Node Name]` populates in the **Detailed description** field, but the value of the **Detailed description** field value should be revised and improved.
Topic-level issues: These issues are validation errors at the topic level such as a missing description, keywords, or any other required field.	`Some topic properties couldn't be generated. Edit them before publishing the topic.`	No. The issue must be corrected before the topic can be published.
LLM-generated description issues: These issues occur whenever LLM is unable to generate a valid topic description.	`The topic description couldn’t be generated. Edit the description field on the Publish page or from the topic properties page in Virtual Agent Designer before publishing.`	Yes. Topics with this issue can be published because the `[Topic name]` populates the **Topic description** field, but the **Topic description** field value should be revised and improved.
LLM-generated description issues related to NLU intent complications: These issues occur whenever an NLU model and intent is mapped to a topic but is missing from the sys_nlu_model or sys_nlu_intent table or if these values are incorrectly mapped to the topic.	`The topic description couldn’t be generated because the mapped intent wasn’t found. Edit the description field on the Publish page or from the topic properties page in Virtual Agent Designer before publishing.`	Yes. Topics with this issue can be published because the `[Topic name]` populates the **Topic description** field, but the **Topic description** field value should be revised and improved.
LLM-generated description issues related to NLU intent	`The topic description couldn’t`	Yes.

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Issues column details (continued)

Types of issues	Issues column value	Can the topic be published?
complications: These issues occur whenever an NLU model's intent and keywords aren't mapped to the topic.	`be generated because both the intent and keywords are missing. Edit the description field on the Publish page or from the topic properties page in Virtual Agent Designer before publishing.`	Topics with this issue can be published because the `[Topic name]` populates the **Topic description** field, but the **Topic description** field value should be revised and improved.
Dynamic topic block issues: These issues occur whenever there's a node that has a dynamic topic block that wasn't migrated.	`The migration tool couldn't convert one or more dynamic topic block nodes from this topic. The topic blocks used inside the dynamic topic blocks must be manually migrated. The following nodes use these dynamic topic blocks: [list of node names]`	Yes. Topics with this issue can be published because the topic block names use a script for dynamic topic blocks and continue to operate as expected, using the NLU topic block. If you encounter this issue, select these topic blocks for migration from the Select topics page and update the topic block names in the script.
Switch topic script issues: These issues occur whenever a node has a switch topic function that wasn't migrated.	`The migration tool couldn't convert one or more switch topic scripts from this topic. The topics used inside the switch topic script need to be manually migrated. The following nodes use these switch topic scripts: [list of node names]`	Yes. Topics with this issue can be published because the topic script continues to use the NLU topic until migration. If you encounter this issue, select these topics for migration from the Select topics page.
Process failure issues: These issues occur whenever there's an error during a particular migration process.	`This topic couldn't be migrated. Contact` *`ServiceNow`* `support for assistance.`	No. The issue must be corrected by a ServiceNow employee before the topic can be published.
Process failure issues: These issues occur whenever there's an error during the transformation of NLU nodes to LLM nodes.	`This topic couldn't be migrated because the transformation of` *`NLU`* `nodes to LLM nodes failed. Contact` *`ServiceNow`*	No. The issue must be corrected by a ServiceNow employee before the topic can be published.

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Issues column details (continued)

Types of issues	Issues column value	Can the topic be published?
	`support for assistance.`	
Process failure issues: These issues occur whenever there's an error during a particular migration process.	`This topic couldn't be migrated because the publish payload failed to generate. Contact ServiceNow support for assistance.`	No. The issue must be corrected by a ServiceNow employee before the topic can be published.
Process failure issues: These issues occur whenever there's an error during a particular migration process.	`This topic can't be published until a topic description is added.`	No. The issue must be corrected before the topic can be published. Edit the description field on the Publish page or from the topic properties page in Virtual Agent Designer before publishing.

LLM topic and node description examples

Strong topic and node descriptions for large language model (LLM) topics result in a better Virtual Agent user experience.

Topic description examples

Admins write LLM topic descriptions during topic creation and can manage the descriptions on the topic's **Properties** tab. Topic authors with the virtual_agent_admin role or sn_vad_genai.topic_migration_admin role can also change the LLM-generated topic description on the Publish (optional) page of the topic migration workflow if they want to provide more details than what was automatically generated. In the **Topic description** field, describe in detail what you want the topic to do. The more information that you provide in your topic descriptions, the more successful your user's experience is with the Virtual Agent. The following table provides examples of both weak and strong topic descriptions.

Weak and strong topic description examples

Topic name	Weak topic description	Strong topic description
Company Holiday Calendar	This topic is about a holiday calendar for employees in a company.	This topic is about a holiday calendar for employees in a company. Users can ask for the holiday list or company holiday for a specific year, specific date, inquire about a specific holiday, or ask if they have a day off for a particular holiday. The topic also covers the availability of a holiday calendar and specific holidays like Freedom Day and wellbeing days.

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Weak and strong topic description examples (continued)

Topic name	Weak topic description	Strong topic description
Active Directory Password Change	This topic is related to the management and administration of Active Directory, a directory service provided by Microsoft.	This topic is related to the management and administration of Active Directory, a directory service provided by Microsoft. This topic involves making changes to the Active Directory, such as creating, modifying, or deleting directories and processes. This topic also includes tasks performed by administrators, such as managing user accounts, groups, and permissions within the Active Directory environment.

Node name and Detail description example

Make input node names unique and descriptive so that they explain what operation the user is trying to perform. Descriptive node names enable the LLM to work properly with entities and slot filling. For example, if admins create two similar input node names, such as AD `Operation Type` and `AD Operation`, the LLM may identify the wrong node and map it to random input node variables. Renaming the nodes to differentiate the two is best. For example, `AD Operation for Password Reset` and `AD Operation for Locked Credentials and Change Password` are stronger, more unique node names.

The **Detail description** field for all LLM-enabled user input nodes requires you to describe one specific detail that you need from the user. Using detailed descriptions helps the LLM generate user prompts and capture the most important part of their reply.

There are currently seven LLM-enabled user input nodes:

- Input Collector
- Text
- Static Choice
- Dynamic Choice
- Boolean
- Date Time
- Carousel

When working with one of the preceding input nodes, include clear instructions within the **Detail description** field about what possible values the LLM should request from the user. For example, in an Active Directory Operation topic, admins must be specific in the **Detail description** field about what operations are allowed. Providing detailed descriptions enables the LLM to use value mapping to identify the entity and fill the slots. The following table provides examples of a weak and strong node **Detail description** field.

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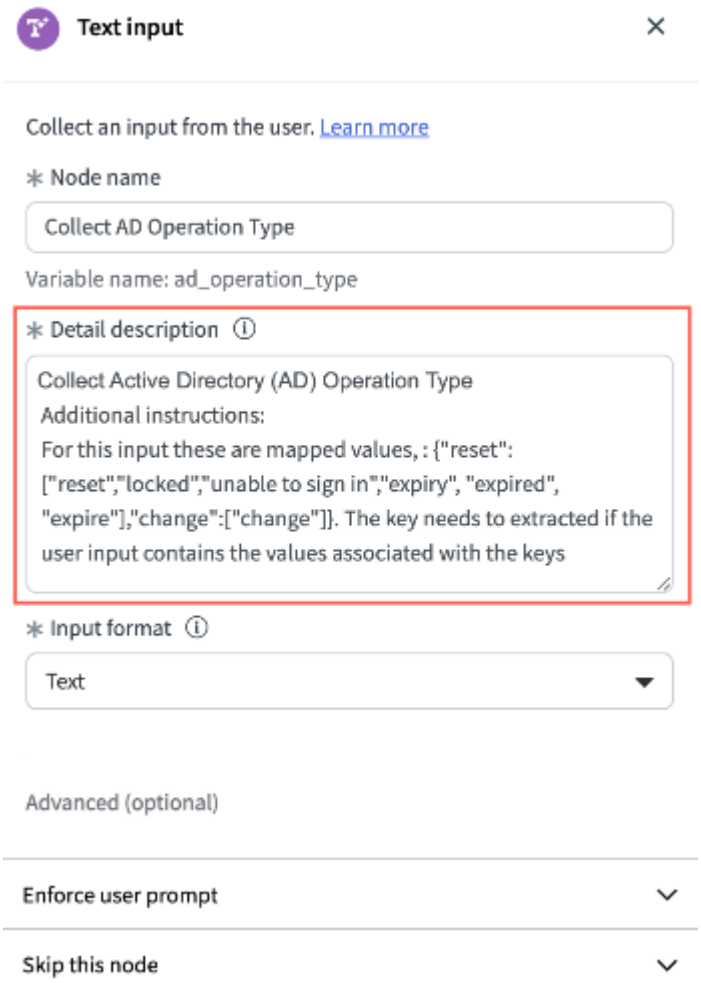
Detail description for an Active Directory Operation Type topic's input node example

Weak detail description	Strong detail description
Collect AD Operation Type	Collect Active Directory (AD) Operation Type Additional instructions: For this input these values are mapped values: {"reset":["reset","locked","unable to sign in","expiry", "expired", "expire"],"change": ["change"]}. The keys must be extracted if the user input contains the values associated with the keys.

Strong detail description example of LLM-enabled input node



Duplicate a Virtual Agent topic

Create a new topic or topic block by copying an existing Virtual Agent topic or topic block and customize it.

Before you begin

Role required: virtual_agent_admin or admin

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About this task

Consider duplicating topics in the following scenarios:

- When you want to use an existing topic, such as a prebuilt topic or topic block, as the basis for a new topic or topic block.
- When you want to modify an active topic while preserving the original topic for reference purposes or as a backup.
- When you want to convert a Natural Language Understanding (NLU) topic to a large language model (LLM) topic.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**, and in the Topics page, select the item to be copied.
2. In the topic header bar, select the more actions on topics icon (⋮), then select **Duplicate**.
   a. In the Duplicate window, enter the new name for the item.
   b. Select **Save**.
3. Update the properties on the **Properties** tab and on the **Flow** tab, change the conversation flow design as needed.

   Note:
   Keep in mind the goal or purpose of your new topic as you set the properties and update the flow. For example, if you're using keyword-based topics, you might need to change certain keywords based on the purpose of your new topic. For Natural Language Understanding (NLU)-enabled topics, you might need to change the NLU model and intent associated with the topic.

Topic and topic block duplication

If you're duplicating	See this section
Topics	See Create a Virtual Agent topic for a description of the topic properties that you can change and how to add or change the nodes in the flow.
Topic blocks	See Create a reusable topic block for a description of the topic block properties that you set and the input and output parameters that you define for the block.

4. As you update your design, use the **Test** option to run your design in a chat test window, then fine-tune your design flow accordingly.
   For details on test features regarding NLU topics, see Testing NLU/Keyword topics.

   [store-future: BEGIN review]For details on test features of LLM topics, see LLM topic testing. [End]

What to do next

If you've completed the topic or topic block, publish it to deploy it to your Virtual Agent clients.

LLM topic testing

Preview, test, and debug topics that use large language models (LLMs) in the Virtual Agent Designer chat window.

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You can test your topic's functions by running your conversation in a chat test window as you work. The web (Service Portal) chat client is the default test window.

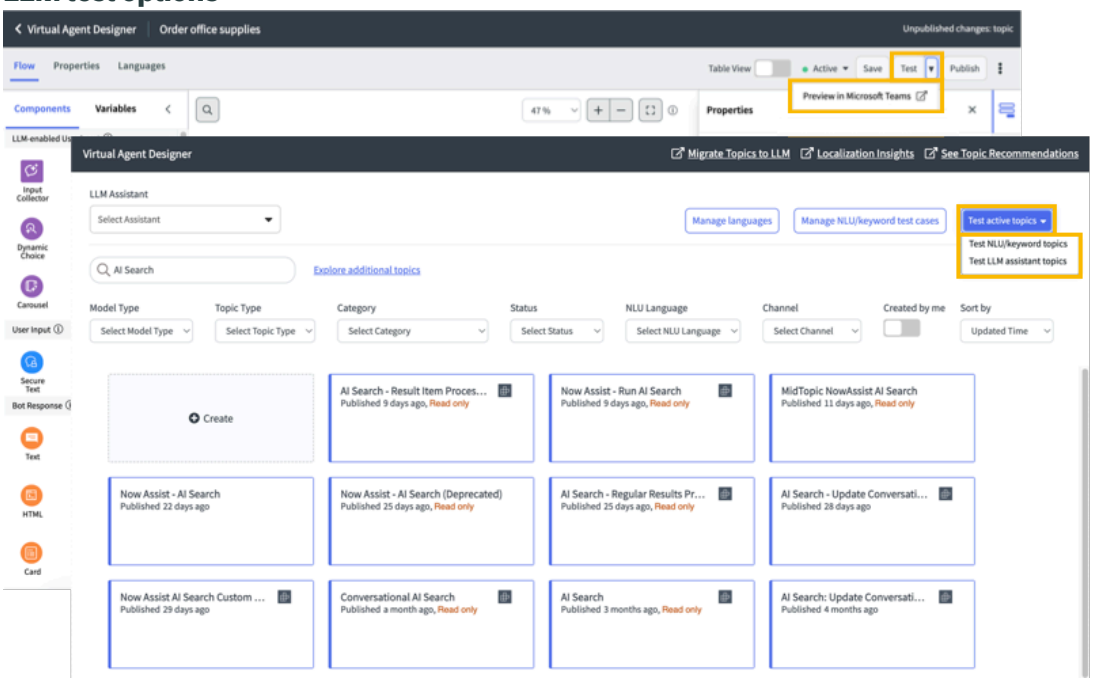
Large language model (LLM) topics are faster and easier to test compared to Natural Language Understanding (NLU) topics. For example, you don't need to retest your topic after updating utterances and retraining models as with NLU topics.

If you're using the Virtual Agent integrations with third-party messaging apps, elements in your conversation might appear differently in third-party messaging applications. Test your conversations in any third-party applications where you want to deploy Virtual Agent.

Note:
If the Now Assist panel or Microsoft Teams is configured for your environment, preview options for those channels display in the Test button list. Select **Preview in Now Assist panel** or **Preview in Microsoft Teams** in the list to test your topic in those environments.

Testing your LLM topic in the chat test window

LLM test options



Test LLM topics on the Virtual Agent Designer canvas by working with the **Test** options on the topic header bar. When testing from a single topic, the **Include topic discovery** option must be selected to work with the assistants. If the topic is associated with multiple LLM assistants, use the Assistant drop-down list to select which assistant you want to test. For more information about LLM assistants, see LLM assistants.

Note:
If your topic is missing any necessary materials, an incomplete badge appears in the corner of the flow diagram pane. A yellow or red warning badge also appears next to each node. The incomplete badge lists the total number of issues, while the local warning badges show how many issues are found in each node. If you select **Test** when there are issues, an Issues window opens with the number of issues present along with the details of each issue. These details include a full description and a hyperlink to each incomplete item.

Alternatively, you can test active (published) LLM topics on the Topics page. Use the **LLM Assistant** filter to restrict your topics to only topics associated with that assistant, and then select **Test active topics**. If you don't use the **LLM Assistant** filter, select **Test LLM assistant**

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topics from the Test active topics drop-down list. When using the **Test active topics** option or sub-options from the Topics page, topic discovery is enabled, so it's not listed as an option. When testing from the Topics page, the Assistant drop-down list appears in the chat test window. You must have previously established at least the default Now Assist in Virtual Agent assistant to see the Assistant drop-down list. When a topic is associated with just one LLM assistant, the Assistant drop-down list defaults to that assistant name. If you have multiple assistants, select which assistant you want to work with using the Assistant drop-down list. For more information about creating multiple LLM assistants, see Manage LLM virtual agents on the Assistants screen.

The chat test window opens in the Now Assist in Virtual Agent web client. The Assistant drop-down list and **Include topic discovery** option might display depending on where you originated the test from and if you have established any LLM assistants.

You can provide feedback to each utterance made by the LLM by selecting from the like thumbs-up icon ( ) or dislike thumbs-down icon ( ) options that appear when you hover over an utterance. All LLM-enabled user inputs aside from the Input Collector have these feedback options.

LLM utterance feedback options



The chat test window also displays adjoining tabs that provide details about your topic as you test it. The following tabs are available when testing LLM topics:

- **Analyze test phrases** - Results for topic discovery based on your input.
- **Prompt discovery** - List of all the prompts in the topic that are sent to the LLM.
- **Variables** - List of all the variables used in the conversation, such as input and Live Agent variables.
- **Edit variables** - Options for editing the variables used in this topic.
- **Context** - Options for specifying the context (using context variables) in which a topic is run.
- **Logs** - List of the processing performed.

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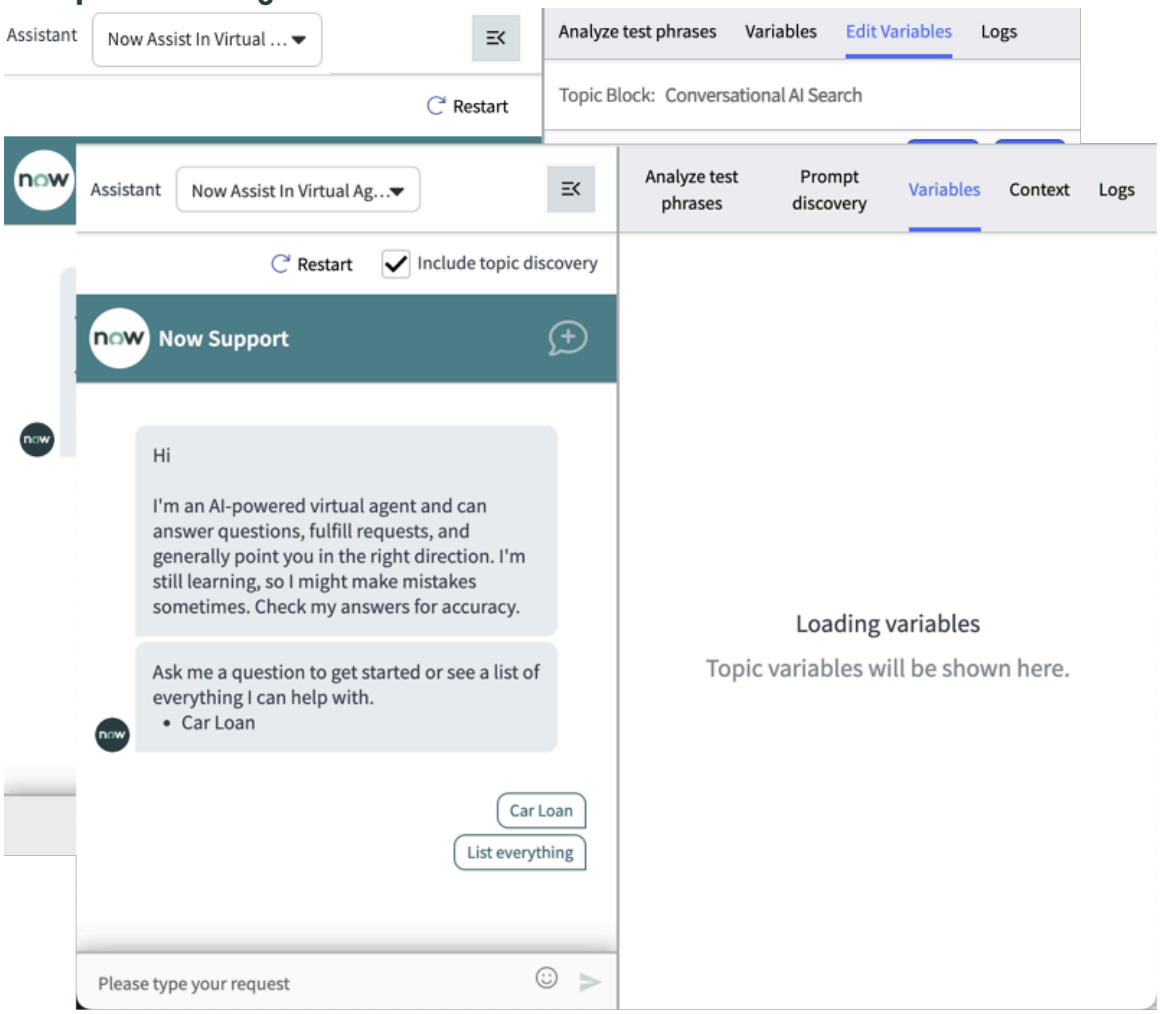
Example LLM testing chat test window and test tabs



The following tabs appear when you test their related topic types on the Virtual Agent Designer canvas:

- The **Analyze test phrases**, **Prompt discovery**, **Variables**, and **Logs** tabs appear for all LLM topic types.
- The **Edit variables** tab appears for topic blocks and custom controls.
- The **Context** tab appears for topics, setup topics, or small talk topics when you select **Include topic discovery**.

If you run tests from the Topics page, the test window shows only the **Analyze test phrases**, **Variables**, **Context** (available by default, with no **Include topic discovery** option), and **Logs** tabs.

Analyze test phrases tab

When you test LLM-enabled topics, results for topic discovery appear based on your input. When you input a test phrase, you can see a variety of search results when Genius Results are enabled including skill (topic) discovery, Knowledge Base (KB) articles, and catalog items. Under the skills search results, variables and values may also be listed (such as the variable *`@laptop_make`* and the value *`macbook`*), depending on the topic. These Genius Results only appear if you're testing a published topic and have selected the **Include topic discovery** option. If the **Include topic discovery** option appears inactive, publish the topic to work with topic discovery. A `Search indexing in progress` message might appear, but you can still test while the search indexing runs although topic discovery might not be updated. For more information about how Genius Results work, see Now Assist in AI Search.

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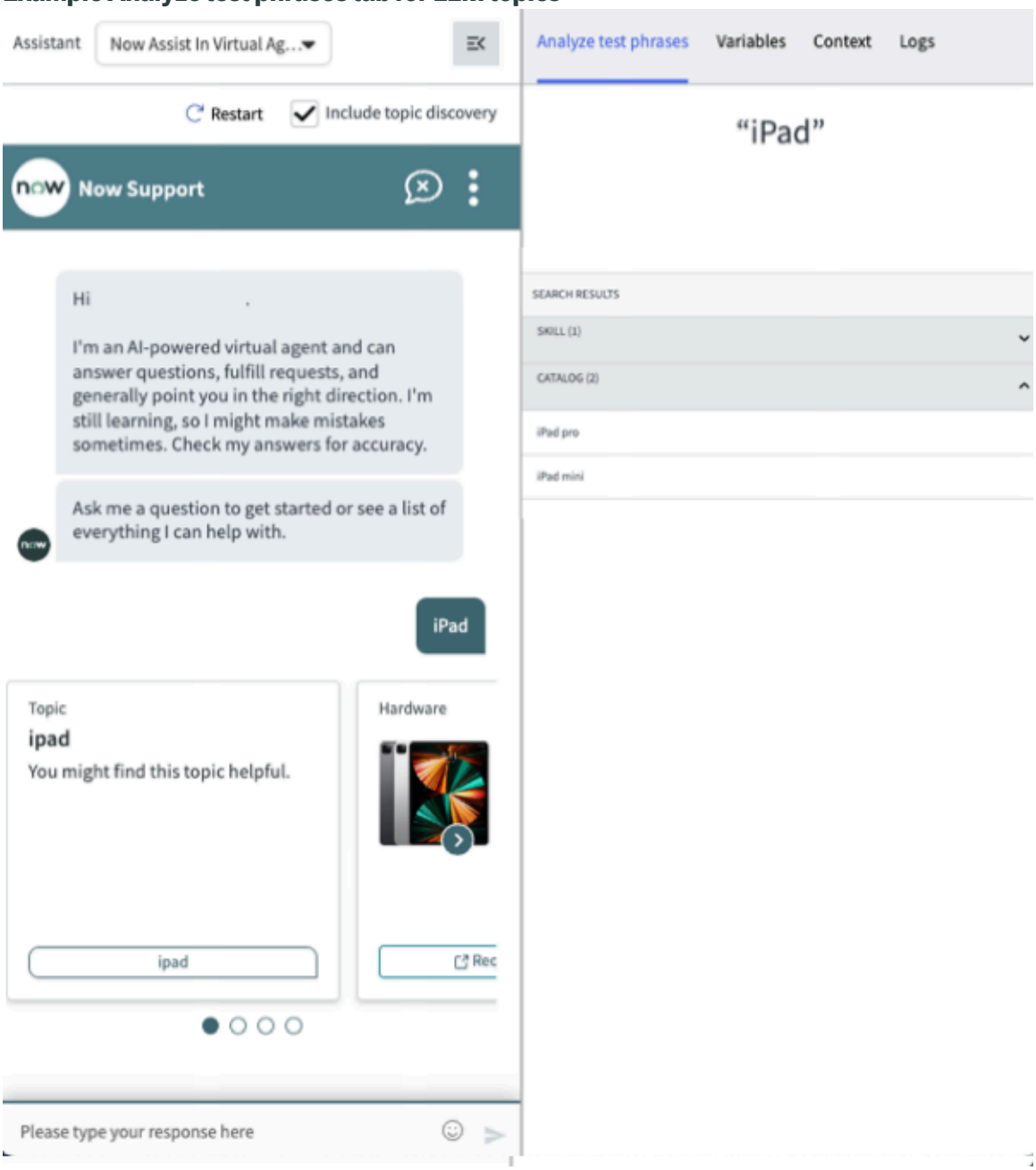
Additionally, when testing active LLM assistant topics from the Topics page, you see skills results for Semantic search. Semantic search analyzes the meanings and context of your search terms and uses that information to find results with similar meanings. It improves search recall by interpreting natural language to more accurately reflect your search's intent. If semantic search is deactivated for topic discovery testing, those results are not displayed. For more information about semantic search, see Semantic vector search in AI Search.

Example Analyze test phrases tab for LLM topics



Prompt discovery tab

If your topic contains any prompts that are sent to the LLM, they're shown in the Nodes category. The Nodes category lists LLM-enabled user input nodes on the canvas, their field names and types, and their contents.

You can modify the content of any of the prompts to develop optimal prompts for the conversation. Each prompt's status starts at `Original prompt`. If you alter a prompt's content, its status changes to `Modified prompt` and a revert icon ( ) appears next to it.

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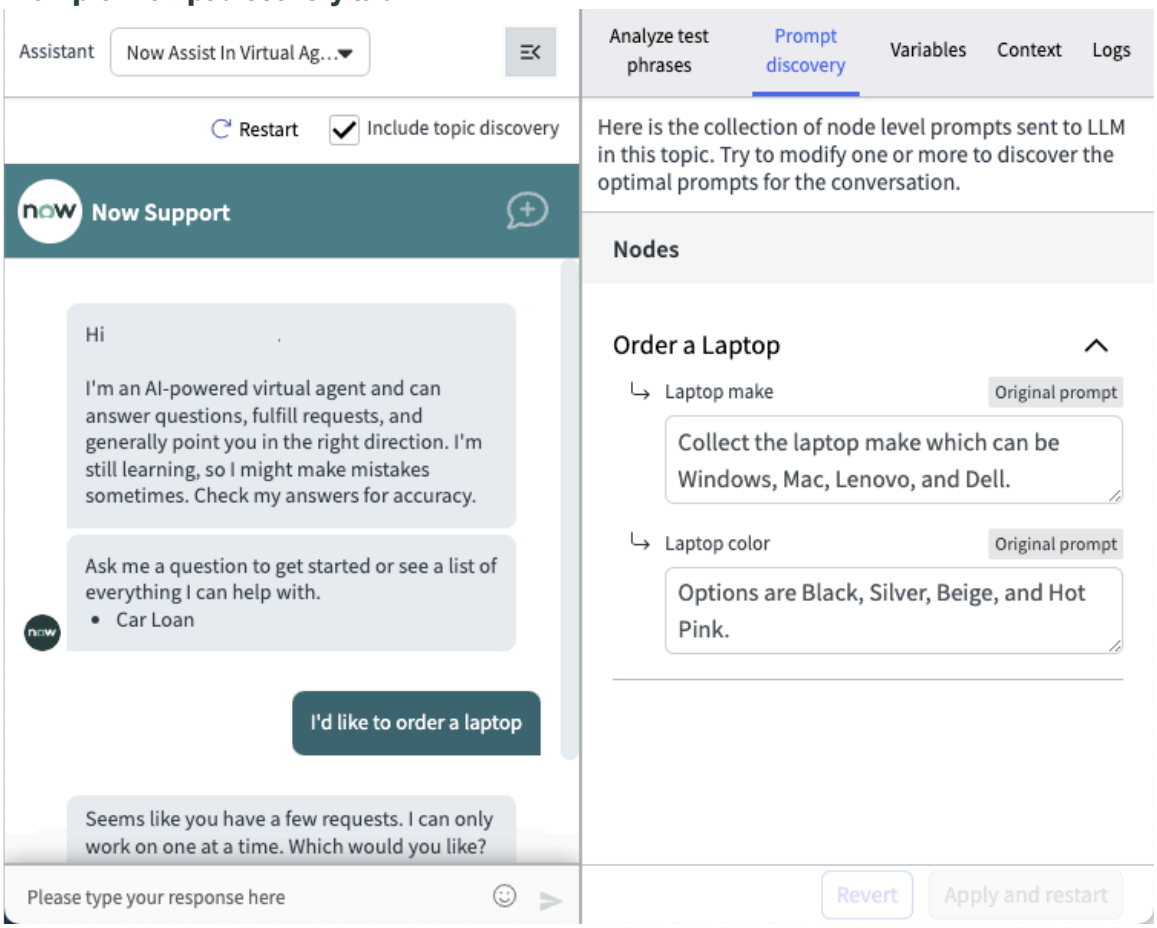
The total number of prompts modified is listed at the bottom of the tab next to a **Save to topic** button. To test the modified prompts, select **Apply and restart**. To undo changes to a prompt, select the revert icon next to the prompt. Alternatively, undo all changes by selecting **Revert** that activates when you modify any prompts.

Note:
If you select **Save to topic**, all changes are saved and all `Modified prompt` messages reset to `Original prompt`.

Example Prompt discovery tab



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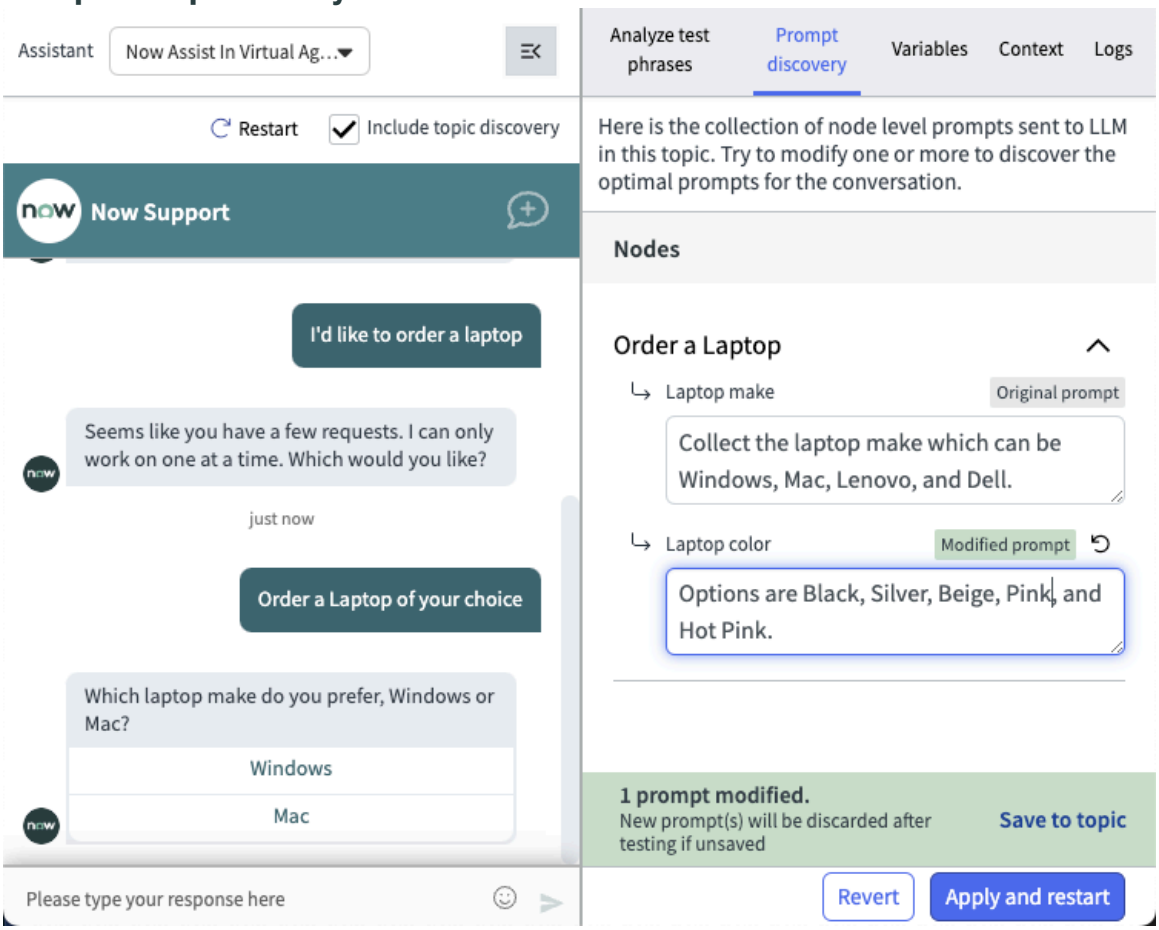
Example Prompt discovery tab with a modification



Variables tab

The **Variables** tab displays a list of all the variables used in the conversation and the associated values captured as the conversation progresses, so that you can follow along. A conversation can have these variable types:

- Input variables
- Script variables
- Live Agent variables
- Variables passed between a calling topic and topic block

The list is separated into sections by variable types. The following example shows the Input variables section. Notice that for the static list control, both the display label and value are captured for the selected choice.

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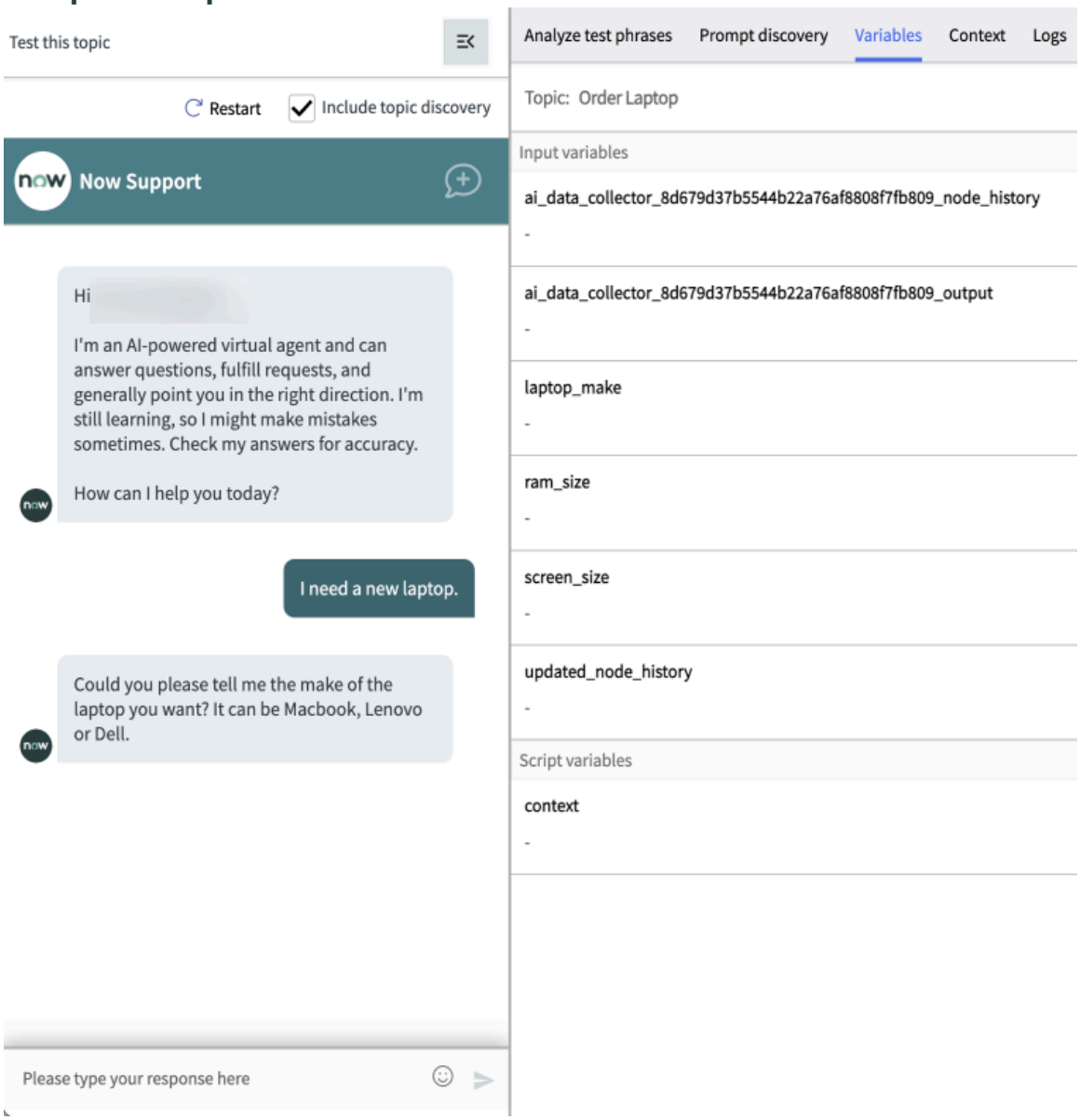
Example list of input variables



The following example shows the Input variables section for the grouped list control. This variable information appears similar to the static list control, but the variables are separated by each group of the grouped choice.

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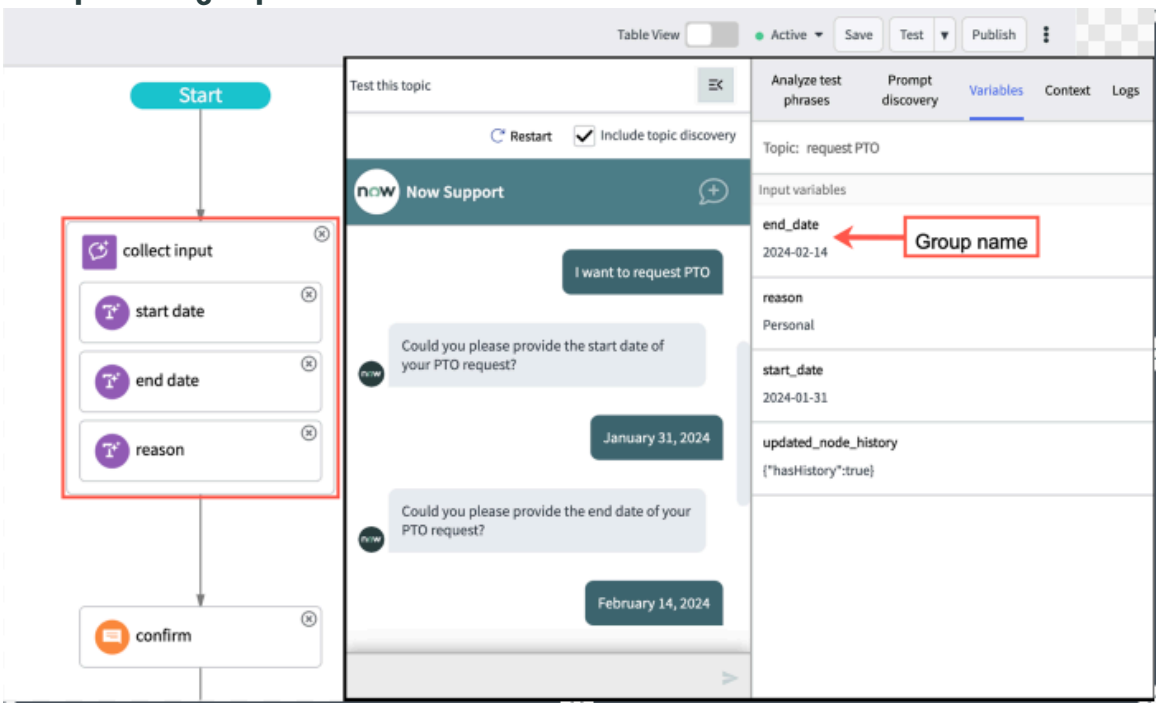
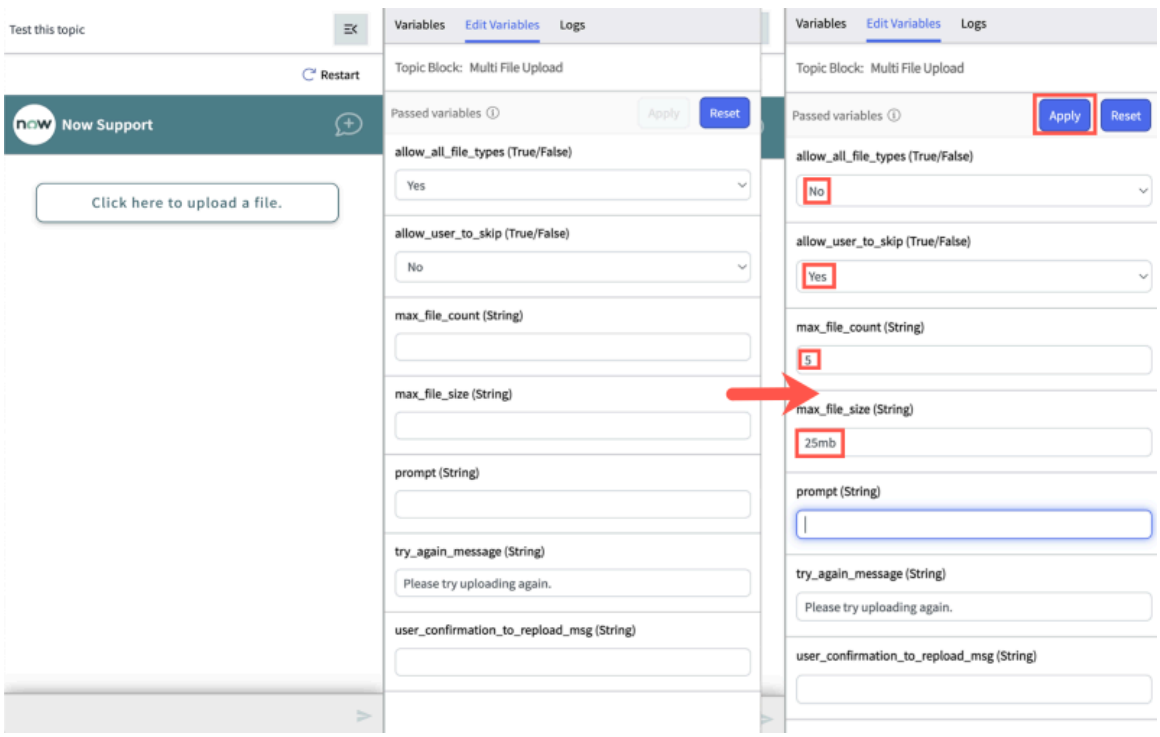
Example list of grouped choice variables



Edit Variables tab

When testing topics, topic blocks, and small talk topics, you can edit the variables found in the topic's nodes.



Context tab

The **Context** tab appears when you're testing topics, setup topics, or small talk topics, to specify a different context for the chat. Choose a context variable from the list. The variables contain contextual information that can be used to determine topic intent or control how chats are routed

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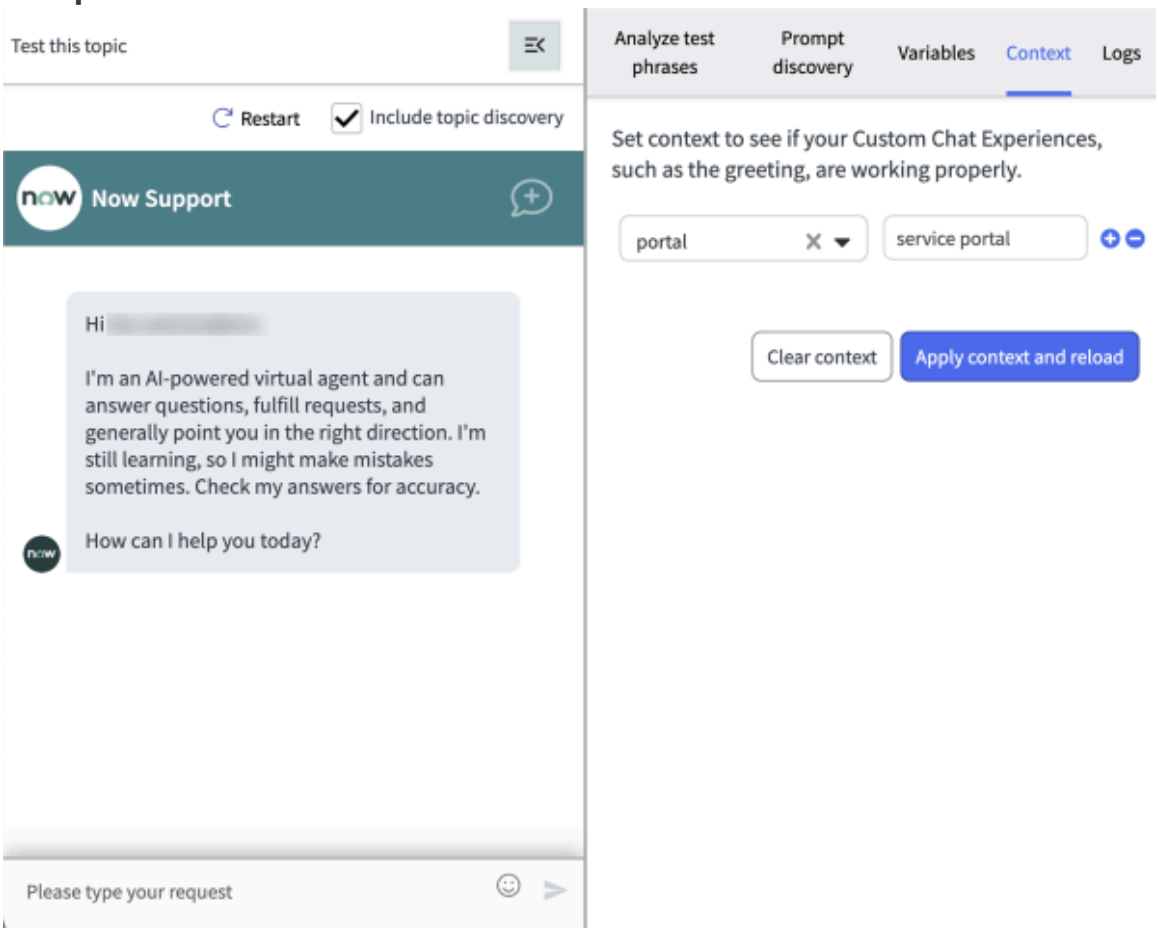
to live agents. For example, you could select **portal** from the list of variables and enter the portal name **IT Express**. The **Context** tab is unavailable when creating test cases.

For more information about defining context variables, see Configure context variables for storing chat-related information. For more information about live agent variables that are included with Virtual Agent, see Live agent chat context variables.

Example Context tab



Next steps

When you're done testing your topic, close the test chat window. If necessary, use the test information to adjust your topic to perform more accurately. For example, the results on the **Analyze test phrases** tab may return low scores or `Unsure` or `Unknown` confidence ratings. Improve scores by updating the topic description or instructions in the LLM-enabled user input nodes.

Testing NLU/Keyword topics

Use the chat test window to preview, test, and debug Natural Language Understanding (NLU)/Keyword topics.

As you work on a topic in Virtual Agent Designer, you can run your conversation in a chat test window. The default test window is the web (Service Portal) chat client. If it's configured for your instance, you can also run the test window in the Microsoft Teams application.

If you're using the Virtual Agent integrations with third-party messaging apps, elements in your conversation might appear differently in third-party messaging applications. Test your conversations in any third-party applications where you want to deploy Virtual Agent.

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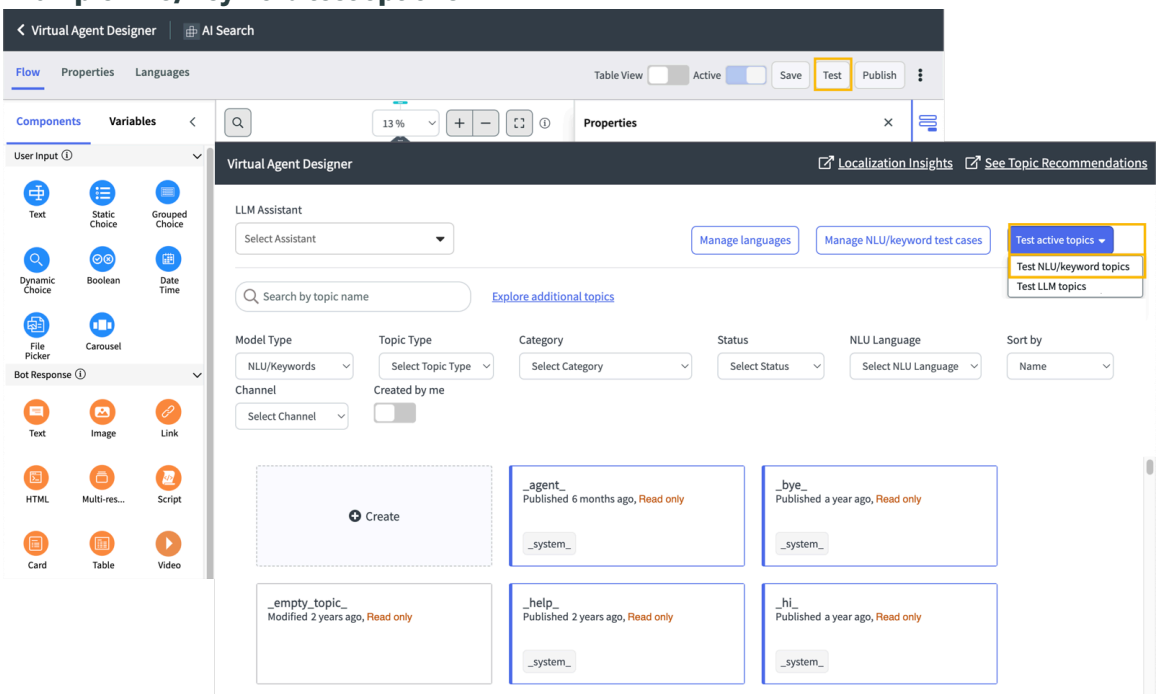
Note:
If the Now Assist panel or Microsoft Teams is configured for your environment, preview options for those channels display in the Test button list. Select **Preview in Now Assist panel** or **Preview in Microsoft Teams** in the list to test your topic in those environments.

Testing your NLU/Keyword topic in the chat test window

Example NLU/Keyword test options



To run your topic in the chat test window, select the **Test** option in the topic header bar. Alternatively, you can test active (published) topics by selecting **Test NLU/keyword topics** from the **Test active topics** button on the Topics page.

Note:
If your topic is missing any necessary materials, an incomplete badge appears in the corner of the flow diagram pane. A yellow or red warning badge also appears next to each node. The incomplete badge lists the total number of issues, while the local warning badges show how many are found in each node. Selecting **Test** when there are issues present opens an Issues window at the bottom, which counts up and details all the issues needing correction. These details include a full description and a hyperlink to each incomplete item.

The chat test window opens in the web client and displays adjoining tabs that provide details about your topic as you test it. You can use these tabs:

- **Analyze Test Phrases** - The results for intent matching and entity recognition appear based on what you entered in the conversation.
- **Variables** - List of all the variables used in the conversation, such as input and Live Agent variables.
- **Context** - Options for specifying the context (using context variables) in which a topic is run.
- **Logs** - A list of the processing performed.

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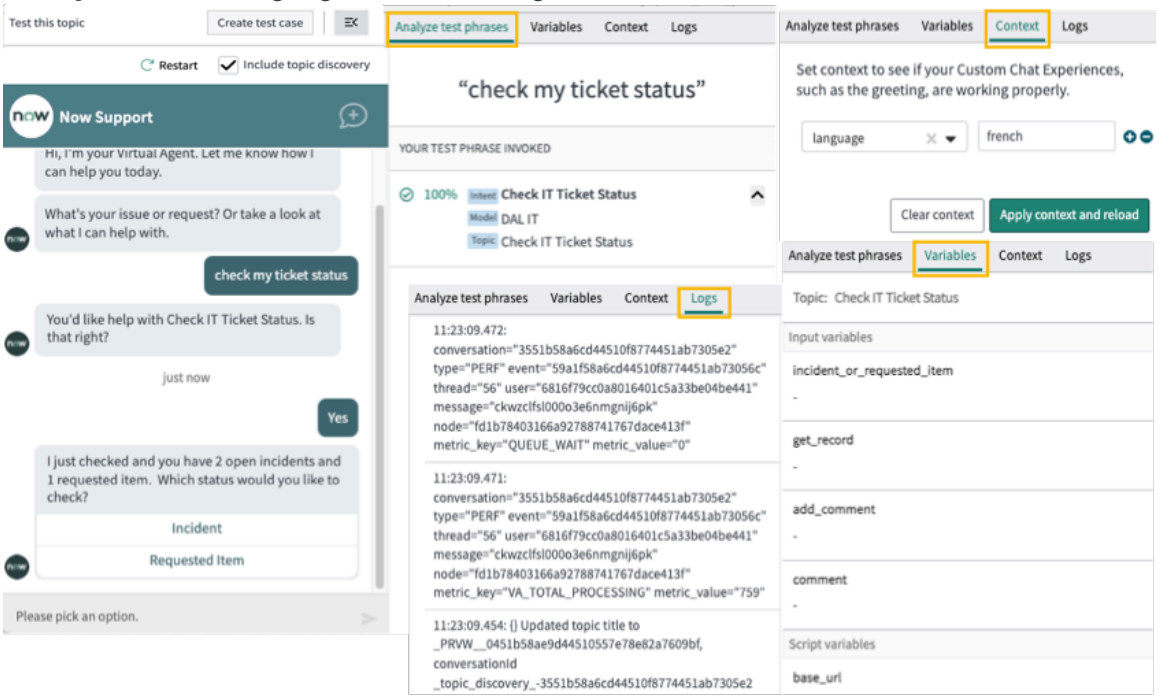
Example Natural Language Understanding (NLU) chat test window and test tabs



By default, the **Include Topic Discovery** option is enabled. This option automatically performs topic discovery and generates prediction results for NLU topics using test phrases that you enter in the test window. The conversation begins with the Virtual Agent greeting and the button for the menu of available topics.

If you're using the **Test Active Topics** option or sub-options from the Topics page, topic discovery is enabled, so it's not listed as an option. Testing active topics behaves the same as testing from a topic except that test cases can't be created.

Analyze test phrases tab

For NLU enabled topics, the **Analyze test phrases** tab provides an analysis of the possible intents that match the test phrase (utterance) that you entered in the chat test window. The tab lists the prediction results, which include matched intents and their prediction scores, along with any entity recognition and slot-filling results. The top match is listed first. The predicted intents depend on the prediction confidence threshold set in the NLU service.

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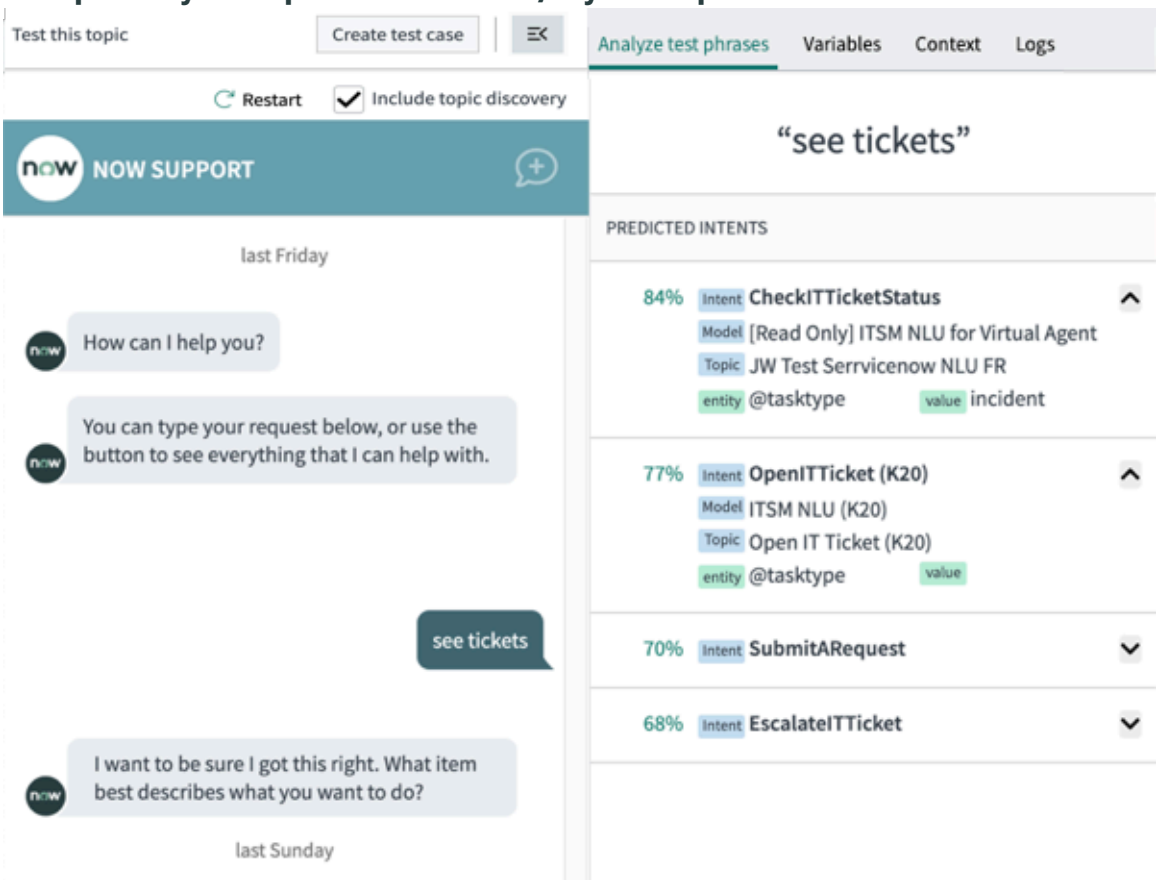
Example Analyze test phrases tab for NLU/Keyword topics



If an utterance doesn't match a current intent, you can add or change utterances in Virtual Agent Designer. For more information, see Modify NLU utterances and entities for a Virtual Agent topic.

Make changes, train the model again, and then retest until you're satisfied with the results. When the topic is ready, you can publish both the topic and the model from Virtual Agent Designer.

Variables tab

The **Variables** tab displays a list of all the variables used in the conversation and the associated values captured as the conversation progresses, so that you can follow along. A conversation can have these variable types:

- Input variables
- Script variables
- Live Agent variables
- Variables passed between a calling topic and topic block
- "Nodeless" NLU entities declared as a slot-filled variable for the topic

The list is separated into sections by type of variable. The following example shows the Input variables section. Notice that for the static list control, both the display label and value are captured for the selected choice.

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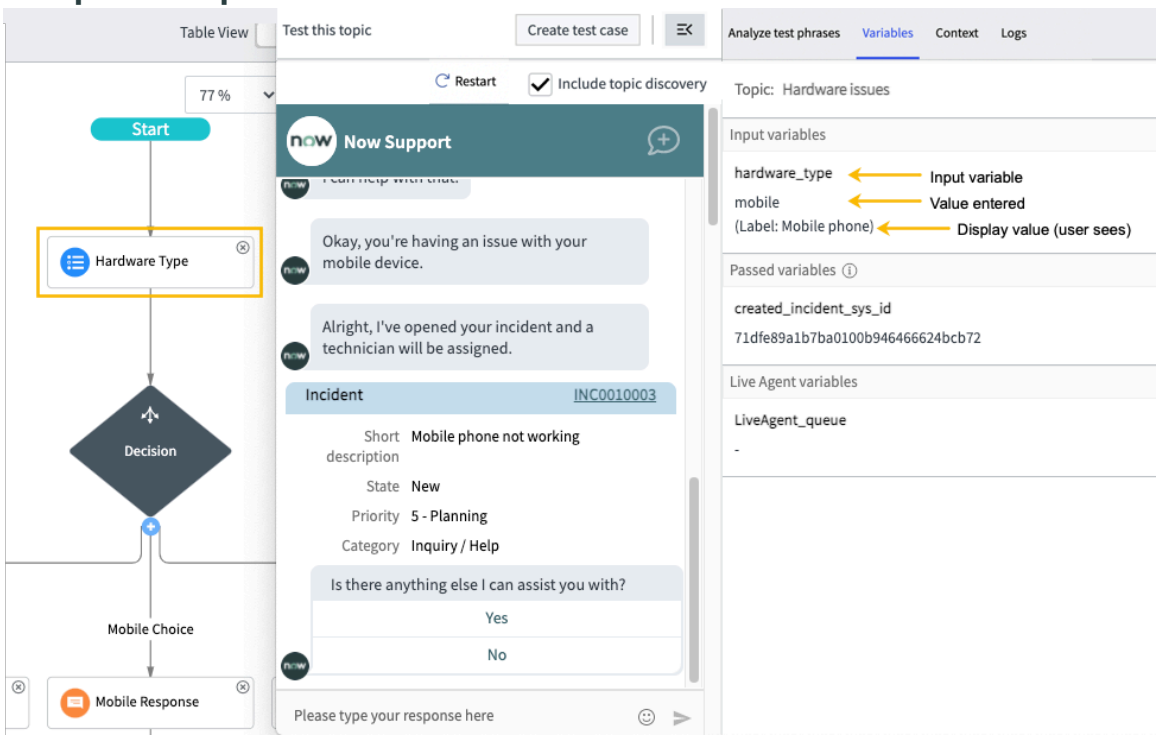
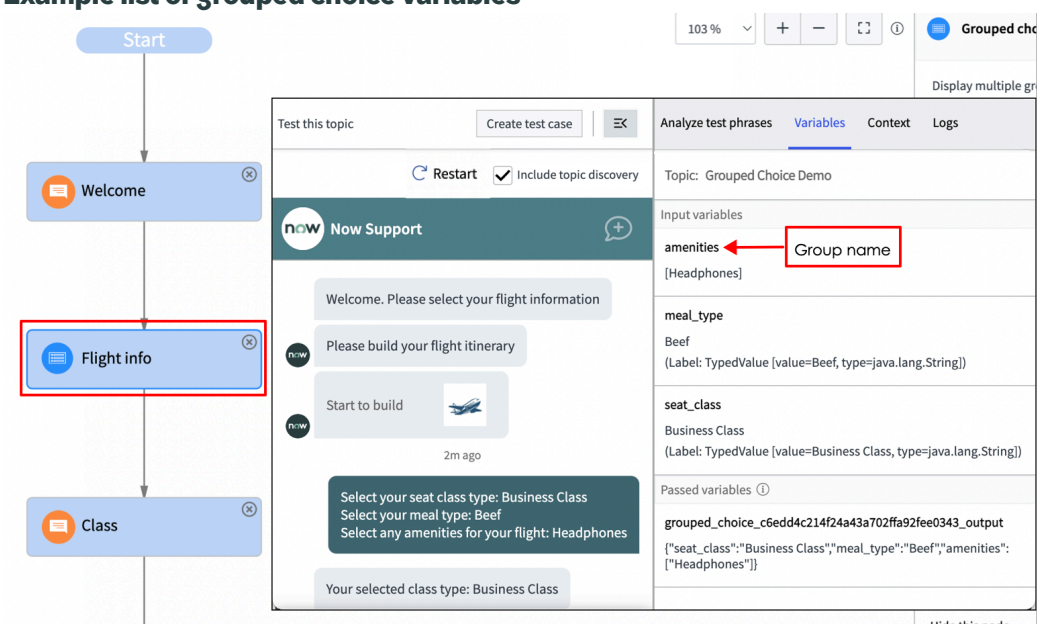
Example list of input variables



The following example shows the Input variables section for the grouped list control. This variable information appears similar to the static list control, but the variables are separated by each group of the grouped choice.

Example list of grouped choice variables



Context tab

Use the **Context** tab to specify a different context for the chat. Choose a context variable from the list. These variables contain contextual information that can be used to determine topic intent or control how chats are routed to live agents. For example, you could select **portal** from the list of variables and enter the portal name **IT Express**. The **Context** tab is unavailable when creating test cases.

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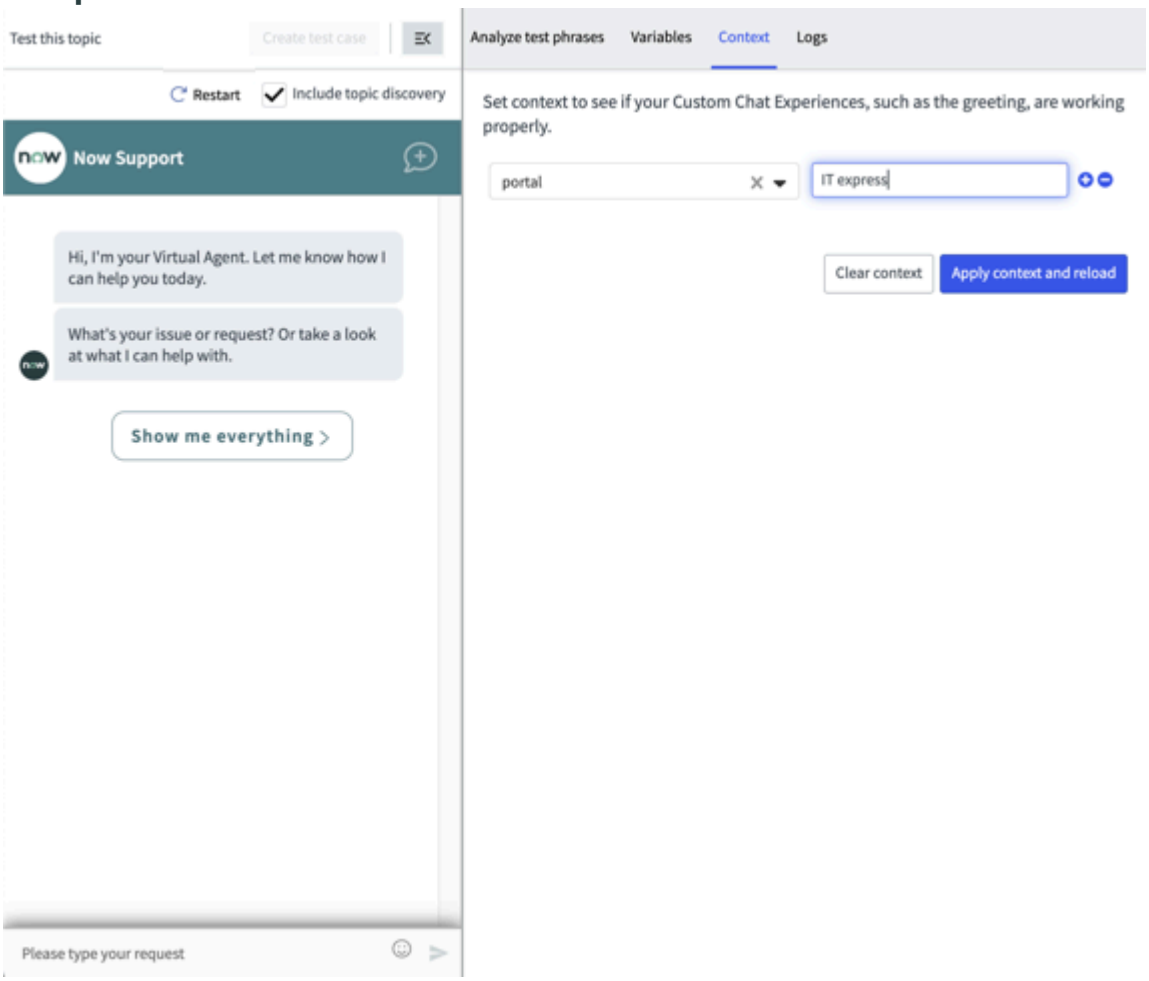
For more information about defining context variables, see Configure context variables for storing chat-related information. For more information about live agent variables that are included with Virtual Agent, see Live agent chat context variables.

Example Context tab



Logs tab

The **Logs** tab displays the processing and error messages that are recorded while running your conversation. If you're using scripts in Virtual Agent Designer, use `gs.log`, `gs.print`, and `gs.warn` statements in your scripts to output information in this log.

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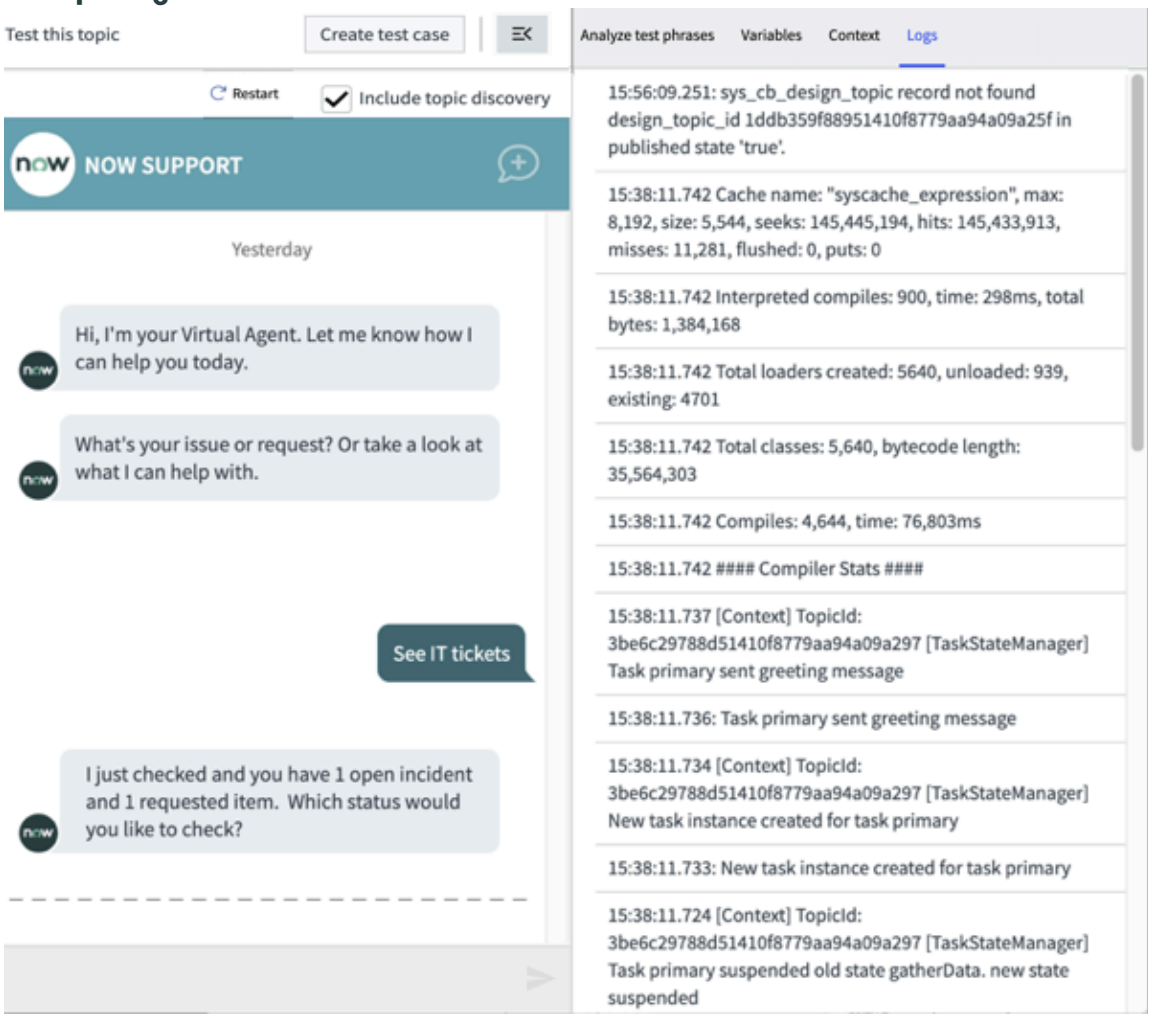
Example Logs tab



Next steps

When you're done testing your topic, close the test chat window. If needed, you can use the test information to fine-tune your conversation. For example, if the results on the **Analyze test phrases** tab return multiple possible matches for your utterance, you could update the utterances for your intent and NLU model on the **NLU Intent** tab for your topic.

Train and test your NLU model in Virtual Agent Designer

Use the **NLU Intent** tab to train and try a Natural Language Understanding (NLU) model that is mapped to a topic without leaving Virtual Agent Designer.

Before you begin

Role required: virtual_agent_admin or admin

About this task

As you make changes to a topic's intent, train the model so that your updates are incorporated. Then try and test the model to review prediction results based on the latest changes. Continue to test and refine your model until you're satisfied with your changes.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Open a topic and view the **NLU Intent** tab.
3. Select **Train model**.

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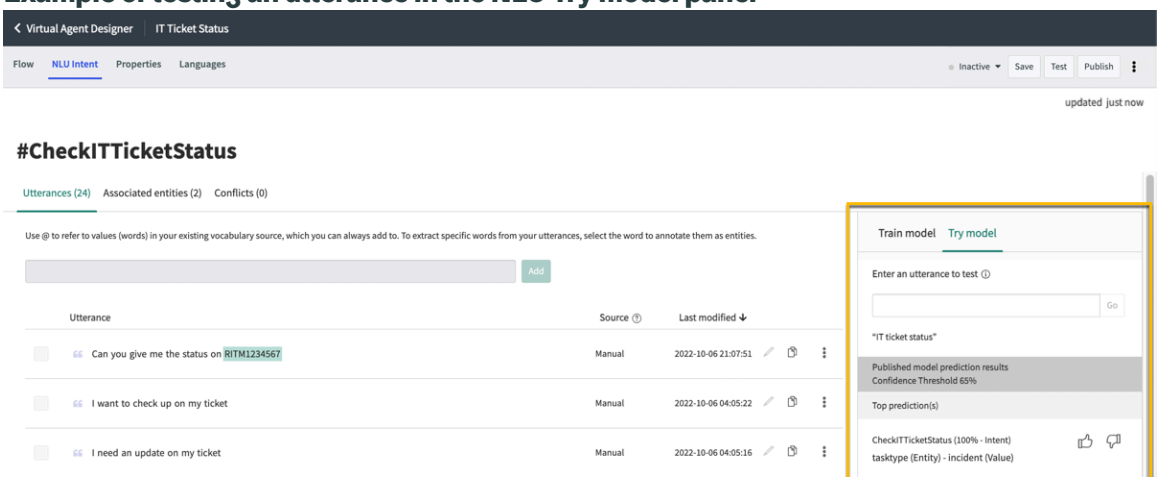
A message indicates that the model was successfully trained.

4. Select **Try model**.
   In the Try model panel, manually enter an utterance to test. The prediction results display in the panel.

Example of testing an utterance in the NLU Try model panel



If prediction confidence score results meet or surpass the confidence threshold you established for the model, the results appear under Top prediction(s). In this example, the threshold value is 65%.

The default value of the *com.glide.cs.intent_confidence_threshold* property is **0.7**.

The default value of the *com.glide.cs.entity_confidence_threshold* property is **0.5**.

> **Note:**
> You can compare the draft NLU model to its most recent published version. For more information, see Compare draft and published versions of your NLU model.

5. When you're satisfied with the prediction results, publish the model from NLU Workbench or click **Publish** in the topic Header bar and select **NLU Model**.

What to do next

You can publish the model at the same time as the Virtual Agent topic if the model meets publication criteria. Make sure your model has passed through all phases of development and is ready to publish. For more information, see Model management.

For more information on providing feedback using thumbs icons in the results, see Test panel feedback.

Automated testing for Virtual Agent topics that use NLU topic discovery

Automated testing for your Virtual Agent topic flows uses the ServiceNow Automated Test Framework product through Virtual Agent Designer. You can create and run automated tests through the Automated Test Framework to confirm that your topic flow works after making a change.

Create topic test cases through a topic's **Test** > **Create test case** preview and view the topic's test cases through the Topics List page's **Manage NLU/keyword test cases** button. Only run automated tests on a development, test, or other non-production instance to avoid data corruption and outage. For more information, see the Automated Test Framework.

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Working with test cases is only available if you have:

- Installed the com.glide.cs.atf plugin (installed as a part of the Virtual Agent chatbot plugin).
- Received one of the following roles: atf_test_designer, atf_ws_designer, atf_test_admin, virtual_agent_admin, or admin.
- Published topics with one of the following topic types: **Topic**, **Setup Topic**, or **Small talk**.

Create an automated test in Virtual Agent Designer

Create automated tests in Virtual Agent Designer and run tests regularly against ideal conversation topic flows. You can create multiple automated tests for a topic to capture different conversation flows for various situations such as ideal conversation paths or errors.

Before you begin

Plugin required: com.glide.cs.atf.

Role required: atf_test_designer, atf_ws_designer, atf_test_admin, virtual_agent_admin, or admin

About this task

As you work on a published topic, setup topic, or small talk topic, use the **Test** option in the topic header bar to run your conversation in a chat test window. The default test window is the web (Service Portal) chat client. Use the **Create test case** button to create a test case and save the test case in the Automated Test Framework.

> **Note:**
> You can find a list of NLU/Keyword test cases by selecting the **Manage NLU/Keyword test cases** button on the Virtual Agent Designer main page. Automated tests are also listed on the Automated Test Framework (ATF) Tests [sys_atf_test] table. For more information on managing NLU/Keyword test cases, see Manage and run automated test cases in Virtual Agent Designer

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Select a published topic.
3. In the topic's header bar, select **Test**.
4. Select **Create test case**.

   > **Note:**
   > The **Create test case** button is only available for published topics that are non-read only with one of the following topic types: **Topic**, **Setup Topic**, or **Small talk**.

   The topic's test client restarts and the test case begins to capture your ideal conversation. While capturing your test case, the **Include Topic Discovery** and the **Context** tabs are unavailable.
5. Enter the conversational flow that you want to capture and test.

   > **Tip:**
   > Select **Restart** at any time to restart the topic conversation and test case capture.

6. Select **Stop**.
   The **Test case name** field displays the topic's name along with the date and timestamp. For example: `[Topic name] 3/28/2022, 3:32:19 PM`.
7. Perform one of the following actions.

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Manage and run automated test cases in Virtual Agent Designer

Run reusable test cases of your published topics using the Automated Test Framework through Virtual Agent Designer to identify performance issues and prevent regressions before production.

Before you begin

Plugin required: com.glide.cs.atf.

Role required: atf_test_designer, atf_ws_designer, atf_test_admin, virtual_agent_admin, or admin

About this task

The **Manage NLU/keyword test cases** button opens the **Run test cases** tab. Before you can run a test case, you previously must have created a test case. The **Create test cases** tab displays published topics that don't have associated automated tests. These topics appear in order from their last published date. After you select a topic name, a new window opens and you're directed to that topic in Virtual Agent Designer. From the topic, you can select **Test** to create a test case. For more information, see Create an automated test in Virtual Agent Designer.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Select **Manage NLU/keyword test cases**.
   You either see the **Run test cases** tab or the **Get started** button. The **Run test cases** tab displays topics that have had test cases previously created. The **Get started** button redirects you to the **Create test cases** tab to begin creating your topics' automated testing.
3. In the list view, review the columns.

Run test cases columns

Column	Description
Test case	Displays the linked test case name. Selecting the linked name opens a new window and directs you to that test within the Automated Test Framework. From the Automated Test Framework you can view test details, including test steps.
Topic	Displays the linked topic name. Selecting the linked name opens a new window and directs you to that topic in Virtual Agent Designer. Topics with multiple test cases are grouped.
Run status	Displays the run status of the test. Three statuses are possible: ○ Ready: The test case is ready to be run. ○ In-progress: A temporary test case status that appears while the test case is running. After the test runs, the status returns to Ready. ○ Run recommended: The topic's published date is more recent than the test cases latest run date so there may be published updates for the topic. A run

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Column	Description
	is recommended because the latest published topic and its related test cases are potentially out of synchronization.
Last run	Displays the date and timestamp of when the test was last run. Topics are grouped and sorted by the last test run date or if the same run happened across multiple topics, the topic's last published date.
Result	Displays either **Failed** or **Passed**. Pointing to the linked result displays a brief explanation of either the passing or failing step details. Selecting the linked result opens a new window and directs you to that test's **Test Results** in the Automated Test Framework where you can view more specific step fail or pass details. If the test case has passed, no changes happened between the latest published topic and its saved test case. If the test case has failed, a change happened between the latest published topic and its saved test case. For more information, see View test results. **Tip:** You can view the test suite of all topics created and tested through Virtual Agent Designer by navigating to **Automated Test Framework (ATF)** > **Suites**, and then selecting **Virtual Agent Topics**. For more information, see Run an automated test suite.
Actions	Displays the **Delete** button that deletes the test case from this page and the Automated Test Framework.

4. Select one, multiple, or all test case check boxes, and then select **Run**.

   Tip: The **sn_atf.runner.enabled** property must be turned on to run test cases. After the property is turned on, you can select **Run**. Also, you can select the check box next to the Test case column header to select all test cases to be run.

   An in-progress banner appears and changes to a completion banner after your test results are ready. The Last run column updates and the last run test cases are moved to the top of the table.

Handle failures caused by dynamic inputs in user testing of Virtual Agent topics

Avoid failures when performing automated tests for topics in Virtual Agent by controlling which inputs that you want to run as part of a test case.

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Before you begin

Set up a test case for a topic that includes dynamic inputs. See Create an automated test in Virtual Agent Designer for more information.

Role required: virtual_agent_admin or admin

About this task

When running a test in Virtual Agent Designer, some tests may fail even when a topic has fully functional components. These failures can happen based on various cases, such as timestamps based on a function that always returns the current time. The timestamp is created correctly when the test runs, but isn't a match with the recorded timestamp in the test case. Similar examples include different users entering different names, email or physical addresses, or other information specific to each user. Any topic that returns different data based on time or other changing conditions is a potential failing point in testing. By deactivating test steps that use dynamic input, you can run tests that won't fail due to a change in the data found in those steps.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Select **Manage NLU/keyword test cases**, followed by the test case that you want to work with.
3. Under the **Test Steps** tab, select the Active column of the test step you want to exclude, and set its value to `False`.
4. Repeat Step 3 with as many test steps as you want to deactivate.
5. Run or debug your test case.

Debug a Virtual Agent topic

Investigate and resolve unexpected behavior in your custom Virtual Agent topics, topic blocks, and controls.

For information about topic discovery issues, see Resolve Natural Language Understanding (NLU) topic discovery issues.

Duplicate a live topic before debugging and changing it

Duplicate a topic rather than update a live topic. The unmodified original topic can serve as both a reference and a backup, and retaining the original enables you to restore the topic quickly. Remember to deactivate the original topic before publishing the duplicate.

Debug a topic while testing your conversations

As you create or update a topic in Virtual Agent Designer, use the **Test** button in the topic header bar to preview the conversation. The chat test window shows the conversation as it appears within Service Portal. Elements in your conversation might appear differently in third-party messaging applications. Test your conversations in any third-party applications where you intend to deploy Virtual Agent.

The test chat window displays four tabs that provide detailed information for debugging and refining your topic: **Analyze test phrases**, **Variables**, **Context**, and **Logs**. For details on these tabs, see Testing NLU/Keyword topics. The following example shows the processing messages and errors logged during testing.

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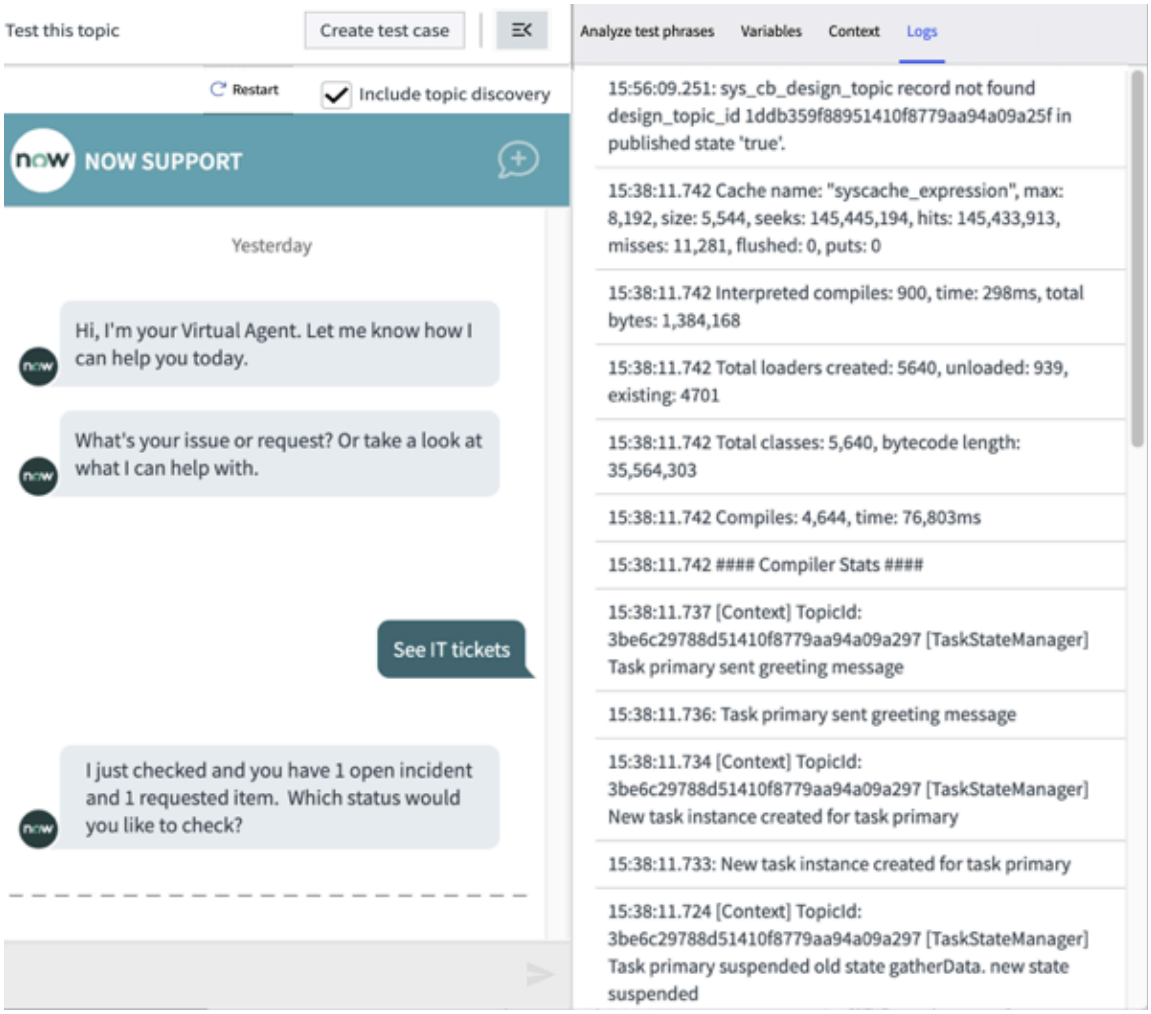
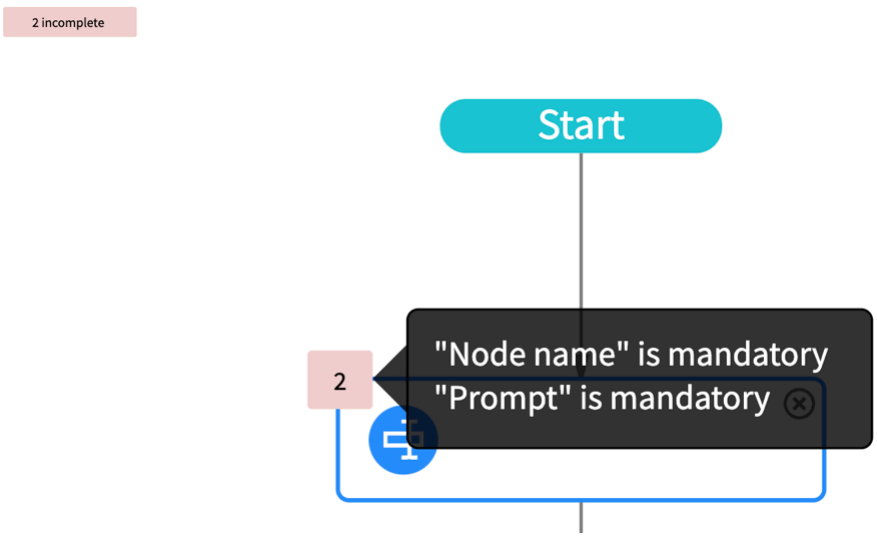


Watch for warnings on controls within your topic

Warnings on a topic node in the Flow tab



Controls that are missing necessary information show a red incomplete badge in the upper left corner of the control. The badge shows a number indicating the number of issues in that control. Select this badge to see a list of the issues in the control.

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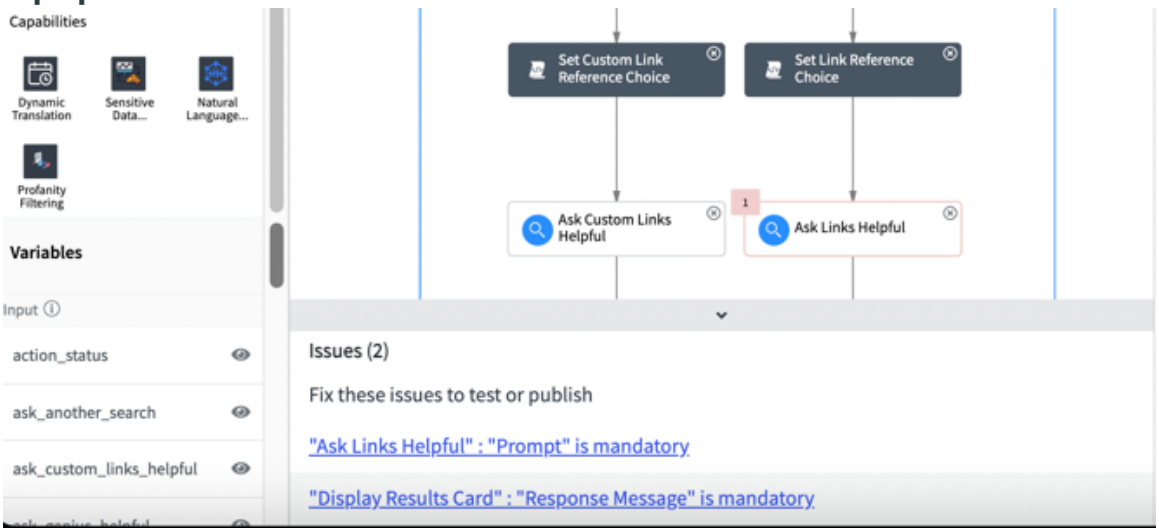
Another warning badge appears in the upper left corner of the designer to indicate the number of issues within the entire topic.

Check for errors when a topic preview does not run

Topic preview errors on the canvas



Additional information appears under the Virtual Agent Designer canvas when an error prevents the topic from running. The total number of Issues are listed, along with details and a hyperlink for each. Select a hyperlink to go to the node, and use the information provided to correct any errors in your conversation.

Common Virtual Agent issues

Issue	Possible resolution
Cannot see module designer under conversational interfaces	• User might not have the virtual_agent_admin role. • Virtual Agent plugin might not be activated.
Cannot edit a topic	Logged-in user must be in the same application scope as the topic.
Cannot preview topic	• Make sure that all required fields are filled in on the node properties. • Ensure that your browser is configured to permit pop-ups from your instance.
Web client stuck at Connecting...	One or more of your topics might be missing. Check the Topics page to ensure that topics are present on the instance and in the Active state.

Review topics that run in a conversation flow

Each Virtual Agent (VA) conversation in an instance automatically generates an interaction record in the Interactions [interactions] table, which logs the conversation between a requester

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and virtual and live agent. You can review the transcript of the conversation between the requester and virtual agent, including live agent transfers (if using Agent Chat). For details, see Virtual Agent interaction records.

Resolve Natural Language Understanding (NLU) topic discovery issues

If an intent is not being chosen when expected, you can troubleshoot NLU prediction errors.

Quick troubleshooting tips

If a Virtual Agent is not being discovered, check the following:

Is NLU enabled for the session language?

Enable the language in Natural Language Understanding (NLU) settings for Virtual Agent. For details, see Enable NLU languages in Virtual Agent settings.

Is the NLU Model trained and published for the session language?

Your topic may not be using the latest changes to your model. For ServiceNow® NLU, see Train and try your NLU model and Publish a Virtual Agent topic.

Is the Virtual Agent topic published, discoverable, and bound to a published NLU Model and Intent for the session language?

The topic should be bound to a single model and intent for a given language. Ensure there are no duplicate intents bound to other topics. Make sure that the topic, model, and intent are in the same domain. For more information, see Publish a Virtual Agent topic.

Are any roles or conditions specified for the Virtual Agent topic on the Properties tab in Virtual Agent Designer?

If the topic is shown only for certain roles or for certain conditions, this can impede topic discovery. For details, see Topic Properties tab.

Why did Virtual Agent discover my topic in Spanish but not in French?

There are several possibilities:

- Not all languages are supported by all NLU providers. For details, see Language support for NLU services.
- Not all topics are bound to a language-specific NLU model and intent.

  For example, Topic A may be mapped as follows:
  - Bound to Model A and Intent A for English
  - Bound to Model A and Intent A for Spanish
  - NOT bound to a model or intent for French

  In this scenario, create a French model and intent for the topic. For more information, see Multilingual model management.

Why did a topic variable NOT slot fill?

Check the following:

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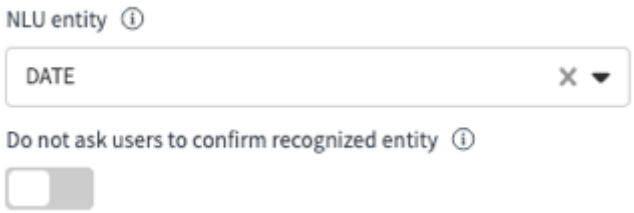
- The topic's user input node was not configured with an associated entity. Use the **NLU entity** property for the node in Virtual Agent Designer.



- The prediction result contained an NLU entity with a confidence score that was less than the configured confidence threshold.
- The NLU entity value for the node was invalid. For example, you can't apply the word "red" to a Date/Time entity type.

Test discovery from the topic.

Do one of the following:

- From the Topics page, select **Test Active Topics**. Enter your utterance, and watch the **Analyze test phrases** tab.
- Open the topic in Virtual Agent Designer, then select **Test**. In the Test window, select the **Include topic discovery** check box. Enter your utterance, and watch the **Analyze test phrases** tab.

For details, see Testing NLU/Keyword topics. For an understanding of how topic discovery works, see Natural Language Understanding topic discovery logic in Virtual Agent.

Is "Setup Topic" the topic in question?

If so, it needs to be configured in Conversational Interfaces Chat Settings for it to be discovered. For details, see Configure a Virtual Agent chat experience.

Questions or issues with mid-topic switching.

Why did the conversation return to Topic A after Virtual Agent switched to Topic B?

The **Resume topic flow after topic switching** attribute is enabled on the topic. You can find this toggle switch on the **Properties** tab under **Advanced properties** > **Additional**.

Why did the conversation NOT return to Topic A after Virtual Agent switched to Topic B?

The **Resume topic flow after topic switching** attribute is disabled on the topic. You can find this toggle switch on the **Properties** tab under **Advanced properties** > **Additional**.

If Virtual Agent doesn't find an intent, will it use a keyword search in mid-topic?

No.

Are Topic A's variables available to Topic B after switching?

No.

Are Topic B's variables available to Topic A when Topic A resumes?

No.

For additional troubleshooting, check the information in the following tables.

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Check NLU prediction information in the Open NLU tables

When reviewing or debugging topics that use Natural Language Understanding (NLU), you can use various Open NLU tables to view the NLU prediction results for your topics. For example, the Open NLU Predict Intent Feedbacks and Open NLU Predict Entity Feedbacks tables provide detailed information on the NLU processing performed by applications (such as Virtual Agent) to determine topic intent and entities (slot filling).

Open NLU Predict Intent Feedbacks table

The Open NLU Predict Intent Feedbacks [open_nlu_predict_intent_feedback] table shows the intent processing that an application (in this case Virtual Agent) performs in response to an NLU intent prediction result. The goal for Virtual Agent is to map a predicted NLU intent to a Virtual Agent topic. Whenever Virtual Agent suggests a topic, a record of the prediction result is added to this table. If Virtual Agent doesn't find a topic, no prediction occurs, and a record marked *`Skipped`* is added to this table.

To view the table, navigate to **All**, and then enter `open_nlu_predict_intent_feedback.list` in the navigation filter.

Key fields in the Open NLU Predict Intent Feedbacks table

Field	Description
App	Application using NLU. For example: *VA* (Virtual Agent).
App Document	sys_id of the application record. For example: *`sys_cs_topic.sys_id`*.
App document table	Table of the application record. For example: *`sys_cs_topic`* (Topics table).
Auto-Selected	Boolean indicating whether the system detected only one intent above the prediction threshold, and therefore the application chose to run the topic that matched the same intent: *`true`* or *`false`*.
Current Intent	NLU intent that was used by the application when the NLU prediction was submitted. This field can be empty (blank). For example, an intent used in the Virtual Agent application could be *`Change password`*.
Domain	The intent's domain. For example, Global or ITSM.
External Model Display Name	Name of the external NLU model. For example, the name of the IBM Watson Assistant NLU application.
Intent Switch Causer	Name of the originating topic that prompts the user for confirmation. There are two possible scenarios for values in this column: • The user is prompted for confirmation on the initial intent match for their utterance (**Ask user if topic VA chose is correct** toggle switch is enabled in NLU Settings). If the user is prompted for an initial utterance, this value may be the Greetings topic. If the value is *`empty`*, the user either was not

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Key fields in the Open NLU Predict Intent Feedbacks table (continued)

Field	Description
	prompted for the initial match, or the user rejected the initially matched topic intent. • The user is prompted for confirmation for an intent switch in mid-topic (**Ask user if switched topic is correct** toggle switch is enabled in NLU Settings). If the user is prompted for a switch in mid-topic, this value is the name of the topic they were viewing at the time of the switch. **Note:** System tasks may also display here, which you can ignore. For example: *__silent_TerminateGoal_a3817a5f7ca7439b8*.
Intent Switch Causer current Task	Name of the task (node) that the user switches from. **Note:** System tasks may also display here, which you can ignore. For example: *__silent_TerminateGoal_a3817a5f7ca7439b8*.
Mapped	Boolean indicating whether the application (Virtual Agent) considered the prediction to be usable by matching the intent to an available topic: *true* or *false*.
Model Display Name	Name of the ServiceNow NLU model.
Model ID	ID of the NLU model that the prediction was submitted for.
Model Name	Name of the NLU model that the prediction was submitted for.
NLU Topic Discovery Outcome	Prediction result for initial utterance in a conversation as part of topic discovery: • **AI Search Fallback**: No prediction was made. AI Search was used as the fallback. • **Correct**: A single prediction was made. The user confirmed the topic was correct. • **Correct Among Multiple**: Multiple predictions were made. This result indicates that the user selected this prediction. Other prediction records are marked as Uncategorized. • **Exited with no confirmation**: The user exits with no confirmation. • **Incorrect**: A single prediction was made. The user confirmed the topic was incorrect. • **Incorrect Among Multiple**: Multiple predictions were made, but the user did not select any of the suggested topics. This result indicates that this prediction had the highest Prediction

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Key fields in the Open NLU Predict Intent Feedbacks table (continued)

Field	Description
	Confidence value. The other prediction records are marked as Uncategorized. • **Setup Topic Prediction**: Setup topic related prediction was made without using AI Search. • **Skipped**: No prediction was made. • **Skipped with New Utterance**: When the Topic menu displayed, the user typed a new utterance. • **Uncategorized**: None of the above conditions were met, or the user abandoned the conversation.
NLU Model Language	Language of the NLU model used for the prediction.
Prediction	Name of the predicted intent.
Prediction Audit Log	Reference to the Open NLU Predict Logs [open_nlu_predict_log] table.
Prediction Confidence	Confidence value of the prediction.
Requester Session Language	Language code of the requester session language when Dynamic Translation is enabled. For example, if the user types in French, the code *fr* is stored. If language detection is enabled and the user enters text in a language that is not the default, Virtual Agent asks the user to confirm their language. If confirmed, the detected language becomes the default value for the session.
Selected	Boolean indicating whether the multiple predicted intents shown to end users as matched topics were actually selected by the end users: *true* or *false*.
Shown	Boolean indicating whether the application (Virtual Agent) displayed the predicted intent as a choice for the end user to select: *true* or *false*.
Topic Switched	Name of the topic, if the user was prompted for confirmation (regardless of their choice, yes or no).
Utterance	Phrase entered by the end user in the chat client window.

Open NLU Predict Entity Feedbacks table

The Open NLU Predict Entity Feedbacks [open_nlu_predict_entity_feedback] table shows the entity (slot-filling) processing that an application (in this case Virtual Agent) performs in response to an NLU entity prediction result. For example, the goal of Virtual Agent is to map a predicted NLU entity to a Virtual Agent topic input variable.

To view the table, enter `open_nlu_predict_entity_feedback.list` in the navigation filter.

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Key fields in the Open NLU Predict Entity Feedbacks table

Field	Description
App	Application using NLU. For example, VA (Virtual Agent).
App Document	sys_id of the application record. For example: *sys_cs_topic.sys_id*.
App Document Table	Table of the application record. For example: *sys_cs_topic*.
Auto Selected	Boolean indicating whether the application automatically chose to use the entity without notifying the user: *true* or *false*.
External Model Display Name	Name of the external NLU model. For example, the name of the IBM Watson Assistant NLU application.
Mapped	Boolean indicating whether the application (Virtual Agent) considered the prediction to be usable: *true* or *false*.
Mapped to	Item in the application that the entity was mapped to.
Model Display Name	Name of the ServiceNow NLU model.
Model ID	ID of the NLU model that the prediction was submitted for.
Model Name	Name of the NLU model that the prediction was submitted for.
Prediction	Name of the predicted entity.
Prediction Audit Log	Reference to the Open NLU Predict Logs [open_nlu_predict_log] table.
Prediction Confidence	Confidence value for the prediction.
Selected	Boolean indicating whether the application selected to use the entity: *true* or *false*.
Shown	Boolean indicating whether the application displayed the predicted entity to the end user as a choice to select: *true* or *false*.
Utterance	User phrase entered in the chat client window.
Value	Value of the predicted entity.

Open NLU Predict Logs

The Open NLU Predict Logs [open_nlu_predict_log] table provides a consolidated overview of the NLU prediction records for topics. Each record in the log identifies the utterance and corresponding intents (topics) and entities determined by the NLU service. Each record also includes the NLU prediction scores calculated during topic discovery (intent matching) and entity extraction.

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Note:
NLU prediction node logs are generated automatically. If you're using node logs for debugging but you want to suppress the automatic generation of NLU prediction node logs, add the *com.glide.opennlu.predict.node_logging_enabled* system property and set the value to false.

To view the Open NLU Predict Logs, enter `open_nlu_predict_log.list` in the navigation filter.

Key fields in the Open NLU Predict Logs table

Field	Description
Async	Indicator for asynchronous prediction processing: *true* or *false*. True indicates that the prediction was performed asynchronously, allowing Virtual Agent worker threads to continue.
Created	Date and time the NLU prediction record was created.
Duration	Length of processing time for the prediction to return intent and entity values.
Language	The language of the NLU prediction request.
Level	Type of message: Information level.
Message	Prediction results returned: number of intents and entities.
Request	NLU prediction parameter that contains the utterance and NLU model for the recognized intent.
Response	NLU prediction results, which contain 0 (none) or more scored intents and scored entities.
Source	Process or area: *OpenNLU - Predict*.
Utterance	User statement recognized by the bot, which maps to an intent defined in an NLU model.

Note:
You can view the detailed intent and entity results in the Open NLU Predict Intent Feedbacks and Open NLU Predict Entity Feedbacks tables.

Review HTTP connection information for Open NLU integrations

Use the Open NLU Driver HTTP Connection [open_nlu_driver_http_connection] table to quickly check the HTTP credentials, connection details, and methods for the intents, entities, NLU models, and predictions for your NLU service provider.

To view the table, enter `open_nlu_driver_http_connection.list` in the navigation filter.

Natural Language Understanding topic discovery logic in Virtual Agent

Understand how Virtual Agent returns intents and how it selects which intents to show to the user.

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Prerequisites for topic discovery

Virtual Agent can discover a topic when the following conditions are met:

- The topic must be published and active.

  In the Topics [sys_cs_topic] table, the **Active**, **Published**, and **Is Topic Discoverable** values are set to *true*.

  Note:
  The **Is Topic Visible** column does not affect topic discovery.

- The topic must be discoverable.
- Topic conditions must evaluate to true at runtime.
- If any roles are configured for the topic, the requestor must have at least one of those roles.
- The topic's NLU model must have a binding for the session language.

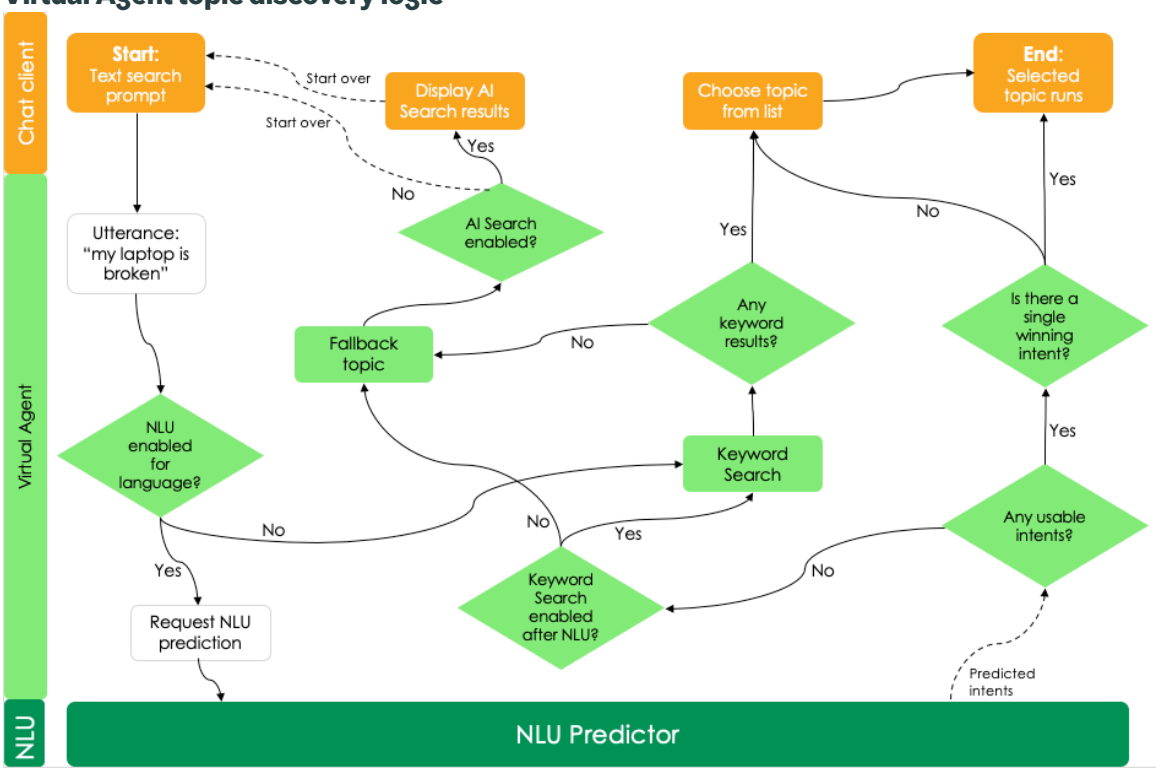
NLU topic discovery logic

Virtual Agent sends a prediction request to the NLU provider. The request contains the utterance and all registered NLU model IDs that are bound to the session language. Matches return NLU intents that correspond with a topic. Virtual Agent then responds in one of the following ways:

- Automatically selects a topic for the requester, based on the confidence score.
- Prompts the requester to pick a topic from the returned list of matches.
- Finds no matching topics.

If no matches are found but backup keywords are enabled (the *com.glide.cs.nlu.keywords.enabled* property is *true*), Virtual Agent searches for a topic based on keywords.

Virtual Agent topic discovery logic



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Virtual Agent NLU confidence scores

Virtual Agent uses confidence scores to return predicted intents. If an intent's confidence score is greater than or equal to the configured threshold, Virtual Agent considers it a good match. The confidence threshold is set using the *com.glide.cs.intent_confidence_threshold* system property.

Virtual Agent uses the following logic when selecting intents:

Auto-selects the highest predicted intent

This occurs when only one intent is matched, or in the event of a tie-breaker, when the next closest match is a distant second.

> **Note:**
> If ServiceNow NLU is used and the *com.glide.cs.intent_confidence_delta* system property is *0*, there can be no tiebreaker.

Returns a topic list for the requester to choose from

This occurs if auto-select is not applicable. The length of the list is determined by the *com.glide.cs.max_number_display_topics* system property.

No intents are matched

When zero NLU Intents are predicted with a confidence score greater than or equal to the configured threshold, Virtual Agent falls back to a keyword search if configured. (The *com.glide.cs.nlu.keywords.enabled* and *com.glide.cs.nlu.keywords.include_topics_bound_to_lang* system properties are *true*).

Mid-topic NLU topic discovery logic

While a topic is running, the requester can enter an utterance or phrase that results in a topic switch. For example:

1. The requester is in a Virtual Agent conversation, and Topic A is running.
2. Topic A prompts the user to enter their date of birth.
3. Instead of choosing a date, the requester types, "I want to view my Incidents."
4. Virtual Agent can't resolve this phrase to a date, so it issues an NLU prediction request.
5. The NLU predictor returns Intent B, and Virtual Agent sees that Topic B is bound to Intent B.
6. Virtual Agent switches the conversation to Topic B, which then presents information to the requester about their incidents.

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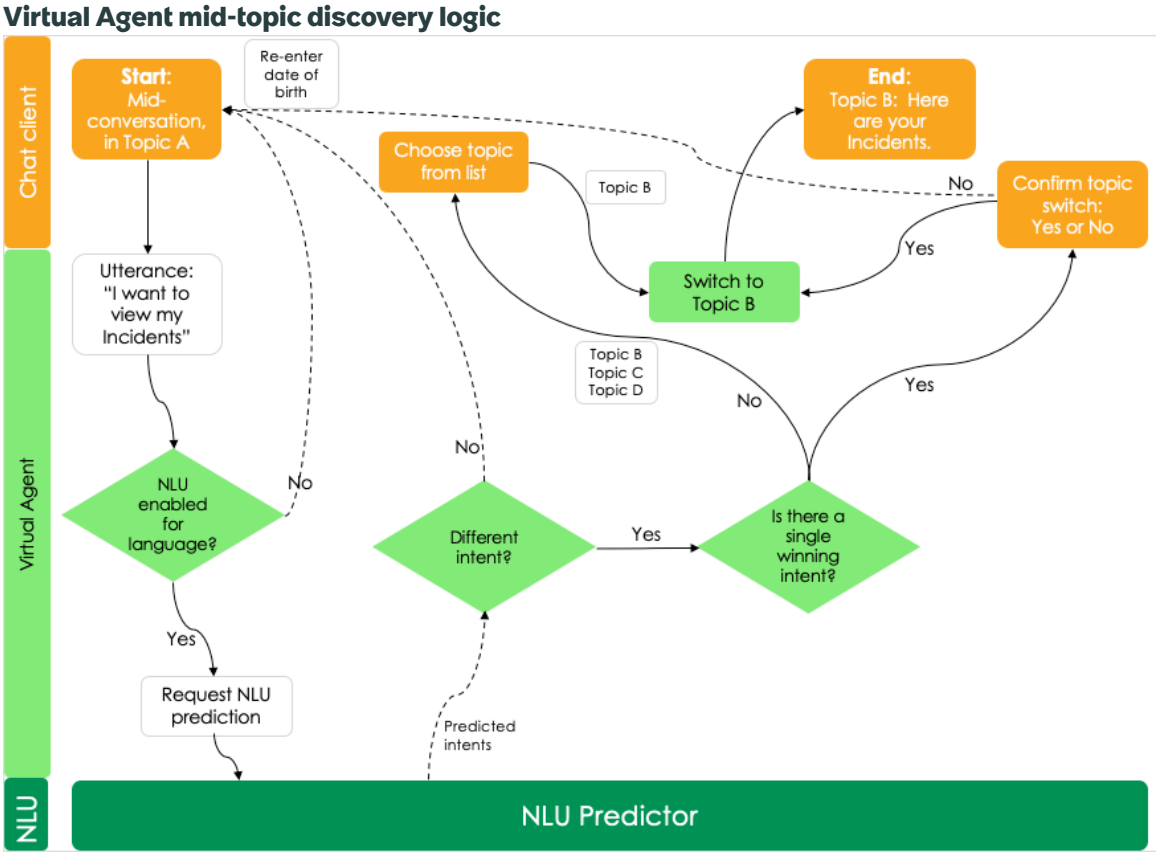

Related topics

Resolve Natural Language Understanding (NLU) topic discovery issues

Publish a Virtual Agent topic

Deploy an inactive topic or an updated topic to save it and make it available to users on Virtual Agent clients.

Before you begin

If you're using Natural Language Understanding (NLU) topic discovery, you can publish the model at the same time as the topic if the model meets publication criteria. Make sure that your model has passed through all phases of development and is ready to publish. If you haven't refined, tested, and optimized your model, you may not be able to publish it in Virtual Agent Designer. For more information, see Model management.

Role required: virtual_agent_admin or admin

About this task

You can also publish topic blocks and custom controls to make them available for use in calling topics.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, select the topic, topic block, or custom control to publish or republish.
3. In the topic header bar, select **Publish**.

   Selecting **Publish** when there are issues present opens an Issues shelf at the bottom of the diagram, which counts up and details all issues needing correction. These details include a hyperlink for each incomplete item. If the issue is in a node, selecting the hyperlink opens the

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property sheet for that node. As each issue is resolved, the list on the shelf updates to show the remaining errors. Once there are no issues to resolve, the publishing dialog box opens.

If you're using NLU topic discovery, the Choose what to publish dialog box appears. Select the available items to publish with the topic, such as the NLU model and language mappings, and then select **Publish**.

Note:
If the **Publish** option is unavailable, the model may need some work. For example, the model may not have enough intents or may need more utterances for some intents. Fix these issues before proceeding. Also, if a model language is unavailable, the language-specific model has never been published. Publish it from the NLU Workbench. For more information, see Model management.

The topic header bar displays a `Saving in progress...` message. The toast message `Successfully saved your topic` appears in the lower-right corner afterward for four seconds, and can be closed by selecting the **X** in the message.

For topics, the topic state is Active and the Published state changes to Published just now.

4. If you published a conversation topic using either keywords or NLU, verify that your keywords or NLU utterances for the topic work as expected.

   a. Return to the Topics page, and then select **Test Active Topics**.

   Note:
   If Now Assist is enabled, the **Test Active Topics** button includes a drop-down menu to identify topic types and where you want to test:

   - **Test NLU/keyword topics**
   - **Test LLM topics**
   - **Test in Now Assist Panel**

   b. In the conversation window, verify that the topic opens.
   You can enter keywords or NLU utterances that correspond to the topic intent. For the pre-built Virtual Agent topics, the bot returns a list of topics that match the entered keyword or utterance. For more information about testing Now Assist LLM topics, see LLM topic testing.

Result
The topic blocks and custom controls are published and are available for use in calling topics.

Note:
Active topics, including setup topics and small talk topics, can also be available for use after the topics are published. For more information, see Control topic discovery and visibility.

Delete a Virtual Agent topic

Delete a Virtual Agent topic that is no longer needed.

Before you begin
Role required: virtual_agent_admin or admin

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Note:

Sometimes, certain categories of topics can’t be deleted, such as the Greeting, Survey, Live Agent, Error, Explore help, and Closing setup topics.

If you want to remove a topic from your Virtual Agent clients but don't want to delete it, consider making the topic inactive instead.

About this task

You can delete a topic using the **Delete** option in the Virtual Agent Designer header bar for the topic.

Procedure

1. If you're not working on the topic, navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer** to display the Topics page.
2. Use one of the following methods based on either a card on the topic page or the header inside a topic.
3. In the Confirm Topic Deletion window, select **Delete**.
   The tab closes and returns you to the Topics page.

Result

If the topic was active and is no longer listed in the Topics page, the topic is immediately removed from Virtual Agent clients.

Promote or demote Virtual Agent LLM topics

Promote topics in Virtual Agent Designer after associating them with a large language model (LLM) assistant. Promoted topics are then suggested to the user by the LLM assistant.

Before you begin

Associate an LLM topic with an LLM assistant. For more information, see Create a Virtual Agent topic.

Role required: virtual_agent_admin or admin

About this task

When you create a topic in Virtual Agent Designer or open a non-read-only topic, you can associate it with an LLM assistant. After linking your topic, you can promote the topic so the LLM assistant suggests it to the user. You can also find promoted topics on the topic page by selecting the **Promoted** option from the Sort by drop-down list. Promoted topics can also be demoted to remove them from the list of suggested topics.

System topics, setup topics, topic blocks, custom controls, and small talk topics cannot be promoted.

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Promotion and demotion controls for LLM topics

The **Promote** and **Demote** controls appear if the topic is demoted or promoted, respectively. A *Promoted* category also appears on a promoted topic's card.

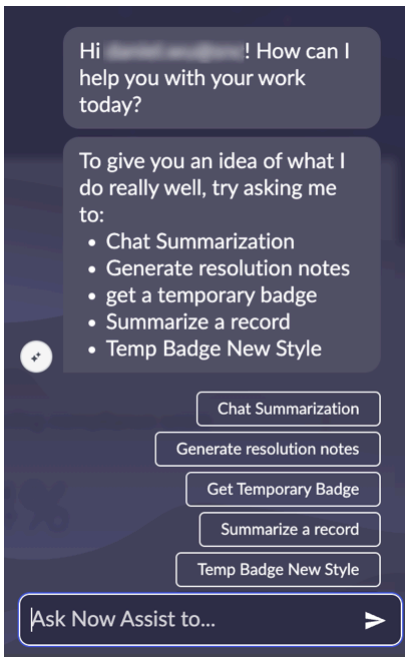


For more information, see Create a Virtual Agent topic and LLM assistants.

Procedure

1. Navigate to **All** > *Virtual Agent* > **Designer**.
2. Select the LLM assistant drop-down list, then select the LLM assistant that will promote the topic.
   The list of topics reduces to LLM topics that are associated with the selected LLM assistant.
3. Find the card for the topic that you want to promote or demote.
4. Select the topic actions icon (⋮), then select **Promote** to add the topic to the list of promoted topics, or select **Demote** to remove it from the list.
   If the topic is already promoted, the topic has a `Promoted` flag, and the **Promote** option is replaced with a **Demote** option.

Result



The topic is added to the list of topics promoted by the LLM assistant, while a demoted topic is removed from the list.

Reorder promoted Virtual Agent LLM topics

Arrange large language model (LLM) topics to a desired non-alphabetical order after promoting them for recommendation by the Virtual Agent.

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Before you begin

Promote an LLM topic or topics. For more information, see Promote or demote Virtual Agent LLM topics.

Role required: virtual_agent_admin or admin

About this task

Promoted LLM topics are presented in alphabetical order by default. You can rearrange promoted topics in any desired order by editing their records in the Promoted Skills [sys_cs_context_profile_promoted_skill] table.

Procedure

1. Navigate to **All** > **sys_cs_context_profile_promoted_skill.list**.
2. Under the topic that you want to reorder, select the **Order** value.
3. Input a value number.

Result

The list of promoted skills is presented in a Virtual Agent conversation based on the order value of each topic from the lowest to highest number relative to other promoted topics.

What to do next

Repeat the previous steps to adjust any other promoted topics to sort them in a desired order.

Exploring other Virtual Agent features

After creating topics with the basic Virtual Agent Designer controls and scripting, you can also enhance conversation functionality and topic maintenance by using additional Virtual Agent features.

After learning the basics, here are some other Virtual Agent features that may help you improve your authoring and end-user experience.

Deploy Virtual Agent in other channels

By default, Virtual Agent runs in a web client, but you can also run it in other channels. While some features may not be available in certain channels (such as the carousel user input control), you can customize your conversation flow to accommodate these differences.

Use link unfurling in Virtual Agent

Virtual Agent supports link unfurling on the web client, mobile devices, and various channels. Link unfurling generates a content-rich preview when a supported link is shared in a conversation with a user, a virtual agent, or in a text-based bot response.

Improve the user experience with AI Search

What happens when a user utterance isn't matched to a keyword or intent? Enable AI Search as a fallback so that the user sees a list of search results as a response when no other match is found.

Maximize code reuse with topic blocks

Rather than duplicate common functionality in multiple topics, you can create reusable topic blocks that you can reference in many topics. This allows you to maintain frequently used functionality in one central location.

Customize Virtual Agent with custom controls

If a Virtual Agent Designer control doesn't quite work for what you want to achieve, create a custom control. You can create your own controls to accept input from the

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conversation, as well as custom response controls to handle the output. Use these controls within topics to handle specialized tasks.

Integrate Virtual Agent with Flow Designer workflows

If your company is using Flow Designer to create workflows, you can integrate them into Virtual Agent. You may need to do this if your conversations require you to pass secure inputs, such as a password. Flow Designer actions and subflows support the password2 data type, which lets you pass the input securely.

Use Virtual Agent with Agent Chat

Customize Virtual Agent to hand off some conversations to a live agent when needed.

Use Virtual Agent for Incident Auto-Resolution

Initiate a Virtual Agent conversation with an end user after they submit an incident through email or the ServiceNow® Service Portal if an existing Virtual Agent topic can resolve the issue.

Localize Virtual Agent topics

Use the ServiceNow Localization Framework to translate topics and NLU models into other languages.

NLU Workbench - Advanced Features

Expand the functionality of NLU Workbench to help you manage and improve your models. NLU Workbench - Advanced Features is available from the ServiceNow Store.

Integrate Virtual Agent with other portals and apps

Integrate and extend the capabilities of Virtual Agent by connecting to your employees and customers where they already are.

Use Virtual Agent REST API in a standalone or multi-bot environment

Integrate any chat interface or bot using this REST API that is available in the ServiceNow Store.

Additional resources

Take advantage of the following ServiceNow® resources to help you customize your Virtual Agent:

- Virtual Agent and Natural Language Understanding (NLU) community forum
- Virtual Agent Academy

Deploying Virtual Agent topics in other channels

When creating a topic or topic block, you can specify the chat channels in which the topic or topic block will run. During conversation design, Virtual Agent Designer provides built-in guardrails to help you tailor your conversations to those channels.

In Virtual Agent, a channel is a chat interface or application in which Virtual Agent interacts with end users. Default channels are the chat applications natively supported by Virtual Agent, such as the Slack, Microsoft Teams, Workplace, and Facebook Messenger applications, and the web and mobile clients. Virtual Agent also supports custom channels created through the conversational custom chat integrations feature, which enables third-party applications (other chat providers) to work in Virtual Agent.

For example, admins can build a custom conversational chat integration for a specific messaging provider, such as Skype. Admins also define the controls that can be used in topics that run

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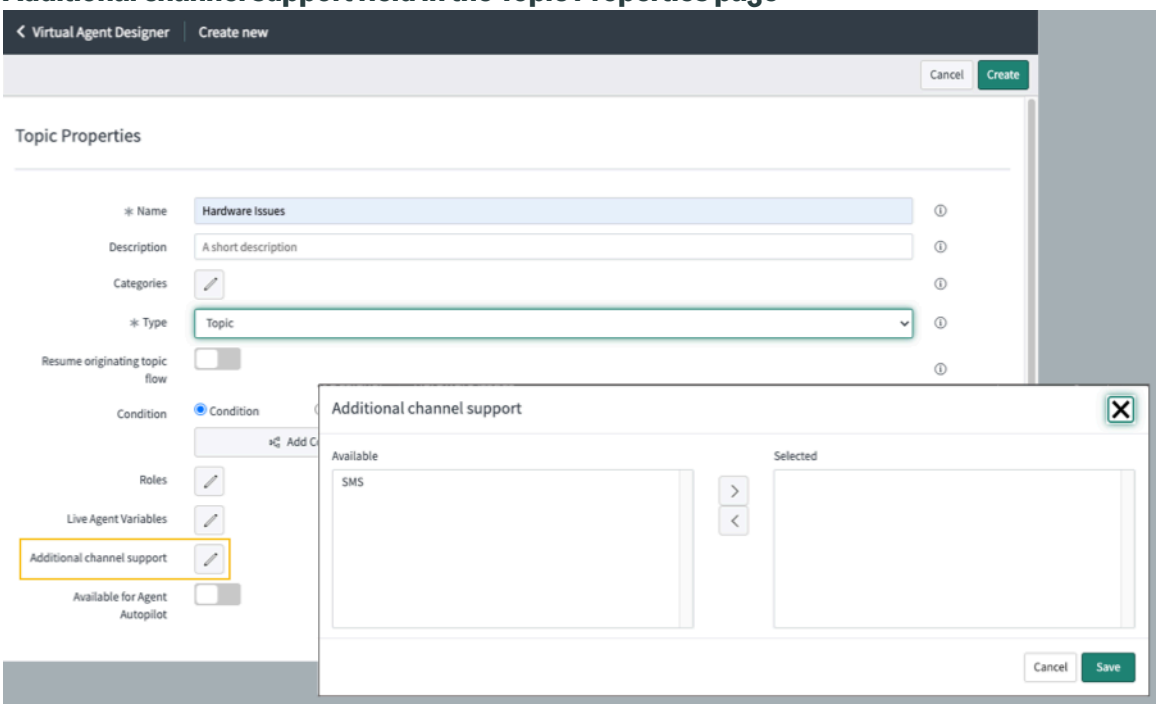
in these channels. For details about creating channels for chat providers and specifying the controls used in a channel, see Conversational custom chat integrations.

Specifying channels in your topics or topic blocks

When you create or edit a topic or topic block, you can specify the applicable channels in the **Additional channel support** field of the Topic Properties page. Applicable channels are the custom channels created for your instance through the conversational custom chat integrations. Use this field to specify chat clients in which the topic or topic block will run.

Additional channel support field in the Topic Properties page



During conversation design, Virtual Agent checks the various controls used to build the conversation flow to confirm that the control is valid for the channels in which the topic or block will run.

Design checks for specified channels during conversation design

When you're designing your conversation, built-in guardrails identify the Virtual Agent Designer controls that are not suited for the custom channels that you specified in the Topic Properties page. These messages are displayed in the following views:

- **Properties** tab (Topic Properties page)

  In the following example, Skype and SMS are the additional channels in which the topic will run. The banner message identifies the controls that are not supported on the channels for the topic. As you develop the conversation flow, you can revise your conversation so that it does not use any of the specified controls for your selected channels.

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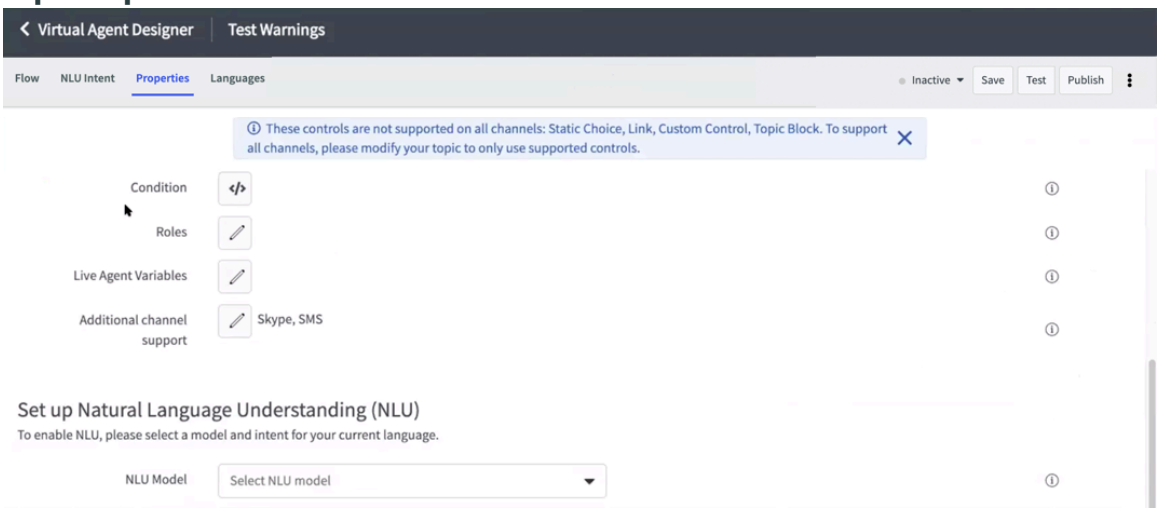
Topic Properties tab with defined channels

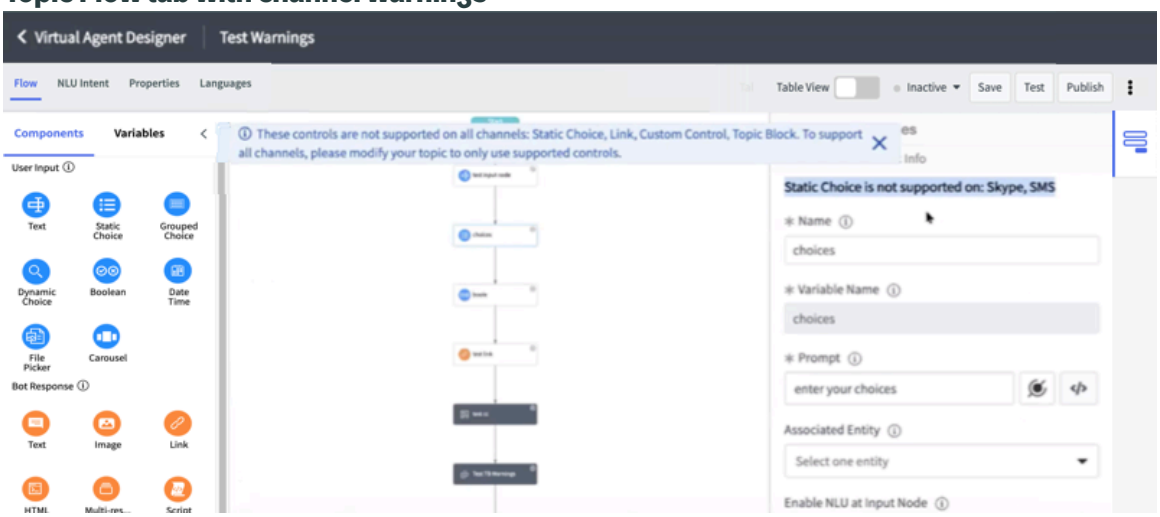


- **Flow** tab (Virtual Agent Designer canvas)

  In the following example flow, the banner message identifies the controls that are not supported for the specified channels. The property sheet for the affected nodes also displays a message indicating that the control is not supported. For example, when you highlight a particular node (control) in the flow, the associated property sheet for the node indicates that the control is not supported in the Skype and SMS channels.

  If you have controls that cannot be used, you can branch the flow so that you can continue building the flow with the controls that are supported.

Topic Flow tab with channel warnings



Finding the channels available in your instance

To see a list of the available channels in your instance, use the **Supported Channels** filter in the Topics page in Virtual Agent Designer (**Conversational Interfaces** > **Virtual Agent** > **Designer**). The Messaging Channels [sys_cs_channel] table also shows the available channels.

Note:
If no channels are configured for the instance, this filter is not displayed.

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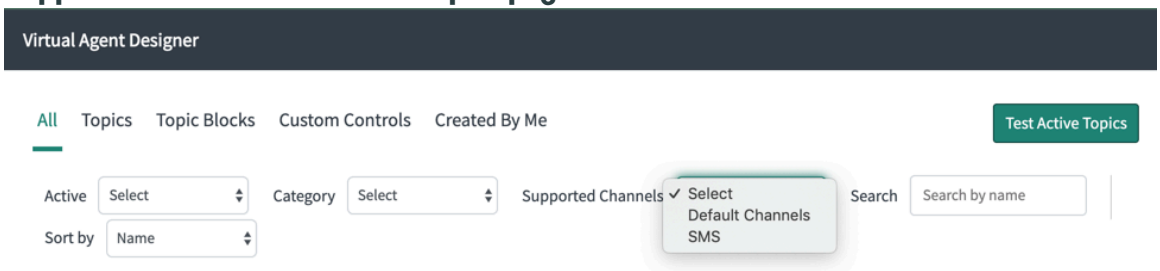
Supported Channels filter in the Topics page



The default channels in Virtual Agent are the web chat and mobile clients and also the Virtual Agent messaging integrations for the Slack, Microsoft Teams, Workplace, and Facebook Messenger messaging applications. In the previous example, SMS is an available chat channel that was created for your instance through a conversational chat integration. When you choose a channel, the Topics page lists your topics (cards) by channel type. For more information, see Conversational custom chat integrations.

Using link unfurling in Virtual Agent

Virtual Agent supports link unfurling on the web client, mobile devices, and various channels. Link unfurling generates a content-rich preview when a supported link is shared in a conversation with a user, a virtual agent, or in a text-based bot response.

If the link is supported on the web client or channel, the generated content-rich previews can include text, images, and videos.

Note:
Factors such as website availability, security policies, or response time of the link you want to unfurl are unpredictable. As a result, link unfurling may be delayed or unavailable. However, these performance-related issues don’t impact the user and don't affect the conversation flow.

How to determine if a link is supported

The ServiceNow user interface currently supports link unfurling for OG tags only. A link is supported only if all the following conditions are met:

- The host or domain is included in the Hostname allow list table.
- The link uses standard, compliant Open Graph (OG) tags in the page header as metadata. For example, og:image.
- The link was shared in a conversation with a user, a virtual agent, or in a text-based bot response.

Note:
These conditions apply only to the web client and mobile devices on the ServiceNow® platform. Support requirements and conditions for clients on other platforms can vary. For client-specific support and requirement conditions, see the documentation for the client you're using.

Tip:
Admins can add OG tags to ServiceNow UI pages by following the instructions in the Adding meta tags to ServiceNow UI Pages Knowledge Base article.

When a link meets the specified criteria, the ServiceNow software does the following:

- Asynchronously fetches, if available, the OG tag at the provided link.
- Attaches a card-based, content-rich preview of the link based on the OG tag.

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The time required to complete these and any other required tasks can vary, depending on your network configuration and system performance.

Supported OG tags

The ServiceNow user interface supports image, video, and text-based OG tags. When both an image OG tag and a video OG tag are fetched, the video is used instead of the image in the card-based, content-rich preview.

Note:
The specific OG tags supported on channels can vary. For example, the OG tags supported on Slack may be different from the OG tags supported on Microsoft Teams, or Workplace from Facebook. For details about the OG tags supported on channels, see the documentation for the channel you're using.

Disabling link unfurling

Link unfurling is automatically enabled by default. To turn it off, Maint users change the *com.glide.cs.enable_link_unfurling* system property to *False*.

Configure link unfurling using the Hostname allow list table

Use the Hostname allow list [sys_cs_hostname_allow_list] table to identify the list of hosts and domains that can be unfurled.

Before you begin

For security reasons, only the hosts and domains in the Hostname allow list table can be unfurled.
The Hostname allow list table includes the following hosts and domains by default:

- Instance URL/hostname: <*instance*>.service-now.com or <*customURL*>.com
- Instance root domain: *service-now.com or *.<*yourdomain*>.com
- servicenow.com
- *.youtu.be
- *.youtube.com

Role required: admin

Procedure

1. Navigate to **All**, and then enter `sys_cs_hostname_allow.list` in the filter.
2. Click **New**.
3. On the form, fill in the fields.

Field	Description
Active	Select this option to enable the host or domain that can be unfurled.
Hostname	Name of the host or domain that can be unfurled. You can use an asterisk (*) to specify a wildcard in the host or domain name. For example, enter `*.domain.com`.

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Field	Description
Domain	Domain group. The default is global.

4. Click **Submit**.

Improving the user experience with AI Search

Virtual Agent uses the ServiceNow AI Platform® AI Search application to return search results in bot conversations as a fallback when there are no relevant topics to display to end users. Virtual Agent also provides a Run AI Search topic block that topic authors can use to generate search results in a topic.

How Virtual Agent uses AI Search

The AI Search application, which is included with the ServiceNow AI Platform, provides relevant search results for queries and uses Machine Learning to continuously improve search results based on end-user selections. To learn more about AI Search, see AI Search.

In addition to normal search results, AI Search can display Genius Result cards that show relevant catalog items, questions and answers (Q&A), and people (user) information. To learn more, see Genius Results.

Catalog Genius Results and Q&A Genius Results are automatically activated in the base system.

Virtual Agent uses AI Search to provide the following:

- The Run AI Search topic block, which calls the AI Search application in a conversation. Topic designers can add this block as a topic node, to generate and display search results in a conversation. For details about the Run AI Search block and other topic blocks provided with Virtual Agent, see Virtual Agent platform topic blocks.
- The AI Search Fallback setup topic that generates search results for end users when Virtual Agent can't determine an intent and topic or the keyword to display the appropriate conversation for user requests.

Virtual Agent provides base system (default) AI Search configurations that determine how search results are generated and displayed:

- Search application configuration that defines:
  - Index sources - Data sources to be used for search, such as catalog items or knowledge base (KB) articles.
  - Search profile - Index source to be used and the type of results to show in Genius Result cards.
- Entity View Action Mapping (EVAM) configuration that defines how search results and Genius Results are displayed.

The Virtual Agent search configurations are part of the default chat experience set in Virtual Agent Designer, through the Custom Greetings and Setup feature. Use this feature to specify the context for running Virtual Agent. The chat experience defines the setup topics used in Virtual Agent conversations and the search configuration that controls the AI Search experience. The AI Search Fallback setup topic controls the AI Search experience. For details, see Setting up chat experiences for Virtual Agent users.

Virtual Agent and Virtual Agent Lite use AI Search functionality. If you're a Virtual Agent Lite admin, you can deactivate setup topics such as the AI Search Fallback setup topic, but you can't change the Virtual Agent search configurations set in chat experiences, the Run AI Search topic block, nor the AI Search Fallback setup topic.

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In order to use AI Search in Virtual Agent, you must request it for your instance. For more information, see Activate AI Search for Virtual Agent.

When Virtual Agent uses AI Search fallback

Virtual Agent uses AI Search fallback in the following instances:

- Topic discovery can't find any matching topics for the user query.

  Note:
  If you're using pre-built NLU conversations, such as ITSM Virtual Agent conversations, topic discovery finds the topics that match the keywords or intents provided with those conversations, before falling back to AI Search. If your users select **Ask something else** after suggested topics are displayed, Virtual Agent takes the additional input and reruns topic discovery AI Search to return relevant search results.

- Topic discovery returns too many topics for the user query. In this case, Virtual Agent can't determine the best topic to display to the end user.
- Topic suggestions are displayed to the user, but the user selects the **Ask something else** option.

Note:
If you deactivate the AI Search Fallback setup topic in a chat experience, the Virtual Agent runs the Fallback setup topic when it can't find a matching topic.

What the AI Search results look like

In Virtual Agent, the default chat experience or a custom chat experience determines the search experience, namely the search profile used and the format of the AI Search results displayed:

- The search application specified in the Virtual Agent default or custom chat experience defines certain aspects of the search experience, such as the search sources (searchable content) and synonyms used to improve search recall.
- The EVAM configuration for Virtual Agent controls the Genius card content presented in search results (Q&A, Catalog, and People). For information on how EVAM works, see Entity View Action Mapping.

The default AI Search results include these items:

Genius Result cards

When AI Search generates a match (result) with a high confidence score, Virtual Agent displays a single Genius card with the result. The cards display information returned from AI Search:

- Q&A - Provides an answer snippet from the Knowledge Base article determined as the top search result.
- Catalog items - Returns the most relevant catalog item with the related entities (catalog item name and catalog item category).

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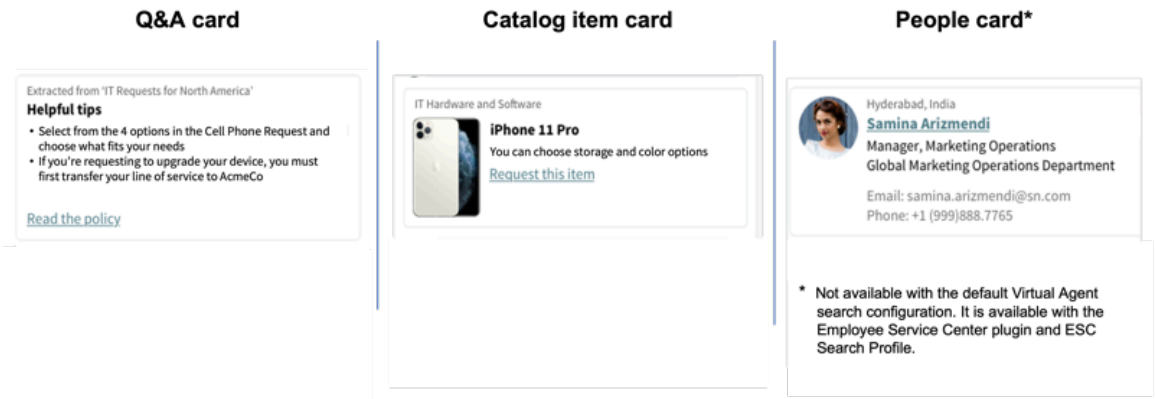
- People - Returns the relevant person with the related entities (name, department, city).

Note:
The default search application for Virtual Agent is configured to include Q&A (Knowledge Base) and Catalog results, but not People card results. The People card is not available with the default Virtual Agent search application. People card results are available if you're using the Employee Service Center (ESC) app and the ESC search profile, which can be specified in a Virtual Agent chat experience for ESC.

Genius card examples

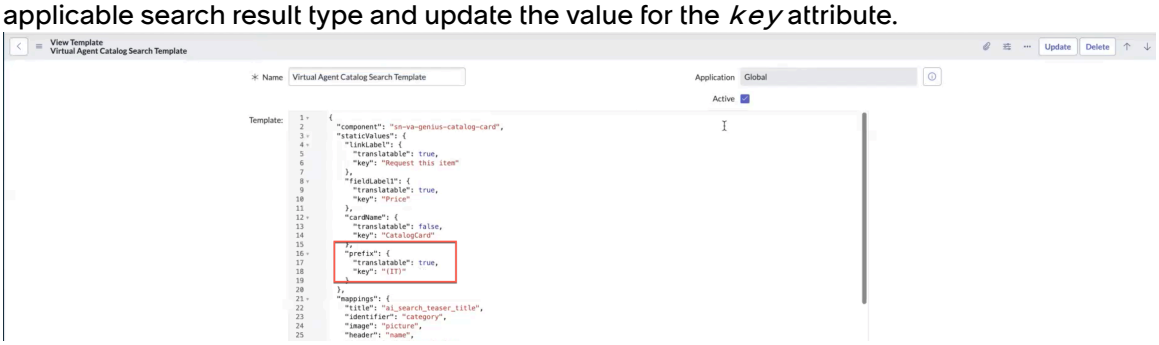


List output

After a Genius Result is returned, users can indicate what they would like to do next. If they choose the option **Show me more on <search item>**, Virtual Agent displays search results as a list output, which includes:

- Knowledge articles
- Catalog items
- People
- Other - Generic results determined by EVAM, for example results from Microsoft SharePoint or Microsoft OneDrive connectors

Admins can edit the prefix of these search result titles by navigating to EVAM and searching for Virtual Agent templates. Select the template for the applicable search result type and update the value for the *key* attribute.



Admins can expand the number of search results displayed up to 10, using the *com.glide.cs.ai_search.max_regular_result* property. In order for the search results to display as expected, the search result limit in the search application configuration should be greater than or equal to the *com.glide.cs.ai_search.max_regular_result* system property.

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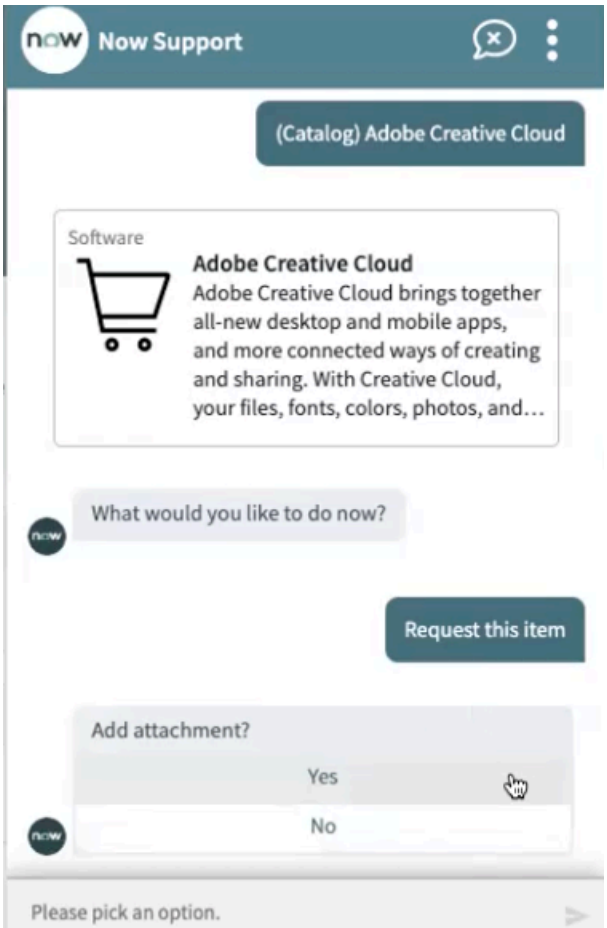
Note:
When admins specify 10 for the maximum regular results, 12 choice options display (10 results plus the actions "I need more help" and "Ask something else"). However, the default total number of list options allowed on the web client is 10. In order for all 12 choices to display, the admin must adjust the *com.glide.cs.picker_page_limit* system property accordingly. For optimal user experience, fewer list options are recommended.

Users can select a search result from the list and continue the Virtual Agent conversation. For example, when a user selects a catalog item from the search results list, Virtual Agent provides an option to request the item directly from the chat.



Portals that display AI Search links

Links in the Genius card and multi-link output search results are opened automatically in a portal that you can set in various ways. For example, you can use default or custom URL mappings to specify the portal in which links are opened. To learn more, see Configure URL navigation for chat links.

Custom search experiences

You can customize the AI Search experience in a conversation, for example to run searches that return results relevant to a particular business application. To control the AI Search results returned in a conversation, you can create a search application configuration that defines the search experience used by the AI Search topic block. For details, see Create a custom AI Search experience for Virtual Agent conversations.

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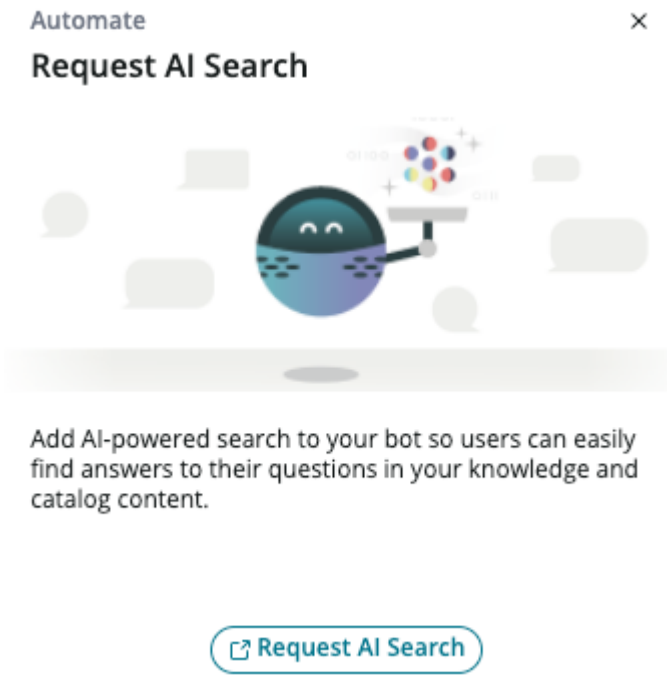
Activate AI Search for Virtual Agent

Once activated, AI Search configurations that are part of the Virtual Agent default chat experience become available. The AI Search Fallback setup topic controls the AI Search experience.

Before you begin
Role required: admin or virtual_agent_admin

About this task
The default chat experience is defined in the Custom Greetings and Setup settings area in the Conversational Interfaces admin console. The default experience uses the AI Search Fallback setup topic, which requires AI Search to be activated for Virtual Agent. You can request AI Search from the Conversational Interfaces admin console Home page.

Procedure
1. Navigate to **All** > **Conversational Interfaces** > **Home**.
2. On the Home page, find the Request AI Search tile, and select **Request AI Search**.



3. On the page that opens, select **Request AI Search** to request provisioning.

Result
Your request will be processed. Once activated, enable the AI Search Fallback setup topic in the default or a custom chat experience. For instructions on configuring a chat experience, see Setting up chat experiences for Virtual Agent users.

If you want to customize the Virtual Agent AI Search results that are generated for your users, see Create a custom AI Search experience for Virtual Agent conversations.

Create a custom AI Search experience for Virtual Agent conversations

Define a custom AI Search experience in a conversation using the AI Search topic block. You create a Search Application Configuration used by the topic block to control the AI Search results returned in the conversation. Or you can use the Search Application Configuration to control AI Search results in a custom chat experience.

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Before you begin

Create the search profile that defines the search experience to be used in the search application configuration. For details, see Search profiles and Search application configurations.

Role required: virtual_agent_admin or admin with the search application administrator [search_application_admin] role

About this task

A search application configuration specifies the AI Search profile used by the Run AI Search topic block or in a custom chat experience to control the search experience, such as the search source used to generate search results.

Note:
As of the Utah release, use the AI Search topic block when creating an AI Search application. (The Run AI Search topic block is used in releases from Rome to Tokyo.)

Procedure

1. Navigate to **All** > **AI Search** > **Search Experience** > **Search Applications** and select **New** to create the search application configuration.
2. On the form, fill in the fields.

Search Applications Configuration form

Field	Description
Name	Name for the search application to be used by the AI Search topic block.
Search Engine	Search engine to use in this search application. Use AI Search as the search engine.
Search Profile	Search profile that stores the search experience settings for generating AI Search results.
Search Results Limit	Maximum number of search results that the application should display. **Note:** The search query in Virtual Agent returns 3 results per query. However, the limit can be changed by using the `com.glide.cs.ai_search.max_regular_resu` system property, for a maximum of 10 results. For more information, see Improving the user experience with AI Search.
Genius Results Limit	Maximum number of Genius Result cards to be displayed.

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Field	Description
	Note: Virtual Agent supports only 1 or 0 card results per AI Search query. If you change this field to a different value, Virtual Agent still displays only 1 or 0 card results.
Enable Typo Handling	Option to auto-correct search query terms to match terms found in the search profile's typo handling dictionary. For Virtual Agent, turn off this option by deselecting it.

3. Select **Submit**.
4. Apply the custom Search Application Configuration to the AI Search topic block used in a conversation or to a custom chat experience.
   Your custom Search Application Configuration is used in the AI Search topic block in a conversation or a custom chat experience to generate the customized AI Search experience.

Maximizing code reuse with topic blocks

Topic blocks are reusable components that you can create to run common tasks and conversational elements in Virtual Agent conversations. Topic blocks simplify the topic authoring and maintenance process by enabling you to reuse standard procedures or actions across conversation topics.

How reusable topic blocks work

A topic block is basically a subflow that performs certain actions or conversational tasks in a topic. For example, you can build a topic block that creates or retrieves certain types of records. You create topic blocks with Virtual Agent Designer, similar to the way that you build conversation topics. With Virtual Agent Designer, you can do the following:

- Set topic block properties.
- Define the controls (nodes) used in the block.
- Test or preview the block.
- Publish the block to make it available for use in topics or other topic blocks.

Unlike topics, topic blocks are not discoverable by a large language model (LLM), Natural Language Understanding (NLU), or keywords. The topic block's functionality can only be accessed by a topic.

A conversation that uses (consumes) a topic block is referred to as the calling topic. A topic block can call another topic block, but it cannot call itself. You can "nest" topic blocks in this manner, even if the flow returns to the initial topic, as in this example:

Chain of nested topic blocks



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Note:
If Virtual Agent detects an infinite loop, the conversation ends.

The Virtual Agent platform and applications provide pre-built topic blocks for common tasks or subflows. You can use these pre-built topic blocks in your conversation topics "as is" in the appropriate application scope by duplicating them. You can then customize these pre-built topic blocks as needed. Some of the common topic blocks include the following.

Examples of pre-built topic blocks

Pre-built topic blocks	Application scope
• Transfer to Live Agent: Transfers a bot conversation to a live agent. • Survey: Presents a survey for collecting feedback for an agent. • Geolocation: Gathers information about the user's location. • Pause: Insert a pause (in seconds) in the conversation. • Deflection: Tracks deflection metrics for the Virtual Agent.	Global. Provided with the Glide Virtual Agent plugin (com.glide.cs.chatbot).
Contextual search: Uses a search phrase to return search results in a card format, such as knowledge articles and catalog items.	Common topic block used by the CSM, HR Service Delivery, and ITSM business applications. Provided with the Service Management Virtual Agent Topic Blocks plugin (com.glideapp.cs.sm_topic_blocks). This plugin is included with the Virtual Agent conversation plugins for these business applications.

Topic blocks are listed as cards in the Topics page. Use the **Type** filter to list and view only topic blocks in the Topics page.

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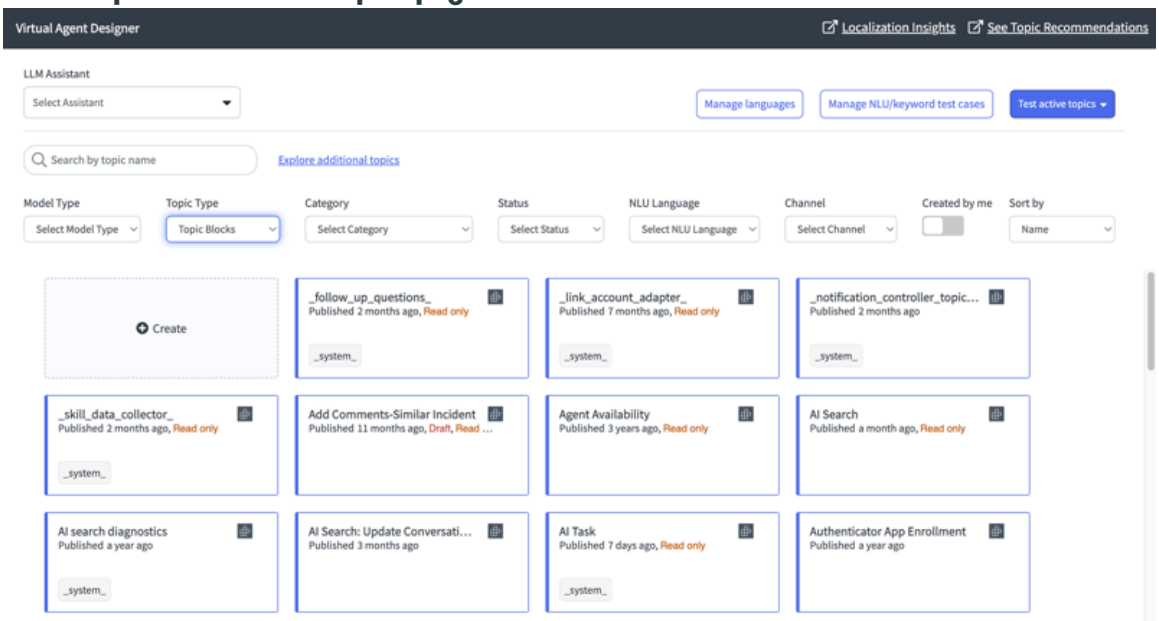
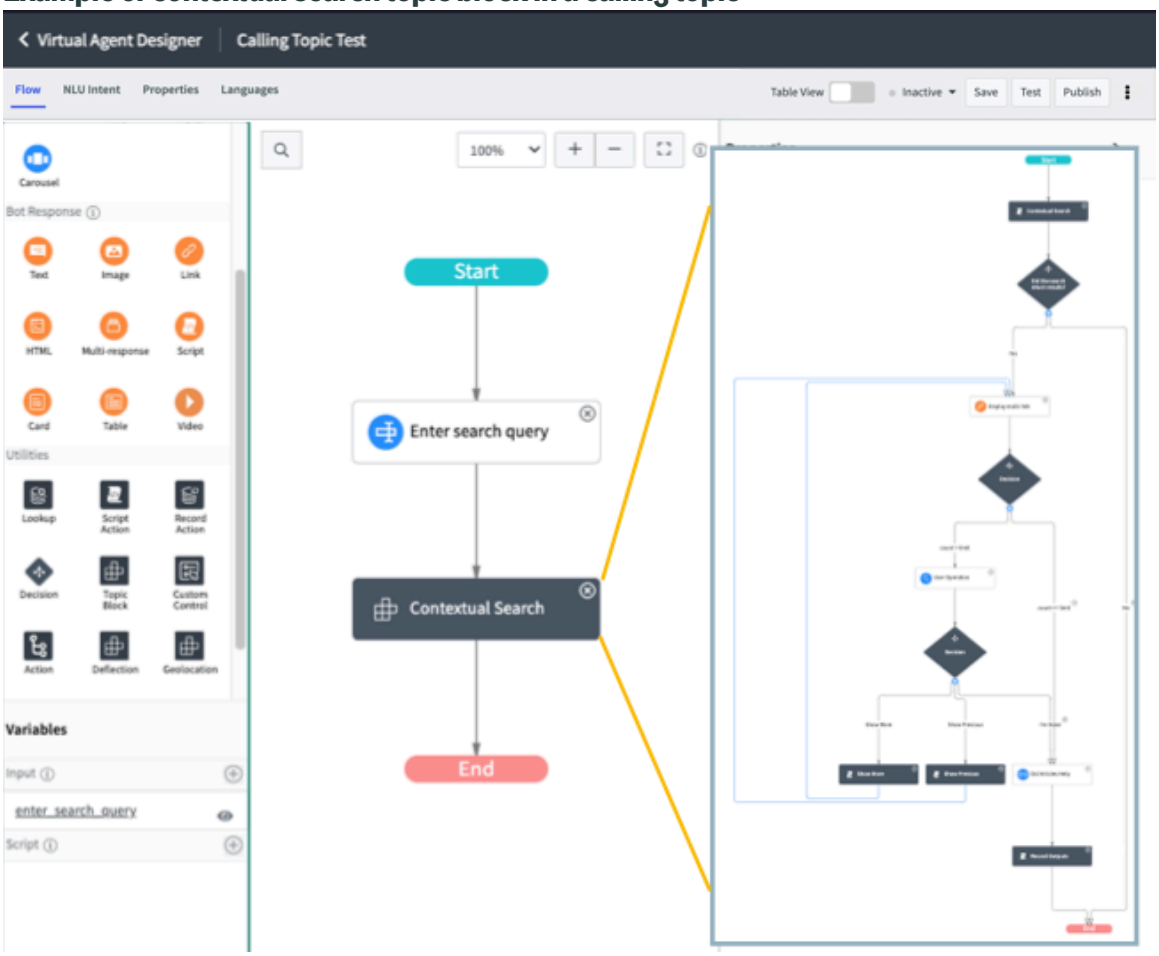
List of topic blocks in the Topics page



After you create and publish a topic block, the block is available for use as a Topic Block utility in Virtual Agent Designer. You can add the topic block to a calling topic or to another topic block. In the following example, the calling topic uses the Contextual Search topic block.

Example of contextual search topic block in a calling topic



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What to do next

Working with topic blocks involves the following steps:

1. Create a reusable topic block.

   Build a conversation component that performs a common function that can be reused in Virtual Agent conversations.

2. Add a reusable topic block to a calling topic or topic block.

   To run a specific subflow, add a reusable topic block to a calling (parent) topic or topic block. Specify the inputs that are used in the topic block and review outputs that are returned from the topic block.

3. Maintain topic blocks and associated calling topics (as needed).

   When you update a published topic block, Virtual Agent Designer performs certain checks. Displayed messages inform you of changes that you may want to make to calling topics that use the updated block.

Create a reusable topic block

Build a reusable component that performs a specific subflow of tasks and conversational elements in Virtual Agent conversations.

Before you begin

Tip:
Developers and topic authors may need to access topic blocks created in other application scopes. To give them access, see Create cross-scope access privileges for topic blocks and custom controls.

Role required: virtual_agent_admin or admin

About this task

Use topic blocks to run common steps, such as retrieving certain records.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, do one of the following:
   - To create a topic block from scratch, select **+ Create**.
   - To create a topic block based on a pre-built topic block, open the topic block and do the following:
     a. In the header bar, select **Duplicate**.
     b. Enter the name of the new block and select **Save**.
3. On the sheet, fill in the fields.

Topic Block Properties sheet

Field	Description
Type	List of items that you can create in Virtual Agent Designer. Select **Topic Block** and define the additional properties.

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Field	Description
	Note: Once you set this topic as a topic block, you cannot change it to a regular topic.
Name	Unique name for the topic block that reflects its functional purpose. This name appears in the list of topic blocks that topic authors can choose from when creating or updating a topic.
Description	Brief explanation of the purpose of the topic block. For example, to retrieve records.
Advanced properties (optional)	
Who can access this topic	
Channels	Chat clients in which the topic or topic block will run. These channels are different from the default channels that are natively supported by Virtual Agent. Your instance may have additional channels for custom chat integrations created for it. For more information about channels, see Deploying Virtual Agent topics in other channels.
Live agent	
Live agent context variables	Live agent context variables that are defined in the General Chat Settings. Select the variables that provide dynamic context, which means information from the Virtual Agent chat. This information is transferred from the bot conversation to the live agent. For information about the default list of live agent variables, see Live agent chat context variables.
Available for Agent Autopilot	Toggle switch that determines whether the topic block is available to a live agent. When enabled, an agent can search for the topic and invoke the topic. For details, see Conversation Autopilot.
Available on the palette	
Enable	Toggle switch that determines whether the topic block appears as its own icon in the Utilities section of the palette on the **Flow** tab. This provides easy access to the topic block for other authors.
Additional	
Categories	Category that contains this block. You can define custom topic categories for your topic blocks.

4. Select **Create**.
   The **Flow** tab opens. The canvas displays a flow with a **Start** and **End** node.
5. To define an input to the block, do the following:

   a. Select the **Start** node in the canvas.

   b. In the Start Segment Properties sheet, select **+ Add**

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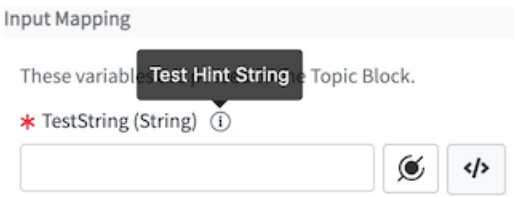
c. On the sheet, fill in the fields.

Add input dialog box

Field	Description
Name	Name of the input variable that stores the input value.
Type	Type of data being passed to the topic block. For example, **String**, **Boolean**, and so on. The fields change according to your choice. For more information, see Input data types in Virtual Agent topics.
Required	Option to set the parameter as required.
Hint	Tooltip that is visible when authoring a calling topic. See the following example: 
Table	ServiceNow table that is used to query for input. This field is available only when **Reference** or **Array.Reference** is selected from the **Type** field.
Max Number of Rows	Maximum number of rows that the topic block is allowed to define. This field is available only when **Array** is selected from the **Type** field.
Default Value	Default value for the variable. This value can be used when previewing the block. Duplicate default values are not allowed for array data types.

Example
For example, the pre-built Contextual Search topic block provides the following input parameters:

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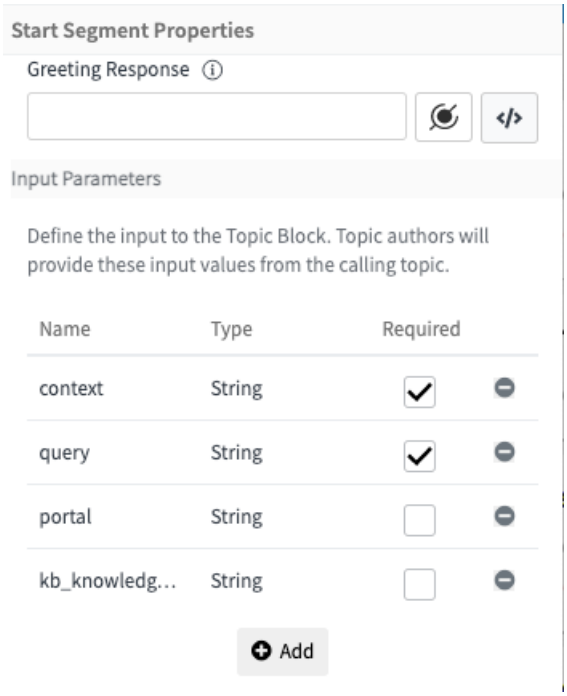

d. Select **Save**.

The calling topic or topic block passes input parameters to the topic block.

6. Drag Virtual Agent Designer controls onto the canvas.
These controls include the input, bot responses, and utilities. Use them in combination to define the logic that is run in the topic block. For more information, see Virtual Agent Designer controls.
7. To define the output returned from the topic block, do the following:

a. Select the **End** node in the canvas.

b. In the End Segment Properties sheet, click **+ Add New**.

c. On the sheet, fill in the following fields.

- **Name**: Name of the value returned from the topic block.
- **Value**: Either a string with variables or a script that can be used within the calling topic. The **Value** is presented as data pills for the input variables that you defined (the **Default Value** specified in the Input Parameters and the input values from the node in the topic block).

Example
For example, the pre-built Contextual Search topic block passes the following output parameters:

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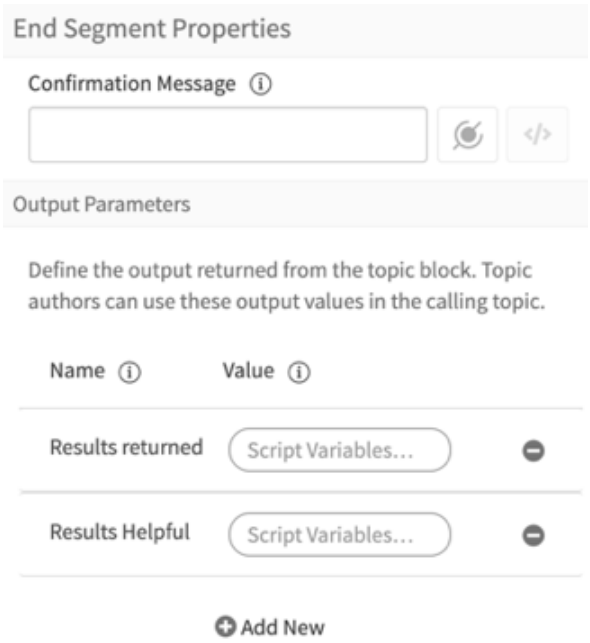

d. Click **Save**.

When the topic block finishes running in the calling topic, it can pass output variables to the calling topic.

8. To see how the topic block runs, select **Test**.

Example
For example, the Contextual Search topic block returned the following results, including a preview-only message with the output values. The preview message helps you verify expected outputs and is not viewable to your users.

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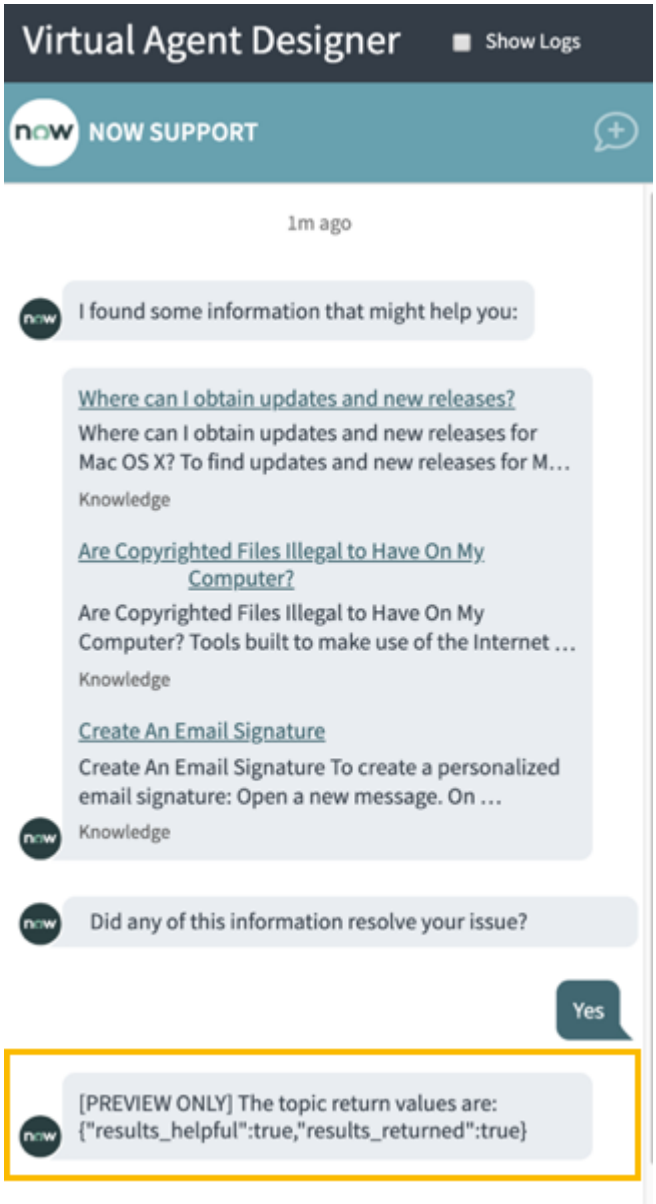

9. If you're ready to make the topic block available for use in calling topics, then do the following:
   a. Remove the default parameters that you used for testing.
   b. Select **Save**, and then click **Publish**.
   The topic block state changes to Active and is ready for use in calling topics.

What to do next

Add a reusable topic block to a calling topic or topic block.

Add a reusable topic block to a calling topic or topic block

Add a reusable topic block to a calling (parent) topic or topic block to run a specific function or task in the calling topic. You specify input parameters used in the topic block, and you specify output parameters that are used by the calling topic.

Before you begin

Review the topic blocks available in the Topics page in Virtual Agent). You can create a new topic block. You can also use a pre-built topic block, duplicate it, and customize it. Pre-built topic blocks are installed automatically with the Glide Virtual Agent plugin, as well as the Virtual Agent conversation plugins for Customer Service Management, HR Service Delivery, and ITSM.

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Verify that the topic block you want to use is published and active.

Role required: virtual_agent_admin or admin

About this task

You can specify the following types of variables:

- Input variables that are passed to the topic block.
- Output variables that are returned from the topic block to the calling topic.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, select the calling topic or topic block in which you will include the topic block.
   The **Flow** tab displays the conversation flow.
3. Depending on the type of topic block you are adding, add the appropriate Virtual Agent controls (nodes) to the conversation.
   For example, if you are adding the Contextual Search topic block, you could add the Text user input control to request an item from the user. Drag that control before the node for the Contextual Search topic block.
4. From the Utilities section of the palette, drag the Topic Block control onto the canvas at the appropriate location in the conversation flow.
5. In the Topic Block properties sheet, select the name of the topic block that you want to add.
   The property sheet for the selected topic block displays the input and output parameters. The name of the selected topic block automatically pre-populates the **Node name** field. You can override the name if needed.
6. Set the required Input Mapping variables and, if applicable, the Output Mapping variables for the selected topic block.
7. In the header bar, click **Save**.
8. To preview your calling topic, click **Test** in the header bar.
   You can see how the calling topic runs in the chat window.

   If the Now Assist panel or Microsoft Teams is configured for your environment, preview options for those channels display in the Test button list. Select **Preview in Now Assist panel** or **Preview in Microsoft Teams** in the list to test your topic in those environments. For more information, see Integrating Virtual Agent with enterprise messaging apps.
9. If no further changes are needed, click **Publish** in the header bar.

Maintain reusable topic blocks

When you update topic blocks, Virtual Agent Designer provides built-in checks to help you identify changes to topic blocks that affect the calling topics that use them. Updates include changing input and output parameters, deleting topic blocks, and publishing inactive and active topic blocks and calling topics.

To help you maintain your topic blocks and associated calling topics, Virtual Agent Designer provides alerts that serve as guardrails. These alerts have many functions, including the following:

- They warn you of topic block updates that affect associated calling topics.
- They help prevent you from making unintentional changes.
- They let you know that you may need to make changes in associated calling topics.

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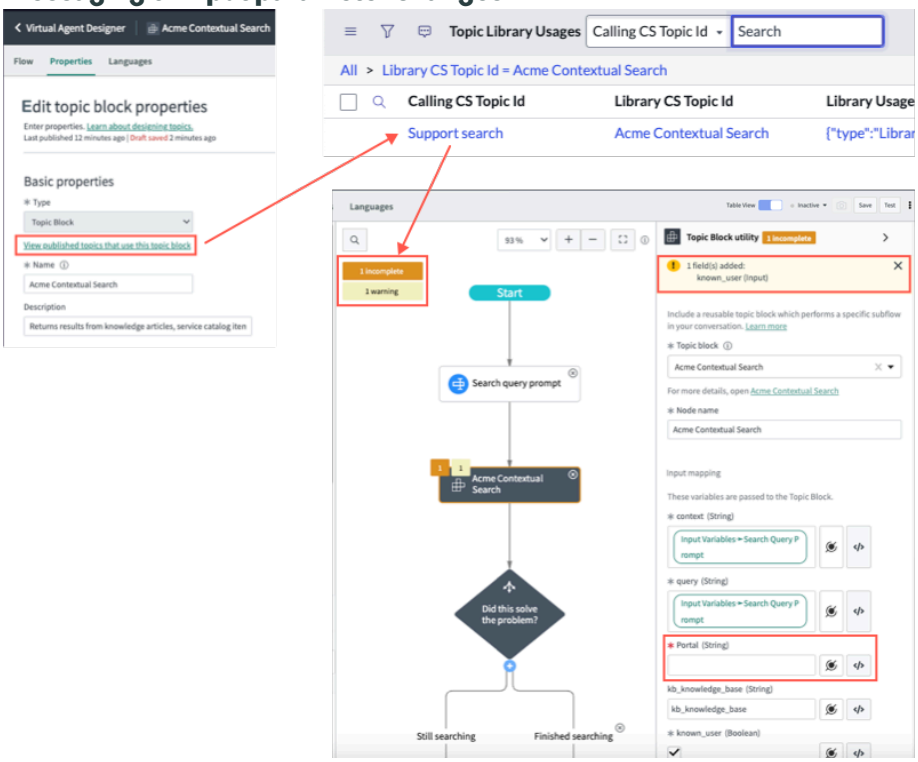
Changing the input or output parameters in a topic block that is used by calling topics

Virtual Agent Designer helps prevent you from deleting output parameters that are being used in calling topics. Virtual Agent Designer informs you that the changes will affect calling topics that use the topic block.

For example, suppose you added a new input parameter and made an existing parameter required in the Acme Contextual Search topic block. You can review the affected topics from a link on the topic block's **Properties** tab. The **View published topics that use this topic block link** opens the Topic Library Usages [sys_cs_topic_library_usage] table. This table lists the published calling topics that use the topic block.

When you open an affected topic, Virtual Agent Designer displays warnings and messages on the canvas indicating where you need to make changes. When you select the Topic Block node, warning messages are displayed in the properties sheet so that you can update parameters accordingly.

Messaging of input parameter changes



Virtual Agent platform topic blocks

Virtual Agent provides pre-built topic blocks that topic authors or admins can use to perform specific platform-related functions or tasks in bot conversations. For example, certain topic blocks enable you to check agent availability or generate AI Search results.

Overview of pre-built topic blocks

Certain pre-built topic blocks are included automatically with the Glide Virtual Agent (com.glide.cs.chatbot) plugin and Virtual Agent Lite. If you're using Virtual Agent Lite, you have read access to the topic blocks but you can't create topic blocks or add them to calling topics.

You can duplicate pre-built topic blocks and modify the duplicates by using Virtual Agent Designer. For information about working with topic blocks and how to add them to calling topics,

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see Maximizing code reuse with topic blocks and Add a reusable topic block to a calling topic or topic block.

The following sections describe the input and output parameters for calling different types of platform topic blocks. The topic block input parameters are passed from the calling topic, and the output parameters are returned from the topic block to the calling topic.

Note:
Upgrades to the default topic blocks are not applied to the duplicated topic blocks.

Agent Availability topic block

Use this topic block to get relevant live agent information for use in agent handoff conversations. This information includes agent availability, wait time (how long before an agent is available), and queue information. You can use the information returned, such as a long wait time for an agent, to initiate a case or customer callback.

This topic block requires the Agent Chat (com.glide.interaction.awa) plugin, which includes Advanced Work Assignment.

The following table lists the output parameters for this topic block.

Agent Availability output parameters

Parameter	Description
agentAvailable	Agent availability. The value is true if an agent is available for this queue. Otherwise, the value is false.
supportQueue	sys_id of the queue that is associated with the conversation. The value is null if an agent is not available or if there is no associated queue.
waitingTime	Average numeric wait time for the queue. The value is null if an agent is not available.

Deflection topic block

Use the deflection topic block in Virtual Agent conversation topics to track the issues that Virtual Agent helped to resolve or actually resolved for a user.

For example, the pre-built Auto Resolution Virtual Agent topic uses a deflection topic block to track deflections. For more information, see Tracking deflections in Virtual Agent using the deflection topic block.

The following table lists the input parameters for this topic block.

Deflection input parameters

Parameter	Description
Deflection Configuration	Group of deflection patterns.
Deflection Pattern	Deflection pattern in the deflection configuration that you have chosen.
Activity Table	Table where the deflection activity occurs. This table is associated with the primary activity table. For more information, see Create deflection configurations and patterns.

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Deflection input parameters (continued)

Parameter	Description
Activity Ids	List of comma-separated activity system IDs. For example, incident ID or task ID. You can also add output from the AI Search or Contextual Search topic block to create a link between a deflection occurrence and the content that contributed to the same deflection.

FAQ Conversation Builder topic block

Use this topic block to build bot conversations that use your existing FAQ content. With this topic block, you can enable topic authors to build simple conversations by using existing knowledge articles that are published in the FAQ template or by using Q&A data that was imported from sources such as spreadsheets.

The FAQ Conversation Builder topic block uses contextual search to find an appropriate match in the FAQ content. FAQ content is access-controlled based on requester role, access rights, and context.

Activate the Knowledge Management Advanced plugin to use the FAQ Knowledge template.

Note:
The default length of an FAQ snippet that is returned in the conversation is 400 characters. The snippet length includes the HTML tags and links that are used in the snippet. To change the snippet length, change the value in the `com.glide.cs.faq.display_size` system property. In addition to applying the specified length, the system applies word-wrap logic to prevent words and links in the snippet from being truncated arbitrarily.

The following tables list the input and output parameters for this topic block.

FAQ Conversation Builder input parameters

Parameter	Description
query	Search term or phrase that is passed to the topic block. Select **Input Variables** or **Script Variables**.
portal	Context for the search. Select **Input Variables** or **Script Variables**.
kb_knowledge	Knowledge base for the search. Select **Input Variables** or **Script Variables**.

FAQ Conversation Builder output parameters

Parameter	Description
Results_Returned	Boolean value that indicates whether any results were returned from the query.
Results_Helpful	Boolean value that indicates whether the user found the results helpful.

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Form Content Popup topic block

Use this topic block to open a form in a popup window from the web client. Once the user submits the required information, the record appears as a card in the Virtual Agent chat window. If a new record is created, the sys ID for that record is sent to the server so that the Virtual Agent topic has that information. For information about creating a pop-up window from a link, see Create a smart link preference.

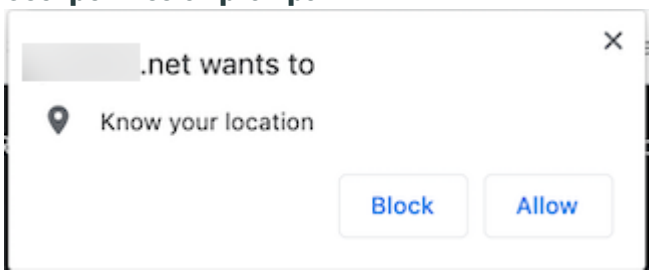
Form Content Popup topic block input parameters

Parameter	Description
sysId	Sys ID of the record you want to display from the table specified in the *table* parameter. If you don't want a specific record, enter `-1` to create a new record.
table	Name of the table you want to query or create a record in.
view	Name of a view that you created for the table. If not specified, the default view is used.

Geolocation topic block

Use this topic block to retrieve information about the location of users, if the users agree to that. Before the topic block is called in a conversation, the users are asked if they want their location to be known. For example, the users see a prompt similar to the following:

User permission prompt



Users can choose to block the request or allow their location to be known. If the users click **Allow**, they are later asked if they would like to share their location, as shown in the following example:

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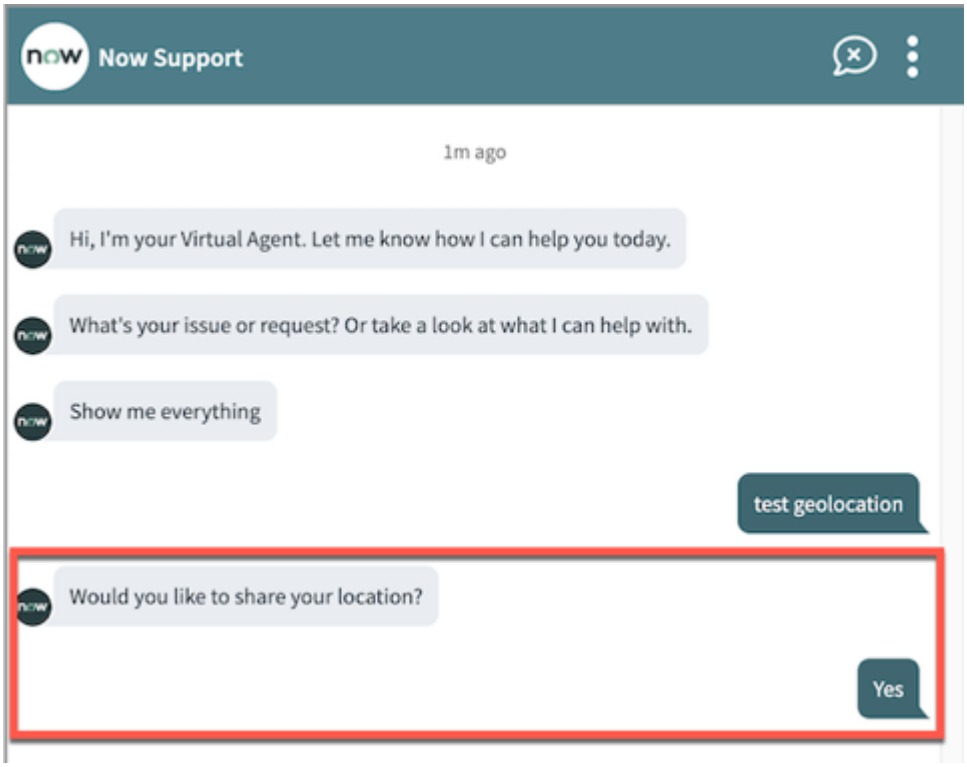
Use of Geolocation in a chat



The following tables list the input and output parameters for this topic block.

Geolocation input parameters

Parameter	Description
permissionPrompt (String)	Text asking permission to use the user's location. This text is shown to the user.
isGeoPermissionGrantedForNextUse (Boolean)	A boolean value that determines if users have granted permission to retrieve their location coordinates if this request is asked more than once during the conversation. The variable can be set as follows: • *True*: Don't display permission prompt again because the user has granted permission on this device. • *False*: Display the permission prompt because the user has either denied permission or has allowed the coordinates to be retrieved one time only.

Geolocation output parameters

Parameter	Description
Latitude	Latitude coordinates.
Longitude	Longitude coordinates.
errormessage	Message that is associated with the error if there are any errors.

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Geolocation output parameters (continued)

Parameter	Description
errortype	Variable that is returned from the topic block. Types of errors include: • PERMISSION_DENIED • POSITION_UNAVAILABLE • TIMED_OUT • UNKNOWN_ERROR
status	Variable that is returned from the topic block. The status can be: • OK: Location coordinates were retrieved successfully. • ERROR: Retrieval was unsuccessful.

Pause topic block

Use this topic block to create a pause to control the pacing of a conversation. To end users, this feedback is seamless and is displayed as a typing indicator.

For example, if the chat generated a list of knowledge base links, you may want to add a delay before continuing the conversation to give your end user time to read the information.

The Pause topic block appears on the Utilities section of the palette for easier access.

The following table lists the input parameter for this topic block.

Pause input parameter

Parameter	Description
Seconds	Number of seconds to wait before continuing the chat. The maximum value allowed is 60 seconds. If the value entered is 30 seconds (the default value) or less, the block should unpause in near real time. If the value entered is greater than 30 seconds, expect the unpause to occur with a maximum latency of +30 seconds. For example, if you set the value to 31 seconds, it could take up to 61 seconds to unpause (at most).

Run AI Search topic block

Note:
If you're upgrading from Rome or a prior release, you must replace the legacy AI Search topic block with the Run AI Search topic block in order for it to work.

Use this topic block to generate AI Search results in a conversation. This block doesn't require specific input parameters from a calling topic because it is controlled by the AI Search application in Virtual Agent. The default Virtual Agent Search Application and EVAM configuration set in the chat experience control how AI Search results are displayed in conversations.

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For information about how Virtual Agent uses AI Search, see Improving the user experience with AI Search. To learn more about Virtual Agent chat experiences and how to configure them, see Setting up chat experiences for Virtual Agent users.

You can control certain aspects of the Run AI Search topic block:

- Optionally customize the AI Search experience - You can customize the search experience by creating a custom Search Application Configuration to be used by the topic block, rather than the default Virtual Agent Search Application Configuration. The Search Application Configuration defines the search results returned in the conversation. For details on using a custom Search Application Configuration in the topic block, see Create a custom AI Search experience for Virtual Agent conversations.

  To use the default Virtual Agent configuration for AI Search, leave the **Search Application Configuration** field empty in the Topic Block Properties sheet when you're adding the Run AI Search topic block to a topic.

- Specify an AI Search flow action timeout value - The AI Search flow action in the topic block automatically times out at 10 seconds. You can change the length of time before this flow action times out by adding the system property *com.glide.cs.fdih.atlassearch.timeout* and setting these fields to change the timeout value:

System property fields for com.glide.cs.fdih.atlassearch.timeout

Field	Value
Name	Enter the system property name: `com.glide.cs.fdih.atlassearch.timeout`
Description	Enter an explanation for this property: `AI Search action timeout (in seconds)`
Type	Select `integer`.
Value	Enter the number of seconds before the AI Search action times out. The default value is 10 seconds.

The following tables list the input and output parameters for this topic block. For the output parameters, you have the option to deactivate any of the variables returned by the topic block.

Run AI Search input parameters

Parameter	Description
search_term	Phrase entered by a user during the conversation.

Run AI Search output parameters

Parameter	Description
genius_results	Variable that identifies the Genius Results returned.
search_results	Variable that identifies the regular search results (multi-list output) returned.

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Run AI Search output parameters (continued)

Parameter	Description
search_metadata	Variable that identifies the search result metadata used for click metrics in Conversational Analytics, such as the search term used, query language, and more.

Runtime Language Detection topic block

Use this topic block to detect the user's language during a conversation and switch to that language mid-conversation if the language is supported in the ServiceNow AI Platform.

For example, in conversations where guest users are interacting with the bot in a language different from the current conversation language, you can use this topic block to change the language accordingly. This topic block enables your bot to:

- Detect the language in conversations across all supported Virtual Agent channels.
- Determine if the language is supported in the ServiceNow AI Platform, and if so, ask the user whether to switch to the detected language.
- Switch to the detected language during the conversation if the user agrees to the switch.

Activate the Virtual Agent Language Detection and Translation plugin [com.glide.cs.runtime_language_detection_translation] to use this topic block.

The following table lists the input parameters for this topic block.

Runtime Language Detection input parameters

Parameter	Description
utterance (String)	Text entered by the user.
Change language (Boolean)	Option that displays a message to the user that does the following: • Indicates the bot has detected that the user is typing in a different language. • Asks whether to continue the conversation in the supported language. If the user responds yes, the conversation changes to the supported language.

Using geolocation in Virtual Agent

Topic authors can include a pre-built topic block called Geolocation in conversations with users. The Geolocation topic block retrieves the latitude and longitude coordinates of the user's location.

Topic authors can add this topic block to larger conversation flows. With the user's permission, the topic block retrieves the user's latitude and longitude location coordinates. Knowing these coordinates can help topic authors respond to customer requests or issues faster and more efficiently.

For example, you may need to send a technician to a customer site to resolve an incident. To quickly respond to the customer, you need to know which technicians are located nearby so you can dispatch the appropriate technician for the customer's location.

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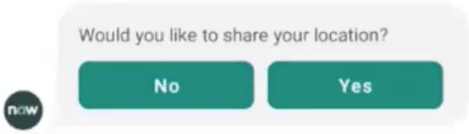
For general information about how geolocation is used on the ServiceNow platform, see Geolocation.

Share location details

The first time a user, such as a field technician, uses the Geolocation topic block in a conversation, they are asked if they would like to share details about their location.



Geolocation topic block flow

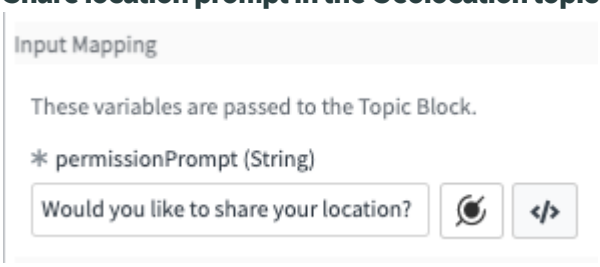
User choice	Topic block response
Yes	The topic block sends the user's latitude and longitude coordinates from the server to the user's device. If users want to allow the ServiceNow instance to access their location, users may then see operating system-specific or browser-specific prompts. Examples of such prompts include the following: • Allow (always) • Allow (one time only) • Block (don't allow) Depending on the user's response, they may see this prompt one or more times, or they may never see it.
No	The topic block does not retrieve user coordinates and displays a relevant error message for the topic author to resolve. The error is logged as an output parameter. For details, see Geolocation topic block parameters.

Modify the Geolocation topic block

If you are a topic author or an admin, you can modify the Geolocation topic block flow, as applicable. Simply duplicate the topic block and rename it. You can then use it as needed in the larger conversation flow you're designing.

The Geolocation topic block properties sheet lets topic authors specify the input and output mappings. You can also customize the prompt using data pills or scripts. For example, you can include an explanation or reason for asking the question. For information about using data pills and scripts, see Virtual Agent Designer controls.

Share location prompt in the Geolocation topic block properties



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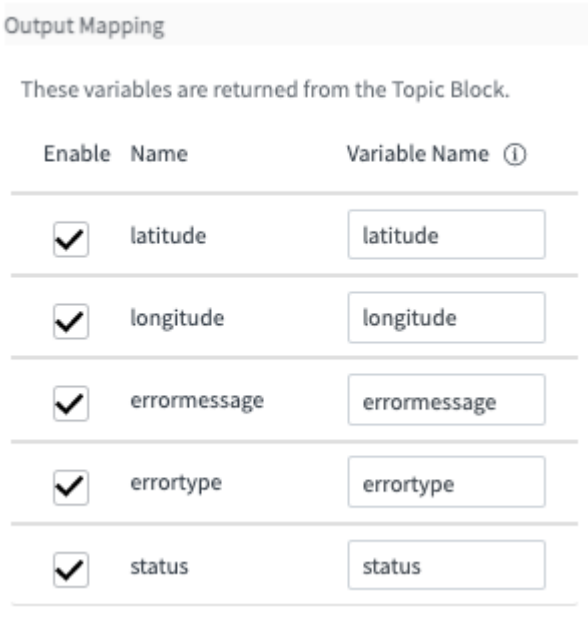
Use the input mappings to customize how Virtual Agent asks users for permission to share their location. The response is passed to the topic block.

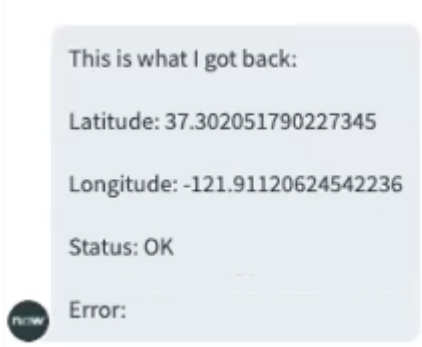
Use the output mappings to specify the variables that are returned from the topic block in the conversation.

Output mapping properties in the Geolocation topic block



All the variables are selected by default. Keep the default choices, or select the variables you want returned from the topic block. At a minimum, you should select the latitude and longitude coordinates. However, error messages, error type, and status details could be useful when resolving problems. The output mappings you select are stored as variables on the server.

Geolocation topic block results



For more information about the Geolocation topic block properties, see Geolocation topic block parameters.

Customizing Virtual Agent with custom controls

Custom controls are components that ServiceNow® developers can create for use in Virtual Agent topics or topic blocks. Such controls include sliders or video players. Custom controls complement the controls provided in Virtual Agent Designer.

Virtual Agent Designer provides a default set of controls that represent user inputs, bot responses, and utilities for building a Virtual Agent conversation. As a developer, you can use Virtual Agent Designer to create additional controls (interface components) for specific inputs or

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output responses. For example, a slider is an example of a custom input control that enables end users to select a quantity.

Note:
Custom controls do not work on Internet Explorer version 11. Custom controls are also not supported for Microsoft Teams.

Before building a custom control

Custom controls are based on customizable Next Experience Components that you can create by using the Next Experience Design System.

Before building a custom component, you must have the following:

- Basic knowledge of the ServiceNow AI Platform® and application table structures.
- General knowledge of web component concepts, development, and design.
- JavaScript knowledge to define component behavior and that of the custom control.
- Knowledge of the design process for creating custom components for use in Virtual Agent Designer.

To learn more about developing custom components for Virtual Agent, see Develop a component for Virtual Agent.

How custom controls work

To add your custom control to Virtual Agent, follow these main steps:

1. Create a custom control definition.

   After building the custom component to be used for the control, create a custom control definition that maps an input or response control to the custom component.

2. Create a custom control using Virtual Agent Designer.

   A custom control is an input or response control. Developers build a custom control in Virtual Agent Designer by doing the following:

   - Selecting a custom control definition.
   - Defining the input parameters for using the control.
   - Specifying the output parameters returned by the control.

   An input control has callbacks that use input from the end user. A response control typically presents information to the end user and doesn't have callbacks.

3. Add a custom control to a topic or topic block.

   Topic authors, virtual agent admins, or admins can add a custom control utility to a topic or topic block.

Secure inputs

Beginning with the San Diego release, you can create custom input controls that can accept secure inputs, such as passwords, to pass through to Integration Hub actions or subflows. To enable this, slide the **Make inputs secure** toggle switch when you create your custom input control. For more information, see Create a Virtual Agent custom control.

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Create a custom control definition

Define a custom input or response control definition that maps to a custom component.

Before you begin

A custom control definition needs a custom component. For example, a slider input control uses a custom slider component. To begin, create the customizable component that you will use for your control.

Role required: virtual_agent_admin or admin

About this task

For a given custom control, create a separate control definition for each channel in which the control will be used.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Custom Control Definitions**.
2. Click **New**.
3. On the form, fill in the fields.

Custom Control form

Field	Description
Name	Name of the custom control to be created.
Type	Type of custom control. Choices are as follows: ○ Input ○ Response
Domain	Domain in which this control is used.

4. Click **Submit**.
5. Open the custom control record that you just created.
6. In the Custom Control Definitions related list, click **New**.
7. On the form, fill in the fields.

Custom Control Definition form

Field	Description
Channel	Channels in which your control can be used. The channel is a chat client, such as a web client or messaging app, that is supported in Virtual Agent. If your control can be used in more than one channel, create a Custom Control Definition for each channel. If channels are defined, then the custom control can only run in the specified channels.
Application	Scope that this control belongs to.
UX Component Definition	List of custom components that are created for use as custom controls in Virtual Agent.

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Field	Description
	Choose an optional component for your custom control.
Domain	Domain where this control is used.

8. Click **Submit**.

Result
The custom control definition is available for use. You can specify it when you create the appropriate control in Virtual Agent Designer.

What to do next
Create the custom control in Virtual Agent Designer.

Create a Virtual Agent custom control

Build a custom input or response control that topic authors can use in topics or topic blocks. In Virtual Agent conversations, an input control gathers information from end users, while a response control displays information to end users.

Before you begin
Create the custom control definition.

Important:
To implement secure (password2) inputs in your Virtual Agent custom control, you must adhere to the scoped application requirements in Flow Designer. For details, see Flow Designer scoped application requirements for secure inputs.

Tip:
Developers and topic authors may need to access custom controls created in other application scopes. To give them access, see Create cross-scope access privileges for topic blocks and custom controls.

Role required: virtual_agent_admin or admin

Procedure
1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, click **+ Create.**
3. On the form, fill in the fields.

Properties form

Field	Description
Type	List of objects that you can create in Virtual Agent Designer. Choose the type of custom control: ○ **Custom Input Control** ○ **Custom Response Control**
Name	Unique name for the custom control that reflects its purpose.
Description	Brief explanation of the purpose and functionality of the control.

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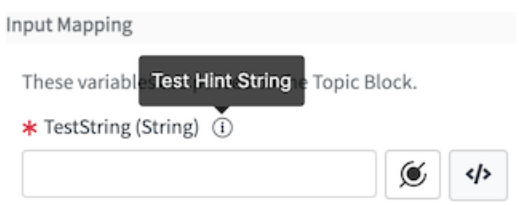
Field	Description
Advanced properties (optional)	
Make inputs secure [Custom input controls only]	
Enable	Toggle switch that lets a custom input control pass secure inputs, such as passwords.
Available on the palette	
Enable	Toggle switch that determines whether the custom control appears as its own icon in the Utilities section of the palette on the **Flow** tab. This provides easy access to the control for other authors.
Additional	
Categories	List of categories. Categories identify and group related topics, topic blocks, or custom controls. If applicable, choose a category for your control.

4. Click **Create**.
   The **Flow** tab opens and displays an initial flow that contains a custom control node.
5. Click the **Start** node and define the input parameters to the control.
   Topic authors will provide these input parameters and values from the calling topic.

   a. Click **+ Add**.

   b. On the form, fill in the fields.

Add input dialog box

Field	Description
Name	Name of the input variable that stores the input value.
Type	Type of data being passed to the topic block. For example, **String**, **Boolean**, and so on. The fields change according to your choice. For more information, see Input data types in Virtual Agent topics.
Required	Option to set the parameter as required.
Hint	Tooltip that is visible when authoring a calling topic. See the following example: 
Table	ServiceNow table that is used to query for input. This field is available only when **Reference** or **Array.Reference** is selected from the **Type** field.

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Field	Description
Max Number of Rows	Maximum number of rows that the topic block is allowed to define. This field is available only when **Array** is selected from the **Type** field.
Default Value	Default value for the variable. This value can be used when previewing the block. Duplicate default values are not allowed for array data types.

c. Click **Save**.

d. Repeat these steps for additional parameters.

6. Click the **End** node and define the output parameters and values returned from the custom control.
   Topic authors can use the output value in the calling topic.
   a. Click **+ Add New**.
   b. Enter the name and value of the parameter.
   c. Repeat these steps for additional parameters.
   d. Click **Save**.
7. Click the custom control node and complete the property sheet as follows:
   - For a custom input control, fill in the Custom input properties sheet.
   - For a secure custom input control, fill in the Secure custom input properties sheet.
   - For a custom response control, fill in the Custom output properties sheet.
8. To create the control, click **Save** and then **Publish**.

Result

If you selected **Available on the palette** in the Properties page, the Custom Control icon displays as its own icon in the Utilities section of the palette. The control is listed on the Topics page, and you can use the Type menu to show only custom controls.

What to do next

Add a custom control to a Virtual Agent topic or topic block.

Add a custom control to a Virtual Agent topic or topic block

Add a custom control to a Virtual Agent topic or topic block. During the conversation, you can gather inputs from the user or display outputs to the user.

Before you begin

Do the following before you start this task:

- Create and publish the custom input or response control.
- Create a calling topic or topic block in which the custom control will be embedded.

Role required: virtual_agent_admin or admin

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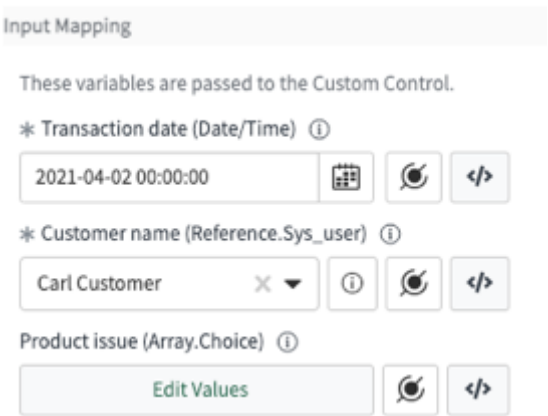
Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, click the topic or topic block where you will add the custom control.
3. In the **Flow** tab, drag the Custom Control icon from the Utilities section of the palette to the appropriate position in the topic flow.

   Note:
   If you selected **Available on the palette** in the custom control Properties page, the Custom Control displays as its own icon in the Utilities section of the palette.

4. Click the custom control node.
5. On the form, fill in the fields.

Custom control utility properties sheet

Property	Description
Custom control	The name of a custom control object that has been published in Virtual Agent Designer.
Node name	The name of the custom control you selected.
Input mapping	The variables to be used as input to the selected custom control. For example, the following image has example variables:  The contents of this area change according to the custom control you selected. Options may include string input, referenced records, scripts, and so forth.
Output mapping	The variables to be output by the selected custom control. For example, the following image has example variables that are enabled:

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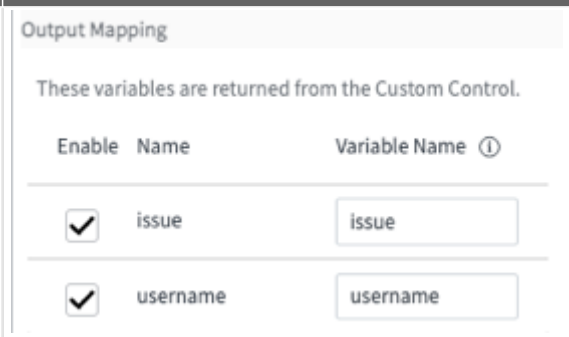
Property	Description
	 The contents of this area change according to the custom control you selected.
Advanced	
Hide this node	
Conditionally use this node if	A no-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

6. Click **Save**.
7. To see how your custom control works in the topic, click **Test** in the header bar.
   Your topic runs in a chat test window.
8. If no further changes are needed, click **Publish** in the Virtual Agent Designer header bar.

Result

The topic is active. You can deploy it to your Virtual Agent clients.

Custom input properties sheet

Use this sheet to define a custom input control in Virtual Agent.

Custom input properties sheet

Custom input property	Description
Custom Control Definition	List of custom control definitions for the controls. Select the definition that defines how the control is rendered for the channel in which it runs. If you need to add a custom control definition, click the **Custom control definitions** link.
Generate Control Data Function	Script function that provides the data used to render the custom control. For example, if you're creating a slider input control, you would define the values for the slider. These values include the slider minimum and maximum values, slide default values, icon used in the slider, and so on.
Transcript Function	Script function that provides the message recorded in the transcript.

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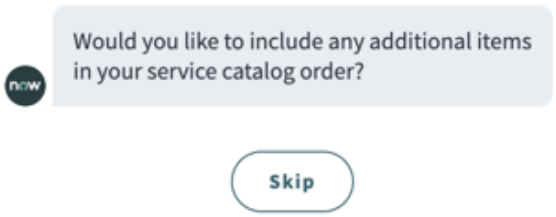
Custom input property	Description
	For example, a message for an input control could confirm that the control is rendered with specific data values.
Response Handler Function	Script function that defines how the input response is handled on the conversation server.
Response Transcript Function	Script function that provides the message for the input control response that is recorded in the conversation transcript.
Non-supported channel response message	Default fallback message that is displayed when a user is running the control on an unsupported channel.
Advanced (optional)	
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 

Secure custom input properties sheet

Use this sheet to specify secure inputs, such as a password, in a custom input control in Virtual Agent.

Important:
To implement secure (password2) inputs in your Virtual Agent custom control, you must adhere to the scoped application requirements in Flow Designer. For details, see Flow Designer scoped application requirements for secure inputs.

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Secure custom input properties sheet

Secure custom input property	Description
Custom Control Definition	List of custom control definitions for the controls. Select the definition that defines how the control is rendered for the channel in which it runs.
Generate Control Data Function	Script function that provides the data used to render the custom control. For example, if you're asking for one or more passwords, you would define the values for each password.
Transcript Function	Script function that provides the message recorded in the transcript. For example, a message for an input control could confirm that the control is rendered with specific data values.
Non-supported channel response message	Default fallback message that is displayed when a user is running the control on an unsupported channel.
Invoke Flow Designer object	The Flow Designer action or subflow that secure inputs from the custom control can be passed into. For more information about Flow Designer actions and subflows, see Actions and Subflows.
Spoke	Name of the scoped application that contains Flow Designer content that is dedicated to a particular application or record type. For a list of default spokes, see Spokes.
Action / Subflow	The Flow Designer action or subflow to be performed in the instance. The **Input mapping** and **Output mapping** areas change depending on your selection. For details about the action or subflow, click the link beneath your selection to view it in Flow Designer.
Input mapping	Specifies the variables to be used as input to the selected action. The check boxes for secure fields (password2 type) are selected automatically, which makes them mandatory. If you select the check box for a String field, it will be mandatory, but not secure. Only fields that use the password2 data type are secure. For each selected field, provide the corresponding input response variable name that is specified in the action or subflow. For example, a Flow Designer action contains an *`oldPassword`* input and a *`newPassword`* input. The input response object looks like this:

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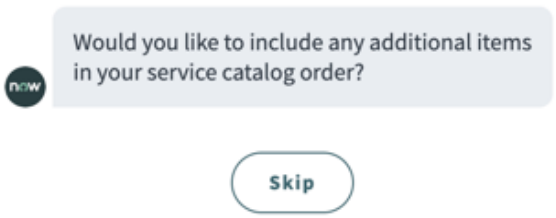
Secure custom input property	Description

	<pre>{
	  "old_password": "1234",
	  "new_password": "5678"
	}</pre>
	In this example, enter `old_password` for the *`oldPassword`* property, and then enter `new_password` for the *`newPassword`* property.

Output mapping	Specifies the variables to be output by the selected action. The contents of this area change according to the action you selected.
Advanced (optional)	
Permissions	
Run as	Permissions to use for the action. Select one of the following options: • **User who initiates session**: When selected, the action runs using the same permissions that the current user has. • **System User**: When selected, the action runs using system privileges, some of which may be unavailable to the current user.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 

Related topics

- Flow Designer Actions
- Flow Designer Subflows
- Password (2 Way Encrypted) design considerations

Custom output properties sheet

Use this sheet to define a custom response control in Virtual Agent.

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Custom output properties sheet

Custom response property	Description
Custom Control Definition	List of custom control definitions for the controls. Select the definition that defines how the control is rendered for the channel in which it runs.
Generate Control Data Function	Script function that provides the data used to render the custom control. For example, if you're creating a slider input control, you would define the values for the slider. These values include the slider minimum and maximum values, slide default values, icon used in the slider, and so on.
Transcript Function	Script function that provides the message recorded in the transcript. For example, a message for an input control could confirm that the control is rendered with specific data values.
Non-supported channel response message	Default fallback message that is displayed when a user is running the control on an unsupported channel.
Advanced (optional)	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Integrating Virtual Agent with Flow Designer workflows

The conversation workflows of ServiceNow® Virtual Agent can be integrated with those of the ServiceNow Flow Designer. You can then use these workflows in Virtual Agent conversations.

You can integrate Flow Designer actions and subflows as follows:

- Add the actions or subflows to Virtual Agent conversations.
- Use actions created for another product in Virtual Agent conversations.
- Create conversations that call workflows directly in the conversation. For example, users can place catalog requests, create incidents, or input information securely.

In Virtual Agent conversations, you can use actions to trigger workflows that are custom-built in an application (such as Flow Designer) or workflows of the third-party applications and products available in the Integration Hub. Integrations built using Flow Designer and Integration Hub help to ensure a high level of resiliency and performance.

If an action in the workflow is slow to respond or appears to be waiting, topic authors see a relevant error message.

By default, a scheduled job checks the conversation flow every 120 seconds. For more information about scheduled jobs, see Scheduled jobs.

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You can change this interval as needed. To change the interval, see Specify the action workflow timeout.

Integrate workflows of third-party products available on the IntegrationHub

You can use the Integration Hub to create end-to-end digital workflows and automate processes that integrate the ServiceNow AI Platform® with any third-party application, platform, or data.

For example, you can use one of the 100 pre-built spokes available on the ServiceNow Store. These pre-built spokes include those for popular applications, such as Microsoft Azure, Workday, and Okta.

For information about the ServiceNow Integration Hub, see ServiceNow IntegrationHub – natively integrate ServiceNow with anything.

Add workflows to topics

Use the Action utility to integrate ServiceNow Flow Designer workflows in Virtual Agent topics. The Action node triggers the required Flow Designer workflows used in the Virtual Agent conversation.

Before you begin

Create a Virtual Agent topic, if you don't already have one.

Be familiar with the following features:

- Flow Designer concepts and tasks. For more information, see Flow Designer.
- Virtual Agent Designer utilities, such as the Lookup utility, and the Script Action utility.

  Use these utilities to control the actions within the Virtual Agent conversation. For more information about these utilities, see Virtual Agent Designer utilities.

- Virtual Agent controls. You may be asked to enter any of the following:
  - Text strings
  - Data pills
  - Strings with embedded data pills
  - Scripts that return strings

  For more information, see Virtual Agent Designer controls.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**, and in the Topics page, click the topic you want to use.
2. From the **Utilities** section of the palette, drag-and-drop the Action utility icon () onto the canvas at the appropriate location on the conversation flow.
   The Action utility is now a node in the conversation flow, and the Action utility properties panel appears.
3. On the form, fill in the fields.

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Action utility properties sheet

Property	Description
Node name	The name of this Action node.
Invoke Flow Designer object	Select one of the following Flow Designer components: ○ **Action**: A reusable operation. ○ **Subflow**: An automated process that consists of a sequence of reusable actions, data inputs, and outputs.
Spoke	Name of the scoped application that contains Flow Designer content that is dedicated to a particular application or record type. For a list of default spokes, see Spokes.
Action/ Subflow	The Flow Designer action or subflow to be performed in the instance. The **Input mapping** and **Output mapping** areas change depending on your selection. For details about the action, click the link beneath your selection to view it in Flow Designer.
Wait for response?	Toggle switch that determines whether Virtual Agent waits for a response from the specified action before continuing.
Input mapping	Specifies the variables to be used as input to the selected action. The contents of this area change according to the action you selected. Options may include string input, referenced records, scripts, and so forth. For options that require a password, enable the **Include a password input** toggle switch to prompt the user for a password. Secure inputs must use the password2 data type. Input is securely masked and not viewable by others. **Note:** The `Array.Reference` input data type in Virtual Agent Designer corresponds to the `List.[Table]` input data type in Flow Designer. For more information, see Action input and output data types.
Output mapping	Specifies the variables to be output by the selected action. The contents of this area change according to the action you selected.
Advanced (optional)	
Permissions	
Run as	Permissions to use for the action. Select one of the following options: ○ **User who initiates session**: When selected, the action runs using the same permissions that the current user has. ○ **System User**: When selected, the action runs using system privileges, some of which may be unavailable to the current user.
Hide this node	

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Property	Description
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

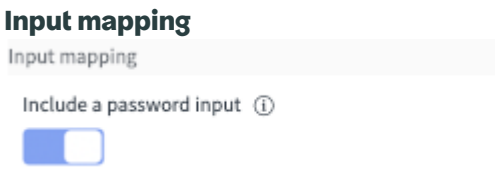
4. Click **Save**.

Virtual Agent secure password inputs

The **Include a password input** toggle switch on the Action utility properties sheet lets you enter passwords securely for use in Virtual Agent conversations.

If the workflow discovers a password2 type as an input, the Action utility properties sheet displays the **Include a password input** toggle switch.

Note:
In previous releases, inputs with a string data type would also display this toggle switch. Starting with the San Diego release, only password2 data types are supported. If you have existing actions that use password inputs, update them to use password2.



If you enable this toggle switch, you see messages about clients that are supported, along with fields that let you do the following:

- Designate the field you want to make secure
- Enter the text you want to use for the password-related prompt
- Enter the text for a confirmation prompt
- Enter the text to use for messages about channels that aren't secure

Important:
To implement secure (password2) inputs in your Virtual Agent custom control, you must adhere to the scoped application requirements in Flow Designer. For details, see Flow Designer scoped application requirements for secure inputs.

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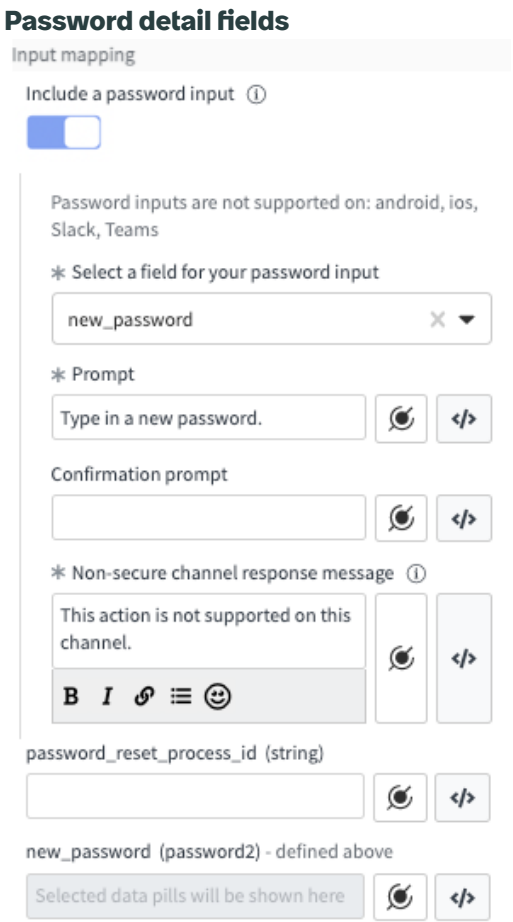

These password input type fields are dynamic in the sense that the fields you see map to the fields set for the action when it was created in Flow Designer. Some of the password2 fields may also be read-only.

For password-related design considerations in Flow Designer, see Password (2 Way Encrypted) design considerations .

Note the following points about how password-related inputs are handled securely:

- Only users can see the passwords. No one else can.
- The passwords are held in memory on the server and are passed securely to the Flow Designer Action or Subflow.
- When users enter a password on a channel, users can toggle the Hide text icon ( ) to show or hide the password.
- ServiceNow admins can mark a specific channel as secure. If topic authors attempt to include a channel that isn't marked as secure, a warning message appears.

  For more information about creating secure channels, see Create a Virtual Agent conversational custom chat integration configuration.

- Passwords are masked (not readable) in queues, tables, and logs.

Flow Designer scoped application requirements for secure inputs

Adhere to the following scoped application requirements to implement secure (password2) inputs in your Virtual Agent topics.

You can add secure inputs to Virtual Agent topics in two ways:

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- Create a secure custom input control that uses a Flow Designer action or subflow with secure (password2 type) inputs.
- Add an Action utility node to a topic that refers to a Flow Designer action or subflow that has a single password2 field as an input.

The Key Management Framework (KMF) must be installed and configured for your instance. The scoped application that uses the secure fields must also have the following:

- A *sys_kmf_crypto_module* record, with a related Symmetric Key Wrapping/Unwrapping *sys_kmf_module_crypto_spec* record
- A *sys_kmf_crypto_caller_policy* record with the following properties:
  - Policy name: <modify the auto-generated name>
  - Crypto module: *com_glide_cs_glideencrypter*
  - Type: *Scope*
  - Target Scope: <your application's scope>
  - Application: <the name of your scoped application>
  - Active: *true*
  - Result: *Track*
- A Flow Designer action or subflow that accepts one or more password2 input fields
- A Script step in the Flow Designer action that unwraps the password2/KMF passwords as follows:

```
var op = new
sn_kmf_ns.KMFCryptoOperation("global.com_glide_cs_glideencrypte
r","SYMMETRIC_UNWRAPPING").withAlgorithm("AES").withOutputForma
t("KMFNONE");
var old_pw_clear_data = op.doOperation(inputs.old_pw);
var new_pw_clear_data = op.doOperation(inputs.new_pw);
var new_pw_confirmed_clear_data =
 op.doOperation(inputs.new_pw_confirmed);
```

For more information about password2 encryption with KMF, see Password2 encryption with KMF.

Test the action workflow

Use this task to make sure that the integrated action workflow completes as intended in the conversation.

Before you begin

Role required: virtual_agent_admin or admin

About testing the action workflow

Topic authors can also see the test results in the Conversation Task FDIH Invocations [sys_cs_fdih_invocation_list] table.

About this task

When you test the workflow, you will see a test results preview pane that includes preview-only messages. These messages include a link called **View in Flow Designer**. This link takes you to the Flow Execution Details report. You can use this report to do the following:

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- View the flow execution details.
- See the results of the action in Flow Designer.
- Verify what is being returned to Virtual Agent.

Note:
Only topic authors have access to the **View in Flow Designer** link. In non-production environments, this link is available by default. In production environments, topic authors need to enable access to this link by creating a record in the [sys_flow_execution_setting] table for each Flow Designer object. This link is not available in conversations where password2 input is used.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, open the topic with the action you want to test.
3. Click **Test**.
   If an action in the test window is slow to respond or appears to be waiting, you will see a relevant error message.

   By default, a scheduled job checks the conversation flow every 120 seconds. For more information about scheduled jobs, see Scheduled jobs.

   You can change this interval, as needed. To change the interval, see Specify the action workflow timeout.
4. Troubleshoot the Action utility node:
   - View the flow execution details report.
   - Look at the Conversation Task FDIH Invocations [sys_cs_fdih_invocation_list] table.
5. Click **Save** when you're finished.

Specify the action workflow timeout

Set the length of time before the Flow Designer Integration Hub action workflow times out.

Before you begin
Role required: admin

Procedure

1. Navigate to **All**.
2. Enter `sys_properties.list` in the filter.
3. Click **New** to add the *`com.glide.cs.fdih.interactive.timeout`* property.

   a. On the form, fill in the fields.

Field	Value
Name	Enter the system property name: `com.glide.cs.fdih.interactive.timeout`.
Description	Enter an explanation for this property, such as: `Virtual Agent Flow Designer IntegrationHub workflow timeout (in seconds)`.

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Field	Value
Type	Enter `integer`.
Value	Enter the number of seconds before the workflow action times out. The default value is 120 seconds.

b. Click **Submit**.

Using Virtual Agent with a live agent

Sometimes a conversation requires human intervention. When this occurs, you can transfer the user to a live agent in Agent Chat.

Transferring Virtual Agent conversations to a live agent

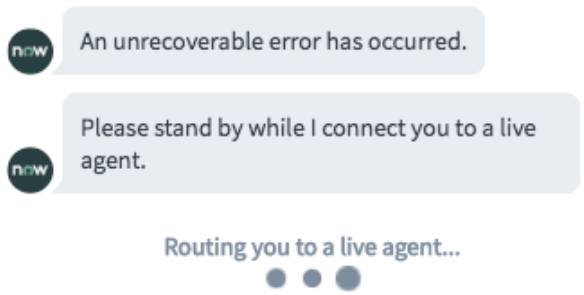
Manage live chat support, including the chat support interface used when a Virtual Agent conversation is transferred to a live agent.

Note:
The Glide Virtual Agent plugin (com.glide.cs.chatbot) automatically activates the Glide Conversation Server plugin (com.glide.cs) for chat support.

Conversations in Virtual Agent are transferred to a live agent in several ways. This transfer happens automatically when an unrecoverable error occurs, but it can also be triggered by a script in a topic or when a user manually selects that option.

Automatic transfer to a live agent when an error occurs

When a conversation encounters an error, the conversation automatically transfers to a live agent.



Note:
If you don't plan to use Agent Chat, be sure to deactivate it in the Agent Chat settings. For more information, see Setting up Agent Chat.

Automatic transfer to a live agent that is triggered by a script in a topic

In situations where you want a support agent to handle the conversation, you can create a script in your topic that uses the *`vaSystem.connectToAgent()`* method. This method triggers a transfer to a live agent. This option can be useful for conversations involving negative customer sentiment, high priority requests, or requests outside the scope of your topic process. For example:

```
(function execute() {
    if (vaInputs.urgency == 1 && vaInputs.impact == 3)
        if(vaSystem.isLiveAgentAvailable()) {
            vaSystem.connectToAgent()
        }
    })()
```

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This script action control transfers the conversation to a live agent based on the incident impact and user urgency. The script uses the `vaSystem.isLiveAgentAvailable()` method as follows:

- In Agent Workspace, the `vaSystem.isLiveAgentAvailable()` method checks the queue schedule and whether agents are online.
- In Connect Support, the `vaSystem.isLiveAgentAvailable()` method only checks the queue schedule.

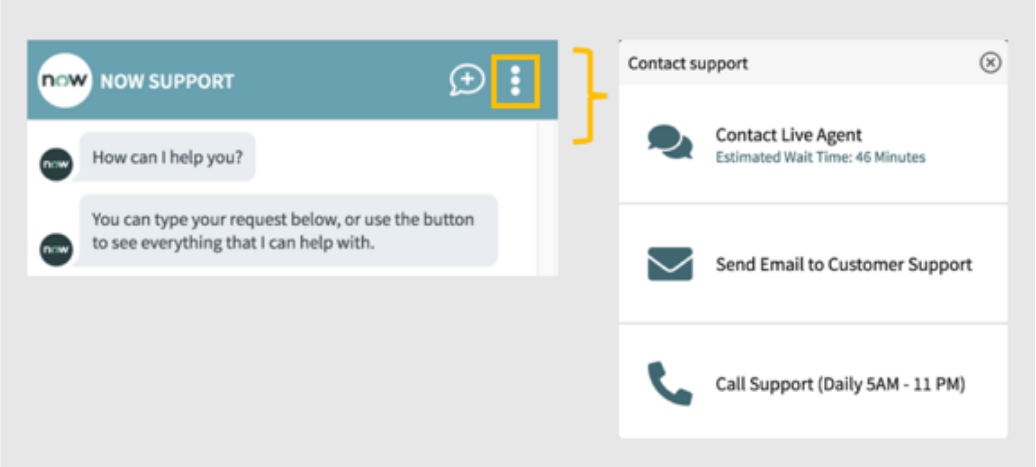
Note:
The `vaSystem.isLiveAgentAvailable()` method only checks whether agents are online, regardless of their skill set.

Manual transfer to a live agent using the Contact support option

You can choose the **Contact support** option and then select **Contact Live Agent** to transfer the conversation to a live agent.

Note:
Users running a Virtual Agent messaging integration must enter the command `Hi` or `agent` to access the live agent transfer option. If your environment isn't configured for live agents, the `agent` command doesn't work. For more information, see Virtual Agent integration with messaging apps.

Contact Support options in Virtual Agent



How Virtual Agent conversation transfers work

For a user engaged in a Virtual Agent conversation, the switch to a live agent is a seamless transfer. When a transfer is triggered, either automatically or by a user manually, the conversation is automatically routed to the appropriate chat support interface, based on your Agent Chat settings. In Agent Chat settings, admins also define the general messages that users see during live agent transfers.

If you're using Agent Workspace, the conversation is automatically routed and assigned to an available live agent. If you're using Connect Support, the conversation is routed to the chat support queue that you specify.

Note:
At least one live agent must be available when transferring from Virtual Agent, otherwise the end user is presented with a `no agents available` message and their conversation isn't transferred.

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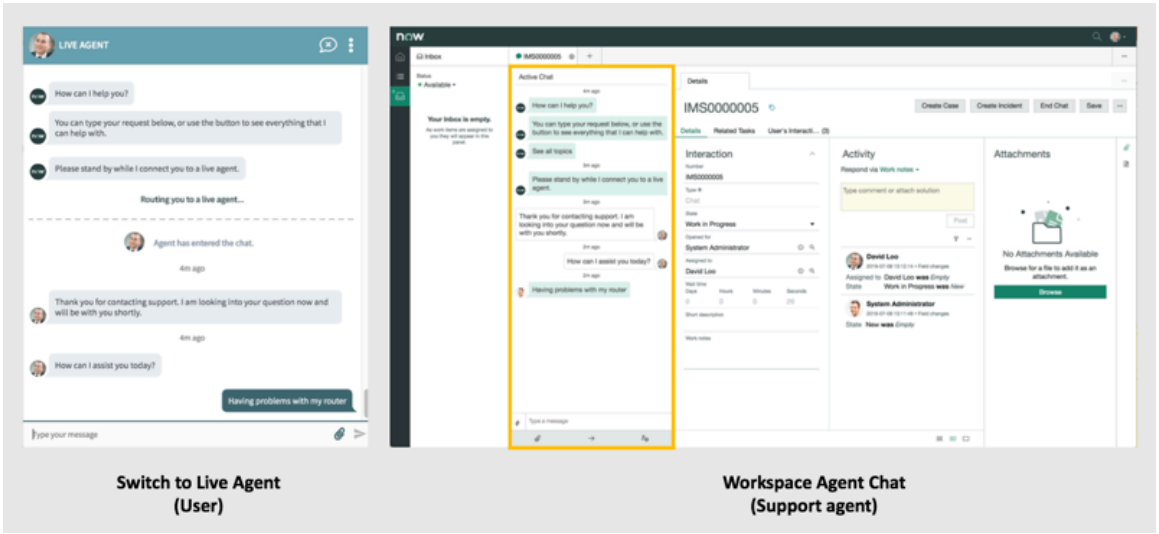
Transfer to a live agent in Agent Workspace

If you're using Agent Workspace, the Virtual Agent conversation is automatically transferred to a qualified available agent, based on the Chat service channel configuration and the queues that the agent supports, as defined in Advanced Work Assignment.



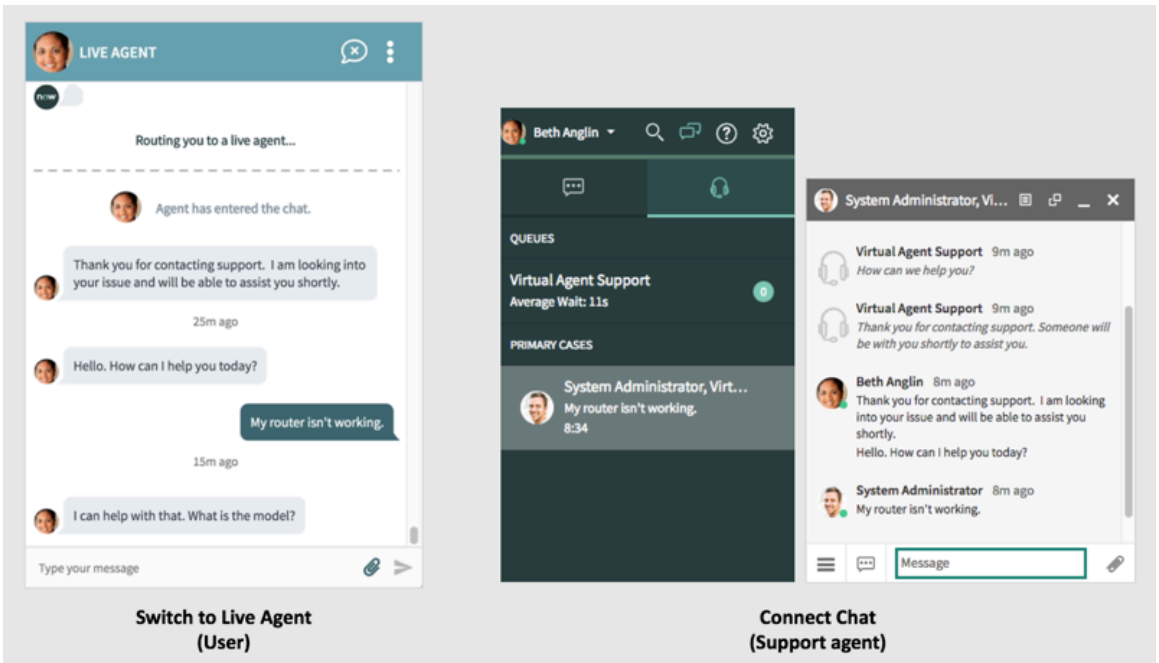
Switch to Live Agent (User)

Workspace Agent Chat (Support agent)

For the user, the conversation with the agent continues in the Virtual Agent (client) interface. In Agent Workspace, the chat assignment appears in the agent's inbox. When an agent accepts the assignment, the agent joins the conversation and interacts with the user.

Transfer to a live agent in Connect Support

If you're using Connect Support, the virtual agent conversation is routed to the appropriate chat support queue. For the user, the conversation with the agent continues in the Virtual Agent client interface. In Connect Support, the agent accepts the queue with the transferred user to join the conversation and interact with the user.



Switch to Live Agent (User)

Connect Chat (Support agent)

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In earlier releases, admins used the Chat Setup form to assign the default chat queues for Customer Service Management, HR Service Delivery, and IT Service Management or a global queue to which Virtual Agent conversations were automatically routed if default queues weren't assigned. These queues, which admins defined in Connect Support, are stored in the Chat Queues [chat_queue] table. If you're using Connect Support as the fulfiller interface and must change chat settings, see Setting up Agent Chat for details.

User sentiment

When configured, user sentiment analysis is performed on Virtual Agent and live agent conversations. The user sentiment is stored in the Interaction Insights [sys_cs_interaction_insight] table. For details, see Interaction Insights table.

Closing Virtual Agent and Agent Chat conversations

Virtual Agent and Agent Chat conversations that are abandoned by requesters remain open until they are automatically closed by the scheduled job, *`Time Out Abandoned VA Conversations`*. This job runs hourly each day.

The default timeout period for abandoned Virtual Agent and live agent conversations is two hours (7200 seconds). The *`Time Out Abandoned VA Conversations`* job runs hourly to find and close any conversations that have been open longer than the default (or configured) timeout period.

As admins, you can change the default timeout period for closing Virtual Agent and live agent conversations by adding the system property *`com.glide.cs.conversation_idle_timeout`*. The timeout value that you specify in this property applies to all conversations in supported Virtual Agent and live agent channels, including chat channels (such as Microsoft Teams, Slack, and Workplace from Facebook) and messaging channels (such as SMS). For details, see Change the timeout period for Virtual Agent and live agent conversations.

If you're using Virtual Agent and Agent Chat on multiple chat channels, you can add a channel-level idle timeout value that overrides the timeout value set in the *`com.glide.cs.conversation_idle_timeout`* property for chat channels. For details, see Override the conversation timeout period by channel.

If needed, you can also change the time at which the Time Out Abandoned VA Conversations job runs.

Note:
If you're using keywords or NLU, you can initiate the Closing Conversation topic with phrases tied to the intent (End Conversations) such as `Bye` or `Exit`. If the chat isn't closing when you enter an appropriate phrase, the NLU model for the setup topics might not be published or assigned.

Change the timeout period for Virtual Agent and live agent conversations

Add the *`com.glide.cs.conversation_idle_timeout`* property to the System Property [sys_properties] table to specify the length of time that an abandoned Virtual Agent or Live Agent conversation remains open (idle). When the *`Time Out Abandoned VA Conversations`* job runs hourly, it closes any Virtual Agent and Live Agent conversations that have been open longer than the specified time.

1. In the navigation filter, enter `sys_properties.list`.
2. Click **New**.

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a. Complete these fields:

Field	Value
Name	Enter the system property name: `com.glide.cs.conversation_idle_timeout`
Description	Enter an explanation for this property: `Idle timeout period (in seconds) for all conversations`
Type	Select `integer`.
Value	Enter the number of seconds that abandoned Virtual Agent or Live Agent conversations remain open, after the requester's last response. This value must be less than 7200 seconds, since the *`Time Out Abandoned VA Conversations`* job runs every 3600 seconds (hourly) to close idle conversations. For example, a value of 1800 seconds (30 minutes) means that an abandoned conversation remains open for 1800 seconds (30 minutes). When the *`Time Out Abandoned VA Conversations`* job runs, it closes any conversations that have been idle longer than 1800 seconds.

b. Click **Submit**.

Override the conversation timeout period by channel

You can set the conversation timeout value for a channel by adding a channel-specific conversation timeout value that overrides the *`com.glide.cs.conversation_idle_timeout`* property. When the *`Time Out Abandoned VA Conversations`* job runs hourly, it closes any Virtual Agent or Live Agent conversations in the channel that have been open longer than the specified time.

1. In the navigation filter, enter `sys_cs_channel.list`.
2. In the Messaging Channels table, locate the channel record to be changed and double click the **Conversation Idle Timeout** field.
3. Enter the number of seconds that abandoned Virtual Agent or Live Agent conversations remain open in the channel, after the requester's last response.

   For example, a value of 1800 seconds (30 minutes) means that an abandoned conversation in the channel remains open for 1800 seconds (30 minutes). When the *`Time Out Abandoned VA Conversations`* job runs, it closes any conversations that have been idle longer than 1800 seconds.
4. Save the value.

Change the Time Out Abandoned VA Conversations scheduled job

To change the time that this hourly scheduled job runs or to make other adjustments to the scheduled job:

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1. Navigate to **All** > **System Definition** > **Scheduled Jobs** and open the Time Out Abandoned VA Conversations record.
2. In the Scheduled Script Execution form, change the **Time** at which the scheduled job runs. Or, depending on how you want to adjust the timing, change other fields in the form as needed.

   For example, to change the interval at which the job runs, in the **Run** field, select **Periodically**. You then specify the **Repeat Interval** (**Days** and **Hours**) that the job runs and the **Starting** date for the interval. For a description of the other fields that you can change in this form, see Automatically run a script of your choosing.
3. Click **Update**.

   The job runs at the specified time and frequency.

Tracking deflections in Virtual Agent using the deflection topic block

Use the pre-built deflection topic block in ServiceNow® Virtual Agent to track the issues that Virtual Agent helped to resolve or actually resolved for a user. Incident deflection patterns and metrics can help you optimize and analyze the effectiveness of Virtual Agent.

A deflection occurs when Virtual Agent automatically redirect users to self-service options or knowledge base articles that can help them solve their problems without requiring the assistance of a live agent. As a result, the user might not need to create an incident. If necessary, however, Virtual Agent can ask relevant questions and then create an incident in the correct assignment group. This workflow becomes more efficient because no live agent has to get involved.

The Virtual Agent deflection tracking is enabled by default, but you must set up the deflection configuration and deflection patterns to capture certain deflection metrics. For more information, see Create deflection configurations and patterns.

You use deflection configurations to group deflection patterns. A deflection configuration can consist of one or more deflection patterns. Deflection patterns categorize Virtual Agent activities in conversations for tracking deflection metrics. For example, let's say that Virtual Agent adds a user to an email list without creating a task in the Task table to complete the workflow. You can categorize this activity as a self-resolving deflection pattern.

You can view the deflection metrics for each deflection pattern. A deflection pattern can lead to these deflection outcomes in a conversation:

- Confirmed deflection: Virtual Agent provided a resolution to the user, which prevented the user from creating an incident or transferring to a live agent.
- Potential deflection: It is unclear whether Virtual Agent provided a resolution to the user. An example is when search results are displayed to a user in a conversation.
- No deflection: Virtual Agent did not provide a resolution, and the user created an incident or transferred to a live agent.

You can either create new deflection patterns, or use these pre-built deflection patterns in the **VA Default** deflection configuration:

Deflection pattern	Activity	Outcome
VA-Search-served	Virtual Agent showed search results to the user.	Potential deflection
VA-Triage & Created	Virtual Agent creates an incident in the correct assignment group. This	Confirmed deflection

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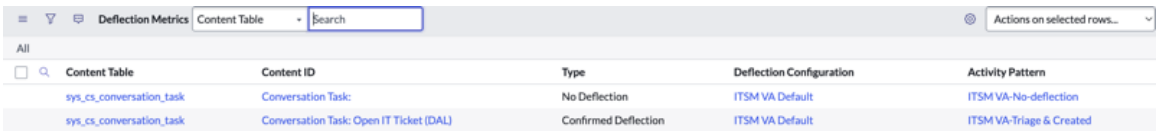
Deflection pattern	Activity	Outcome
	action improves the assignment accuracy. For example, Virtual Agent identifies a reimbursement-related intent in a user conversation and creates a reimbursement incident instead of a general incident.	
VA-Self-Resolving	Virtual Agent completes the workflow on its own without creating an incident. For example, Virtual Agent adds a user to a distribution list.	Confirmed deflection
VA-Intercept & Resolved	Virtual Agent intercepts an incident that was created by a user and provides a resolution to close the incident. An example is when Incident Auto Resolution resolves an incident.	Confirmed deflection

The deflection configuration and deflection pattern that you create in the deflection settings are mapped to the deflection topic block. For example, the pre-built Issue Auto Resolution topic uses a deflection topic block to track deflections. For more information, see Maximizing code reuse with topic blocks and Virtual Agent platform topic blocks.

The deflection metrics are generated and stored in the Deflection Metric [ssa_deflection_metric] table. To view the deflection metrics, navigate to the Deflection Metrics module in the Self-Service Analytics framework.

Note:
The Self-Service Analytics framework requires the Self-Service Analytics Core plugin (com.snc.self_service_analytics_core). For more information, see Activate Self-Service Analytics.

Deflection metrics



You can also view the visualization for deflection metrics in the **Overview** tab of the Conversational Analytics Dashboard. For more information, see Conversational Analytics dashboard.

Create deflection configurations and patterns

Set up deflection settings to create deflection configurations and deflection patterns that you can map to deflection topic blocks in Virtual Agent conversation topics. These deflections help you to track the issues that Virtual Agent helped to resolve or actually resolved for a user.

Before you begin
Review Tracking deflections in Virtual Agent using the deflection topic block.

https://www.youtube.com/watch?v=YMAaTSzPhwM&list=PLkGSnjw5y2U79gjQuQW-2GBqzEccwFkWH&index=21 Watch this video for more information about deflection tracking.

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Note:
For information about configuring components of the Virtual Agent Analytics dashboard (such as Performance Analytics widgets), see Add and configure components.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
   The **Conversational Interfaces Settings** page opens in a new tab.
2. Navigate to **Virtual Agent** > **Deflection metrics** > **View all**.
3. To enable tracking of deflection metrics, turn on the toggle under **Activate**.
4. To create new Deflection Configurations, click **New**.
5. In the Create Deflection Configuration form, enter these deflection configuration properties:

Field	Description
Name	Short and meaningful name for the deflection configuration.
Description	Short description about the deflection configuration.

6. Click **Save**.
   A new Deflection Configuration is created.
7. To add new deflection patterns to a deflection configuration, select the deflection configuration in which you want to add the deflection pattern.
8. Click **New**.

   In the Create Deflection Pattern form, enter these deflection pattern properties:

Field	Description
Name	Short and meaningful name for the deflection pattern.
Outcome	Result of the deflection in a Virtual Agent conversation.
Primary Activity Table	Table that is associated with the activity that you are categorizing in the deflection pattern. For example, if the Virtual Agent is helping to prevent the creation of a task for the activity, then you can specify the task table.

Note:
If you are creating a generic pattern that is used for tracking different deflections, you can leave the **Primary Activity Table** field empty.

The primary activity table that is associated with each activity helps in calculating the deflection rate for a particular business area. For example, if Virtual Agent resolves 42 VPN

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issues and overall 100 VPN incidents are created, the deflection rate for VPN issues is 42/142 or 30 percent.

9. Click **Save**.

Using Virtual Agent API

Use the ServiceNow® Virtual Agent API app to integrate any chat interface or a bot with ServiceNow® Virtual Agent or Agent Chat. The app is available from the ServiceNow® Store.

Overview

The Virtual Agent API is a REST API. This API is built on the conversational custom chat integration framework that is provided with Virtual Agent starting in the Paris release. The API enables ServiceNow developers, advanced users, and admins to use Virtual Agent in either of the following ways:

Standalone bot

Use Virtual Agent as a standalone bot that you integrate with enterprise or with any other third-party chat interface that supports conversational interfaces.

Your end users can interact with the Virtual Agent and Agent Chat through multiple channels by using this integration.

Secondary bot

Use Virtual Agent as a secondary bot in an environment that has multiple, specialized bots managed by a primary bot.

In this scenario, a primary bot manages communication with secondary bots on behalf of the end user. A primary bot could be IBM Watson Assistant, Microsoft LUIS, or a homegrown primary bot.

Your secondary bots, such as the ServiceNow bot, might handle specific types of end-user requests, such as service tickets or reservations.

Bot Interconnect

Use Virtual Agent Bot Interconnect as the primary bot in a diverse chat environment. Bot Interconnect creates a unified chat experience and gives your end users access to multiple channels and a wide variety of enterprise tasks that are available from ServiceNow.

The Virtual Agent API is useful for creating server-to-server integrations. However, for integrations that require the transformation of unsupported controls that must be rendered in your existing chat interface, consider using the Custom Chat Integration Framework.

For information about features such as the URL format and the supported request and response parameters in the Virtual Agent API, see Virtual Agent Bot Integration API.

Augment your experiences with the Virtual Agent API (Virtual Agent Academy video)

How the Virtual Agent API works

The following diagram shows how the REST API processes user input from a third-party chat interface or a primary bot, and then generates a bot response.

1. The user provides input to a primary bot or third-party chat interface.
2. The bot sends a POST request JSON to the inbound REST endpoint (via scripted REST API).

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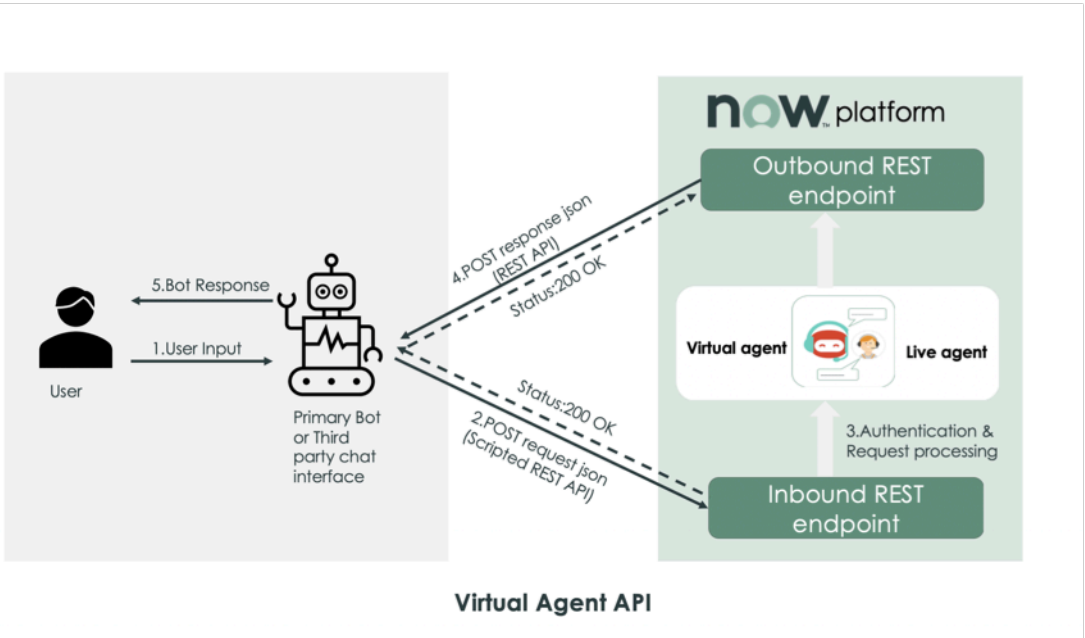
3. The ServiceNow AI Platform authenticates and processes the request, which is sent to Virtual Agent or a live agent.
4. The ServiceNow AI Platform sends a POST response JSON from the outbound REST endpoint (via REST API) back to the bot.
5. The primary bot or third-party chat interfaces displays the response to the user.

Inbound and outbound REST endpoints in the Virtual Agent API



To see a demonstration of the Virtual Agent API and an FAQ, see Getting Started with Virtual Agent APIs on the Community site.

Limitations

The Virtual Agent API does not support the following features:

- Chat branding through this Virtual Agent API integration

Version and release compatibility

Virtual Agent API version and release compatibility

Version	Compatible Releases
3.10.0	Washington DC
3.9.x	Vancouver
3.8.x	Vancouver
3.7.x	Utah
3.5.x	Tokyo
3.0.x	San Diego
2.0.x	Rome A subset of features is compatible with Quebec.

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Virtual Agent API version and release compatibility (continued)

Version	Compatible Releases
1.3.0	Quebec
1.0.12	Quebec
1.0.9	Paris

Note:
The Virtual Agent API requires a Pro license similar to that of Virtual Agent.

Virtual Agent API features

You can use the Virtual Agent API to integrate many of the same features that are available in Virtual Agent and Agent Chat into your chat environment. Feature support varies depending on your ServiceNow release and the Store app version number of the API.

For information about the request and response templates for Virtual Agent API, as well as examples of common use cases, see Virtual Agent Bot Integration API.

Key features

The main features in Virtual Agent API starting with version 1.0.9 include the following:

- Provider authentication using static, hash, and token-based authentication
- Auto-linking user IDs to ServiceNow accounts for a personalized experience
- Virtual Agent transfer to a live agent in Agent Chat
- Intent classification in bot-to-bot integrations through the following strategies:
  - The primary bot determines the user intent and sends the user request to Virtual Agent so that the corresponding topic is displayed to the user.
  - The primary bot sends the user utterance to Virtual Agent so that it can discover the intent and return a prediction confidence score. A higher confidence score indicates that the predicted topic more accurately matches the user utterance.

Version 1.0.12 features

Automatically close idle bot-to-bot conversations

You can automatically close conversations that have been idle for more than one hour. The *Time Out Abandoned B2B Conversations* job runs hourly each day and automatically closes idle conversations that requesters have abandoned.

Conversation states and reason codes in Virtual Agent interaction records

When a user or primary bot ends a conversation, Virtual Agent records the state and reason codes in the interaction records. For example, an end user can type **End** to stop the conversation or click the **X** button to close the chat.

Notifying when a conversation ends

The primary bot is notified when Virtual Agent or Agent Chat conversations end. The primary bot is also notified when it must take control of a conversation. Virtual Agent uses the following flags:

- *completed*: Sent when the conversation with Virtual Agent or a live agent is finished.
- *takeControl*: Sent when the primary bot must take control. This typically occurs when Virtual Agent can't determine the conversation

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intent after two consecutive attempts (the default value). You can add the *va.bot.to.bot.take.control_times* system property to change the default number of attempts that Virtual Agent tries to determine the conversation intent.

For more information, see Virtual Agent Bot Integration API.

Changes with intents

- Share the NLU confidence score for an intent match if NLU is enabled in Virtual Agent.
- Enable end users to jump directly into a topic based on intent matching by the primary bot.

Version 1.3.0 features

Starting with version 1.3.0, Virtual Agent API supports logging as a system property (*va.bot.to.bot.logging_enabled*).

Virtual Agent API features available in Store release 2.0.x

Virtual Agent API version 2.0.x provides access to more of the same features that are available in Virtual Agent and Agent Chat, including rich control support and notifications.

Support for additional rich controls

Virtual Agent API now supports the following rich controls.

Boolean controls

Boolean controls return responses as strings (either *Yes* or *No*) for easier localization.

For more information about topic localization, see Localizing Virtual Agent conversations.

Virtual Agent API sends the following example JSON for a boolean control:

```
{
  "requestId": "asd2423-wrr434-weruyt-1234567",
  "clientSessionId": "",
  "nowSessionId": "",
  "message": {
    "text": "7a36412253a13010ff59ddeeff7b12fb",
    "typed": false,
    "clientMessageId": "ABC-123"
  },
  "userId": "beth.anglin",
  "body": [
    {
      "uiType": "Boolean",
      "group": "DefaultPicker",
      "required": true,
      "nluTextEnabled": false,
      "label": "Sample Response for boolean control",
      "options": [
        {
          "label": "Yes"
        },
        {
```

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```
          "label": "No"
        }
      ]
    }
  ],
  "score": 1
}
```

Custom controls

Topics that use custom controls are now supported. For more information about custom controls, see Customizing Virtual Agent with custom controls.

Table bot response controls

Topics that use table bot response controls are now supported. For more information, see Table bot response control.

All records are returned from Virtual Agent API at once. Virtual Agent will wait for a response from the API client to send the next control. Use the *paginationBreak* property to display records in chunks to the user. For example, if *paginationBreak* is set to 10, the user will see 10 records at a time. When the client is ready to move to the next control, it should send *DONE*.

Virtual Agent API sends the following example JSON for a table bot response control:

```
{
  "requestId": "asd2423-wrr434-weruyt-1234567",
  "clientSessionId": "",
  "nowSessionId": "",
  "message": {
    "text": "Yes",
    "typed": false,
    "clientMessageId": "ABC-123"
  },
  "userId": "beth.anglin",
  "body": [
    {
      "uiType": "OutputTable",
      "group": "DefaultOutputTable",
      "label": "Sample Table Rich control",
      "headers": [
        "Number",
        "Short description"
      ],
      "data": [
        [
          "INC0000005",
          "CPU load high for over 10 minutes"
        ],
        [
          "INC0000015",
          "I can't launch my VPN client since the last
 software update"
        ],
        [
          "INC0000025",
          "Need to add more memory to laptop"
        ],
```

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```
        [
          "INC0000035",
          "Reset my password"
        ],
        [
          "INC0000055",
          "SAP Sales app is not accessible"
        ],
        [
          "INC0009005",
          "Email server is down."
        ]
      ],
      "paginationBreak": 10,
      "totalSearchResultsCount": 6,
      "navigationBtnLabel": "Click for more"
    }
  ],
  "score": 1
}
```


HTML bot response controls

Topics that use HTML bot response controls are now supported. For more information, see HTML bot response control.

Virtual Agent API sends the following example JSON for an HTML bot response control:


```
{
  "requestId": "asd2423-wrr434-weruyt-1234567",
  "clientSessionId": "",
  "nowSessionId": "",
  "message": {
    "text": "Yes",
    "typed": false,
    "clientMessageId": "ABC-123"
  },
  "userId": "beth.anglin",
  "body": [
    {
      "uiType": "OutputHtml",
      "group": "DefaultOutputHtml",
      "style": "inline",
      "height": 100,
      "width": 100,
      "value": "<html> <body> Sample Response for Html
 control </body> </html> ",
      "imageUrl": null,
      "imageHeight": 0,
      "imageWidth": 0,
      "links": null
    },
    {
      "uiType": "InputText",
      "group": "DefaultText",
      "required": true,
      "nluTextEnabled": false,
```


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```
      "label": "some text",
      "maskType": "NONE"
    }
  ],
  "score": 1
}
```

Multi-response bot response controls

Topics that use multi-response bot response controls are now supported. For more information, see Multi-response bot response control.

Virtual Agent API sends the following example JSON for a multi-response bot response control:

```
{
  "requestId": "asd2423-wrr434-weruyt-1234567",
  "clientSessionId": "",
  "nowSessionId": "",
  "message": {
    "text": "Done",
    "typed": false,
    "clientMessageId": "ABC-123"
  },
  "userId": "beth.anglin",
  "body": [
    {
      "uiType": "MultiPartOutput",
      "group": "DefaultMultiPartOutput",
      "navigationBtnLabel": "Click for more",
      "content": {
        "uiType": "OutputText",
        "value": "Text response from multiflow control
 example",
        "maskType": "NONE"
      }
    }
  ],
  "score": 1
}
```

Rich text support

Topics that use rich text are now supported. Rich text includes bold or italicized text, hyperlinks, bulleted lists, and emojis.

Additional Agent Chat features

The Virtual Agent API now supports the following features when transferring to Agent Chat.

Pass agent name and avatar

When the primary bot transfers a chat to a live agent, Virtual Agent can send the agent name and avatar to the primary bot. To enable this, activate **Agent names and avatars** in Agent Chat settings.

An example message payload might look like this:

```
{
"requestId":"f42f3550-5b44-4cde-aa52-9b6756b3131c",
"clientSessionId":"U94CSJLEN",
```

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```
"message":{
"text":"Live Agent support.",
"typed":true
},
"userId":"U94CSJLEN",
"body":[
{
"uiType":"OutputText",
"group":"DefaultText",
"agentInfo":{
"sentFromAgent":true,
"agentName":"Beth Anglin",
"agentAvatar":"ee4eebf30a0004d963b5c5ac0d734dc4.iix?t=s
mall"
},
"value":"Thank you for contacting support. I am looking
 into your question now and will be with you shortly."
}
],
"agentChat":true,
"score":1
}
```


For more information, see Configure Agent Chat.

Live agent wait time

When transferring to a live agent, the primary bot can receive the wait time and display this to the user. To enable this, select **Wait Time** in the **Live chat wait status** field in Agent Chat settings. The *spinnerType* value is set to *wait_time*. If the **Live chat wait status** is set to **None**, the *spinnerType* value is *none*.

Virtual Agent API sends the following example JSON in the *body* parameter of the payload.


```
{
"uiType":"ActionMsg",
"actionType":"StartSpinner",
"spinnerType":"wait_time",
"message":"Routing you to a live agent...",
"waitTime":"8 Seconds"
}
```


For more information, see Configure Agent Chat.

Send chat history from the primary bot to Virtual Agent

The primary bot can pass chat history to a live agent so that the agent can see the context of the conversation.

Virtual Agent converts the message history to HTML and then to an image.

- The converted image is sent to the live agent as the first message of the chat.
- The primary bot should send the message history in the first request. In any other request after the first request, the message history payload will be ignored.
- Only text messages are supported.
- The primary bot can pass any URL as a value in the text message, but the live agent can only view it as part of the image. The live agent will not be able to click the link.

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Example message payload:

```
{
   "value": "Help me with password reset",
   "displayName": "able",
   "type": "text"
   "isBotMessage": false,
  }
```

Note:
In the previous example, *type* is case sensitive and should have a value of *text*.

Enriched requests from the primary bot

The Virtual Agent API now supports the following requests from the primary bot.

System parameters and context variables

The primary bot can pass system parameters and context variables as input, and Virtual Agent will honor these#parameters. System parameters such as *liveagent_devicetype*, *liveagent_requester_session_language*, *liveagent_topic*, *topic*, *live_agent_only*, and *liveagent_devicetimezone* are supported. Custom context variables and Agent Chat context variables are also supported.

Example message payload:

```
{
"requestId": "f42f3550-5b44-4cde-aa52-xxxxxxxxxx",
"clientSessionId": "xxxxxxxxxx",
"token": "abcd",
"message": {
  "text": "Test",
  "typed": true
},
"contextVariables": {
  #"requester_session_language": "es"
},
"userId": ""abel.tuter",
"emailId": "abel.tuter@example.com"
}
```

For more information, see Live agent chat context variables and Configure context variables for storing chat-related information.

User timezone

Set the user's timezone by passing it in the request payload. Once set, that timezone setting is retained until it is reset.

Example message payload:

```
{

  "requestId": "xxxxxx-xxxxxx-xxxx-xxxx-xxxxxxxxxx",
  "clientSessionId": "xxxxxxxx-xxxx",
  "token": "xxxxx",
 ##"action" : "SET_USER_TIMEZONE",
  "userId": "able.tuter",
  "emailId": "abel.tuter@example.com",
```

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```
  #"timezone":"Asia/Kolkata"
}
```

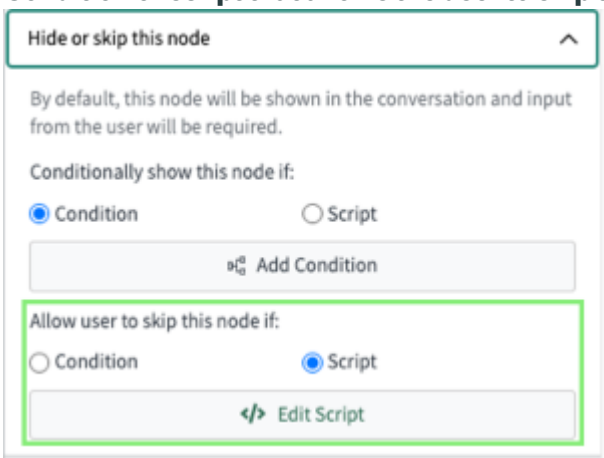
When using this functionality, consider the following:

- The conversation must be open (current) in order to convert date and time to the user's timezone.
- The primary bot must send date and time in one of the following formats:
  - Timezone name. For example, *Asia/Kolkata* or *America/New_York*.
  - Date Time 24-hour format. For example: *YYYY-MM-DD HH:MM:SS*
- The Virtual Agent API uses the timezone specified by the primary bot, even if the timezone it sets differs from the value stored in the [sys_user] table.
- To set the user timezone, send the *SET_TIMEZONE* action. If the timezone name is not valid, the timezone value defaults to UTC time. For example, *2021-02-16 20:13:13*.

Support for node skipping

Virtual Agent API supports skipping a node if it is designed to do so in the topic. For example, in Virtual Agent Designer, you can designate a user input control as skippable in the **Advanced** > **Hide or skip this node** area of the property sheet.

Condition or script that allows the user to skip the node



For more information about defining a node as skippable, see Virtual Agent Designer user input controls.

If a node is marked as skippable, the bot will present that option to the user. If the user skips it, the primary bot should pass the skip command as depicted in the following example.

```
{
"requestId": "f42f3550-5b44-4cde-aa52-9b6756b3131c",
"clientSessionId": "835607",
"token": "snow",
"message": {
"text": "_skip_",
"typed": false
},
"emailId": "beth.anglin@example.com",
"userId": "beth.anglin"
}
```

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Synchronous handshake support

Note:
These requirements apply to version 2.0.x of the Virtual Agent API. For greater synchronous handshake functionality, upgrade to version 3.0.x, which supports live agent transfer and other enhancements. For details, see Synchronous handshake enhancements.

When enabled, Virtual Agent delivers responses to the primary bot synchronously. If you want to enable communication with Virtual Agent in synchronous mode, you must manually turn off the following features in order for the handshake to work:

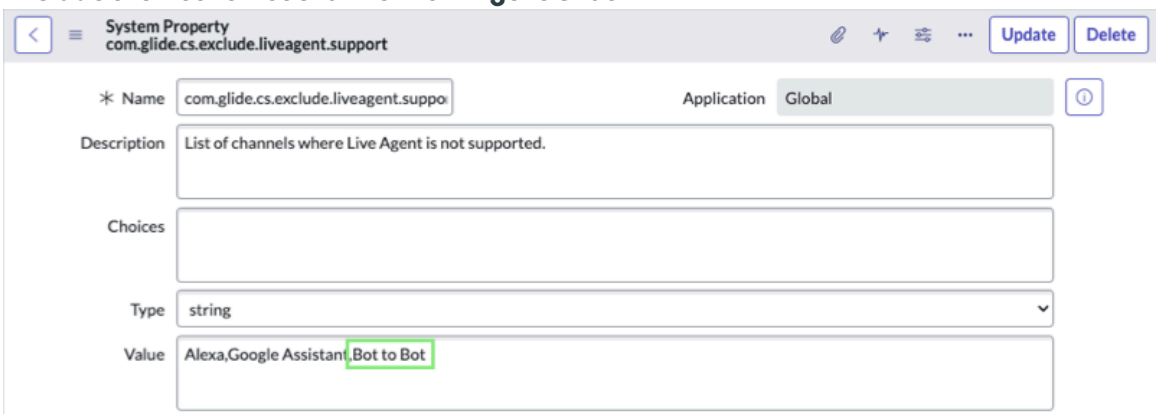
- Agent Chat
- Notifications
- Typing indicators

Note:
Topics that use the following features are not supported in synchronous mode: file upload, the Action utility, and the Pause topic block.

To disable these features and enable synchronous support, follow these steps:

1. Exclude the Bot to Bot channel from Agent Chat.
   a. Navigate to **All**, and then enter `sys_properties.list` in the filter.
   b. Select the *`com.glide.cs.exclude.liveagent.support`* system property to open it.
   c. Add *`Bot To Bot`* to the **Value** field.

Exclude the Bot To Bot channel from Agent Chat



   d. Click **Update**.
2. Navigate to **All**, and then enter `sys_cs_channel.list` in the navigation filter.
3. Select the Bot to Bot record.
4. Clear the **Enable Notifications** check box to disable it.
5. Clear the **Support typing indicator** check box to disable it.
6. Select the **Synchronous** check box.

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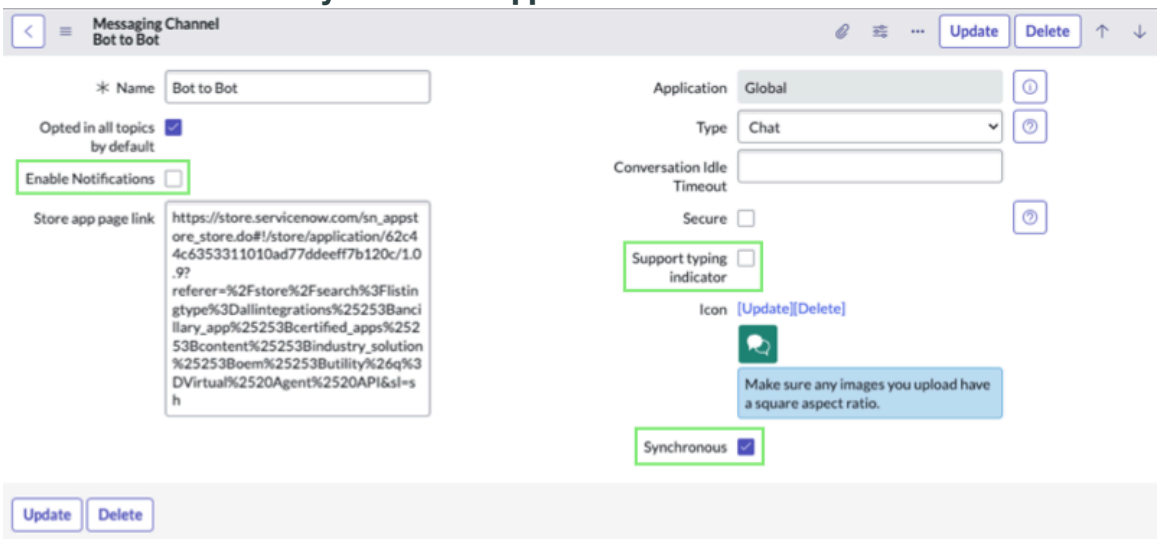
Bot to Bot channel with synchronous support enabled



Note:
If the **Synchronous** field is not visible, you can configure the form layout to show it.

7. Click **Update**.

Notifications support

Use Virtual Agent API to send the following types of notifications in the Bot to Bot channel when it is enabled in asynchronous mode:

- Simple: Text-only notifications. Simple notifications are delivered as soon as they arrive.
- Image Card: An image that is uploaded to the server or specified with a URL.
- Record Card: Specified columns from a record in a table.
- Actionable: Provides the user with the opportunity to perform certain actions. Actionable notifications are queued. The user can retrieve them on demand by sending the *Show Notification* command.

For more information, see Configuring Virtual Agent notifications.

Virtual Agent API sends the following example JSON for a simple notification:

```
{
  "requestId": "asd2423-wrr434-weruyt-1234567",
  "clientSessionId": "",
  "nowSessionId": "",
  "message": {
    "text": "Done",
    "typed": false,
    "clientMessageId": "ABC-123"
  },
  "userId": "beth.anglin",
  "body": [
    {
      "uiType": "OutputCard",
      "group": "DefaultOutputCard",
      "templateName": "Notification",
```

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```
      "data":
 "{\"sys_id\":null,\"recordDisplayValue\":null,\"messageHead
ing\":\"[Heading]A notification has arrived. You
 can continue the conversation after viewing the
 notification.\",
\"imageUrl\":null,\"tableLabel\":null,\"enableLink\":false,\"mes
sage\":\"[message]A notification has arrived. You
 can continue the conversation after viewing the
 notification.\",\"fields\":[],\"table_name\":null,\"url\":
\"http://192.168.1.9:8080/null.do?sys_id=null\"}"
    }
  ],
  "completed": true,
  "score": 1
}
```


Virtual Agent API sends the following example JSON for an Image Card notification:


```
{
  "requestId": "asd2423-wrr434-weruyt-1234567",
  "clientSessionId": "",
  "nowSessionId": "",
  "message": {
    "text": "Done",
    "typed": false,
    "clientMessageId": "ABC-123"
  },
  "userId": "beth.anglin",
  "body": [
    {
      "uiType": "OutputCard",
      "group": "DefaultOutputCard",
      "templateName": "Notification",
      "data":
 "{\"sys_id\":null,\"recordDisplayValue\":null,\"messageHead
ing\":\"[Heading]A notification has arrived. You
 can continue the conversation after viewing the
 notification.\",\"imageUrl\":
\"http://xxxxxx.service-now.com/2b2d0d2653a13010ff59ddeeff7b120d
.iix\",\"tableLabel\":null,\"enableLink\":false,\"message\":
\"[message]A notification has arrived. You can
 continue the conversation after viewing the
 notification.\",\"fields\":[],\"table_name\":null,\"url\":
\"http://192.168.1.9:8080/null.do?sys_id=null\"}"
    }
  ],
  "completed": true,
  "score": 1
}
```


Virtual Agent API sends the following example JSON for a Record Card notification:


```
{
  "requestId": "asd2423-wrr434-weruyt-1234567",
  "clientSessionId": "",
  "nowSessionId": "",
  "message": {
    "text": "Done",
```


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```
    "typed": false,
    "clientMessageId": "ABC-123"
  },
  "userId": "beth.anglin",
  "body": [
    {
      "uiType": "OutputCard",
      "group": "DefaultOutputCard",
      "templateName": "Notification",
      "data":
 "{\"sys_id\":
\"552c48888c033300964f4932b03eb092\",\"recordDisplayValue\":
\"INC0010112\",\"messageHeading\":\"[Heading]A notification has
 arrived. You can continue the conversation after viewing the
 notification.\",\"imageUrl\":null,\"tableLabel\":\"Incident\",
\"enableLink\":true,\"message\":\"[message]A notification has
 arrived. You can continue the conversation after viewing the
 notification.\",\"fields\":[{\"fieldLabel\":\"Number\",
\"fieldValue\":\"INC0010112\"},{\"fieldLabel\":\"Short
 description\",\"fieldValue\":\"Assessment : ATF
 Assessor\"}],\"table_name\":\"incident\",\"url\":
\"http://192.168.1.9:8080/incident.do?sys_id=552c48888c033300964
f4932b03eb092\"}"
    }
  ],
  "completed": true,
  "score": 1
}
```


Notifications for the Bot to Bot channel are disabled by default. To enable them, do the following:

1. Navigate to **All**, and then enter `sys_cs_channel.list` in the navigation filter.
2. Open the Bot to Bot record.

   If prompted, enable editing on the record.
3. Select the **Enable Notifications** check box.
4. Click **Update**.

Admins can limit the number of recipients per notification by modifying the *`com.glide.cs.per_notification_user_limit`* property. The default value is 1000.

Topic switching using the topic name

In addition to using the topic ID or topic intent ID to switch topics, you can use the topic or topic intent name. It is recommended that you only send either the topic ID or the topic name. Currently, if either is incorrect or if the bot is already in the specified topic, Virtual Agent does not send any response. Usage depends on the mode you are using, as follows:

- NLU topic discovery: Use the topic intent name or ID.
- Keyword topic discovery: Use the topic name or ID.

The primary bot can send the *`SWITCH`* action along with the topic name to switch directly to a #particular#topic.

Example message payload:

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```
{
  "requestId": "xxxx-xxxx-xxxx-xxxx",
  "clientSessionId": "xxx-xxx-xxx-xxx",
  "action":"SWITCH",
  "topic":{
   "name": "Topic Name"
  #},
  "userId": "beth"
}
```

Typing indicator support

You can enable typing indicators for users and live agents. Currently, typing indicators are displayed as follows:

- Displayed to the agent when the user is typing
- Displayed to the user when the bot is preparing a response

When the typing indicator is enabled, Virtual Agent API sends the **StartTypingIndicator** and **EndTypingIndicator**#actions in the response payload. For example:

```
{
    "uiType":"ActionMsg",
    "actionType":"StartTypingIndicator"
}
```

To send the user typing indicator to a live agent, the client should send#the *TYPING*# action. When the user finishes typing, the #client should# send the*VIEWING*#action. For example:

```
{
  "requestId": "xxxxxx-xxxxxx-xxxx-xxxx-xxxxxxxxxx",
  "clientSessionId": "xxxxxxxx-xxxx",
####"action": "TYPING/VIEWING",
  "userId": "able.tuter",
  "emailId": "abel.tuter@example.com",
  "timezone":"Asia/Kolkata"
}
```

To enable typing indicators, follow these steps.

1. Navigate to **All**, and then enter `sys_cs_channel.list` in the navigation filter.
2. Select the Bot to Bot record.
3. Select the **Support typing indicator** check box.
4. Click **Update**.

Virtual Agent API features available in Store release 3.0.x

Virtual Agent API version 3.0.x provides access to more of the same features that are available in Virtual Agent and Agent Chat, including the ability to upload files from a private URL and synchronous handshake enhancements.

Ending abandoned Virtual Agent conversations

If a conversation is incomplete due to an error, Virtual Agent can ask the primary bot to take control. If the *takeControl* flag is *true*, Virtual Agent (as the secondary bot) will close the conversation automatically. If the primary bot wants to start a conversation, it can send the following action message: `"hi"/START_CONVERSATION`.

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You can ask the primary bot to take control in the following situations:

- Idle time out: Interaction State is `Closed Abandoned`. State Reason is `No Activity`.
- Technical issues: Interaction State is `Closed Abandoned`. State Reason is `Bot issues`.
- Invalid user input: Interaction State is `Closed Abandoned`. State Reason is `Invalid user input`.

To request that the primary bot take control, send the *`takeControl`* flag in the body of the payload to the primary bot with a value of *`true`*.

Example message payload:

```
{
  "requestId": "xxxx-xxxx-xxxx-xxxx",
  "clientSessionId": "xxx-xxx-xxx-xxx",
   "message": {
      "text":"invalid3",
       "typed":true
       }
   "body":[{
       "uiType":"OutputText",
       "group":"DefaultText",
       "value":"Sorry, I didn't get that. Could you help me by
 answering this?"
       },
       {
       "uiType":"Boolean",
       "group":"DefaultPicker",
       "required":true,
       "nluTextEnabled": false,
       "label":"Choose a value",
       "options":[
          {"label":"Yes"},
          {"label":"No"}
          ]
       }],
    "takeControl":true,
    "score":0
}
```

Improved Virtual Agent API response time

Virtual Agent API responses include parameters like Take Control and NLU Score. These parameters are processed while preparing the response.

Starting with version 3.9.0, you can exclude the Take Control and/or NLU Score parameters from the Virtual Agent API response to improve the response time.

To exclude Take Control and NLU Score parameters from the Virtual Agent API response, complete the following steps:

1. Navigate to **All** > **sys_cs_custom_adapter_property.list**.
2. Search for *`enable_take_control`* and *`send_nlu_score`* properties.
3. Set the value of *`enable_take_control`* property to false to exclude Take Control setting and *`send_nlu_score`* property to false to exclude NLU Score calculation while processing the response. These properties are set to true by default.

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Improved topic switching errors and troubleshooting

Topic switching may fail for any of the following reasons:

- The request includes both the topic name and topic ID (keyword topic discovery) or the topic intent name and topic intent ID (NLU topic discovery). Specify one or the other.
- The request includes an invalid topic or intent name or ID.
- The topic/intent name or ID is valid, but Virtual Agent can't run it because it's inactive or not a topic. For example, if the name or ID refer to a topic block or custom control object.
- The requested topic is already running.
- The requested topic is valid, but a security condition is preventing access. For example, the topic may not be permitted to run in the channel or some other access-control condition may apply.

If topic switching fails, Virtual Agent API responds in the following ways, whether you're using it synchronously or asynchronously:

- If topic switching fails, the conversation is closed with a message stating that the conversation cannot continue. The conversation will no longer remain in an open state.
- The previous request is marked as processed so that a new request can be made without waiting for a timeout.
- The reason for the failure is logged in the system log table (**Automated Test Framework** > **System Logs** > **Errors**).

Synchronous handshake enhancements

Starting with version 3.0.x, Virtual Agent API can transfer to a live agent synchronously. When a user or agent finishes a conversation, the transfer back to Virtual Agent is done synchronously as well. Some system messages and wait time messages are also sent synchronously.

To use synchronous transfer to a live agent, be aware of the following guidelines:

- Configure the Virtual Agent response endpoint. Agent Chat messages will be delivered to the endpoint you specify.
- You must manually turn off Notifications for the instance.
- If you are using synchronous transfer to a live agent, Virtual Agent API sends the typing indicator if it is enabled:

```
{
  "uiType": "ActionMsg",
  "actionType": "StartTypingIndicator",
}
```

- Topics that use the following features are not supported in synchronous mode: file upload, the Action utility, and the Pause topic block.

To disable these features and enable synchronous support, follow these steps:

1. Navigate to **All** > **sys_cs_channel.list**.
2. Select the Bot to Bot record.
3. Clear the **Enable Notifications** check box to disable it.
4. If you will not be transferring to a live agent in synchronous mode, clear the **Support typing indicator** check box to disable it.
5. Select the **Synchronous** check box.

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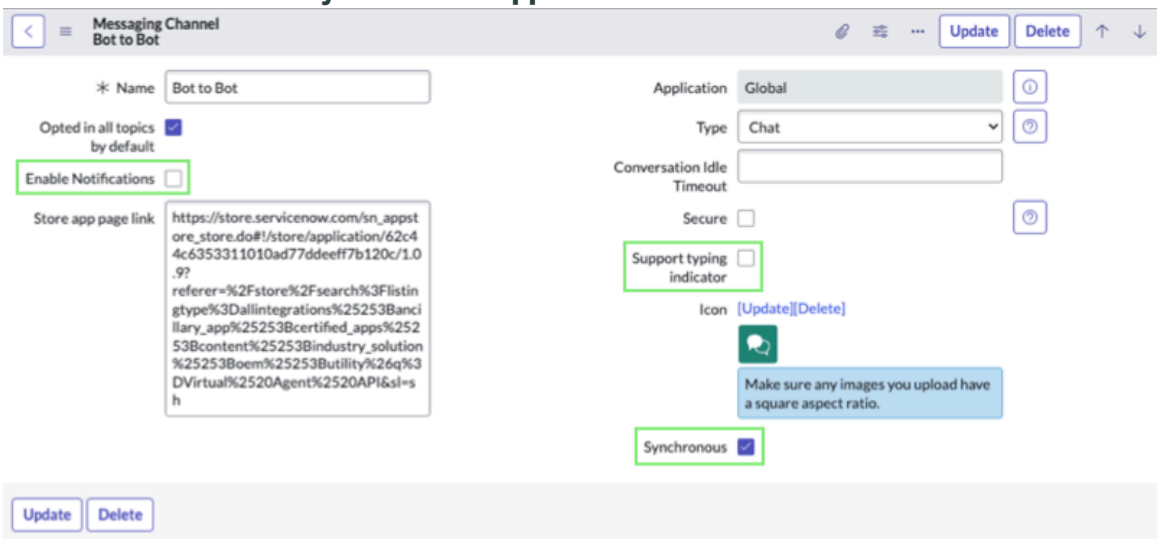
Bot to Bot channel with synchronous support enabled



6. Click **Update**.

Support for action messages

In addition to passing messages to a ServiceNow® Virtual Agent secondary bot, the primary bot or chat client can pass messages to an agent through Agent Chat. Use the *`action`* parameter passed in the request body to specify how the content should be handled.

Virtual Agent API supports the following action message types:

Supported action message types

actionType value	Description
ChatSubHeader	Outbound message indicating one of the following occurred: • Dynamic translation failed. • Live agent autopilot was initiated and completed.
StartSpinner	Outbound message that starts a spinner when a message is in the pending state due to asynchronous processes, such as AI Search or the profanity filter.
EndSpinner	Outbound message that stops the spinner that was sent previously.
StartTypingIndicatorActionMsg	Outbound message indicating that a user or agent has begun to type (after an agent has accepted the chat).
EndTypingIndicatorActionMsg	Outbound message indicating that a user or agent has stopped typing.
SubscribeToSupportQueue	Indicates that the conversation is set to the support queue.
SubscribeToChatPresence	Outbound message indicating that a live agent conversation has begun.
SwitchToLiveAgent	Outbound message indicating that a live agent has accepted the conversation.

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Supported action message types (continued)

actionType value	Description
SwitchToVirtualAgent	Outbound message indicating that the live agent session has ended, and the conversation is returned to Virtual Agent.
SwitchConversation	Outbound message indicating that a notification was sent. This creates a new conversation, so Virtual Agent switches to the new conversation.
System	Outbound message indicating one of the following: • A live agent has entered the cat. • Either the live agent or the user closed the chat. • The conversation with a live agent has timed out.

Support for silentMessage flag

A silent message is a message that does not require a response. If Virtual Agent receives a request with *`silentMessage=true`*, all subsequent bot messages are suppressed until Virtual Agent receives a request to turn off silent mode (*`silentMessage=false`*).

Example message payload from the primary bot:

```
{
   "token": "BOT_TOKEN",
   "botToBot": true,
   "clientSessionId": "8845022147303010 27f83ee4070f589a",
   "clientVariables": {},
   "requestId": "48450221d23030107300b7756770bc9b",
   "silentMessage": "true",
   "timestamp": 1623916324820,
   "timezone": "GMT",
   "userId": "abel.tuter",
   "emailId": "abel.tuter@example.com"
}
```

Note:
If *`silentMessage=true`*, notifications are not delivered.

Secure file uploads from a private URL

Virtual Agent API supports file uploads up to 1 GB in size from a private URL. The primary bot must pass the user ID, optional provider application ID, and the name of the file. Observe the following guidelines:

- Provider application ID is optional.
- The user ID and provider application ID should be sent before the file name in the payload.
- The end user must have a role specified in the *`glide.attachment.role`* property. For more information, see Require a role to attach files.
- Basic or OAuth authentication is supported, but Message Authentication is not.

Example message payload from the primary bot:

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```
curl -X POST \
  https://instance.service-now.com/api/now/v1/cccif/media/upload
 \
  -H 'authorization: Basic YWRtaW46YWRtaW4=' \
  -H 'content-type: multipart/form-data; \
  -F user_id=xxxxxx \
  -F provider_application_id=optionalId \
  -F 'file=@SomeFile.png'
```

Virtual Agent API sends the following example JSON:

```
{
  "result": {
    "mediaUrl":
 "http://123.456.7.8:8080//api/now/v1/cs/media/string",
    "name":"imagefile.png",
    "state":"pending",
    "attachmentId":"abcdefghijklmno12345"
  }
}
```

Support for transformation of Virtual Agent API request and response

Virtual Agent API supports transformation of request and response payloads to and fro Virtual Agent API. This is helpful in cases where the primary bot has a common response template across all secondary bots. See Transform Virtual Agent API request and response for more information.

Support for configuring multiple provider applications

Virtual Agent API enables configuration of multiple provider applications to support use cases where there are multiple primary bots using Virtual Agent API and you need to distinguish between them. See Configure multiple provider applications for more information.

Support for Now Assist experience

Now Assist experience in Virtual Agent API offers generative AI skills across multiple provider channels. See Enable Now Assist experience in Virtual Agent API for more information.

Install the Virtual Agent API

Install the Virtual Agent API app to integrate any chat interface or a bot with ServiceNow® Virtual Agent or Agent Chat.

Before you begin

If you're upgrading from a version prior to version 2 and if authentication is required for your instance, you must revert the customization before upgrading. For these versions, the upgrade skips the Scripted REST Service when authentication is turned on. For more information, see Revert a customization.

You must meet the following requirements:

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the Virtual Agent API application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

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- Ensure that you activated the Glide Virtual Agent (com.glide.cs.chatbot) plugin, which activates the Conversational Custom Chat Integration (com.glide.cs.custom.adapter) plugin.

  For more information about this plugin, see Activate Virtual Agent.

Note:
The Virtual Agent API requires a Pro license similar to that of Virtual Agent.

Role required: admin or virtual_agent_admin

About this task

The Bot to Bot Control [sys_cs_bot_to_bot_control] table is installed with the Virtual Agent API. This table tracks the number of times that a particular task in a topic is executed. You can use this table for debugging. For example, use it to determine whether Virtual Agent is stuck on a particular control or topic.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Virtual Agent API application using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you may have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.

What to do next

Review the inbound REST endpoint and configure inbound authentication

Review the inbound REST endpoint and configure inbound authentication

After you install the Virtual Agent API, navigate to the Scripted REST API resource to review the endpoint and set up authentication.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Web Services** > **Scripted Web Services** > **Scripted REST APIs**.
2. Select the **VA Bot Integration** record to open it.
3. In the **Resources** tab, open the **BOT Integration** record.
4. Review the inbound REST API resource details.

   The format is: `https://<customer instance>/api/sn_va_as_service/bot/integration`

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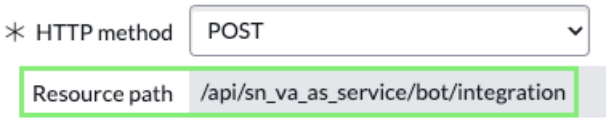
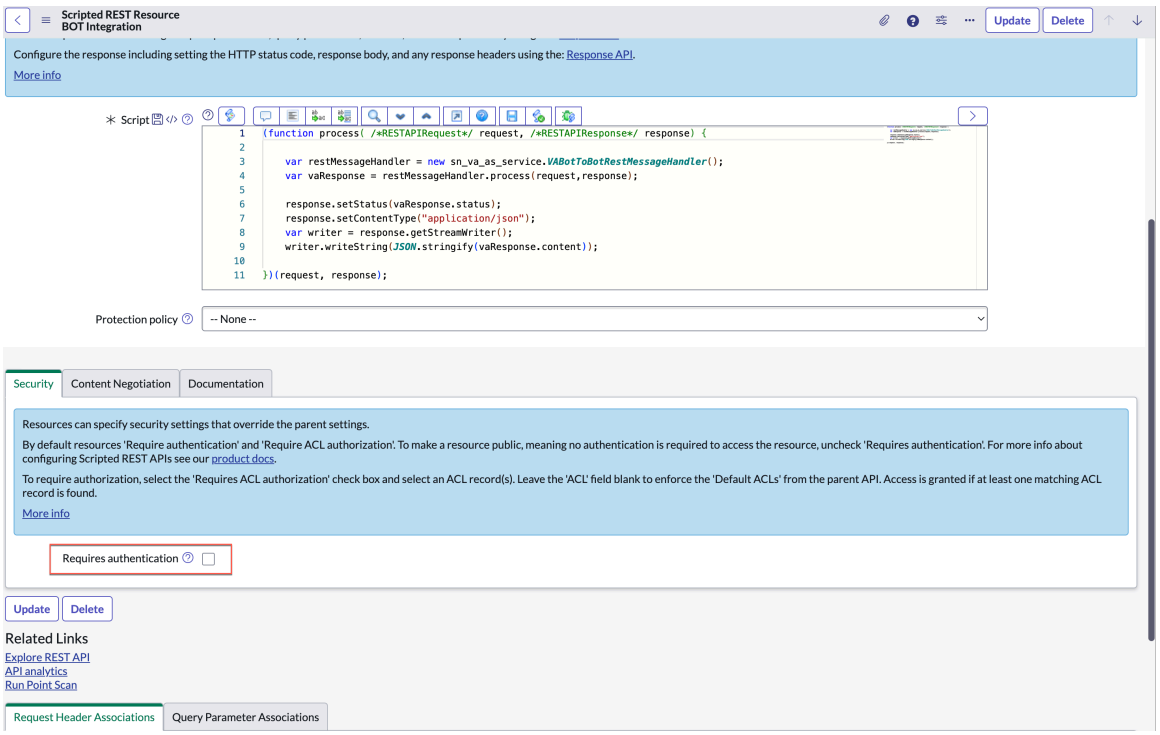


For a description of the request parameters and an example send request, see Virtual Agent Bot Integration API.

5. In the **Security** tab on the same page, select the **Requires authentication** check box.



6. Set up Provider Authentication using any of these methods: Basic, OAuth, Hash, or Static Token.

> **Note:**
> Guest usage via Basic or OAuth is already supported out-of-box when you select **Requires authentication**. To support user account linking, you must use Static or Hash token-based authentication. You can use token-based authentication (Static or Hash) with or without Basic or OAuth authentication. The token can be passed in either the request body or the header. If the token is specified in both places, the one in the header is accepted.

Do one of the following:

- Set up Basic or OAuth authentication.

  To learn more about OAuth authentication and the possible security configurations for scripted REST APIs, see Enable OAuth with inbound REST.

- Set up Message Authentication, which involves configuring either Static or Hash tokens, setting up Provider Authentication, and setting the channel identity. For details, see Configure Message Authentication for inbound communication.

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What to do next

If you are using Message Authentication, Configure Message Authentication for inbound communication.

Configure the output response REST endpoint and outbound authentication for the Virtual Agent API.

Configure Message Authentication for inbound communication

You can configure Message Authentication for the Virtual Agent API instead of Basic or OAuth. Message Authentication involves configuring either Static or Hash tokens, setting up Provider Authentication, and setting the channel identity.

Before you begin

Follow the steps in Review the inbound REST endpoint and configure inbound authentication.

Role required: admin

Procedure

1. Configure the token by doing one of the following, depending on the token type:
   - Static token:
     a. Navigate to **All**, and then enter `token_verification.list` in the filter.
     b. Click **New**.
     c. On the Token Verifications form, fill in the fields.

Field	Description
Name	Name of the authentication token, such as `B2BTestAppAuthToken`.
Description	Description of the authentication token, such as `B2B Testing application Auth Token`.
Token	Enter an authentication token that you generated using any general programming or scripting language, or click **Generate Secure Token** in the Related Links.

     d. Click **Submit**.
   - Hash token:
     a. Navigate to **All**, and then enter `hash_message_verification.list` in the filter.
     b. Click **New**.
     c. On the Hash Message Verification form, fill in the fields.

Fields	Description
Name	Name of the authentication token, such as `B2BTestAppAuthToken`.
Description	Description of the authentication token, such as `B2B Testing application Auth Token`.
Secret	Authentication token (random string).

     d. Click **Submit**.
2. Set up Provider Authentication for token-based authentication.

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a. Navigate to **All**, and then enter `message_auth.list` in the filter.

b. Click **New**.

c. On the Message Auths form, fill in the fields.

Field	Description
Name	Name of the message authentication, such as `B2B Auth token`.
Provider	Name of the provider.
Group name	Not required.
Service Portal	Not required.
Inbound message verification	Select the Static token or Hash message token that you created.
Outbound message creation	This field is currently not supported in the Virtual Agent API. Select the Static token or Hash message token that you created.
Outbound service token	This field is currently not supported in the Virtual Agent API.

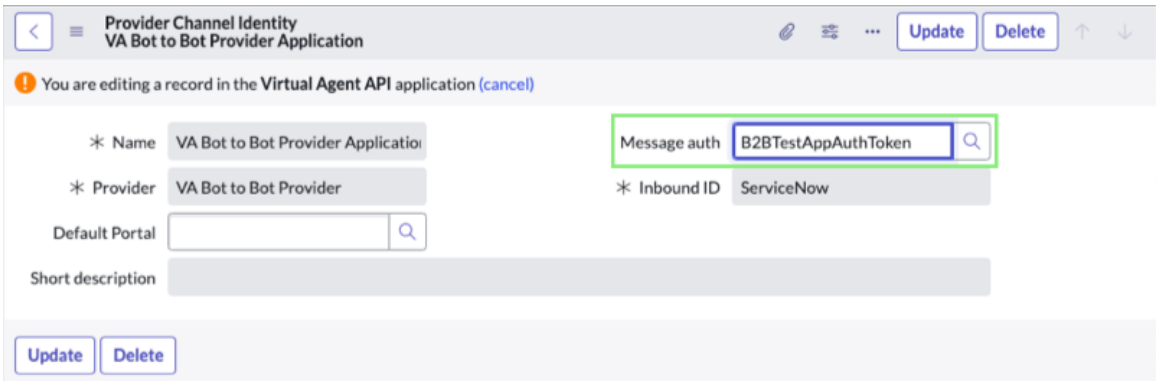
d. Click **Submit**.

3. Set the channel identity.

a. Navigate to **All**, and then enter `sys_cs_provider_application.list` in the filter.

b. Select the **VA Bot to Bot Provider Application** record to open it.

c. In the Provider Channel Identity form, locate the **Message auth** field and select the message auth that you set up previously.



d. Click **Update**.

4. For Hash token-based authentication only, send the **x-b2b-signature** in the request headers.

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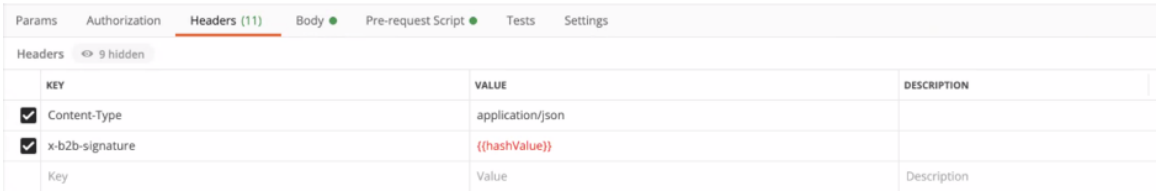
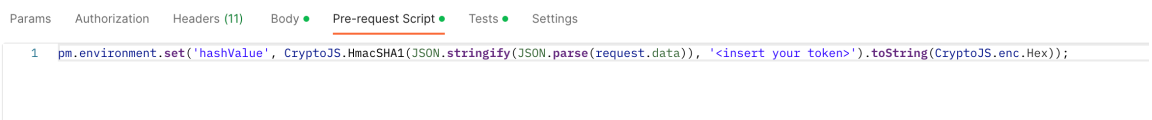
The value is the *HmacSHA1* encoded value of the request payload, which uses the token created in the ServiceNow instance. For example, in Postman, follow these steps:

a. In the Headers, set the **x-b2b-signature** to `{{hashValue}}`.



b. In the Pre-request Script area, set the token as follows:

```
pm.environment.set('hashValue',
 CryptoJS.HmacSHA1(JSON.stringify(JSON.parse(request.data)),
 '<insert your token>').toString(CryptoJS.enc.Hex));
```



What to do next

Configure the output response REST endpoint and outbound authentication for the Virtual Agent API

Configure the output response REST endpoint and outbound authentication for the Virtual Agent API

Specify the outbound endpoint URL to which the Virtual Agent responses are posted. Configure outbound authentication.

Before you begin

If needed, specify the Message Authentication for token validation in the Provider Channel Identities [sys_cs_provider_application] table.
Role required: admin

Procedure

1. Navigate to **All** > **System Web Services** > **Outbound** > **REST Message.**
2. Select the **VA Bot to Bot** record to open it.
3. In the **Endpoint** field, enter the response endpoint for the third-party bot, and then click **Update**.

   This is the endpoint for the primary bot server, where the response will have to be sent from the ServiceNow bot to another bot or another ServiceNow instance.

   For example: `http://<customer instance>/demo/rest/service/nowbot/processResponse`
4. In the **Authentication** tab, set the **Authentication type** field to either **Basic** or **OAuth 2.0**, and then click **Update**.

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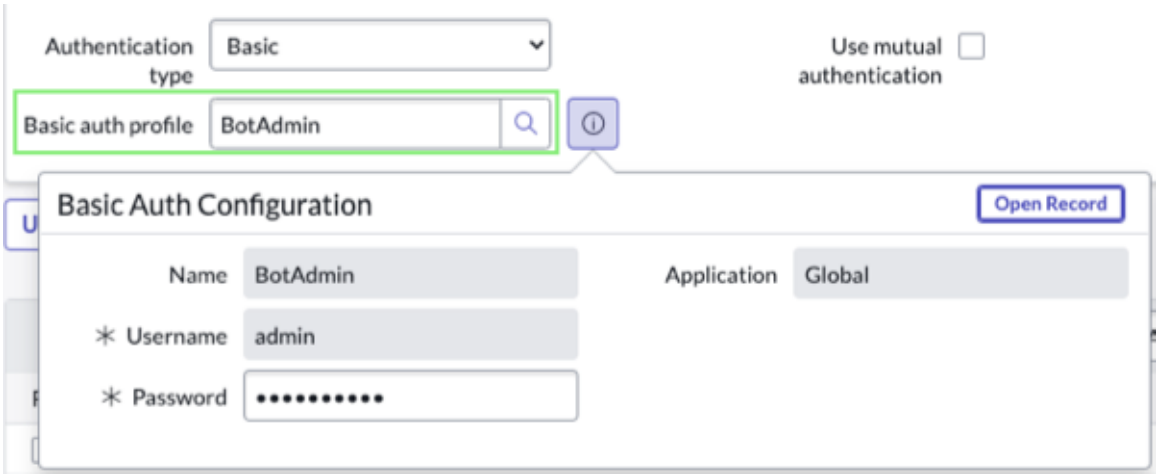
- **Basic:** In the **Basic auth profile** field, select or create a Basic auth profile. It will contain a username and password.



- **OAuth:** In the **OAuth profile** field, select or create an OAuth profile. After saving your changes, click **Get OAuth Token** in the related links list.

For details about configuring basic authentication, see Configure a REST message with basic auth. For information about configuring OAuth 2.0, see Configure a REST message with OAuth.

5. Review the JSON response returned from the endpoint call.
   For a description of the Virtual Agent API response parameters and an example of a successful response, see Virtual Agent Bot Integration API.

Virtual Agent bot-to-bot integration

The Virtual Agent API supports environments that use multiple bots. In this situation, a primary bot communicates with third-party secondary bots, such as a ServiceNow bot.

There are two types of bot communication with the primary bot:

- If the primary bot understands an end user's request (intent), the primary bot routes the request to the appropriate secondary bot, which displays the corresponding topic.
- If the primary bot cannot determine where to route a user request, the primary bot can broadcast a user's request to all secondary bots. Each secondary bot returns a prediction confidence score for determining the end user's intent. The primary bot then routes the request to the secondary bot with the highest prediction confidence score.

In both scenarios, the ServiceNow bot informs the primary bot when the request is completed or when it cannot continue handling the request. The primary bot can then determine whether to inform the end user that the conversation is complete or provide further assistance.

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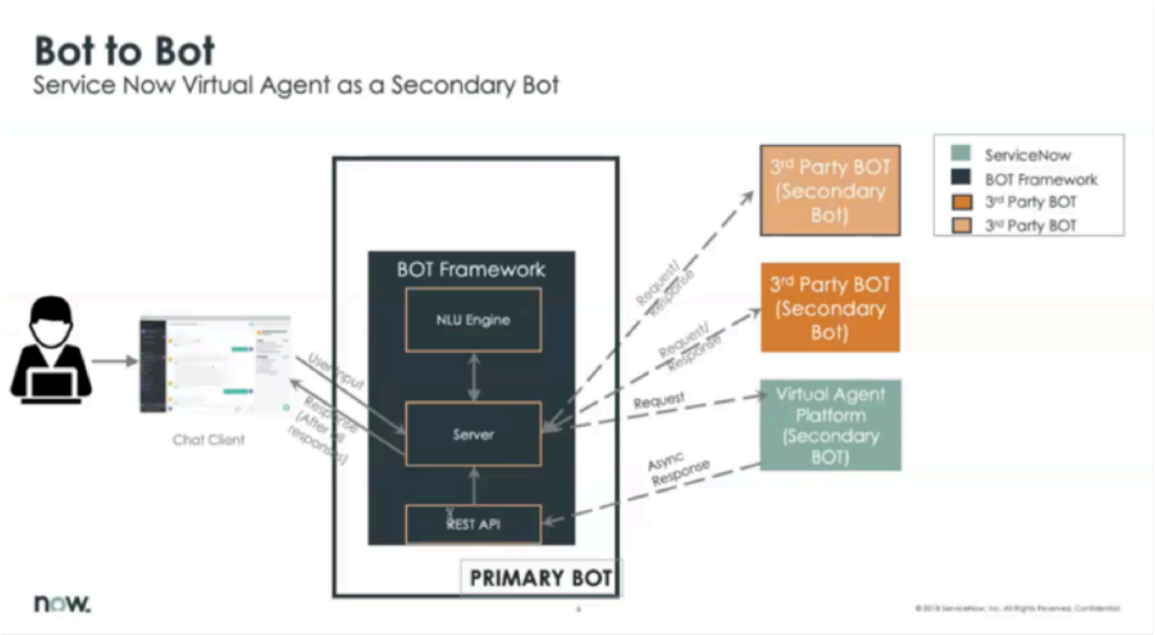
Bot-to-Bot ecosystem with ServiceNow Virtual Agent as a secondary bot



The ServiceNow secondary bot uses a standard request and response through REST endpoints. When the request is received through the Bot Framework or an enterprise app seeking to integrate with the ServiceNow bot, the response for a request is sent asynchronously via the API to the requesting system. Virtual Agent supports Live Agent in the channel as well.

Properties for bot-to-bot integrations

You can add system properties to configure the following:

- Starting with version 1.3: Logging for the Virtual Agent API
- Number of times that the Virtual Agent bot tries to get a response
- Bot normalization score

Bot-to-bot properties

Property	Description	Default value
va.bot.to.bot.logging_enabled	Starting with version 1.3: Option that enables logging for the Virtual Agent API. To enable logging, set the value to *True*.	False
va.bot.to.bot.take.control_times	Number of times that Virtual Agent tries to get a response, after which control is returned to the primary bot.	2
va.bot.to.bot.score.normalization_value	A value used to normalize the prediction confidence score returned by Virtual Agent, if the primary bot does not use intents to route requests to the appropriate bot.	1

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Closing idle bot-to-bot conversations

In bot-to-bot integrations (Virtual Agent API), abandoned conversations that are "idle" for more than an hour are automatically closed by the scheduled job, *Time Out Abandoned B2B Conversations*. This job runs hourly each day.

The default timeout period for abandoned bot-to-bot conversations is one hour (3600 seconds). The *Time Out Abandoned B2B Conversations* job closes any bot-to-bot conversations that have been open longer than one hour (3600 seconds). You (admins) can change the default timeout period for idle bot-to-bot conversations by adding the system property *com.glide.cs.b2b_conversation_idle_timeout*.

The timeout value that you specify in this property applies to all bot-to-bot conversations involving the Virtual Agent.

Change the timeout period for idle bot-to-bot conversations

Add the *com.glide.cs.b2b_conversation_idle_timeout* property to the System Property [sys_properties] table to specify the length of time that an abandoned bot-to-bot conversation remains open (idle). When the *Time Out Abandoned B2B Conversations* job runs hourly, it closes any bot-to-bot conversations that have been idle longer than the specified time.

1. Navigate to **All**, and then enter `sys_properties.list` in the navigation filter.
2. Click **New**.
3. On the form, fill in the fields.

Field	Value
Name	Enter the system property name: *com.glide.cs.b2b_conversation_idle_tim*
Description	Enter an explanation for this property: `Idle timeout period (in seconds) for all bot-to-bot conversations`
Type	Select `integer`.
Value	Enter the number of seconds that the abandoned bot-to-bot conversations remain open, after the requester's last response. For example, a value of 1800 seconds (30 minutes) means that an abandoned bot-to-bot conversation remains open for 1800 seconds (30 minutes). When the *Time Out Abandoned B2B Conversations* job runs, it closes any conversations that have been idle longer than 1800 seconds.

4. Click **Submit**.

Change the Time Out Abandoned B2B Conversations scheduled job

To change the time that this hourly scheduled job runs or to make other adjustments to the scheduled job:

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1. Navigate to **All** > **System Definition** > **Scheduled Jobs** and open the Time Out Abandoned B2B Conversations record.
2. In the Scheduled Script Execution form, change the Time at which the scheduled job runs. Or, depending on how you want to adjust the timing, change other fields in the form as needed.

   For example, to change the interval at which the job runs, in the **Run** field, select **Periodically**. You then specify the **Repeat Interval** (**Days** and **Hours**) that the job runs and the **Starting** date for the interval. For a description of the other fields that you can change in this form, see Automatically run a script of your choosing.
3. Click **Update**.

   The job runs at the specified time and frequency.

Configure multiple provider applications

You can configure multiple provider applications to support use cases where there are multiple primary bots using Virtual Agent API and you need to distinguish between them.

Before you begin

Role required: admin

Be sure you are in Virtual Agent API application scope.

Procedure

1. Navigate to **All** > **sys_cs_provider_application**.
2. Click **New** to create a new provider application.
3. On the form, fill in the fields.

Field	Description
Name	Name of the provider application, such as `VA API Custom Bot`.
Provider	Select the provider as **VA Bot to Bot Provider**.
Inbound Id	Unique inbound Id used in the request message, for example, custom_1.
Message Auth	Configure Message Authentication with a token for inbound communication. See Configure Message Authentication for inbound communication for more details.

4. Click **Submit**.
5. Navigate to **All** > **System Web Services** > **REST Message**.
6. Click **New** to create a new REST Message record.
7. In the REST Message record, fill in the form fields.

Field	Description
Name	Name of the REST Message record. This should be the same as the newly created provider application.
Endpoint	The response endpoint of the primary bot.

8. Click **Submit**.

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9. In the HTTP Methods section, click New to create a new method or you can override the default GET method.

Field	Description
Name	Name of the HTTP Method. Enter `postMessage`.
HTTP method	Select **POST**.
Endpoint	Enter the response endpoint of the primary bot.
Authentication Type	Configure Basic or OAuth 2.0 authentication as per your requirement. For details about configuring basic authentication, see Configure a REST message with basic auth. For information about configuring OAuth 2.0, see Configure a REST message with OAuth.

10. To use the newly created provider application, pass the Inbound Id of the provider application in the *appInboundId* parameter of the Virtual Agent API request.
You need to pass the Inbound Id of the provider application in the *appInboundId* parameter for every Virtual Agent API request. The following is a sample Virtual Agent API request that uses the newly created provider application.

```
{
    "userId": "adminuser1",
    "emailId": "admin@example.com",
    "action": "START_CONVERSATION",
    "message": {
        "text": "",
        "typed": true
    },
    "appInboundId": "custom_1",
    "contextVariables": {
        "app_name": "test"
    }
}
```

You can test the configuration by viewing the outbound HTTP logs to verify that your response endpoint was called.

Transform Virtual Agent API request and response

You can transform Virtual Agent API request and response into supported formats through the scripted extension points provided in Virtual Agent API.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **System Extensions Points** > **Scripted Extension Points**
   - The sn_va_as_service.va_api_payload_transformation extension point transforms primary bot payload into standard Virtual Agent API supported format before processing the request. The sn_va_as_service.va_api_output_transformation extension point transforms Virtual Agent API response into a format supported by the primary bot.
   - Both the scripted extension points have two parameters: *shouldTransform* and *transform*. *shouldTransform* is used to determine whether the implementation is executed. *transform* is used to transform the request or response.
2. If you want to transform the request payload, complete the following steps.

   a. Select sn_va_as_service.va_api_payload_transformation extension point

   b. In the Related Links section, click **Create implementation**.

   c. Update the extension point script as per your requirements.
   In sn_va_as_service.va_api_payload_transformation extension point, the request parameter is an object with two keys: *payload* and *headers*. *payload* is the request payload received from the primary bot, and *headers* are the headers sent in the request payload. The following is a sample implementation.

```
var va_api_payload_transformation = Class.create();
va_api_payload_transformation.prototype = {
    initialize: function() {},

    shouldTransform: function(request) {
        return request.payload.caller === "examplebot";
    },

    /*
    return object for transform function should be in the
 following format
    transformedRequest = {
    payload: request.payload,
    headers: request.headers
    };
    */transform: function(request) {
    var payload = request.payload;
    var headers = request.headers;

    var vaAPIPayload = {
"userId": payload.userId,
"emailId": payload.email,
"message": {
    "text": payload.message,
    "typed": true
},
"contextVariables": {
    "requester_session_language": payload.user_language
},
"appInboundId": "custom_1"
    };
```

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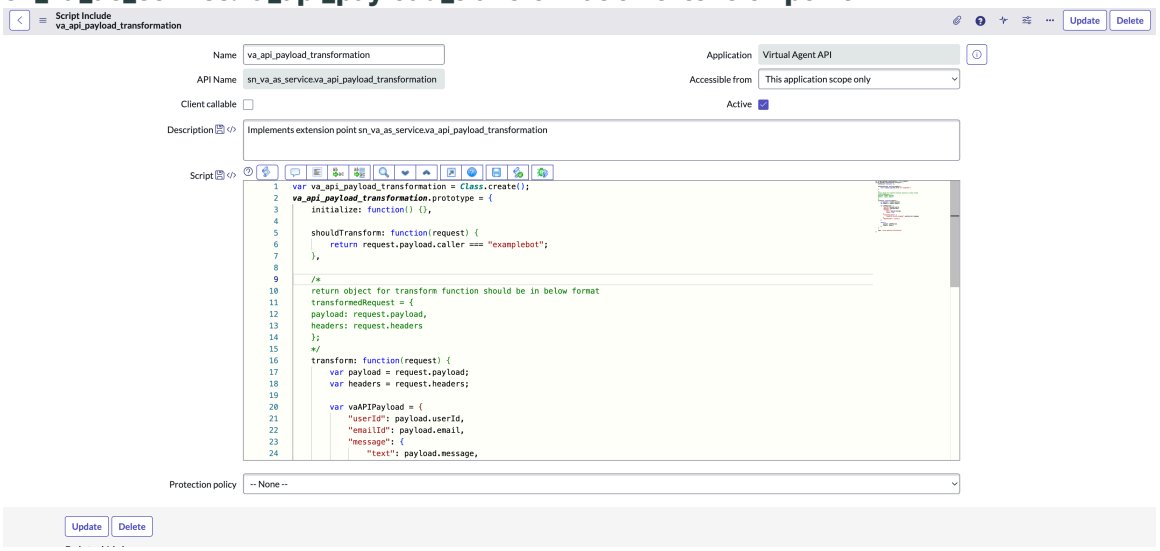
```
    return {
 payload: vaAPIPayload,
 headers: headers
    };
},
```

sn_va_as_service.va_api_payload_transformation extension point



d. Click **Update**.

3. If you want to transform the response payload, complete the following steps.

a. Select sn_va_as_service.va_api_output_transformation extension point

b. In the Related Links section, click **Create implementation**.

c. Update the extension point script as per your requirements.
In sn_va_as_service.va_api_output_transformation extension point, the response parameter is an object with two keys: inputPayload and responsePayload. *`inputPayload`* is the request payload received from Virtual Agent API, and *`responsePayload`* is the response from Virtual Agent API which you can use to build the transformed response. Use the appInboundId field of the request payload to determine whether to return true or false. The following is a sample implementation.

```
var va_api_output_transformation = Class.create();
va_api_output_transformation.prototype = {
    initialize: function() {},

    shouldTransform: function(response) {
 return (response.inputPayload.appInboundId === 'custom_1');
    },

    /*
    input object param for transform function should be in
 the following format
    response = {
        inputPayload: response.inputPayload,
 responsePayload: response.responsePayload
```

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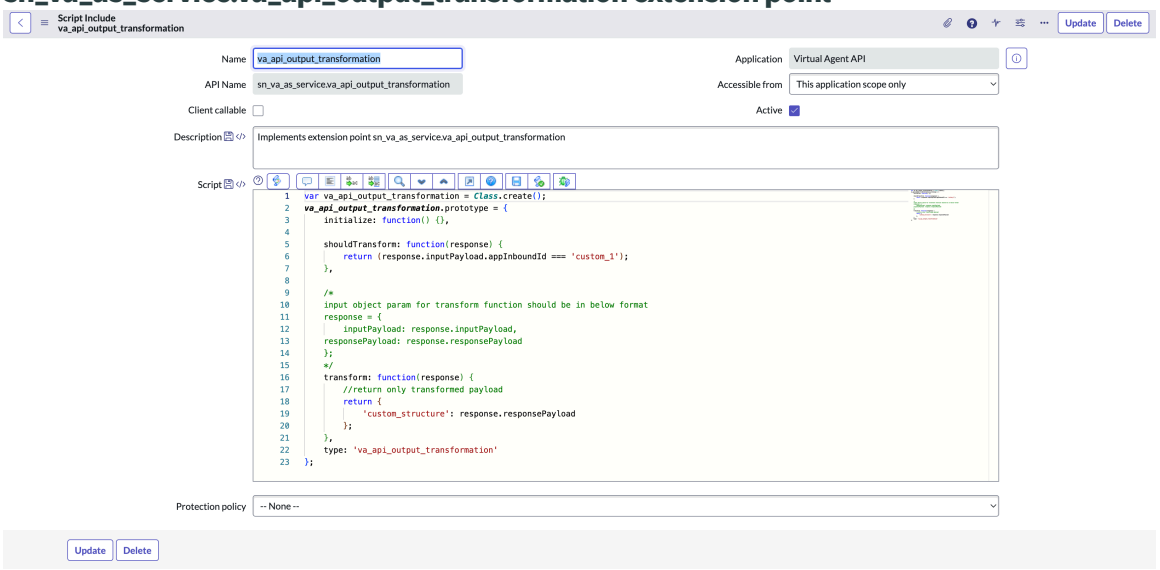
```
    };
    */
    transform: function(response) {
 //return only transformed payload
        return {
      'custom_structure': response.responsePayload
 };
    },

    type: 'va_api_output_transformation'
};
```

sn_va_as_service.va_api_output_transformation extension point



d. Click **Update**.

Enable Now Assist experience in Virtual Agent API

Enable Now Assist experience in Virtual Agent API to support generative AI skills across multiple provider channels.

Before you begin

Be sure you are on Washington DC Patch 7 or above. If you are on an earlier version, see KB1699602 article in the Now Support Knowledge Base .

Set up Now Assist in Virtual Agent. See Configuring Now Assist in Virtual Agent for more information.

Role required: admin

Procedure

1. Navigate to **All**, and then enter `sys_now_assist_deployment_channel.list` in the navigation filter.
2. Click **New**.
3. On the form, fill in the fields.

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Field	Value
Document Table	Select Provider Channel Identity from the dropdown.
Document Id	Select the Provider Channel Identity [sys_cs_provider_application] record corresponding to Virtual Agent API.
Now Assist Deployment	Select Now Assist for Virtual Agent.
Active	Select the **Active** checkbox.

4. Click **Submit**.

Using Virtual Agent Bot Interconnect in your configuration

Use Virtual Agent Bot Interconnect to create a unified chat experience across multiple channels. You can support secondary bots, such as Google Dialogflow, Microsoft Power Virtual Agents, and ServiceNow® Virtual Agent.

Virtual Agent Bot Interconnect functions as the primary bot in a diverse chat environment. It can help you reduce complexity and create a unified chat experience for your end users. Virtual Agent Bot Interconnect gives your end users access to multiple channels and a wide variety of enterprise tasks that are available from ServiceNow.

Bot Interconnect provides the following benefits:

- Ready integration with third-party bots such as Google Dialogflow and Microsoft Power Virtual Agents.
- Easy integration with ServiceNow Virtual Agent bots on other instances.
- The ability to add any other third-party bot as a secondary bot in the system.
- User authentication and account linking in Bot Interconnect.
- Intent discovery in Bot Interconnect across topics that are supported by the primary and secondary bots.
- LLM topic conversations across primary and secondary bots
- Conversations occur with one bot at a time.
- Bot Interconnect provides a common conversation model and data storage, which unifies reporting and analytics.

Note:
The Virtual Agent Bot Interconnect requires a Pro license similar to that of Virtual Agent.

Supported Controls

All input controls and bot response controls are supported.

Features and default behavior

Language support

Responses in Bot Interconnect are not translated. Bot Interconnect passes the user language to the secondary bot and expects the secondary bot to return any responses in that language. For example, if the primary bot has a German-speaking user and the secondary instance is localized in German, then German responses are returned to the primary bot.

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Timeout value from the secondary bot

The timeout value is the maximum time the primary bot waits for a response from the secondary bot. You can pass a custom timeout value (in milliseconds) in the Bot Interconnect Topic Block properties to override this.

1. Select the **Bot Interconnect Topic Block** node in the shell topic on your primary instance.
2. In the **Additional Params (String)** area, click the script icon </>.
3. Add the following script:

```
return JSON.stringify({ timeout : 30000 })
```

   In this example, 30000 equals 30 seconds.
4. Save and publish the topic.

Closed conversations

Conversations are closed on the secondary bot when a user closes the conversation on Bot Interconnect or when the Bot Interconnect conversation times out.

> **Note:**
> Conversations always remain open in Microsoft Power Virtual Agents.

Debug logs

To enable debug logs in the Bot Interconnect instance, set the *sn_va_bot_ic.bot_interconnect.enable.logging* system property to *true*. You will see a conversation ID attached to most logs, as well as the file name.

Pass output from the secondary bot topic to the primary bot

You can apply custom logic to the output of the secondary bot conversation in the Bot Interconnect shell topic.

Support for custom transformation maps

Developers can pass a custom transformation map using the *getTransformerMap* method. A custom transformation map lets you override the default transformation logic.

Example in the DialogflowInboundTransformer script include for Google Dialogflow:

```
/** Custom transformation map based on control types in
 DialogFlow messenger **/

getTransformationMap: function() {
 return {
  'text': 'transformText',
  'info': 'transformInfoCards2',
  'description': 'transformDescription',
  'button': 'transformButtonLink',
  'image': 'transformImage',
  'chips': 'transformChips',

  /* fallback logic in case VA API response format is
 mentioned in Dialogflow custom response payload */
  'servicenow': 'transformServiceNowResponse'
 };
},
```

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In this example, `text`, `info`, `description`, and so forth are the control types that correspond to the secondary bot. The specified method (such as *`transformText`* is called to do the transformation for the control type. For each secondary bot response, Virtual Agent uses the *`getControlType`* method to return the control type specified in the transformation map for the secondary bot message. The inbound transformer in Google Dialogflow provides a good example for how to use this.

If the transformation method called does not exist, Virtual Agent API logs it as an error.

Live agent connection

You can enable live agent connection to route a Virtual Agent interaction in the primary instance to a live agent on the secondary instance. The following are the possible connection scenarios.

- If there are no matching agents available in the primary instance to cater to the interaction, Bot Interconnect will evaluate the matching conditions configured in the live agent connection and route the interaction to the appropriate live agent in the secondary instance.
- If there is only one matching connection, the interaction is routed to that connection and agent availability is checked in the secondary instance.
- If there are multiple matching connections, the user is presented with options in the order defined and is connected to the selected connection.
- If there are no matching agents available in the secondary instance, the following message is displayed: "There are no agents available. Please try again later.".
- If there are matching agents available in the secondary instance, the user is redirected to the available live agent who can cater to the interaction.

Autopilot mode is currently not supported in the secondary instance when the conversation is initiated on the primary instance. Live agent connection in the secondary instance works only when the secondary instance is in asynchronous mode.

Install Virtual Agent Bot Interconnect

You can install the Bot Interconnect application if you have the admin role. The application is available from the ServiceNow® Store.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the Bot Interconnect application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Bot Interconnect application (sn_va_bot_ic) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

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In the list next to the **Install** button, the versions that are available to you are displayed.

3. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.

4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. Select **Install**.

Using Google Dialogflow as a secondary bot with Virtual Agent Bot Interconnect

With Bot Interconnect, you can use ServiceNow® Virtual Agent as the primary bot with a Google Dialogflow secondary bot. All of the skills and topics available to Google Dialogflow are made available to and executable from channels that are configured for ServiceNow® Virtual Agent.

Prerequisites

This bot configuration requires the following:

- A Washington DC ServiceNow instance
- Virtual Agent Bot Interconnect Store application
- A Google Dialogflow account

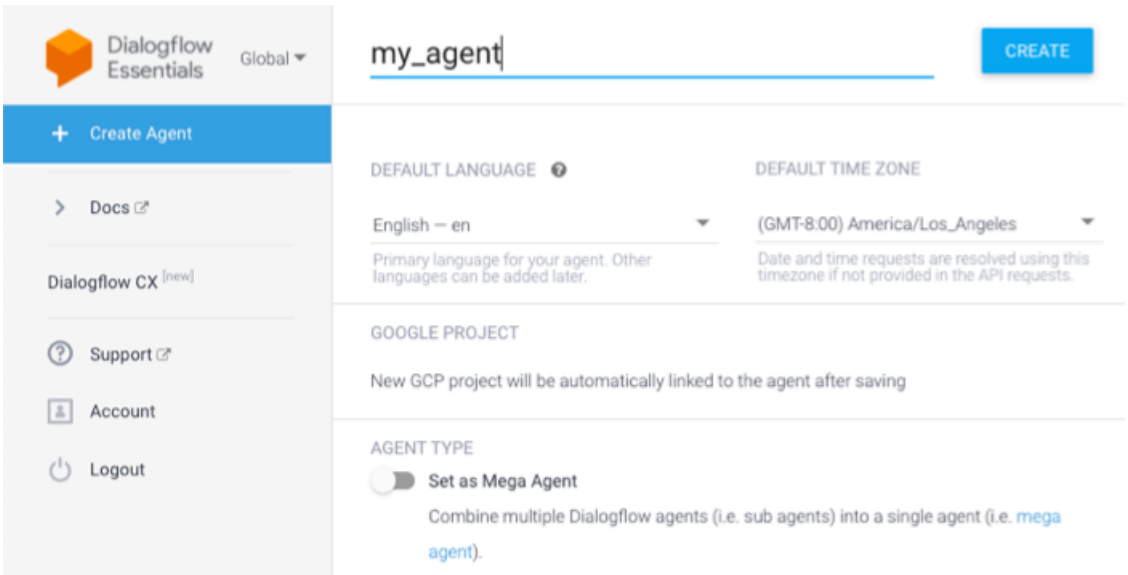
Create a new agent in Google Dialogflow

To use Google Dialogflow with Virtual Agent Bot Interconnect, you must first create a new agent in Google Dialogflow.

Before you begin
Role required: admin

Procedure

1. Create a new agent in Google Dialogflow: https://dialogflow.cloud.google.com/#/newAgent



This also creates a new Google project.

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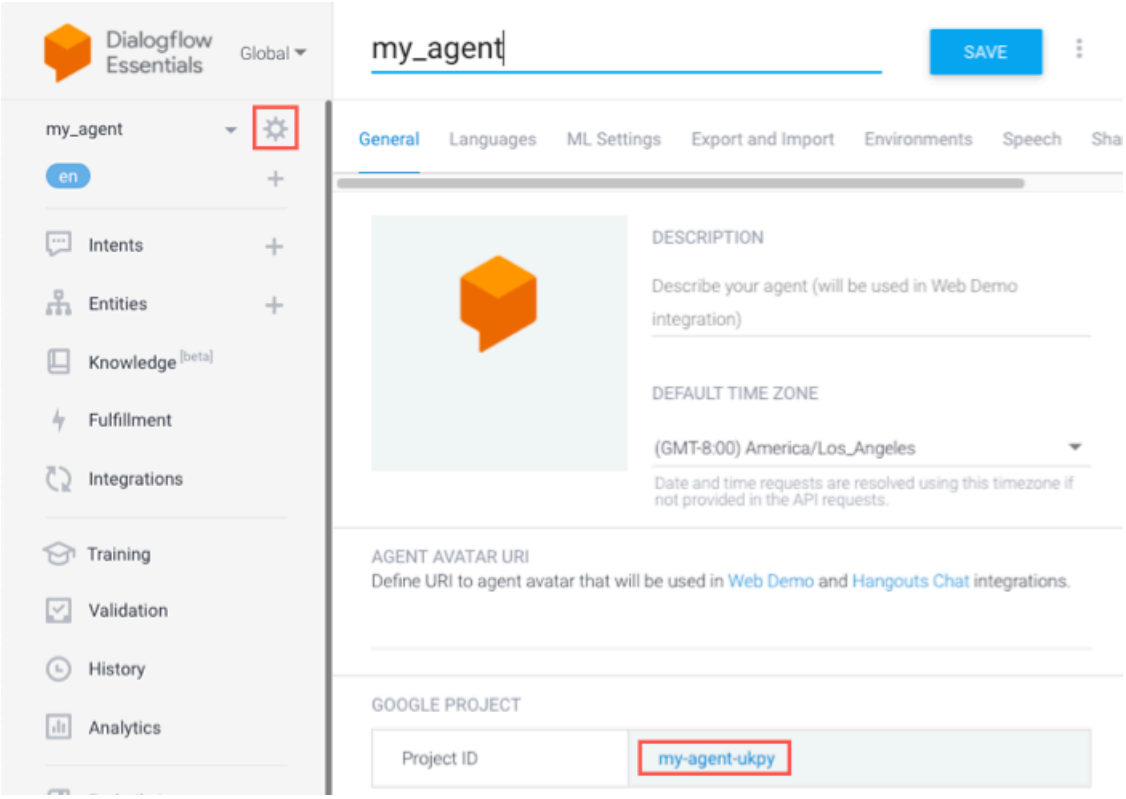
2. Click the agent settings icon, and then find the project ID on the **General** tab.



3. Click the Project ID.
   The project dashboard opens.

Create a service account and private key for the Google Dialogflow project

To use Google Dialogflow with Virtual Agent Bot Interconnect, the second step is to create a service account and private key for the new agent in Google Dialogflow.

Before you begin
Role required: admin

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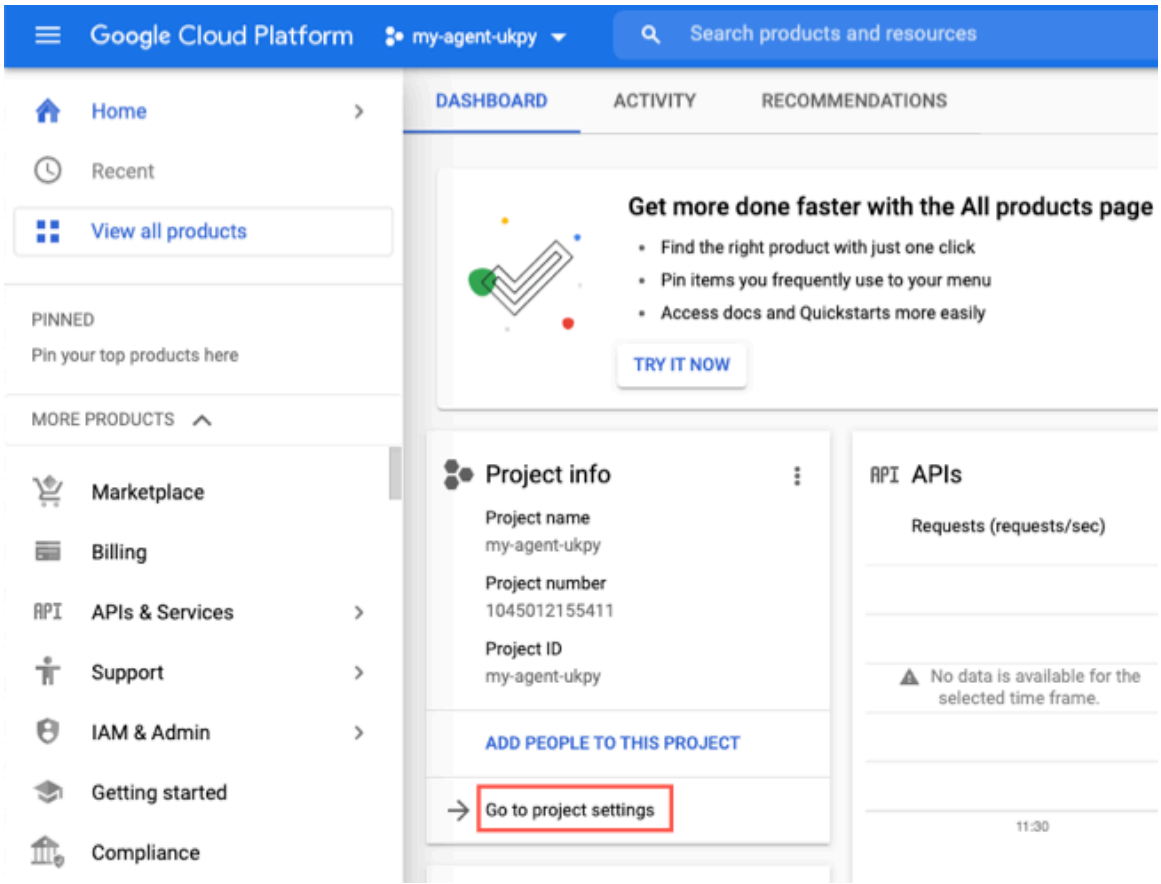
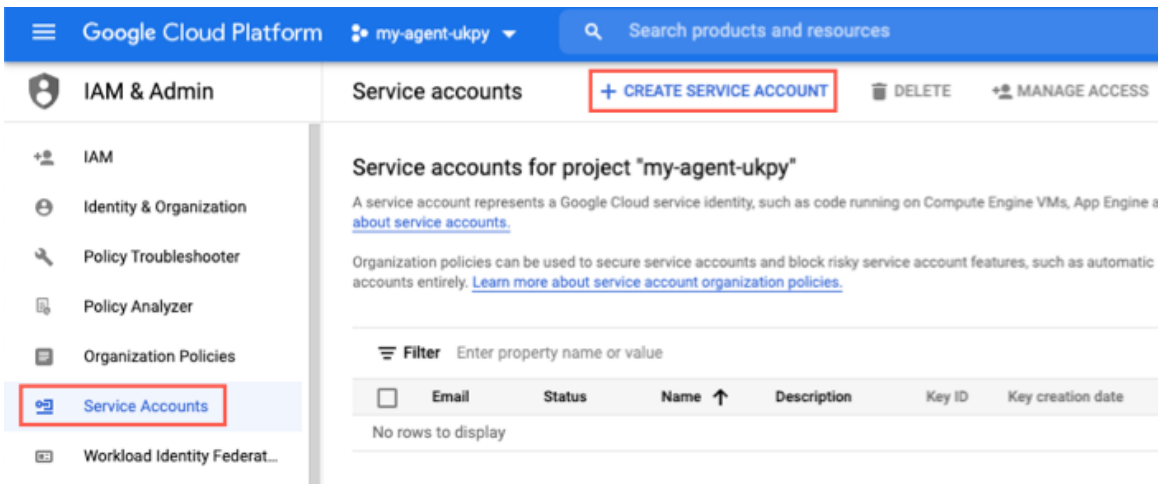
Procedure

1. On the project dashboard page, click **Go to project settings**.



2. On the IAM & Admin page, click **Service Accounts**.
3. Click **+ Create Service Account**.



4. Provide a name, and then click **Create and Continue**.
5. Under Select a role, select **Dialogflow** > **Dialogflow API Client**.
6. Click **Continue**.

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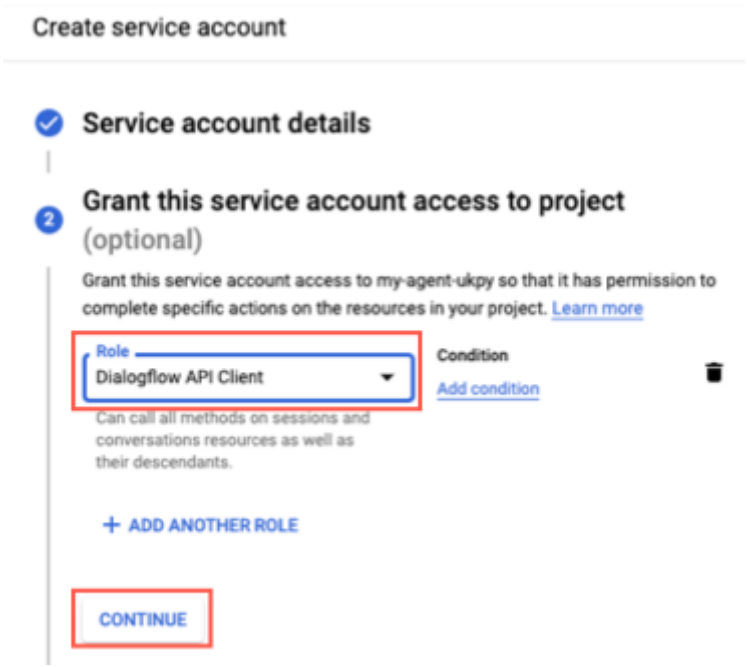
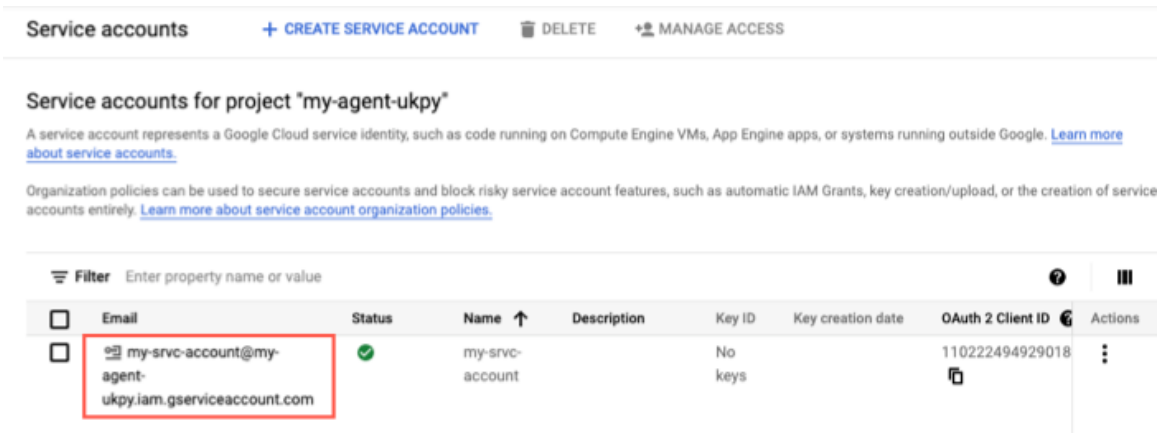


7. Click **Done**.
8. Click the link for the record in the **Email** column.



The Service account details page opens.

9. Click the **Keys** tab.
10. Click **Add Key** > **Create new key**.

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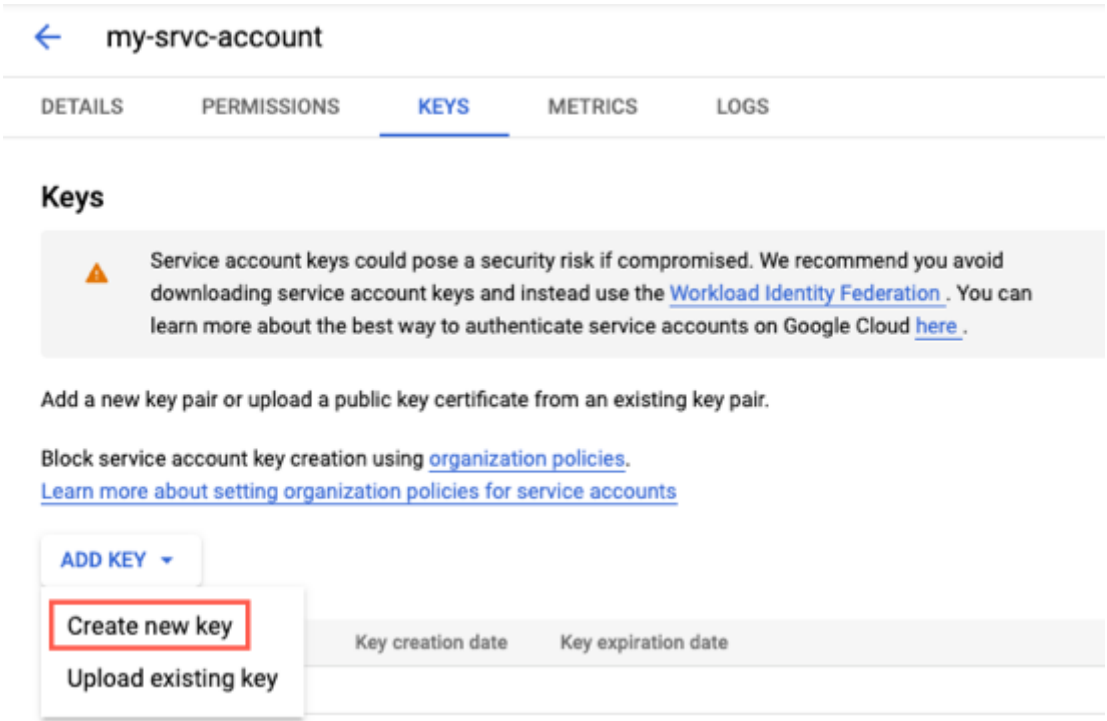

11. When prompted for the key type, select **JSON**, and then click **Create**.
    The JSON file is downloaded to your computer.

Generate a Java Keystore file from the JSON private key file

To use Google Dialogflow with Virtual Agent Bot Interconnect, the third step is to generate a JKS file from the JSON private key you created in the previous step.

Before you begin

Role required: admin

Procedure

1. In a text editor, open the JSON private key file you downloaded in the previous procedure.
2. Copy the private key text, starting with the BEGIN PRIVATE KEY section and ending with the END PRIVATE KEY section.

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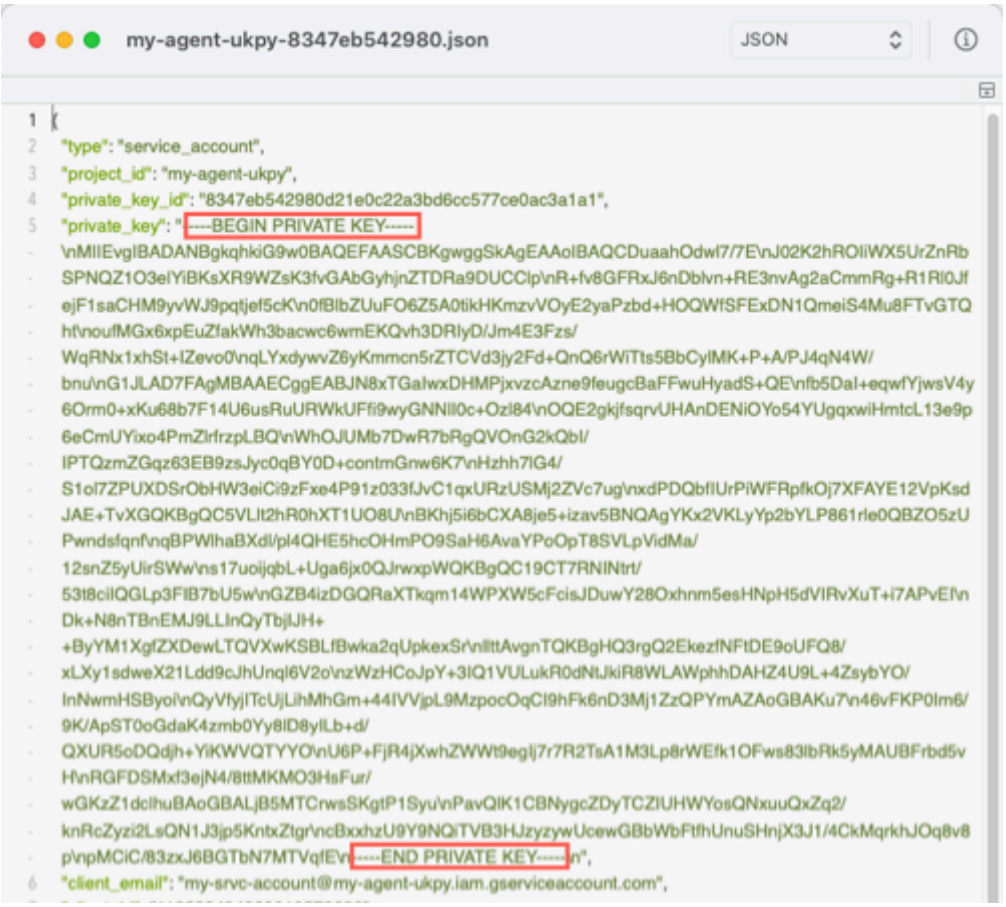

3. Remove the line return characters (\n) from the key:
   a. Paste the key text in a text editor, such as TextEdit or Notepad.
   b. Click **Edit** > **Find** > **Find & Replace** or **Edit** > **Replace**.
   c. In the **Find** field, type `\n`.
   d. In the **Replace** field, press `Ctrl + Enter` or `Alt + Enter`.
   e. Click **Replace All**.
   The key text will be formatted with line breaks.
4. Save the formatted private key text as a `.pem` file.
   For example, `privatekey.pem`.
5. In a web browser, open the URL that is listed in the JSON file for the *`client_x509_cert_url`* parameter.
   For example, https://www.googleapis.com/robot/v1/metadata/x509/my-srvc-account%40my-agent-ukpy.iam.gserviceaccount.com. The certificates page opens.
6. Copy the certificate that has the same private key ID that appears in the JSON file.
7. Replace \n with line breaks in the certificate, as described in step 3.
8. Save the formatted certificate as a `.pem` file.
   For example, `certificate.pem`.
9. Navigate to the folder that contains both the private key and certificate files.
10. Open a terminal window:
    a. In Mac OS, right-click or ctrl-click the folder and select **New terminal at folder**.
    b. In Windows, right-click the folder and select **Open in terminal**.

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11. At the terminal's command prompt, create the JKS file as follows:

    a. Enter the following command:

    ```
    openssl pkcs12 -export -in [certificate file name] -inkey
    [private key file name] -certfile [certificate file name] -out
    testkeystore.p12
    ```

    For example, if certificate.pem is the name of the certficate and privatekey.pem is the name of the private key:

    ```
    openssl pkcs12 -export -in certificate.pem -inkey
    privatekey.pem -certfile certificate.pem -out testkeystore.p12
    ```

    b. When prompted for a password, enter the password of your choice using a minimum of six characters.

    A PKCS 12 file is created with the name `testkeystore.p12`.

    c. Enter the following command:

    ```
    keytool -importkeystore -srckeystore testkeystore.p12
    -srcstoretype pkcs12 -destkeystore dialogflow.jks
    -deststoretype JKS
    ```

    You will be prompted for a password multiple times. Use the same password you created in the previous step.

Result
A JKS file is created.

Configure connections to Google Dialogflow in your Virtual Agent Bot Interconnect instance

To use Google Dialogflow with Virtual Agent Bot Interconnect, the fourth step is to configure the connection in your ServiceNow® instance.

Before you begin
Generate a Java Keystore file from the JSON private key file.

Role required: admin

Procedure
1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. On the Connection & Credential Aliases page, click the **Bot Interconnect Dialogflow Integration** record.
3. Under Related Links, click **Create New Connection & Credential**.
4. Use the JSON file you downloaded in a previous step to fill in the form.

Connection & Credential Aliases New record form

Field	Description
Connection Name	A name for your credential. For example, `Dialogflow Connection`.

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Field	Description
Project ID (project_id)	The value that corresponds with the *project_id* parameter in the JSON file. For example, *my-agent-ukpy*.
Service Account Email (client_email)	The value that corresponds with the *client_email* parameter in the JSON file. For example, *my-srvc-account@my-agent-ukpy.iam.gserviceaccount.com*.
Private Key ID (private_key_id)	The value that corresponds with the *private_key_id* parameter in the JSON file. For example, *8347eb542980d21e0c22a3bd6cc577ce0ac3a1a1*.
Keystore Password	The password that you used when you created the Java Keystore (JKS) file in a previous step.
Keystore	Select the JKS file you created in a previous step.

5. Click **Create and Get OAuth Token**.

Create a Virtual Agent Bot Interconnect shell topic to call Google Dialogflow topics

To access topics in the Google Dialogflow secondary bot, you must create at least one Virtual Agent Bot Interconnect topic.

Before you begin

Create one or more intents in Google Dialogflow. For details, refer to the Dialogflow documentation.

Configure connections to Google Dialogflow in your Virtual Agent Bot Interconnect instance.

Role required: virtual_agent_admin or admin

About this task

There are two ways to integrate Google Dialogflow intents with Bot Interconnect

- Create one Virtual Agent Bot Interconnect topic per Dialogflow intent.

  In case of NLU topics, each Virtual Agent topic has the same name as a single Dialogflow intent. For example, if you have two Dialogflow intents named **order a drink** and **book a ticket**, then you would create two Virtual Agent topics also named **order a drink** and **book a ticket**.

  In case of LLM topics, each Bot Interconnect topic has the same name and description as the corresponding Google Dialogflow topic.

- Map multiple Dialogflow intents to a single Virtual Agent Bot Interconnect topic. This scenario is applicable only for NLU topics.

  Create a Virtual Agent topic for your Dialogflow intents and name it accordingly. For example, **DG ordering issues**. In this scenario, the Dialogflow intents are mapped to the topic as either keywords or utterances, depending on your method of topic discovery. So if you have two Dialogflow intents named **order a drink** and **book a ticket**, you would add both phrases to the topic as keywords or you would add them as utterances to the topic's corresponding intent.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Create a topic for your Dialogflow intents.
   In case of NLU topics, include the Dialogflow intent names as either keywords or utterances in the corresponding ServiceNow Virtual Agent intent. In case of LLM topics, the topic name and

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description of the Bot Interconnect topic should match the topic name and description of the Google Dialogflow topic.

3. On the **Flow** tab, drag a Topic Block utility node onto the canvas.
4. Select the node, and then fill in the form as follows:

Topic Block Properties form

Property	Description
Topic Block	Select **Bot Interconnect** topic block for NLU topics and **Bot Interconnect - LLM** topic block for LLM topics.
Action Name	Enter: `sn_va_bot_ic.dialogflow_bot_interconnect_integration`
Action Type	Enter `subflow`.

5. Click **Save**.
6. Click **Publish**.

What to do next

Test your configuration. You can execute the topics that are available in the secondary bot from channels where Bot Interconnect is deployed.

Using Microsoft Power Virtual Agents as a secondary bot with Virtual Agent Bot Interconnect

With Bot Interconnect, you can use ServiceNow® Virtual Agent as the primary bot with a Microsoft Power Virtual Agents secondary bot. All of the skills and topics available to Power Virtual Agents are made available to and executable from channels that are configured for ServiceNow® Bot Interconnect.

Prerequisites

This bot configuration requires the following:

- A Washington DC ServiceNow instance
- Virtual Agent Bot Interconnect Store application
- A Microsoft Power Virtual Agents account for testing

Create a JavaScript function in Microsoft Azure using Visual Studio Code

To use Power Virtual Agents with Virtual Agent Bot Interconnect, you must create a JavaScript function in Microsoft Azure using the sample code files in Bot Interconnect.

Before you begin

You will need a Microsoft Azure account.

Role required: admin

Procedure

1. Sign into Microsoft Azure and create a JavaScript function.
   This involves configuring your environment and creating a local project. Refer to the Microsoft documentation for details.
2. Go to Create an Azure Function for Microsoft Power Virtual Agents as Secondary bot with ServiceNow Bot Interconnect setup (KB1112368), and then do the following:
   You are required to login to the Support portal to access the knowledge article.

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a. Copy the code in the `index.txt` file in the Attachments section into the `index.js` file in your Azure project.

b. Copy the code in the `function.txt` file in the Attachments section into the `function.json` file in your Azure project.

c. Save both files.

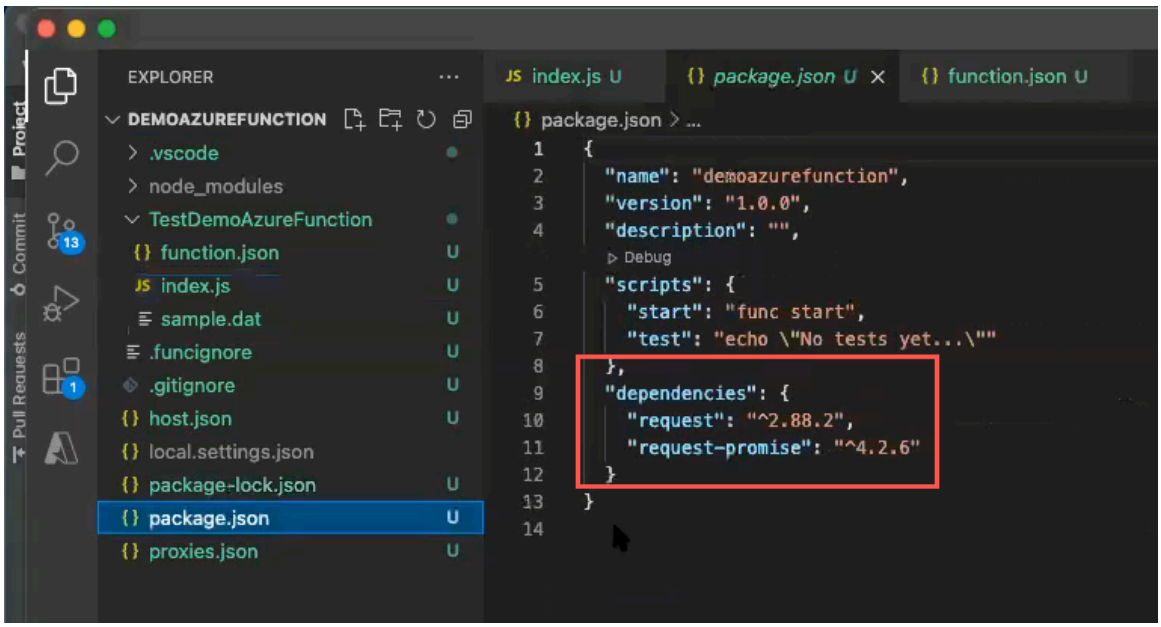
3. Install the *`request-promise`* libraries.

a. In a command line window, change directories to the folder where you created the Azure project.
For example, enter `cd DemoAzureFunction`.

b. At the prompt, enter: `npm install --save request`

c. At the prompt, enter: `npm install --save request-promise`

The dependencies are added to the `package.json` file in your project.



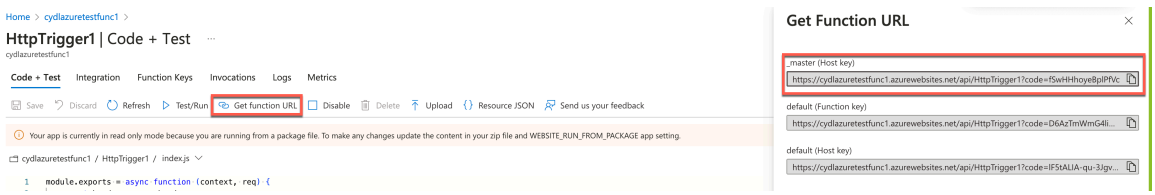
4. Deploy the project to Azure as described in the Microsoft documentation.

5. From the Azure portal, navigate to **All Resources**.

6. Select the name of the function app that you created.

7. On the Overview page, select the function you've created in the Functions tab, and copy the function URL from the Get function URL option.

The Azure function URL will be used as the secondary bot endpoint in your ServiceNow instance.



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Locate and copy the Direct Line secret key in Microsoft Power Virtual Agents

To use Power Virtual Agents with Virtual Agent Bot Interconnect, you must locate and copy the Direct Line security key in your Power Virtual Agents account.

Before you begin

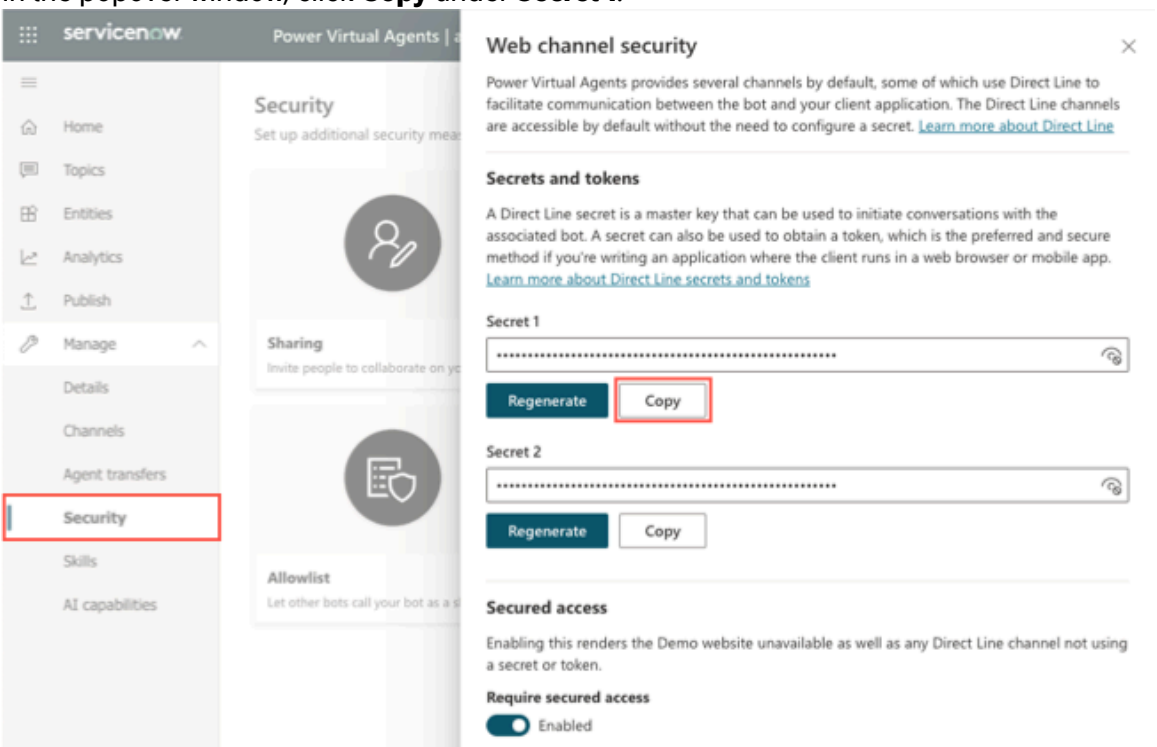
You must have a Microsoft Power Virtual Agents account with at least one bot.

Create a JavaScript function in Microsoft Azure using Visual Studio Code.

Role required: admin

Procedure

1. Log into your Microsoft Power Virtual Agents account.
2. Navigate to **Manage** > **Security**.
3. Click the **Web channel security** tile.
4. In the popover window, click **Copy** under **Secret 1**.



Add the Direct Line secret key to your Virtual Agent Bot Interconnect instance

To use Power Virtual Agents with Virtual Agent Bot Interconnect, you must add the Direct Line security key as a credential in your Bot Interconnect instance.

Before you begin

Locate and copy the Direct Line secret key in Microsoft Power Virtual Agents.

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Click the **Bot Interconnect DirectLine Credentials** record to open it.
3. On the Credentials related list, click **New**.

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4. When prompted for the type of credential to create, click **Bot Interconnect Static Token Credential**.
5. On the form, fill in the fields as follows:

Field	Description
Name	Any unique name for the credential, such as `Power VA Direct Line key`.
Header	Leave as **Authorization**.
Static Token	Enter `Bearer ` , with a white space, followed by the Direct Line secret key from Power Virtual Agents. For example, enter: `Bearer 4km3D8s_6lY.rDVmxVm3k123nWibx3ciJeed2AKled9_ADuwsaN5uCA`

6. Click **Submit**.
7. Return to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
8. Click the **Bot Interconnect DirectLine Fetch Msgs** record to open it.
9. Under Related Links, click **Create New Connection & Credential**.
10. In the dialog box, fill in the form.

Field	Description
Secondary Bot Name	Any unique name that refers to the Power Virtual Agents bot.
Secondary Bot Endpoint	The Azure function URL that you copied in a previous step. For example, enter `https://demoazurefunctionreceivemsgapp.azurewebsites.net`.
Header	Enter: `dlsecret`
Static Token	The Direct Line key that you copied from Power Virtual Agents in the previous step.

11. Click **Create**.

Create a Virtual Agent Bot Interconnect shell topic to call Microsoft Power Virtual Agents topics

To access topics in the Power Virtual Agents secondary bot, you must create at least one Virtual Agent Bot Interconnect topic.

Before you begin

Create one or more topics in Microsoft Power Virtual Agents.

Add the Direct Line secret key to your Virtual Agent Bot Interconnect instance.

Role required: virtual_agent_admin or admin

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About this task

There are two ways to integrate Microsoft Power Virtual Agents topics with Bot Interconnect:

- Create one Virtual Agent Bot Interconnect topic per Power Virtual Agents topic.

  In case of NLU topics, each Virtual Agent topic has the same name as a single Power Virtual Agents topic. For example, if you have two Power Virtual Agents topics named **order a drink** and **book a ticket**, then you would create two Virtual Agent topics also named **order a drink** and **book a ticket**.

  In case of LLM topics, each Bot Interconnect topic has the same name and description as the corresponding Power Virtual Agents topic.

- Map multiple Power Virtual Agents topics to a single Virtual Agent Bot Interconnect topic. This scenario is applicable only for NLU topics.

  Create one Virtual Agent topic for your Power Virtual Agents topics and name it accordingly. For example, **PVA ordering issues**. In this scenario, the Power Virtual Agents topics are mapped to the topic as either keywords or utterances, depending on your method of topic discovery. So if you have two Power Virtual Agents topics named **order a drink** and **book a ticket**, you would add both phrases to the topic as keywords or you would add them as utterances to the topic's corresponding intent.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Create a topic for your Power Virtual Agents topics.
   In case of NLU topics, include the Power Virtual Agents topic names as either keywords or utterances in the corresponding ServiceNow Virtual Agent intent. In case of LLM topics, the topic name and description of the Bot Interconnect topic should match the topic name and description of the Power Virtual Agents topic.
3. On the **Flow** tab, drag a Topic Block utility node onto the canvas.
4. Select the node, and then fill in the form as follows:

Topic Block Properties form

Property	Description
Topic Block	Select **Bot Interconnect** topic block for NLU topics and **Bot Interconnect - LLM** topic block for LLM topics.
Action Name	Enter: `sn_va_bot_ic.direct_line_bot_interconnect_integration_handler`
Action Type	Enter `subflow`.

Additional Params (String)	Follow these steps:
	a. Click the script icon </>
	b. In the Additional Params (String) window, add this code:
	`(function execute() {`
	`  return JSON.stringify({'quick': false});`
	`})()`
	c. Click **Save**.

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5. Click **Save**.
6. Click **Publish**.

What to do next

Test your configuration. You can execute the topics that are available in the secondary bot from channels where Bot Interconnect is deployed.

> **Note:**
> Conversations always remain open in Power Virtual Agents.

Using ServiceNow Virtual Agent as a secondary bot with Virtual Agent Bot Interconnect

Virtual Agent Bot Interconnect enables you to use ServiceNow® Virtual Agent as the primary bot with a ServiceNow Virtual Agent secondary bot.

Prerequisites

In order to configure ServiceNow Virtual Agent as a secondary bot with Virtual Agent Bot Interconnect, you require the following setup:

- Two Washington DC ServiceNow instances.
- On the primary instance: Virtual Agent Bot Interconnect Store application
- On the secondary instance:
  - Virtual Agent API v3.8.x or later
  - Virtual Agent API on the secondary instance must be in synchronous mode or asynchronous mode.

Use ServiceNow Virtual Agent as a secondary bot in synchronous or asynchronous mode

Use ServiceNow Virtual Agent as a secondary bot in synchronous or asynchronous mode with Bot Interconnect.

You can use ServiceNow Virtual Agent as a secondary bot in synchronous or asynchronous mode. See Enable synchronous mode on the secondary ServiceNow Virtual Agent instance or Enable asynchronous mode on the secondary ServiceNow Virtual Agent instance.

Enable synchronous mode on the secondary ServiceNow Virtual Agent instance

Enable synchronous mode on the secondary ServiceNow Virtual Agent instance to use ServiceNow® Virtual Agent as a secondary bot with Virtual Agent Bot Interconnect.

Before you begin

Role required: admin

Procedure

1. On the secondary instance, navigate to **All**, and then enter `sys_cs_channel.list` in the navigation filter.
2. Select the Bot to Bot record.
3. Select the **Synchronous** check box.
4. Click **Update**.

Enable asynchronous mode on the secondary ServiceNow Virtual Agent instance

Enable asynchronous mode on the secondary ServiceNow Virtual Agent instance to use ServiceNow® Virtual Agent as a secondary bot with Virtual Agent Bot Interconnect.

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Before you begin
Role required: admin

Procedure

1. On the secondary bot instance, navigate to **All** > **System Web Services** > **Outbound** > **REST Message**.
2. Select the VA Bot to Bot record.
3. In the Endpoint field, specify the outbound endpoint URL of the primary ServiceNow® instance to which the Virtual Agent responses are posted. `http://<primary instance>/api/sn_va_bot_ic/bot_interconnect/va_api_response`
4. In the Authentication tab, set the Authentication type field to either Basic or OAuth 2.0. For more information on configuring a basic authentication profile and OAuth 2.0 profile, see Configure a REST message with basic auth and Configure a REST message with OAuth respectively.
5. Click **Update**.
6. In the HTTP Methods section, select the postMessage method and specify the endpoint URL. `http://<primary instance>/api/sn_va_bot_ic/bot_interconnect/va_api_response`
7. Click **Update**.

Create a connection and credential in Virtual Agent Bot Interconnect

To use ServiceNow® Virtual Agent as a secondary bot with Virtual Agent Bot Interconnect, configure the connection and credential records in the Bot Interconnect (primary) instance.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Click the **Bot Interconnect VA API Integration** record to open it.
3. In the Connections related list, click **New**.
4. On the form, fill in the fields.

Field	Description
Name	Enter a unique name, such as `SNow Secondary Bot`.
Credential	Leave this blank for now.
Connection alias	Use the default value.
Connection URL	Enter the URL for Virtual Agent API on your secondary instance. For example, enter `https://secondary-instance-name.service-now.com/api/sn_va_as_service/bot/integration`.

5. Click **Submit**.
6. Navigate to **All** > **Connections & Credentials** > **Credentials**.
7. On the Credentials page, click **New**.

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8. Click either **Bot Interconnect Hash Token Credential** or **Bot Interconnect Static Token Credential** as the type.
9. On the form, fill in the fields.

Field	Description
Name	Enter a unique name for the credential. For example, `SNowSecondaryBotToken`.
Static token	
Header	Enter `Token`.
Static Token	Enter a password.
Hash token	
Header	Enter `x-b2b-signature`.
Algorithm	Select **HmacSHA1**.
Hash Secret	Enter the hash secret.
Authorization Algorithm	Select the algorithm to use. For example, **Secondary Bot Hash Token Auth**.

10. Click **Submit**.
11. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
12. Click the **Bot Interconnect VA API Integration** record to open it.
13. In the Connections related list, open the new connection record you created in an earlier step.
14. In the **Credential** field, enter the name of the record that contains the static token or hash token.
    For example, `SNowSecondaryBotToken`.

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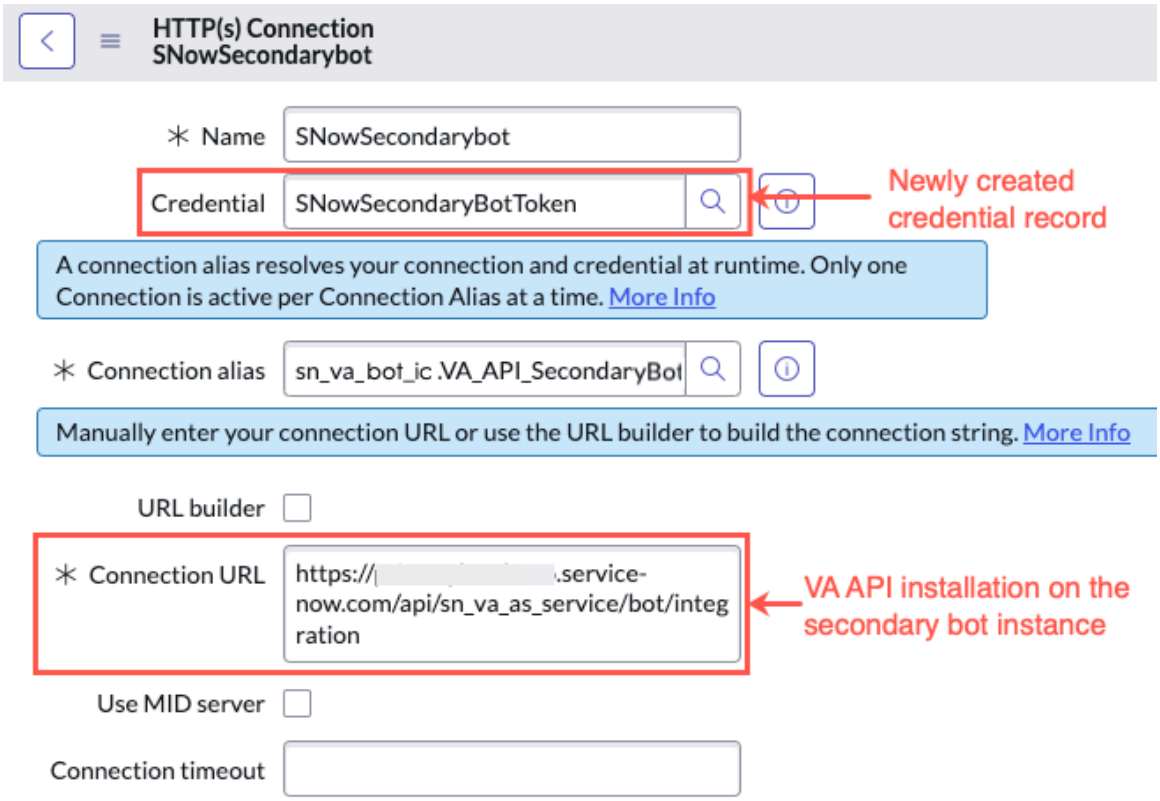
Connection and credential record in the ServiceNow Bot Interconnect instance



15. Click **Update**.

Create a connection and credential in Virtual Agent Bot Interconnect

Create a connection and credential in Virtual Agent Bot Interconnect (primary instance) to enable uploading of attachments in the secondary bot.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Click the **Bot Interconnect VA API Attachment** record to open it.
3. In the Connections related list, click **New**.
4. On the form, fill in the fields.

Field	Description
Name	Enter a unique name, such as `SNowSecondaryBotAttachment`.
Credential	Leave this blank for now.
Connection alias	Use the default value.
Connection URL	Enter the URL of your secondary instance. For example, enter `https://secondary-instance-name.service-now.com/`.

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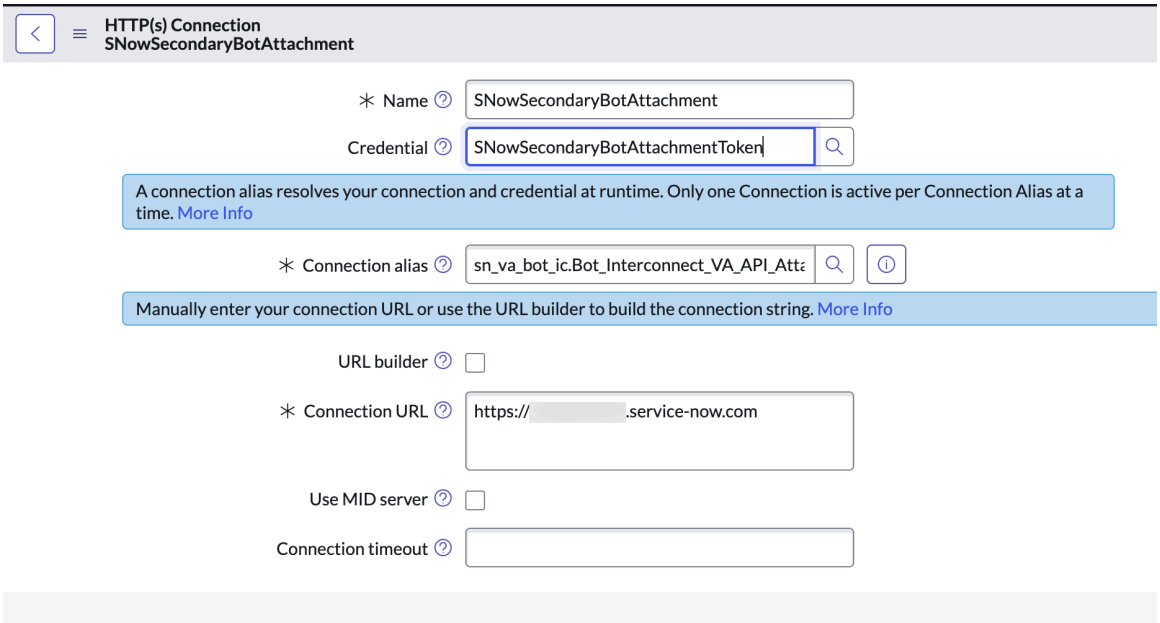
5. Click **Submit**.
6. Navigate to **All** > **Connections & Credentials** > **Credentials**.
7. On the Credentials page, click **New**.
8. Click either **Basic Auth Credentials** or **OAuth 2.0 Credentials** as the type.
9. On the form, fill in the fields.

Field	Description
Name	Enter a unique name for the credential. For example, `SNowSecondaryBotAttachmentToken`.
Basic Auth Credentials	
Username	Enter the username you want to send as basic authentication credential..
Password	Enter the password you want to send as basic authentication credential.
OAuth 2.0 Credentials	
OAuth Entity Profile	In the OAuth profile field, select the OAuth 2.0 profile that specifies the credentials you want to send.

10. Click **Submit**.
11. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
12. Click the **Bot Interconnect VA API Attachment** record to open it.
13. In the Connections related list, open the new connection record you created in an earlier step.
14. In the **Credential** field, enter the name of the record that contains the static token or hash token.
    For example, `SNowSecondaryBotAttachmentToken`.

Connection and credential record in the ServiceNow Bot Interconnect instance



15. Click **Update**.

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Create an auth token in the ServiceNow secondary instance

To use ServiceNow® Virtual Agent as a secondary bot with Virtual Agent Bot Interconnect, create an authentication token in the secondary instance.

Before you begin

Create a connection and credential in Virtual Agent Bot Interconnect.

Role required: admin

About this task

Ensure that the type of authentication (Static or Hash) and token or hash secret in the secondary instance is the same as the type and token or hash secret in the Bot Interconnect instance.

Procedure

1. Navigate to **All**, and then enter `token_verification.list` in the filter.
2. On the Token Verifications page, click **New**.
3. On the form, fill in the fields.

Token Verification form

Field	Description
Name	A unique name for the authentication token, such as `SNSecondaryBotToken`.
Token	The static token or hash secret you provided in the Bot Interconnect (primary) instance.

4. Click **Submit**.
5. Navigate to **All**, and then enter `message_auth.list` in the filter.
6. On the Message Auth page, click **New**.
7. On the form, fill in the fields.

Message Auth form

Field	Description
Name	Name of the message authentication, such as `SNtoSNAuthtoken`.
Provider	Name of the provider, such as `ServiceNowProvider`.
Group name	Name used to classify the provider.
Service Portal	Set this field to link users on Virtual Agent integrations such as Slack and Microsoft Teams to a service portal login page. If the field is empty, Virtual Agent redirects the users to the instance login page.
Inbound message verification	The name of the authentication token you created in the secondary instance. For example, `SNSecondaryBotToken`.
Outbound message creation	The name of the authentication token you created in the secondary instance. For example, `SNSecondaryBotToken`.

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Field	Description
Outbound service token	The name of the authentication token you created in the secondary instance. For example, `SNSecondaryBotToken`.

8. Click **Submit**.
9. Navigate to **All**, and then enter `sys_cs_provider_application.list` in the filter.
10. Open the VA Bot to Bot Provider Application record.
11. In the **Message auth** field, select the name of the message authentication record you created. For example, select **SNtoSNAuthtoken**.
12. Click **Update**.

Create a Virtual Agent Bot Interconnect shell topic to call Virtual Agent secondary topics

To use ServiceNow® Virtual Agent as a secondary bot with Virtual Agent Bot Interconnect, you must create at least one shell topic in Bot Interconnect.

Before you begin

Create and publish topics in the secondary instance of ServiceNow Virtual Agent.

Enable synchronous or asynchronous mode on the secondary ServiceNow Virtual Agent instance.

Role required: virtual_agent_admin or admin

About this task

There are two ways to integrate secondary Virtual Agent topics with Bot Interconnect:

- Create one Virtual Agent Bot Interconnect topic per secondary Virtual Agent topic.

  In case of NLU topics, each Bot Interconnect topic has the same name as the corresponding secondary Virtual Agent topic. For example, if you have two secondary Virtual Agent topics named **order a drink** and **book a ticket**, then you would create two Virtual Agent Bot Interconnect topics also named **order a drink** and **book a ticket**.

  In case of LLM topics, each Bot Interconnect topic has the same name and description as the corresponding secondary Virtual Agent topic.

- Map multiple secondary Virtual Agent topics to a single Virtual Agent Bot Interconnect topic. This scenario is applicable only for NLU topics.

  Create one Virtual Agent Bot Interconnect topic and name it accordingly. For example, **SVA ordering issues**. In this scenario, the secondary Virtual Agent topics are mapped to the Bot Interconnect shell topic as either keywords or utterances, depending on your method of topic discovery. So if you have two secondary Virtual Agent topics named **order a drink** and **book a ticket**, you would add both phrases to the Bot Interconnect topic as keywords or you would add them as utterances to the Bot Interconnect topic's corresponding intent.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Create a topic in your primary instance of Virtual Agent.
   In case of NLU topics, include the secondary Virtual Agent topic names as either keywords or utterances in the corresponding Bot Interconnect intent. In case of LLM topics, the topic name

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and description of the Bot Interconnect topic should match the topic name and description of the secondary Virtual Agent topic.

3. On the **Flow** tab, drag a Topic Block utility node onto the canvas.
4. Select the node, and then fill in the form as follows:

Topic Block Properties form

Property	Description
Topic Block	Select **Bot Interconnect** topic block for NLU topics and **Bot Interconnect - LLM** topic block for LLM topics.
Action Name	○ If the secondary bot is configured in synchronous mode, enter `sn_va_bot_ic.va_api_bot_interconnect_integration_handler` ○ If the secondary bot is configured in asynchronous mode, enter `sn_va_bot_ic.va_api_bot_interconnect_async_integration_handler`
Action Type	Enter `subflow`.
Async Response Transformer	If the secondary bot is configured in asynchronous mode, enter `sn_va_bot_ic.va_api_bot_interconnect_async_response_handler`

5. Click **Save**.
6. Click **Publish**.

Enable live agent connection on the primary instance

Enable live agent connection on the primary instance to route an interaction to a live agent on the secondary instance.

Before you begin

Be sure to enable *`com.glide.cs.external.agent.chat.enabled`* system property. It's not enabled by default.

Role required: admin or virtual_agent_admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Live Agent Connections**.
2. Select **New** to create a connection.
3. On the form, fill in the fields.

Live Agent Connection form fields

Field	Description
Name	Name of the connection
Active	Check box to enable the connection
Order	If there are multiple matching live agent connections, the value entered in this field determines the order in which the matching connections are displayed to the user.

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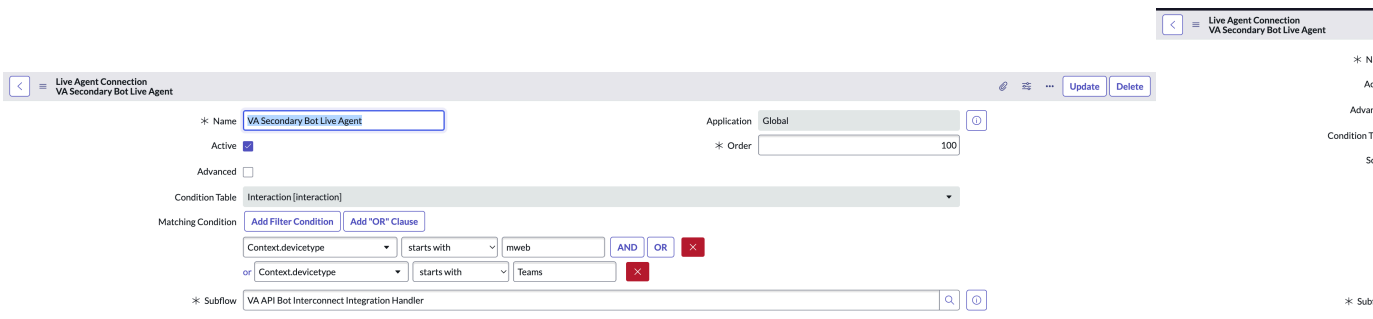
Field	Description
Advanced	Selecting this check box opens the **Script** field. You can specify conditions using JavaScript in the script editor.
Condition Table	Table used for selecting the matching condition. **Interaction** table is selected by default.
Matching Condition	Conditions to route the interaction to this live agent connection. Use the condition builder to add conditions. The fields used in the condition are from the Interaction table.
Script	JavaScript script that specifies the conditions for the interaction to be routed to this live agent connection. The condition in the script editor must evaluate to true. This field is enabled only when you select the **Advanced** check box.
Subflow	Subflow transforms the request into the secondary instance request format and routes the request to the secondary instance. Select **VA API Bot Interconnect Integration Handler**.



4. Click **Submit**.

Debug Virtual Agent Bot Interconnect with a ServiceNow Virtual Agent secondary bot

Debug Flow Designer executions of your Virtual Agent Bot Interconnect and Virtual Agent secondary bot integration.

Before you begin

Enable the following system properties:

- *sn_va_bot_ic.bot_interconnect.enable.logging* = true
- *glide.outbound_http_log.override* = true
- *glide.outbound_http_log.override.level* = all

For more information, see Add a system property.

Role required: admin

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Procedure

1. In the Bot Interconnect instance, modify the shell topic you created in Virtual Agent:

   a. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.

   b. Open the shell topic you created in a previous step.

   c. On the **Flow** tab, select the Bot Interconnect Topic Block.

   d. In the **Additional Params (String)** field, click the Script icon (</>), and then add the following code:

   ```
   (function execute() {
     return JSON.stringify({quick: false});
   })()
   ```

   e. Click Save.

   f. Save the topic.

2. Enable execution context debugging in Flow Designer.

   a. Navigate to **All** > **Process Automation** > **Process Automation Designer** > **Flow Administration** > **Settings**.

   b. On the Settings page, click **New**.

   c. In the **Flow/Subflow/Action** field, click the Search icon ().

   d. On the Select the document form, fill in the fields.
   Add the following Flow Designer document settings if your secondary bot is in synchronous mode.



   Add the following Flow Designer document settings if your secondary bot is in asynchronous mode.

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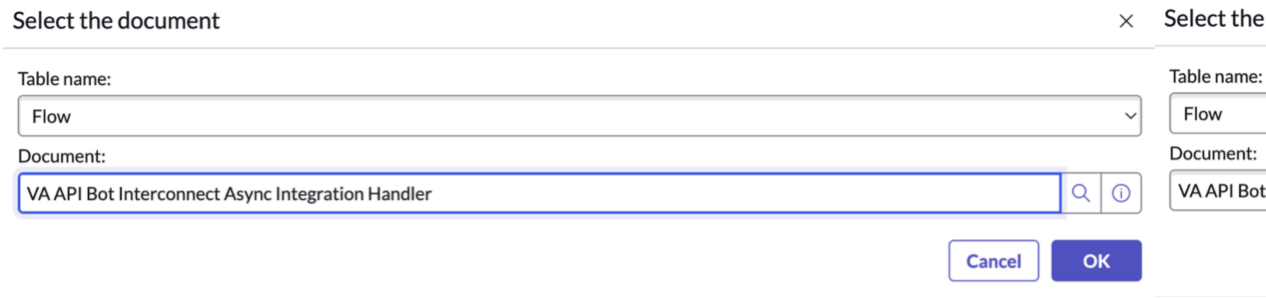

e. Click **Ok**.

f. In the **Reporting** field, select **Developer Trace**.

g. Click **Submit**.

Result
You can view additional logs and Flow Designer executions for debugging purposes.

Localization options for Virtual Agent

The ServiceNow platform provides several methods for serving your international Virtual Agent users, regardless of their language and locale. Professionally localize your conversations, use dynamic machine translation, or a combination of the two.

Direct and dynamic language support

If your chat audience is diverse, you want to support them in their own language whenever possible. One option is to localize everything professionally using linguists who can translate your topics into the desired languages. While this option produces the best user outcomes, it is often the most expensive. Another option available to you is language detection combined with dynamic machine translation. Instead of using translated topics and models, dynamic translation connects to a third-party machine translator. During the conversation, user utterances and responses are translated into the primary language on the instance, and all results are translated back into the user's language for the session. There are benefits and drawbacks for all options, as described in the following list. Before activating machine translations, you should carefully weigh the costs and benefits and set proper expectations for your deployment objectives.

Direct language support (professional localization)

A direct language strategy employs an expert linguist to configure entities, intents, strings, keywords, and vocabulary, which are then used to match user utterances with configured content. Since an expert provides translations that directly match the conversation's content, the accuracy of the translated content will be high. In addition to the translations themselves, experts can use the NLU vocabulary feature to further define words and phrases that it may encounter from your users. For example, a user may enter an acronym such as `MS`, which you can define as the vocabulary item `Microsoft`.

Professional translations are implemented directly in Virtual Agent Designer. For details, see Localizing Virtual Agent conversations.

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Using translations from professional linguists and corresponding ServiceNow language plugins

Benefits	Constraints
• More accurate translations • For supported languages, NLU intents and entities are localized	• Requires more resources to build and maintain • Longer completion time • Higher implementation costs • 5 languages have NLU intent and entity support • 12 languages have NLU intent support only • Increased coverage is not typically scalable • Not easily extensible For more information, see Language support for NLU services.

Dynamic language detection and machine translation

Dynamic machine translation relies on the translation service to translate all content in real time. The accuracy of the translations is dependent on the translation service. Although translation services typically leverage algorithms to translate words based on the context of the conversation or sentence, there may be times when there is minimal context for the algorithm to leverage. Accuracy may be diminished in this situation. Check with your translation service provider about the ability to exclude words from translation or associate vocabulary with specific synonyms.

Using dynamic translation with the supported ServiceNow language plugins

Benefits	Constraints
• Lower implementation costs • Faster completion time • Less human maintenance • ServiceNow provides 22 language plugins with basic translations	• Limited scalability • Limited extensibility • 5 languages have NLU intent and entity support • 12 languages have NLU intent support only For more information, see Language support for NLU services.

Dynamic machine translation for languages that are not supported on the ServiceNow platform provides coverage, but the quality of the user experience may be lower.

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Using dynamic translation with unsupported languages

Benefits	Constraints
• Lower implementation costs • Faster completion time • Less human maintenance • Support for many languages • Highly scalable • Highly extensible	• User experience may vary • Potential for mistranslation may reduce user outcomes

Multi-language deployment strategies

Depending on the needs of your user base, you may want a mix of solutions to maximize both user experience and access. For example, you may choose to professionally localize prioritized languages and dynamically translate others. For example, if 95% of your users speak six languages, you may decide to use a linguist to translate your topics into those six. You might then use Dynamic Translation for the remaining five percent.

You can also enable locale support by designating translated languages as fallback languages. For example, you can support Mexican Spanish users by designating Spanish as the fallback language for that locale.

In the following example, French, German, and Spanish are professionally localized, including the NLU models, intents, and entities. This localized content provides the best user experience. Polish is supported as a language on the ServiceNow platform, and when the plugin is installed and activated, it includes some translated content. In this imaginary scenario, the business decision was made to dynamically translate Polish content because it accounts for a smaller percentage of users. The quality of this experience may vary since NLU models are not localized. Instead, utterances are dynamically translated to English, and NLU topic discovery is run through the English model. Since Czech is currently not a supported language on the ServiceNow platform, dynamic machine translation is the only option. Admins can add Czech as a language and enable Dynamic Translation for the language in Virtual Agent.

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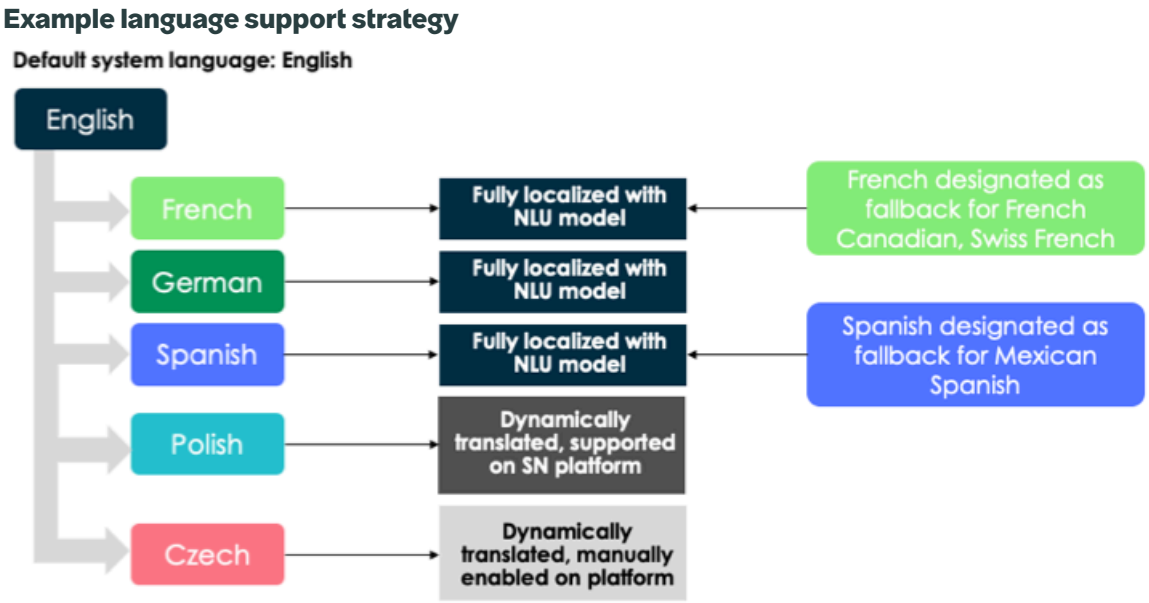

Localization insights

You can view dynamic translation and localization insights from the Virtual Agent Designer page. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**, and then click **Localization Insights**.

For more information, see Localization Insights dashboard.

Using language detection and dynamic machine translation in Virtual Agent

Enable a combination of language detection and machine translation for Virtual Agent to improve the chat experience for diverse users. You can designate fallback languages for locales or dynamically translate languages that are not professionally localized or are not supported in NLU topic discovery.

Chat users are more comfortable having conversations in their preferred language. For example, Virtual Agent greets users in the preferred language specified in their user profile. But if a user types an utterance in another language, Virtual Agent can detect the change and offer to continue the conversation in that language instead. But in many cases users don't have control over the session language, particularly if they are guest users. Guest conversations do not support language detection if resumable guest sessions are not enabled. This is why language detection and dynamic machine translation can improve the chat experience, particularly if you have conversations that have not been localized in some languages. For example, your organization may routinely localize into Spanish and French, but you may also want to support Dutch and Danish. You can enable Dynamic Translation on your ServiceNow® instance for those languages.

You can use language detection to support custom or locale-specific language codes as well. For example, NLU topic discovery doesn't support Mexican Spanish (es-mx), but it does support Spanish (es). You can designate Spanish as the fallback language for Mexican Spanish, ensuring that these users have a good customer experience.

When a language is enabled in Dynamic Translation, Virtual Agent ignores all platform translations and uses the configured machine translation service instead. If some conversations have been professionally translated, you should disable dynamic translation for those specific languages. Expert translations of your NLU models, keywords, and topics may be more accurate and of higher quality than machine translations. Prior to making a dynamic translation call, the Text Translations for Dynamic Translation [sys_cs_dynamic_translation_text] and Message [sys_ui_message] tables are checked to see if the text has been previously translated or already

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has a localization record. A dynamic translation call is only made if no translation exists in either table. After a dynamic translation call is made and that text is translated, that translated text is stored in the Text Translations for Dynamic Translation [sys_cs_dynamic_translation_text] table for future use. Storing previously translated text results in fewer dynamic translation calls to third-party translation services. For more information about localizing Virtual Agent conversations, see Localizing Virtual Agent conversations.

You can use Dynamic Translation during the localization process as well. If you are localizing conversations with professional linguists, you can enable Dynamic Translation while some topics and strings remain untranslated. When your deployment in that language is complete, you can disable Dynamic Translation, since professional translations are likely more accurate.

Virtual Agent Academy: Dynamically translate languages in Virtual Agent Watch this video for a demonstration of using Virtual Agent with Dynamic Translation.

Note:
You can use language detection independently of Dynamic Translation.

Language detection and Dynamic Translation process in Virtual Agent

When you enable language detection and Dynamic Translation for Virtual Agent for other languages, a variety of diverse users gain access to your Virtual Agent chat environment.

The default system language on your instance is the same as the default language in Virtual Agent. It is also the primary language in your NLU model, if NLU is enabled. When a user types an utterance that is not recognized as the system language, the results depend upon your configuration for that language.

Language detection and Dynamic Translation process

Language configuration	Results in Virtual Agent
Language detection and Dynamic Translation are not configured	For unlocalized conversations, the default system language is used for topics and topic discovery.
Language detection is enabled, but not Dynamic Translation	If the detected language is a locale or other language code that has been configured with a fallback language, Virtual Agent asks the user if they want to switch the conversation to the fallback language. For example, if the detected language is Mexican Spanish (mx-es), and Spanish (es) has been designated as the fallback language, Virtual Agent asks: `Would you like to switch the conversation to Spanish? (Yes/No)` If the user selects **Yes**, the fallback language is used for topic discovery and topic display. This continues until the conversation ends. If the user selects **No**, Virtual Agent will not prompt them again during the conversation.

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Language detection and Dynamic Translation process (continued)

Language configuration	Results in Virtual Agent
Language detection and Dynamic Translation are enabled	If the detected language is enabled for dynamic translation in Virtual Agent Chat Settings, Virtual Agent asks the user if they want to switch the conversation to their preferred language. For example: `Would you like to switch the conversation to Danish? (Yes/No)` If the user selects **Yes**, the utterance is translated to the default language in Virtual Agent. This process uses the machine translation software that was configured in Dynamic Translation. Topic discovery, whether keyword or NLU, is done in the default language. All topic matches are translated dynamically into the user's conversation language and displayed. Virtual Agent will continue in that language, including expecting the user to continue typing their utterances in that language. Once the conversation is ended, Virtual Agent uses the default language in the next session. If the user selects **No**, Virtual Agent will not prompt them again during the conversation.

Virtual Agent detects an utterance in a different language



The language detection and dynamic machine translation process operates according to the following principles:

- Language detection occurs only once per conversation.

  If a user tries to change the language in the middle of a conversation, Virtual Agent returns an `I didn't understand` message.

- When the conversation is closed, the primary language is restored in the next session.

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- If a user's detected language is the same as the primary language, the user is not asked to switch languages.
- If a user's detected language has no fallback language specified and dynamic translation is not enabled for it, the conversation continues in the primary language.
- If a user's detected language is not activated on the instance, the conversation continues in the primary language. For more information, see Activate a language.

Note:
AI Search results are not translated.

Dynamic Translation and Agent Chat

If Dynamic Translation is enabled on Virtual Agent but turned off for Agent Chat, the live agent will see what the user sees. If the user started the conversation in another language and chose to switch when prompted, then the live agent will see the conversation in the user's chosen language. This may cause some confusion for both the agent and the customer. To resolve this issue, consider turning on Dynamic Translation for Agent Chat as well. For details, see Configuring Dynamic Translation for Agent Chat.

Supported languages

For better results, install the ServiceNow language plugins for each language that uses dynamic translation. For a detailed list of language plugins, see Activate a language.

You can enable dynamic translation for languages that are not currently supported on the ServiceNow platform. For details, see Enable Dynamic Translation for an unsupported language.

Supported channels

Dynamic Translation for Virtual Agent is currently supported in the following channels:

- ServiceNow web client
- Microsoft Teams
- Slack
- Workplace from Facebook
- Facebook Messenger

Note:
The Virtual Agent topic test window may identify user utterances from Microsoft Teams or other adapters as `sysparm_search_text`. Dynamic Translation will translate this content as well.

The following channels do not support Dynamic Translation for Virtual Agent:

- ServiceNow mobile client
- WhatsApp
- LINE
- Twilio SMS
- Alexa
- Google Assistant
- Siri

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Prerequisites for using Dynamic Translation in Virtual Agent

To enable dynamic machine translation, install ServiceNow® language plugins and Dynamic Translation plugins. Then configure Dynamic Translation for your instance.

Before you can enable dynamic machine translation for a language, you must install and configure Dynamic Translation on your instance.

1. As an admin, install the following plugins:
   - Glide Virtual Agent (com.glide.cs.chatbot)
   - Dynamic Translation for Virtual Agent (com.glide.cs.dynamic.translation.virtual_agent)
2. Activate language plugins for each language that you want to deploy with dynamic translation.

   Note:
   Languages for Dynamic Translation are stored in the sys_cs_dynamic_translation_virtual_agent table.

3. Enable NLU languages in Virtual Agent settings, if you are using NLU topic discovery.

   Note:
   NLU detection and discovery values are stored in the sys_cs_general_settings table. As of Vancouver, ServiceNow NLU is the available NLU driver.

The following translation service providers are pre-configured once the plugins are installed:

- Microsoft Azure
- Google Translate

Configuring other translation service providers

You can configure any other translation service provider in the Dynamic Translation application as follows:

1. Integrate with a translation service provider.
2. Create a translator configuration in Dynamic Translation.
3. (Optional) Create a language code mapping to map translator language codes to the ServiceNow® language codes.

Next step

Configure Dynamic Translation service integration credentials

Configure Dynamic Translation service integration credentials

Configure the credential and connection for your translation service.

Before you begin
Complete the prerequisites for using Dynamic Translation in Virtual Agent.

Role required: admin

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Procedure

1. Create a credential for the translator service alias.
   For detailed information, see the following topics:
   - Create a credential for the MicrosoftTranslation alias
   - Configure the credential for the GoogleTranslation alias
2. Create a connection for the translator service alias.
   For detailed information, see the following topics:
   - Create a connection for the MicrosoftTranslation alias
   - Configure the connection attributes for the GoogleTranslation alias

What to do next
Activate your translation service in Dynamic Translation

Activate your translation service in Dynamic Translation

Activate your preferred Dynamic Translation provider and mark it as the default service for both translation and language detection.

Before you begin
Complete the prerequisites for using Dynamic Translation in Virtual Agent.

Configure Dynamic Translation service integration credentials.

Role required: admin

Procedure

1. Navigate to **All** > **Dynamic Translation** > **Translator Configurations**.
2. Select the name of the translation service to open the record.
3. On the Translator Configuration form, select the **Active** check box.
4. On the Preferences tab, select **Mark as default for translation**.
5. On the Preferences tab, select **Mark as default for detection**.
6. Select **Update**.

What to do next
Enable Dynamic Translation for languages in Virtual Agent

Enable Dynamic Translation for languages in Virtual Agent

Enable Dynamic Translation for one or more languages in Chat Settings for Virtual Agent.

Before you begin
Install and configure the plugins for Dynamic Translation, as described in Prerequisites for using Dynamic Translation in Virtual Agent. If these prerequisites aren't completed, the Multi language support card described in the following steps doesn't appear.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select **Virtual Agent**.
3. On the Multi language support card, do the following:

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a. Slide the **Language Detection** toggle switch to enable it.

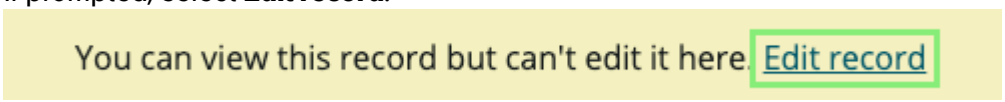
b. Slide the **Dynamic language translation** toggle switch to enable it.

c. Select **View All**.
The Multi-language support page opens. All languages that are installed on the instance are listed.

4. In the **Dynamic Translation Enabled** column, select **false** for the language you want to enable.



a. If prompted, select **Edit record**.



b. Select **Dynamic Translation Enabled**.

c. Select **Update**.

d. Return to the Multi-language support page and repeat these steps for any other language you want to enable.

5. **Optional:** Enable language detection for guest users.
If this system property is set to **off**, Dynamic Translation will not work for guest users.

a. Navigate to **All**, and then enter `sys_properties.list` in the filter.

b. In the **Name** field, search for *`com.glide.cs.guest_session_resumable`*.

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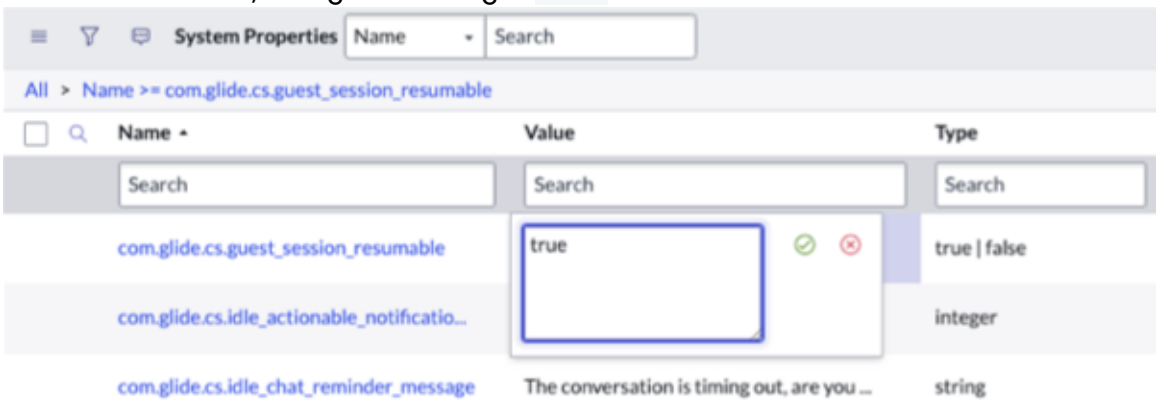
c. In the **Value** column, change the setting to `true`.



Enable Dynamic Translation for an unsupported language

The ServiceNow® platform supports several languages, but you can enable dynamic machine translation for additional languages in Virtual Agent.

Before you begin

Install and configure the plugins for Dynamic Translation, as described in Prerequisites for using Dynamic Translation in Virtual Agent.

Role required: virtual_agent_admin or admin

About this task

You can configure Dynamic Translation for any installed language plugin on the ServiceNow® platform. Once installed, the language is available for configuration in the Multi language support card in Virtual Agent Chat Settings. But if you want to support a language that doesn't have a plugin, you can add it to the Languages [sys_language] table. Once added, you can enable dynamic machine translation for that language.

For more information about multi-language support options and their tradeoffs, see Localization options for Virtual Agent. For more information about custom localizations, see Custom translations.

Procedure

1. Navigate to **All**, and then enter `sys_language.list` in the filter.
2. On the Languages page, click **New**.
3. On the form, fill in the fields.

Field	Description
Name	Name and locale of the language, if applicable. For example, **Spanish (Mexican)**.
Active	Check box indicating that the language is enabled on the instance.
ID	The BCP 47 code for the language. For example, **es-MX**.
Text Direction	Direction of text for the language. Options are **Left-to-Right** or **Right-to-Left**.
Fallback	Language to be used if a translation is not available. The language plugin must be installed on the instance and activated for NLU, if you are using NLU topic discovery.

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Field	Description
	For example, if the language is Mexican Spanish, you can specify **Spanish** as the fallback language.

4. Click **Submit**.
5. **Optional:** For a better user experience, translate some of the Virtual Agent system messages into the new language.

   a. Navigate to **All**, and then enter `sys_ui_message.list` in the filter.

   b. Translate the following Keys:

   - Are you sure you want to end the current conversation?
   - Click here to start a new conversation
   - Close contact options
   - [language name] (for example, **English** or **German**)
   - Disable audio notifications
   - End conversation
   - I have detected you are typing in {0}. Would you like to continue the conversation in {0}?
   - Just now
   - No
   - No Chat Agents Currently Available
   - Please pick an option.
   - Please type your request
   - Please type your response here
   - Send
   - Start a new conversation
   - Start typing to filter the list of topics below...
   - Support options
   - Yes

   Note:
   If you specify a supported fallback language for the language you're adding, you do not need to translate Keys in the Messages table. For example, if you add Mexican Spanish as a language, you can specify Spanish as the fallback language. The Spanish language plugin already contains translations of these messages. For more information, see Specify a fallback language for locale-specific languages and NLU prediction.

6. When the languages have been added, enable Dynamic Translation for them in Virtual Agent settings.

Specify a fallback language for locale-specific languages and NLU prediction

Provide language locale support by specifying a fallback language for Virtual Agent to use for topics, keywords, and NLU prediction. For example, the ServiceNow® platform doesn't support

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Mexican Spanish (mx-es), but it does support Spanish (es), which you can designate as the fallback language for a better user experience.

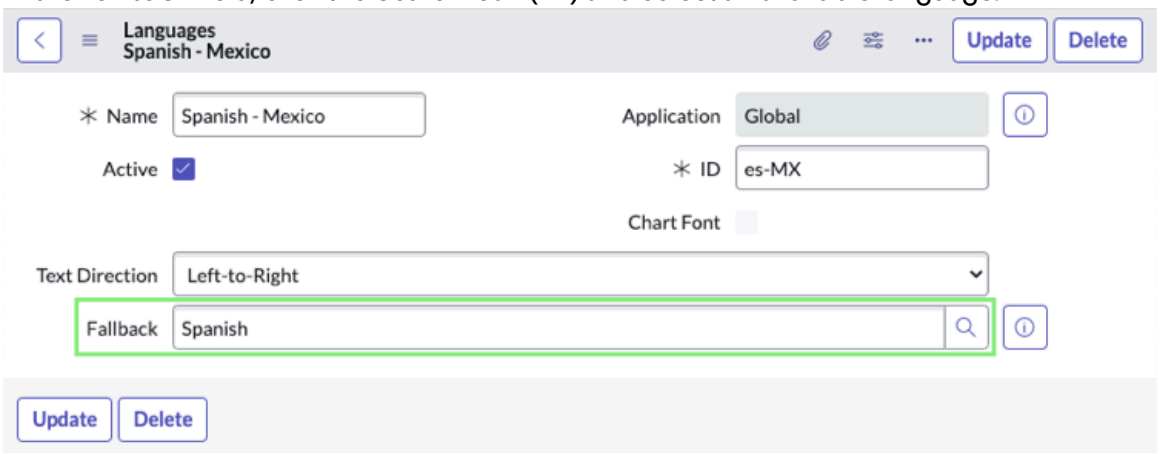
Before you begin

The fallback language plugin must be installed on the instance. Once installed, the language will be available in the Languages [sys_language] table.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select **Virtual Agent**.
3. On the Multi language support card, slide the **Language Detection** toggle switch to enable it.
4. Select **View All**.
5. Select the name of a language to open the record.
6. Select **Edit Record** at the top of the page.
7. In the **Fallback** field, click the Search icon ( ) and select an available language.



8. Click **Update**.

Result

Custom locales appear in the Languages [sys_language] table, along with their fallback language. The language code (ID) indicates a language that Virtual Agent can detect. In the following example, three French locales use French as the fallback language. Only French Canadian remains unconfigured.

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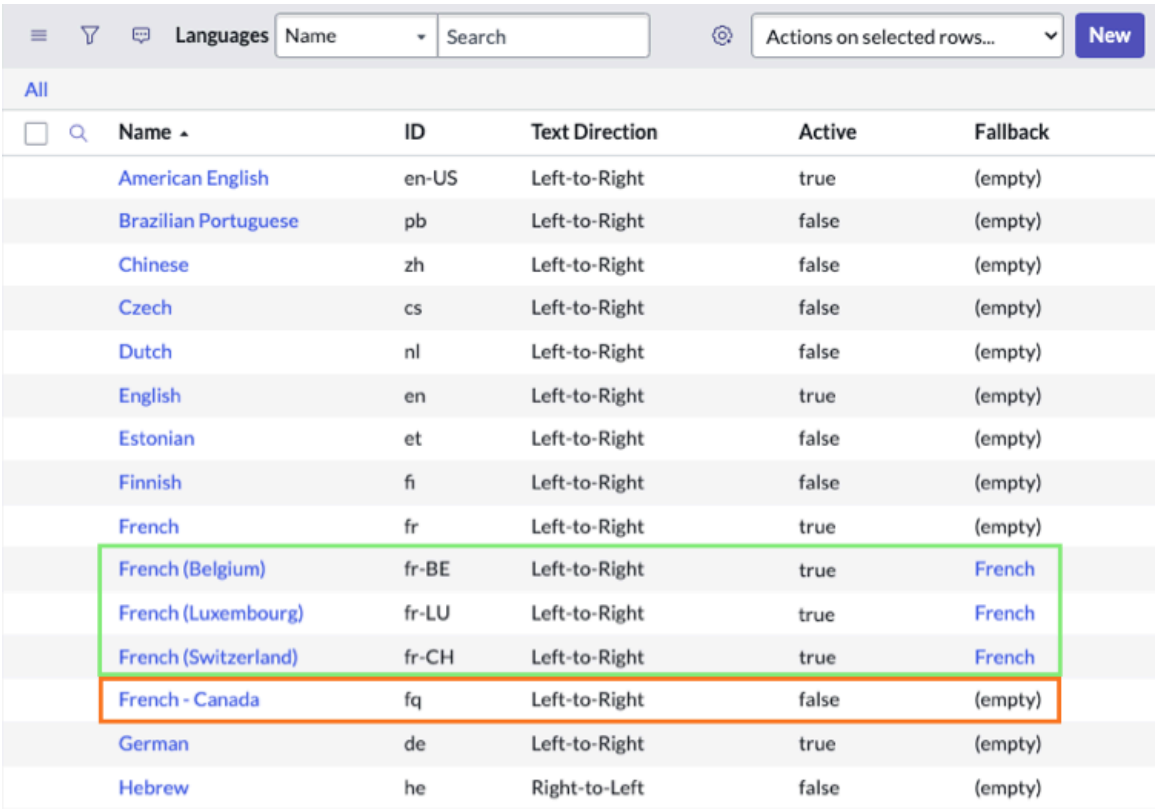

Name	ID	Text Direction	Active	Fallback
American English	en-US	Left-to-Right	true	(empty)
Brazilian Portuguese	pb	Left-to-Right	false	(empty)
Chinese	zh	Left-to-Right	false	(empty)
Czech	cs	Left-to-Right	false	(empty)
Dutch	nl	Left-to-Right	false	(empty)
English	en	Left-to-Right	true	(empty)
Estonian	et	Left-to-Right	false	(empty)
Finnish	fi	Left-to-Right	false	(empty)
French	fr	Left-to-Right	true	(empty)
French (Belgium)	fr-BE	Left-to-Right	true	French
French (Luxembourg)	fr-LU	Left-to-Right	true	French
French (Switzerland)	fr-CH	Left-to-Right	true	French
French - Canada	fq	Left-to-Right	false	(empty)
German	de	Left-to-Right	true	(empty)
Hebrew	he	Right-to-Left	false	(empty)

Localizing Virtual Agent conversations

The ServiceNow platform provides several methods for localizing Virtual Agent conversations, depending on your needs. Use the Localization Framework to manage all aspects of the translation process, whether you are using machine translation, a third-party provider, or both.

Use the ServiceNow Localization Framework to standardize and track the translation process for Virtual Agent topics. The framework enables you to define the business process for translating your conversations. Use it to configure the following:

- How localization requests are fulfilled.

  Options include machine translation, a translation management system (TMS), and exporting and importing files.

- Who is responsible for each step in the process.

  Virtual Agent uses the following roles:

  - Localization requestor
  - Localization fulfiller
  - Localization editor

- Business rules for the process:
  - Auto translation and publication
  - Approval required for translation and publication

To learn more, see Localization Framework. To learn more about localization roles, see Localization roles for Virtual Agent.

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Localizing topics

The localization process flow depends on the method of topic discovery that you are using for your topics. There are two main types of topic discovery:

- keyword topic discovery

  When you use the Localization Framework, the chat conversation and the keywords associated with the topic are translated.

- Natural Language Understanding (NLU) topic discovery

  If your topics use NLU, both the topic and the model group must be localized. When you request a translation from Virtual Agent Designer, the topic and any optional keywords are translated. You must request translation for model groups from NLU Workbench. For more information about that process, see Translate a multilingual model.

  Once the topic and secondary models are localized, you may need to map the models to the topic before publishing them.

Prerequisites

Important:
Currently, translatable strings such as topic text and bot responses cannot contain embedded quotes. Strings that contain embedded quotes cannot be localized.

Do the following before you begin managing translations:

- Activate the ServiceNow plugin for each language you want to support.

  The Localization Framework is also installed by default. For more information, see Activate a language.

- Configure the translation mode that you want to use in the Localization Framework.

  You can configure machine translation, a translation management system (TMS), or send via email. For more information, see Translation modes.

- If you are using Natural Language Understanding (NLU), enable languages in Virtual Agent settings.

  For more information, see Enable NLU languages in Virtual Agent settings.

- If necessary, add secondary languages to your NLU model group. For more information, see Multilingual model management.
- Assign localization roles to team member groups.

  Users are assigned different roles based on their responsibilities for the translation process. For more information, see Localization roles for Virtual Agent.

Manage languages by model

If NLU is enabled for your instance, you can view and manage translations by model and language. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**, and then click **Manage languages**. Choose a model and a language, and then you can do the following:

- View translation status
- Request translations

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- View or edit translations
- Test translations

Click **Manage NLU translations** for easy access to the model management page in NLU Workbench.

For more information, see Localize Virtual Agent topics that use NLU topic discovery.

Enable NLU languages in Virtual Agent settings

If you plan to use language-specific NLU models, you must enable the installed languages in the Supported NLU Languages list. A language is enabled if the **Enabled** column displays true. English language is enabled by default.

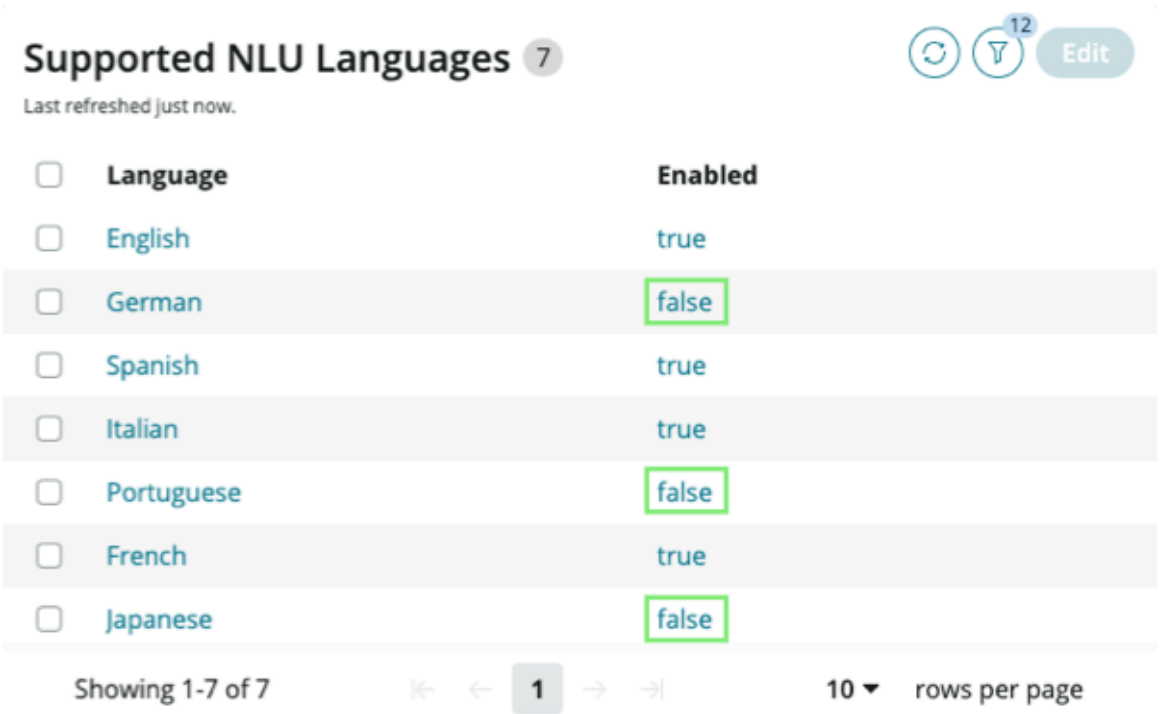
Before you begin

Activate the ServiceNow plugin for each language you want to support. For more information, see Activate a language.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Click **Virtual Agent**.
3. Under Natural Language Understanding (NLU), click **View settings**.
4. Find the languages in the Supported NLU Languages list.
5. If the Enabled column displays **false** for a language, select the link to open the language NLU properties.
   For example, in the following image, German, Portuguese, and Japanese are not enabled.



6. Select the **Enabled** check box.
7. Click **Save**.

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Localize Virtual Agent topics that use keyword topic discovery

Use the ServiceNow Localization Framework to manage the process of localizing Virtual Agent conversations and keywords.

Before you begin

Check the prerequisites for translating Virtual Agent components. For more information, see Localizing Virtual Agent conversations.

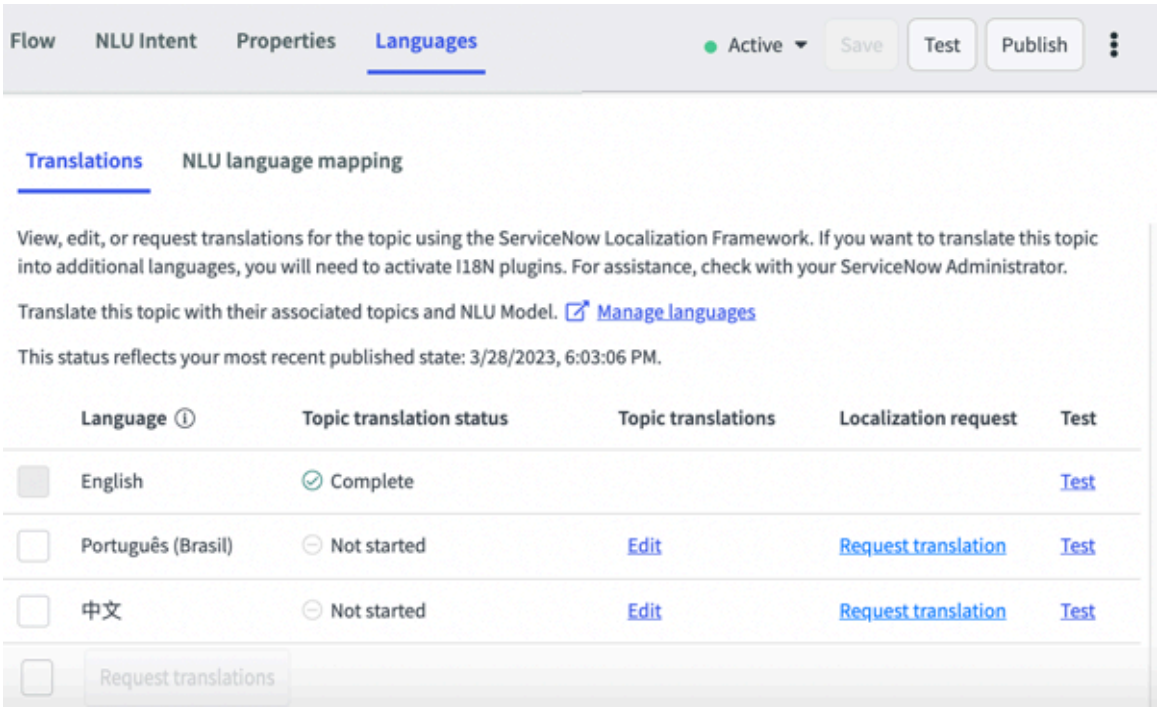
Make sure that your Virtual Agent topics are published and performing the way you want them to. Make any adjustments before you send them to localization.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Open the topic that you want to translate.
3. Click the **Languages** tab.
   Only languages that are installed and activated are displayed. To learn how to activate localization plugins, see Activate a language.

   Note:
   The ServiceNow AI Platform provides translations for interface features and pre-built topics. So in some topics, languages may display as partially translated.



4. Do one of the following:

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- Request translation:

  a. Select the applicable check boxes, and then click **Request translations**.

  b. When prompted, confirm your choice.

  A translation record is created, and the translation status changes to **In progress**. The translation task is assigned to a user with the localization fulfiller role. For information about the fulfillment process in the Localization Framework, see Fulfill a localization task.

- Edit translations directly in Virtual Agent Designer.

Result

When translations are complete, Virtual Agent admins can view, unlock, or edit them from the topic Languages tab or the Manage languages page.

Once translations are published, they are made available to Virtual Agent topics that use keywords dynamically.

Localize Virtual Agent topics that use NLU topic discovery

Use the ServiceNow Localization Framework to manage the process of localizing Virtual Agent conversations that use Natural Language Understanding (NLU).

Before you begin

Check the prerequisites for translating Virtual Agent components. For more information, see Localizing Virtual Agent conversations.

Make sure that your Virtual Agent topics are published and performing the way you want them to. Make any adjustments before you send them to localization.

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Click **Manage languages**.
3. In the **Select NLU Model** list, select the model group you want to manage.
   Intents that are mapped to a topic display on the page.
4. In the **View language** list, select a language.
   The translation status of each topic in the chosen language displays on the page. Select a topic name to open the topic in Virtual Agent Designer, view or edit translations, or test translated content. The **Topic translation status** column shows the current status of the topic in the localization process.

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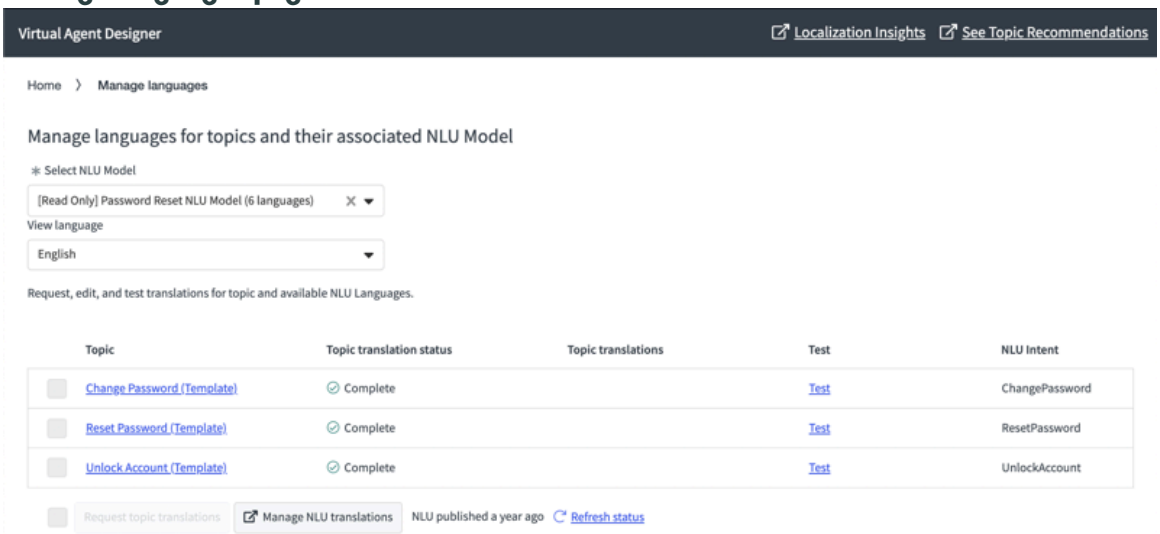
Manage languages page



If the **Topic translation status** column shows **Needs publishing**, you must publish the topic before you can submit it for translation.

> **Note:**
> The ServiceNow AI Platform provides translations for interface features and pre-built topics. So in some topics, languages may display as partially translated.

5. Do one of the following:
   - Select the check boxes for the topics you want to translate, and then click **Request topic translations**. When prompted, confirm your choice.

     A translation record is created, and the translation status changes to **In progress**. The translation task is assigned to a user with the localization fulfiller role. For information about the fulfillment process in the Localization Framework, see Fulfill a localization task.

     > **Note:**
     > If a topic is already in localization, the corresponding check box is not available.

   - Edit translations directly.
6. Click **Manage NLU translations**.
   The model opens in NLU Workbench. Request translations for your model group. For more information, see Translate a multilingual model.

Result

When translations are complete, Virtual Agent admins can view, unlock, or edit them from the topic Languages tab or the Manage languages page.

Once translations are published, they are made available to Virtual Agent topics that use keywords dynamically. However, language-specific intent matching is not available until model groups are also translated and published.

What to do next

You may need to map a topic to secondary models or a language-specific model.

When translations are done, you can test localized NLU models.

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Map a topic to a secondary NLU model

Map a Virtual Agent topic to a secondary model in the model group or to a standalone, single-language NLU model for each supported language.

Before you begin

If you're using ServiceNow NLU, review NLU model mapping in Virtual Agent Designer for an understanding of NLU model groups.

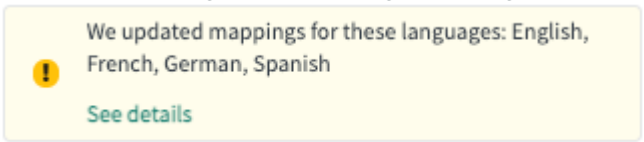
If necessary, add secondary languages to the model group in NLU Workbench to create language-specific versions of the model. For more information, see Multilingual model management.

Role required: virtual_agent_admin or admin

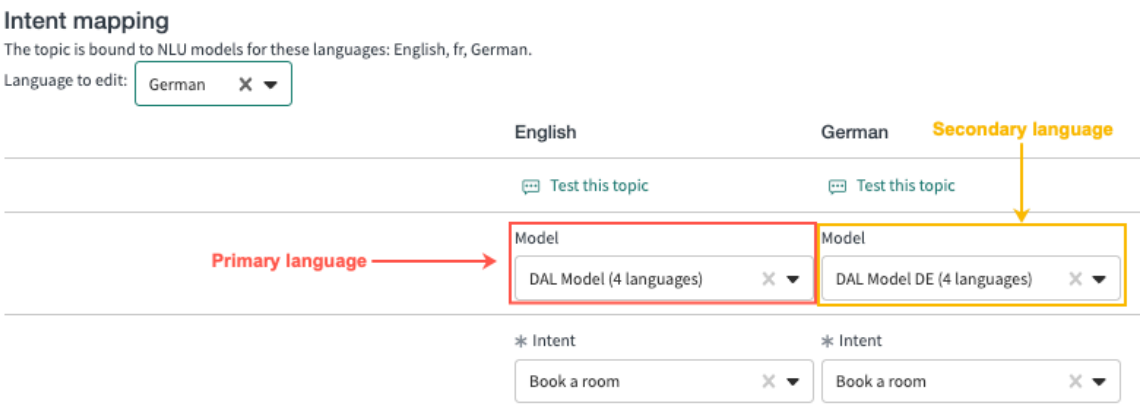
About this task

If you select a secondary model for a language that is part of a different model group, the mapping changes for the entire topic. Secondary models must be part of the same model group as the primary language. You can select a different model and intent for a secondary language when it is the only language in the model (and therefore the primary language).

Updated model group mappings message



Topic mapped to a model group with primary and secondary languages



For more information, see NLU model mapping in Virtual Agent Designer.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer** and open a topic.
2. Open the **Languages** tab, and then select the **NLU language mapping** tab.
   The first column is the NLU mapping that is based on your current session language. For example, if you're using English, the first column is **English**.
3. In the **Language to edit** list, select the language to map.
   The languages listed are based on the NLU languages that you enabled in Virtual Agent settings. After you select a language, a column displays in the Intent mapping section and, if applicable, in the Entity mapping section. For example, if you select **Français**, a French language column displays.

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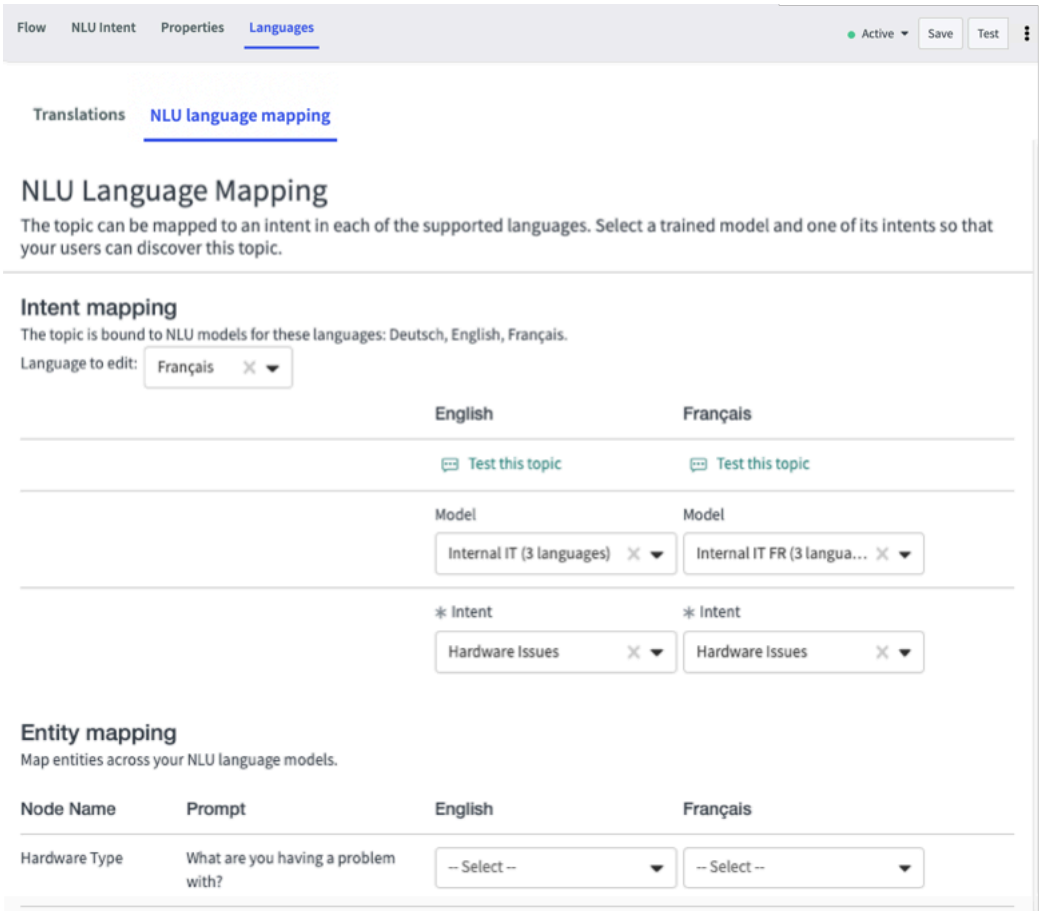

4. Update the Intent mapping section.
   a. In the Model row, select an NLU model for the language that you selected.
   b. In the Intent row, select an NLU intent for the language that you selected.
5. If applicable, update the Entity mapping section.
   For each language, map an entity from the model to an input node in the topic. In a conversation, these nodes are populated automatically with the entity value.
6. Click **Save**.

What to do next

Test topic and NLU model translations

Test topic and NLU model translations

Test a translated Virtual Agent topic and the localized NLU model to ensure that it works as expected in a conversation.

Before you begin

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. Click **Manage languages**.
3. In the **Select NLU Model** list, select the model group to test.
4. In the **View language** list, select a language.

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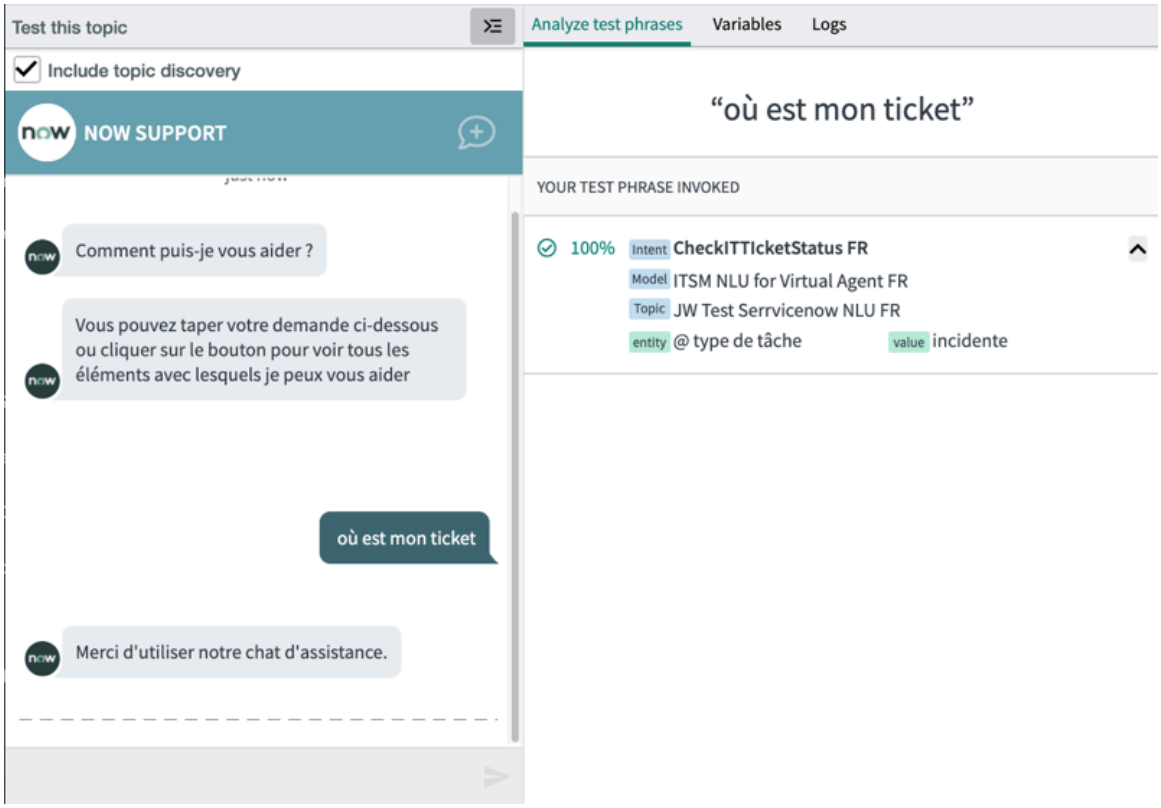
5. In the **Test** column for an intent, click **Test**.
6. On the test window that appears, run the conversation and review the results in the test tabs. For more information about using the chat test window, see Testing NLU/Keyword topics.

   Example
   The following image illustrates how you can test a French translation.



7. End the test by closing the window.

What to do next

Use the test results to modify the topic as needed. Continue testing as you adjust your topic and the NLU language mappings.

When the topic is ready, publish the topic to make it available to users. You can publish all or some of the NLU mappings. For more information about publishing a topic, see Publish a Virtual Agent topic.

Tip:
You can view localization insights from the **Manage languages** page and the Virtual Agent Designer Topics page. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**, and then click **Localization Insights**.

Edit translations for Virtual Agent topics

A Virtual Agent admin user can edit and publish translations directly in Virtual Agent Designer.

Before you begin

Role required: virtual_agent_admin or admin

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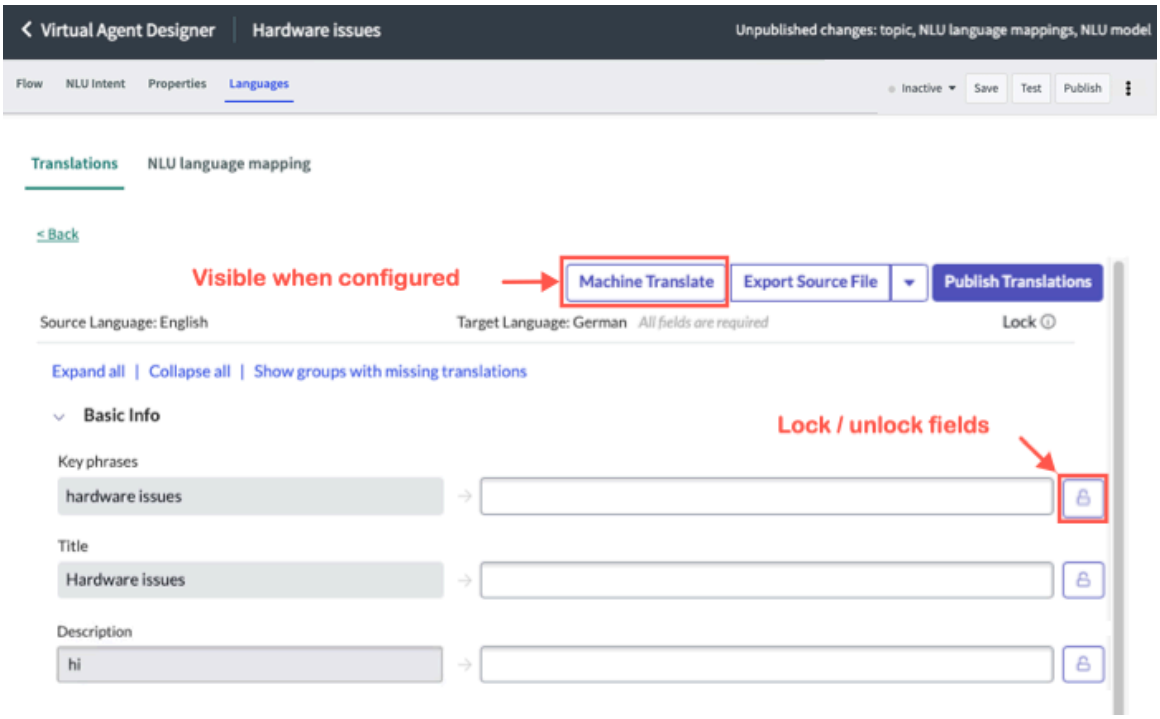
Procedure

1. Do one of the following:
   - Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**, open a published topic, and then click the **Languages** tab.
   - (NLU only) Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**, click **Manage languages**, and then choose a model and language.
2. In the **Topic translations** column, click **Edit**.

   Example
   The Edit Translations form opens.



3. On the Edit Translations form, you can do any of the following:
   - Unlock fields and enter translations directly on the form.
   - If it is configured in the Localization Framework, use machine translation to fill in the fields.

     To set up machine translation, see Create a translator configuration.
   - Export files to send to a third party for translation.

     Click **Export Source File**, and then choose the file type. Click **Export File** to begin the download.
   - Import translated files received from a translation service.

     From the Export Source file list, select **Import Translated File**.
4. When translations are ready to publish, click **Publish Translations**.

Result

Once translations are published, they are made available to Virtual Agent topics that use keywords dynamically.

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If your topic uses Natural Language Understanding (NLU), train your localized models. You may also need to map them to the topic. Then test and publish your localized models to ensure that native speakers can access localized intents. For more information, see Map a topic to a secondary NLU model and Test topic and NLU model translations.

Request bulk translations for multiple topics

If you need to translate many Virtual Agent topics across multiple models at one time, you can use the [sys_cs_topic] table list view to request translations.

Before you begin

Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All** > **sys_cs_topic.list**.
2. Select the topic records you want to translate.
3. From the **Actions on selected rows** list at the bottom of the page, select **Request Translations**.
4. In the Request Translations dialog box, select the languages.

   Only languages that are installed and activated in the Localization Framework are displayed. To learn how to activate localization plugins, see Activate a language.
5. Click **Submit**.

Authoring Virtual Agent conversations for localization

Use localization methods in your Virtual Agent scripts to ensure that the content can be translated. Localization methods are designed to show the original text when no translation is found. These methods can be applied to your code before you have created translations.

Localization method for message content

The `gs.getMessageLang` method checks the Message table [sys_ui_message] for a translated version of the text in the language selected for the current user. If a translated version isn't found, the default language (English) is returned.

This code provides a greeting that dynamically adds the value of the `first_name` variable.

```
(function execute() {
        return 'Hi there ' + vaInputs.first_name;
})()
```

The following example shows that same code rewritten for localization.

```
(function execute() {
         return gs.getMessageLang('Hi there {0}',
 vaContext.getRequesterLang()), [vaInputs.first_name]);
})()
```

The second example uses the `gs.getMessageLang` method. The text is the same as the previous example, but the format is changed. The number in brackets acts as a placeholder for the variable, which is then listed in an array after the comma: `[vaInputs.first_name]`. The `gs.getMessageLang` method searches for a record on the Message table with a key value matching `Hi there {0}` and a language value matching the requester's language. The method returns the translated version of the text, which is stored in the **Message** field of the record.

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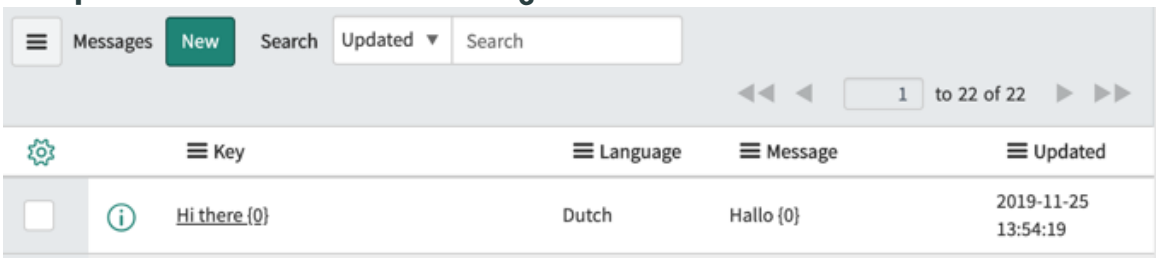
Note:
Language values use ISO standard two-character language codes. For more information, see ISO 639.1 language codes.

Example translation record in the Message table



Note:
Content is translated only for published topics. Content does not appear translated when previewing unpublished topics.

Language support for NLU services

Entity extraction is supported on ServiceNow® NLU models for specific languages only. The remaining languages support intent matching only. If you are using IBM Watson Assistant or Microsoft LUIS, supported languages vary.

You can see the list of currently supported languages in the Open NLU Driver Languages [open_nlu_driver_language] table.

The VA NLU Languages [sys_cs_nlu_language] table lists the languages that are currently enabled in Virtual Agent.

Note:
If you choose a language that doesn't support full entity extraction, an error message appears.

For unsupported language codes, you can specify a fallback language for NLU prediction. For example, if a user's language detected language is Mexican Spanish (es-mx), you can specify Spanish (es) as the fallback language, if it is enabled on your instance. For more information, see Specify a fallback language for locale-specific languages and NLU prediction. You can also enable Dynamic Translation for Virtual Agent. For details, see Using language detection and dynamic machine translation in Virtual Agent.

Supported NLU languages

Service	Supported languages
ServiceNow NLU	For intent matching and entity recognition: • English • French • German • Japanese • Spanish For intent matching only: • English • Chinese (Simplified)

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Supported NLU languages (continued)

Service	Supported languages
	• Danish • Dutch • Finnish • French • French (Canadian) • German • Italian • Japanese • Korean • Norwegian • Polish • Portuguese (Brazilian) • Spanish • Swedish
IBM Watson Assistant	• English • Chinese (Simplified) • Dutch • French • German • Italian • Japanese • Korean • Portuguese • Spanish
Microsoft LUIS	• English • Chinese (Simplified) • Dutch • French • French (Canadian) • German • Italian • Japanese • Korean • Portuguese (Brazilian)

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Supported NLU languages (continued)

Service	Supported languages
	• Spanish • Turkish
Google Dialogflow ES	• English • Chinese (Simplified) • Chinese (Traditional) • Dutch • Finnish • French • French (Canadian) • German • Italian • Japanese • Korean • Norwegian • Polish • Portuguese • Portuguese (Brazilian) • Russian • Spanish • Swedish • Thai • Turkish

Localization roles for Virtual Agent

Assign localization roles according to a user's scope in the localization process. Users may request translations, fulfill translation requests, and edit translations, based on their role.

The localization process follows this basic flow:

1. Topics are developed and released in the source language (for example, English).
2. Topics are translated, either by request or by editing them directly in Virtual Agent Designer.

   If you are using NLU models, the models must be translated as well. For more information about that process, see Multilingual model management.
3. Translations are tested and published.

Virtual Agent role privileges vary with the user's function in this process. These roles are also defined in the Localization Framework. For more information, see Localization Framework roles.

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To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

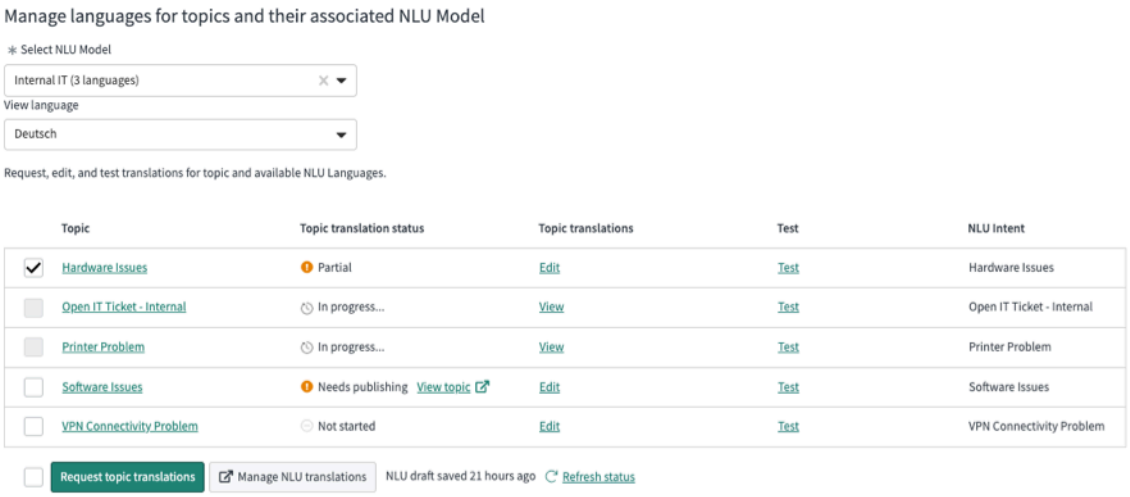
Virtual Agent admin permissions

The Virtual Agent admin role contains the localization requestor and localization editor roles by default. Users can do the following:

- Request translations
- View existing translated content
- Unlock and edit translated content (unless translation is in process)

The localization task is not available to this user.

Manage languages page with the Virtual Agent admin role

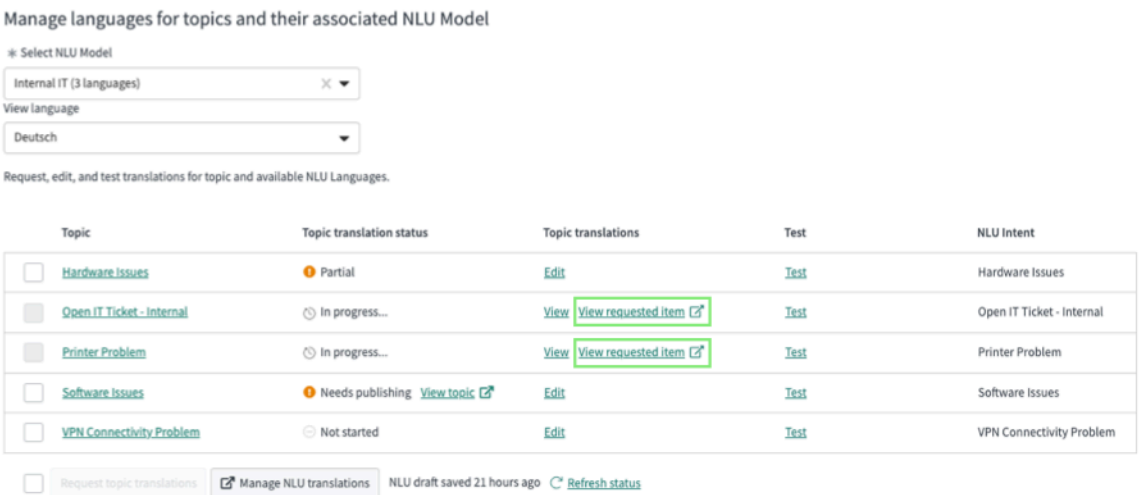


Localization fulfiller permissions

The localization fulfiller role may not have Virtual Agent privileges. In that case, the user would only have access to assigned Localization Framework tasks.

If a Virtual Agent admin has the localization fulfiller role, the **Manage languages** page lets the user view the localization task that was created.

Manage languages page with Virtual Agent admin and localization fulfiller roles



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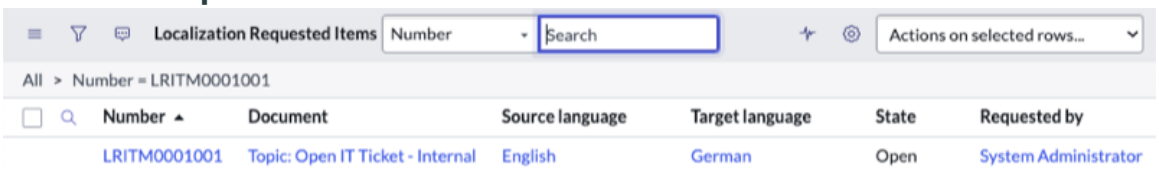
Click **View requested item** to open the localization fulfillment task in a new window.

Localization request task number



Localization requestor [localization_requestor]

Requests translations for all the Virtual Agent components into one or more languages. Can also view localization insights. The Virtual Agent admin [virtual_agent_admin] role contains this role by default.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Localization fulfiller [localization_fulfiller]

Provides translations for the requested Virtual Agent topics. Depending on the flow, duties may include editing the translations in the Localization Framework task, interacting with third parties, and loading, verifying, and publishing translations.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Localization editor [localization_editor]

Edits the translations directly in Virtual Agent Designer. The NLU admin [nlu_admin] and Virtual Agent admin [virtual_agent_admin] roles contain this role by default.

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Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Virtual Agent admin [virtual_agent_admin]

Contains the localization requestor and localization editor roles by default.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Virtual Agent translation tables

Virtual Agent uses the [sys_translated_text] and [sys_ui_message] tables to store translated text.

Translation tables used by Virtual Agent

Table	Description
Translated Text [sys_translated_text]	Stores translations for fields with the field type translated_text or translated_html (see the dictionary entry). The [sys_cs_topic] table contains the English keywords and topic titles. It pulls translations from the [sys_translated_text] table. For details about translating text content into different languages, see Translated text table and Translating text fields.
Message [sys_ui_message]	Stores expert translations for messages in Virtual Agent topics.

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Translation tables used by Virtual Agent (continued)

Table	Description
	Pre-built topics have already been translated, but you must provide translations for any content you create for your instance. For more information about the Message table, see Message table.
Text Translations for Dynamic Translation [sys_cs_dynamic_translation_text]	Stores copies of the translations found in the Message [sys_ui_message] table and previously dynamically translated messages. This view-only table is only available when the Dynamic Translation for Virtual Agent plugin is installed and the Dynamic Translation in Virtual Agent feature is enabled. This table is cleared every 24 hours to ensure that the most up-to-date translations stored in the Message [sys_ui_message] table are being referenced. For more information about how the Text Translations for Dynamic Translation [sys_cs_dyamic_translation_text] table works with Dynamic Translation in Virtual Agent, see Using language detection and dynamic machine translation in Virtual Agent.

Integrating Virtual Agent with other channels

Integrate and extend the capabilities of Virtual Agent by connecting to your employees and customers where they already are. They are engaged in web portals, Now® Mobile apps, and collaboration tools such as Slack, Microsoft Teams, Facebook Messenger consumer app, Workplace enterprise messaging app, and any other popular chat or messaging app.

Conversational custom chat integrations

Conversational custom chat integration framework is a powerful framework consisting of scriptable APIs and configurations to bring the ServiceNow® Virtual Agent to any conversational interface.

How custom chat integrations work

Virtual Agent Chat Server (VACS) supports the following chat client integration without enhancements or plugins:

- Microsoft Teams
- Slack
- Workplace
- WhatsApp
- LINE
- Facebook Messenger
- Twilio
- Alexa
- Amazon Connect
- Google Assistant

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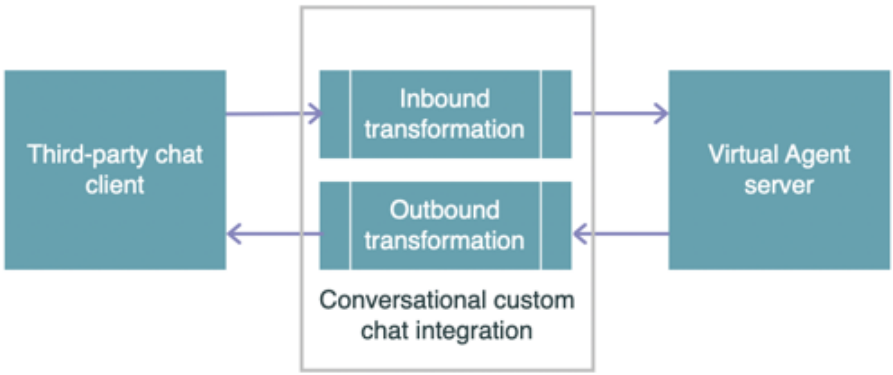
- ServiceNow® Service Portal
- ServiceNow® Now Mobile
- Apple Messages for Business

If you're using a chat client that is not in the list, you can create a custom integration using conversational custom chat integration framework.

You can use any channels that support conversational interfaces, such as Web Portals, Mobile Apps, Slack, Microsoft Teams, SMS, and any other channel and add ServiceNow® Virtual Agent to them.

With a conversational custom chat integration, you can manage and control how your end users' chat experience. The framework helps transform messages from a chat client to VACS, and VACS back to the chat client in a format that renders well on your chat interface.



The transformation is carried out through a set of Flow Designer scripts. If you want more information on how to use Flow Designer, see Flow Designer.

Basic integration using conversational custom chat integration framework

You can use the following links to configure a basic custom chat integration.

To see an example of a custom chat integration using Telegram Messenger, see the Telegram demo and integration on the ServiceNow Developer Site. (You may need to log in to access the demo.)

Create a Virtual Agent conversational custom chat integration configuration

Use the Custom Chat Configuration Integration Framework (CCCIF) to create a conversational custom chat integration to support third-party chat clients so they can connect to the Virtual Agent Chat Server (VACS).

Before you begin

Activate the Glide Virtual Agent plugin (com.glide.cs.chatbot) if it's not already activated. This plugin automatically activates the Conversational Custom Chat Integration plugin (com.glide.cs.custom.adapter) for custom chat integrations.

Role required: admin

About this task

To integrate chat clients with Virtual Agent, follow these configuration steps and add action scripts to Flow Designer.

Note:
The CCCIF uses Integration Hub. Transactions count against your Integration Hub quota.

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Procedure

1. Create a new channel or update an existing channel for the integration.
2. Configure a new provider for the integration.
3. Set up message authentication.
4. Create a channel identifier.
5. Select rich controls for inbound (user input) and outbound (bot response) transformation.
6. Create and configure a scripted REST API for your custom chat integration.
7. Create the action scripts.

Create a new channel for your custom chat integration

Create a new channel or update an existing channel for your custom chat integration. Channels are defined in the Messaging Channels [sys_cs_channel] table.

Before you begin

Activate the Glide Virtual Agent plugin (com.glide.cs.chatbot) if it's not already activated. This plugin automatically activates the Conversational Custom Chat Integration plugin (com.glide.cs.custom.adapter) for custom chat integrations.

Note:
The Conversational Custom Chat Integration Framework (CCCIF) uses Integration Hub. Transactions count against your Integration Hub quota.

Role required: admin

Procedure

1. Navigate to **All**, and then enter `sys_cs_channel.list` in the navigation filter.
2. On the Messaging Channels page, click **New**.
   Alternatively, select an existing channel to open it.
3. On the form, fill in the fields.

Field	Description
Name	Name of your channel, such as Mobile App or SMS.
Opted in all topics by default	Option to make all topics available in this channel.
Enable Notifications	Option to turn notifications on or off on this channel.
Live Agent Only	Option to initiate conversations with live agents, bypassing the Virtual Agent bot.
Store app page link	This field should be left empty.
Type	Channel type. ○ **Chat**: Standard chat experience ○ **Messaging**: Long-running conversation

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Field	Description
	○ **Phone**: Phone (audio) conversation ○ **Walk-up**: In-person conversation
Conversation Idle Timeout	Number of seconds that abandoned Virtual Agent and Agent Chat conversations remain open in the channel, after the requester's last response. This channel-specific value overrides the following settings: ○ Default idle conversation timeout value, which is 7200 seconds ○ Idle conversation time-out value set through the *com.glide.cs.conversation_idle_timeout* system property to override the default timeout value For more information about conversation idle timeouts, see Closing Virtual Agent and Agent Chat conversations.
Secure	Option for the channel to be secure to support handling of sensitive data such as passwords.
Support typing indicator	Option to display typing indicators for this channel. Flag applies to both agent and bot indicators.
Icon	This field should be left empty.

4. Click **Submit**.

What to do next
Configure a provider for your custom chat integration

Configure a provider for your custom chat integration

Create a new provider for your custom chat integration. Providers are defined in the Connections [sys_cs_provider] table.

Before you begin
Create a new channel for your custom chat integration.

Role required: admin

About this task
Configure a new provider for each integration that you set up.

Procedure
1. Navigate to **All**, and then enter `sys_cs_provider.list` in the filter.
2. On the Connections page, select **New Custom**.
3. On the form, fill in the fields.

Field	Description
Name	Name of your provider application. For example: `VA SMS Twilio Adapter`

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Field	Description
Provider attributes action	Name of the provider attributes action script. The provider attributes action script can return a Provider auth token, a user identifier, user input, and context variables.
Response processor action	Name of the response processor action script. The Response processor action script performs platform actions. For example, updating a message status based on the response received for an outbound message.
Version	The version of the provider. The framework is able to send the expected inputs to actions and subflows and handle the expected outputs. There are 2 versions: ○ **1.0.0**: The assumed version unless explicitly defined on the provider. ○ **1.1.0**: The `outbound_token` input parameter (from the provider channel identity) was added to invocations of the sender subflow/action.
HTML to Image conversion required	Option to convert an HTML bot response into an image and link. Used for chat interfaces that do not support HTML rendering.
Allow account linking	Option to link your account to an existing ServiceNow® profile.
Channel	Channel that this provider supports and the one to which the integration is being built.
Sender action	The sender action script. The sender action script bundles the request and then sends the response via Flow Designer or Integration Hub asynchronously.
Sender subflow	The sender subflow bundles the request and sends the response via Flow Designer (FD) or Integration Hub (IH) asynchronously.
Contextual action	Name of the contextual action script. The contextual action script supports custom contextual actions.

4. Click **Submit**.

What to do next

Set up message authentication for your custom chat configuration

Set up message authentication for your custom chat configuration

Create a Hash Message Verification record and Message Auth record to set up message authentication for your custom chat integration. This is configured in the Hash Message Verifications [hash_message_verification] table.

Before you begin

Configure a provider for your custom chat integration.

Role required: admin

About this task

You can create a Hash Message Verification record and Message Auth record to set up message authentication.

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Procedure

1. Navigate to **All**, and then enter `hash_message_verification.list` in the filter.
2. On the Hash Message Verifications page, click **New**.
3. On the form, fill in the fields.

Field	Description
Name	Name of the authentication token, such as TwilioSMSTestAppAuthToken.
Description	Description of the authentication token, such as "Twilio SMS Testing application Auth Token."
Secret	Authentication token (random string).

4. Click **Submit**.
5. Navigate to **All**, and then enter `message_auth.list` in the filter.
6. On the Message Auths page, click **New**.
7. On the form, fill in the fields.

Field	Description
Name	Name of the message authentication, such as VA Twilio SMS Test App Message Authentication.
Provider	Provider, such as Twilio.
Group name	Name of the group or team of the provider channel.
Service Portal	Option to redirect users to a service portal for authentication during account linking.
Inbound message verification	Hash message token that was created.
Outbound message creation	Hash message token that was created.
Outbound service token	Token passed to the sender subflow that is used to invoke REST endpoint for the chat client. Use the outbound token to send a message using the REST API.

8. Click **Submit**.

What to do next

Create a channel identifier for your custom chat integration

Create a channel identifier for your custom chat integration

Create a channel identifier for your custom chat integration in the Provider Channel Identities [sys_cs_provider_application] table.

Before you begin

Set up message authentication for your custom chat configuration.

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If you're using domain separation, change the scope to the domain you want to use before you create the channel identifier. The domain ID will be stored in the [sys_cs_provider_application] table and passed to the Virtual Agent server as a context parameter, which will set the domain for the user.

Role required: admin

Procedure

1. Navigate to **All**, and then enter `sys_cs_provider_application.list` in the filter.
2. On the Provider Channel Identities page, click **New**.
3. On the form, fill in the fields.

Name	Name of the channel identity. For example: `VA SMS Twilio Adapter`
Provider	Select the name of your provider application that you set up in a previous step. For example: `VA SMS Twilio Adapter Pro`.
Default Portal	Portal in which chat links to ServiceNow records are opened by default, including links in cards used for Virtual Agent notifications and AI Search results.
Message auth	Select message authentication for the channel identifier that you set up in a previous step.
Inbound ID	Identifier for your bot. For example, the phone number.
Short description	Description for your channel identifier.

4. Click **Submit**.
5. **Optional:** Follow these steps again to create additional channel identifiers.

What to do next

Map rich controls to the channel in your custom chat integration

Map rich controls to the channel in your custom chat integration

Create records for rich controls in the Custom Adapter Configurations [sys_cs_custom_adapter_config] table. If a rich control is missing an outbound transformer implementation, a response is not served to the end user and that user may get an unsatisfactory chat experience.

Before you begin

Create a channel identifier for your custom chat integration.

Role required: admin

About this task

You must create a mapping for any rich controls your conversations will use in the channel. For example, you may need a mapping for *`DefaultText`*, which supports input and output text response, along with file upload and image response. If your channel doesn't support a control, then you won't need to map it. For example, SMS doesn't support video responses. For a description of each default rich control, see Default input and output rich controls for a custom chat integration.

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Procedure

1. Navigate to **All**, and then enter `sys_cs_custom_adapter_config.list` in the filter.
2. On the Custom Adapter Configurations page, click **New**.
3. On the form, fill in the fields.

Field	Description
Provider	Provider that you created.
Control type	Default rich control type. For example, the DefaultPicker rich control type maps to File Picker, Topic Picker, and Boolean For more information about the types of controls, see Default input and output rich controls fo custom chat integration.
Inbound transformer action	Name of the inbound transformer action script for this rich control. For example: `sn_va_sms_twilio.va_sms_twilio_adapter_input_text_inbound_transf`
Outbound transformation action	Name of the outbound transformer action script for this rich control. For example: `sn_va_sms_twilio.va_sms_twilio_adapter_input_text_outbound_trans`

4. Click **Submit**.

What to do next

Create and configure a scripted REST API for your custom chat integration

Create and configure a scripted REST API for your custom chat integration

Create a scripted REST API, add a scripted REST resource, set security and content negotiation, and set REST API rate limits.

Before you begin

Map rich controls to the channel in your custom chat integration.

Role required: admin

Procedure

1. Create the REST API.
   a. Navigate to **All** > **System web services** > **Scripted Web Services** > **Scripted REST APIs**.
   b. Click **New**.
   c. On the form, fill in the fields.

Field	Description
Name	Name of your API. For example, `ACME Mobile App Chat Adapter`.
API ID	API identifier. For example, `acme_chat`.
Protection policy	The protection policy for the script.

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Field	Description
	▪ **Read-only**: Script is viewable only. ▪ **Protected**: Users with password permissions can edit the script.
Application	The application containing the script record. **Global** is selected by default.
API namespace	The namespace the API belongs to. The value depends on the current application scope.

d. Click **Submit**.

e. Optional: Open the new record, navigate to **Related Links** and click **Enable Versioning**, and then click **OK**.
Click **Update** to save your changes.

2. Add a scripted REST resource to your new REST API.
The scripted REST resource defines the scripted REST API definition that you created.

a. Open the REST API record you created, and then navigate to the **Resources** tab under **Related Links**.

b. Click **New**.
Retrieve the payload from the request, and then write it to a hybrid queue.

c. On the form, fill in the fields.

Field	Description
API Definition	Name of the parent API.
Application	The application containing the script record.
Name	Name of your API REST Resource. For example, **ACME chat**.
API version	API version. For example, **v1**. This field displays only if you enabled versioning for the REST API.
Active	Option to make the REST resource active.
HTTP method	HTTP method, such as POST, GET, and so forth.
Relative path	Relative path to the resource.
Script	Script for the REST resource.
Protection policy	The protection policy for the script. ▪ **Read-only**: Script is viewable only. ▪ **Protected**: Users with password permissions can edit the script.

Example of a scripted REST resource:

```
(function process(/*RESTAPIRequest*/
 request, /*RESTAPIResponse*/ response) {
    var body = request.body;
```

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```
    var queryParams = request.queryParams; // incoming
 content is application/x-www-form-urlencoded in this example
    // get the provider application sys id. this can be done
 via a glide query using incoming data such as where the
 original message is being sent to. or it can be hard-coded
 such as this example.
    var providerAppId = "a5f8b75b7377001042281188caf6a73a";
    // the time of receipt is recorded for analytics purposes
    var d = new Date();
    var logTime = d.getTime();
    // add this message to the VA Server queue for processing
    var queued =
 sn_cs.VASystemObject.enqueueCustomAdapterMessage(providerApp
Id, JSON.stringify(queryParams),
 JSON.stringify(request.headers), logTime);
    if (queued == false) {
 response.setError(new sn_ws_err.BadRequestError('Failed to
 process the request.'));
    }
})(request, response);
```

3. Set security and content negotiation for your scripted REST resource.
   Choose to set authentication and request formats. If your custom integration does not rely on authentication, you may want to remove it as follows.
   a. In the new record for the Scripted REST Resource, navigate to the **Security** tab.
   b. Clear **Requires authentication**.
   c. Click the **Content Negotiation** tab, and then select **Override supported request formats**.
   d. Click **Submit**.
4. Set REST API rate limits to define the rate of incoming requests.
   a. Navigate to **All** > **System web services** > **REST** > **Rate Limit Rules**.
   b. Click **New**.
   c. On the form, fill in the fields.

Field	Description
Name	Unique name for the rate limit rule.
REST API	REST API that you created in an earlier step.
Version	Version of the REST API. Values listed depend on the selected REST API.
Resource	Resource for the specified Version. Values listed depend on the selected Version.
Active	Check box to indicate that the rate limit rule is active. Rate limit rules are activated by default as soon as you create them. You can deactivate rate limit rules to stop enforcing a rate limit or activate rate limit rules to resume enforcing a rate limit.

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Field	Description
Request limit per hour	Maximum number of requests allowed per hour. **Note:** Whenever you update the value of this field, the ServiceNow AI Platform resets the count of requests to 0 and deletes all violations for the current hour.
Apply to	Users restricted by this rule. Select **All users**.

d. Click **Submit**.

What to do next

Create the action scripts for your custom chat integration

Create the action scripts for your custom chat integration

Set up the transforms that your custom chat integration needs to communicate through the chat process.

Before you begin

Create and configure a scripted REST API for your custom chat integration.

Note:
All action messages relevant to the chat client are displayed to requesters during live agent conversations.

Role required: admin

Procedure

1. Navigate to the **All** > **Process Automation** > **Flow Designer**.
2. Click the **Actions** tab.
3. Create the actions you require to complete the conversational custom chat integration. For details about the input and output used in action scripts, along with script examples, see Virtual Agent action scripts.

Default input and output rich controls for a custom chat integration

Input and output rich controls must be mapped to your custom chat integration in the Custom Adapter Configurations [sys_cs_custom_adapter_config] table. If a rich control is missing an outbound transformer implementation, a response is not served to the end user and that user may get an unsatisfactory chat experience.

The following default rich controls map to input and output rich controls. The *uiType* parameter refers to a topic control used to build conversations in Virtual Agent Designer.

Default input and output rich controls

Rich control	Description
ActionRichControl	This component handles the different events and actions that occur in a conversation. Some actions may not apply to all channels. For example, StartSpinnerActionMsg is ignored in SMS.

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Default input and output rich controls (continued)

Rich control	Description
	ServiceNow® Virtual Agent produces the following types of action messages through this framework. The custom chat interface only recognizes certain action message types. • SeparatorActionMsg ||actionMsg instanceof • SystemActionMsg ||actionMsg instanceof • TopicFinishedActionMsg ||actionMsg instanceof • SwitchToVirtualAgentActionMsg ||actionMsg instanceof • SwitchConversationActionMsg ||actionMsg instanceof • ChatSubHeaderActionMsg ||actionMsg instanceof • StartSpinnerActionMsg ||actionMsg instanceof EndSpinnerActionMsg • SubscribetoSupportQueue ||actionMsg instanceof • SubscribeToChatPresence ||actionMsg instanceof • SwitchToLiveAgentActionMsg ||actionMsg instanceof ActionRichControl wraps these messages inside the *actionMsg* element. So, a single outbound transformer for ActionRichControl can handle all of these messages. There is no need for an inbound transformer for this component.
agentInfo parameter	If the rich control is sent from a live agent, then the *agentInfo* attribute is added to the rich control. Example: `{ uiType: "someType", group: "someGroup" agentInfo: { sentFromAgent: true } // please note that this object may contain more info in subsequent releases. ... }`
DefaultPicker	Maps to File Picker, Topic Picker, and Boolean controls. Example: `{ uiType: "Picker/TopicPicker/Boolean", group: "DefaultPicker", nluTextEnabled: true/false, promptMsg: "", // optional (needed for TopicPicker)`

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Default input and output rich controls (continued)

Rich control	Description

	<pre>label: "The question for the list", // always filled
	itemType: "Picture/List" // needed to user key to expect picture attached
	options: [
	{
	label: "display label prompt",
	value: "the value required to satisfy the question",
	description: "a description of value_1 item"
	attachment: "www.foo",
	enabled: true/false
	},
	...
	]
	}</pre>
	The optional *order* parameter lets you specify the order in which promoted topics should display. For example:
	<pre>"options": [
	{
	label: "Check IT Ticket Status",
	value: "55720b465bf0201024f11fc40a81c72d",
	order: 100,
	enabled: true
	},
	{
	label: "Live Agent Support",
	value: "ce2ee85053130010cf8cddeeff7b12bf",
	order: 200,
	enabled: true
	},
	{
	label: "Open IT Ticket 2",
	value: "2a46cffbc7602010v088bbf603c260a7",
	order: 300,
	enabled: true
	}
	]</pre>

DefaultText	Maps to Input Text, Output Text, and File Upload controls. Example:

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Default input and output rich controls (continued)

Rich control	Description

	<pre>{
	    uiType:
	 "InputText/OutputText/FileUpload/Picture",
	    group: "DefaultText",
	    required: true/false,
	    nluTextEnabled: true/false,
	    itemType:
	 "file/image/inputtext/outputtext",
	    maskType: "SECURE/SENSITIVE/NONE"
	  // null except for
	 InputText/OutputText
	    label: "The Question?"
	}</pre>

DefaultDate	Maps to Date and Time controls.
	<pre>{
	    uiType: "Date/DateTime/Time",
	    group: "DefaultDate",
	    required: true/false,
	    nluTextEnabled: true/false,
	    label: "The Question?"
	
	}</pre>

DefaultOutputLink	Maps to link response controls.
	Example:
	<pre>{
	    uiType: "OutputLink",
	    group: "DefaultOutputLink",
	    label: "link label",
	    header: "link header",
	    type: "link",
	    value: {
	        action: "www.foo",
	    }
	}
	
	}</pre>

DefaultOutputImage	Maps to image response controls.
	Example:
	<pre>{
	    uiType: "OutputImage",
	    group: "DefaultOutputImage",
	    value: "www.foo"
	}</pre>

DefaultOutputCard	Maps to card response controls.

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Default input and output rich controls (continued)

Rich control	Description
	Example: `{ uiType: "OutputCard", group: "DefaultOutputCard", templateName: "Card", data: "some json data string" }`
DefaultOutputHtml	Maps to HTML response controls. Example: `{ uiType: "OutputHtml", group: "DefaultOutputHtml", style: "inline", height: 100, width: 100, value: "<div>html</div>" }`
DefaultOutputTable	Maps to table response controls. Example: `{ uiType: "OutputTable", group: "DefaultOutputTable", label: "Table Title", headers: ["Column 1", "Column 2"], navigationBtnLabel: "See next", data: [ ["foo1", "foo2"], ["bar1", "bar2"] ] }`
DefaultGroupedPartsOutputControl	Maps to multi-response controls. Example: `{ uiType: "GroupedPartsOutputControl", group: "DefaultGroupedPartsOutputControl" groupPartType: "Link", header: "header message", values: [ { action: "www.foo", description: "description", label: "link_1 label", context: "ITSM" },`

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Default input and output rich controls (continued)

Rich control	Description
	...] }

DefaultMultiPartOutput	Maps to multi-response controls.
	
	Example:
	{
	uiType: "MultiPartOutput",
	group: "DefaultMultiPartOutput"
	navigationBtnLabel: "Go next",
	content: {
	uiType: "OutputHtml",
	style: "inline",
	type: "html",
	height: 100,
	width: 100,
	value: " html "
	}
	}

DefaultCustomControl	Maps to custom controls.
	
	Example:
	{
	uiType: "CustomControl",
	group: "DefaultCustomControl",
	name: "The name of the Custom Control (sys_cs_custom_control.name)",
	required: true/false,
	uxComponentDefinitionSysId: "seismicComponentId" // or null if not
	isInput: true/false, // whether to wait for a response value or if just output
	serializedControlData: "User defined JSON from generateControlData function";
	}

Modify adapter card styles for Virtual Agent

Adapter cards are defined in the Adapter Cards [sys_cs_adapter_card] table. Each card has a template for each supported channel to ensure it displays correctly. You can modify the channel templates to accommodate your organization's style requirements.

Before you begin

Adapter card templates are stored in the Adapter Card Templates [sys_cs_adapter_card_template] table, which is available from the Adapter Cards table as a related list. For example, the YouTube Video Card adapter has three default templates, for the Web client, iOS, and Android devices.

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Role required: virtual_agent_admin or admin

Procedure

1. Navigate to **All**, and then enter `sys_cs_adapter_card.list` in the navigation filter. The Adapter Cards page opens.
2. Select an entry in the **Card Name** column.
3. In the **Adapter Cards Template** related list, select the channel you want to view or modify. For example, select the active link for **Web Client** or **Android Device** to view the corresponding style sheet.
4. Make any changes in the **Template Definition** field.
5. Select **Update**.

Supported Virtual Agent and Agent Chat features for custom chat integrations

The chat integrations framework supports a multitude of Virtual Agent and Agent Chat features to provide a robust conversational experience.

User authentication, authorization, and secure connection setup

Synchronous authentication of messages

Provider authentication is synchronous. They will get an immediate response with the request successful or failure code. For configuration information, see Synchronous authentication of messages.

> **Note:**
> As of the Paris release, asynchronous authentication is no longer supported.

Account auto-linking

Allow a user's third-party account to be auto-linked to their ServiceNow® profile. This feature bypasses the prompt for the user to link their accounts manually. Without account linking, conversations will take place in Guest mode. For configuration information, see Account linking in pre-built messaging integrations.

Configure the output response REST endpoint and outbound authentication for the Virtual Agent API

Specify the outbound endpoint URL to which the Virtual Agent responses are posted and configure outbound authentication. For configuration information, see Outbound authentication using a token.

Secure data transfer

Sensitive data such as passwords can be masked and transferred via the integration framework securely.

Trusted media domains

Use trusted media domains to check the URLs of attachment files before uploading them. For configuration information, see Set up trusted media domains for secure file upload.

Rich control transformation

Design a rich and unique conversational experience for a channel through rich control transformation via inbound and outbound transformation scripts. All standard rich controls are supported. For detailed information about Virtual Agent controls, see the following sections:

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- Virtual Agent Designer user input controls
- Virtual Agent Designer bot responses
- Virtual Agent Designer utilities

Supported Virtual Agent chat features

No configuration or scripting required to implement these features in Custom Chat Integration Framework.

Support for all standard Virtual Agent controls

- Pass context variables, system parameters, or a user's time-zone along with user input.
- By default the Virtual Agent processes only one user request at a time. If a user sends a second request before the first request is finished, the second request is ignored. This does not apply when the user is connected to a live agent.
- Ignore duplicate requests from client.

Topic discovery using keywords or Natural Language Understanding

Custom chat integrations can avail topic discovery via keywords or NLU depending on how Virtual Agent is set up on your instance.

Standard chat and long-running conversations

Channels can be set up as either chat or messaging. For more information on long-running conversations, see Using Asynchronous Chat in messaging channels.

Custom Virtual Agent chat experiences

Define a custom chat experience for a specific context in which your users run Virtual Agent.

Dynamic translation

Display a message in chat client that messages are being translated if dynamic translation is enabled.

Customize Virtual Agent and Agent Chat system messages

System messages are a set of pre-built messages that can be served as bot response in common conversation scenarios such as greeting a user or transferring to a live agent. Admins can override the message text to suit their business needs.

Notifications

Deliver both simple and actionable notifications via the integration framework.

Standard timeouts for idle agent conversations

You can change the default timeout period for closing Virtual Agent and live agent conversations by adding the system property *com.glide.cs.conversation_idle_timeout*.

Virtual Agent interaction records

The channel (sys_cs_channel.Name), channel type (sys_cs_channel.Type), provider (sys_cs_provider.Name), provider identifier name (sys_cs_provider_application.Name) and provider channel id (sys_cs_provider_application.InboundID) fields are available for reporting.

API rate limiting

Ability to control the rate at which API calls are made via the platform rate limiting feature.

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API versioning

Specify the version of the provider. The framework is able to send the expected inputs to actions and subflows and handle the expected outputs. See Configure a provider for your custom chat integration for more information.

Specify the default portal for URL navigation at the Provider Channel Identities level

For a provider channel, specify the portal in which chat links, including links in output cards and cards for Virtual Agent notifications and AI Search results, are opened. For details on setting the default portal in the Provider Channel Identities [sys_cs_provider_application] table, see Create a channel identifier for your custom chat integration. To learn more about URL navigation, see Configure URL navigation for chat links.

Supported Agent Chat features

Support for all standard live agent controls

- Transfer to live agent from Virtual Agent or directly by user
- Persistent messages after live agent is initiated
- Interaction history (chat transcripts) for live agents
- Channel-level flag to initiate conversations with live agents, bypassing Virtual Agent

Live agent status for end users

- Agent availability
- Wait time for next agent
- Display agent name and avatar, if enabled in Agent Chat settings.

Channel-level flag to initiate conversations with live agents, bypassing Virtual Agent

Enable the **Live Agent Only** option in the Messaging Channels [sys_cs_channel] table to route conversations directly to a live agent and skip the Virtual Agent conversation greeting. If an agent isn't available, the message **No agent available** is displayed to the user. For channel configuration information, see Create a new channel for your custom chat integration.

Pass the agent avatar and name if enabled in Agent Chat settings

When the **Agent Names and Avatars** field is enabled in Agent Chat settings, the Custom Chat Integration Framework supports the display of the agent name and avatar in the chat. For more information, see Setting up Agent Chat.

Pre-chat and post-chat surveys

After an agent ends a chat, the post-chat survey runs automatically when the following criteria are met:

- The Virtual Agent Feedback setup topic is enabled.
- The chat service channel and the queues that your live agents support are configured in Advanced Work Assignment.

Synchronous authentication of messages

Inbound message authentication is performed before the message is added to the hybrid queue.

This code has to be implemented in the provider attribute script. For more information, see Virtual Agent action scripts.

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Example: Synchronous authentication of messages

```
var validated =
 sn_cs.VASystemObject.validateMessage(providerApp.sysId,
 payload, JSON.stringify(headers));
if (validated === false) {
    response.setStatus(401);
    response.setContentType("test/xml")
    var writer = response.getStreamWriter();
    writer.writeString(
```

Outbound authentication using a token

Pass an outbound token from the authentication API to the sender script.

Secure Fields: Outbound Authentication Token Script

Secure fields contain the `maskType` metadata field as "SECURE". The client can handle the following script appropriately.

Example: Outbound authentication token script

```
(function execute(inputs, outputs) {
    try {
        var results = inputs.result;

        var sendInputs = {
            app_inbound_id : inputs["app_inbound_id"],
            channel_user_id: inputs["channel_user_id"],
            messages: JSON.stringify(results)
        };


 sn_fd.FlowAPI.startSubflowQuick('sn_va_sms_twilio.va_sms_twilio
_adapter_send_sms', sendInputs);
        //return
 sn_fd.FlowAPI.executeActionQuick('sn_va_sms_twilio.va_sms_twili
o_adapter_sender_handler', sendInputs);


    } catch (e) {
        gs.error("Messages: " + JSON.stringify(sendInputs));
        gs.error("Error is twilio sms sender : " + e.message);
    }
})(inputs, outputs);
```

Message delivery order

Control message delivery order by enabling the **Maintain message ordering** option in the Provider Channel [sys_cs_provider] table. You can view the message order and status in the Custom Adapter Message [sys_cs_ca_message] table.

When you enable the **Maintain messaging order** option in the Provider Channel table, a Sender Subflow occurs only after the previous Sender Subflow completes to ensure that messages are delivered in the order that they were sent.

Messages are stored in the Custom Adapter Message [sys_cs_ca_message] table, which is cleaned nightly. If the Custom Chat Integration Framework client is not receiving any messages, you can use this table to check the message delivery status:

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- Processing
- Pending - not yet processed
- Completed
- Error - problem with processing an outbound message, possibly due to Integration Hub issues that could occur when the Sender Subflow is invoked

Virtual Agent action scripts

You need to write a set of mandatory Flow Designer action and subflow scripts to pass the user data to VACS, apply transformations and send the response back to your chat interface endpoint.

Provider and inbound/outbound scripts

A provider, such as Twilio, provides the chat capability. User action scripts perform provider actions, as well as conversational custom chat integration configuration for inbound and outbound transformer actions for your chatbot or custom conversations. Examples of each script are provided. They include a description of what each script does, as well as the action input and action output. You also see examples of the script JSON.

You use Flow Designer to build these scripts to transform server and client messages. The provider, sender, and inbound/outbound transformer scripts are required. You can use the additional scripts to add more functionality to your chat.

Scripts

Script name	Purpose	Required (Y/N)
Provider attribute	Contains a Provider Auth token, a user identifier, user input, and context variables.	Y
Sender action	Bundles the request, and sends a response asynchronously via Flow Designer or Integration Hub.	Y
Response processor	Performs platform actions, such as an update message status, that's based on a response received for an outbound message.	N
Contextual action	Supports contextual actions.	N
Link account action	Provides a callback about whether account linking was successful or not.	N
Outbound transformer	Transforms a chat server's supported control to chat interface-specific rendering.	Y
Inbound transformer	Optional. You can use the default rich controls if they apply to your chat provider. You do not need to provide a separate inbound transform for each input control. If a default behavior does not work, you can override the default with your own inbound transform for a specific Virtual Agent server control.	Y

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Provider attributes action script

The provider attributes action script extracts data from the incoming message. The script knows about the conversational custom chat integration protocol and outputs the content of the incoming message, the user ID of the sender, and an optional authentication token.

Note:
If your provider attributes action script has a contextual action, your script must have both the request_context.contextual_action and request_context.typed_value so that the user input (which is matched to a contextual action) is included in the transcript. If you do not set the request_context.typed_value, that message content does not appear in the transcript.

Provider attributes action script input/output

Input	Output

• Headers (JSON) - Request headers
• Payload (JSON) - Request body
	• Token (String) - Authentication token.
	• provider_user_id (String) - Name of the sender, for example, a user name in a Slack message.
	• request_context (JSON) - Actual content received.
	  ○ typed_value - Typed content such as an answer to a question.
	  ○ attachment_value.url - URL of the attachment.
	  ○ attachment_value.content_type - Content type of the attachment.
	  ○ attachment_value.name - File name of the attachment.
	  ○ contextual action - Action to perform, such as END_CONVERSATION, START_CONVERSATION, AGENT. This script looks at the incoming message. If there is a recognized keyword, then one of the actions can be set, such as outputs.request_context.contextual_action = "END_CONVERSATION";. The framework recognizes this keyword and invokes the contextual action script.
	  ○ context_vars - Contextual variables to pass into a conversation, such as `outputs.request_context.context_vars = {language: "en"};`.

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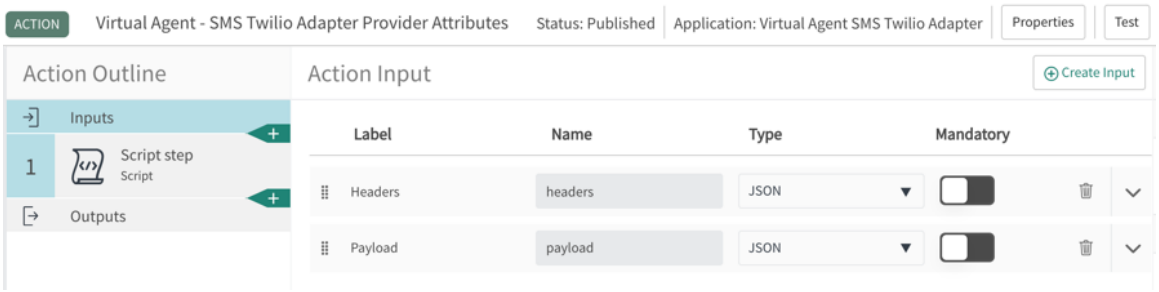
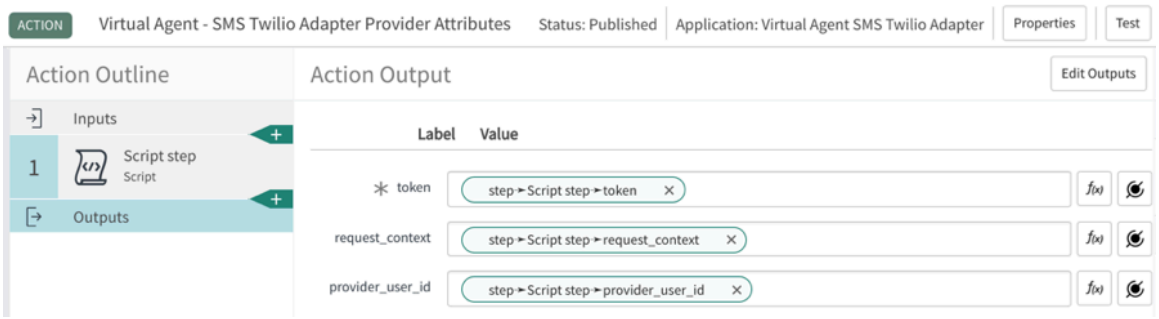
Example: Flow Designer provider attributes action script input, including headers and payload



Example: Flow Designer provider attributes action script output, including token, request_context, and provider_user_id



Example: Provider attributes action script.

```
(function execute(inputs, outputs) {
    var headers = (inputs.headers);
    var payload = (inputs.payload);

    // check if an authentication token was included. this is
optional.
    var smsUtil = new VASMSTwilioUtil();
    outputs.token = JSON.stringify(smsUtil.getToken(headers,
payload));

    var data = payload.data;
    var request_context = {};
    // inspect the actual message. it could be an MMS
(attachment) or raw text
    if (data['MediaUrl0']) {
        var attachment_value = {};
        attachment_value.url = data['MediaUrl0'];
        attachment_value.content_type =
data['MediaContentType0'];
        attachment_value.name =
smsUtil.getFileName(attachment_value.url ,
attachment_value.content_type);
        request_context.attachment_value = attachment_value;
    } else {
       request_context.typed_value = data['Body'];
    }

    // set the mandatory outputs
    outputs.request_context = request_context;
```

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```
    outputs.provider_user_id = data.From;
})(inputs, outputs);
```

Sender subflow script

The sender subflow script knows how to send a message to the provider. The script should asynchronously invoke a Flow Designer or Integration Hub subflow. The Virtual Agent is freed to continue processing messages rather than trying to send external requests. When creating a subflow do not have an action call an action within the subflow.

```
}else{
  outputs.sendmessage = true;
  messages = inputs.results.results;
  outputs.from = from;
  outputs.to = to;
  outputs.messages = getMessages(messages);
}
```

Contextual action script

The contextual action script performs special keyword actions such as typing `agent` while inside a Virtual Agent topic to get immediately handed off to a live agent.

Contextual action script Input

Input	Output
• conversation_id (String) - The conversation ID. • request_context (JSON) - Request passed from the provider attribute script that contains the action to perform, such as (END_CONVERSATION, START_CONVERSATION, AGENT).	None

Example: Contextual action script.

```
(function execute(inputs, outputs) {
  var contextual_action =
 inputs.request_context.contextual_action;
  if (contextual_action === "END_CONVERSATION") {

 sn_cs.VASystemObject.endConversation(inputs.conversation_id);
  } else if (contextual_action === "AGENT") {

 sn_cs.VASystemObject.switchToLiveAgent(inputs.conversation_id);
  } else if (contextual_action === "START_CONVERSATION") {

 sn_cs.VASystemObject.startConversation(inputs.conversation_id);
  }
})(inputs, outputs);
```

Link account action script

The link account action script contains identifiers for the user who is linking. The script also contains the account that it is linked to.

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Link account action script Input

Input	Output
• provider_user_id (String) - Identifier of the user who is linking, such as a phone number in an SMS case. • status (String) - Success/failure. • user_id (String) - ServiceNow user_sys_id for the account that was linked to.	None

Example: Link account action script.

```
(function execute(inputs, outputs) {

  var richControl = (inputs.rich_control);
  var value = richControl.value;
  outputs.result = richControl.header + ': ' + value.action;

})(inputs, outputs);
```

Response processor action script

The response processor action script performs specialty actions that are based on the response to a send message request. The framework already does basic message status tracking.

Response processor account action script input

Input	Output
• message_id (String) - Identifier of sys_cs_message record that is associated with this response. • headers (JSON) - Headers that are received. • body (String) - Body that is received. • status code (Integer) - The HTTP status code that is received.	None

Example: Response processor action script.

```
(function execute(inputs, outputs) {
    gs.debug("Response from provider: message_id = " +
 inputs.message_id + ", status_code = " +
     inputs.status_code + ", headers = " +
 JSON.stringify(inputs.headers) + ", body = " + inputs.body);
})(inputs, outputs);
```

Outbound transformer scripts

The outbound transformer scripts convert outgoing Virtual Agent messages to a protocol that is related to the conversational custom chat integration.

Input.

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- rich_control (JSON) - Virtual Agent server rich control component that must be transformed.
- payload (JSON) - Last response that was received from a requester.

Output.

result (String) - Provider-appropriate component message to send.

Examples: Outbound transformer scripts

Outbound transformer name	Script example
Virtual Agent - SMS Twilio Adapter Default Text Outbound Transformer	`(function execute(inputs, outputs) {  var rich_control = inputs.rich_control;  outputs.result = rich_control['label'];})(inputs, outputs);`
Virtual Agent - SMS Twilio Adapter Default Link Outbound Transformer	`(function execute(inputs, outputs) {  var richControl = (inputs.rich_control);  var value = richControl.value;  outputs.result = richControl.header + ': ' + value.action;})(inputs, outputs);`
Virtual Agent - SMS Twilio Adapter Default Picker Outbound Transformer	`(function execute(inputs, outputs) { var rich_control = inputs.rich_control; var options = rich_control['options']; if (options && options.length > 0) { var optionsLength = options.length; var picker = rich_control['label'] || ""; for (var x = 0; x < optionsLength; x++) { picker += "\n" + (x+1) + ": " + options[x].label; } } outputs.text_message = picker;})(inputs, outputs);`
Virtual Agent - SMS Twilio Adapter Default Multi Link Outbound Transformer	`(function execute(inputs, outputs) {  var rich_control = inputs.rich_control;  var linkResult = rich_control['header'];  var totalValues = rich_control['values'].length;`

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Examples: Outbound transformer scripts (continued)

Outbound transformer name	Script example

	``
	  for (var i = 0; i < totalValues;
	i++) {
	   linkResult = linkResult + '\n';
	   var linkValue =
	rich_control['values'][i];
	   linkResult = linkResult + '\n'
	+ linkValue['description'] + ': ' +
	linkValue['action'];
	  }
	  outputs.result = linkResult;
	})(inputs, outputs);
	``

Virtual Agent - SMS Twilio Adapter Default Card Outbound Transformer	```
	(function execute(inputs, outputs) {
	  var richControl =
	(inputs.rich_control);
	  var data =
	JSON.parse(richControl.data);
	  var tableTitle = data.title;
	  var fields = data.fields;
	  var subtitle = data.subtitle;
	  var url = data.url;
	  var message = subtitle ?
	getCardLine(tableTitle, subtitle) :
	tableTitle + "\n";
	  for (var i= 0; i<fields.length; i++)
	{
	    message +=
	getCardLine(fields[i].fieldLabel,
	fields[i].fieldValue);
	  }
	  message += url;
	  outputs.result = message;
	
	  function getCardLine(key, value) {
	    if (value == '' || value == null
	|| key == '' || key == null)
	      return;
	    return key + ": " + value +
	"\n";
	  }
	})(inputs, outputs);
	``

Inbound transformer scripts

The inbound transformer scripts convert incoming conversational custom chat integration messages to a protocol that the Virtual Agent recognizes. It determines the required value to be injected into the rich control that is presented to the user.

Input.

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- request_context (JSON) - The request passed from the Provider Attribute script.
- rich_control (JSON) - The last rich control sent to the requester that contains the original "question".

Output.

result (JSON) - The result expected by the Virtual Agent server. If the requester is responding to a topic picker, it is the sys_id of the topic. If the requester is responding to an input text, it is the text response.

- value - sys_id or text value.
- search_text - Text that is used if the requester selected something that was unexpected. For example, a user typed something that the NLU could assist with, such as, "None of these options match what I want" in response to a topic picker component.

Examples: Inbound transformer scripts

Inbound transformer name	Script example

Virtual Agent - SMS Twilio Adapter Default Text Inbound Transformer
 	
Purpose: Find the text response to the InputText question posed
	(function execute(inputs, outputs) {
	  var requestContext = inputs.request_context;
	  var richControl = inputs.rich_control;
	  var typedValue = requestContext['typed_value'];
	  var attachmentValue = requestContext['attachment_value'];
	  var smsUtil = new VASMSTwilioUtil();
	  var result = {};
	  if(richControl['itemType'] == 'image' || richControl['itemType'] == 'file') {
	  if (attachmentValue && attachmentValue.content_type.includes('image')) {
	  result.url = attachmentValue.url;
	  result.content_type = attachmentValue.content_type;
	  result.name = attachmentValue.name;
	  result.headers = attachmentValue.headers;
	  } else if (typedValue) {
	  result.url = typedValue;
	  var contentType = smsUtil.getContentType(typedValue);
	  if (typeof contentType === 'undefined')
	  gs.error('Please enter a valid image link. Inbound image link: {0}', typedValue);
	  else

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Examples: Inbound transformer scripts (continued)

Inbound transformer name	Script example

	result.content_type = contentType;
	} else {
	gs.error('Please upload an image or enter a valid image link.');
	}
	}
	result['value'] = typedValue;
	result['search_text'] = '';
	outputs.result = result;
	})(inputs, outputs);

Virtual Agent - SMS Twilio Adapter Default Picker Inbound Transformer
 	
Purpose: Find the sys_id of the option that the user selected for this picker question. This script uses the same algorithm of the outbound transformer. If no options are selected, and the user typed something instead, then the "search_text" is set and fed into NLU if it is enabled on this instance.
	(function execute(inputs, outputs) {
	var request_context = inputs.request_context;
	var rich_control = inputs.rich_control;
	var selectedValue = request_context["typed_value"];
	var result = {};
	result["value"] = "";
	result["search_text"] = "";
	if (rich_control['options']) {
	var options = rich_control['options'];
	var optionsLength = options.length;
	selectedValue === Number(selectedValue)
	if (selectedValue > 0 && selectedValue <= optionsLength) {
	var selectedOption = options[selectedValue - 1];
	result["value"] = selectedOption.value;
	} else {
	result["search_text"] = request_context["typed_value"];
	}
	}
	outputs.result = result;
	})(inputs, outputs);

Set up trusted media domains for secure file upload

Virtual Agent uses trusted media domains to check the URLs of attachment files before uploading them. If a URL is not from a trusted domain, Virtual Agent will not upload the attachment.

Before you begin

Role required: admin

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About this task

For custom chat integrations, specify trusted media domains in either the Provider [sys_cs_provider] table or the Provider Channel Identity [sys_cs_provider_application] table. The trusted media domain values in the Provider Channel Identity table override the corresponding values in the Provider table.

Pre-built integrations, such as Slack, Microsoft Teams, and Workplace from Facebook, have default trusted media domain values set at the provider level, in the Provider [sys_cs_provider] table. To change the default trusted values, specify the different trusted media domains in the Provider Channel Identity [sys_cs_provider_application] table.

Procedure

1. Navigate to **All** > **sys_cs_provider_application.list** > **Provider Channel Identity** and click **New**.
2. On the form, fill in the fields.

Provider Channel Identity form

Name	Name of the channel identity. For example: `VA SMS Twilio Adapter`
Provider	Select the name of your provider application that you set up previously. For example: `VA SMS Twilio Adapter Pro`.
Message auth	Message authentication for the channel identifier.
Inbound ID	Identifier for your bot. For example, the phone number.
Trusted media domains	Comma-separated list of one or more trusted domains for the provider. For example: `twilio.com`, `slack.com` **Note:** Subdomains under a trusted domain are also trusted. You do not need to specify subdomains in this list. If this field is not visible, you can configure the form layout to show it. For security reasons, Virtual Agent checks that the URLs for attachments in conversations are from trusted domains specified here. If the URL is not for a trusted domain, Virtual Agent doesn't upload the attachment. If an attachment upload fails because Virtual Agent didn't trust the domain, Virtual Agent does not inform the end user why the attachment upload failed. **Note:** For Trusted Domains In custom chat integrations, the values specified in the Trusted media domains field of the Provider Channel Identities table [sys_cs_provider_application] takes precedence over the Connections table [sys_cs_provider] and hence overrides.
Short description	Description for your channel identifier.

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3. Click **Submit**.
4. **Optional:** Create additional channel identifiers using the same procedure.

Create bot messages

Create channel-specific bot messages.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Channel Integrations** > **Connections** and select a connection.
2. In the **Provider Channel Identity** tab, select a provider channel identity.
3. Select **New** in the **Bot Messages** table.
4. In the form, fill in the fields.

Bot Messages Form

Field	Description
Name	Name of your bot message
Value	Text displayed when a bot message is triggered
Description	Description of the bot message, such as Welcome message or Instructional message for image upload
Message Type	Default selection is Bot Message
Provider Channel Identity	Select the Provider Channel Identity

5. Select **Submit**.

Bot message implementation

Use the bot messages API to implement channel-specific bot messages.

Bot message API

Use the following API to incorporate bot messages into your custom chat integration.

Example: Bot message implementation

```
function getBotMessage(providerId, inboundId, botMessageName) {
    // fetch the bot message using bot messages api
    var botMessages =
 sn_cs.VASystemObject.getAllBotMessages(providerId, inboundId);
    if (botMessages && botMessages[botMessageName]) {
        var botMessage = botMessages[botMessageName];
        botMessage = botMessage.trim();
        if (botMessage) {
            return botMessage;
        }
```

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```
    }
}
```

Integrate custom controls

Implement and leverage custom controls built using the custom control framework in your integration.

Before you begin

Role required: virtual_agent_admin or admin

About this task

Map custom controls to a provider channel.

Implement custom controls created in Flow Designer

Use the example script to implement custom controls created in Flow Designer.

Example: Custom controls support

```
{
    uiType: "CustomControl",
    group: "DefaultCustomControl",
    name: "The name of the Custom Control
 (sys_cs_custom_control.name)",
    required: true/false,
    uxComponentDefinitionSysId: "seismicComponentId" //
 or null if not
    isInput: true/false, // whether to wait for a
 response value or if just output
    serializedControlData: "User defined JSON from
 generateControlData function";
}
```

Example: Custom controls script

```
(function execute(inputs, outputs) {
    var rich_controls = inputs.rich_control;
    //this is the data returned from the 'serialized
 control data function' defind in designer
    var serializedControlData =
 rich_control['serializedControlData'];
    // if this rich control will require a response to
 move forward in topic flow
    var isInput = rich_control['isInput'];
    // if the component is suggesting using a Seismic
 control (web) that handles this
    var uxComponentDefinitionId =
 rich_control['uxComponentDefinitionSysId'];
    // the name of the custom control
    var name - rich_control['name'];

    // 1) now perform some logic to transform this
 data into a custom ui (slack/facebook/sms ascii
 art/html/etc)
    // 2) attach to outputs, i.e.
 outputs.text_message='foo :)'; for sms twillio
```

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```
    // basic flow is to take the
 serializedControlData/Name/compId(optional) and create
 a custom UI component here
    // that your client understands (i.e. a slack rich
 form payload)
})(inputs, outputs);
```

Implement a provider-specific transformation of a custom control

You can implement a provider-specific transformation for each custom control by using the **Sub type** field in the Custom Adapter Configuration [sys_cs_custom_adapter_config] table. You can publish a newer version of a custom control or a pre-built, ServiceNow custom control, also referred to as a default custom control, if needed. This involves publishing the appropriate Inbound and Outbound Flow Designer action scripts and updating the configuration in the Custom Adapter Configuration [sys_cs_custom_adapter_config] table.

- If you're publishing your own version of a ServiceNow custom control, overwrite the custom control record in the Custom Adapter Configuration table with your own Inbound and Outbound action script names.
- Only one record with the same **Sub type** is allowed. If the same custom control is implemented by two different parties, only one can update the existing record with new Inbound and Outbound transformers.

Note:
Once you override an existing custom control record, the system uses the new version of the custom control. For example, transformation scripts can transform multiple custom controls, such as Time Picker and Auth. If you add a Time Picker control with different inbound and outbound transforms, the newer Time Picker control is used. You cannot revert to the original version of the custom control.

Procedure

1. Navigate to **All**, and then enter `sys_cs_custom_adapter_config.list` in the filter.
2. Select **New**.
3. On the form, fill in the fields.

Custom Adapter Configurations form

Field	Description
Provider	The name of the channel identifier for your custom chat integration. For details, see Create a channel identifier for your custom chat integration.
Control type	Select the custom control that you designed. For custom controls, the type is always DefaultCustomControl. To learn more about custom controls, see Customizing Virtual Agent with custom controls.
Sub type	Name of the custom control.
Inbound transformer action	Name of the inbound transformer action script for this rich control, such as, sn_va_sms_twilio.va_sms_twilio_adapter_input_text_inbound_transformer.

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Field	Description
Outbound transformation action	Name of the outbound transformer action script for this rich control, such as, sn_va_sms_twilio.va_sms_twilio_adapter_input_text_outbound_transformer.

4. Select **Submit**.

Multi-step responses

An example of multi-step response is a set of images in a carousel or a date control.

Multipart Control Attributes for RichControl in UI Transformation

Multipart Control richControl has the following attributes, which can be used to transform control.

- content: Rich Control which must be presented in current step.
- navigationBtnLabel: Label for "next" or "more" button for user to click to move to next step.

Example:

```
{
        uiType: "MultiPartOutput",
        group: "DefaultMultiPartOutput",
        navigationBtnLabel: "Go next",
        content: {
                uiType: "OutputHtml",
                style: "inline",
                type: "html",
                height: 100,
                width: 100,
                value: "<div>html</div>"
        }
}
```

Outbound transformation script

```
(function execute(inputs, outputs) {

    try{
      var richControl = inputs.rich_control;
      var payload = inputs.payload;

      var content = richControl.content;
      var navigationBtnLabel = richControl.navigationBtnLabel;
      var uiType = content.uiType;
      var partResult = null;

      switch (uiType) {
        case "OutputText":
          partResult =
 sn_fd.FlowAPI.executeActionQuick('example_default_text_outbound
_transformer', {
              rich_control : content,
              payload : payload
            });
          break;
```

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```
        case "OutputLink":
          partResult =
 sn_fd.FlowAPI.executeActionQuick('example_default_output_link_o
utbound_transformer', {
              rich_control : content,
              payload : payload
            });
          break;
        case "OutputImage":
          partResult =
 sn_fd.FlowAPI.executeActionQuick('example_default_image_outboun
d_transformer', {
              rich_control : content,
              payload : payload
            });
          break;
        case "OutputHtml":
          partResult =
 sn_fd.FlowAPI.executeActionQuick('example_default_html_outbound
_transformer', {
              rich_control : content,
              payload : payload
            });
          break;
        default:
          break;
      }
      partResult =  partResult +
 addButtonMore(navigationBtnLabel)
      outputs.result = JSON.stringify(outActivity);
    }
    catch(e){
      gs.error("Error in default multipart outbound
 transformer : " + e.message);
      throw e;
    }

  })(inputs, outputs);
```

Inbound transformation script

```
  (function execute(inputs, outputs) {
    try {
      var requestContext = inputs.request_context;
      var typedValue = requestContext.typed_value;
      outputs.result = typedValue;
    } catch(e) {
       gs.error("Error in default multipart inbound
 transformer : " + e.message);
       throw e;
    }
  })(inputs, outputs);
```

Multi-response output controls

Implement controls that involve multiple steps to get user input.

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Use the following API to configure context data for multi-output controls.

Common use cases

1. To achieve pagination of pickers: page_no, pagination_length updated in inbound based on next/previous button is read in outbound.
2. Step by step response of date picker like first year, then month, and then date selection.

The following APIs are only available in inbound and outbound transformers.

```
sn_cs.VASystemObject.setProviderUserContext( key, contextData,
 providerAppId, providerUserId);
sn_cs.VASystemObject.getProviderUserContext(key, providerAppId,
 providerUserId);
sn_cs.VASystemObject.removeProviderUserContext(key,
 providerAppId, providerUserId);
sn_cs.VASystemObject.removeAllProviderUserContext(providerAppId,
 providerUserId)
```

The outbound transformer of the picker control can store current page details in user contextData.

```
 var paginationData = {
          "page_index": 1,
          "pagination_length": 2
    }
};
sn_cs.VASystemObject.setProviderUserContext("picker_pagination",
 paginationData, providerAppId, providerUserId, );
```

The inbound transformer of picker control can get current page details from user contextData.

```
var paginationData =
 sn_cs.VASystemObject.getProviderUserContext("picker_paginatio
n", providerAppId, providerUserId);
```

Example code for picker control outbound transformer

```
(function execute(inputs, outputs) {
    var control = inputs.rich_control;
    var payload = inputs.payload;
    var appId = payload.appId;
    var userId = payload.userId;

    var paginationData =
 sn_cs.VASystemObject.getProviderUserContext('picker_control',
 appId, userId);
    paginationData = JSON.parse(paginationData);
    //First time when the outbound picker is called when
 selecting the topic.
    if (paginationData == null) {
        paginationData = {
            'page_index': 1,
            'pagination_length': 5
        };
```

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```
 sn_cs.VASystemObject.setProviderUserContext('picker_control',
 paginationData, appId, userId);
    }

    var page_index = paginationData['page_index'];
    var pagination_length = paginationData['pagination_length'];
    var start = (page_index - 1) * pagination_length;
    var end = page_index * pagination_length;

    if (control['options']) {
        var options = control['options'];
        var optionsLength = options.length;
        if (end > optionsLength)
            end = optionsLength;
        var picker = control["label"] + ":";
        if (start > 0)
            picker += "\n" + "*" + ": " + "prev";
        for (var x = start; x < end; x++) {
            gs.log("here " + x + " : " + options[x]);
            picker += "\n" + (x + 1) + ": " + options[x].label;
        }
        if (end < optionsLength)
            picker += "\n" + "#" + ": " + "next";
    }
    outputs.text_message = picker;
})(inputs, outputs);
Example Picker Control Inbound Tranformer
(function execute(inputs, outputs) {

    var request_context = inputs.request_context;
    var rich_control = inputs.rich_control;
    var appId = request_context.appId;
    var userId = request_context.userId;

    var selectedValue = request_context["typed_value"];
    var result = {};
    result["value"] = "";
    result["search_text"] = selectedValue;

    var options = rich_control['options'];

    var paginationData =
 sn_cs.VASystemObject.getProviderUserContext('picker_control',
 appId, userId);
    paginationData = JSON.parse(paginationData);

    switch (selectedValue) {
        case 'prev': {
            --paginationData["page_index"];
            result["send_prev_control"] = true;
        }
        break;
    case 'next': {
        ++paginationData["page_index"];
        result["send_prev_control"] = true;
    }
```

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```
    break;
    default: {
        var selectedIndex = Number(selectedValue) - 1;
        if (paginationData["page_index"] != undefined &&
 paginationData["pagination_length"] != undefined) {
            var highestOptionInPage =
 paginationData["page_index"] *
 paginationData["pagination_length"];
            if (selectedIndex >= 0 && selectedIndex <
 highestOptionInPage) {
                var selectedOption = options[selectedIndex];
                result["value"] = selectedOption.value;
                result["search_text"] = "";
            }
        } else {
            var selectedOption = options[selectedIndex];
            result["value"] = selectedOption.value;
            result["search_text"] = "";
        }
    }
    }

 sn_cs.VASystemObject.setProviderUserContext('picker_control',
 paginationData, appId, userId);
    outputs.result = result;
})(inputs, outputs);
```

Send previous control to client

Provide the ability to send previous control to client.

There are two ways to send previous control back from the server when a client requests:

- In inbound transformation, set `validation_message` in result. Previous control will be sent again with message provided in `validation_message`.
- In inbound transformer, set `send_prev_control` in result to true, previous control will be sent again. Use this method for Multi-Step controls.

Example script:

```
(function execute (inputs, outputs) {
  var result = {};
  var request_context = inputs.request_context;
  var typed_value = request_context ['typed_value'];
  if (typed_value.indexOf("#") > -1)
    result["validation_message"] = "Invalid character, please
 don't enter special character '#'";
  result["value"] = typed_value;
  result["search_text"] = "";
  outputs.result - result;
})(inputs, outputs);
```

Implement a skip option

Use a rich control to provide the option for users to skip a question.

Use the rich control `\nType SKIP to skip question` to provide the option for a user to skip a question. There are two ways to configure a skip option:

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- In the provider attributes script, use `_skip_internal` to trigger a contextual action service to skip the question.
- Map a contextual action for the provider and use `//request_context.contextual_action = "SKIP"` to skip the question. See Contextual actions for custom chat integrations to learn more about mapping user inputs to contextual actions.

Example script:

```
va_sms_twilio_adapter_default_text_outbound_transformer
(function execute(inputs, outputs) {
  try {
    var richControl = inputs.rich_control;
    outputs.result = richControl['label'];
    if (richControl['required'] === false &&
 richControl['uiType'] != "OutputText") { // new
      outputs.result += "\nType SKIP to skip question"; // new
    } // new
  } catch(e){
    gs.error('Error in default text outbound transformer: ' +
 e.message);
    throw e;
  }
})(inputs, outputs);
va_sms_twilio_adapter_provider_attributes
(function execute(inputs, outputs) {
    try {
        var headers = (inputs.headers);
        var payload = (inputs.payload);
        var smsUtil = new VASMSTwilioUtil();
        outputs.token = JSON.stringify(smsUtil.getToken(headers,
 payload));
        var data = payload.data;
        var request_context = {};
        if (data['MediaUrl0']) {
            var attachment_value = {};
            attachment_value.url = data['MediaUrl0'];
            attachment_value.content_type =
 data['MediaContentType0'];
            attachment_value.name =
 smsUtil.getFileName(attachment_value.url ,
 attachment_value.content_type);
            request_context.attachment_value = attachment_value;
        } else {
           var b = data['Body']; // new
           request_context.typed_value = b; // new
           if (b === "SKIP") { // new
             request_context.typed_value = "_skip_internal"; //
 new
             //request_context.contextual_action = "SKIP"; //
 new
           } // new
        }
        outputs.request_context = request_context;
        outputs.provider_user_id = data.From;
    } catch (e) {
```

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```
        gs.error("Error in
 va_sms_twilio_adapter_provider_attributes : " + e.message);
    }
})(inputs, outputs);
contextual_action (all new)
(function execute(inputs, outputs) {
  var contextual_action =
 inputs.request_context.contextual_action;
  if (contextual_action === "SKIP") {

 sn_cs.VASystemObject.skipOptionalQuestion(inputs.conversation_i
d);
  }
})(inputs, outputs);
```

Pass branding to a chat client

Pass custom branding to your custom chat integration.

See Set up your Virtual Agent bot's branding for more information about branding. Use `sn_cs.VASystemObject.getSettings` to apply branding.

Example script:

```
va_sms_twilio_adapter_default_text_outbound_transformer
(function execute(inputs, outputs) {
  try {
    var richControl = inputs.rich_control;
    var branding =
 sn_cs.VASystemObject.getSettings("default_branding"); // new
    var header = "(" + branding["header_label"] + ") "; // new
    outputs.result = header; // new
    outputs.result += richControl['label'];
  } catch(e){
    gs.error('Error in default text outbound transformer: ' +
 e.message);
    throw e;
  }
})(inputs, outputs);
```

Contextual actions for custom chat integrations

Commands with a pre-defined behavior can be mapped to certain user-friendly keywords and passed as user input. This input is mapped to supported contextual actions for the most appropriate response in the chat.

Getting started with contextual actions

User inputs can be mapped to a contextual action in two ways.

- UI-based mapping of comma-separated keywords to available contextual actions. For example: Hi, Hola - Start Conversation
- Script-based mapping of user actions to available contextual actions. For example: User clicks "Start" menu - Start Conversation

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Available contextual actions

Pre-built contextual actions

Name	Description
Agent	Command to request transfer to a live agent
Bye	Command to end a conversation with a live agent or a virtual agent whenever you are outside of a topic-selection prompt
Help	Command to request help using the bot
Hi	Command to start or end a conversation
Logout	Command to unlink the user messaging account from ServiceNow
Notifications	Command to subscribe or unsubscribe from receiving notifications
Restart	Command to end a bot conversation that is either in progress or runs into an error, and then begin a new conversation

Contextual action mapping

Map user inputs to base system contextual actions.

Before you begin

Role required: admin

About this task

Use the Contextual Actions [sys_cs_contextual_action] table to review the commands used in the chat integrations. You can add more keywords for a command. Each record for a pre-built command has this information:

Contextual Actions fields

Field	Description
Name	Name of the command.
Commands	Keyword for the command. You can add multiple keywords, separated by commas.
Description	Explanation of the command
Applicability	Application in which the command is used: • Virtual Agent only • Agent Chat only • Virtual Agent and Agent Chat

Procedure

1. Navigate to **All**, and then enter `sys_cs_contextual_action.list` in the filter.
2. Select a contextual action from the list.

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3. Add comma-separated keywords to the **command** field.
   For example: `Agent, Live Agent, Transfer to agent`.
4. **Optional:** Exclude specific messaging channels from contextual actions.
   a. Select the **Insert a new row...** text.
   b. Select the magnifying glass.
   c. Select the messaging channel you would like to exclude from the contextual action.
   d. Select the green checkmark to save.
5. Select **Update**.

What to do next

Create bot messages specific to each channel.

Typing indicators

Display a typing indicator when a bot or live agent is preparing a response to a requester.

When Virtual Agent processes a request, the Start typing indicator action is called. When Virtual Agent completes the request processing, the End typing indicator action is called before Virtual Agent processes any output or input controls.

These actions call the defaultText control outbound transformation. The following example shows how the typing indicator is handled in the defaultText control outbound transformation.

Example: Typing indicator script

```
(function execute(inputs, outputs) {
    try {
        var richControl = inputs.rich_control;
        var actionType = richControl.type;
        if(actionType == 'StartTypingIndicatorActionMsg'){
            outputs.result = '{activity:{type: "typing" }}'
        }else if(actionType == 'EndTypingIndicatorActionMsg'){
            outputs.result = '{activity:{type: "message" , text:
 "Finished typing"}}'
        }
       /* Handle other type of control */
    } catch (e) {
        gs.error("Error in default action outbound transformer :
 " + e.message);
        throw e;
    }
})
```

Virtual Agent integration with messaging apps

Enable users to run Virtual Agent bot conversations in supported third-party messaging apps. Use the Conversational Integration apps for Slack, Microsoft Teams, and Workplace that are available from the ServiceNow Store to configure these messaging apps on your ServiceNow instance.

Note:
Conversational Integration apps for Slack, Microsoft Teams, and Workplace, other consumer apps and voice apps are not supported for on-prem instances.

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Admin setup

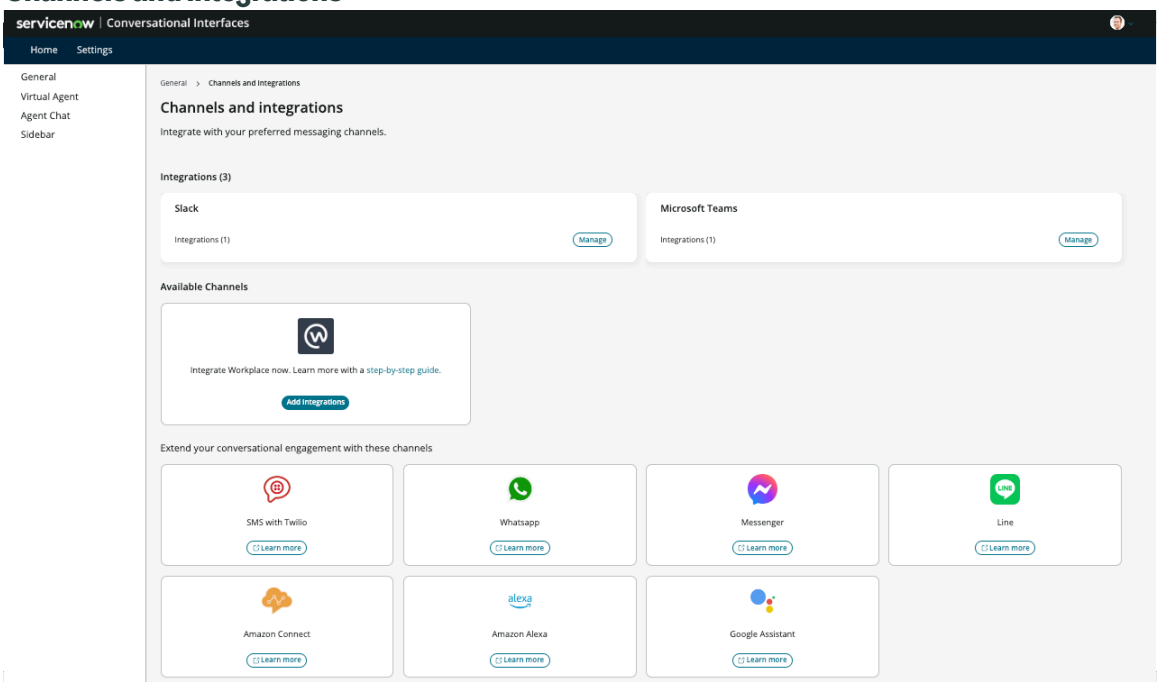
Use the Virtual Agent Conversational Integration apps to configure the messaging applications for your instance. Perform these basic installation steps to set up the Virtual Agent bot.

1. Install the Conversational Integration messaging apps, that are pre-built with ServiceNow Virtual Agent from the ServiceNow Store and then associate the app with your own ServiceNow instance.

   For details, see Integrating Virtual Agent with enterprise messaging apps.

2. Install the Conversational Integration apps for Slack, Microsoft Teams, and Workplace, LINE, Twilio, WhatsApp, Facebook Messenger, Alexa, Google Assistant, Google Business Messages, Amazon Connect, on your ServiceNow instance once they become available for installation after installing from the ServiceNow Store.

   Channels and integrations

3. If needed, configure the system messages that users see in Virtual Agent conversations. You can also customize the common commands used in these messaging integrations.

Conversational interface in messaging integrations

The Virtual Agent interface for the Conversational Integration apps (Slack, Microsoft Teams, and Workplace) is similar to the web-based interface. However, there are some differences, such as commands used and how certain interface controls are displayed in these third-party messaging apps.

Common commands in messaging integrations

Command	Description
`Hi`	Begin a new conversation or end a conversation.
`agent`	Begin a new conversation or request a transfer to a live agent.

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Command	Description
`bye`	Leave a live chat conversation at any time, for example before engaging with a live agent, during a live chat, or when live chat is about to end.
`help`	Displays a short list of useful commands.
`logout`	Unlink your ServiceNow account from a messaging integration.
`notification or notifications`	Subscribe to or unsubscribe from notifications.
`restart`	End the current conversation and begin a new one.

After you install the integration, you can customize these commands by using the **Configure** button for the installed teams/communities in the channel specific pages.

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. On the Channels and integrations page, you can see the number of integrated channels and available channels for installation on your instance.
4. Click the **Manage** button in the specific channel and navigate to the Settings tab.
5. Click the **view settings** button against Contextual Actions.
6. Select the command record to be changed and update as needed.

Configuring Virtual Agent system messaging in the Conversational Integration apps

You can modify the default messages displayed to your users in Virtual Agent and Agent Chat conversations. For details on customizing them, see Change Virtual Agent and Agent Chat system messages.

Rendering of input controls and bot responses in conversations

Input controls in Virtual Agent Designer, such as the Carousel render differently in bot conversations in messaging apps than in the web-based interface. For example, the Date Time picker control in Workplace presents buttons for users to select a date and time. Similarly, certain bot response controls, such as the Image response and Multi-response controls, also render differently in third-party messaging apps. For details on these differences, see the descriptions of the Virtual Agent Designer input controls, bot responses, and utilities.

Attachments

In live agent conversations, users and agents can upload and exchange any type of attachment file when prompted.

Redirect user authentication to a Service Portal

After installing a pre-built Conversational Integration (for messaging apps, Consumer apps or voice apps), you can specify a Service Portal in which unauthenticated end users complete the user authentication step (user account linking), instead of in their ServiceNow instance. Users who do not have linked accounts complete authentication before continuing with the virtual agent in the messaging application.

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Before you begin

Install the Virtual Agent messaging integrations for your instance. The system creates a record in the Provider Auth [provider_auth] table for each integration that you install (Slack, Microsoft Teams, and Workplace, LINE, Twilio, WhatsApp, Facebook Messenger, Alexa, Google Assistant, Amazon Connect). You use the Provider Auth table to specify the Service Portal in which user authentication occurs.

Role required: admin

Procedure

1. In the navigation filter, type `provider_auth.list`.
2. In the Provider Auth table, open the record for the messaging integration you installed.
3. In the **Service Portal** field, select the Service Portal in which user authentication occurs.
4. Click **Update**.

Result

When unauthenticated users start a conversation with the virtual agent for the first time in the messaging integration, they are redirected to the Service Portal specified for the provider in the Provider Auth table. After they log in to the Service Portal, they are prompted to link their ServiceNow account to the messaging application.

Configure the IBM Watson Assistant Chat integration

Set up the IBM Watson Assistant topic to run dialog skills (conversations created in IBM Watson Assistant) in the web-based chat client. This topic returns information exchanged during the virtual agent conversation to IBM Watson Assistant.

Before you begin

- In IBM Watson Assistant:
  - Create the dialog skill (conversation) in your IBM Watson Assistant workspace. The skill includes the dialog and any intents and entities that you define.
  - Navigate to your skill tile and in the tile menu, select **View API Details**. View the Skill Details and Service Credentials. Copy the following items: **Skill ID**, **Workspace ID**, **Username**, and **Password**. You need these items when setting up this integration.
- Activate the IBM Watson Assistant Integration plugin (com.glide.cs.ibm.watson.assistant).

Role required: virtual_agent_admin or admin

About this task

This topic runs an IBM Watson Assistant dialog in Virtual Agent. It doesn't require enabling Natural Language Understanding (NLU) or setting IBM Watson Assistant NLU as the NLU service provider for Virtual Agent.

Procedure

1. In your ServiceNow instance, update the watson_assistant.workspaceID system property.
   a. In the navigation filter, enter `sys_properties.list`.
   b. In the System Properties [sys_properties] table, locate the watson_assistant.workspaceID property.
   c. Replace the existing **Value** with the **Workspace ID** for your skill, and select **Update**.
2. Verify that the REST message for IBM Watson Assistant provides the correct authentication endpoint for your IBM skill:

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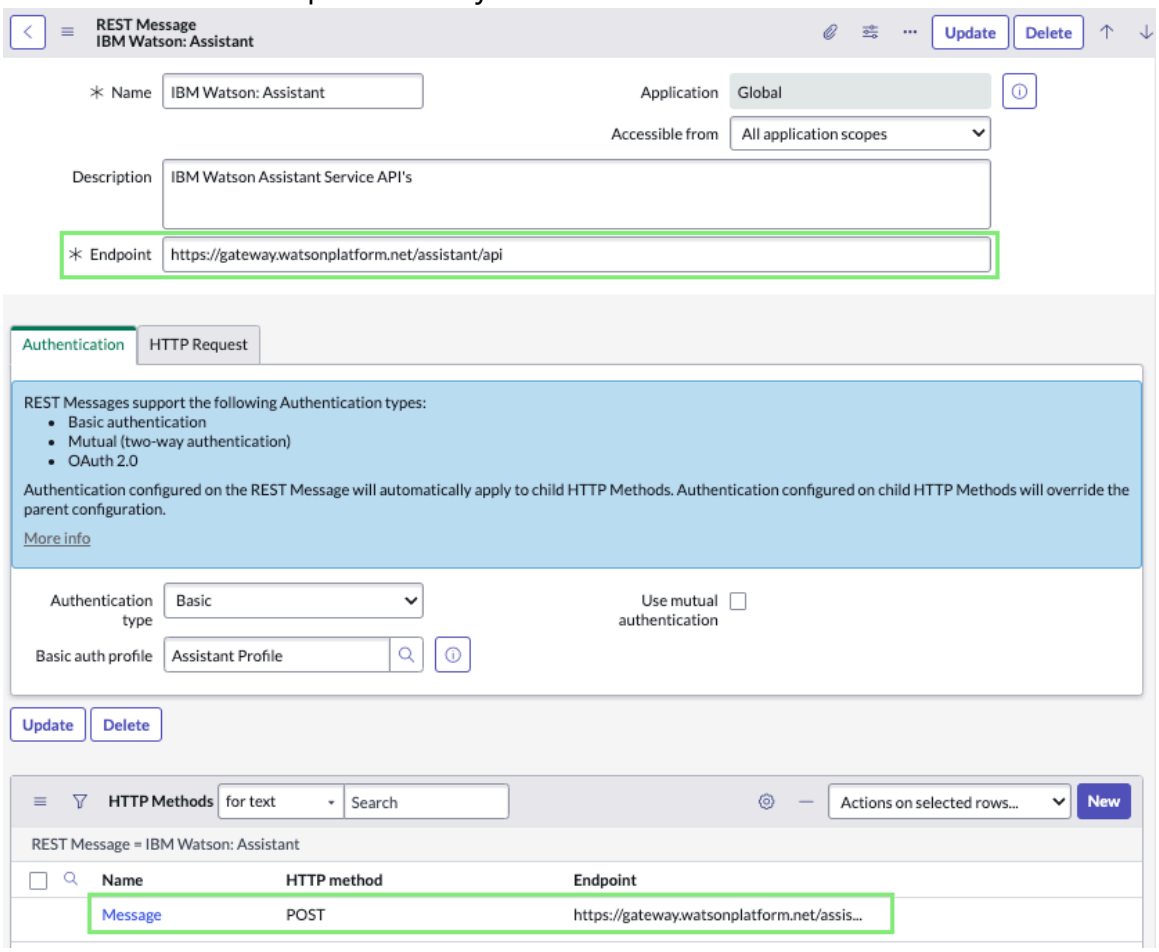
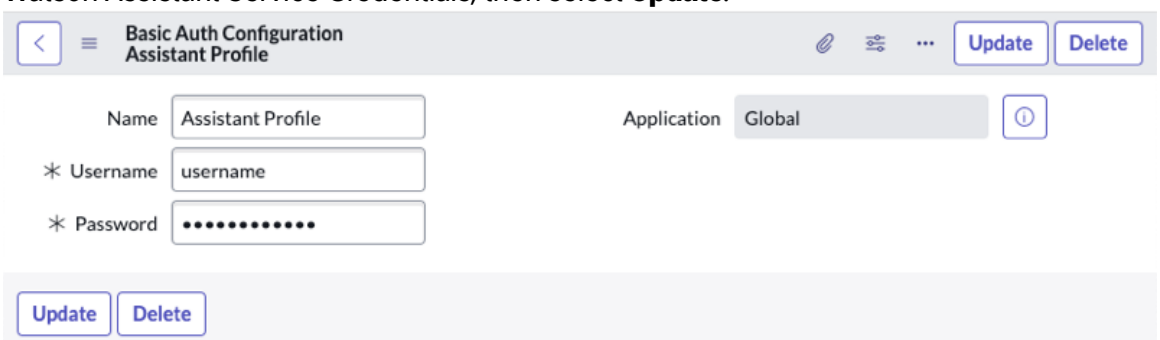
a. Navigate to **System Web Services** > **Outbound** > **REST Message**.

b. Select the IBM Watson Assistant record to open the REST Message IBM Watson Assistance form.

c. Confirm that the **Endpoint** field and the **Endpoint** column displayed on the **Authentication** tab have the correct endpoint URL for your IBM Watson account.



3. In the **Basic auth profile** field on the **Authentication** tab, open the Assistant Profile record.
4. In the Basic Auth Configuration form, enter the **Username** and **Password** values from your IBM Watson Assistant Service Credentials, then select **Update**.



5. Publish the IBM Skill topic:

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a. Navigate to **Conversational Interfaces** > **Virtual Agent** > **Designer.**

b. In the Topics page, select the IBM Watson Assistant topic to open the Topic Properties page. Notice that the **Keyword** for this topic is IBM Watson Assistant and the **Category** is IBM.

c. In the Topic Properties page, select **Publish** to deploy the topic to your Virtual Agent web client.

6. Configure the default topic for the Virtual Agent web client in one of the following ways:
   - Provide the URL that specifies the IBM Watson Assistant topic as the default topic that opens in the Service Portal client:

     For example: `https://<Your instance URL>$sn-va-web-client-app.do?sysparm_skip_load_history=true&sysparm_topic=<sys_id>` where *<sys_id>* is the sys_id of the published IBM Watson Assistant topic. The `sysparm_skip_load_history` parameter doesn't load the conversation history in the web client.

   - Configure the Service Portal widget by selecting the edit (pencil) icon in the upper right corner of the Virtual Agent widget.

     To set the default topic using the widget instance parameters, enter `sysparm_topic=sys_id` (where *<sys_id>* is the sys_id of the published IBM Watson Assistant topic) in the **Virtual Agent Client URL Parameters** field, and select **Save**.

     Note:
     You can find the sys_id of a topic in the Topics [sys_cs_topic] table.

Important:

Use the `sysparm_topic` parameter only to load the given topic in the Service Portal chat client or when using the IBM Watson Assistant chat integrations (com.glide.cs.ibm.watson.assistant.topic and com.glide.cs.ibm.watson.assistant.topicV2 plugins). This parameter doesn't allow users to start a new conversation or transfer to a live agent. It also disables the context menu and doesn't support other third-party chat clients.

Configure the IBM Watson Assistant Chat integration for the Assistant V2 API

Configure the IBM Watson Assistant Chat Integration to run a dialog skill (conversation) created in IBM Watson Assistant with the Assistant V2 API. The V2 API enables the Virtual Agent web chat client to run a topic that uses Watson Assistant's intent disambiguation feature to improve topic discovery.

Before you begin

With the IBM Watson Assistant v2 API chat integration, the web chat client communicates with an assistant instead of with a workspace. Workspaces are referred to as dialog skills. For information on IBM Watson Assistant, see Migrating to the v2 API in the IBM Watson Assistant documentation.

Role required: virtual_agent_admin or admin

About this task

This integration runs an IBM Watson Assistant dialog as a Virtual Agent topic in the web chat client. It doesn't require enabling Natural Language Understanding (NLU) or setting IBM Watson Assistant NLU as the NLU service provider for Virtual Agent.

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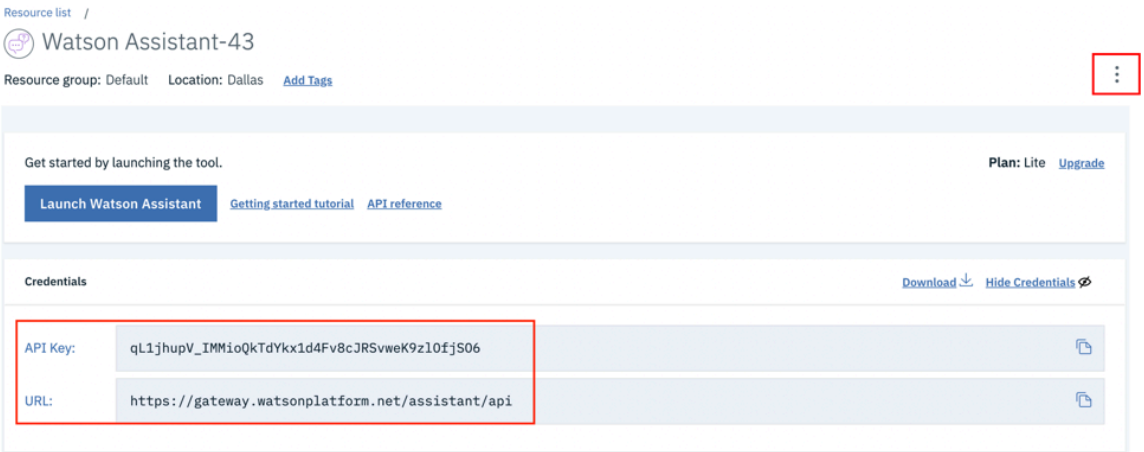
The IBM Watson Assistant V2 API enables the web chat client to use the Watson Assistant intent disambiguation feature, which can potentially reduce false-positive intent predictions. If a user's utterance is ambiguous, IBM Watson Assistant suggests additional intents that might better match the user's true intention. For example, if the user utterance is `restaurant`, IBM Watson Assistant can suggest other possible intents, such as `book a restaurant` or `restaurant reviews`.

Procedure

1. Configure IBM Watson Assistant.

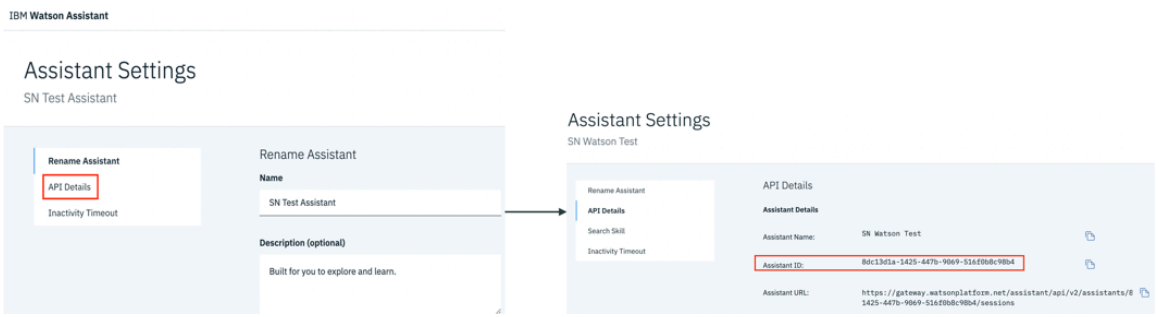
a. Create your assistant, then add a dialog skill.
For details, see Creating an assistant in the IBM Watson Assistant documentation.

b. On the Resource list page, locate and record your API key and URL, which you need to set up the chat integration:



c. Select the three vertical dots icon and select **Settings**.

- Select the **API Details** tab.
- On the Assistant Settings page, find the **Assistant ID** key.



2. Enable the disambiguation feature in IBM Watson Assistant (for premium and plus users only). You can enable (or disable) disambiguation for each skill, and also specify a disambiguation message and the number of suggestions to be displayed to the end user.

a. Access your skill by selecting the skill tree icon in the panel.

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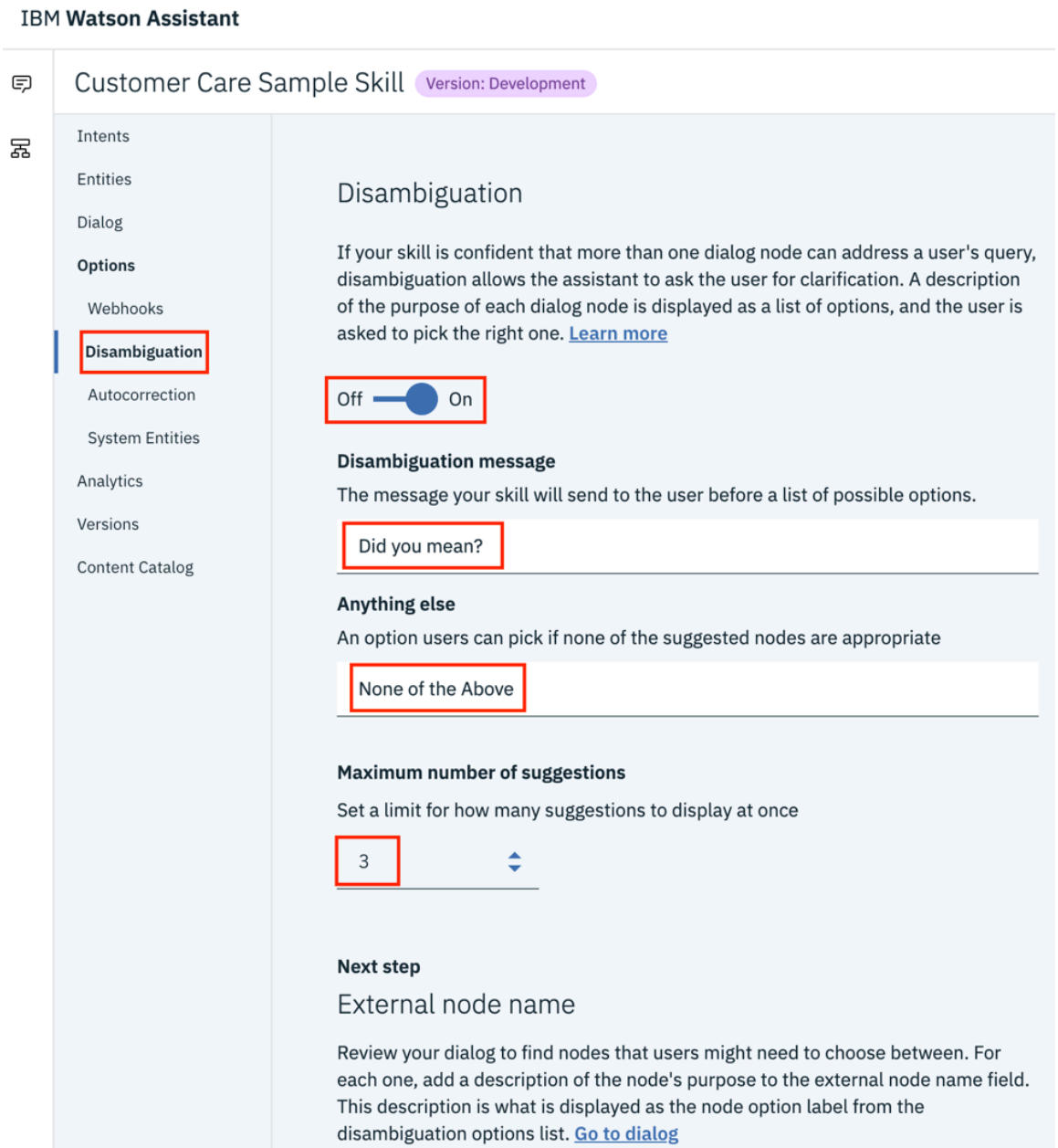
b. Navigate to **Options** > **Disambiguation** to enable disambiguation and set the disambiguation features.
The following example shows the disambiguation features that can be set, such as the disambiguation message and the number of suggested intents to be displayed to the end user.



3. Navigate to **Dialog**, select a node to which the disambiguation feature will apply, and provide a summary of the node that will be displayed to users if it's one of the intent suggestions.

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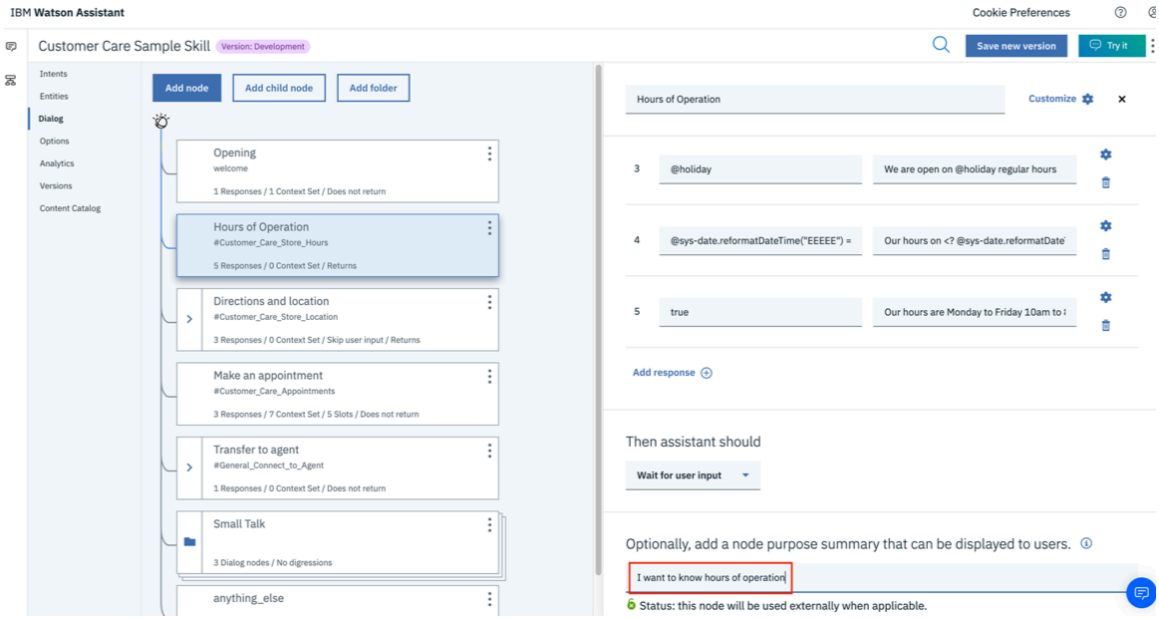

4. In your ServiceNow instance, activate these plugins:
   - Glide Virtual Agent (com.glide.cs.chatbot), if not already activated (requires a subscription)
   - IBM Watson Assistant Integration V2 plugin (com.glide.cs.ibm.watson.assistant.topicV2)
5. In Virtual Agent Designer, publish the IBM Watson Assistant V2 topic:

   a. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.

   b. In the Topics page, select the IBM Watson Assistant V2 topic to open the Topic Properties page.
   Notice that the **Keyword** for this topic is IBM Watson Assistant V2.

   c. In the Topic Properties page, select **Publish** to deploy the topic to your Virtual Agent web client.

6. Navigate to **All**, and then enter `sys_properties.list` in the filter.
7. Update the following properties.

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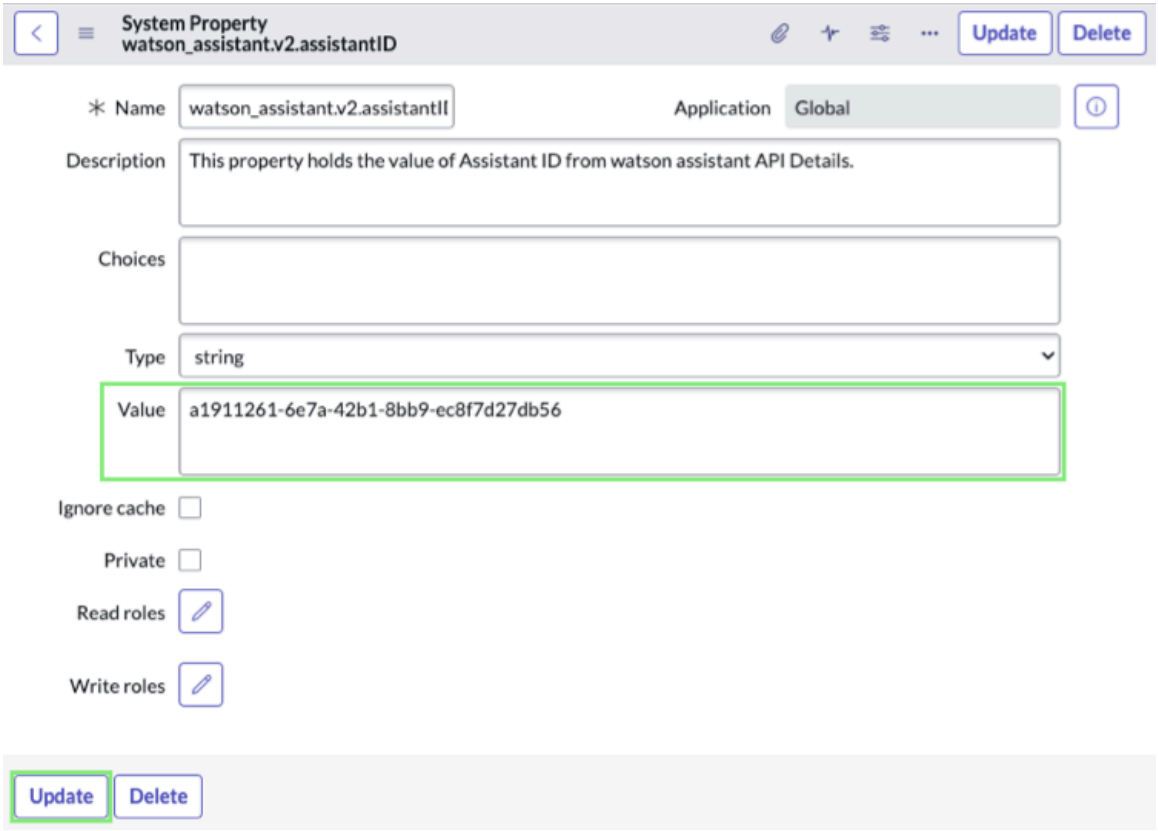
- *watson_assistant.v2.assistantID* — In the **Value** field, enter the Watson Assistant ID for your assistant and select **Update**.



- *watson_assistant.v2.service_endpoint* — In the **Value** field, replace the existing value with your Watson Assistant URL and select **Update**.

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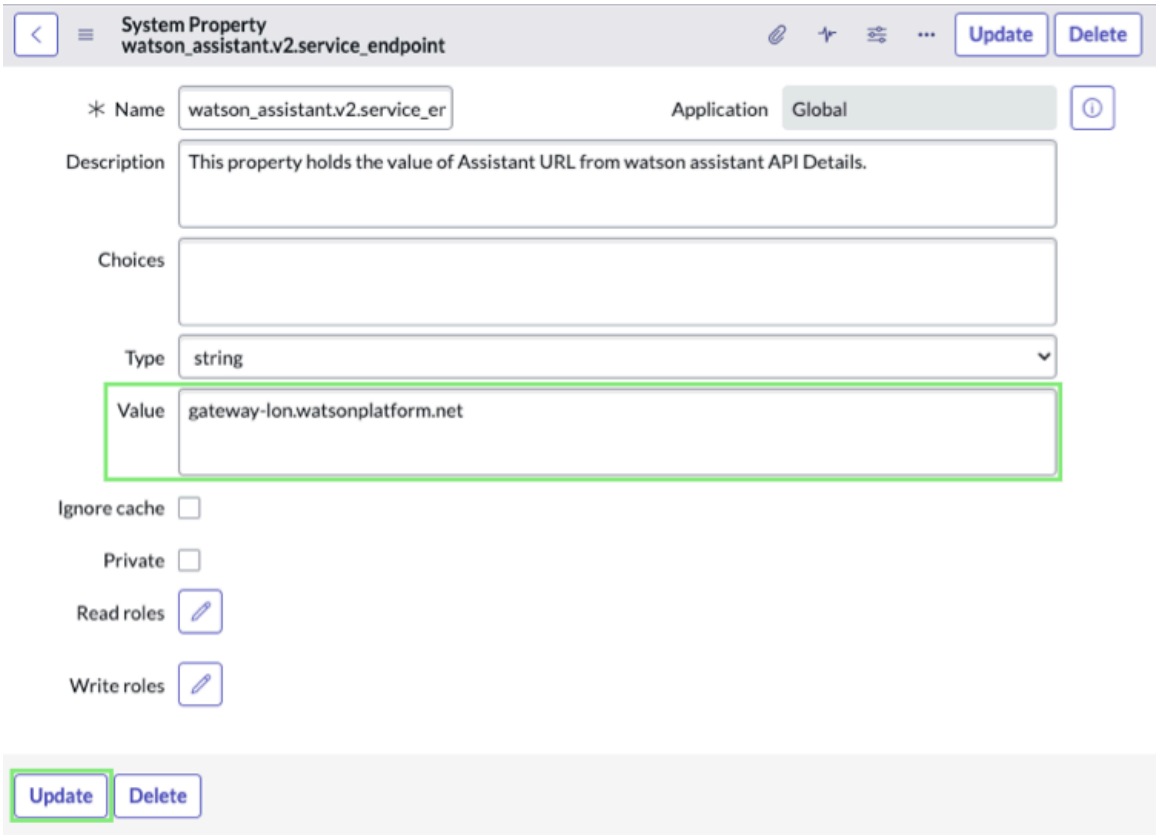


Note:
You can specify just the location portion of the service instance URL in the **Value** field. For example, if the base URL for the IBM Watson service endpoint is https://gateway.watsonplatform.net/assistant/api, you can enter just the location of the service instance, `gateway.watsonplatform.net` in the **Value** field.

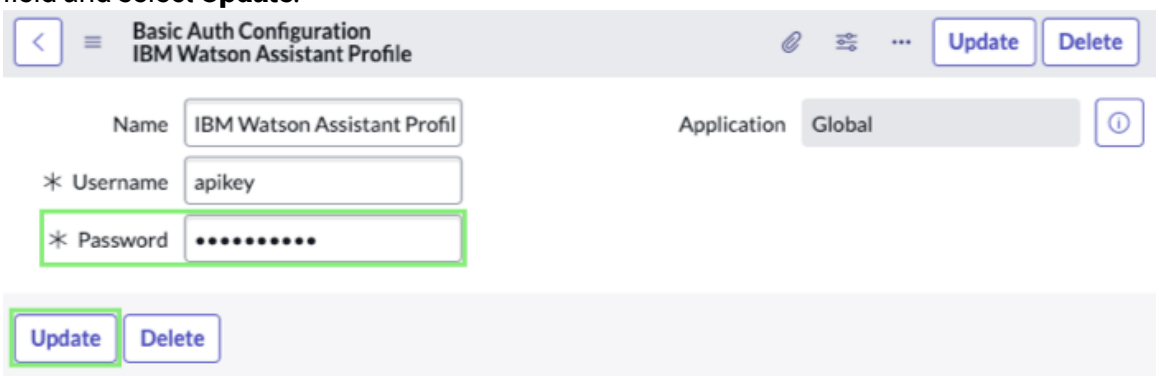
If your Watson Assistant is hosted in a data center other than Dallas, such as Washington DC, your base URL is https://gateway-wdc.watsonplatform.net/assistant/api. You would enter `gateway-wdc.watston.platform.net` in the **Value** field.

8. Set the Watson Assistant API key as the password in the IBM Watson Assistant Profile.

   a. Navigate to **All**, and then enter `sys_auth_profile_basic.list` in the filter.

   b. Open the IBM Watson Assistant Profile record.

   c. In the Basic Auth Configuration form, enter the Watson Assistant API key in the **Password** field and select **Update**.



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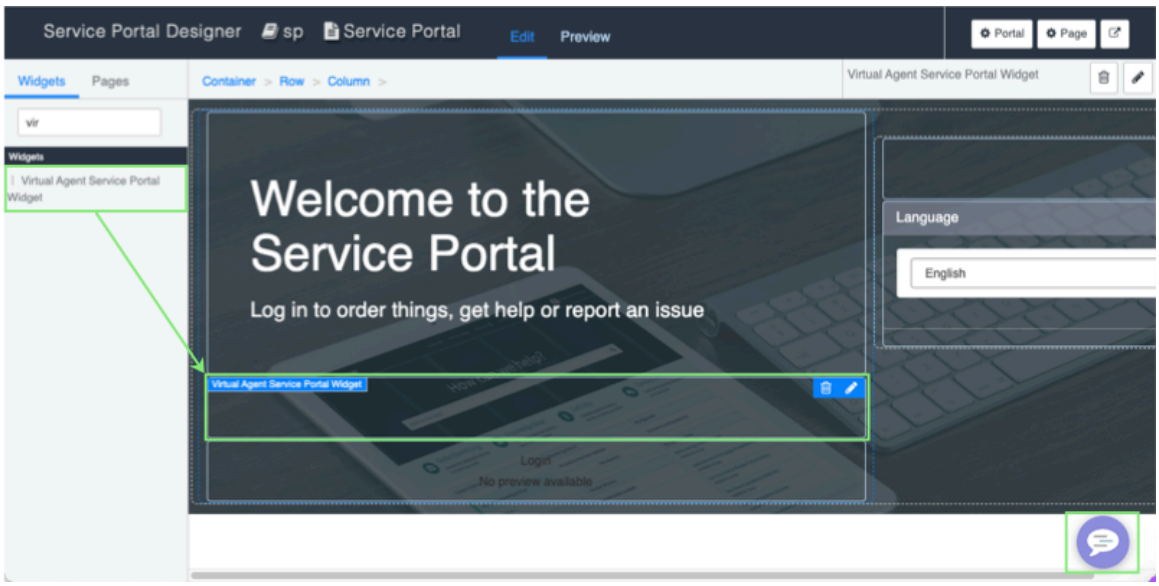
9. Add the Virtual Agent (web chat) client to the Service Portal.

   a. Navigate to **Service Portal** > **Service Portal Configuration**.

   b. Select **Designer**, and then select the **Service Portal** landing page.

   c. Search for the Virtual Agent widget and drag the widget into the outlined area.
   The purple chat icon appears in the bottom right corner.



10. Configure the Virtual Agent widget by selecting the edit icon in the upper right corner to set the URL parameters passed to the chat client and change the color of the floating chat button.

    a. In the **Virtual Agent Client URL Parameters** field, enter the *sysparm_skip_load_history=true* parameter so that the topic history doesn't display in the chat client and the *sysparm_topic* parameter with the sys_id of the published IBM Watson Assistant V2 topic to be run.
    You can find the sys_id of a topic in the Topics [sys_cs_topic] table.

    If you don't configure the instance behavior in Service Portal, you can specify your instance URL with the *sysparm_topic* and *sysparm_skip_load_history* parameters when you open the chat web client. For example: `https://<Your instance URL>$sn-va-web-client-app.do?sysparm_skip_load_history=true&sysparm_topic=<sys_id>` where *<sys_id>* is the sys_id of the published IBM Watson Assistant V2 topic to be run.

    Important:

    Use the `sysparm_topic` parameter only to load the given topic in the Service Portal chat client or when using the IBM Watson Assistant chat integrations (com.glide.cs.ibm.watson.assistant.topic and com.glide.cs.ibm.watson.assistant.topicV2 plugins). This parameter doesn't allow users to start a new conversation or transfer to a live agent. It also disables the context menu and doesn't support other third-party chat clients.

    b. To change the floating button color, enter the new color (RGB hex format) in the **Floating Button Color** field.

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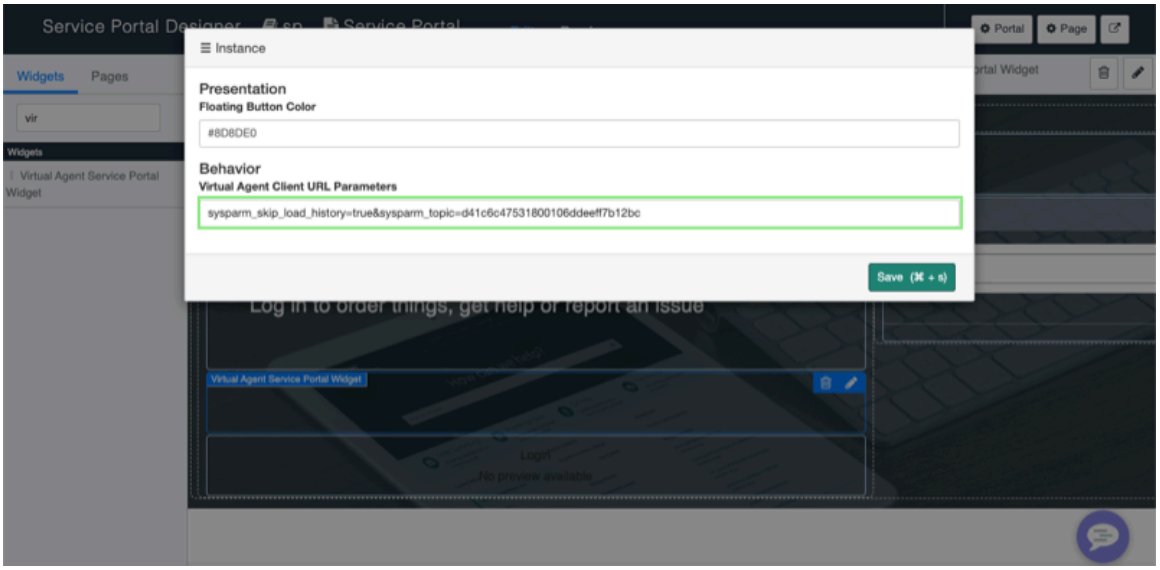
c. Select **Save**.



11. Test that the disambiguation feature is working for your topic.

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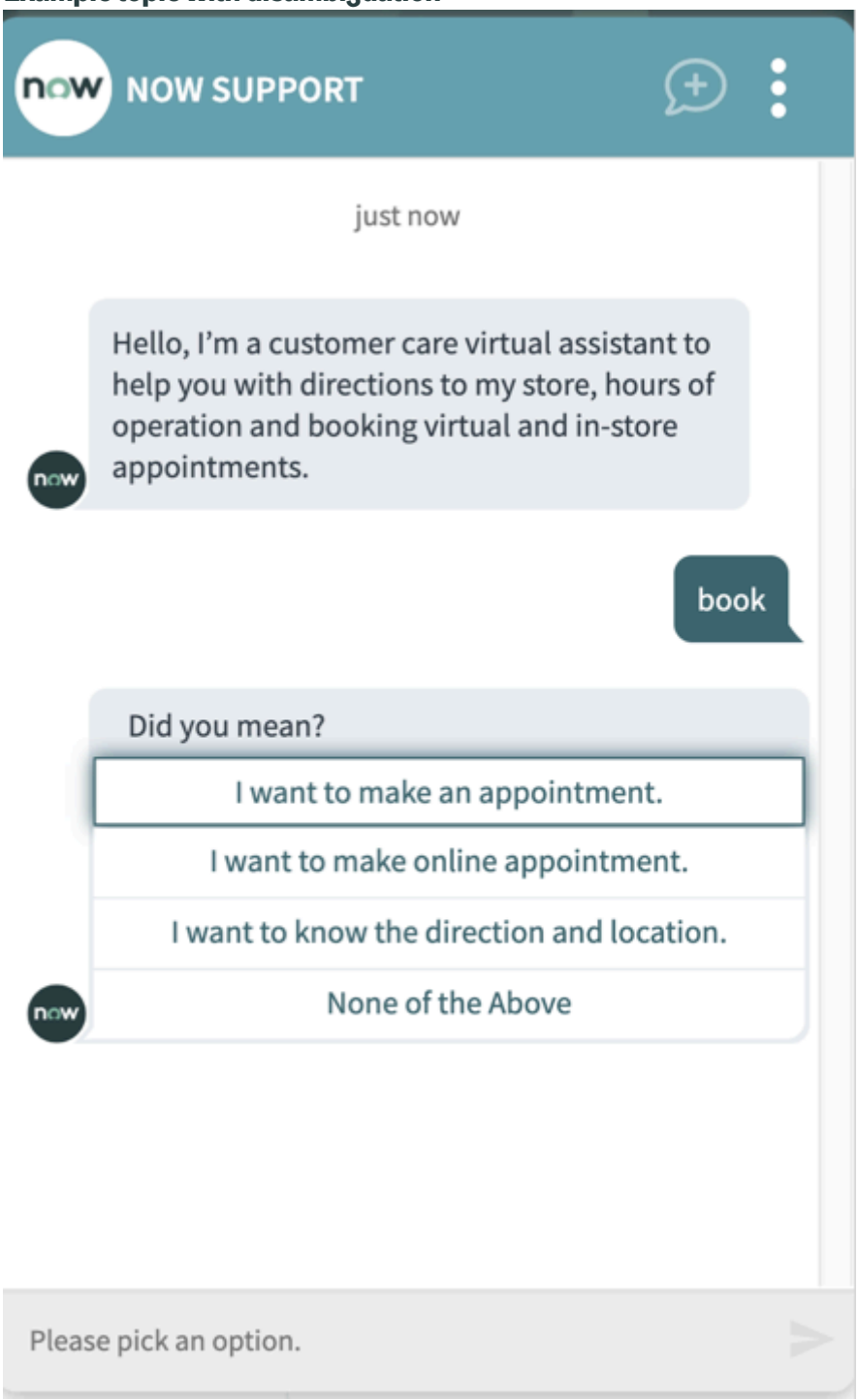
Be sure that disambiguation is enabled for your Watson Assistant skill and at least two dialog nodes. In the following example, the virtual agent provides four additional intents that the user can select.

Example topic with disambiguation



Account linking in pre-built messaging integrations

In Virtual Agent, account linking maps the users of a supported chat or messaging application to their ServiceNow user profile. Account auto-linking authenticates your messaging users, which enables users to automatically access Virtual Agent topics that involve ServiceNow records. If needed, users can also manually unlink from or link to their ServiceNow accounts.

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How account auto-linking works

In the Conversational Integrations for Slack, Microsoft Teams, and Workplace from Facebook, you have the option to enable account auto-linking, which automatically links messaging users to their ServiceNow accounts. If you enable the account auto-linking feature on the Messaging Apps Integration page, your users are not prompted to link to their ServiceNow accounts when they engage with the virtual agent.

In earlier releases, messaging users were prompted to link to their ServiceNow accounts or continue as guests. However, for the Conversational Integrations for Slack, Microsoft Teams, and Workplace, if you enable account auto-linking, your users do not manually link their messaging accounts to their ServiceNow accounts, provided that they use the same email account for their messaging and ServiceNow accounts. During auto-linking, Virtual Agent maps the email accounts of messaging users to their email accounts defined in their profiles in the Users [sys_user] table. When the email accounts match, the user is automatically linked (authenticated) and they do not see the **Link to ServiceNow** button when they begin a bot conversation.

In messaging integrations, your users can still use the **logout** command during bot conversations to unlink from their ServiceNow accounts. However, in all subsequent conversations after unlinking, Virtual Agent prompts them to link their accounts. When they engage with the virtual agent, they are prompted to link to their ServiceNow account or continue as a guest user.

Account auto-linking

You can allow a user's 3rd party accounts to be auto-linked to their ServiceNow® profile.

You can enable account auto-linking in the sys_cs_provider.list. This feature bypasses the prompt for the users to link their accounts manually.

Note:
Account linking is possible only for users who belong to the same domain that was used for installing Microsoft Teams on an instance. To auto-link users from other domains, ensure that Microsoft Teams installation is done using the global domain.

In the navigation filter type `sys_cs_provider.list`. Select the connection record you wish to link. Check the **Allow account linking** box, then check the **Auto link users' ServiceNow profiles** box that appears. Fill in the **Automatic link action** field with the corresponding account linking script.

Example: Account auto-linking script

```
var response_body = inputs['response_body'];
var status_code = inputs ['status_code'];
var email_id = '';
if(status_code>200 && status_code<=210){
    email_id = response_body &&
 JSON.parse(response_body).userPrincipalName;
}
var sysUserId = null;

if(email_id){
    var gr = new GlideRecord("sys_user");
    gr.addQuery("email",email_id);
    gr.query();
    while(gr.next()){
        sysUserId = gr.getUniqueValue();
    }
}
```

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```
if(sysUserId){
    outputs['status'} = 'Success';
    outputs['userid'] = sysUserId;
}
else{
    outputs['status'] = 'Failure';
}

})(inputs,outputs);
```

Unlink your ServiceNow user account from a messaging application for Virtual Agent conversations

If needed, you can unlink your ServiceNow user account from a messaging app used for the Now Virtual Agent.

Before you begin
Role required: user

About this task
Unlinking your account from a selected Conversational Integration for Slack, Microsoft Teams or Workplace, deactivates the association between your ServiceNow account and the messaging app. After you unlink your account, you can no longer engage in Virtual Agent conversations that query or change records in the ServiceNow database.

Procedure

1. From within the messaging app, type `logout`.
2. From the application navigator, navigate to **Self-Service** > **My Profile**.
3. Click the **View Linked Accounts** related link.
4. In the Linked Accounts page, select the check box for the messaging integration to be unlinked.
5. Select **Actions on selected rows**, then click **Unlink account**.
   The link between your ServiceNow account and the Virtual Agent messaging integration becomes inactive.

   Note:
   Even though you unlinked your account, you can still run public Virtual Agent conversations.

6. To link your account again, repeat steps 1 through 3 for the associated messaging integration and in the **Actions on selected rows...**, click **Link account**.

Link your ServiceNow user account to a messaging application for Virtual Agent conversations

Link your ServiceNow account to a third-party messaging application to access non-public Virtual Agent topics that use ServiceNow records.

Before you begin
Role required: user

About this task
When you initially engage with the Virtual Agent bot, your messaging account is automatically linked to your ServiceNow account as long as the same email account is defined for both your messaging and ServiceNow accounts. However, if you unlinked your messaging account from

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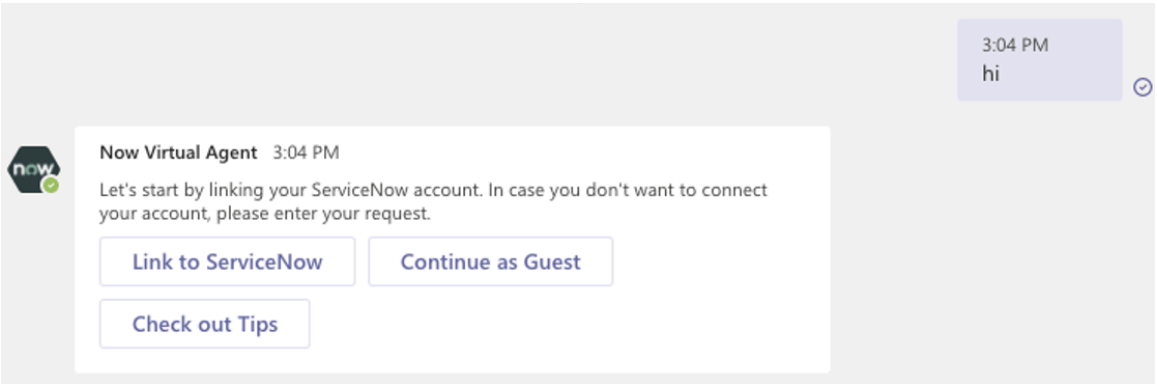
your ServiceNow account (using the **logout** command), each time that you start a subsequent Virtual Agent session, the bot gives you the option to link to your ServiceNow account or continue as guest. The authentication step (linking) occurs in your instance or in a specific Service Portal, if set by your admin.

Procedure

1. Open the messaging application.
2. Find your Virtual Agent bot.
3. Start a conversation with your Virtual Agent bot.
   The bot then presents a prompt that provides options to authenticate (**Link to ServiceNow**), continue as a guest user, or see the help menu (**Check out Tips**).
4. Select **Link to ServiceNow** to authenticate.



   Authentication directs you to your instance or a specific Service Portal set by your admin. If you're not already logged in to your instance or a Service Portal, you are prompted to enter your login credentials.

   Note:
   If a user is unlinked or continued as a guest, notifications will be disabled. Also, only the public topics are discoverable.

5. In the confirmation that appears prompting you to *Confirm* or *Deny* linkage between your accounts, select *Confirm* to allow the account link.
6. After confirmation, you are directed to your instance user record.

   A confirmation message is displayed at the top of the screen.

Related topics

Redirect user authentication to a Service Portal

Control topic visibility in Virtual Agent messaging channels

Suppress the display of a topic in a Virtual Agent messaging channel by using a condition script that excludes the topic from a channel.

Before you begin

Roles required:

- virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications

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About this task

In your condition script for the topic, use a context variable to identify the messaging channel that excludes this topic.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Virtual Agent** > **Designer**.
2. In the Topics page, select the topic for updating or create a new topic.
3. In the **Condition** field on the Topic Properties page, enter a condition script that identifies the messaging channel (Slack, Microsoft Teams, Workplace from Facebook, or Facebook Messenger) from which the topic will be excluded.

   You can use the following example script, which contains the *vaContext.deviceType* variable, to identify the messaging channel that excludes the topic: Slack, Microsoft Teams, Workplace, and Facebook Messenger.

```
(function execute()
{ if(vaContext.deviceType === 'Slack' || vaContext.deviceType
 === 'Teams' || vaContext.deviceType=='Facebook' ||
 vaContext.deviceType=='Messenger'){
return false;
}
return true;
})()
```

4. To save the topic properties, click **Save**.

Result

Publishing the topic deploys it to the Virtual Agent messaging channels, except for the Virtual Agent channels that you specified in the topic condition script. A keyword or an intent (if using NLU) does not trigger the topic.

Integrating Virtual Agent with enterprise messaging apps

Integrating enterprise messaging apps such as Slack, Microsoft Teams, and Workplace with ServiceNow® Virtual Agent associates the app with your ServiceNow instance to facilitate conversations across the enterprise.

Conversational integrations are available for Slack, Microsoft Teams, and Workplace from the ServiceNow Store.

Conversational Integration with Microsoft Teams

Enable requesters to chat with Microsoft Teams or live agents using the Microsoft Teams application. Use the Conversational Integration with Microsoft Teams app, available from the ServiceNow Store, to associate your instance with Microsoft Teams.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Overview

Use the Conversational Integration with Microsoft Teams application to connect your end users with Virtual Agent or live agents through your company's Microsoft Teams account. To get started, see Install Conversational Integration with Microsoft Teams.

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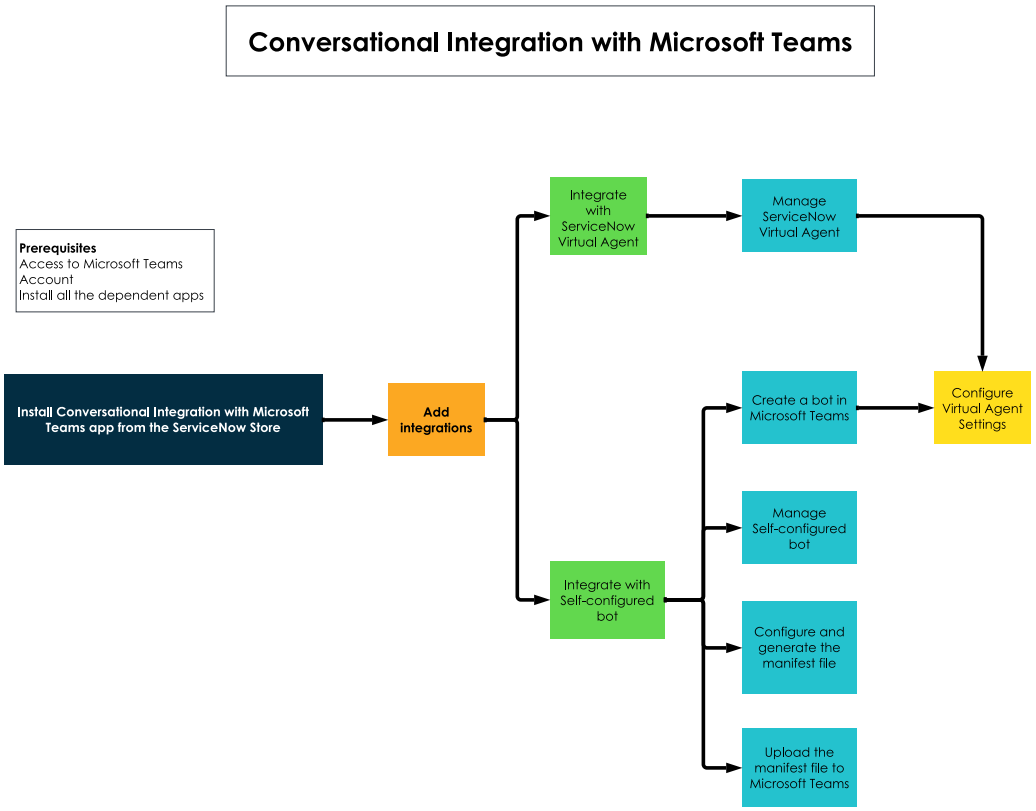
Important:

- If your instance is in our GovtCommunityCloud (GCC) environment, see to Integrating Virtual Agent with Microsoft Teams using the self-configured bot for more information.
- If your instance is in our Australia SPP (ServiceNow Protected Platform) environment, see Enable Microsoft Teams integration in ServiceNow Protected Platform (SPP) for more information.
- The Microsoft Teams Graph spoke consumes Integration Hub transactions, thus, usage of Virtual Agent in Microsoft Teams does count against Integration Hub transactions. Microsoft is also monetizing Microsoft Teams API usage, therefore such usage will also count against their Microsoft 365 subscription. For further information, see Sidebar and Microsoft Teams.

Workflow of Conversational Integration with Microsoft Teams



Integrating ServiceNow Virtual Agent with Microsoft Teams

Enables ServiceNow Virtual Agent to integrate with Microsoft Teams application.

Install Conversational Integration with Microsoft Teams

You can install the Microsoft Teams (sn_va_teams) application to integrate with Now Virtual Agent if you have the admin role.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- If you're using an earlier release of Virtual Agent, you must upgrade to the 2023, February store release to use the features supported in this channel integration.

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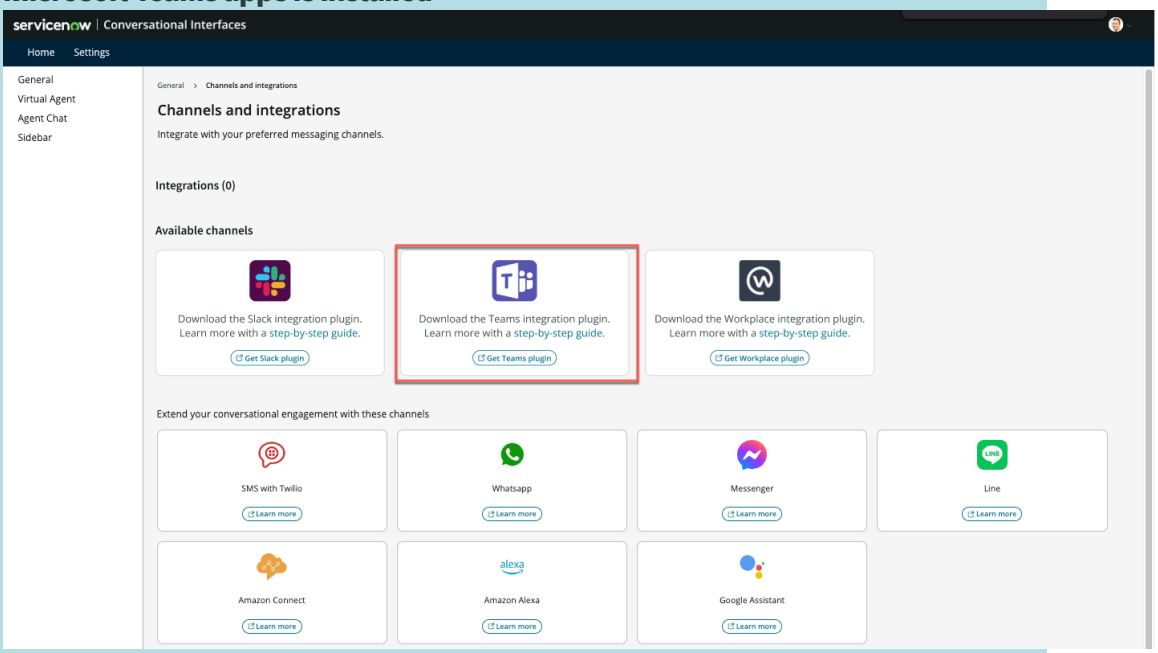
- Conversational Integration with Microsoft Teams requires the Glide Virtual Agent plugin (com.glide.cs.chatbot) to activate full functionality in Virtual Agent or the Virtual Agent Lite plugin (com.glide.cs.chatbot.lite) to activate a limited version of Virtual Agent. Activate the appropriate plugin before you install the integration.
- Install the Conversational Integration with Microsoft Teams app from the ServiceNow® Store.

Important:
Installing the Conversational Integration with Microsoft Teams app from the ServiceNow Store activates the app for integration on your ServiceNow instance. If you have not installed the integration app, the Microsoft Teams app is listed in the Available Channels section.

Channels and integrations page before Conversational Integration with Microsoft Teams apps is installed



After you install the Conversational Integration with Microsoft Teams app, Microsoft Teams is seen in the Integrations section, and you can proceed with the configuration.

- Roles required:
  - virtual_agent_admin and external_app_install_admin or admin.
  - Microsoft Teams administrator (one of the following): Global administrator, Application administrator, or Cloud Application administrator.

Note:
These aren't necessarily required. Microsoft allows non-admin users to give consent to some or all requested permissions. Granting non-admin consent is not recommended, as this may cause unexpected behavior in the Now Now Virtual Agent application. Please review your user consent policies by consulting: https://learn.microsoft.com/en-us/entra/identity/enterprise-apps/configure-user-consent?pivots=portal

About this task

Review these guidelines for using Virtual Agent with Microsoft Teams.

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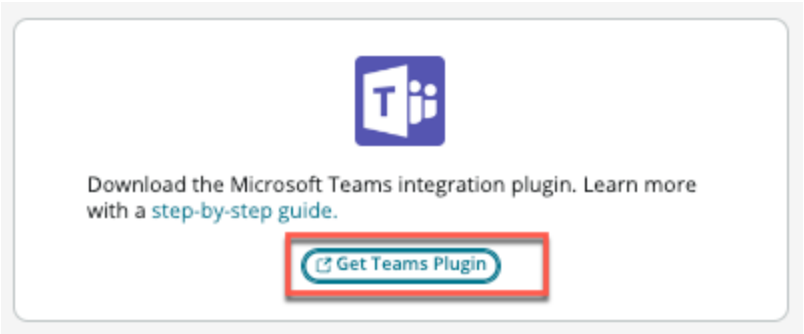
- The Microsoft Teams app creates a one-to-one association between the ServiceNow instance that you're installing from and the Microsoft Teams tenant in which the integration runs.

  Use a separate Microsoft Teams tenant for each instance that you plan to install the integration in. If you plan to test with a non-production instance and clone the instance, be sure to run the configuration steps again on the clone target to associate the bot to the new instance. Running the steps again disassociates the integration between the original non-production instance and the tenant.

- The Microsoft Teams app doesn't support the Microsoft Teams premium account, which enables user email accounts other than Microsoft Office 365 accounts.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, select **View All**.
3. On the Channels and integrations page, in the Microsoft Teams card, select **Get Teams plugin**.



   You're redirected to the Conversational Integration with Microsoft Teams ServiceNow Store page.

4. Select **Get**.

   Note:
   You must be logged in to the ServiceNow Store portal to get the plugin.

5. On the Conversational Integration with Microsoft Teams ServiceNow Store page, select **Request Install**.
6. On the Request Install screen, provide the **Instance Name** and **Reason for request**.
   You can also validate the instance that you provided by selecting **Validate Instance**.
7. Select **Request**.
   A message pops up on the Request Install screen that your request has been auto-approved.

What to do next

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Integrate ServiceNow Virtual Agent with Microsoft Teams

Add the Now Virtual Agent bot to your ServiceNow instance to integrate with Microsoft Teams.

Before you begin

Ensure that you've installed the Conversational Integration with Microsoft Teams plugin (sn_va_teams) on your ServiceNow instance before adding any integrations.

Role required: admin

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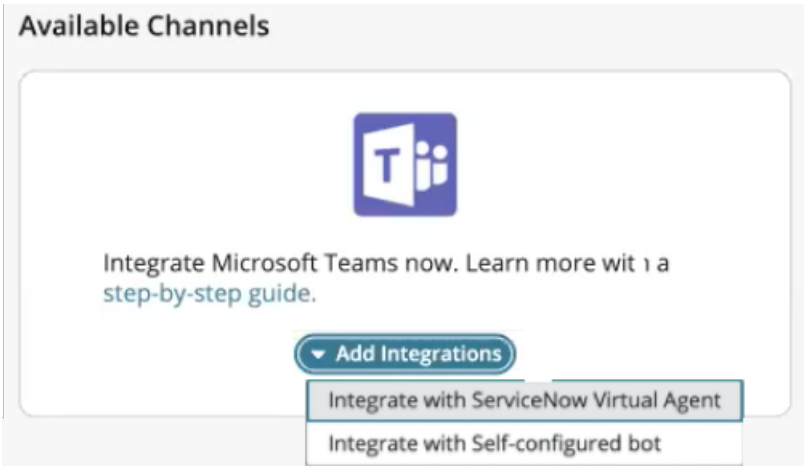
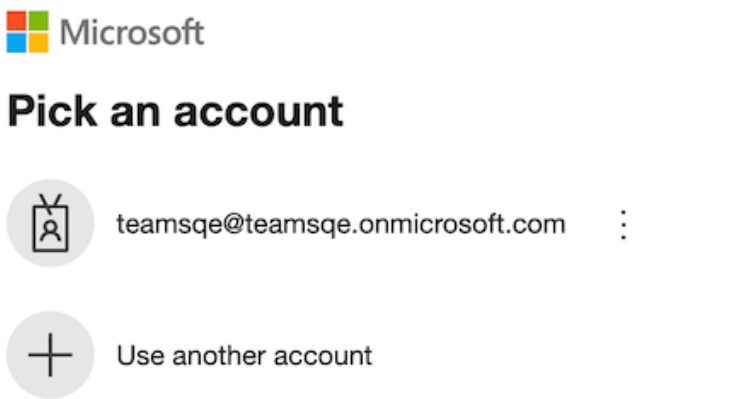
Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, select **View All**.
   The Channels and integrations page opens.
3. Under the Available Channels section in the Microsoft Teams tile, select **Add Integrations**.

> **Note:**
> The **Add Integrations** drop-down is available only after installing the Conversational Integration with Microsoft Teams plugin (sn_va_teams) on your ServiceNow instance.



4. From the **Add Integrations** drop-down, select **Integrate with ServiceNow Virtual Agent**.
5. In the Microsoft Pick an account screen, select a Microsoft Teams account that you would like



   to use for the integration.
6. Log in to the selected Microsoft Teams account.

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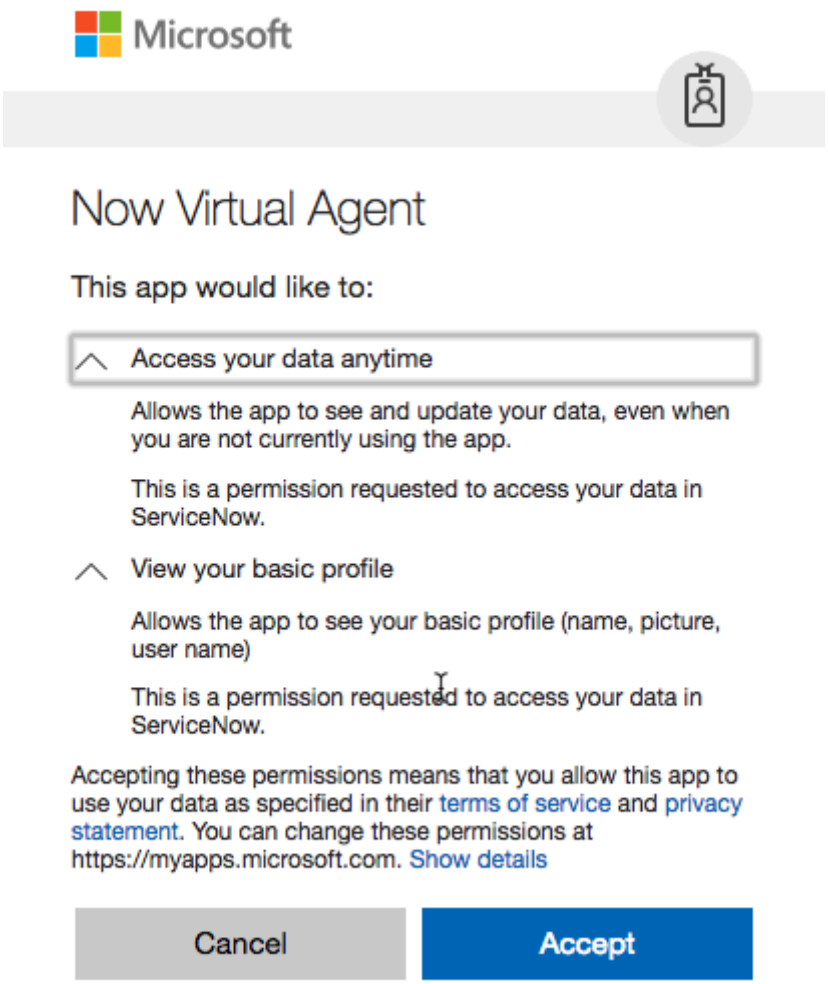
7. In the ServiceNow Virtual Agent screen, select **Accept** to accept the permissions for the



app.

8. If the selected tenant has already been assigned to Virtual Agent, you must first uninstall from the previously associated instance.

Note:
Starting from Tokyo release, if your Microsoft Teams tenant is already associated with another ServiceNow instance. If you intend to associate it with a new instance, then you're asked to contact the administrator to first uninstall it from the previously associated instance. For more information, see Override Microsoft Teams integration.

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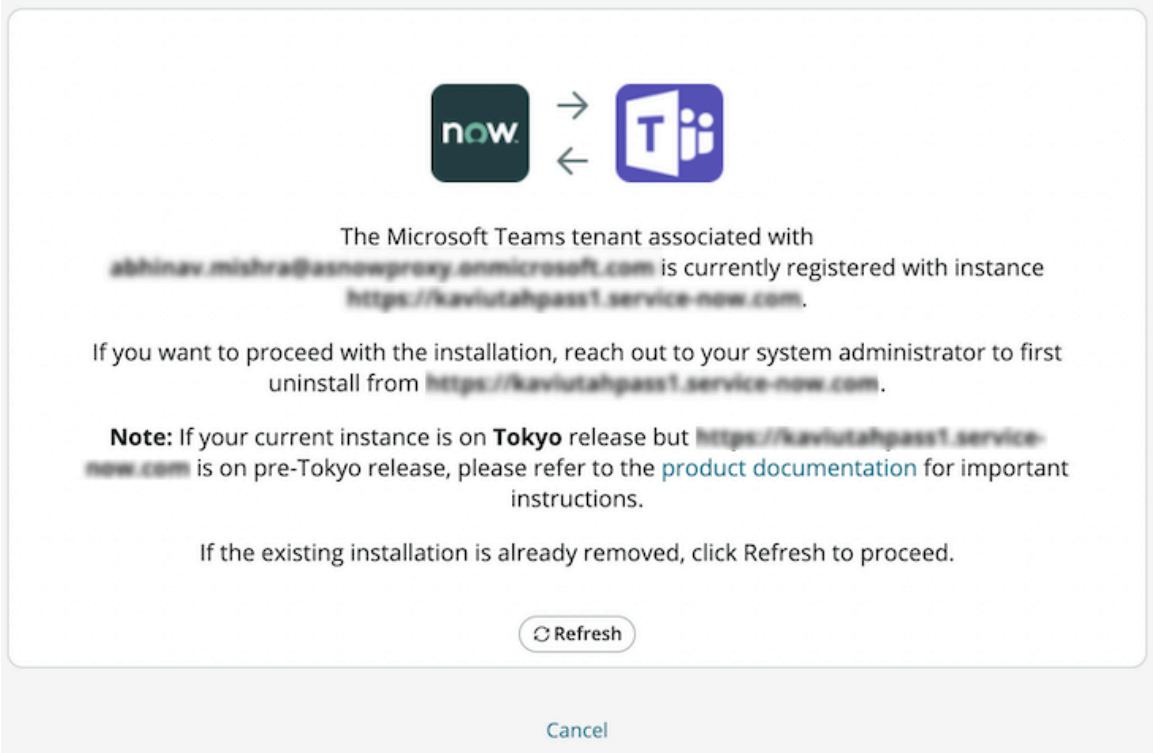
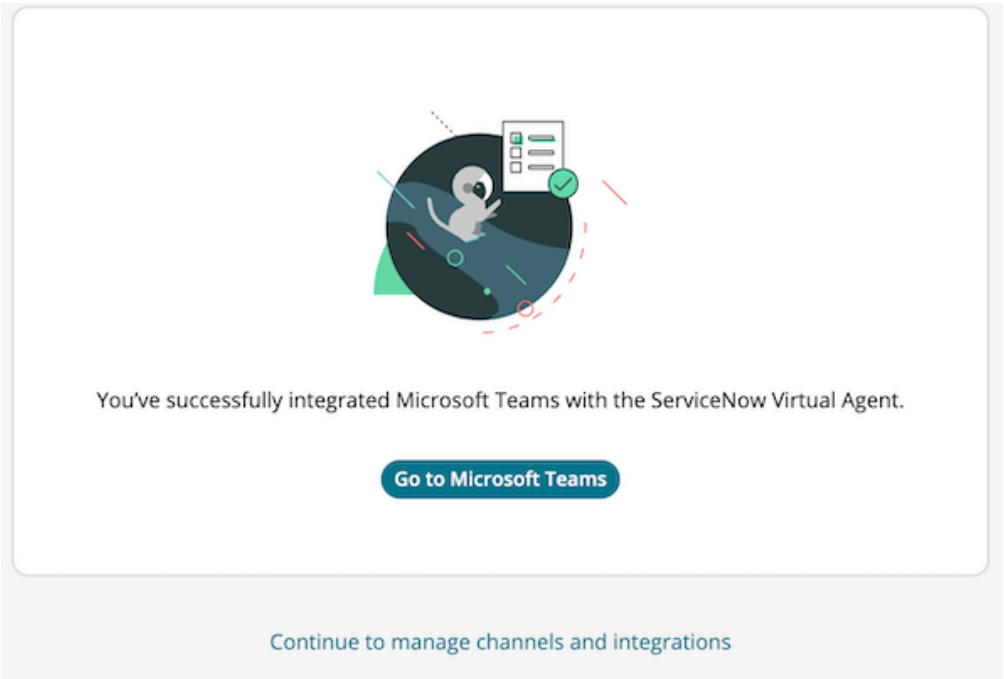


Installation starts in the background. After the installation completes, a message confirms that you successfully installed the Now Virtual Agent integration for Microsoft Teams.



9. Select **Go to Microsoft Teams** to manage your Microsoft Teams app.
10. Select **Continue to manage channels and integrations** to manage the integration on your ServiceNow instance.

    The Microsoft Teams application appears in the list of integrations.

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What to do next

If you would like to integrate your ServiceNow® instance with another Microsoft Teams bot, select the Add Integration for ServiceNow® Virtual Agent icon against the ServiceNow® Virtual Agent bot or select the **Add integration** drop-down on the Manage Microsoft Teams channel page. .

For more information, see Manage the ServiceNow Virtual Agent integration with Microsoft Teams.

Override Microsoft Teams integration

Override Virtual Agent integration with Microsoft Teams.

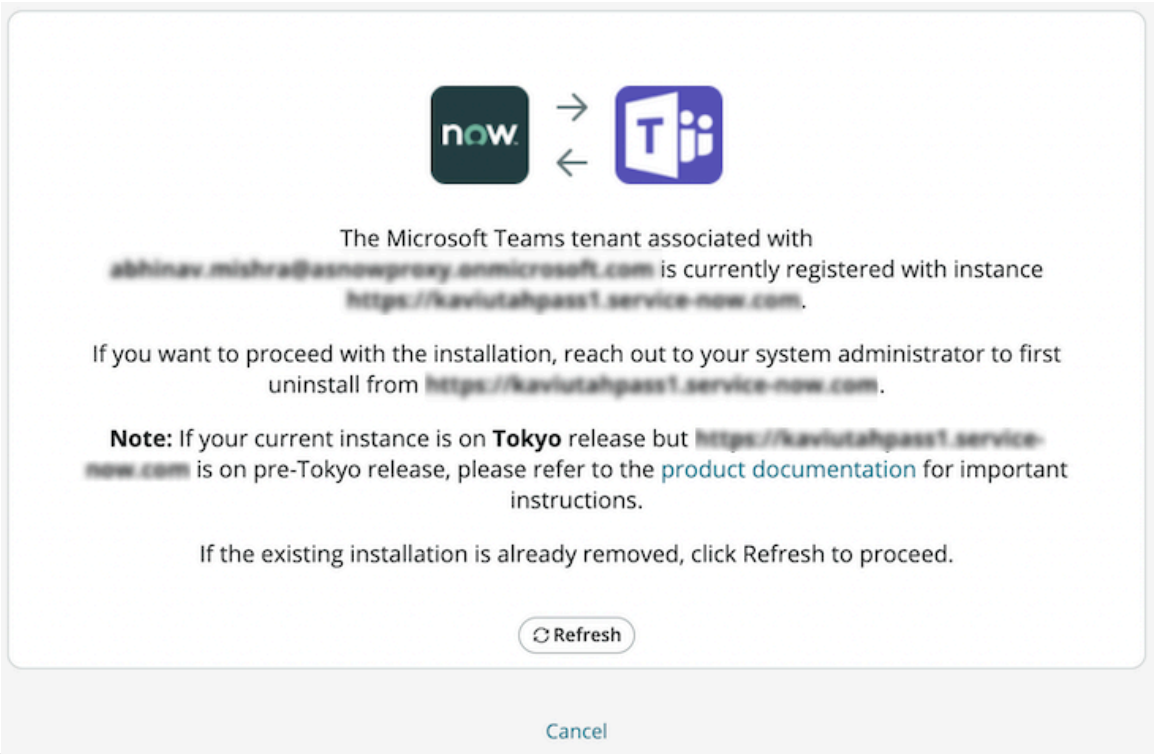
Before you begin

Role required: admin

About this task

Before Tokyo release, an admin was able to override a Microsoft Teams installation that is associated with an instance with a different ServiceNow instance.

Starting from Tokyo release, if you intend to associate your Microsoft Teams tenant with a new ServiceNow instance, contact the administrator to uninstall the tenant from the previously associated instance.



Important:
The instructions in Remove Conversational Integration with Microsoft Teams are only applicable when both instances are compatible with Tokyo and following releases. If one of your ServiceNow instances is on the Tokyo release and another on a release prior to Tokyo, use the following steps.

Procedure

1. In the left navigation filter of your ServiceNow instance, enter `sys_properties_list`.
2. Search and open the *`sn_va_teams.enable_va_override`* system property.

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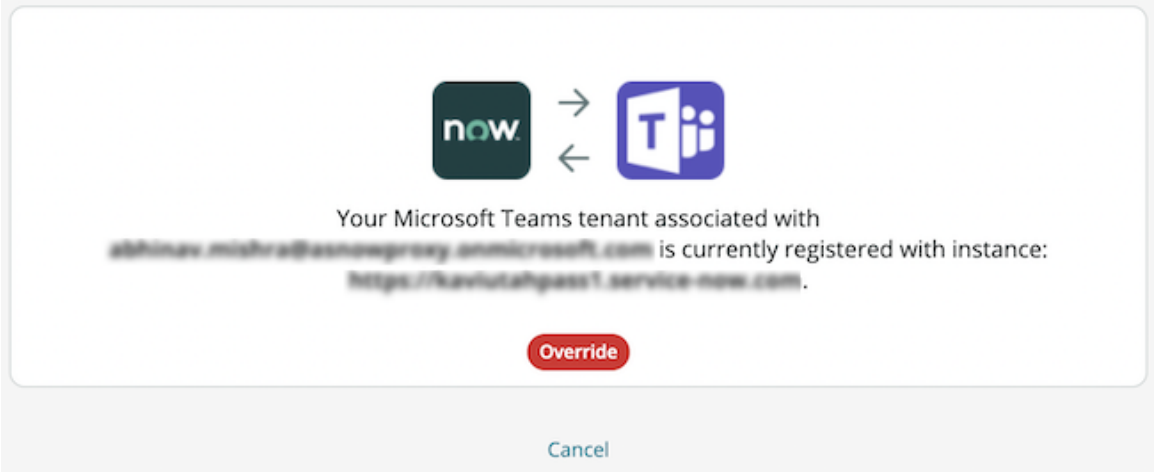
Note:
If you don't find this system property, you (as an admin) must create one.

3. Set the system property value to **true** to enable the **Override** button.

Note:
By default, the value of the system property is **false**.

4. Select **Override** to associate the instance with a new tenant.



Manage the ServiceNow Virtual Agent integration with Microsoft Teams

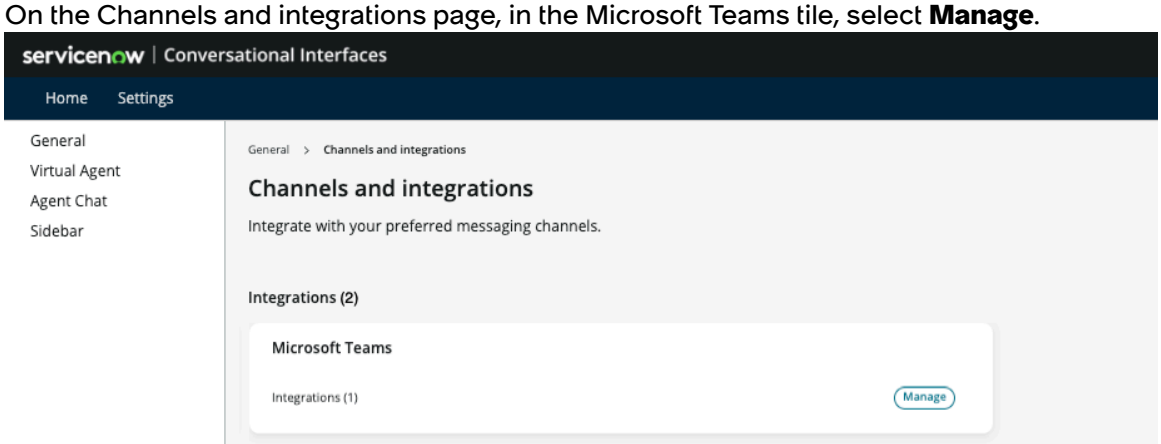
Manage your ServiceNow® Virtual Agent bot branding and customize the bot messages in your ServiceNow instance after integration with Microsoft Teams.

Before you begin

- Roles required:
  - virtual_agent_admin and external_app_install_admin or admin
  - Microsoft Teams administrator (one of the following): Global administrator, Application administrator, or Cloud application administrator

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, select **View All**.
3. On the Channels and integrations page, in the Microsoft Teams tile, select **Manage**.



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When you select **Manage**, you're redirected to the Manage Microsoft Teams channel page where you can manage the bots.

4. To integrate your ServiceNow instance with another Microsoft Teams bot, select the Add integration for ServiceNow Virtual Agent icon against the ServiceNow Virtual Agent bot or select the **Add integration** drop-down on the top-right of the Manage Microsoft Teams channel page and select **Integrate with ServiceNow Virtual Agent**.
5. Select the Manage Bot icon and select **Manage Virtual Agent**.
   You're redirected to the Bot Configuration page for the selected bot.
6. Select the **Branding** tab to brand your Now Virtual Agent bot.
   For more information about branding your bot, see Configure branding for your ServiceNow Virtual Agent bot in Microsoft Teams.
7. Select the **Bot Messages** tab to create and edit a bot message.
   For more information, see Create bot messages.

Configure branding for your ServiceNow Virtual Agent bot in Microsoft Teams

Enable users to configure branding for the published Microsoft Teams bot app, the ServiceNow Virtual Agent. Users are provided with the flexibility to customize the default ServiceNow branding for the Microsoft Teams production bot name and icon.

Before you begin

- Ensure that you have the admin access to your Microsoft Teams tenant and Microsoft Teams admin center.
- Ensure that Virtual Agent is installed on your instance.
- Ensure that the Conversational Integration with Microsoft Teams store app is installed.

Role required: admin

Procedure

1. Log in to Microsoft Teams admin center.
2. Navigate to **Teams apps** > **Manage apps**.
3. In the list of apps, search for the Now Virtual Agent app using the Search bar and open it.
4. Click the pencil icon to **Customizable** to customize the app.
5. In the Customize panel, you can edit the app name, short description, color icon, outline icon, and accent color.

   Note:
   Follow the tool tips for file size and format restrictions for each field. You can also refer to Microsoft documentation on further details on the app customization functionality.

6. Click **Apply**.
   You will see the **Publish application** pop-up.
7. Click **Publish**.

   Note:
   Please note that the changes you made to the app may take up to 24 hours to reflect.

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Integrating multiple ServiceNow instances with a single Microsoft Teams tenant

Enables ServiceNow® Virtual Agent to allow multiple ServiceNow instances to integrate with single Microsoft Teams tenant.

The Virtual Agent integration with Microsoft Teams creates a one-to-one association between the ServiceNow instance that you are installing from and the Microsoft Teams tenant in which the integration runs. By default, Virtual Agent supports one-click installation that integrates one Microsoft Teams tenant with one ServiceNow instance. By enabling this integration, Virtual Agent allows integrating multiple ServiceNow instances with a single Microsoft Teams tenant. You can integrate multiple ServiceNow instances with a single Microsoft Teams tenant by creating a bot for each of the instances on the Microsoft Teams tenant.

What to do next

1. Plugins for Conversational Integration with Microsoft Teams
2. Create a Bot in Microsoft Teams
3. Integrate your Self-configured bot with single Microsoft Teams tenant
4. Auto-generate the manifest file for uploading on Microsoft Teams
5. Upload the manifest package file to publish your bot

Create a Bot in Microsoft Teams

You must create a bot in Microsoft Teams to be able to integrate with the Virtual Agent.

Before you begin
Role required: none

Procedure

1. Login into Microsoft Teams and navigate to Developer Portal.
2. On the Developer Portal page, navigate to the **Tools** > **Bot Management**.
3. Click **Create a New bot** and provide a bot name of your choice and click **Add**.
4. Open the bot that you created and click the **Configure** tab.
5. Under Endpoint address, provide the instance URL in the **Bot endpoint address** field click **Save**.
   For example: `https://<instancename>.service-now.com/api/now/v1/cs/adapter/msft/events`.

   Note:
   Replace the <instancename> with the name of your ServiceNow instance where you are integrating with Microsoft Teams. In case of multi-instance single tenant integration, use the secondary ServiceNow instance for integrating with a bot on Microsoft Teams tenant.

6. Navigate to **Client secrets** and click **Add a client secret for your bot**.
7. Copy the value of the client secret from the **New client secret generated** pop-up for later use as it is displayed only during this step and click **OK**.
8. Navigate to **Developer Portal** > **Tools** > **Bot management** and copy the Bot ID of the bot you created.
9. Retrieve the following details of your bot in Microsoft Teams to integrate with Virtual Agent.

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- Tenant ID: Follow the instructions on Microsoft Teams documentation, to fetch the Tenant ID.
- Client ID (App ID): Client ID is the Bot Id that you have copied as mentioned in Step 8.
- Client Secret: It is the secret that you have copied as mentioned in Step 7.
- Bot Name: The name of the bot that you entered in Step 3.

10. Press **Enter** to save.

What to do next

Integrate your Self-configured bot with single Microsoft Teams tenant.

Integrate your Self-configured bot with single Microsoft Teams tenant

Integrate multiple ServiceNow instances with a single Microsoft Teams tenant by creating multiple bots on the Microsoft Teams tenant. Use your ServiceNow Virtual Agent application, which supports multiple bots on a single Microsoft Teams tenant, to install Conversational Integration with Microsoft Teams application.

Before you begin

Role required: virtual_agent_admin or admin and Microsoft Teams Tenant admin

This installation requires a ServiceNow instance other than the one integrated with the production bot to integrate with one bot (of the multiple bots) on a single Microsoft Teams tenant.

Note:
The ServiceNow instance that you will use to integrate with a single Microsoft Teams tenant must not be an instance that you have used for installing Conversational Integration with Microsoft Teams in the primary method where you can integrate only one ServiceNow instance with one tenant.

Ensure that you created a bot on the Microsoft Teams tenant for each ServiceNow instance to be integrated. For more information, see Create a Bot in Microsoft Teams.

Procedure

1. Fetch the Tenant ID, Client ID (App ID), Client Secret, and Bot Name details for your bot created in Microsoft Teams.
   For more information, see Retrieve bot details.

   Note:
   Use this information when setting up the bot in your ServiceNow instance.

2. As a ServiceNow admin, set up the bot on the ServiceNow instance in the global scope.

   Note:
   The virtual_agent_admin can install bots with multiple instances or bots apart from production in the ServiceNow instance and avail all the features of Virtual Agent and the flexibility to integrate one of the multiple ServiceNow instances with a bot on a single Microsoft Teams tenant.

   a. Log in to your ServiceNow instance (secondary instance for integrating with a bot on single Microsoft Teams tenant) and navigate to **All** > **Conversational Interfaces** > **Settings**.

   b. In **General Settings** under **Channels and integrations**, click **View All**.
   The Channels and integrations page opens.

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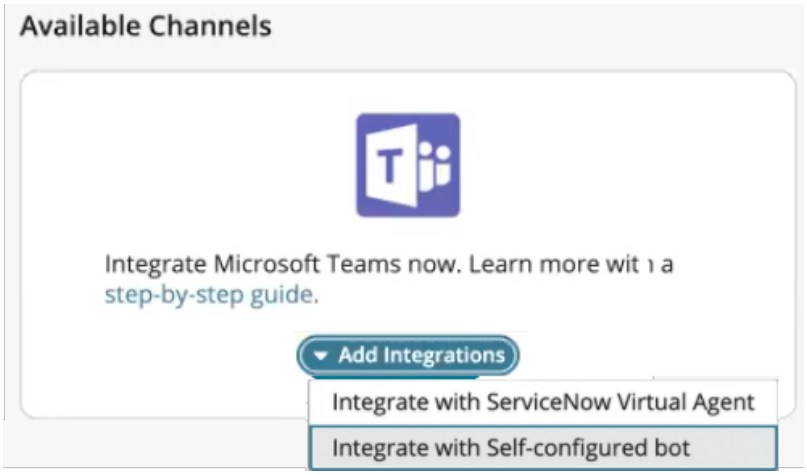
c. Under the Available Channels section in the Microsoft Teams tile, click **Add Integrations**.

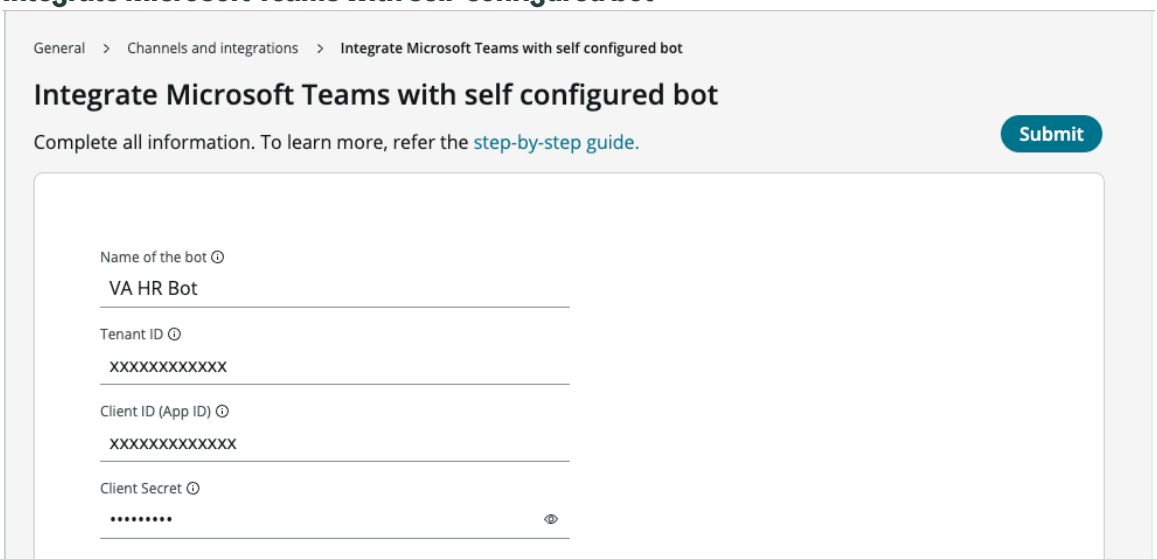
Note:
The **Add Integrations** drop-down is available only after installing the Conversational Integration with Microsoft Teams plugin (sn_va_teams) on your ServiceNow instance.



d. From the **Add Integrations** drop-down, select **Integrate with Self-configured bot**.

e. In the Integrate Microsoft Teams with self-configured bot page, provide the **Name of the bot**, **Tenant ID**, **Client ID (App ID)**, and **Client Secret** that you made a note while creating the Microsoft Teams bot and click **Submit**.

Integrate Microsoft Teams with self-configured bot



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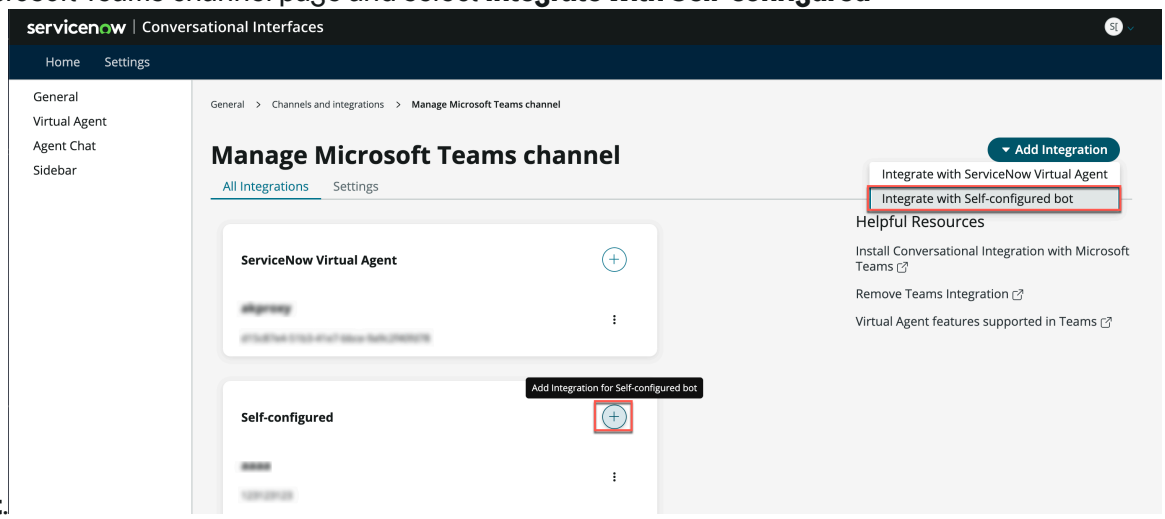
Note:
For each additional bot to be integrated, repeat steps 1 and 2.

If you would like to integrate your ServiceNow instance with another Microsoft Teams bot, click the Add integration for Self-configured bot icon against the Self-configured bot or click the **Add integration** drop-down on the Manage Microsoft Teams channel page and select **Integrate with Self-configured bot**.



User receives a message that the installation is successful.

What to do next

- Auto-generate the manifest file for uploading on Microsoft Teams.
- Upload the manifest package file to publish your bot

Configure Microsoft Teams Message Extension

Configure Microsoft Teams Message Extension to enable users to use AI Search to find content (Knowledge articles and catalog items), and share information in a one-on-one or group chat. For the base system Virtual Agent integration with Microsoft Teams, this feature is enabled by default.

Before you begin
Role required: admin

About this task
Administrators have the option to configure the number of search results that appear in Message Extension and control the access level of a Guest user.

Procedure

1. Navigate to **All** > **AI Search** > **Search Experience** > **Search Applications** to configure the number of search results that appear in Message Extension.
2. In the **Search Results Limit** field, adjust the number of search results that you want to appear in Messages Extension, and then select **Update**.
   Message Extension then generates the new results limit when a user performs a search if AI Search is able to find that number of results. For example, a limit may be set to 8 but if AI Search only finds 6 results, then 6 items are shown.
3. Navigate to **All> System Properties> All Properties** and select *message_extension_guest_access_only* to control the access of the Guest user.

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When the flag is set to true, Message Extension returns the results that are only visible to the Guest users. Only the items that are publicly available are returned while the property is set to true. By default, this value is set to false, which means that a user can see all search results that they have access to. However, if you set the system property value to true, a user can only access the search results that are publicly available. This system property is useful if you want to avoid having a user accidentally sharing something that they shouldn't be sharing. You don't typically have to change the value. For self-configured bots, see the procedure in Auto-generate the manifest file for uploading on Microsoft Teams for more information.

Integrating Virtual Agent with Microsoft Teams using the self-configured bot

You can integrate Virtual Agent with Microsoft Teams by configuring your own bots. The self-configured method provides another way for customers to enable the integration without installing the default Now Virtual Agent app that is published on the Microsoft Store. Unlike the pre-published app, the self-configured bot bypasses the collaboration proxy architecture.

The self-configured method offers a solution for the following cases:

- Commercial customers with a ServiceNow instance running far away from the United States who may be having issues using the collaboration proxy.
- ServiceNow Government Community Cloud (GCC) customers.

Note:
Microsoft Azure supports the bot framework in GCCHIGH and DOD (US Department of Defense). For more information about the bot framework support, see Integrating Virtual Agent with Microsoft Teams for GCC-H or DoD.

If you are a commercial customer who has already installed a pre-published bot but would like to integrate with multiple ServiceNow instances within a single Microsoft Teams tenant, see Integrate your Self-configured bot with single Microsoft Teams tenant.

Prerequisites

Before integrating Virtual Agent with your Microsoft Teams tenant, ensure that the following prerequisites are met:

- Verify that your ServiceNow instances have been upgraded to the San Diego release.
- If you are a commercial user, verify that your Microsoft 365 is on the commercial environment. If you are a regulated market user, verify that your Microsoft 365 is on the GCC environment.
- You have not attempted previous installations of the Conversational Integration with Microsoft Teams in your instances.

  If you previously tried to install the integration in Quebec and the above releases, refer to this Knowledge Base article to remove the residual installation items.

  If you previously tried to install the integration in a release prior to Quebec, contact Customer Service and Support for help with cleaning up your instance manually.

- Verify that you have the admin permissions on ServiceNow and Microsoft Azure instances.

What to do next

1. Plugins for Conversational Integration with Microsoft Teams
2. Create a Bot in Microsoft Teams
3. Integrate your Self-configured bot with Microsoft Teams for GCC.

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4. Auto-generate the manifest file for uploading on Microsoft Teams
5. Upload the manifest package file to publish your bot

Plugins for Conversational Integration with Microsoft Teams

Activate the Glide Virtual Agent [com.glide.cs.chatbot] plugin, the Conversational Integration with Microsoft Teams [sn_va_teams] plugin, and verify its additional plugins to enable other features for conversation design.

You must have either the virtual_agent_admin or admin role and the external_app_install_admin role to activate these additional plugins. For details, see Activate a plugin.

Note:
Ensure that you have performed the following steps before verifying the activation of additional plugins required for Microsoft Teams.

- Installing of the Glide Virtual Agent [com.glide.cs.chatbot] plugin.

  For more information about activating the Glide Virtual Agent plugin, see Activate Virtual Agent.

- Downloading the Conversational Integration with Microsoft Teams app from the ServiceNow® Store.

  For more information about downloading the app, Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

- Installing the Conversational Integration with Microsoft Teams [sn_va_teams] plugin in your ServiceNow instance.

  For more information about installing Conversational Integration with Microsoft Teams, see Install Conversational Integration with Microsoft Teams.

Verify the following plugins for Conversational Integration with Microsoft Teams.

- Microsoft Teams Graph Spoke [sn_msteams_ahv2]: Plugin is auto installed as part of [sn_va_teams]. In your ServiceNow instance, navigate to **System Definition** > **Plugin Installation History** and search for [sn_msteams_ahv2] to locate the plugin. If it has not been installed, you might have to request from the ServiceNow Store first and install the plugin in your ServiceNow instance.
- MS Teams - App Core [com.snc.msteams.app.core]: Plugin is auto installed as part of [sn_va_teams]. In your ServiceNow instance, navigate to **System Definition** > **Plugin Installation History** and search for [com.snc.msteams.app.core] to locate the plugin. If the plugin is installed, you are all set to move forward. If it was not installed, reach out to Customer Service and Support.

Integrate your Self-configured bot with Microsoft Teams for GCC

You must install the bot that you created in your Microsoft Teams tenant on your ServiceNow instance to integrate it with the Virtual Agent. Use your ServiceNow Virtual Agent application to install and configure Conversational Integration with Microsoft Teams.

Before you begin

Role required: virtual_agent_admin or admin and Microsoft Azure admin.

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This installation requires a ServiceNow instance to integrate with a self-configured bot on the Microsoft Teams tenant.

Ensure that you created a bot on the Microsoft Teams tenant to integrate with the ServiceNow instance. For more information, see Create a Bot in Microsoft Teams.

Procedure

1. Fetch the Tenant ID, Client ID (App ID), Client Secret, and Bot Name details for your bot created in Microsoft Teams.
   For more information, see Retrieve bot details.

   Note:
   Use this information when setting up the self-configured bot in your ServiceNow instance.

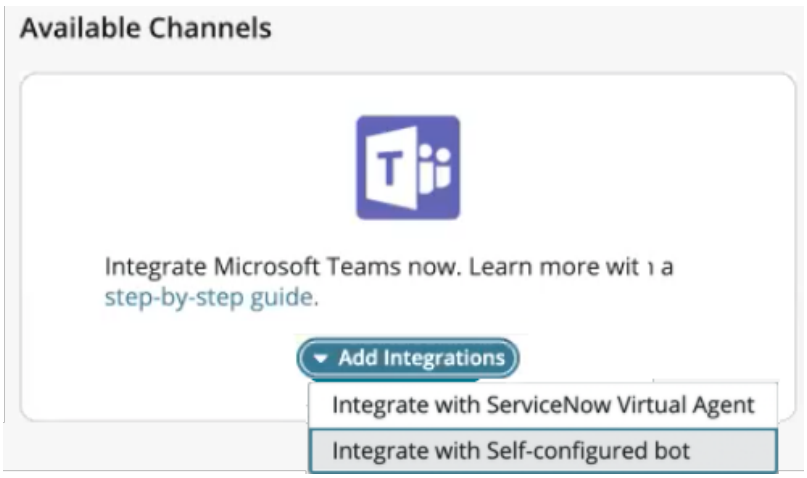
2. As a ServiceNow admin, set up the self-configured bot on the ServiceNow instance in the global scope.

   a. Log in to your ServiceNow instance and navigate to **All** > **Conversational Interfaces** > **Settings**.

   b. In **General Settings** under **Channels and integrations**, select **View All**.
   The Channels and integrations page opens.

   c. Under the Available Channels section in the Microsoft Teams tile, select **Add Integrations**.

   Note:
   The **Add Integrations** drop-down is available only after installing the Conversational Integration with Microsoft Teams plugin (sn_va_teams) on your ServiceNow instance.



   d. From the **Add Integrations** drop-down, select **Integrate with Self-configured bot**.

   e. In the Integrate Microsoft Teams with self-configured bot page, provide the **Name of the bot**, **Tenant ID**, **Client ID (App ID)**, and **Client Secret** that you made a note while creating the Microsoft Teams bot and select **Submit**.

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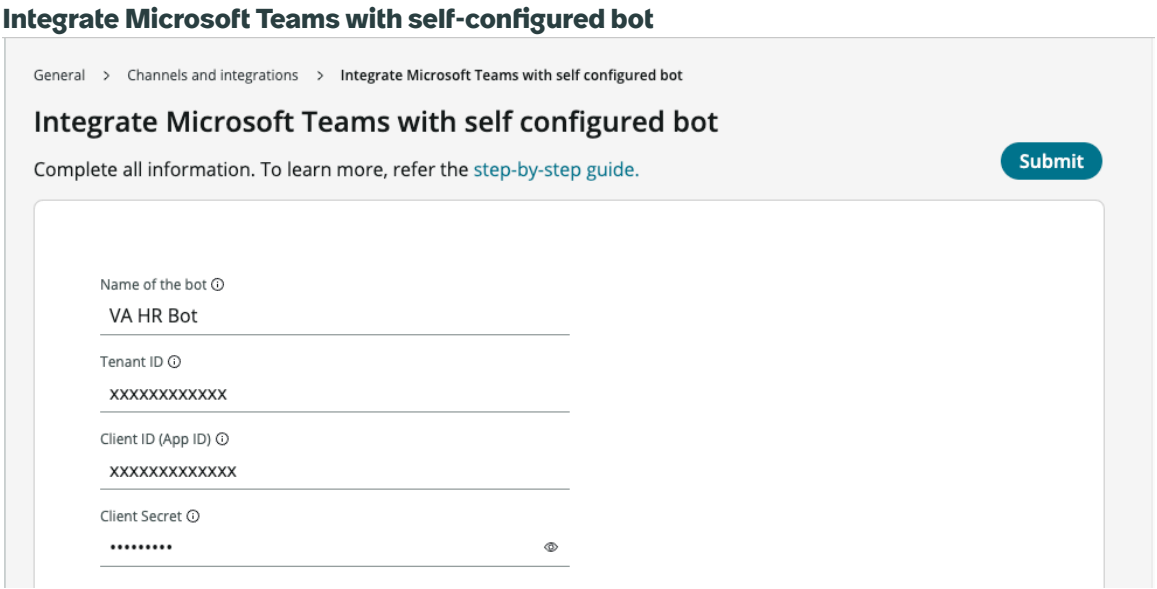

Note:
If you own multiple ServiceNow instances and would like to integrate additional bots for additional instances, repeat the preceding steps to add and integrate with bots.

If you would like to integrate your ServiceNow instance with another Microsoft Teams bot, select the Add integration for self-configured bot icon against the Self-configured bot or select the **Add integration** drop-down on the Manage Microsoft Teams channel page and select **Integrate with your self-configured bot**. .

For more information, see Manage the ServiceNow Virtual Agent integration with Microsoft Teams.

User receives a message that the installation is successful.

What to do next
Auto-generate the manifest file for uploading on Microsoft Teams.

Auto-generate the manifest file for uploading on Microsoft Teams

Auto-generate the manifest file and customize the branding of your Microsoft Teams app so that you can make Virtual Agent available in your organization.

Before you begin
Role required: virtual_agent_admin or admin

About this task
An automated manifest file generator on the new Microsoft Teams UI automatically fills in the bot ID and updates the other settings (such as branding) based on input from you, the administrator. The manifest file generator also enables a one-click download of the manifest package.

- Before you generate a manifest file, you must create a self-configured bot (or ensure that one has already been created) in the ServiceNow instance. You can then generate a manifest package for each self-configured bot that you create.
- After you save the manifest form, you can download the manifest zip package, which contains the following three files:

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- manifest.json
- color.png
- outline.png

You can edit the manifest form and redownload it as many times as you want.

Note:
This feature is only applicable when you're setting up the Virtual Agent integration with Microsoft Teams. If you intend to use ServiceNow for Microsoft Teams with ITSM or HR capabilities, select the **Learn more** link next to **Planning to enable additional ITSM and HR integrations** on the Bot Configuration page. That way, you can configure the manifest in a separate module instead of continuing to configure the manifest here. For more information, see Create and download the manifest file.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings**, in the Channels and routing section, select **View All**.
3. On the Channels and integrations page, in the Microsoft Teams tile, select **Manage**.
4. In the Self-configured bot section, select the **Manage Bot** icon.
   If you haven't enabled Message Extension and you are accessing it for the first time, you see a Turn on new feature alert message that informs you that the Message Extension feature for your Microsoft Teams integration is now available to be turned on.
5. On the **Configuration** tab, select **Edit configuration** and on the form, fill in the fields.

Configure your Bot - VA Microsoft Teams Manifest

Field	Description
Short Name	Short display name for your app. **Note:** Ensure that the name doesn't exceed 30 characters.
Full Name	Full name of your app. Use the full name if the short name of the app exceeds 30 characters. **Note:** Ensure that the full name doesn't exceed 100 characters.
Bot (Client) ID	Unique Microsoft generated identifier. This field is automatically tied to the bot creation step and can't be altered.
Short description	Short description of your app experience. Use a short description when space is limited.

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Field	Description
	Note: Ensure that the short description doesn't exceed 80 characters.
Full description	Full description of your app. **Note:** Ensure that the full description doesn't exceed 4000 characters.
Valid domains	List of valid domains for websites that your app expects to load in Microsoft Teams. **Note:** Currently only the ServiceNow domain is supported.
Version	Specific version of your app to track the incremental manifest submission to Microsoft Teams. For example, 1.0.0. Use a maximum of 2 digits after each decimal. **Note:** Ensure that you put a higher number for each new version.
Accent color	Color to use as a background for your outline icons. **Note:** The value must be a valid HTML color code starting with a hash-tag (#). For example, #293E40.
Color icon	Icon of your app that you want to appear in most Microsoft Teams scenarios. You can select the following options: ○ **Use Default icon**: Changes the color of the icon back to the default color icon. ○ **Use Custom icon**: Changes the color icon with an icon color of your choice. **Note:** Ensure that you upload only the `.png` image files that have fewer than 192x192 pixels to change the color of the icon.
Outline icon	Icon that is seen on the app bar when the app is in use.

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Field	Description
	You can select the following options: ○ **Use Default icon**: Changes the outline icon back to the default outline icon. ○ **Use Custom icon**: Changes the outline icon with an icon of your choice. **Note:** Ensure that you upload only the `.png` image files that have fewer than 32x32 pixels to change the outline icon.
Message Extension	Message extension that lets users search and share the results through the compose message area of the Microsoft Teams client.

For more details about each field, refer to Microsoft Teams documentation.

6. Select **Save**.
   You're redirected to the Bot configuration page where the manifest file is saved and ready for you to download.

   Note:

   You can also edit the manifest file by selecting **Edit configuration** on the download page and downloading the file as many times as you would like. With each new manifest, ensure that you enter a higher version number in the **Version** field so that the updated form can be saved successfully.

7. In the Bot configuration page, under Your package, select the **Download** button to download your package file.

   Note:

   You can also edit the manifest file by selecting **Edit configuration** on the download page and downloading the file as many times as you would like. However, with each new manifest, ensure that you enter a higher version number in the **Version** field so that the updated form to be saved successfully.

What to do next

Upload the manifest package file to publish your bot.

Upload the manifest package file to publish your bot

Upload the manifest file that you generated to the Microsoft Teams and test your app experience to make it be available in the Microsoft global app store.

Before you begin

Role required: admin

The self-configured bot that you created will not be available in the Microsoft global app store unlike the ServiceNow pre-published app - ServiceNow Virtual Agent. To test your app experience within Microsoft Teams, you must upload your app to Microsoft Teams. Uploading adds the app to the team that you selected and your team can participate in the end-to end conversations with the bot.

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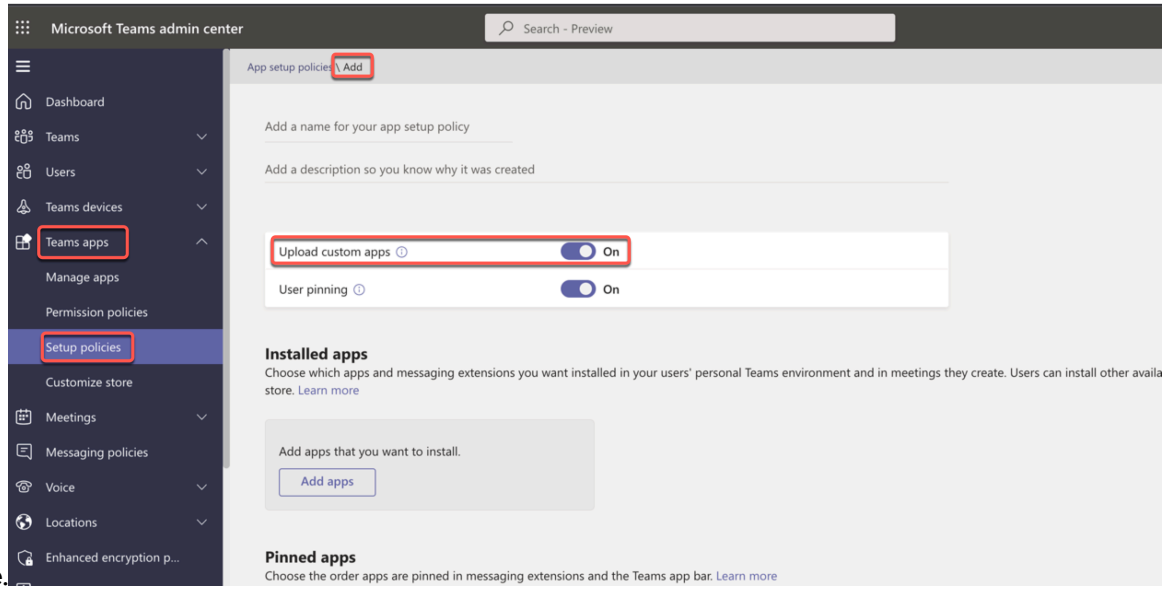
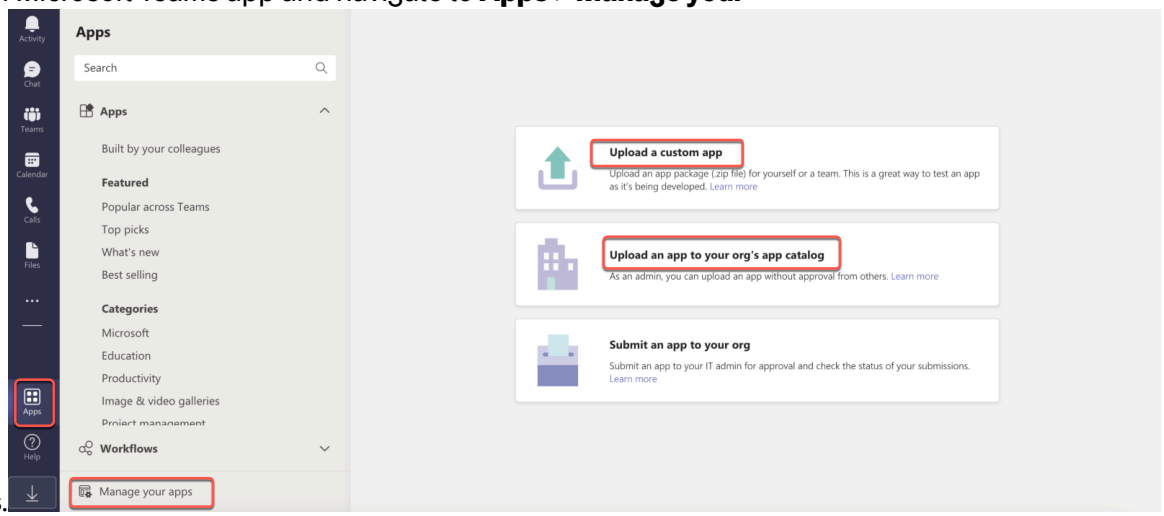
Procedure

1. Log in to the Microsoft Teams Admin Center using the admin credentials and navigate to **Teams apps** > **Setup policies**.
2. Click **Add** and turn on **Upload custom apps** (if it has not been enabled already) and click **Save** at the bottom of the page.



3. Open Microsoft Teams app and navigate to **Apps** > **Manage your apps**.



4. Select **Upload a custom app** for testing purposes and select **Upload an app to your org's app catalog** to release the self-configured bot to the entire organization.
5. Upload the zip file and click **Add/Install**.
6. After you successfully published the bot, click the 3-dot menu on the left pane to locate your app (search in the Find an app bar).
   You have successfully published the bot on Microsoft Teams. It should now be available for your organization and you can start interacting with the bot.
7. Perform the following steps on the Microsoft Teams Admin center.

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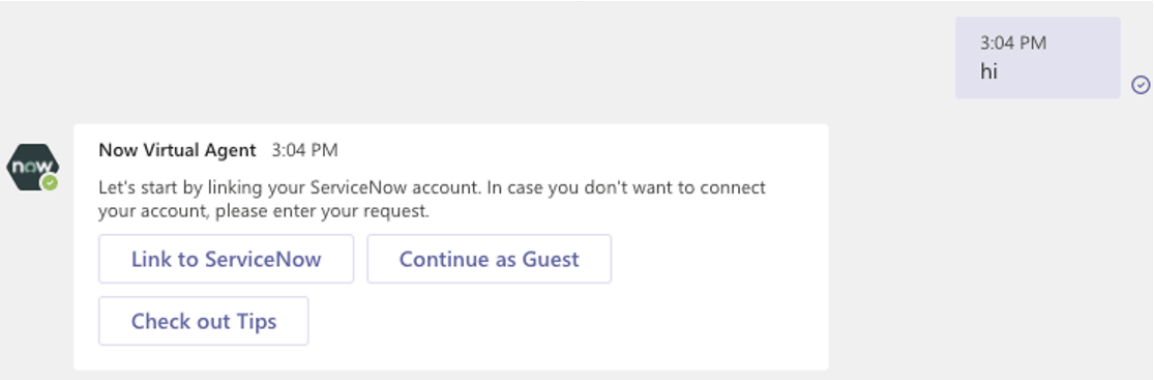
Note:
If you have enabled pre-linking by turning on **Automatically Link ServiceNow user profiles** on the Messaging App Integration UI page, users are pre-linked without typing hi. For more information about pre-linking your accounts, see Pre-link Virtual Agent requesters for integration with Microsoft Teams. If you have turned off the check box, use the following manual account linking process described.

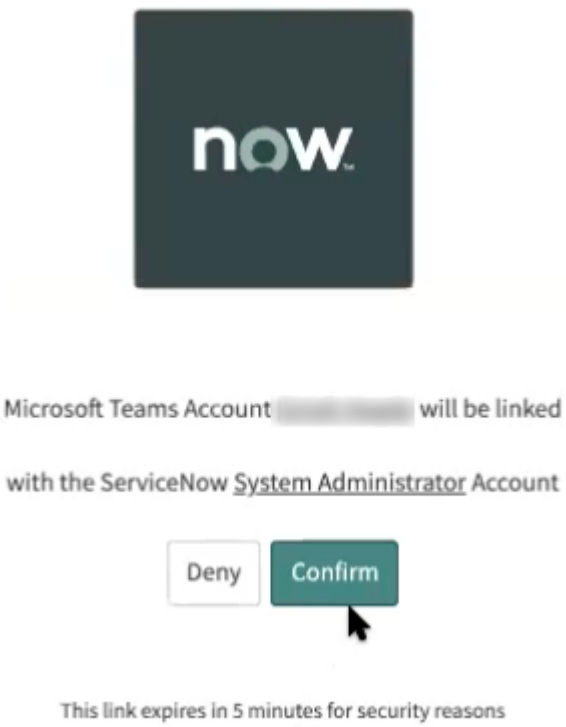
a. Type `hi` to start interacting with the bot.
The bot presents a prompt that provides options to authenticate, such as **Link to ServiceNow**, **Continue as Guest**, and **Check out Tips**.

Microsoft Teams bot responses



The **Link to ServiceNow** option requires users to enter their ServiceNow instance credentials. If you choose to link to your ServiceNow account, the following screen is displayed asking you to confirm the account linking.

Linking Microsoft Teams account with ServiceNow account



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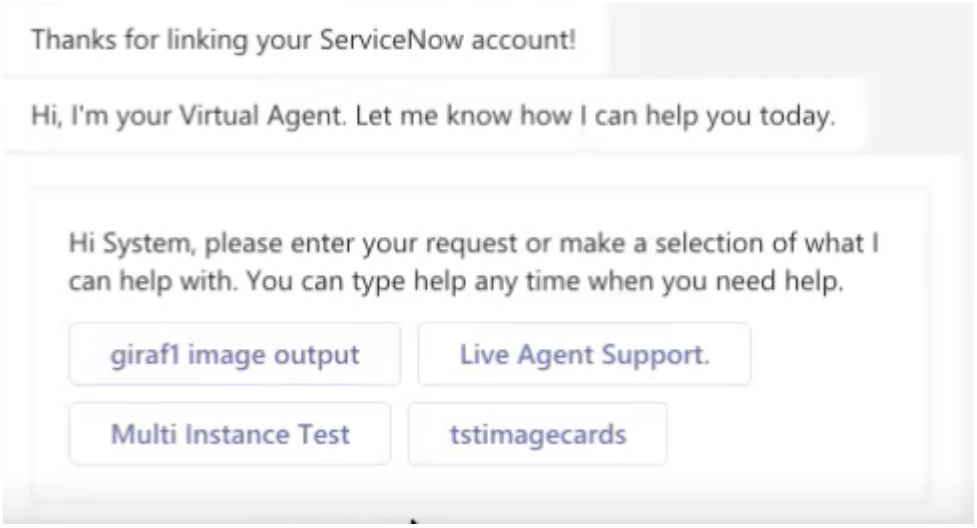
Account linking associates your Microsoft Teams account with your ServiceNow account for the ServiceNow instance that is integrated with the Conversational Integration with Microsoft Teams. Users with linked accounts can run Virtual Agent topics that use ServiceNow information and records.

ServiceNow account linked with Microsoft Teams tenant



If your users do not link their ServiceNow accounts, they can access and run only the public topics.

b. Configure the bot on your ServiceNow instance.
For more information, see Virtual Agent integration with messaging apps.

What to do next

You have successfully integrated Virtual Agent with Microsoft Teams using the self-configured method. If you are interested in getting additional ITSM and HR capabilities in Microsoft Teams, see these instructions for using a self-configured bot with ServiceNow for Microsoft Teams.

Integrating Virtual Agent with Microsoft Teams for GCC-H or DoD

You can integrate Virtual Agent with Microsoft Teams for GCC-H (Government Community Cloud - High) or DoD (Department of Defense) customers by configuring your own bots. The self-configured method provides another way for customers to enable the integration without installing the default Now Virtual Agent app that is published on the Microsoft Store. The self-configured bot bypasses the collaboration proxy architecture.

If you are a commercial customer who has already installed a pre-published bot but would like to integrate with multiple ServiceNow instances within a single Microsoft Teams tenant, see Integrate your Self-configured bot with single Microsoft Teams tenant.

If you are a Microsoft GCC (GovtCommunityCloud) customer, do not follow this step. Instead, refer to Integrating Virtual Agent with Microsoft Teams using the self-configured bot.

Prerequisites

Before integrating Virtual Agent with your Microsoft Teams tenant, ensure that the following prerequisites are met:

- Verify that your ServiceNow instances have been upgraded to the San Diego release.
- Verify that you have not previously attempted installing the Conversational Integration with Microsoft Teams app on your instances.

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If you previously tried to install the integration in Quebec and the above releases, refer to this Knowledge Base article to remove the residual installation items.

If you previously tried to install the integration in a release prior to Quebec, contact Customer Service and Support for help with cleaning up your instance manually.

- Verify that you have the admin permissions on ServiceNow and Microsoft Azure instances.

What to do next

1. Plugins for Conversational Integration with Microsoft Teams.
2. Create a bot in Microsoft Teams for GCC-H or DoD.
3. Integrate your Self-configured bot with Microsoft Teams for GCC-H or DoD.
4. Auto-generate the manifest file and upload it into Microsoft Teams for GCC-H or DoD.

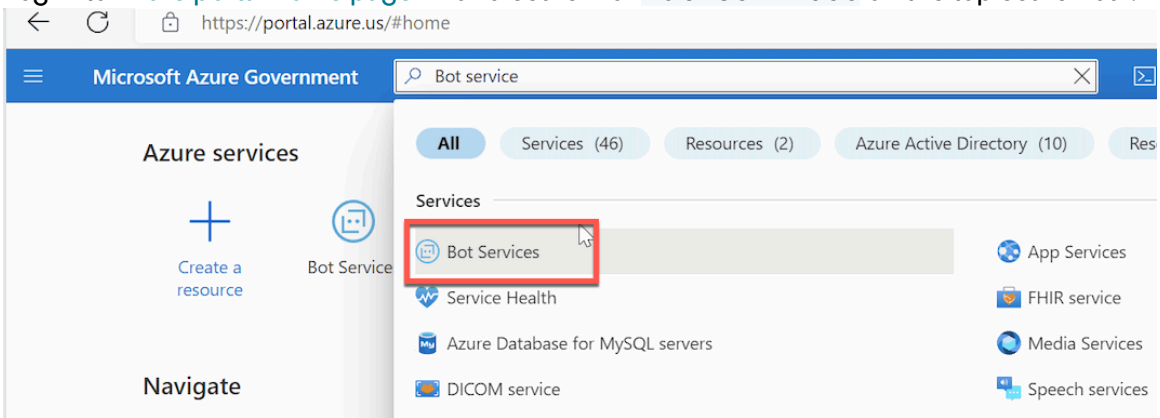
Create a bot in Microsoft Teams for GCC-H or DoD

Create a self-configured bot with Microsoft Teams for GCC-H or DoD customers to be able to integrate with the Virtual Agent.

Before you begin
Role required: none

Procedure

1. Log in to Azure portal home page and search for `Bot Services` on the top search bar.



2. On the Bot services page, select **Create** and select **Azure Bot**.

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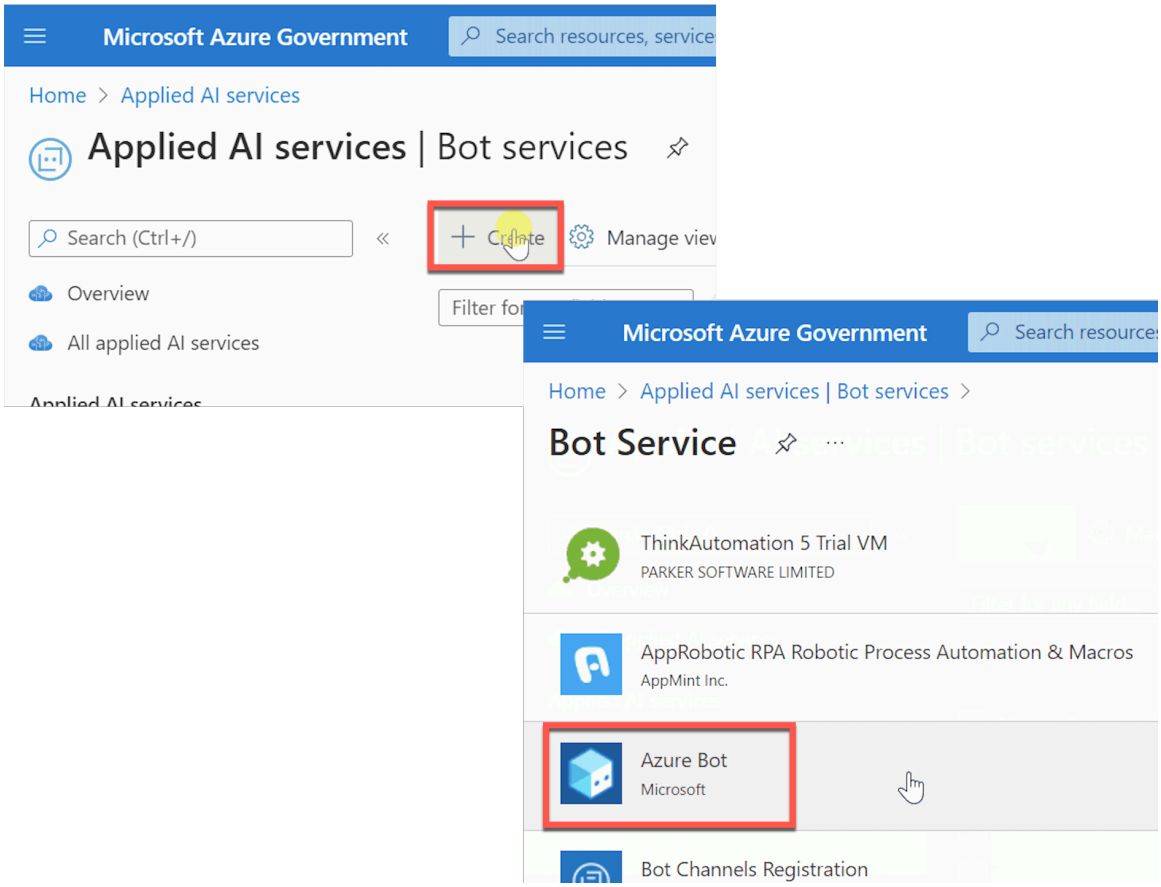
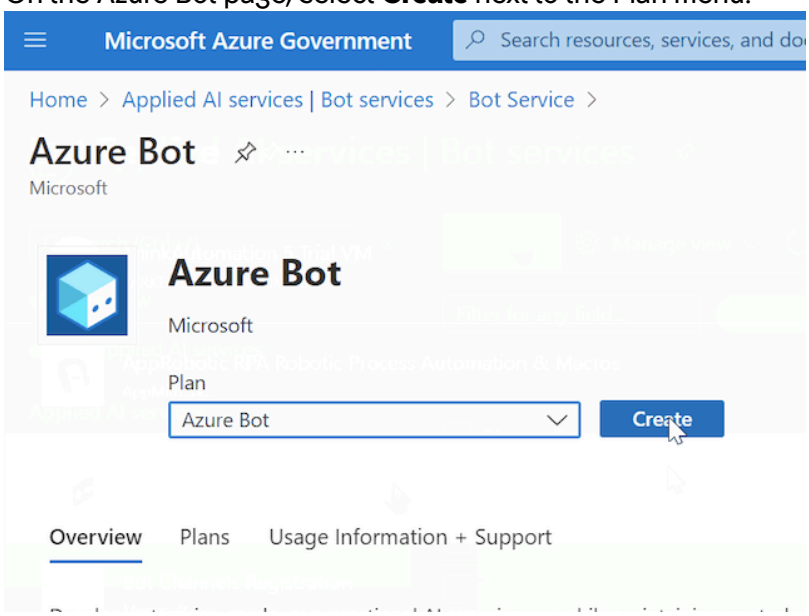


3. On the Azure Bot page, select **Create** next to the Plan menu.



4. On the form, fill in the **Bot Handle**, **Subscription**, **Resource group**, **New resource group location**, and **Pricing** details.

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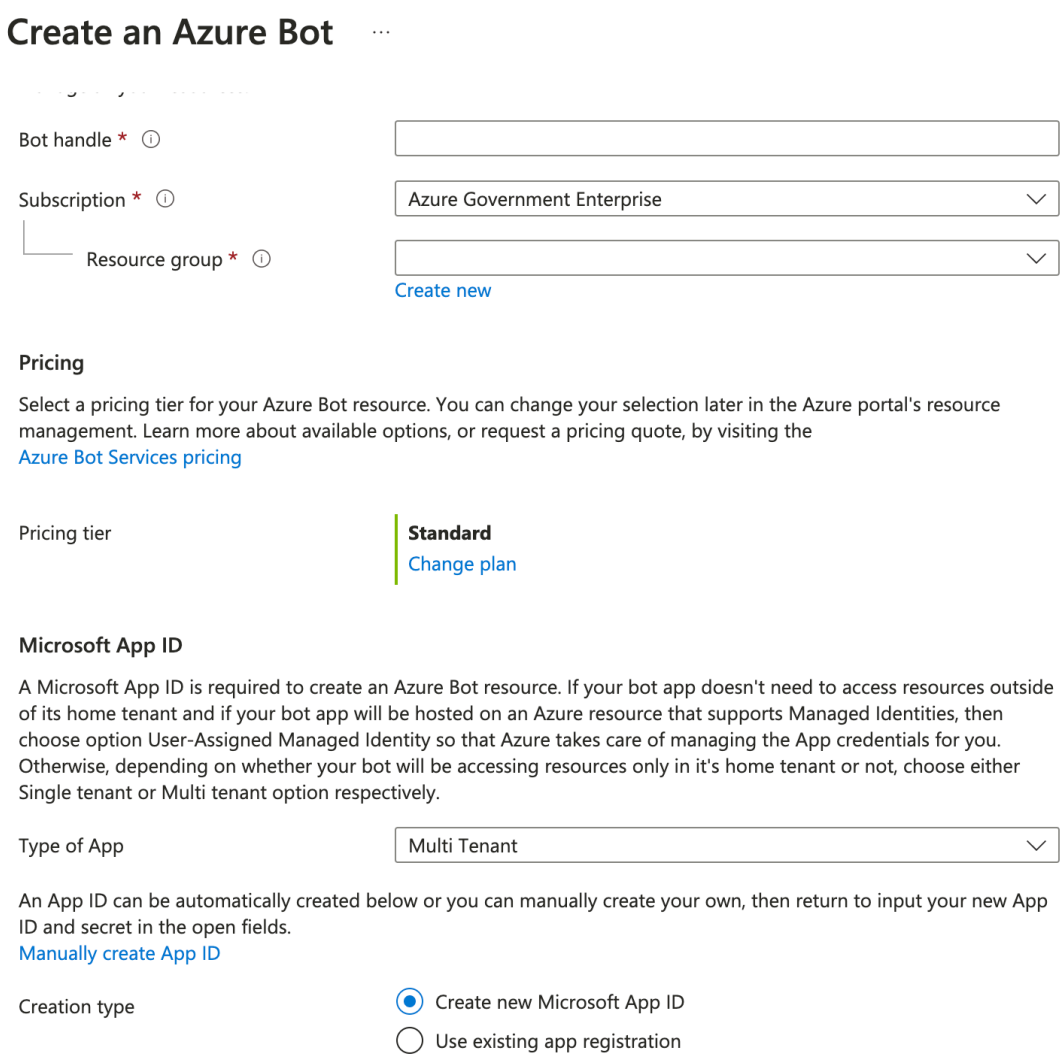

5. Under **Microsoft App ID**, select the type of application from the Type of App list.
   You can create a multi tenant app or a single tenant app.
6. Select the **Creation type** radio button.

> **Note:**
> If an existing app is being used, make sure that the type of app is the same as the type of bot you're creating. This verification is important because a multi tenant app will work with a multi tenant Microsoft Teams bot and vice versa.

7. Select **Review + create**.
8. Review the Basic bot details provided and select **Create**.
   When the bot is successfully created, you will receive the `Deployment succeeded` message.
9. On the left navigation, select **Channels** and select the Microsoft Teams icon under **Add a featured channel**.

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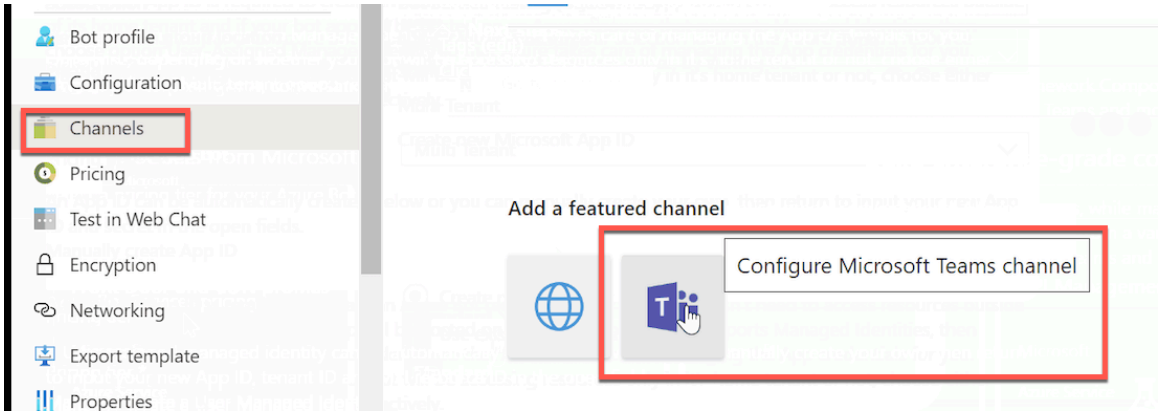
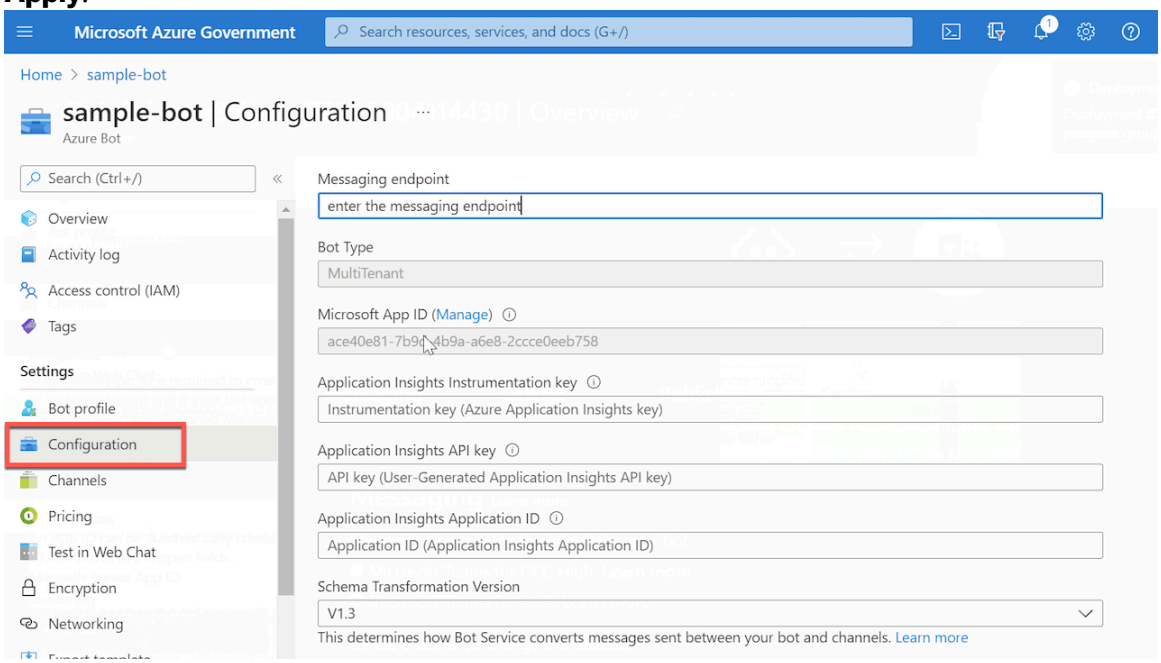


10. On the Terms of Service pop-up, select **Save** and select **Agree**.
    The channel gets saved.
11. On the left navigation, select **Configuration**, complete the configuration form, and select **Apply**.



Note:
In the **Messaging endpoint** field, provide the instance URL address.

For example: `https://<instancename>.service-now.com/api/now/v1/cs/adapter/msft/events`.

The domain might not be `service-now.com` and could be different. For example, the domain for GCC is `servicenowservices.com`.

Replace the <instancename> with the name of your ServiceNow instance where you are integrating with Microsoft Teams.

12. On the left navigation, select **Overview**.
    You can also get to the Overview page by navigating to **Azure Services** > **Azure Active Directory** > **Manage** > **App Registrations** and locate your application from the list to retrieve the following details.
13. Perform the following steps to retrieve the secret value code:

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a. Copy the **Application (client) ID** and **Directory (tenant) ID** of your application and make a note of it.

b. On the left navigation bar under **Manage**, select **Certificates & Secrets**.

c. Select **+ New client secret**, add your **Description** and **Expiration**, and select **Add**.

d. Copy the secret value code in the **Value** field and make a note of it.

> **Note:**
> The secret value code is visible only once.

Integrate your Self-configured bot with Microsoft Teams for GCC-H or DoD

Link your registered Microsoft Teams bot with your ServiceNow instance to integrate it with the Virtual Agent. Use your ServiceNow Virtual Agent application to install and configure Conversational Integration with Microsoft Teams.

Before you begin

Role required: virtual_agent_admin or admin and Microsoft Azure admin.

Procedure

1. Fetch the Tenant ID, Client ID (Application ID), Client Secret, and Bot Name details for your bot created in Microsoft Teams.
   For more information, see Retrieve bot details.

   > **Note:**
   > Use this information when setting up the self-configured bot in your ServiceNow instance.

2. As a ServiceNow admin, set up the self-configured bot on the ServiceNow instance in the global scope.

   a. Log in to your ServiceNow instance and navigate to **All** > **Conversational Interfaces** > **Settings**.

   b. In **General Settings** under **Channels**, select **View All**.
   The Channels and integrations page opens.

   c. Under the Available Channels section in the Microsoft Teams tile, select **Add Integrations**.

   > **Note:**
   > The **Add Integrations** drop-down is available only after installing the Conversational Integration with Microsoft Teams plugin (sn_va_teams) on your ServiceNow instance.

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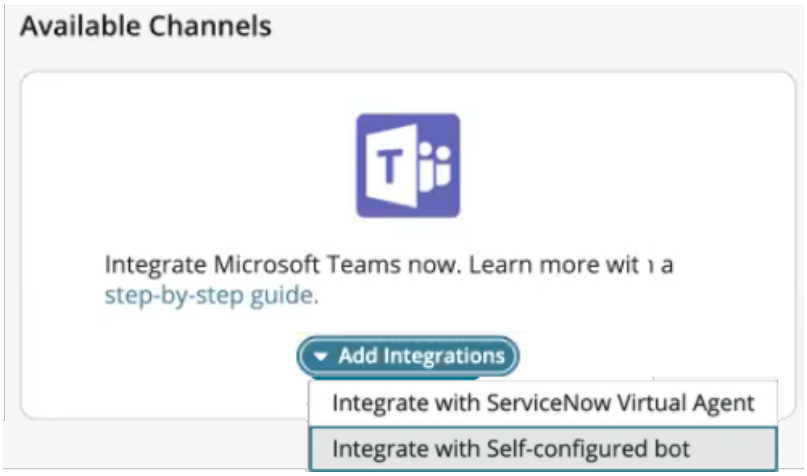
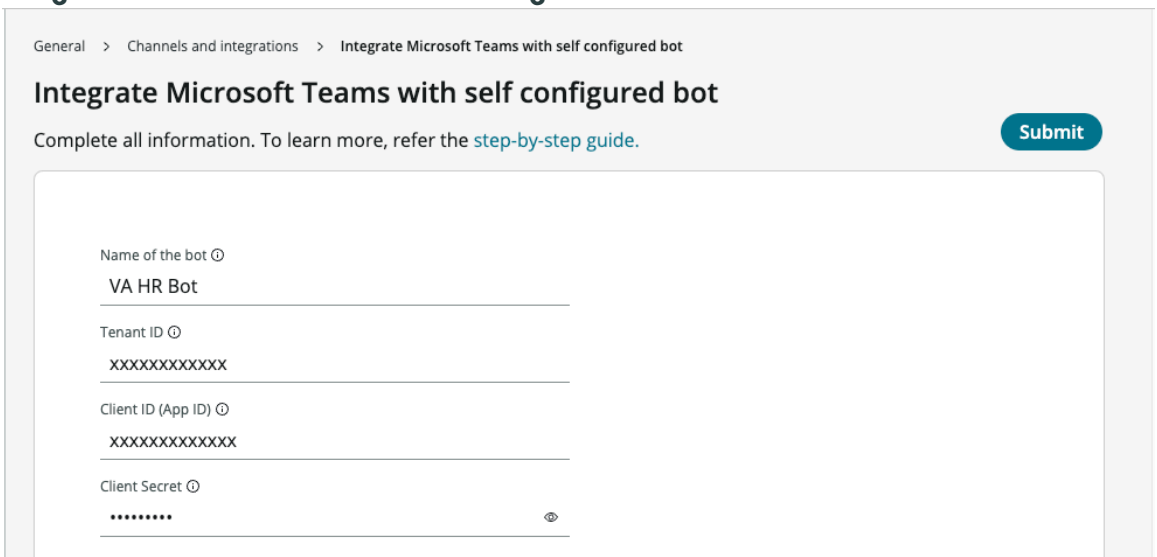


d. From the **Add Integrations** drop-down, select **Integrate with your self-configured bot**.

e. In the Integrate Microsoft Teams with self-configured bot page, provide the **Name of the bot**, **Tenant ID**, **Client ID (App ID)**, and **Client Secret** that you made a note while creating the Microsoft Teams bot and select **Submit**.

Integrate Microsoft Teams with self-configured bot



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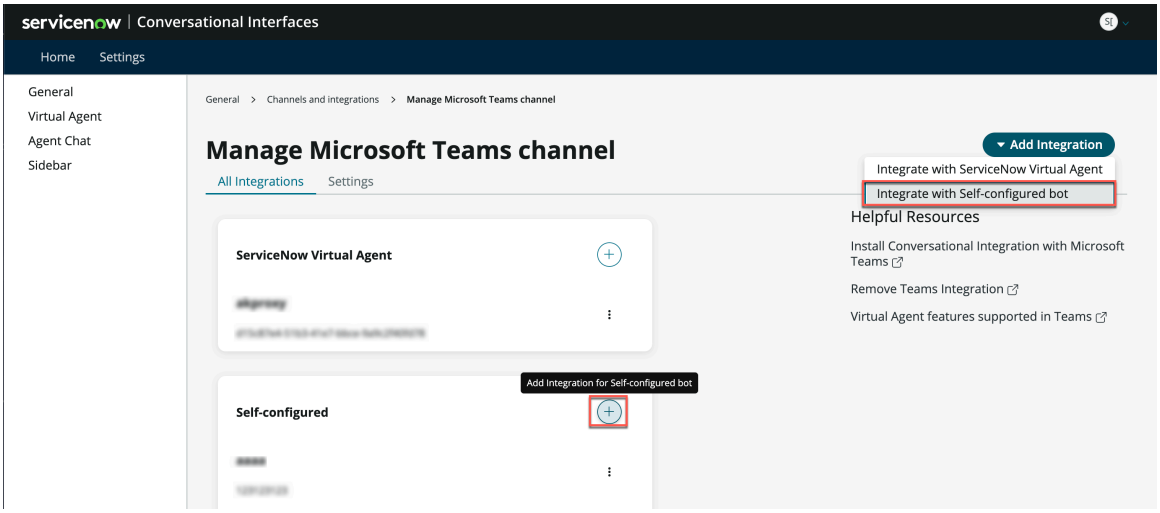
Note:
If you own multiple ServiceNow instances and would like to integrate additional bots for additional instances, repeat the preceding steps to add and integrate with bots.

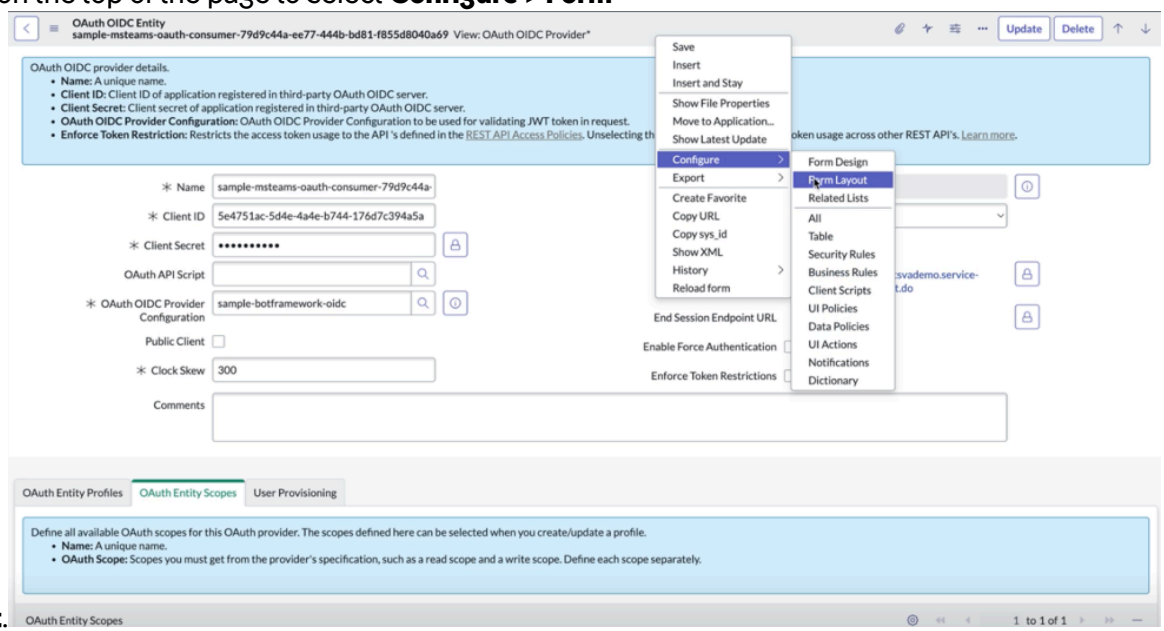
If you would like to integrate your ServiceNow instance with another Microsoft Teams bot, select the Plus icon against the Self-configured bot or select the **Add integration** drop-down on the Manage Microsoft Teams channel page and select **Integrate with your self-configured bot**.



For more information, see Manage the ServiceNow Virtual Agent integration with Microsoft Teams.

User receives a message that the installation is successful.

3. In your ServiceNow instance, navigate to **System OAuth** > **Application Registry** and open the record that contains the **sample-msteams-oauth-consumer**.
4. Right-click on the grey bar header titled **OAuth OIDC Entity** on the top of the page to select **Configure** > **Form Layout**.



Layout.

5. Search for **Token URL** from the **Available** field, add it to the **Selected** field, and move it under **Redirect URL**.

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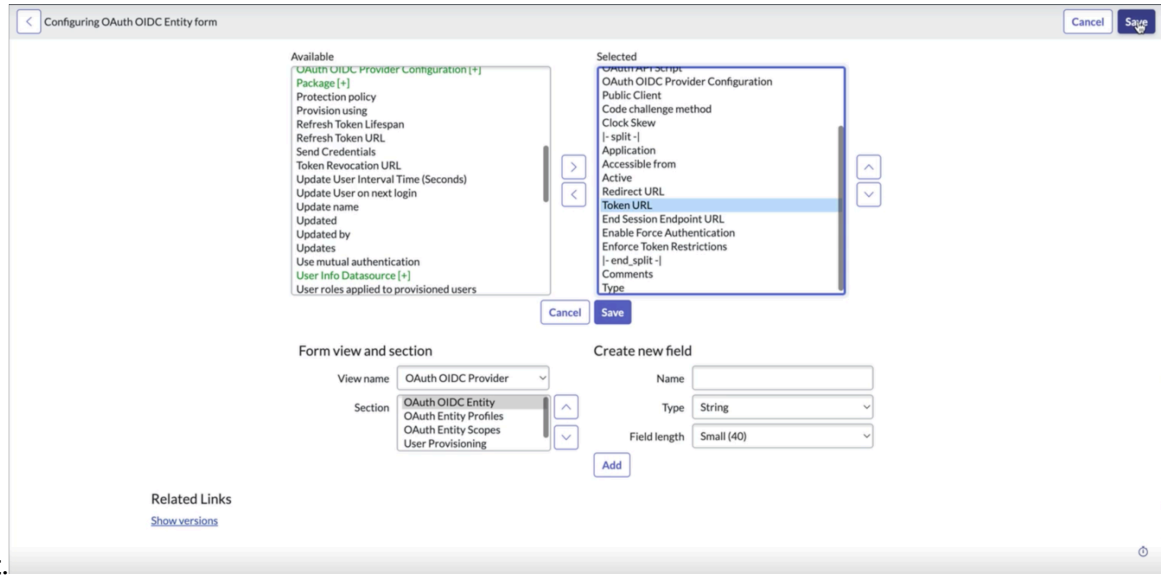
6. Select **Save** to save the layout.



You're redirected to the OAuth OIDC Entity record.

7. On the OAuth OIDC Entity form, select the lock icon to unlock the **Token URL** field, and then update the default value:
   - For multi-tenant application: `https://login.microsoftonline.us/MicrosoftServices.onmicrosoft.us/oauth2/v2.0/token`
   - For Single-tenant application: `https://login.microsoftonline.us/<Tenant-ID>/oauth2/v2.0/token`
8. Scroll down the OAuth OIDC Entity form, select the **OAuth Entity Scopes** tab, and update the OAuth scope's default value to `https://api.botframework.us/.default`.
9. On the OAuth OIDC Entity form, select the information icon next to the **OAuth OIDC Provider Configuration** field and select **Open Record**.
10. On the OIDC Provider Configuration form, update the **OIDC Metadata URL** to `https://login.botframework.azure.us/v1/.well-known/openidconfiguration` and select **Update**.

Auto-generate the manifest file and upload it into Microsoft Teams for GCC-H or DoD

After you complete integrating the bot on the ServiceNow instance, configure the manifest file, auto-generate it, and upload the package file to Microsoft Teams to start conversing with the Virtual Agent.

Before you begin

Role required: admin

About this task

The self-configured bot that you created is not available in the Microsoft global app store, unlike the ServiceNow pre-published app - ServiceNow Virtual Agent. You must upload your app to Microsoft Teams. Uploading adds the app to the team that you select and you and your team can participate in the end-to end conversations with the bot.

Note:

You need permission to upload custom apps in Microsoft Teams. To learn how to enable it, refer to the Microsoft documentation.

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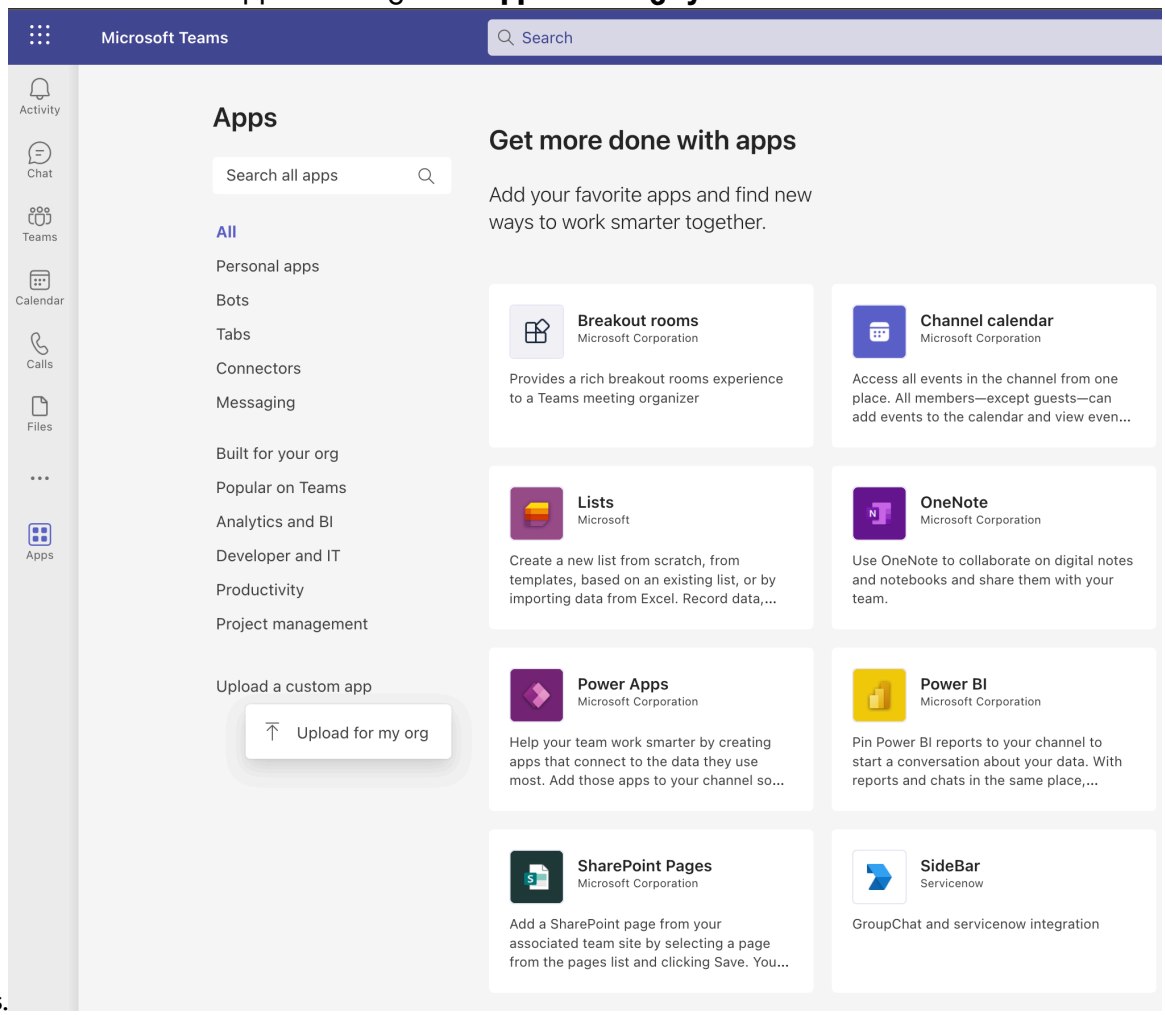
Procedure

1. To configure the bot, auto-generate the manifest file, and download the manifest configured file in your ServiceNow instance, see Auto-generate the manifest file for uploading on Microsoft Teams.
2. To publish the manifest file, from Microsoft Teams, perform the following steps:

   a. Open Microsoft Teams app and navigate to **Apps** > **Manage your apps**.



   b. Select **Upload an app to your org's app catalog** to release the self-configured bot to the entire organization.

   c. Upload the zip file and click **Add/Install**.

   d. After you successfully published the bot, click the 3-dot menu on the left pane to locate your app (search in the Find an app bar).
   You have successfully published the bot on Microsoft Teams. It should now be available for your organization and you can start interacting with the bot.

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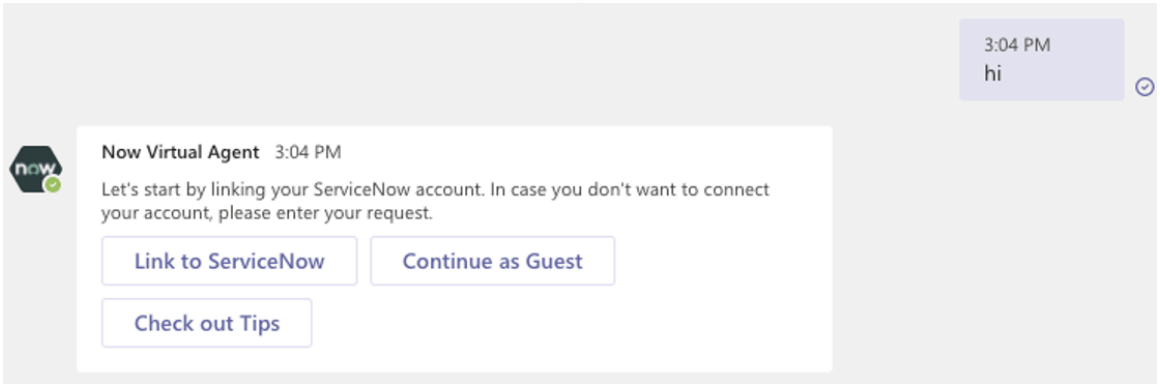
3. **Note:**
   If you have enabled pre-linking by turning on **Automatically Link ServiceNow user profiles** on the Messaging App Integration UI page, users are pre-linked without typing hi. For more information about pre-linking your accounts, see Pre-link Virtual Agent requesters for integration with Microsoft Teams. If you have turned off the check box, use the following manual account linking process described.

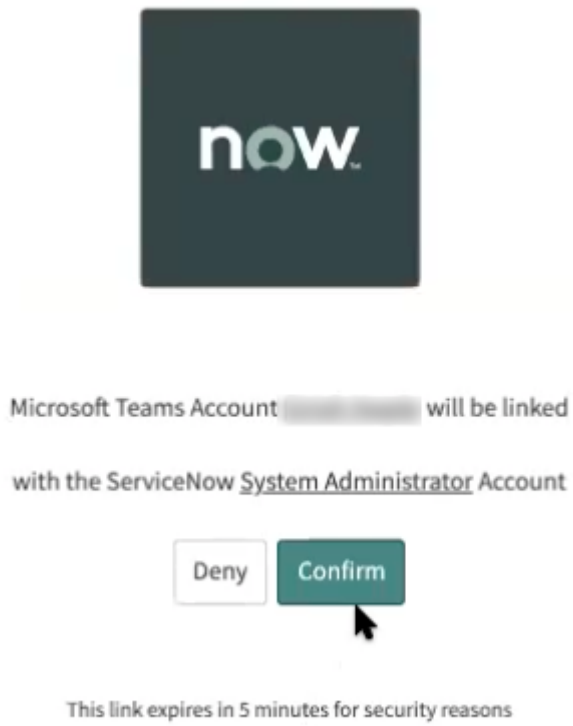
Type `hi` to start interacting with the bot.
The bot presents a prompt that provides options to authenticate, such as **Link to ServiceNow**, **Continue as Guest**, and **Check out Tips**.

Microsoft Teams bot responses



The **Link to ServiceNow** option requires you to enter their ServiceNow instance credentials. If you choose to link to your ServiceNow account, the following screen is displayed asking you to confirm the account linking.

Linking MS Teams account with ServiceNow account



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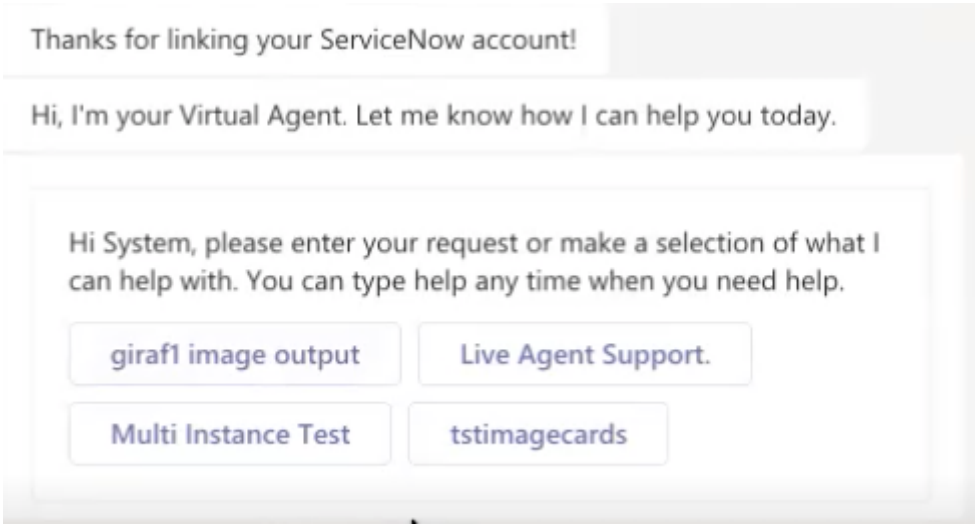
Account linking associates your Microsoft Teams account with your ServiceNow account for the ServiceNow instance that is integrated with the Conversational Integration with Microsoft Teams. If your account is linked, you can run Virtual Agent topics that use ServiceNow information and records.

ServiceNow account linked with Microsoft Teams tenant



If you do not link your ServiceNow accounts, you can access and run only the public topics.

4. Configure the bot on your ServiceNow instance.
   For more information, see Virtual Agent integration with messaging apps.

What to do next

You have successfully integrated Virtual Agent with Microsoft Teams using the self-configured method. If you are interested in getting additional ITSM and HR capabilities in Microsoft Teams, see these instructions for using a self-configured bot with ServiceNow for Microsoft Teams.

Limitations in GCC-H or DoD for Microsoft Teams integration with Virtual Agent

Learn about the limitations for Microsoft Teams Government Community Cloud - High (GCC-H) or the US Department of Defense (DoD) Microsoft Teams integration with Virtual Agent.

Limitations

1. **Manifest version**: Up to v1.10. Ensure that the template that you create has version 1.10 or an earlier version.
2. **Adaptive Cards**: Enable the *sn_va_teams.send_image_as_data* system property to upload images to your conversation on Microsoft Teams that is integrated with GCC-High. Apply this system property to image and card controls. If you're using an image URL, ensure that its source is a ServiceNow instance.

Create and integrate a self-configured bot for a single tenant page

Create a self-configured single tenant bot with Microsoft Teams for integration with Virtual Agent.

Before you begin

Role required: virtual_agent_admin or admin and Microsoft Azure admin.

About this task

Creating and integrating a single tenant bot is similar to creating a GCC-H or DoD bot, with minor adjustments.

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Procedure

1. Follow the instructions in Create a bot in Microsoft Teams for GCC-H or DoD, with the following changes.
   a. Follow steps 1 through 4 as normal.
   b. In step 5, select **Single tenant**.
   c. Follow the remaining steps as normal.
2. Follow the instructions in Integrate your Self-configured bot with Microsoft Teams for GCC-H or DoD, with the following changes.
   a. Follow steps 1 through 6 as normal.
   b. In step 7, select **Single tenant**, and add your tenant ID, but keep the `.com` domain, for example: `https://login.microsoftonline.com/<tenant-id>/oauth2/v2.0/token`.
   c. Follow steps 8 through 10 as normal.

Result
Your single-tenant bot is ready for use in Virtual Agent.

Configure Virtual Agent settings for Microsoft Teams

Configure your Microsoft Teams bots that are integrated with Virtual Agent to enable notifications, to link ServiceNow user profiles, and to set up system messages and contextual actions.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. On the Channels and integrations page, in the Microsoft Teams tile, click **Manage**.
4. Select the **Settings** tab.
5. In the Enable Link Authentication section, configure the different link opening experiences using Smart Links.

   For more information about enabling link authentication for your Microsoft Teams bots, see Configure link authentication and opening experience in Microsoft Teams.
6. Swipe to the left the **Enable Notification for all users** toggle button to disable notifications for the linked users.

   Note:
   The **Enable Notification for all users** toggle button is selected by default.

   The **Automatically Link ServiceNow user profiles** toggle button is selected by default and disabled for any further change. This option links all the active ServiceNow accounts automatically to the associated Microsoft Teams bot.
7. Set up the **Global Messaging Settings**.

   Note:
   Any changes made to these settings will reflect in all the channels.

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- **System Messages**: Customize the default system messages displayed during Virtual Agent conversations.

  For more information about changing or updating a system message, see Change system messages.

- **Contextual Actions**: Customize the supported actions per user command inputs.

  For more information about updating a contextual action, see Contextual actions for custom chat integrations.

What to do next

The Virtual Agent bot and Microsoft Teams tenant are now integrated for use on your ServiceNow instance. Your messaging users are automatically linked to their ServiceNow accounts.

- Notify your users that the Virtual Agent bot for Microsoft Teams is available for use.
- To improve the live agent experience for your users, you can activate the display of the estimated wait time for live chat support. When a user asks to chat with a live agent, a card shows the approximate wait time to talk with an agent, and gives the user the option to cancel the chat. For details on activating this feature, see Configure Agent Chat.

Configure link authentication and opening experience in Microsoft Teams

Link authentication and opening experience in Microsoft Teams provides a seamless experience for end users to interact with ServiceNow links when you use Virtual Agent on Microsoft Teams.

Before you begin

Role required: virtual_agent_admin or admin

Ensure that your Microsoft Teams integration is available in the All Integrations tab of the Channels and integrations page before enabling link authentication.

Ensure that your#Microsoft Teams email ID matches with one of the system users' email.

Ensure that you are in the#Conversational Integration with Microsoft Teams scope while completing this step (instead of the Global scope).

About this task

To configure smart links to open in a pop-up or Microsoft Teams tab, admins must first complete the following link authentication steps before moving on to configure smart links.

Note:
When the status of link authentication is inactive, the link opening behavior falls back to New Browser Tab even when admins configure a link to be opened in a pop-up or Microsoft Teams tab. Therefore, activating link authentication is a pre-requisite of using a pop-up and Microsoft Teams tab.

Important:
Be informed that Smart Links do not work for Now Virtual Agent if your instance has a custom domain.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and routing**, click **View All**.
3. On the Channels and integrations page, in the Microsoft Teams tile, click **Manage**.

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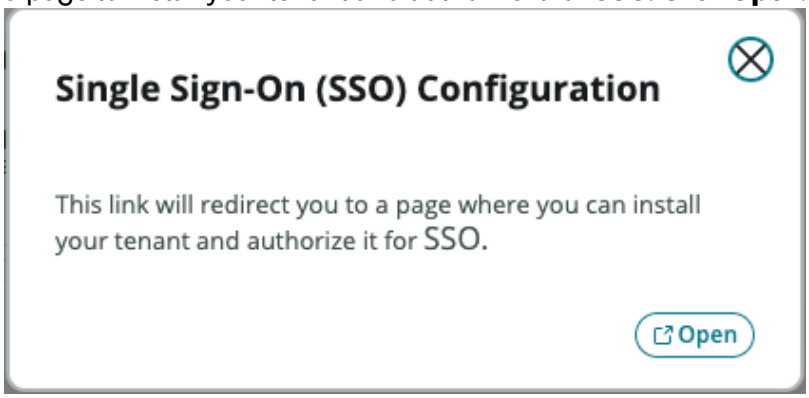
4. In the Manage Microsoft Teams channel page, select the **Settings** tab.
5. In the Enable Link Authentication section, under **Step 1. Configure SSO for tenant**, click the **Configure SSO** button.
   The Single Sign-On (SSO) Configuration pop-up opens to inform you that the link directs you to a page to install your tenant and authorize it for SSO. Click **Open**.

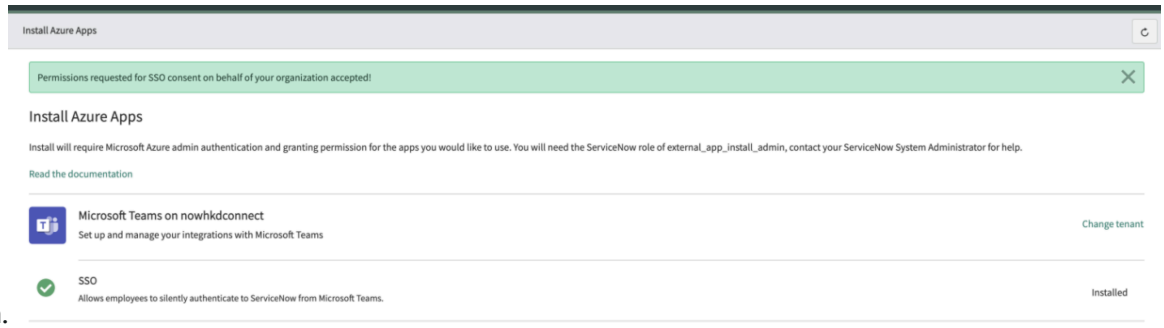


   For more information about configuring Single Sign-On, see Grant permissions to required Microsoft Azure apps.

   Note:

   - SSO can only be enabled on one Microsoft Teams tenant at any given time. If SSO is already enabled on another tenant, make sure to switch the tenant so that SSO can be enabled on the new tenant.
   - If you have already configured a tenant and would like to change it to another tenant, then you can do so by clicking **Change tenant**. Once you confirm to change the tenant, you are directed to the Microsoft Teams login page for changing the tenant.

   After entering the tenant information, ensure that you have clicked the **Authenticate** button in the SSO section.



6. After you have configured SSO, you must enter an APP ID.
   To Find your APP ID, log into the Microsoft Teams admin center, navigate to **Manage apps**, select the app you'd like to configure, and fetch the app ID.

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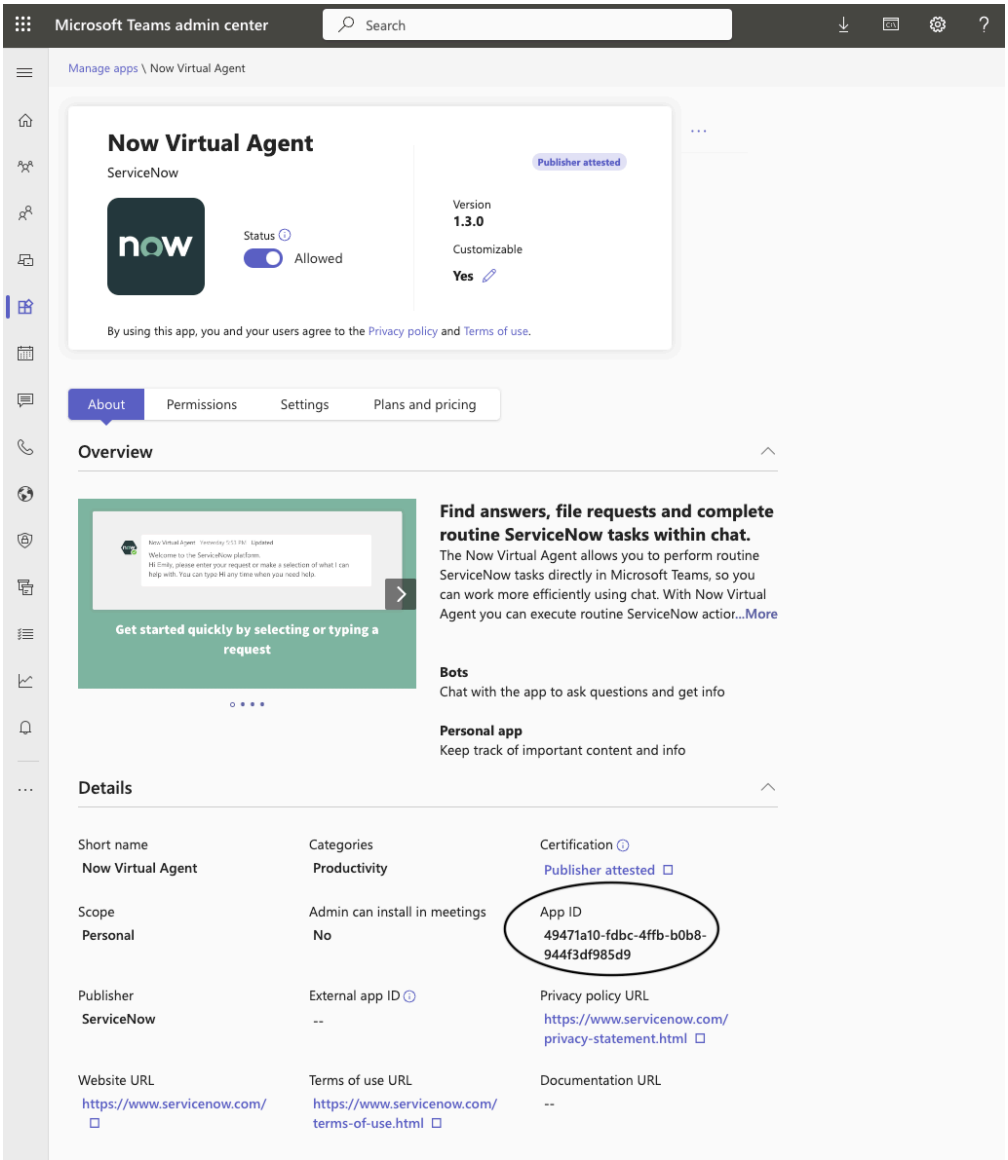

Note:
If you are using ServiceNow for Teams app, search for the app ID for ServiceNow for Teams and make sure not to use External App ID.

7. On the Link Authentication section, at **Step 2. Enter App ID**, enter the app ID that you fetched from your Microsoft Teams admin center, and click **Save**.
   You receive a confirmation that your app ID has been saved successfully. You notice that the status of against SSO is green.

What to do next

Configuring smart links in Microsoft Teams.

Configuring smart links in Microsoft Teams

Configure smart links for your Virtual Agent app in Microsoft Teams to enable different link opening experiences.

Smart link settings in the admin console enable admins to define one of the three link opening options in Microsoft Teams.

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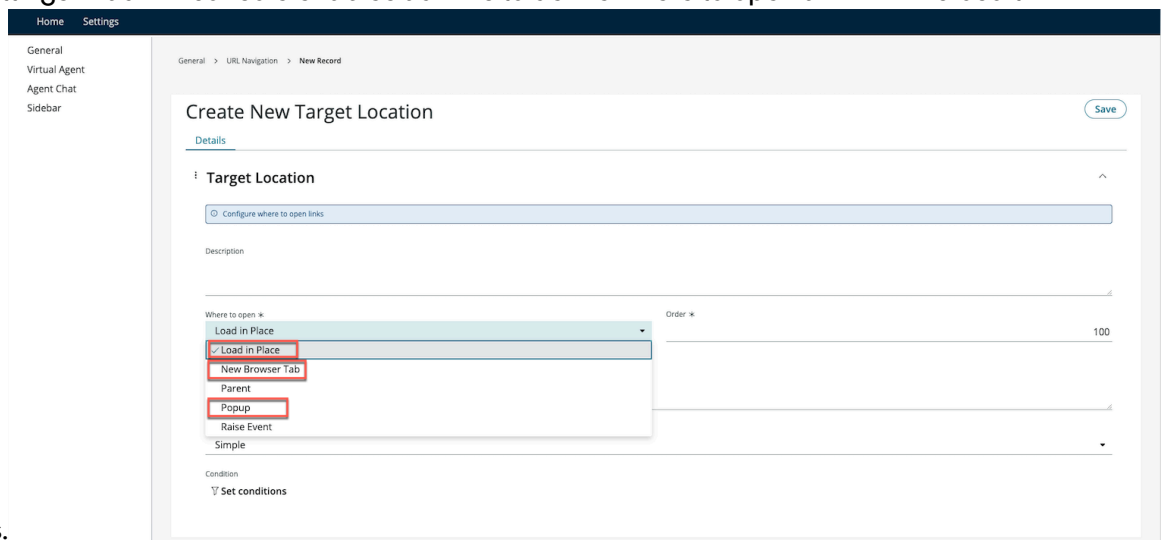
1. Microsoft Teams task module/pop-up
2. Microsoft Teams tab
3. New browser tab

Through link authentication and Single Sign-On (SSO) support, link content can be rendered in a pop-up, Microsoft Teams tab, or a new browser tab.

You can configure smart links for Microsoft Teams from the URL navigation system action under **Target Location**. For more information about configuring smart links, see Create a smart link preference.

There are three valid link opening options that are applicable to Microsoft Teams and the smart link settings in admin console enables admins to define where to open a link in Microsoft Teams.



1. **Load in Place**: Links open inside a Microsoft Teams tab.

   Note:

   - Only ServiceNow links are supported currently.
   - While **Load in Place** is always an option for admins to choose from, this functionality is only supported when admins have already installed an additional tab within Microsoft Teams (for example, Employee Center tab as part of the ITSM/HR plugins).
   - Admins must ensure that the following steps are complete:
     - MS Teams - App Core (com.snc.msteams.app.core) plugin is installed as part of ITSM/HR plugins and additional tab has already been enabled.
     - The *sn_va_teams.view_msft_tab* system property is set to true.
     - The link authentication status on your ServiceNow instance is green.

2. **New Browser Tab**: Links open in a new browser tab (a new tab in Google Chrome, Safari, etc.).
3. **Popup**: Links open in a pop-up/task module in Microsoft Teams. When pop-up is selected, admins also have the option of selecting a pop-up size of Small, Medium, or Large. The default size is Large.

   Before you start configuring pop-up using Target location, double check that the value of *sn_va_teams.view_non_video_msft_task_module* system property is **true**. When the link authentication status is active from the previous step, the value is automatically set to

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true. When this system property is true, you can use the pop-up. If you want to disable pop-up in Microsoft Teams, you can manually set this property to **false**.

Note:
Only ServiceNow links are supported currently.

When no conditions are specified on the Target Location record, the valid link opening mechanism applies to both Web Client and Microsoft Teams in a way that makes sense to its host application. For example, if admins specify a URL pattern to be opened using **Load in Place** without any conditions, the link on Web Client opens by refreshing the topmost browser frame (Web Client's unique behavior). However, the same link opens in a Microsoft Teams tab.

If both Web Client and Microsoft Teams are valid channels for the customer, then admins can define different target locations for each channel by specifying the device type in the condition field (such as Teams and mweb). If the device type is specified as Teams and no other device types are specified, then that particular target location record will only be applied in Microsoft Teams.

Enable Microsoft Teams integration in ServiceNow Protected Platform (SPP)

When installing Conversational Integration with Microsoft Teams, the ServiceNow AI Platform® makes the instance configuration simpler by dynamically determining the bot type for commercial and SPP (ServiceNow Protected Platform) environments from the Tokyo release.

The process of installing and configuring Microsoft Teams integration with Virtual Agent in an SPP environment is similar to that of the installation and configuration of the pre-published bot in a commercial environment. But it is the environment in which you are installing makes the difference and the bot is available based on the installation environment.

After you complete the Microsoft Teams integration with Virtual Agent in an instance with SPP environment, the **Now VirtualAgent Australia SPP** bot is available for Australian Govt customers.

For more information on the installation and configuration, see Install Conversational Integration with Microsoft Teams.

Virtual Agent feature support in Microsoft Teams conversations

The Microsoft Teams app supports Virtual Agent features, such as Virtual Agent Designer controls for creating conversations, notifications, AI Search results, and more.

Emojis and text

Starting with Version 4.0.1, when a user chats with a live agent and sends a message that contains emojis, the text gets delivered and the emoji is displayed on the agent workspace.

Note:
Due to the difference in the platforms (app or web browser) used by the end user and the live agent, there's a difference between the emojis that are sent by the end user and the emojis that are received by the live agent.

A user can understand how emojis look like in a chat conversation and in the Agent Workspace from the following examples.

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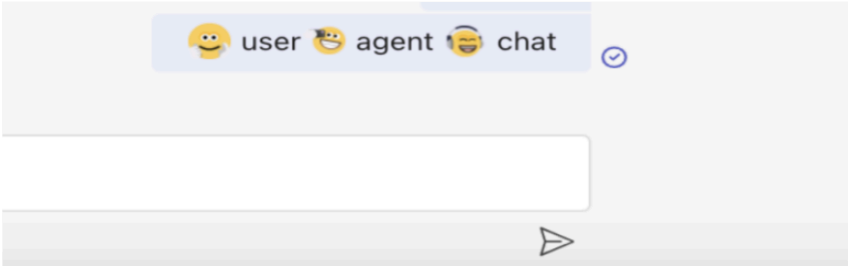
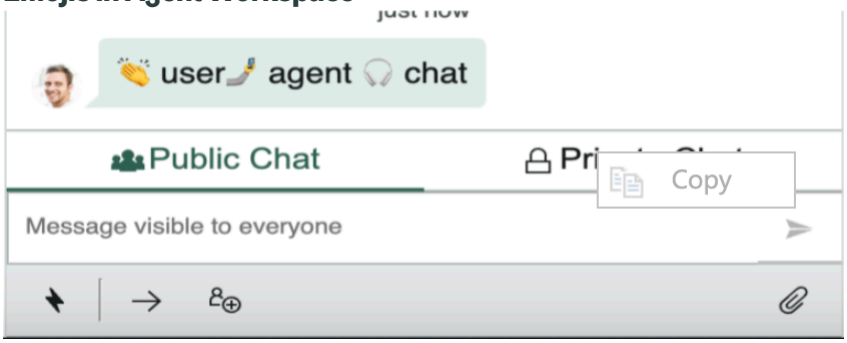
Emojis in a chat conversation



Emojis in Agent Workspace



Message pagination

Microsoft Teams has a limit on the maximum message size before paginating the message. You can adjust the number of characters allowed in a message before paginating by going to the system properties [sys_properties] table and setting the number in the system property *sn_va_teams.picker_char_limit*.

AI Search results

Now Assist in Virtual Agent can generate AI Search results that are displayed as Genius result cards and multi-link outputs in conversations. For details on how Virtual Agent generates AI Search results, see Improving the user experience with AI Search. The default AI Search configuration for Virtual Agent enables search results for Q&A (Knowledge Base and catalog items). The user has the option to like or dislike the information presented in the card. For more information, see Genius Results.

URL navigation for chat links

In the Virtual Agent and Live Agent conversations on the Microsoft Teams app, the links to ServiceNow records open automatically in base system portals, including the links that are displayed in the output cards, Virtual Agent notifications, and AI Search results. If needed, as the administrator, you can change the portals where these links are opened in. For configuration details, see Configure URL navigation for chat links.

Masking of sensitive user data

Starting with Version 2.0.0, passwords that are entered by users and confirmed in bot responses are masked during the password reset conversations in the Microsoft Teams app.

A user can understand how a password is masked in Microsoft Teams from the following example.

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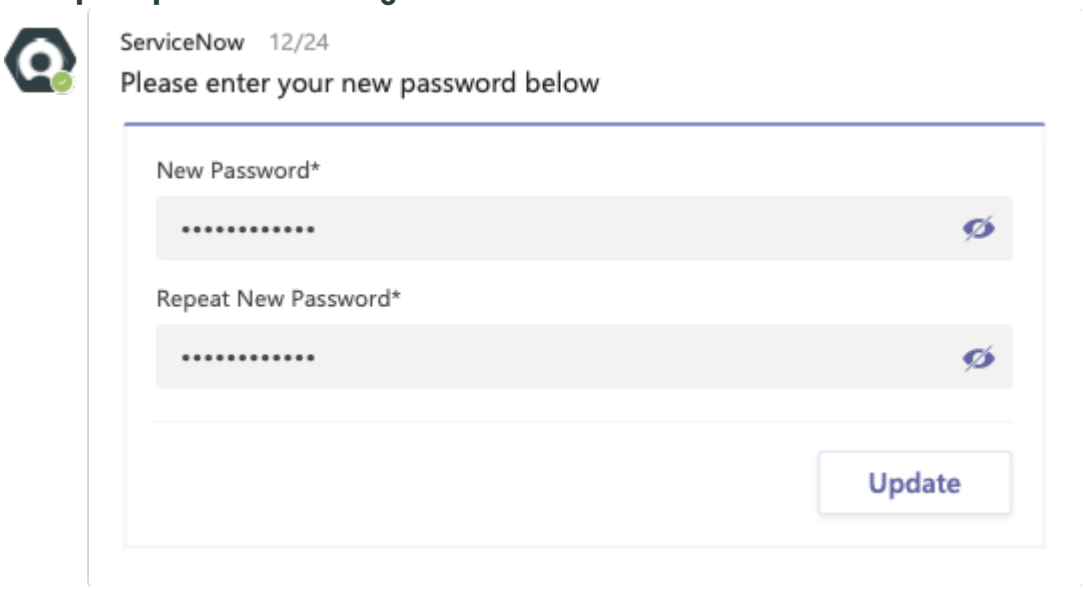
Example of password masking



Support for file uploads

Starting with Version 2.0.0, users can upload their file attachments with the paper clip icon in the Microsoft Teams conversations.

A user can learn to attach an icon in the Microsoft Teams chat window from the following example.

File attachment support

Trusted domains

The values that are specified in the Trusted media domains field of the Provider Channel Identities table [sys_cs_provider_application] take precedence over the Connections table [sys_cs_provider] and overrides its values.

Catalog opening experience in Microsoft Teams conversations

Starting with Version 4.1.0, users can request a catalog item from the Microsoft Teams app during a conversation.

A user can select the **Request this item** button in a conversation with Microsoft Teams that opens the catalog item in a pop-up window, the Task Module, where the user can view the information of the item and submit the request within Microsoft Teams.

The following examples show how a user can request and then view a catalog item.

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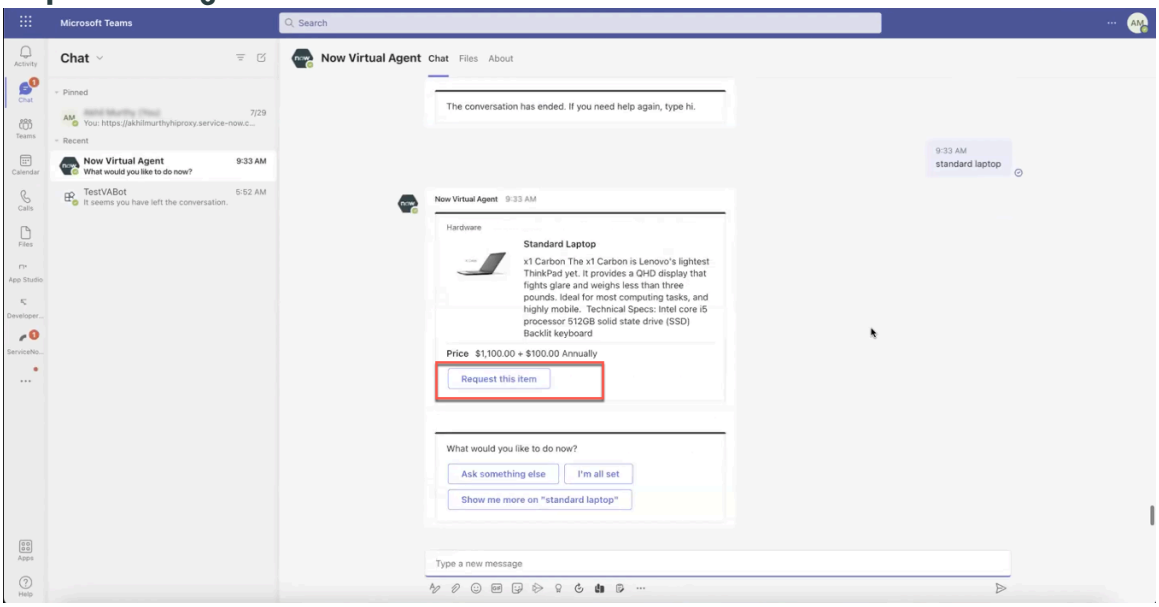
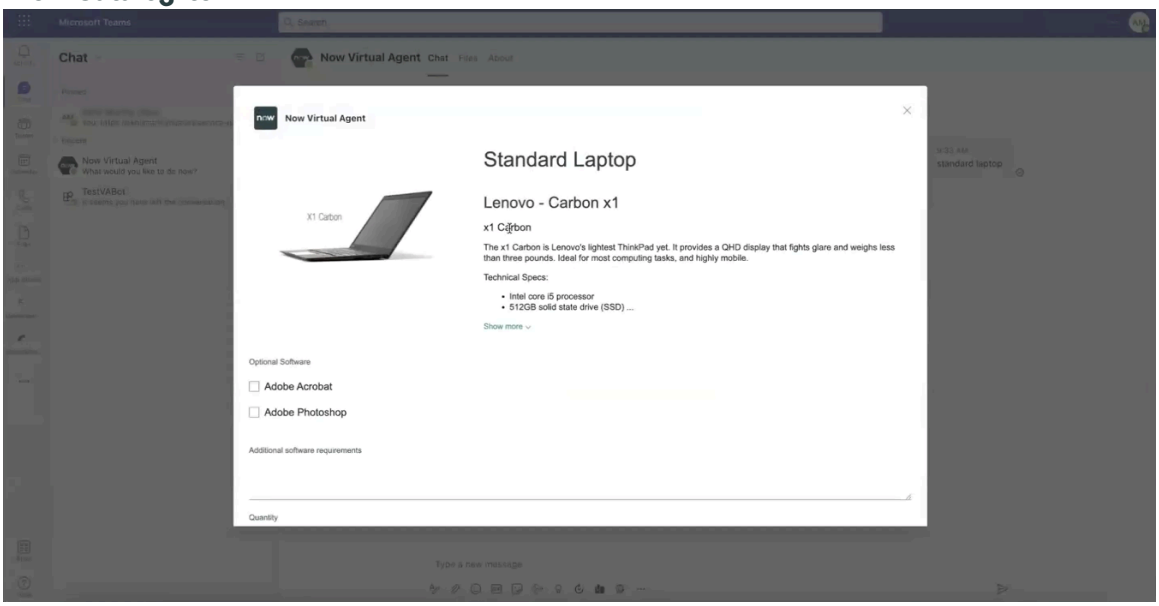
Request Catalog item



View Catalog item



Custom branding in the Microsoft Teams application

Microsoft Teams supports app customization, which enables you, as the administrator, to customize the branding of the Now Virtual Agent bot in the Conversational Integration with Microsoft Teams. To learn more about app customization, see these resources:

- Customize apps in Microsoft Teams in the Microsoft Teams documentation.
- MS Teams branding for the conversational integration in the ServiceNow Community.

Virtual Agent Designer user input and bot response controls in Microsoft Teams

The Virtual Agent Designer user input and bot response controls for creating conversation topics are supported in Microsoft Teams conversations, including the table bot response, the card control that can display images, and the image bot response controls.

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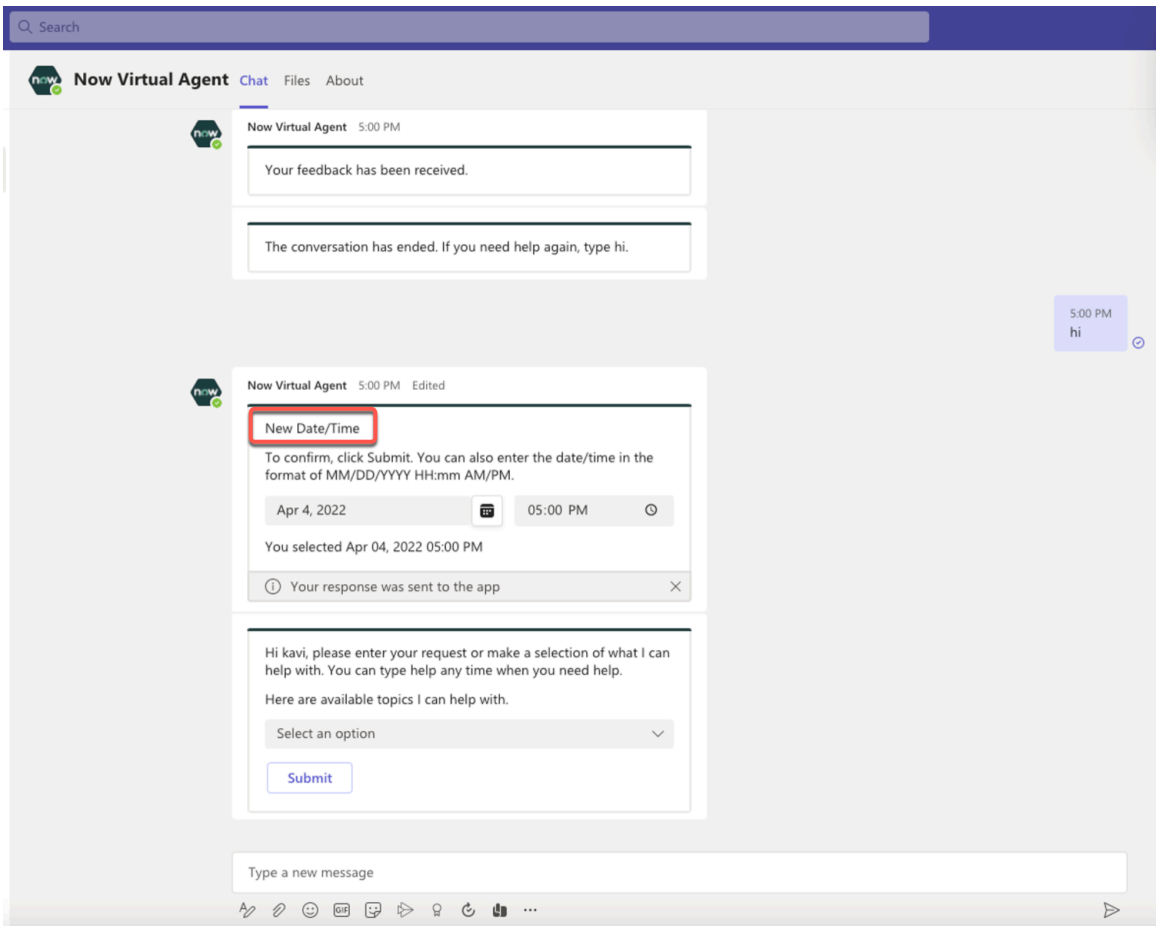
Starting with Version 2.0.0, the updated card and new video bot response controls are supported in Microsoft Teams conversations. The video control displays a thumbnail image of the video that users select to open the video in their preferred web browser.

For more information about user input controls and bot responses, see Virtual Agent Designer user input controls and Virtual Agent Designer bot responses, respectively.

Starting with Version 3.0.10, to improve the bot performance and enable a better conversational experience with Virtual Agent on Microsoft Teams, the non-card bot response controls such as text, links, and date cards are converted into adaptive cards.

As part of converting all controls to adaptive cards, the content displayed on notifications received through bot responses is customized. The Microsoft Teams bot displays a preview of the notification content on the card, such as the message content, card title, or description, where applicable.

Notification with title



Starting with Version 3.0.10, during a conversation with the Microsoft Teams bot, you can search for a particular choice from the list using the drop-down picker controls.

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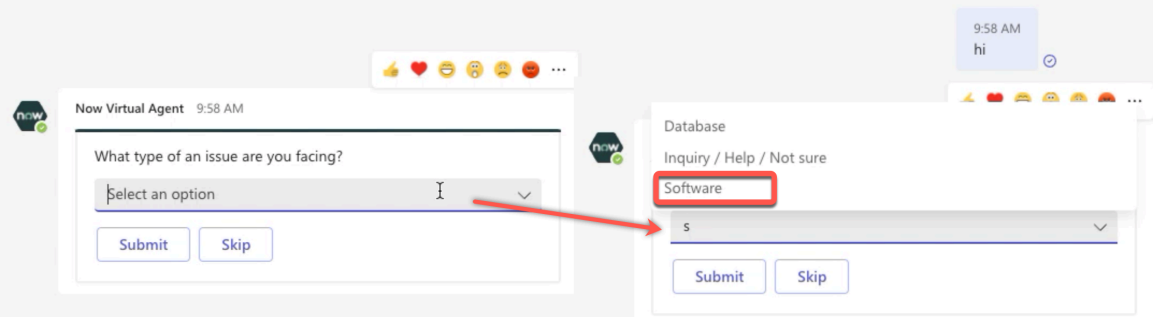

Starting from Version 4.1.0, you have the option to turn off the confirmation banner that appears when you send a response to Virtual Agent in Microsoft Teams conversation.

Set the *sn_va_teams.hide_teams_response_message* system property value to **true** to turn off the confirmation banner (by default the value of the system property is set to **false**).

Virtual Agent notifications supported in Microsoft Teams

Microsoft Teams app supports Virtual Agent notifications during conversations.

- Subscription management
  - Requesters - Use the **notification** (or **notifications**) command to subscribe to or unsubscribe from notifications.
  - Admins - Enable notifications for messaging users in the Messaging Apps Integration page.
- Notification content - Create notifications with rich content, images, and action buttons. Actionable notifications enable recipients to perform certain actions and respond to the notification, such as adding a comment or requesting a live agent.
- Notification delivery
  - Message notifications are delivered immediately to end users, even if the user is chatting with a virtual or live agent.
  - Actionable notifications are delivered only when the user is not in an active conversation with a virtual or live agent. Users can do the following:

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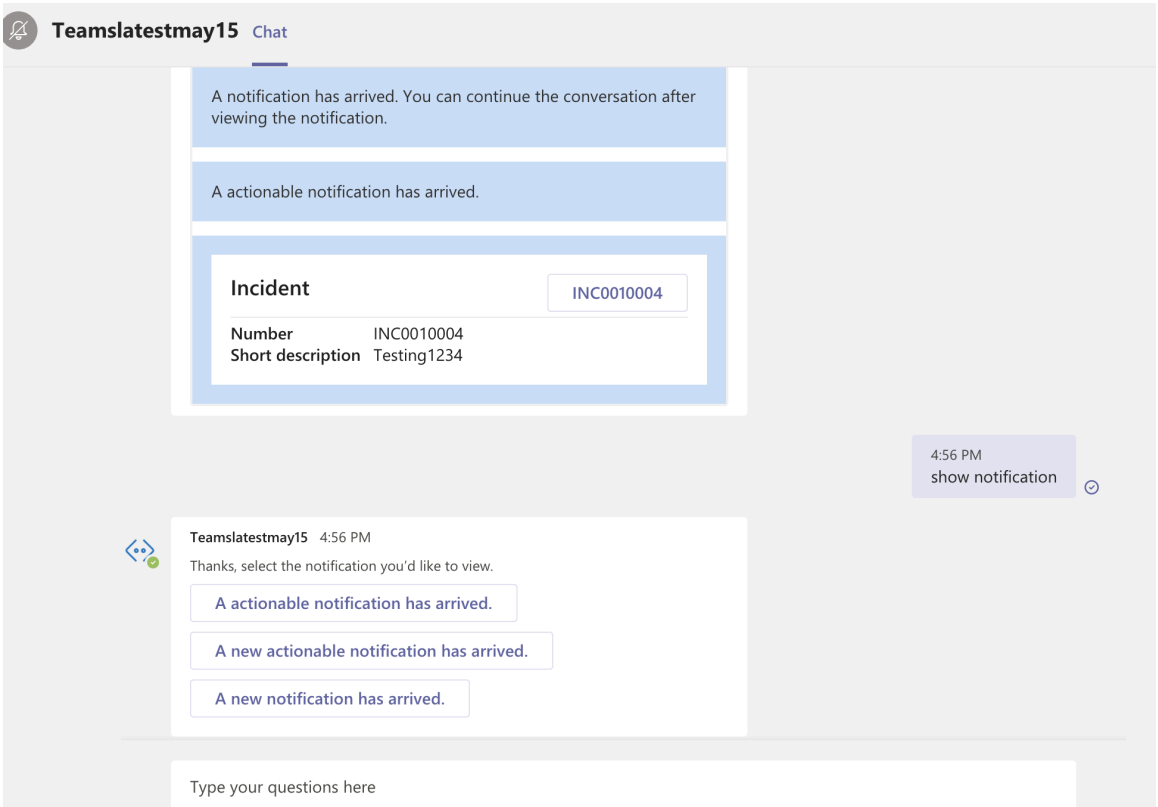
- Review the notifications later by using the **show notification** command.

Show notifications in Microsoft Teams



- Perform or skip the actions for the notification. If users decide to skip the actions, users can return later to the notification by using the **show notification** command.

For detailed information on Virtual Agent notifications, see Configuring Virtual Agent notifications.

Unsupported Virtual Agent features in Microsoft Teams

Refer to the unsupported features of Virtual Agent in Conversational Integration with Microsoft Teams.

Unsupported features

Virtual Agent does not support the following functionalities during a conversation in Microsoft Teams.

- Connect Support
- Geo-location topic block

Pre-link Virtual Agent requesters for integration with Microsoft Teams

Pre-link your Virtual Agent requesters to a ServiceNow instance before they run the Conversational Integration with Microsoft Teams. Batch pre-linking enables your Virtual Agent users to immediately chat with a virtual agent and receive notifications without going through the initial authentication linking process.

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Before you begin

- Install Conversational Integration with Microsoft Teams, with the **Automatically Link ServiceNow user profiles** option enabled.
- Set up Microsoft Teams Graph spoke.
- Set up Microsoft Active Directory spoke.

Roles required:

- virtual_agent_admin
- external_app_install_admin
- One of the following Microsoft Teams administrator roles:
  - Global Administrator
  - Application Administrator
  - Cloud Application Administrator
- admin or schedule_admin to change the scheduled job script

About this task

When the **Automatically Link ServiceNow user profiles** option is enabled on the Settings page of the Manage Microsoft Teams channel, a batch of up to 10,000 users is automatically pre-linked to a ServiceNow instance. Your existing users are pre-linked during the initial run. Newly added users are pre-linked during subsequent daily runs.

To prevent automatic batch pre-linking, disable the **Automatically Link ServiceNow user profiles** option on the Messaging Apps Integration UI page.

Batch pre-linking of your Virtual Agent users to a ServiceNow instance before integrating with Microsoft Teams includes the following benefits:

- Notifications are proactively sent by Virtual Agent to users when their identity in Microsoft Teams is associated with their identity in a ServiceNow instance. This is also true when the user is already linked with ServiceNow Virtual Agent.
- If a user is pre-linked, and when Microsoft Teams notifications are enabled in the app, notifications are pushed to the app even when a user is not logged into a Microsoft Teams account.

Batch pre-linking happens automatically via the **MS Teams Daily Pre Install Job** scheduled job. This job runs by default daily at 1:00 a.m., but you can change the time, if desired. To modify the default scheduled job run time or time zone, access the **MS Teams Daily Pre Install Job** Scheduled Script Execution form.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.
2. Search for the **MS Teams Daily Pre Install Job** scheduled job and click to open the Scheduled Script Execution form for the selected record.
3. In the **Run** field, change the run time to your desired time.
4. For a description of the other fields that you can change in this form, including **Time zone**, see Automatically run a script of your choosing.
5. Click **Save**.

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What to do next

You can also customize the auto-linking process for Conversational Integration with Microsoft Teams. For more information, see Customize auto-linking for Conversational Integration with Microsoft Teams.

Customize auto-linking for Conversational Integration with Microsoft Teams

Customize auto-linking for user profiles by defining the email Id of the user in any custom table rather than just the User [sys_user] table.

Before you begin

- Make the User [sys_user] table extensible.
- Create a custom table with custom email fields extending the User [sys_user] table.
- Ensure that the scope of the custom table is Microsoft Teams, or else, create a cross scope privilege.
- Populate the system property in the *table_name.column_name* format.

Role required: admin

About this task

The auto-linking process searches the user table for the email ID and if found, links the user to the profile automatically. You can also customize the auto-linking process by defining the email Id for auto/pre-linking in any custom table rather than the current User [sys_user] table. You can customize the auto-linking process of user profiles by using the *sn_va_teams.auto_link_email_attribute* system property that defines the column from which the email ID of the user must be read for auto-linking.

Note:

- By default, the value of the system property is empty. If it is set to <empty>, then the email Id for the user is fetched from the [sys_user] table.
- If the value of the system property is specified in the format of *table_name.column_name* (both table_name and column_name must be the physical names from their respective name fields), then the value is read from the column name specified. For example, **sn_va_teams_extendeduser.u_custom_mail**.

Procedure

1. In the navigation filter, enter `sys_properties.list`.

   The entire list of properties in the System Properties [sys_properties] table is displayed.

2. Search and open the *sn_va_teams.auto_link_email_attribute* system property.
3. Provide a value in the format of *table_name.column_name* and save the record. Once the record is saved, you can initiate the conversation with the bot.

Configure Microsoft Azure Conditional Access for Microsoft Teams tenant

You must configure conditional access in Microsoft Azure to restrict users from accessing the production applications. Conditional access helps you from accidentally overriding your production integration with a custom or personal instance integration.

Before you begin

Roles required: virtual_agent_admin and user with Azure admin access.

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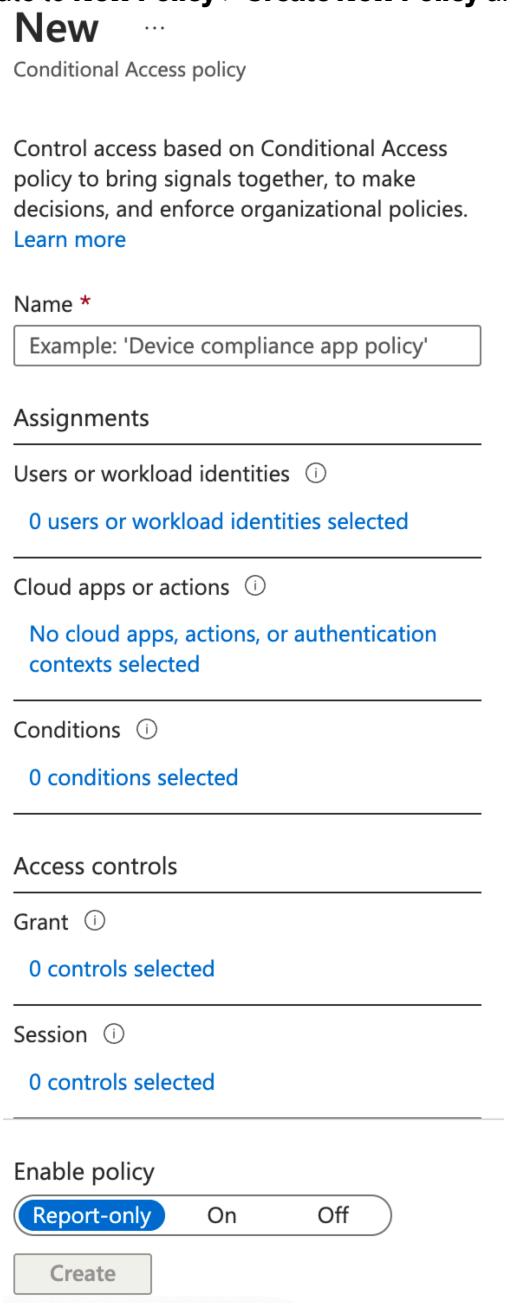
Procedure

1. Log in to Microsoft Azure portal.
2. Search for **Azure AD Conditional Access**.
3. Navigate to **New Policy** > **Create New Policy** and provide the policy a name.



4. Under Users or Workload identities, click **0 users or workload identities selected**.
   A **What does this policy apply to?** pop-up is displayed.

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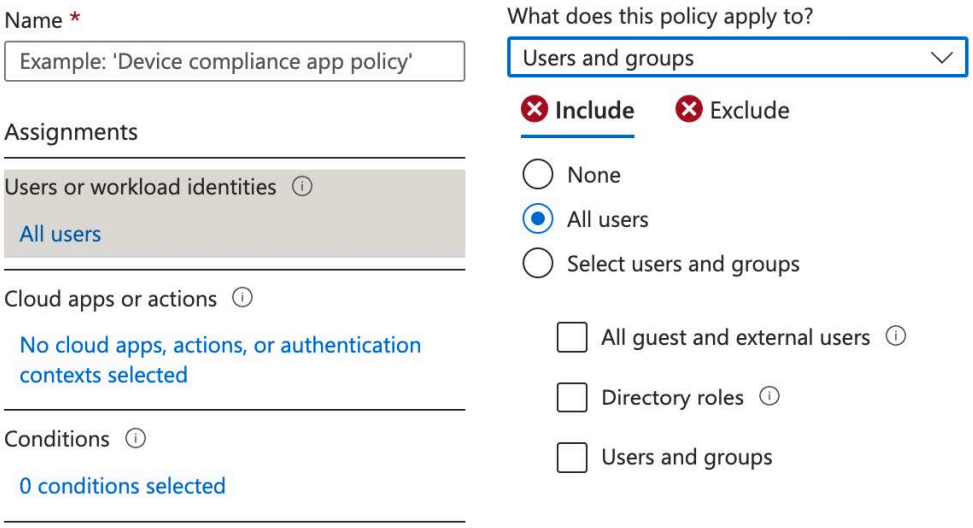
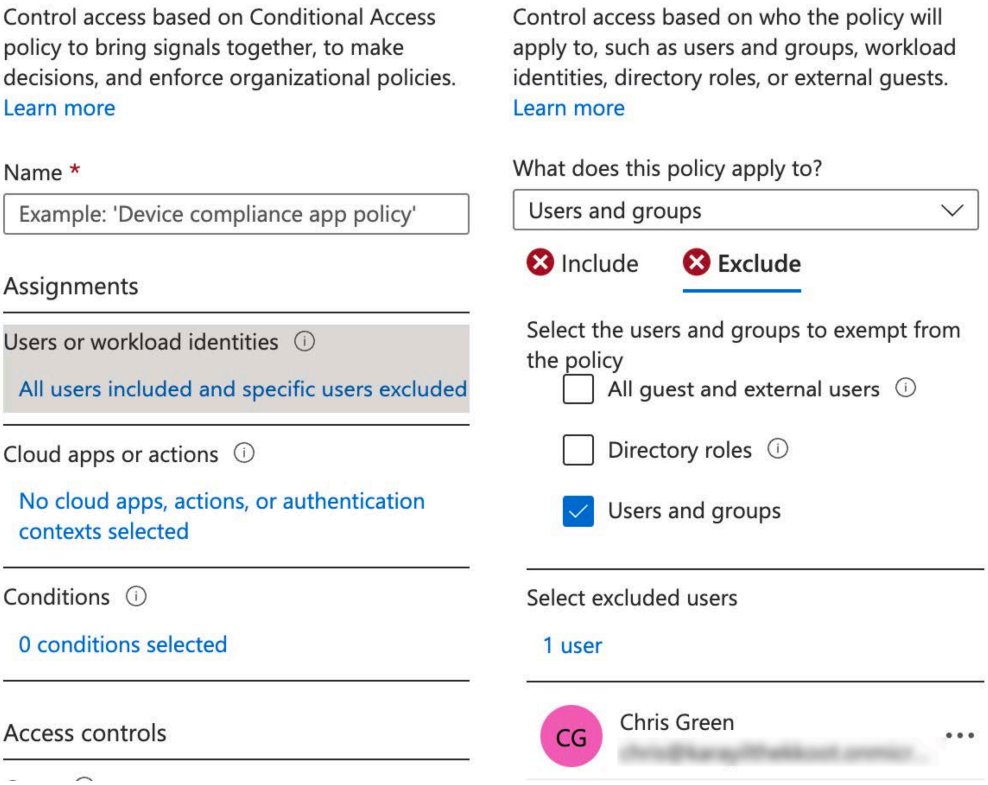
5. Under Include, select **All users**.



> **Note:**
> Selecting All users will include the users in the restriction policy.

6. Under Exclude, select **Users and groups** to exclude admin users who have access to override the tenant.



7. Under Select excluded users, click **0 users and groups selected** to select an admin user and click **Select**.
8. Under Cloud apps or actions, choose which assets to protect.
   For example, the NowBot or whatever the name of the ServiceNow bot is in Azure.
9. Under Grant, click **0 controls selected** and select **Block access**.
10. In the Enable policy section, select **On** to turn on the Report-only function.

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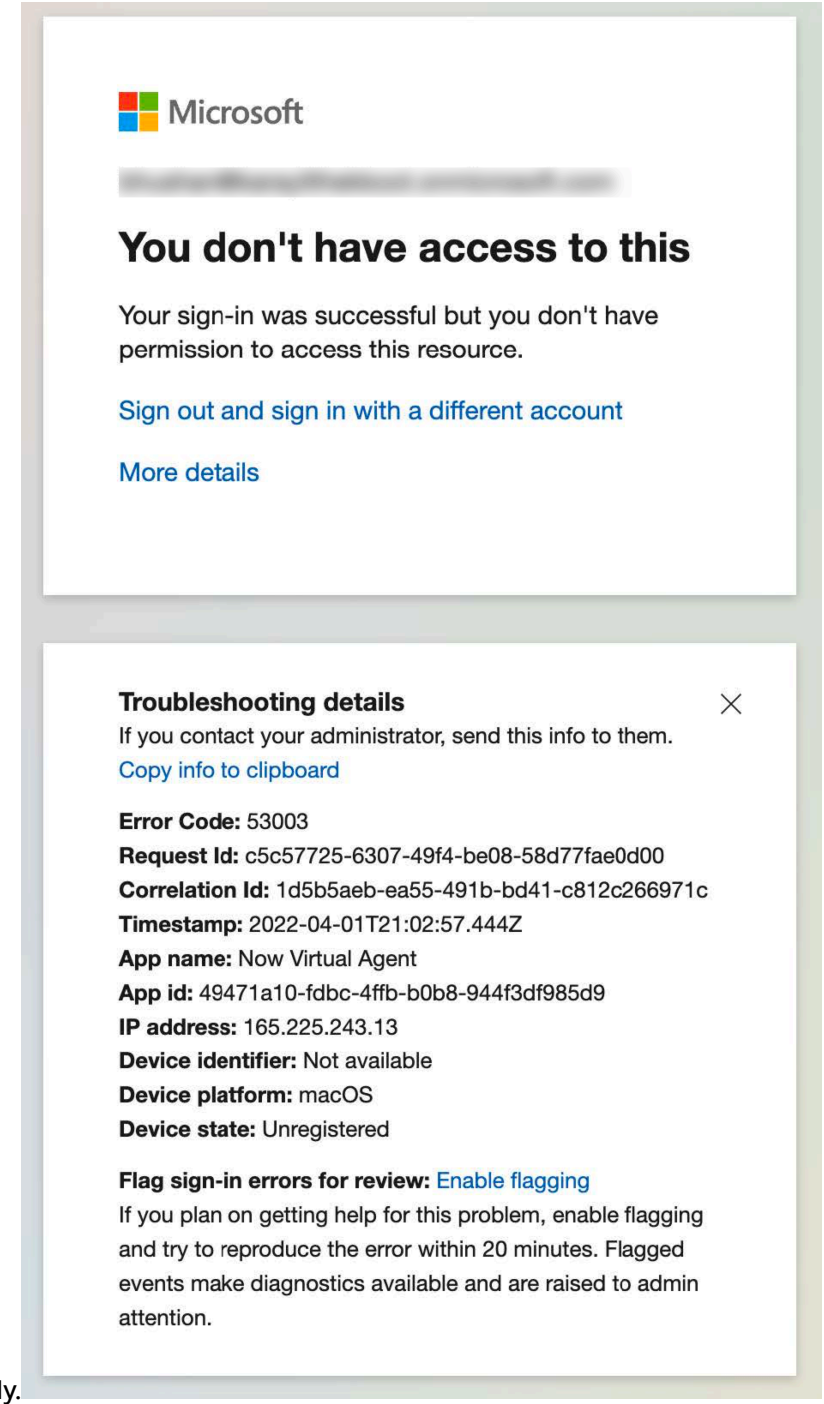
11. Click **Create**.
    After the ACL (Access Control List) is configured, it takes about 15 minutes fr the synchronization.

Result

After the policy is created and the synchronization is complete, it restricts any user except the admins from overriding the tenant accidentally.



Note:
The restriction does not affect the restricted users from using the Microsoft Teams or the Now Virtual Agent.

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Configure promoted topics for Conversational Integration with Microsoft Teams

Configure promoted topics to push out important, common topics for users' quick consumption during a conversation with the Microsoft Teams bot. You can configure up to six different promoted topics to be displayed on the Microsoft Teams channel greeting message.

Before you begin

Role required: admin or va_admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **Virtual Agent**.
2. In **Virtual Agent settings** under **Custom greetings and setup**, click **View All**.
   The promoted topics that you have previously configured will reside in the default chat experience. For more information, see Configure a Virtual Agent chat experience. If default chat experience is the only row that you have on your instance, then you observe that the promoted topics will be applied to Web Client, Microsoft Teams, and Slack (unless you configure something unique for Microsoft Teams as instructed below.)

   If you want to set up unique promoted topics for Microsoft Teams that have to be different from the Web Client, follow the procedure below.
3. In the Custom Greetings & Setup page, click **New**.
4. On the form, fill in the fields.

Create New Custom Greetings and Setup

Field	Description
Name	Name of the chat experience. For example, Microsoft Teams chat experience.
Description	Description of the chat experience.
Active	Enable or disable the chat experience.
Order	Order for the promoted topics to appear on the chat.
Domain	Application scope of the chat experience.
Condition Mode	Situation where your user gets this chat experience. Available Conditions Modes: ○ **Advanced** ○ **Simple**
Condition	Condition that defines the condition mode for the chat experience. Set up a simple condition with **[devicetype] [is] [teams]**.

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Field	Description
	Note: If you set up **[devicetype] [is] [teams]** in the Condition pop up with a higher order than the default chat experience, then Microsoft Teams picks up the setup topics and promoted topics defined in this experience. This change will not affect Web Client, which is still going to inherit the setup topics and promoted topics defined in the default chat experience.

5. Click **Create custom experience**.
6. Add promoted topics in the Microsoft Teams chat experience form that you created.

   a. On the Microsoft Teams form, click the **Promoted Topics** tab, and click **Add topic**.

   b. On the form, fill in the fields.

Create New Promoted Topics

Field	Description
Topic	Name of the topic being chosen. Use the Search icon to choose a topic.
Order	Provide the order for the topic chosen.

Note:
Similar to Web Client, you can configure a maximum of six promoted topics for the Microsoft Teams channel.

   c. Click **Save.**

What to do next
Start a conversation with the Microsoft Teams bot and you should be able to see the promoted topics after the greeting message that you have setup for the Microsoft Teams channel.

In you have not configured the promoted topics for Microsoft Teams, then the promoted topics from the default chat experience are displayed.

Set up your language preferences for the Virtual Agent integration with Microsoft Teams

Set language preferences so that Virtual Agent is in the same language as the user's preferred Microsoft Teams language.

Before you begin
Role required: admin

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About this task

You set the Microsoft Teams language preference in the Microsoft Teams client. The ServiceNow language is the language that is typically used in the ServiceNow instance. By default, a user's Microsoft Teams language preference takes precedence over the user preference language of the base system if both languages are different. For more information, see Change Settings in Microsoft Teams.

To ensure consistency, use the same language. If the user preference language in Microsoft Teams isn't an available language in the ServiceNow instance, then the instance language is the default language.

Procedure

Change which language takes precedence by configuring the following system property for users: *sn_va_teams.use_teams_language*.

Localize the bot messages

Localize the bot messages to receive them in a language of your choice during your conversations with the bot.

Before you begin

Role required: virtual_agent_admin

Procedure

1. Navigate to the provider channel identity record of your bot and select the **Bot Messages** tab.

   Confirm that the values for those bot messages are accurate.

2. Navigate to the Messages [`sys_ui_message.list`] table and click **New**.

   Note:
   Before creating a new message, ensure that the message you want to create is not already created.

3. On the form, fill in the details.

   New Message record

Field name	Description
Key	Message for the record. Make sure that this matches with the bot message value in step 1. If you want to create multiple translations for the same message in different languages, add each translated message individually.
Language	Your preferred language for the conversation/ message.
Message	The equivalent of the key message translated into your preferred language.

4. Click **Submit**.

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Result
Start a new conversation with the bot. You will notice that the translated message is displayed by the bot in user's preferred Microsoft Teams language, if you have already provided the translation for that language.

Capture common errors and resolution steps for Microsoft Teams using the Conversational Interfaces Diagnostic Tool

The Conversational Interfaces Diagnostic Tool runs a health report to define and capture information for different categories of the Conversational Integration with Microsoft Teams app, such as plugin details, configuration settings, system properties, integration failures, and so on, and lets the user validate and review these settings to start a bot-conversation.

When a user runs the health check scan and if there are issues that are shown on the report, then the user can take actions to resolve the issues based on the recommendations that the bot provides through the CI Diagnostic Tool.

Grouping common errors

To provide a health report of the various aspects of the Conversational Integration with Microsoft Teams application, the most common issues have been grouped into the following categories:

- Microsoft Teams not responding
- Notifications
- Automatic Linking
- Image/HTML
- Performance
- Installation
- Live Agent

Resolution

The Conversational Interfaces Diagnostic Tool is used to resolve the errors that users come across with their Microsoft Teams app. Knowledge Base articles are documented with resolutions to the issues and the records for these KB articles are created in the CI Diagnostic Tool.

> **Note:**
> Microsoft Teams requires the CI Diagnostics Tool of version 1.1.0 to make the diagnostic topic available for the user.

Resolving errors using the CI Diagnostic Tool includes the following steps:

1. Login into the Web Client and start the CI Diagnostic Tool.

   The CI Diagnostic Tool presents the following groups to choose from:

   - Error Message
   - System Property Lookup
   - Plugin/Functionality Issue
   - General Question

2. Select **Plugin/Functionality Issue** and type `Conversational Integration with Microsoft Teams` or any related keyword to get the options of available plugins related to your search term.

   The Microsoft Teams application logo appears as a response.

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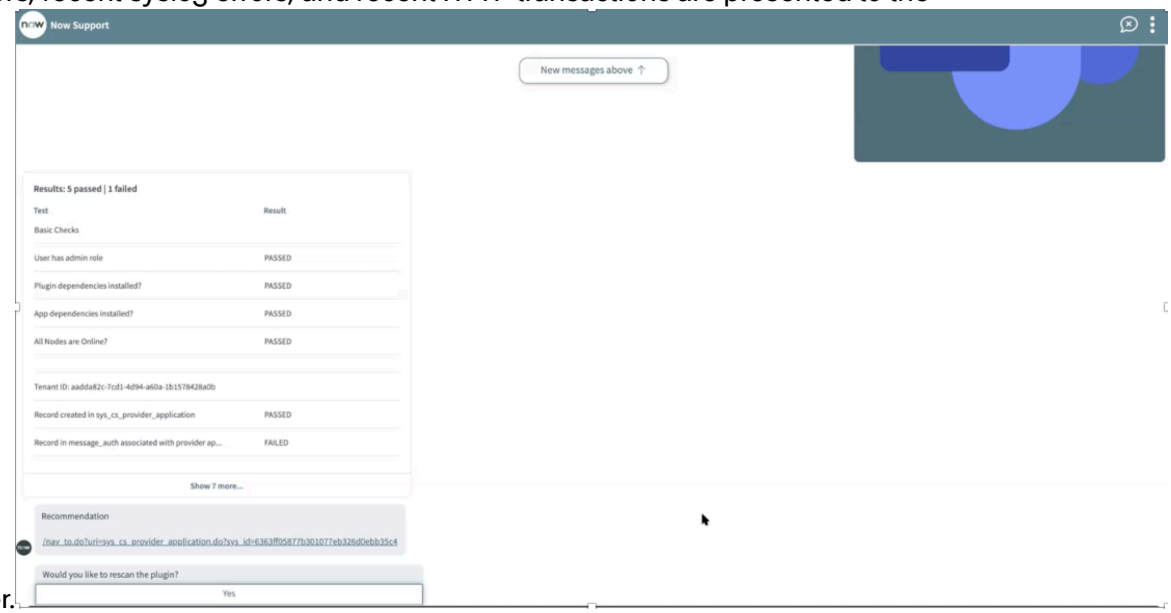
3. After Microsoft Teams is provided as an input to the CI Diagnostic tool, a basic health check of the app gets executed and a report is generated for the user.

   The health check is run to verify if:

   - Microsoft Teams app plugin installed
   - Provider application record verification.
   - Message auth table has all the records
   - Dependant plugins are available
   - OIDC token verification records are available
   - Provider reference is missing in the [sys_cs_provider_application] table

   After successful health check scan, verifications such as recent installation errors, recent syslog errors, and recent HTTP transactions are presented to the user.



4. The health check report also provides you with an option to view existing Knowledge Base articles that may be associated with your issue. Enter **Yes** and provide a few words to describe your issue.

   For example, if you enter `image` as your issue description, then the CI Diagnostic tool presents you with the Knowledge Base articles related to images. Click the link to view the Knowledge Base article.

   Click **No** to proceed for additional support.

5. The CI Diagnostic Tool provides you with an additional support topic available for the Microsoft Teams plugin. Click **Yes** to proceed.

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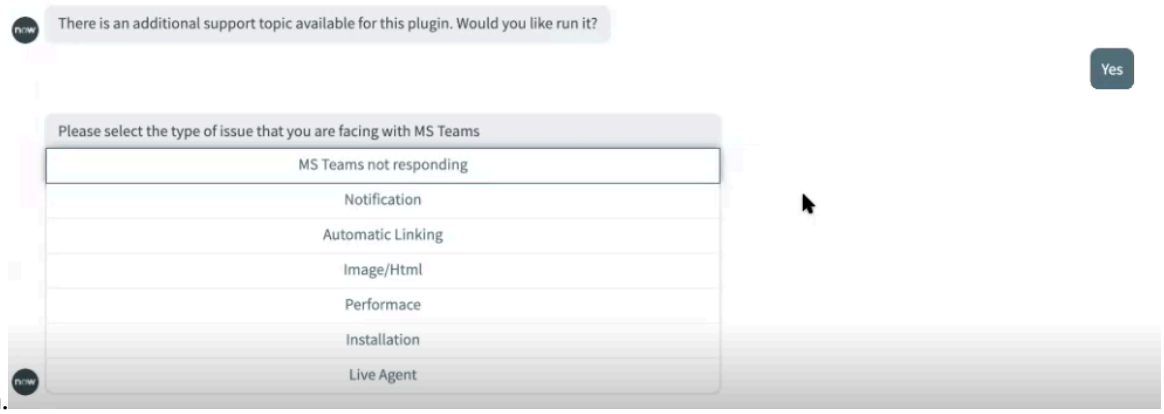
You are presented with the following issue types to select from.



For example, if you select any one of the issue types, the CI Diagnostic Tool provides you with the resolution steps pertaining to that issue type to identify the cause of the issue and to resolve it. You will also be presented with the relevant Knowledge Base articles to get further details about the issue.

Finally, the CI Diagnostic Tool asks you to check if your issue is resolved. Click **Yes** if the issue is resolved.

Remove Conversational Integration with Microsoft Teams

Remove the integrations between your ServiceNow Virtual Agent bot or the Self-configured bots and Microsoft Teams to disassociate the app with your ServiceNow instance.

Before you begin

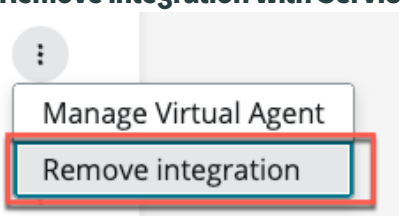
Roles required:

- Virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, select **View All**.
3. On the Channels and integrations page, on the Microsoft Teams tile, select **Manage**
4. In the Manage Microsoft Teams channel page, find the integration (Now Virtual Agent bot or the Self-configured bot) that you would like to remove, select the manage bot icon ⋮, and select **Remove integration**.

Remove integration with ServiceNow Virtual Agent



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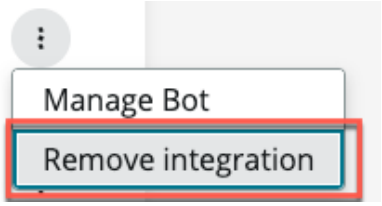
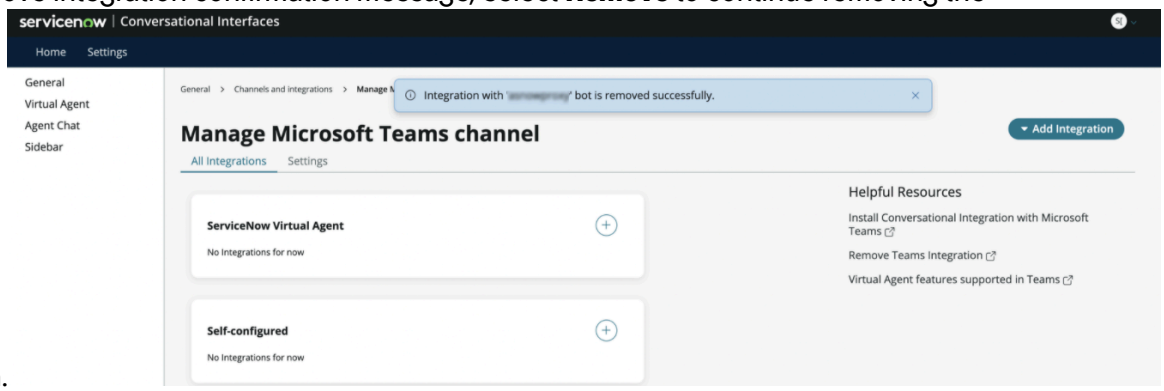
Remove integration with Self-configured bot



5. In the Remove integration confirmation message, select **Remove** to continue removing the integration.



The Virtual Agent integration with the selected Microsoft Teams bot has been removed.

Conversational Integration with Slack

Enable requesters to chat with Virtual Agent or live agents using the Slack application.

Note:
In earlier releases, the pre-built Virtual Agent messaging integration for Slack was part of the Virtual Agent platform. This integration is now the Conversational Integration with Slack app, available from the ServiceNow Store.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Overview

Use the Conversational Integration with Slack application to connect your requesters with Virtual Agent or live agents through your company's Slack workspace. To get started, see .

Integrating ServiceNow Virtual Agent with Slack

Enables ServiceNow® Virtual Agent to integrate with the Slack application.

Install the Conversational Integration with Slack

You can install the Conversational Integration with Slack (sn_va_slack) application if you have the admin role.

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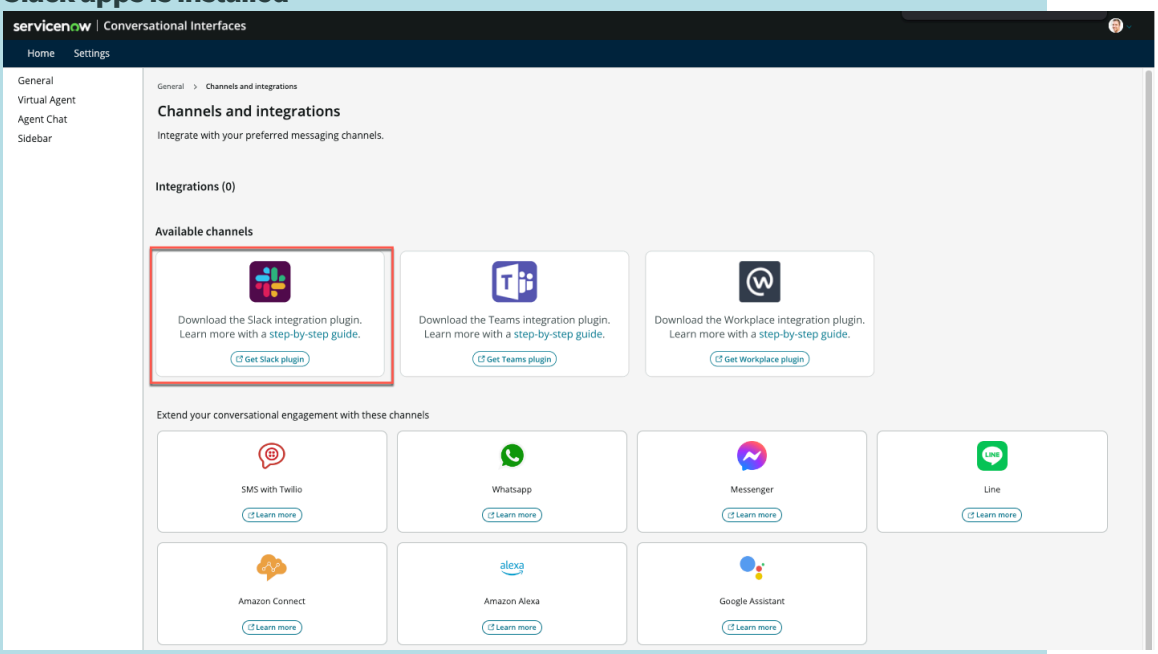
Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- If you're using an earlier release of Virtual Agent, you must upgrade to the Washington DC release to use the features supported in this channel integration.
- Conversational Integration with Slack requires the Glide Virtual Agent plugin (com.glide.cs.chatbot) to activate full functionality in Virtual Agent or the Virtual Agent Lite plugin (com.glide.cs.chatbot.lite) to activate a limited version of Virtual Agent. Activate the appropriate plugin before you install the integration.
- Install the Conversational Integration with Slack app from the ServiceNow® Store.

Important:
Installing the Conversational Integration with Slack app from the ServiceNow Store activates the app for integration on your ServiceNow instance. If you have not installed the integration app, the Slack app is listed in the Available Channels section.

Channels and integrations page before Conversational Integration with Slack apps is installed



After you install the Conversational Integration with Slack plugin (sn_va_slack), Slack is seen in the Integrations section, and you can proceed with the configuration.

Role required: virtual_agent_admin and external_app_install_admin or admin

About this task

Review these guidelines for using Virtual Agent with Slack or with Slack Enterprise Grid.

- The Slack app creates a one-to-one association between the ServiceNow instance that you are installing from and the Slack workspace in which the integration runs.
  - Use a separate Slack workspace for each instance that you plan to install the integration in.
  - If you use a non-production instance for testing, use a Self-configured bot.

    For more information, see Integrate ServiceNow instance with Self-configured bot.

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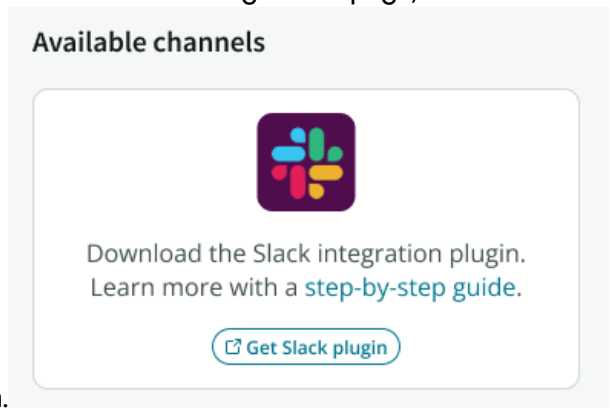
- Slack Enterprise Grid – If you have Slack Enterprise Grid workspaces, your end users can move between workspaces and use the Virtual Agent bot from any workspace.
  - If you use a non-production instance for testing, use a workspace in a different grid or use a non-grid workspace.
  - After installing this store release:
    - Your messaging users are automatically linked to their ServiceNow accounts.
    - If you clone an instance for non-production testing, be sure to run the installation again on the cloned target.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. On the Channels and integrations page, in the Slack tile, click **Get Slack plugin**.



   You are redirected to the Conversational Integration with Slack ServiceNow Store page.
4. On the top right corner for the screen, click **Get**.

   Note:
   You must be logged into the ServiceNow Store portal to get the plugin.

5. On the Conversational Integration with Slack ServiceNow Store page, click **Request Install**.
6. On the Request Install screen, provide the **Instance Name** and **Reason for request**.
   You can also validate the instance that you provided by clicking **Validate Instance**.
7. Click **Request**.
   A message pops up on the Request Install screen that your request has been auto approved.

What to do next

Integrate ServiceNow Virtual Agent with Slack.

Integrate ServiceNow Virtual Agent with Slack

Add the Virtual Agent bot to your ServiceNow® instance to integrate with Slack.

Before you begin

Ensure that you have installed the Conversational Integration with Slack plugin (sn_va_slack) on your ServiceNow instance before adding any integrations.

Role required: admin

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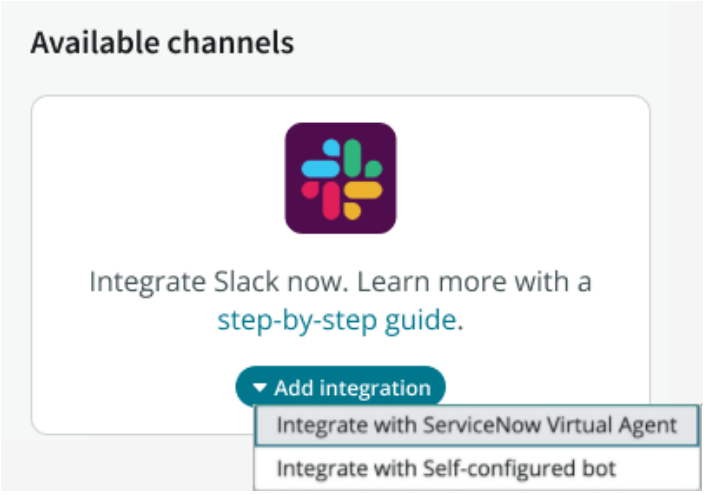
Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, select **View All**.
   The Channels and integrations page opens.
3. Under the Available Channels section in the Slack tile, select **Add Integrations**, and select **Integrate with ServiceNow Virtual Agent**.

   Note:
   The **Add Integrations** drop-down is available only after installing the Conversational Integration with Slack plugin (sn_va_slack) on your ServiceNow instance.



4. Enter your Slack workspace URL to sign into your Slack workspace, and select **Continue**.



   Note:
   Ensure that you input the name of the Slack workspace for which you have access.

5. Sign in to your ServiceNow® instance.
6. Select **Allow** when Slack requests permission to access your workspace.

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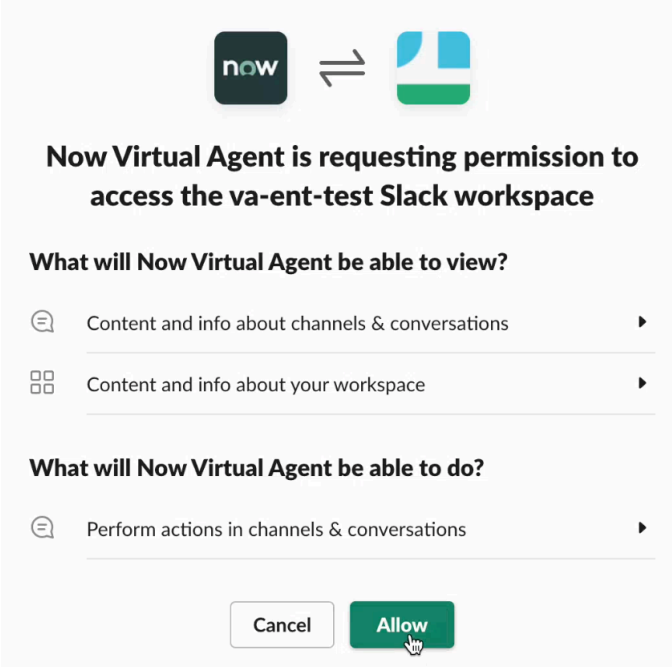
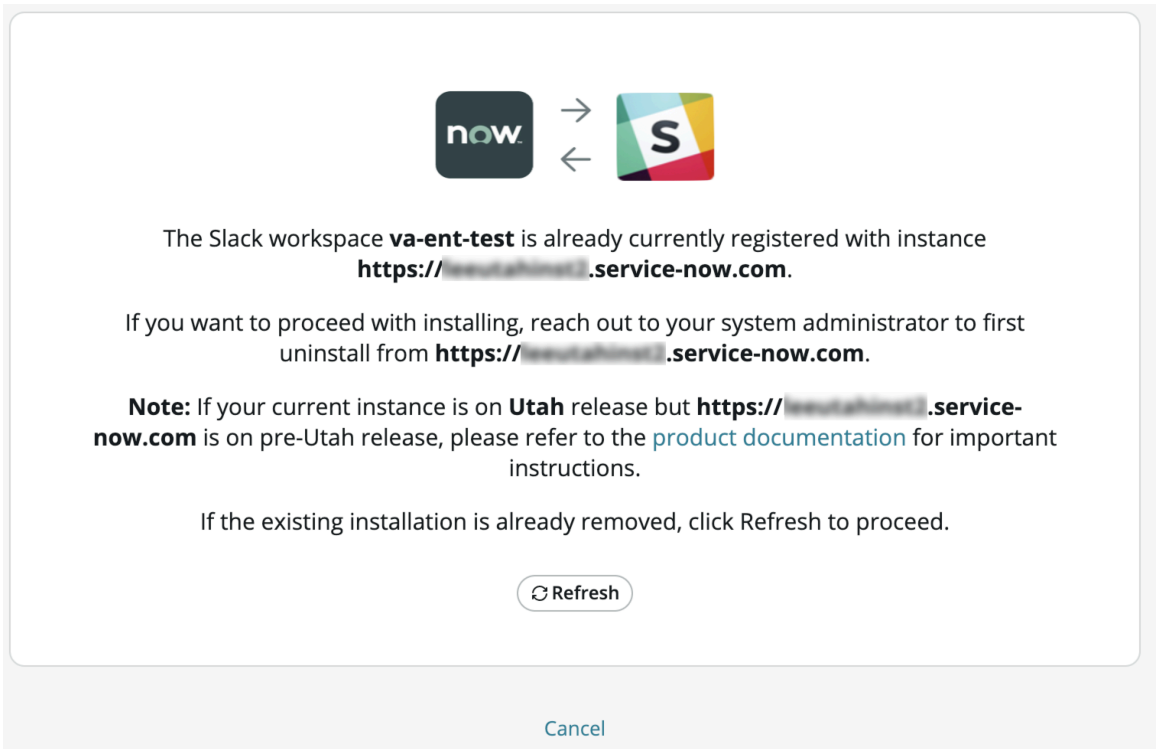


7. If the selected workspace ant has already been assigned to Virtual Agent, you must first uninstall from the previously associated instance.

Note:

Starting from Utah release, if your Slack workspace is already associated with another ServiceNow instance, but if you intend to associate it with a new instance, then you're asked to reach out to the administrator to first uninstall it from the previously associated instance. For more information, see Override Slack integration.



When Virtual Agent has been successfully installed on the Slack workspace, a completion message appears.

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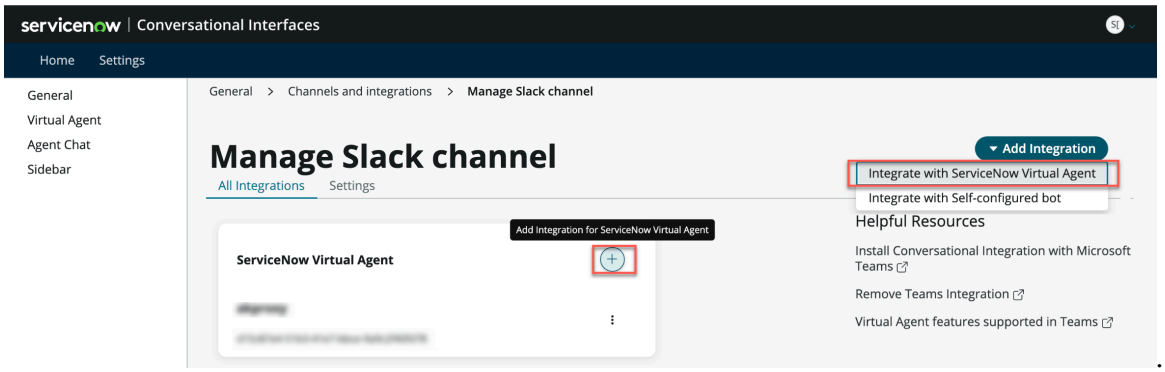
8. Select **Go to Slack** to manage the Slack app.
9. Select **Continue to manage channels and integrations** to manage the integration on your ServiceNow instance.

   The Slack application appears in the list of integrations.

What to do next

If you would like to integrate your ServiceNow instance with another Slack bot, select the plus icon in the ServiceNow Virtual Agent tile, or select the **Add integration** list on the Manage Slack channel page.



For more information, see Manage the ServiceNow Virtual Agent integration with Slack.

Override Slack integration

Override Virtual Agent integration with Slack.

Before you begin

Role required: virtual_agent_admin or admin

About this task

Before Utah release, an admin was able to override a Slack installation that is associated with a particular instance with a different ServiceNow instance.

Starting from Utah release, if your Slack workspace is already associated with another ServiceNow instance, but you intend to associate it with a new instance, then you must reach out to the administrator to first uninstall it from the previously associated instance.

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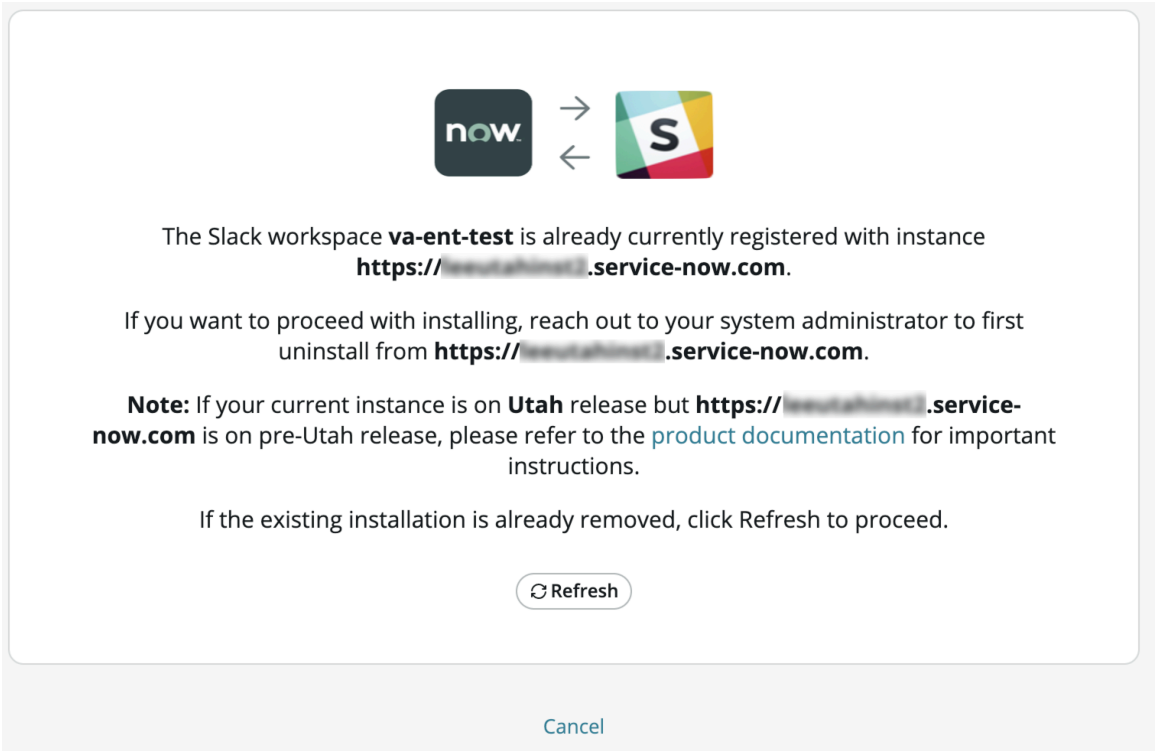


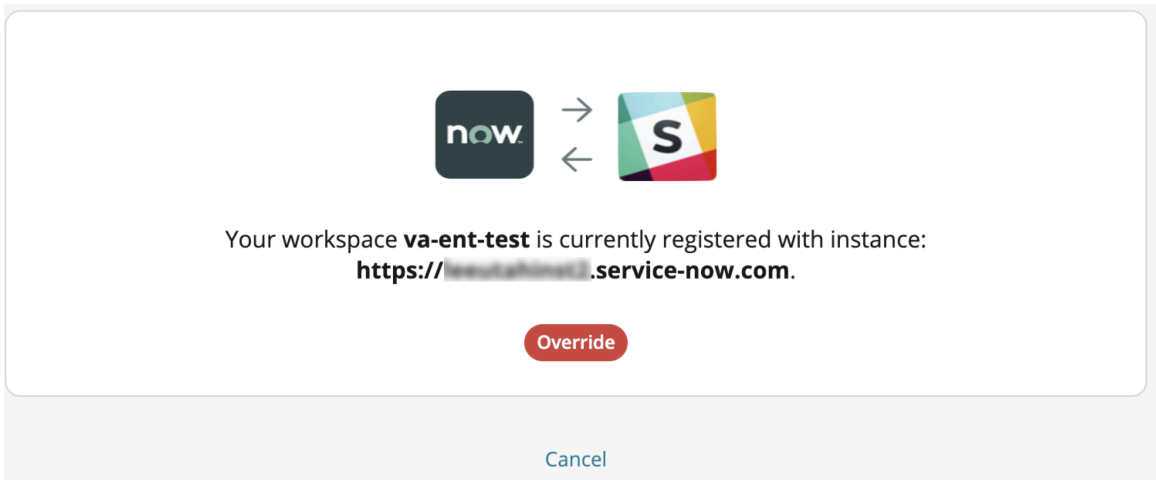
Important:
The instructions in Remove ServiceNow Virtual Agent integration with Slack are only applicable when both instances are compatible with Utah and the above releases. If one of your ServiceNow instances is on the Utah release and another on a release prior to Utah, follow the steps below.

Procedure

1. In the left navigation filter of your ServiceNow instance, enter `sys_properties_list`.
2. Search and open the *`sn_va_slack.enable_slack_override`* system property.

   Note:
   If you don't find this system property, you (as an admin) must create one.

3. Set the system property value to **true** to enable the **Override** button.
   By default, the value of the system property is **false**.
4. Select **Override** to associate the instance with a new tenant.



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Manage the ServiceNow Virtual Agent integration with Slack

Manage your Conversational Integration with Slack application, its branding, and customize the bot-specific messages in your ServiceNow instance after integration.

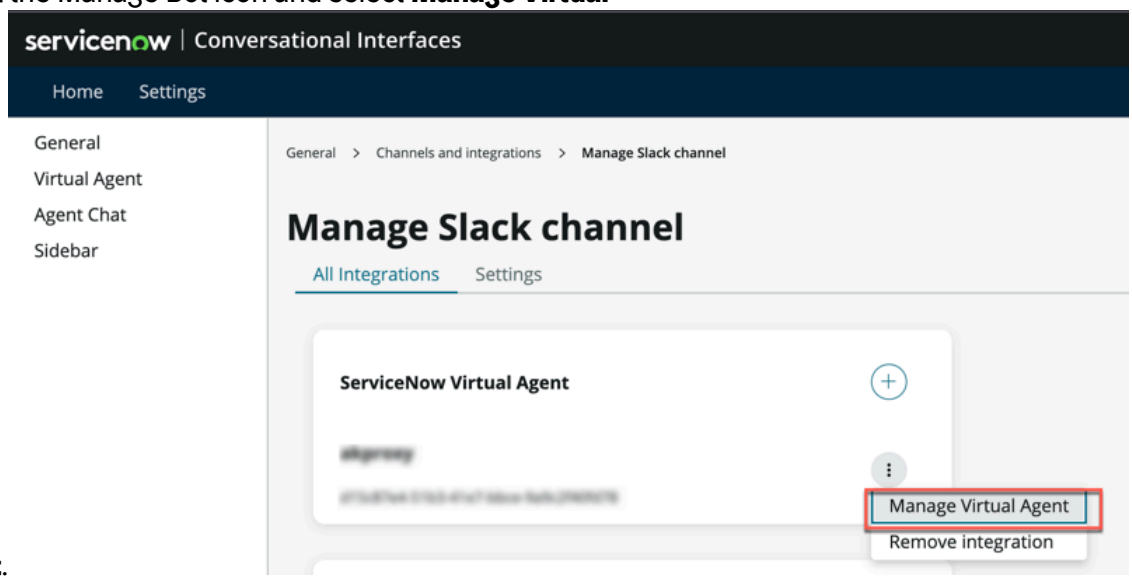
Before you begin

Roles required:

- virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, select **View All**.
3. Click **Manage** on the Slack tile.
   When you select **Manage**, you are redirected to the Manage Slack channel page where you can manage the bots.
4. To integrate your ServiceNow instance with another Slack bot, select the Add integration for ServiceNow Virtual Agent icon against the ServiceNow Virtual Agent.
   Additionally, you can also select the **Add integration** drop-down on the top-right of the Manage Slack channel page and select **Integrate with ServiceNow Virtual Agent**.
5. Select the Manage Bot icon and select **Manage Virtual Agent**.



   You are redirected to the Bot Configuration page for the selected bot.
6. Select the **Branding** tab to brand your ServiceNow Virtual Agent bot.
   For more information about branding your bot, see Configure branding for your Virtual Agent bot in Slack.
7. Select the **Bot Messages** tab to create and edit a bot message.
   For more information, see Create bot messages.

Configure branding for your Virtual Agent bot in Slack

You have the flexibility to customize the default ServiceNow branding for your Slack Virtual Agent. You can change the production bot's name and icon.

Before you begin

Role required: admin or virtual_agent_admin

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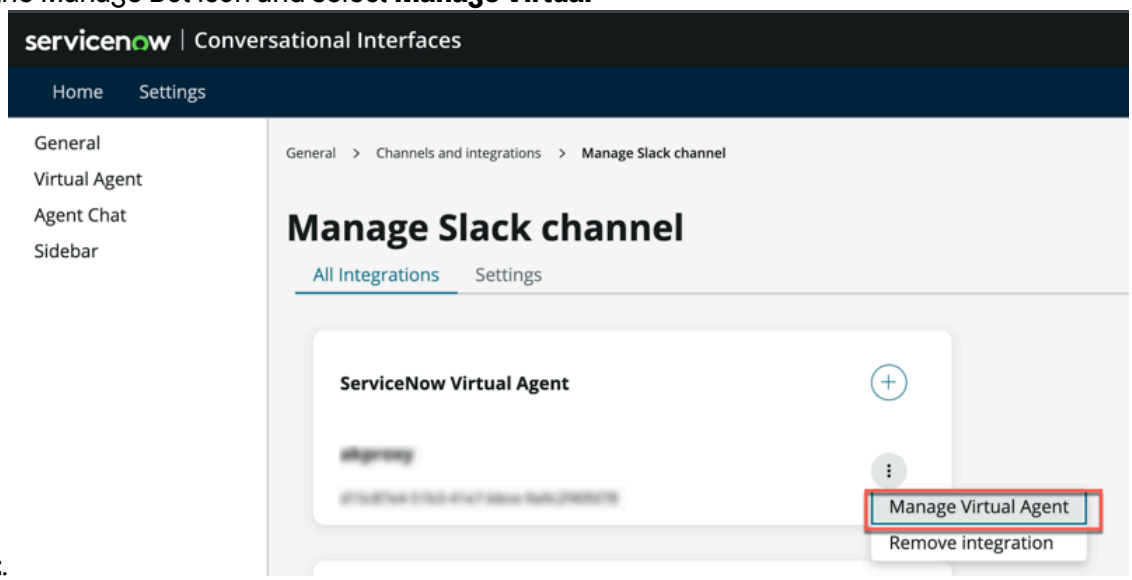
Note:
The branding capability in Slack is available from the August 2022 store release and is compatible with the Tokyo release and above. Users must ensure that they are on the Tokyo family release and have downloaded the August store release for the Conversational Integration with Slack app to use this functionality.

Ensure that you set the *com.glide.cs.enable_slack_branding* system property to true before configuring the branding settings for your bot.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. On the **General Settings** page under **Channels and integrations**, click **View All**.
3. On the Channels and integrations page, in the Slack tile, click **Manage**.
4. Click the Manage Bot icon and select **Manage Virtual Agent**.



5. On the Branding tab, provide the following details:
   - **Bot name**: Name that appears on the Slack conversation body.

     On the Configure your bot integration in Slack page, change the default bot name to a bot name of your choice and click **Save**.

     Note:
     - If you ever want to change the bot name back to the default bot name, delete the bot name that you provided and click **Save**. The bot name will be taken from the available bot name on Slack admin center.
     - If you want your bot name to be different from the header and the left pane, provide a different name.

   - **App name**: Name that appears in the Slack header and left panel.

     To change the App name on the Slack header and left panel, perform the following steps.

     - Log in to Slack admin center.
     - Navigate to **Slack app directory** and find your Slack pre-published app.
     - On your Slack app page, click the **Configuration** tab and navigate to the Bot User section.

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- Click **Edit** to edit the bot name.
- In the Edit bot name pop-up, change the bot name to a name of your choice and click **Save Changes**.

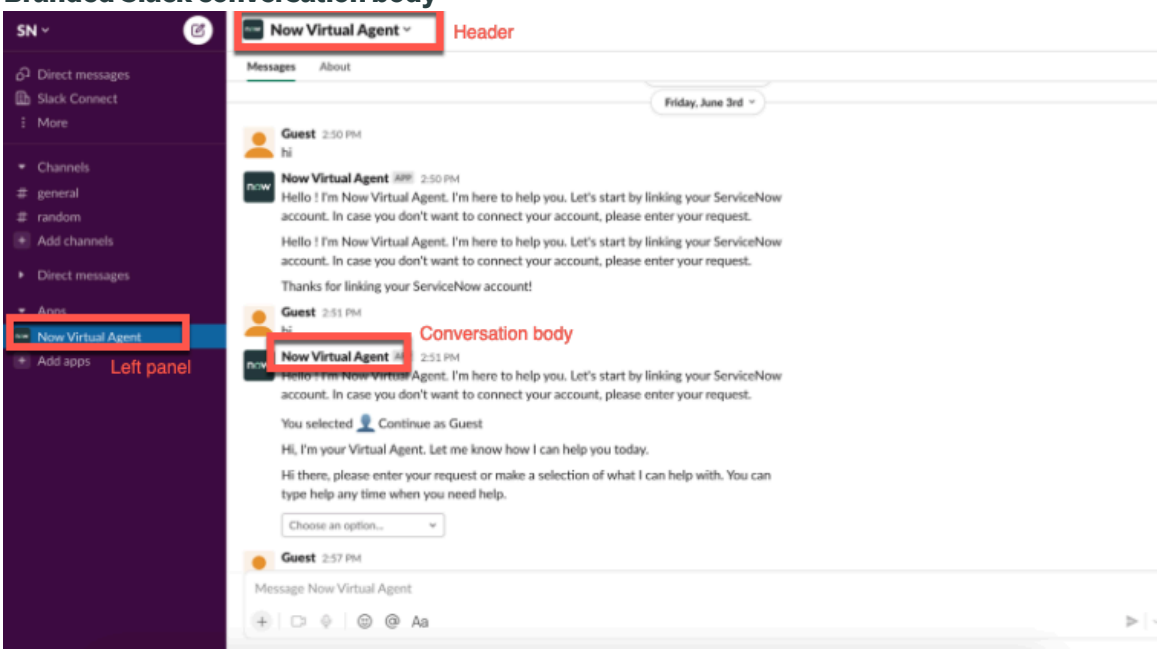
Note:
If you want the bot name to be consistent with the bot name in the conversation body, then provide the same bot name.

- **Slack bot icon**: Icon that appears in the Slack conversation body.
  - **Use default icon**: Select the **Use default icon** radio button and click **Save** to change the bot icon back to the default bot icon.
  - **Use custom icon**:

    Select the **Use custom icon** radio button to change the Slack bot icon and click **Save**.

    There are two ways to upload an image icon.
    - Click **Attach image** to browse for an image icon and click **Save**.
    - Click the **Use image URL instead** to provide a URL of the image icon and click **Save**.

Branded Slack conversation body



What to do next

Open your Slack bot interface and start a new conversation. You will notice that the bot name has been updated on the Slack conversation body, header, and in the left pane and the bot icon is updated only in the conversation body.

Remove ServiceNow Virtual Agent integration with Slack

Remove the ServiceNow Virtual Agent integration from your ServiceNow instance to disassociate the Slack app.

Before you begin

Roles required:

- Virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications

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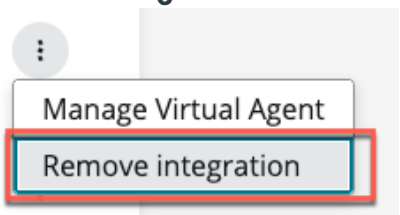
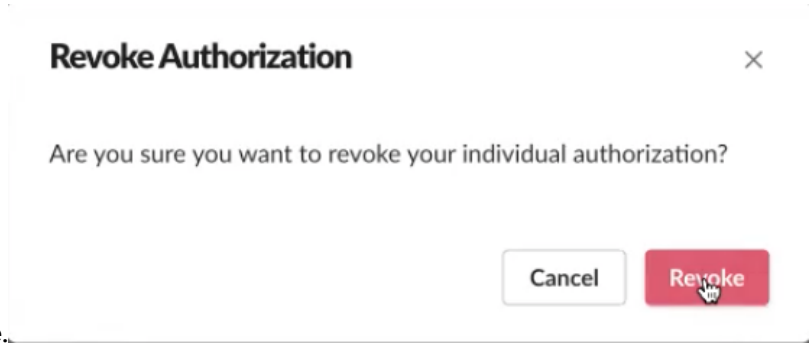
Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. On the Channels and integration page, in the Slack tile, click **Manage**.
4. In the Manage Slack channel page, find the ServiceNow Virtual Agent integration to remove from your ServiceNow instance, click the manage bot icon ⋮, and select **Remove integration**.

Remove integration with ServiceNow Virtual Agent



5. In the Remove integration confirmation message, click **Remove**.
   You are redirected to the Slack App Directory.
6. On the Slack app directory, navigate to the Configuration tab, and click **See All** against **1 authorized member**.
7. Click **Revoke** in the 1 Authorized member pop-up.
8. Click **Revoke** in the confirmation



message.
A message appears saying that **You have successfully removed an authorization for Now Virtual Agent**.
ServiceNow Virtual Agent integration with Slack is removed from your ServiceNow instance.

Integrating Self-configured bot with Slack workspace

Enables ServiceNow® Virtual Agent to allow multiple ServiceNow instances to integrate with single Slack workspace.

The Virtual Agent integration with Slack creates a one-to-one association between the ServiceNow instance that you are installing from and the Slack workspace in which the integration runs. By default, Virtual Agent supports one-click installation that integrates one Slack workspace with one ServiceNow instance. By enabling this integration, Virtual Agent allows you to integrate multiple ServiceNow instances with a single Slack workspace. You can integrate multiple ServiceNow instances with a single Slack workspace by creating a bot for each of the instances on the targeted Slack workspace.

Create a bot in Slack

You must create a self-configured bot in the targeted workspace in Slack to be able to integrate with the Virtual Agent.

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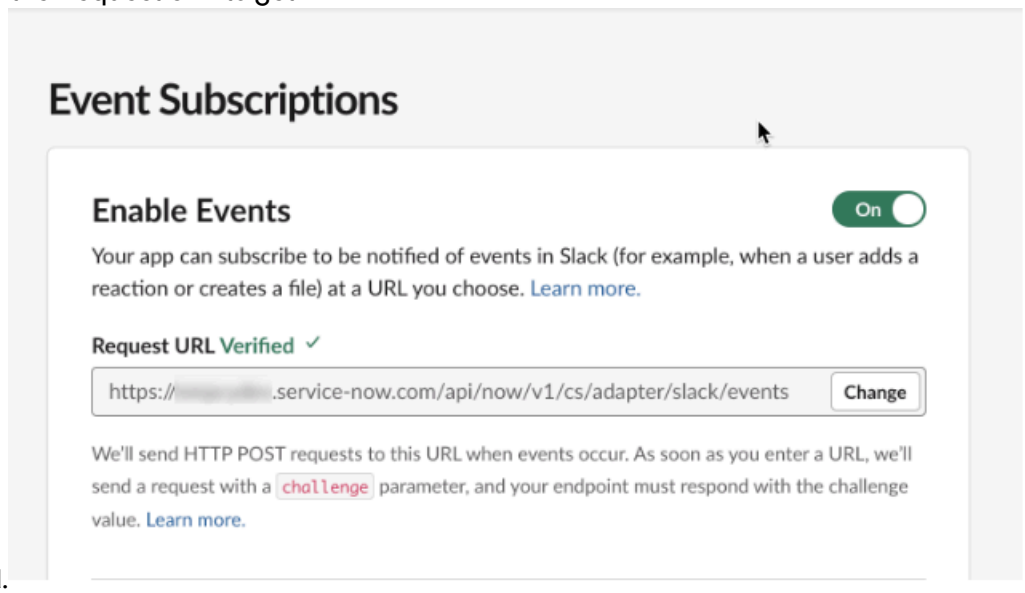
Before you begin

Role required: none

Note:
Users must have permissions to create a bot in the targeted workspace.

Procedure

1. Log in to Slack API.
2. Navigate to **Your Apps** and click **Create New App**.
3. Enter an **App Name**, select your **Slack Workspace** and click **Create App**.
4. Configure Interactive Components.
   a. Navigate to **Interactivity** > **Shortcuts** in the left menu and turn on **Interactivity**.
   b. Update the **Request URL**.
   If you are setting up your self-configured bot on an ServiceNow instance, then the request URL must be `https://<instance-name>/api/now/v1/cs/adapter/slack/actions`.
   c. Click **Save**.
5. Configure Event Subscriptions.
   a. Click **Event Subscriptions** in the left menu and turn on **Enable Events**.
   b. Update the **Request URL**.
   If you are setting up your self-configured bot on a ServiceNow instance, then the request URL must be `https://<instance-name>.service-now.com/api/now/v1/cs/adapter/slack/events`.
   c. Wait for the Request URL to get verified.



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d. Under Subscribe to bot events, click **Add Bot User Event** and add `message.im`.

e. Click **Save**.

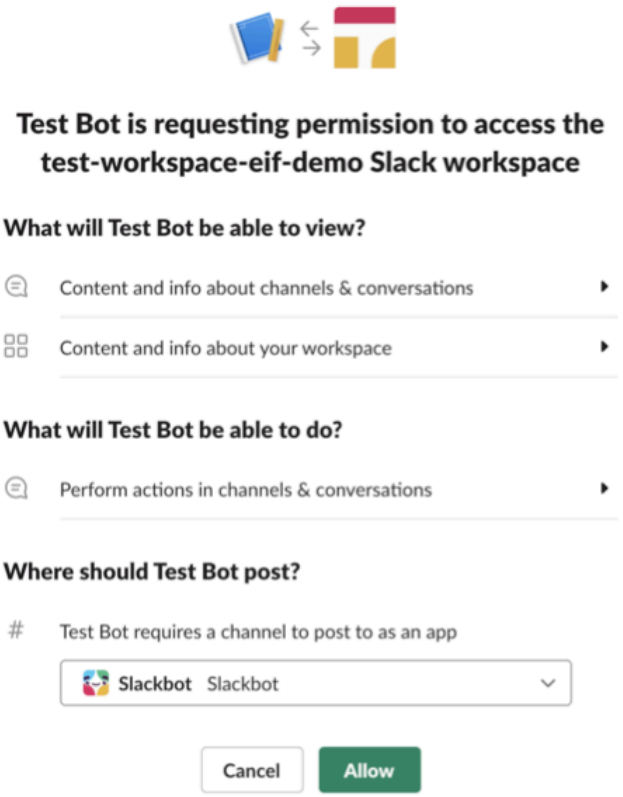
6. Navigate to the **Incoming Webhook** tab and slide the **Activate Incoming Webhooks** toggle switch to enable it.
7. Configure OAuth & Permissions.

a. Click OAuth & Permissions from the left menu and navigate to **Scopes** > **Bot Scopes**.

b. Select **Add an OAuth Scope** and add the following scopes:

- chat:write
- files:read
- files:write
- im.history
- incoming-webhook
- team:read
- users:read
- users:read.email

8. Navigate to **OAuth & Permissions**, click **Install to Workspace**, and click **Allow**.



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Retrieve Self-configured bot details

Retrieve the details of the bot that you created in the Slack workspace to integrate with the ServiceNow instance.

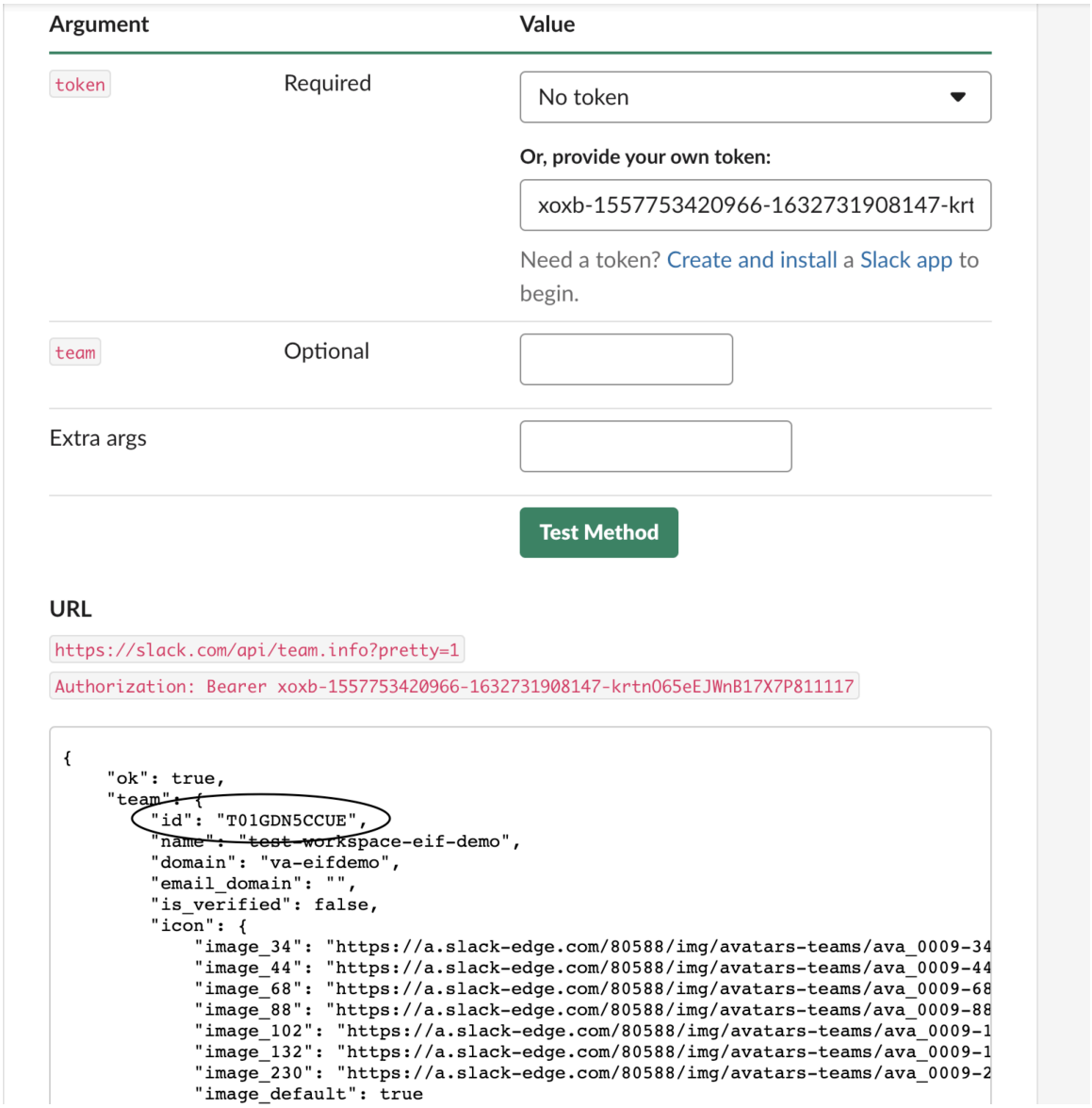
Before you begin

Role required: admin

Procedure

1. Log in to Slack API.
2. Click **Your Apps**, select a bot and navigate to **Settings** > **Basic Information** > **Display Information** to copy the **App name** (Bot name).
3. Enter your **Bot User OAuth Access Token** in the token argument, click **Test Method**, and copy the **Team ID**.

Note:
You can find the Access token in **OAuth & Permissions** in your Slack app.



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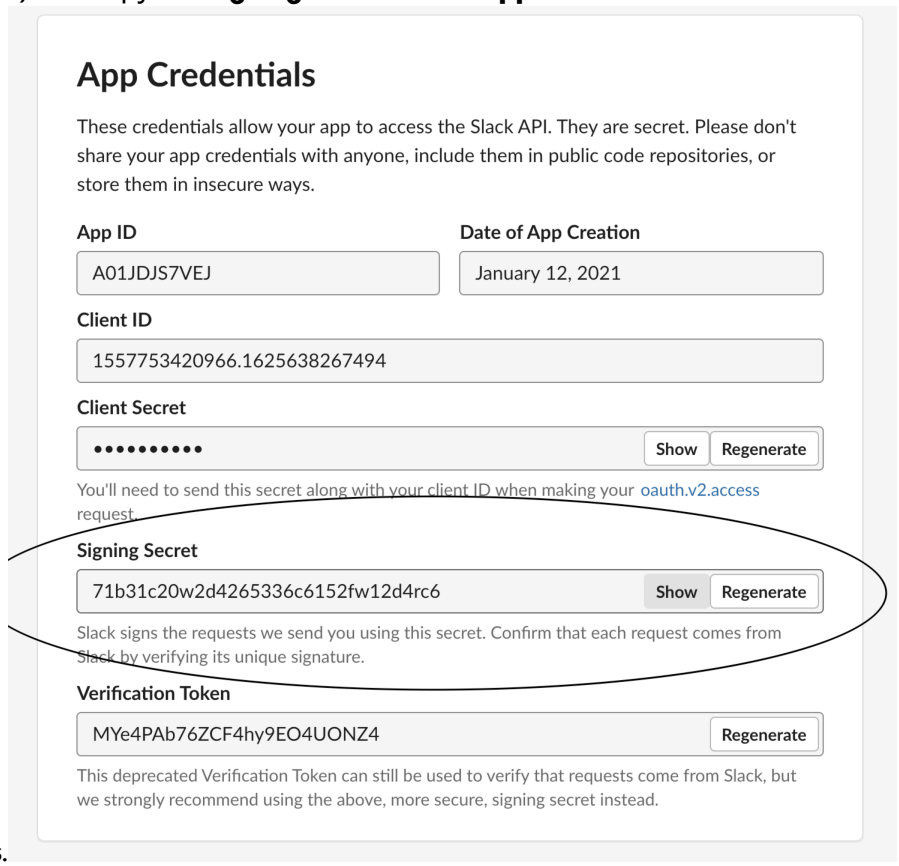
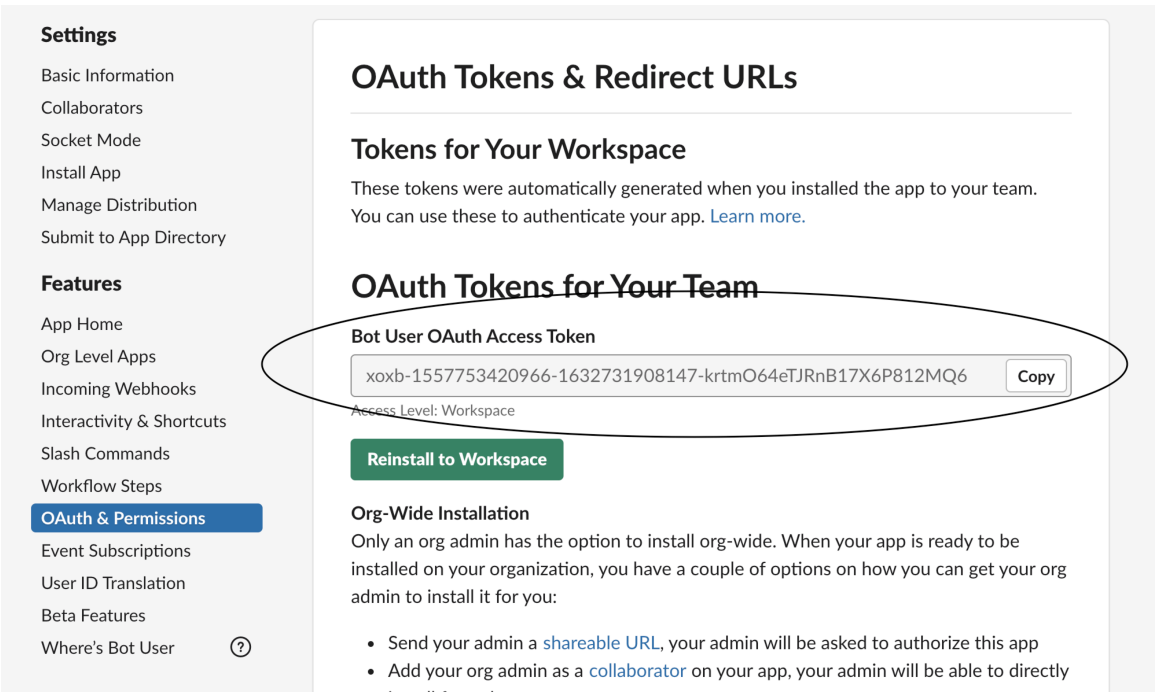
4. Navigate to Basic Information in your Slack workspace (in api.slack.com) and copy the **Signing Secret** under **App Credentials**.



5. Navigate to OAuth & Permissions in your Slack workspace and copy the **Bot User OAuth Access Token**.



Result

You should now be able to interact with your Self-configured bot.

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If you do not see your bot under the Apps section, then click **Add Apps** and search for your bot and select it. You can type **hi** to receive a response.

Integrate ServiceNow instance with Self-configured bot

Add the Self-configured bot to your ServiceNow instance to complete the integration with Slack.

Before you begin
Role required: virtual_agent_admin or admin and Slack workspace admin

This installation requires a ServiceNow instance other than the one integrated with the production bot to integrate one bot (of the multiple bots) with a single Slack workspace.

> **Note:**
> The ServiceNow instance that you will use to integrate the Self-configured bot with a single Slack workspace must not be an instance that you have used for integrating the ServiceNow Virtual Agent.

Ensure that you created a bot on the Slack workspace and fetched the bot details to complete the integration. For more information, see Create a bot in Slack.

Fetch the Name of the bot, Team ID, Signing Secret, and Access Token details for your bot created in Slack. For more information, see Retrieve bot details. Use this information when setting up the bot in your ServiceNow instance.

Procedure

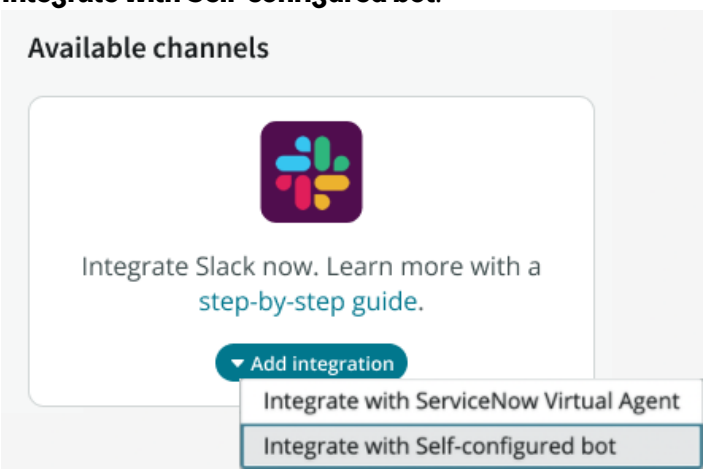
As a ServiceNow admin, set up the bot on the ServiceNow instance in the global scope.

> **Note:**
> The virtual_agent_admin can install bots with multiple instances or bots apart from the production bot in the ServiceNow instance and avail all the features of Virtual Agent and also have the flexibility to integrate one of the multiple ServiceNow instances with a bot on a single Slack workspace.

a. Log in to your ServiceNow instance and navigate to **All** > **Conversational Interfaces** > **Settings**.

b. In **General Settings** under **Channels and integrations**, click **View All**.
The Channels and integrations page opens.

c. Under the Available Channels section in the Slack tile, click **Add Integrations** and select **Integrate with Self-configured bot**.



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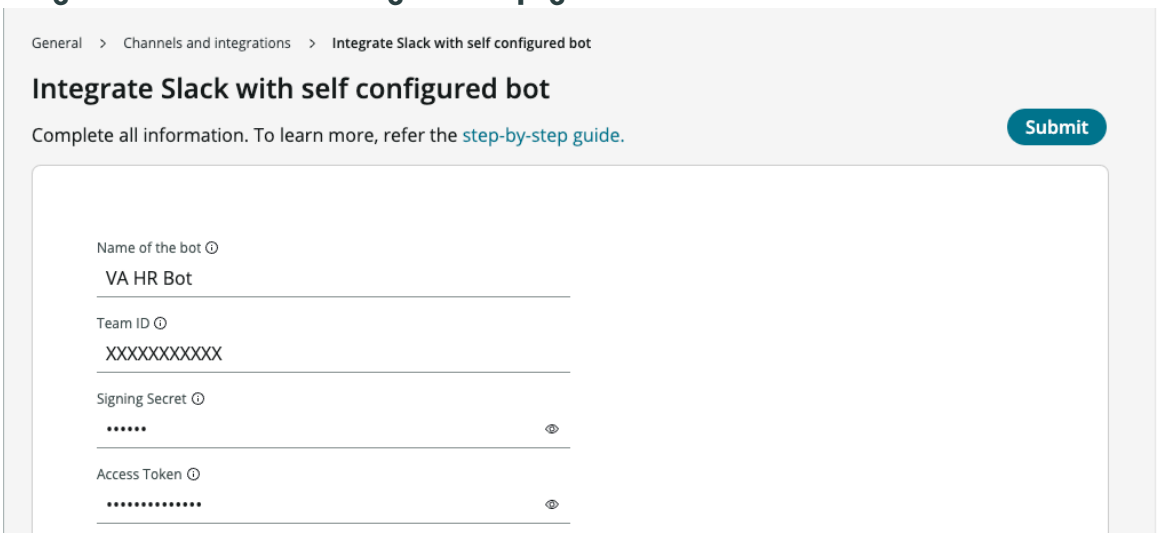
Note:
The **Add Integrations** button is available only after installing the Conversational Integration with Slack plugin (sn_va_slack) on your ServiceNow instance. For more information about getting the plugin installed, see Install the Conversational Integration with Slack.

d. In the Integrate Slack with self-configured bot page, provide the following details that you made a note while creating the Slack bot and click **Submit**.

- **Name of the bot**
- **Team ID**
- **Signing Secret**
- **Access Token**

For more information, see Retrieve bot details.

Integrate Slack with self-configured bot page



Note:
For each additional ServiceNow instance to be integrated, repeat steps 1 and 2.

If you would like to integrate your ServiceNow instance with another Slack bot, click the Plus icon against the Self-configured bot or click the **Add integration** button on the Manage Slack channel page and select **Integrate with Self-configured bot**.

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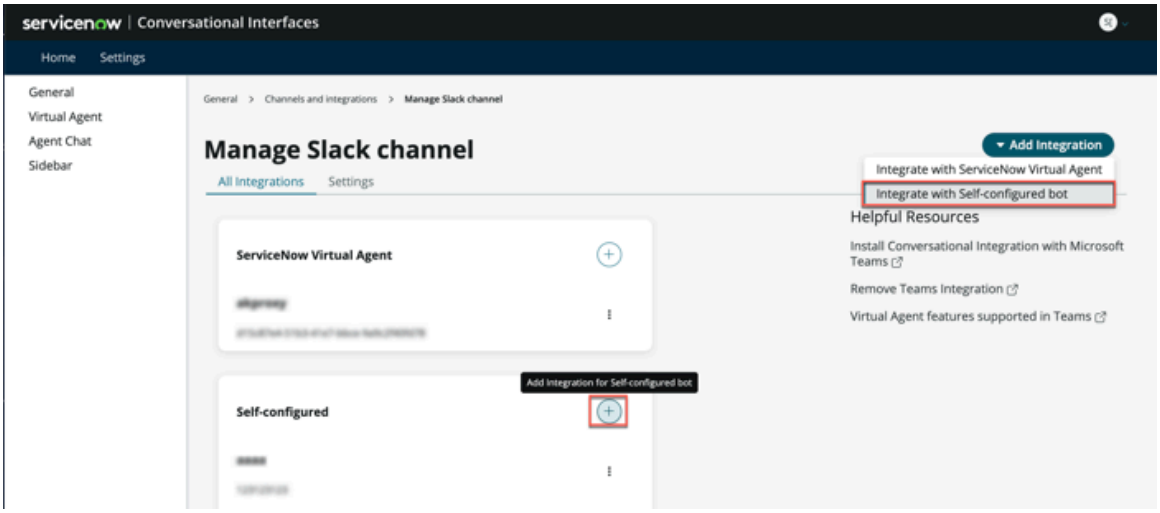


You will receive a message that the installation is successful.

Manage the self-configured bot integration with Slack

Manage your Conversational Integration with Slack application, its branding, and customize the self-configured bot-specific messages in your ServiceNow instance after integration.

Before you begin

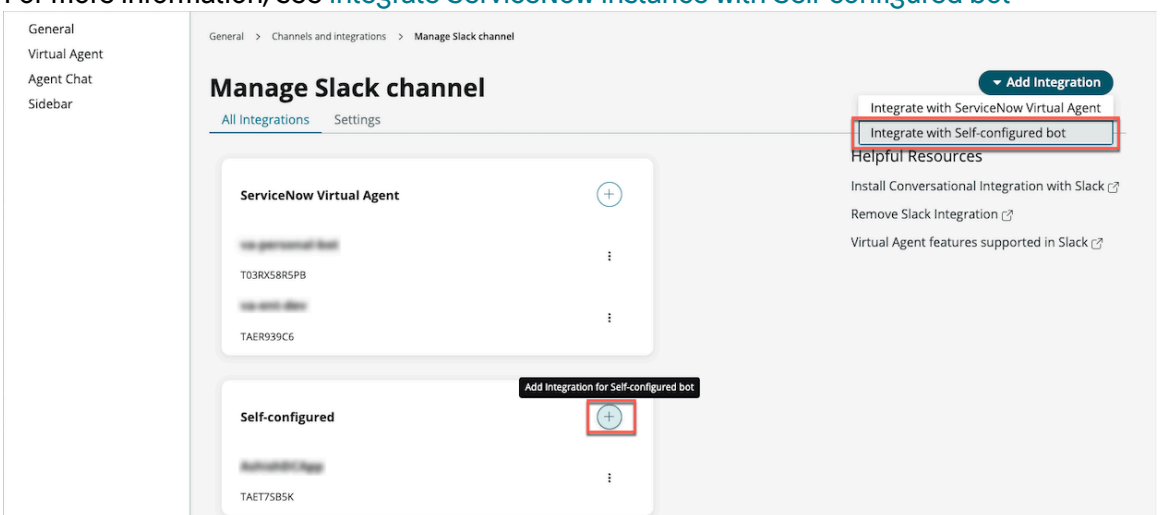
Roles required:

- virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications (Slack)

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. Click **Manage** on the Slack tile.

   If you would like to integrate your ServiceNow instance with another Slack bot, click the Plus icon against the Self-configured bot or click the **Add integration** button on the Manage Slack channel page and select **Integrate with Self-configured bot**. For more information, see Integrate ServiceNow instance with Self-configured bot



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When you click **Manage**, you are redirected to the Manage Slack channel page where you can manage the bots.

4. Click the Manage Bot icon and select **Manage Bot**.
   You are redirected to the Bot Configuration page for the selected bot.
5. Click the **Configuration** tab to brand your Self-configured bot.
   For more information about branding your Self-configured bot, see Configure branding for your Self-configured bot.
6. Click the **Bot Messages** tab to create and edit a bot message.
   For more information, see Create bot messages.

Configure branding for your Self-configured bot

Configure your self-configured Slack app's branding. You have the flexibility to customize the default ServiceNow branding for the Slack self-configured bot name and icon.

Before you begin

Ensure that you have completed integrating Virtual Agent with a Self-configured bot in Slack before customizing the branding options.

Role required: admin

Procedure

1. Log in to the Slack admin center.
2. Click **Your apps** and select a bot from for which you want to change the branding settings.
3. Navigate to **Settings** > **Basic Information** > **Display Information**.
4. In the Display Information section, you can update the following details:

   a. **App name**: Name of your Self-configured bot.

   b. **Short description**: A short sentence describing your Self-configured bot.

   c. **App icon & Preview**: Image representing your Self-configured bot on the conversation body.

   > **Note:**
   > Ensure that the image you would like to upload as the app icon is in squares between 512 px by 512 px and 2000 px by 2000 px.

   d. **Background color**: Background color of your bot icon while on the conversation body.

   e. **Long description**: Description of your Self-configured bot to show on your App Detail page.

5. Click **Save Changes**.

Remove Self-configured bot integration with Slack

Remove the Self-configured bot integration from your ServiceNow instance to disassociate with the Slack app.

Before you begin

Roles required:

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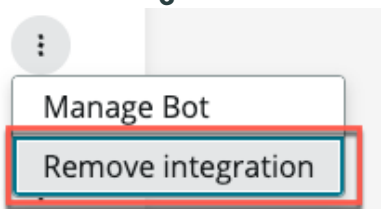
- Virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications

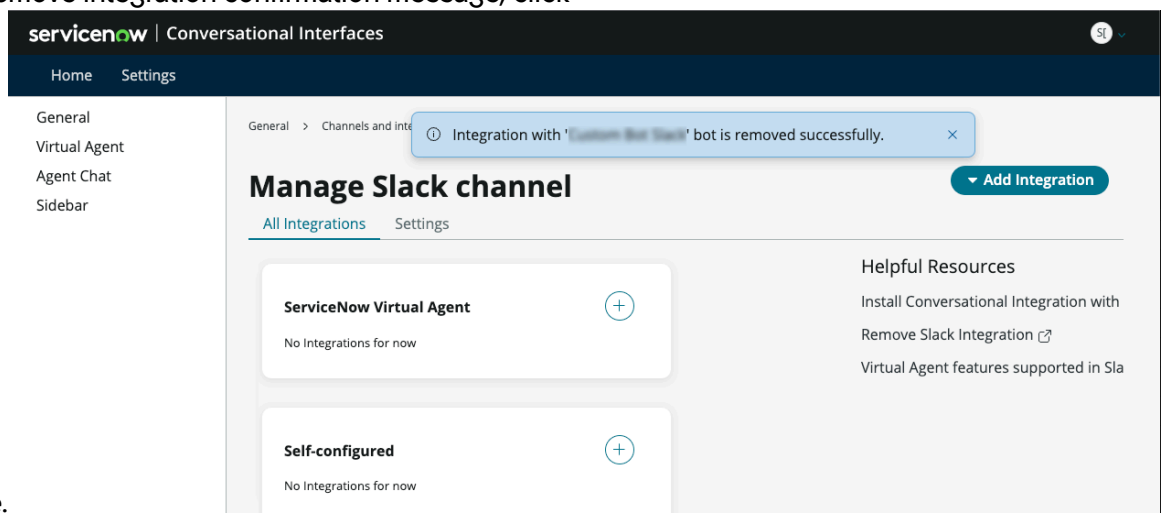
Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. On the Channels and integration page, in the Slack tile, click **Manage**.
4. In the Manage Slack Channel page, find the Self-configured bot integration to remove from your ServiceNow instance, click the manage bot icon ⋮, and select **Remove integration**.

Remove integration with Self-configured bot



5. In the Remove integration confirmation message, click **Remove**.



The Self-configured bot integration with Slack has been removed successfully.

Configure Virtual Agent settings for Slack

Configure your Slack bots that are integrated with the Virtual Agent to enable notifications, to link ServiceNow user profiles, and to set up system messages and contextual actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. On the Channels and integrations page, in the Slack tile, click **Manage**.
4. Select the **Settings** tab.

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5. Slide the **Enable Notification for all users** toggle switch to disable notifications for the linked users.

   Note:
   - The **Enable Notification for all users** toggle switch is selected by default.
   - The **Automatically Link ServiceNow user profiles** toggle switch is selected by default and disabled for any further change. This option links all the active ServiceNow accounts automatically to the associated Microsoft Teams bot.

6. Set up the **Global Messaging Settings**.

   Note:
   Any changes made to these settings will reflect in all the channels.

   - **System Messages**: Customize the default system messages displayed during Virtual Agent conversations.

     For more information about changing or updating a system message, see Change system messages.

   - **Contextual Actions**: Customize the supported actions per user command inputs.

     For more information about updating a contextual action, see Contextual actions for custom chat integrations.

Virtual Agent features supported in Slack conversations

Virtual Agent features, such as AI Search results, Virtual Agent notifications, and Virtual Agent Designer controls for creating Virtual Agent conversations are supported in Slack bot conversations.

Note:
Conversational Integration for Slack is not supported for on-prem instances.

This section highlights key Virtual Agent features that are supported in the Conversational Integration with Slack app.

AI Search results

Virtual Agent can generate AI Search results that are displayed as Genius result cards and multi-link outputs in conversations. For details on how Virtual Agent generates AI Search results, see Improving the user experience with AI Search. The default AI Search configuration for Virtual Agent enables search results for Q&A (knowledge base) and catalog items.

URL navigation for chat links

In Virtual Agent and Live Agent conversations on the Slack app, links to ServiceNow records open automatically in base system portals—including links displayed in output cards, Virtual Agent notifications, and AI Search results. If needed, admins can change the portals in which these links are opened. For configuration details, see Configure URL navigation for chat links.

Trusted Domains

In custom chat integrations, the values specified in the Trusted media domains field of the Provider Channel Identities table [sys_cs_provider_application] takes precedence over the Connections table [sys_cs_provider] and therefore overrides.

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Chat Localization into Conversation Language

Starting from version 5.0.1, chat gets localized into the customer specified conversation language set in the Slack UI, though the session language is different.

Translation of responses to the conversation language is done using the function `gs::getMessageLang(str, lang)`, where the language retrieved from Slack is passed through this function as a parameter. The translation process works with the following three use cases, when:

- The requested language plugin is available in the ServiceNow instance.

  When the requested language plugin is available in the ServiceNow instance then the Session language honors the Conversation language set by the user.

- The requested language plugin is absent, but fallback is set and enabled.

  When the requested language plugin is absent, then the fallback language specified in the [sys_language] table is used for the translation process. However, for the fallback mechanism to work, you must enable the *glide_i18n.language_fallback_enabled* system property. By default, the value of the property is **false**. Set it to **true** to enable the fallback mechanism. For more information, see Set a fallback language.

- The requested language plugin is absent, but fallback is not set/enabled.

  When the requested language plugin is absent and fallback is also not set/enabled, the default translation language will be English.

Virtual Agent Designer user input and bot response controls in Slack

The Virtual Agent Designer user input controls and bot responses for creating conversation topics are supported in Slack conversations, including the table bot response and the card control that can display images.

Virtual Agent Designer user input controls and bot responses

Starting with Version 2.0.0, the card and video bot response controls are supported in Slack conversations. The video control displays a thumbnail image of the video that users select to open the video in their preferred web browser.

For more information about user input controls and bot responses, see Virtual Agent Designer user input controls and Virtual Agent Designer bot responses, respectively.

Upload multiple file types

Starting from Version 5.0.2, you can upload multiple image files (up to 10 files) from your desktop or by providing the valid link for an image picker topic in Virtual Agent. You can also share multiple files (up to 10 files) to a Virtual Agent topic via a link or by uploading it from your desktop.

To upload multiple image files or other attachments during your conversation with the bot, select **Image file types** or **All file types** respectively.

Note:
You can also share multiple files with a Live Agent from Slack.

Virtual Agent notifications supported in Slack

Slack app supports Virtual Agent notifications during conversations.

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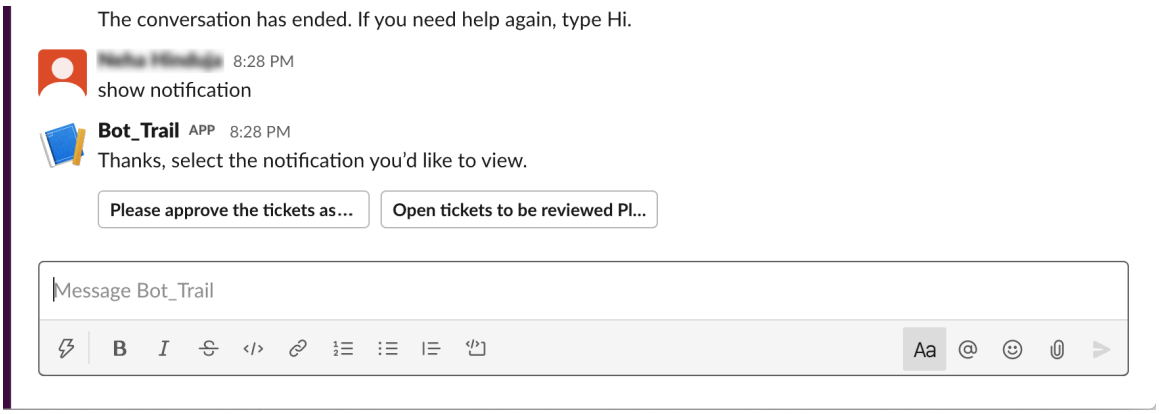
- Subscription management
  - Requesters - Use the **notification** (or **notifications**) command to subscribe to or unsubscribe from notifications.
  - Admins - Enable notifications for messaging users in the Messaging Apps Integration page.
- Notification content - Create notifications with rich content, images, and action buttons. Actionable notifications enable recipients to perform certain actions and respond to the notification, such as adding a comment or requesting a live agent.
- Notification delivery
  - Message notifications are delivered immediately to end users, even if the user is chatting with a virtual or live agent.
  - Actionable notifications are delivered only when the user is not in an active conversation with a virtual or live agent. Users can choose to:
    - Review the notifications later by using the **show notification** command.

      For example, with the **show notification** command, users can select the notification they want to view.



    - Perform or skip the actions for the notification. If users decide to skip the actions, users can return later to the notification by using the **show notification** command.

For detailed information on Virtual Agent notifications, see Configuring Virtual Agent notifications.

Unsupported Virtual Agent features in Slack

Refer to the unsupported features of Virtual Agent in Conversational Integration with Slack.

Unsupported features

Virtual Agent does not support the following functionalities during a conversation in Slack.

- Connect Support
- Geo-location topic block

Pre-link Virtual Agent requesters before integration with Slack

Pre-link your Virtual Agent requesters to a ServiceNow instance before they run the Conversational Integration with Slack. Batch pre-linking enables your Virtual Agent users immediately to chat with a virtual agent and receive notifications without going through the initial authentication linking process.

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Before you begin

- Manage the ServiceNow Virtual Agent integration with Slack, with the **Automatically Link ServiceNow user profiles** option enabled.
- Set up Slack Spoke.

Roles required:

- virtual_agent_admin
- external_app_install_admin
- One of the following Slack administrator roles:
  - Global Administrator
  - Application Administrator
  - Cloud Application Administrator
- admin or schedule_admin to change the scheduled job script

About this task

When the **Automatically Link ServiceNow user profiles** option is enabled on the Messaging Apps Integration UI page, a batch of up to 10,000 users is automatically pre-linked to a ServiceNow instance. Your existing users are pre-linked during the initial run. Newly added users are pre-linked during subsequent daily runs.

To prevent automatic batch pre-linking, disable the **Automatically Link ServiceNow user profiles** option on the Messaging Apps Integration UI page.

Batch pre-linking of your Virtual Agent users to a ServiceNow instance before integrating with Slack includes the following benefits:

- Notifications are proactively sent by the Virtual Agent to users when their identity in Slack is associated with their identity in a ServiceNow instance. This is also true when the user is already linked with the ServiceNow Virtual Agent.
- If a user is pre-linked, and when Slack notifications are enabled in the app, notifications are pushed to the app even when a user is not logged into a Slack account.

Batch pre-linking happens automatically via the **Slack Daily Pre-Link Job** scheduled job. This job runs by default at a scheduled time (time is displayed in the time zone of the system administrator) and you can change the time, if desired. To modify the default scheduled job run time or time zone, access the **Slack Daily Pre-Link Job** Scheduled Script Execution form.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.
2. Search for the **Slack Daily Pre-Link Job** scheduled job and click to open the Scheduled Script Execution form for the selected record.
3. In the **Run** field, change the run time to your desired time.
4. For a description of the other fields that you can change in this form, including **Time zone**, see Automatically run a script of your choosing.
5. Click **Save**.

Configure promoted topics for Conversational Integration with Slack

Configure promoted topics to push out important, common topics for users' quick consumption during a conversation with the Slack bot. You can configure up to six different promoted topics to be displayed on the Slack channel greeting message.

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Before you begin

Role required: admin or va_admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. On the Virtual Agent settings page, navigate to the Custom greetings and setup and click **View All**.
   The promoted topics that you have previously configured reside in the default chat experience. For more information, see Configure a Virtual Agent chat experience. If default chat experience is the only row that you have on your instance, then you observe that the promoted topics will be applied to Web Client, Microsoft Teams, and Slack (unless you configure something unique for Slack as instructed below.)

   If you want to set up unique promoted topics for Slack that have to be different from the Web Client, follow the procedure below.
3. On the Custom Greetings & Setup page, click **New**.
4. On the form, fill in the fields.

Create New Custom Greetings and Setup

Field	Description
Name	Name of the chat experience. For example, Slack chat experience.
Description	Description of the chat experience.
Active	Enable or disable the chat experience.
Order	Order for the promoted topics to appear on the chat.
Domain	Application scope of the chat experience.
Condition Mode	Situation where your user gets this chat experience. Available Conditions Modes: ○ **Advanced** ○ **Simple**
Condition	Condition that defines the condition mode for the chat experience. Set up a simple condition with **[devicetype] [is] [slack]**.

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Field	Description
	Note: If you set up **[devicetype] [is] [teams]** in the Condition pop up with a higher order than the default chat experience, then Slack picks up the setup topics and promoted topics defined in this experience. This change will not affect Web Client, which is still going to inherit the setup topics and promoted topics defined in the default chat experience.

5. Click **Create custom experience**.
6. Add promoted topics in the Slack chat experience form that you created.
   Review the character length of your promoted topics before adding them for Slack. When the text in the topic gets closer to ~30 characters, the text may get truncated. For more information, see Slack document.

   a. On the Slack chat experience form, click the **Promoted Topics** tab and click **Add topic**.

   b. On the form, fill in the fields.

   Create New Promoted Topics

Field	Description
Topic	Name of the topic being chosen. Use the Search icon to choose a topic.
Order	Provide the order for the topic chosen.

   Note:
   Similar to the Web Client, you can configure a maximum of six promoted topics for the Slack channel.

   c. Click **Save.**

What to do next

Start a conversation with the Slack bot and you should be able to see the promoted topics after the greeting message that you have setup for the Slack channel.

In you have not configured the promoted topics for Slack, then the promoted topics from the default chat experience are displayed.

Conversational Integration with Workplace from Facebook

Enable requesters to chat with Virtual Agent or live agents using the Workplace from Facebook application.

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Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Overview

Use the Conversational Integration with Workplace from Facebook application to connect your requesters with Virtual Agent or live agents through your company's Workplace from Facebook application. To get started, see .

Install the Conversational Integration with Workplace from Facebook

You can install the Conversational Integration with Workplace from Facebook (sn_va_fb_workplace) application with the admin role.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- If you're using an earlier release of Virtual Agent, you must upgrade to the Washington DC release to use the features supported in this messaging integration.
- Conversational Integration with Workplace from Facebook requires the Glide Virtual Agent plugin (com.glide.cs.chatbot) to activate full functionality in Virtual Agent or the Virtual Agent Lite plugin (com.glide.cs.chatbot.lite) to activate a limited version of Virtual Agent. Activate the appropriate plugin before you install the integration.

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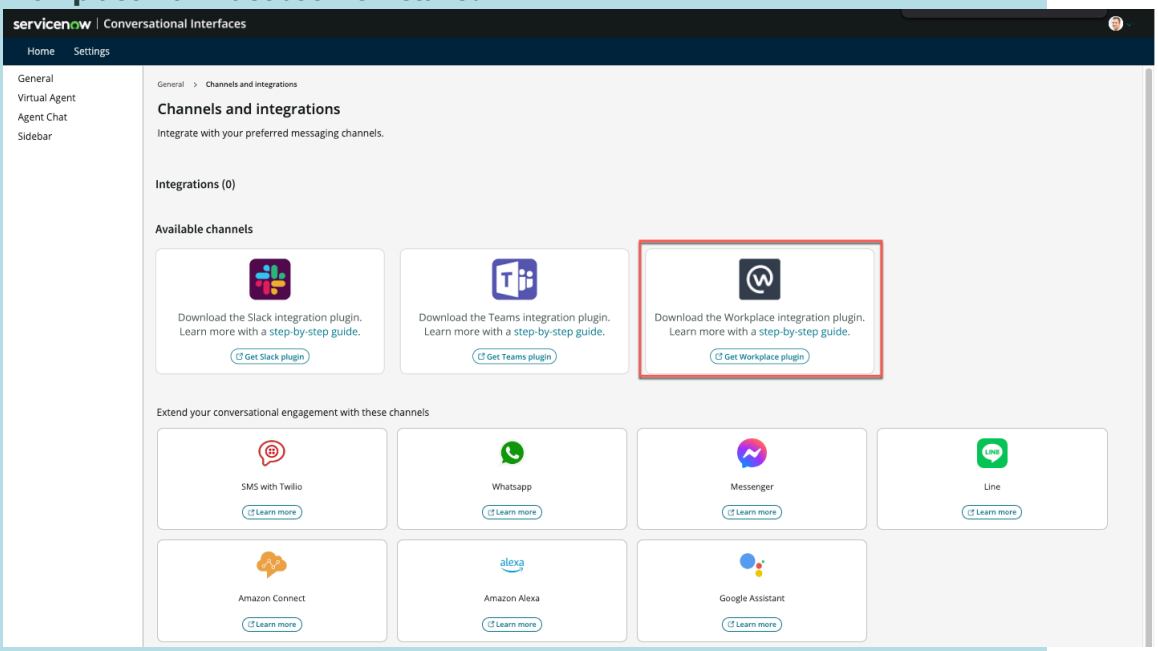
- Install the Conversational Integration with Workplace from Facebook from the ServiceNow® Store.

Important:
Installing the Conversational Integration app from the ServiceNow Store store activates the corresponding **Install** button in the Channels and integrations page. If you have not installed the integration app, the Workplace from Facebook app is listed in the Available Channels section.

Channels and integrations page before Conversational Integration with Workplace from Facebook is installed

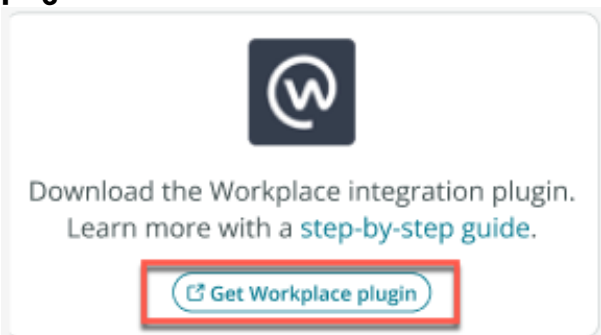


After you install the Conversational Integration with Workplace from Facebook app, the Workplace from Facebook is seen in the Integrations section, and you can proceed with the configuration.

Roles required: virtual_agent_admin and external_app_install_admin or admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. On the Channels and integrations page, in the Microsoft Teams tile, click **Get Workplace plugin**.



You are redirected to the Conversational Integration with Workplace from Facebook ServiceNow Store page.

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4. On the top right corner of the screen, click **Get**.

   Note:
   You must be logged into the ServiceNow Store portal to get the plugin.

5. On the Conversational Integration with Workplace from Facebook ServiceNow Store page, click **Request Install**.
6. On the Request Install screen, provide the **Instance Name** and **Reason for request**.
   You can also validate the instance that you provided by clicking **Validate Instance**.
7. Click **Request**.
   A message pops up on the Request Install screen that your request has been auto approved.

What to do next

Integrate ServiceNow Virtual Agent with Workplace from Facebook.

Integrate ServiceNow Virtual Agent with Workplace from Facebook

Add the Now Virtual Agent bot to your ServiceNow instance to integrate with Workplace from Facebook.

Before you begin

Roles required:

- virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
   The Channels and integrations page opens.
3. Under the Available Channels section in the Microsoft Teams tile, click **Add Integrations**.

   Note:
   The **Add Integrations** button is available only after installing the Conversational Integration with Workplace from Facebook plugin (sn_va_fb_workplace) on your ServiceNow instance.

   You are directed to the Workplace admin page to add a bot.
4. On the login screen for Workplace, enter your login credentials.
   If you have multiple accounts for Workplace, a menu displays the accounts that you can log in to. Select the account in which you want to install the app.
5. In the window that requires your authorization to install the integration, click **Add to Workplace**.

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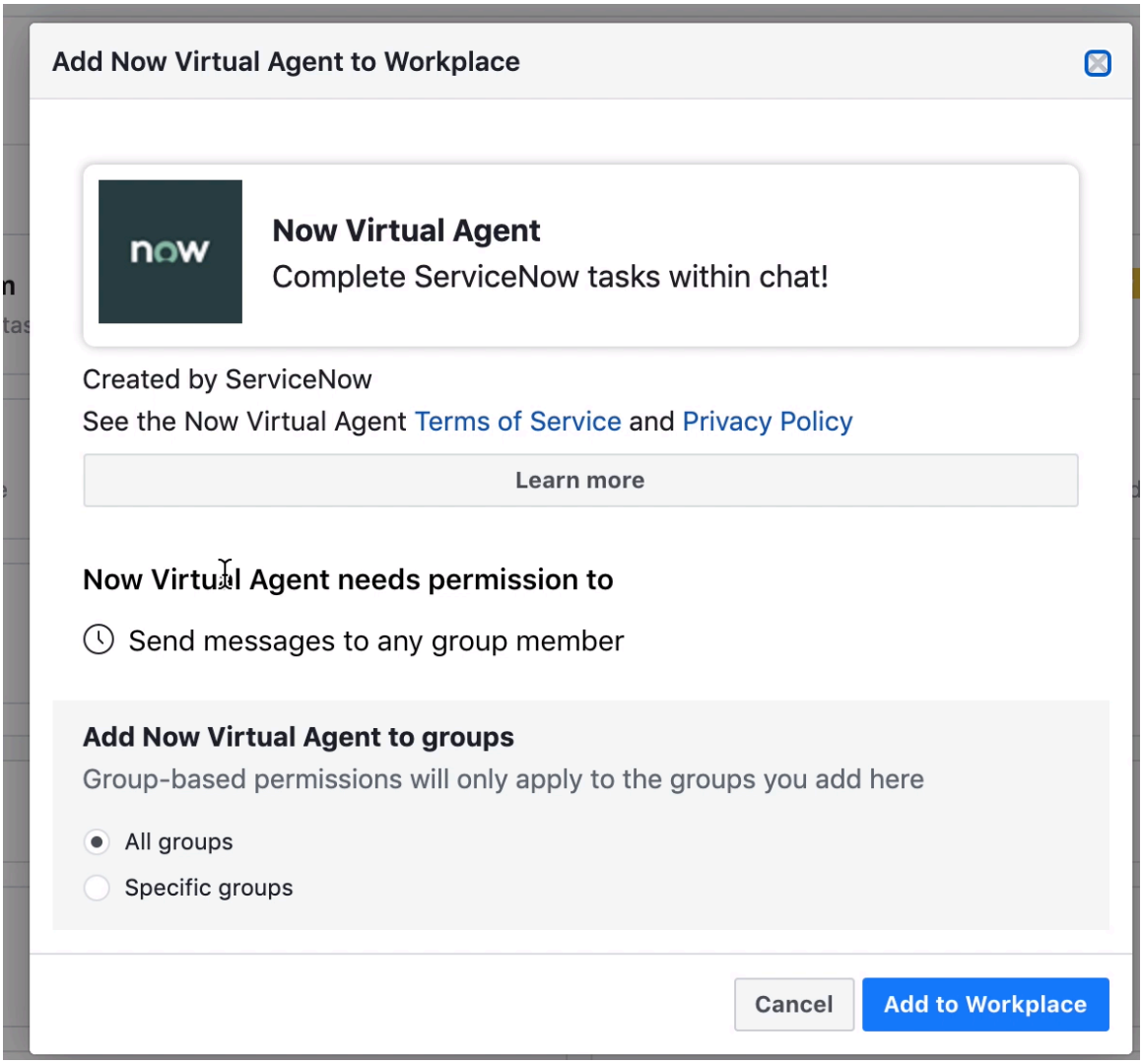

If the selected workspace has already been integrated with Workplace, click **Save** or **Cancel** to leave the current assignment in place.

To delete the Conversational Integration with Workplace from Facebook, see Uninstall the Conversational Integration with Workplace from Facebook.

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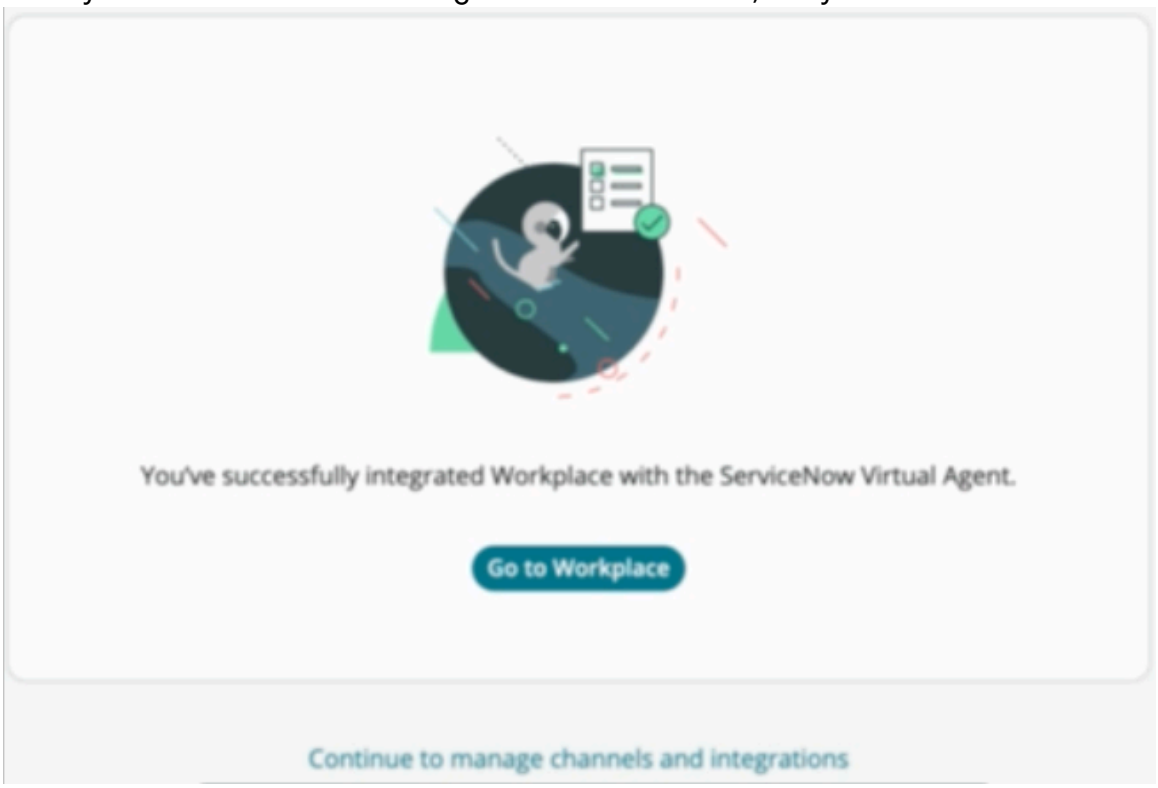
6. When you see a confirmation message about the installation, verify the installation.



Result

The Virtual Agent bot and Workplace from Facebook are now integrated for use on your ServiceNow instance.

Manage ServiceNow Virtual Agent integration with Workplace from Facebook

Manage your Conversational Integration with Workplace from Facebook application, its branding, and customize the bot-specific messages in your ServiceNow instance after integration.

Before you begin

Roles required:

- virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. On the Channels and integrations screen, in the Workplace tile, click **Manage**.

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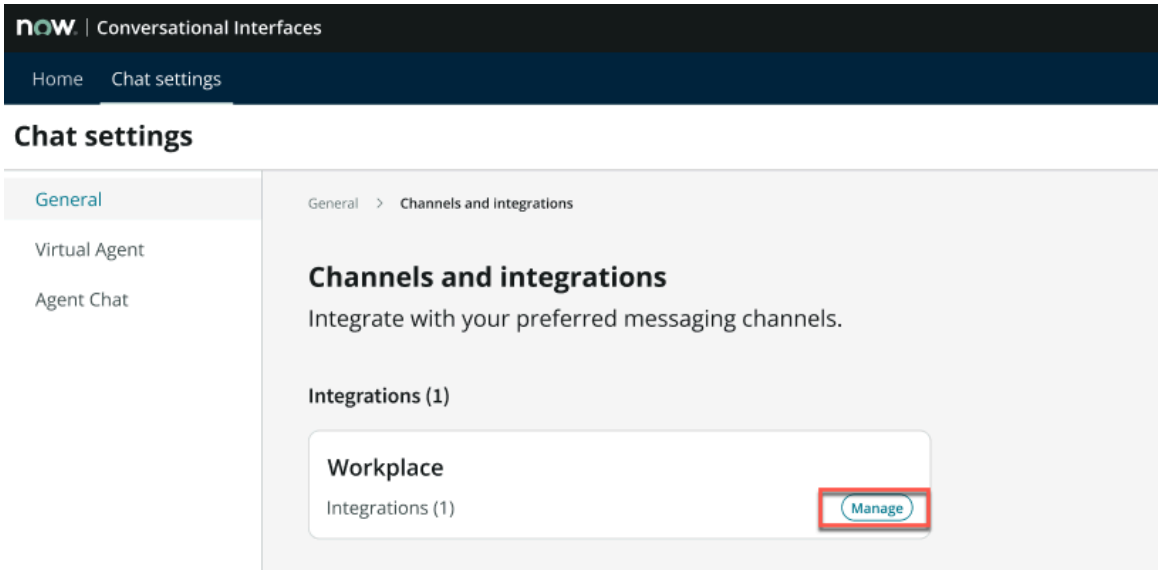
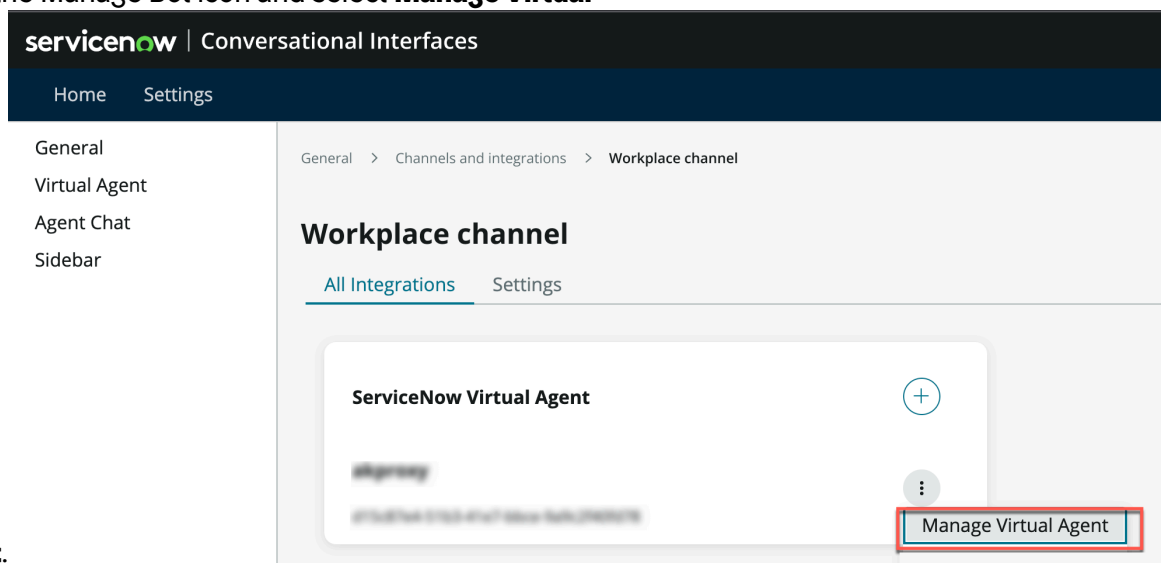


When you click **Manage**, you are redirected to the Manage Workplace channel page where you can manage the bots.

4. Click the Manage Bot icon and select **Manage Virtual Agent**.



You are redirected to the Bot Messages page where you can create and edit a bot message. For more information, see Create bot messages.

Configure Virtual Agent settings for Workplace from Facebook

Configure your Workplace from Facebook bot that are integrated with Virtual Agent to enable notifications, to link ServiceNow user profiles, and to set up system messages and contextual actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. In **General Settings** under **Channels and integrations**, click **View All**.
3. On the Channels and integrations page, in the Workplace tile, click **Manage**.
4. Select the **Settings** tab.

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5. Swipe to the right the **Enable Notification for all users** toggle button to enable notifications for the linked users.

   Note:
   The **Enable Notification for all users** toggle button is selected by default.

   The **Automatically Link ServiceNow user profiles** toggle button is selected by default and disabled for any further change. This option links all the active ServiceNow accounts automatically to the associated Workplace from Facebook bot.

6. Set up the **Global Messaging Settings**.

   Note:
   Any changes made to these settings will reflect in all the channels.

   - **System Messages**: Customize the default system messages displayed during Virtual Agent conversations.

     For more information about changing or updating a system message, see Change system messages.

   - **Contextual Actions**: Customize the supported actions per user command inputs.

     For more information about updating a contextual action, see Contextual actions for custom chat integrations.

Virtual Agent features supported in Conversational Integration with Workplace from Facebook

The Conversational Integration with Workplace from Facebook app supports Virtual Agent features such as Virtual Agent Designer controls for creating conversations, notifications, AI Search results, and more.

Note:
The Conversational Integration with Workplace from Facebook is not supported for on-prem instances.

This section highlights relevant Virtual Agent features that are supported in the Workplace from Facebook app.

Virtual Agent Designer user input and bot response controls

The Virtual Agent Designer user input and bot response controls for creating conversation topics are supported in Workplace conversations, including the table bot response and the card control that can display images.

Starting with Version 2.0.0, the card and video bot response controls are supported in Workplace conversations. The video control displays a thumbnail image of the video that users can select to open the video in their preferred web browser.

For more information about user input controls and bot responses, see Virtual Agent Designer user input controls and Virtual Agent Designer bot responses, respectively.

AI Search results

Virtual Agent can generate AI Search results that are displayed as Genius Result Cards and multi-link outputs in conversations. For details on how Virtual Agent generates AI Search results,

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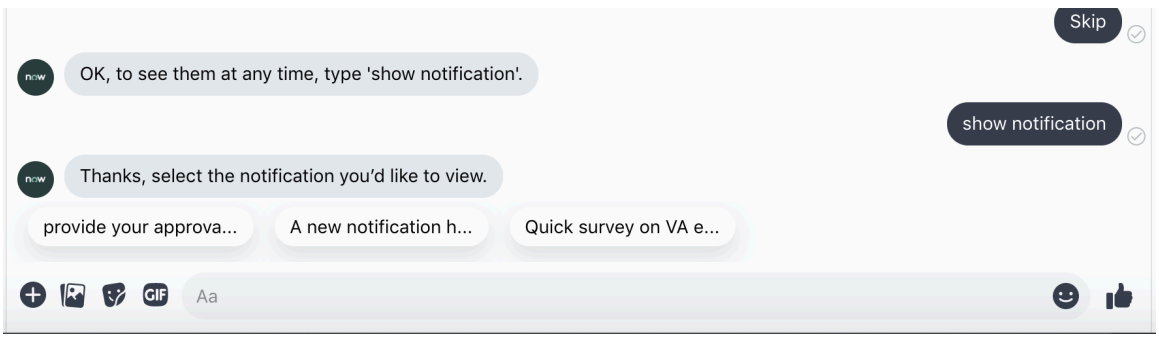
see Improving the user experience with AI Search. The default AI Search configuration for Virtual Agent enables search results for Q&A (knowledge base) and Catalog items.

Virtual Agent notifications

For detailed information on Virtual Agent notifications, see Configuring Virtual Agent notifications.

- Subscription management
  - Requesters - Use the **notification** (or **notifications**) command to subscribe to or unsubscribe from notifications.
  - Admins - Enable notifications for messaging users in the Messaging Apps Integration page.
- Notification content - Create notifications with rich content, images, and action buttons. Actionable notifications enable recipients to perform certain actions and respond to the notification, such as adding a comment or requesting a live agent.
- Notification delivery
  - Message notifications are delivered immediately to end users, even if the user is chatting with a virtual or live agent.
  - Actionable notifications are delivered only when the user is not in an active conversation with a virtual or live agent. Users can:
    - Review the notifications later by using the **show notification** command.

      For example, with the **show notification** command, users can view their notifications.

    - Perform or skip the actions for the notification. If users decide to skip the actions, users can return later to the notification by using the **show notification** command.

URL navigation for chat links

In Virtual Agent and Live Agent conversations on the Workplace app, links to ServiceNow records open automatically in base system portals—including links displayed in output cards, Virtual Agent notifications, and AI Search results. If needed, admins can change the portals in which these links are opened. For configuration details, see Configure URL navigation for chat links.

Trusted Domains

In custom chat integrations, the values specified in the Trusted media domains field of the Provider Channel Identities table [sys_cs_provider_application] takes precedence over the Connections table [sys_cs_provider] and hence overrides.

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Unsupported features

- Promoted topics and Connect Support are not supported.
- Geolocation topic block is not supported.
- Account pre-linking is not supported in Workplace from Facebook.

Uninstall the Conversational Integration with Workplace from Facebook

Uninstall the Conversational Integration with Workplace from Facebook and disassociate the app with your instance.

Before you begin

Roles required:

- Virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications

Procedure

1. Log in to Workplace from Facebook.
2. Click **Admin Panel**.
3. Click **Integrations**.
4. In the list of Workplace from Facebook integrations, click **Now Virtual Agent**.
5. In the window that displays the settings for Now Virtual Agent click **Uninstall**.
6. In the window that requires authorization to uninstall the app, click **Uninstall**.

Result

Now Virtual Agent no longer appears on the list of integrations in Workplace from Facebook. The instance receives uninstallation information from Workplace from Facebook, and the app configuration and user information are deleted within 15 days.

Integrating Virtual Agent with consumer messaging apps

Integrating consumer messaging apps such as LINE, Twilio, WhatsApp, Google Business Messages, and Facebook Messenger with ServiceNow® Virtual Agent associates the app with your ServiceNow instance to facilitate end-to-end conversations.

Setup Virtual Agent integration for consumer messaging apps

Engage customers where they are with rich conversations by enabling them to message anytime to your company's account using their choice of messaging apps.

Conversational integrations are available for SMS Twilio, WhatsApp (powered by Twilio), LINE, and Facebook Messenger consumer messaging apps from the ServiceNow Store.

Conversational SMS Integration with Twilio

Host Virtual Agent conversations on Twilio SMS to chat with virtual agent or live agents. Use the Conversational SMS Integration with Twilio app, available from the ServiceNow Store, to associate your instance with SMS Twilio.

Capturing information from a user in an SMS chat conversation

Conversational SMS Integration with Twilio enables users to initiate conversations with Virtual Agent by messaging your Twilio phone number.

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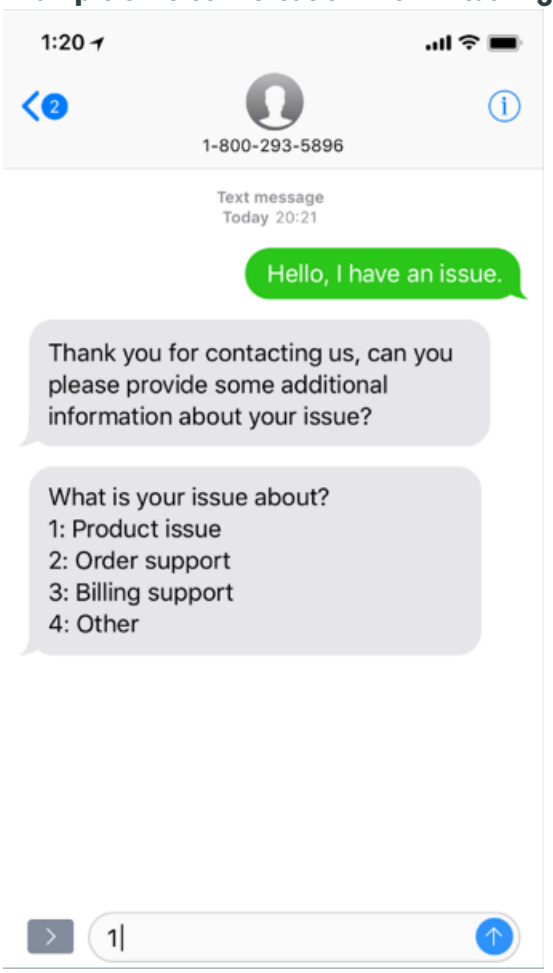
Note:
Do not use the same ServiceNowTwilioDirect or Twilio Notify phone number for Conversational SMS Integration with Twilio. Instead, use separate Twilio numbers for Conversational SMS Integration with Twilio and ServiceNowTwilioDirect.

Example SMS conversation with Virtual Agent



If a bot transfers the conversation to a live agent, the agent can respond to SMS messages in Agent Workspace.

After you set up the Conversational SMS Integration with Twilio, you can create SMS conversation topics in Virtual Agent Designer. For more information on using the tool, see Getting started with Virtual Agent Designer

Supported controls

The Conversational SMS Integration with Twilio does not support all the available controls in Virtual Agent Designer.

The following user input controls are supported in Twilio SMS conversations:

Supported user input controls

User input control	Description
Text	User enters a plain text string in the conversation.

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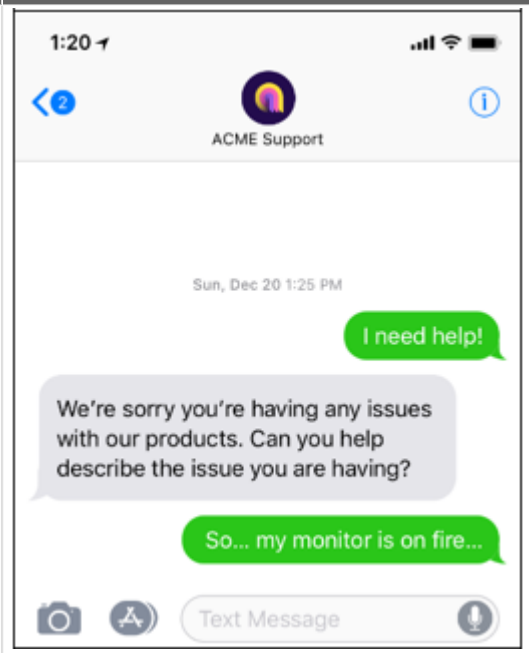
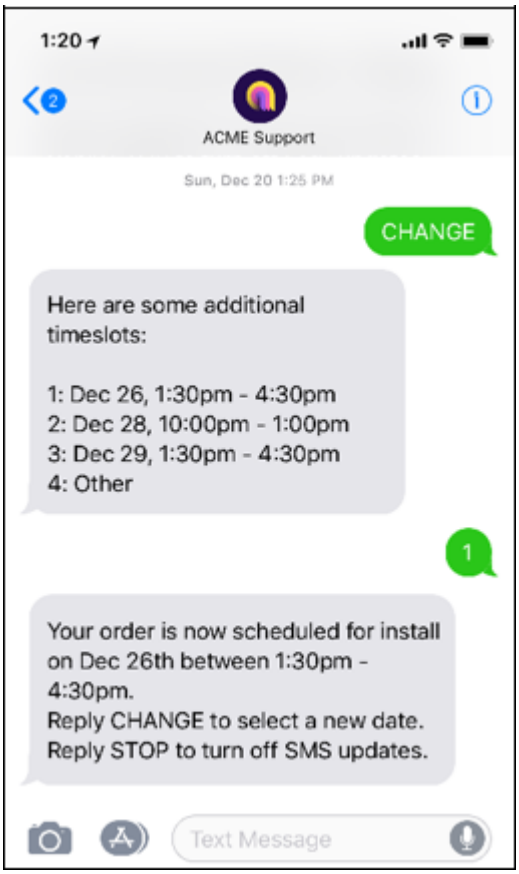
Supported user input controls (continued)

User input control	Description
	
Static Choice	User selects an item from a predefined list. 

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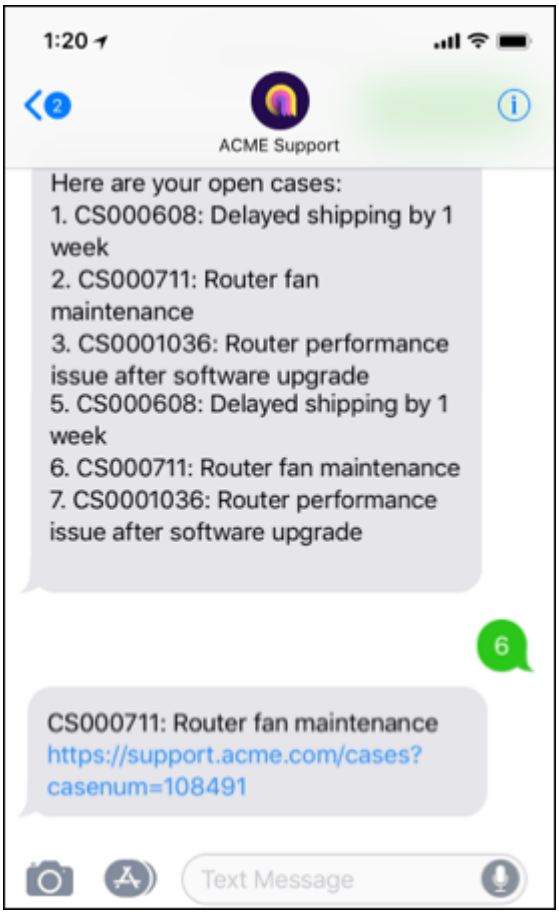
Supported user input controls (continued)

User input control	Description
Dynamic Choice	User selects an item from a list that is created dynamically. For example, the user can select from a list of cases that they opened. 
Boolean	User enters a Boolean response to the bot. For example, the user can reply "Yes" or "No" in the conversation.

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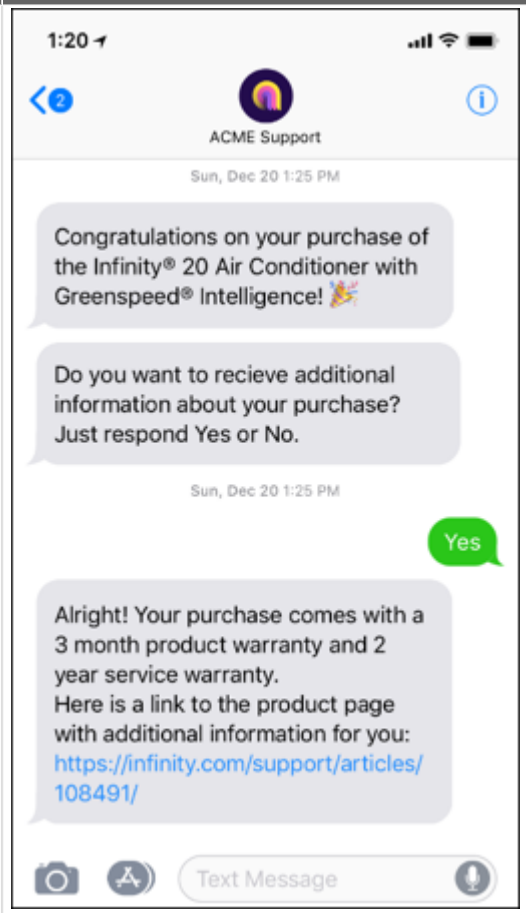
Supported user input controls (continued)

User input control	Description
	
File picker	User sends a file to the bot. **Note:** Conversational SMS Integration with Twilio doesn't support all file types. Only images can be sent in an SMS conversation.

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Supported user input controls (continued)

User input control	Description
	

For more information on configuring user input controls, see Virtual Agent Designer user input controls.

The following bot responses are supported in Twilio SMS conversations:

Supported bot responses

Bot response	Description
Text	Bot sends a plain text string to the user.

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Supported bot responses (continued)

Bot response	Description
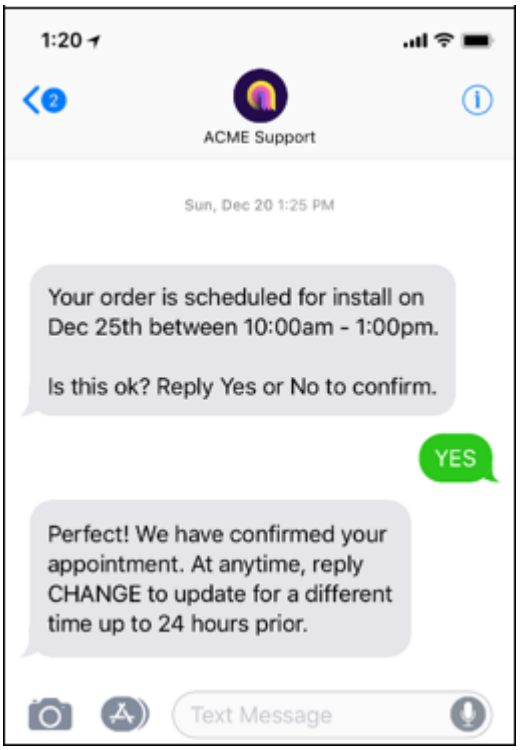	
Image	Bot sends an image to the user.

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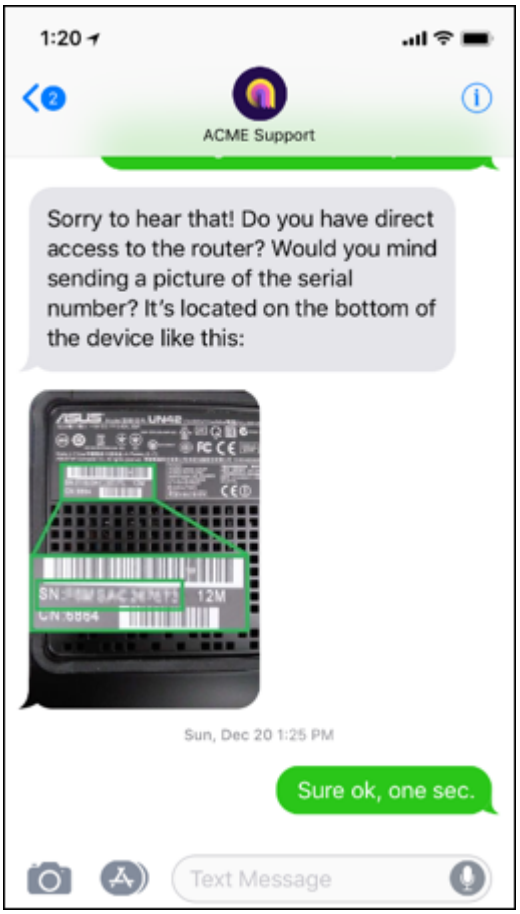
Supported bot responses (continued)

Bot response	Description
	
Link	Bot sends a web link to the user.

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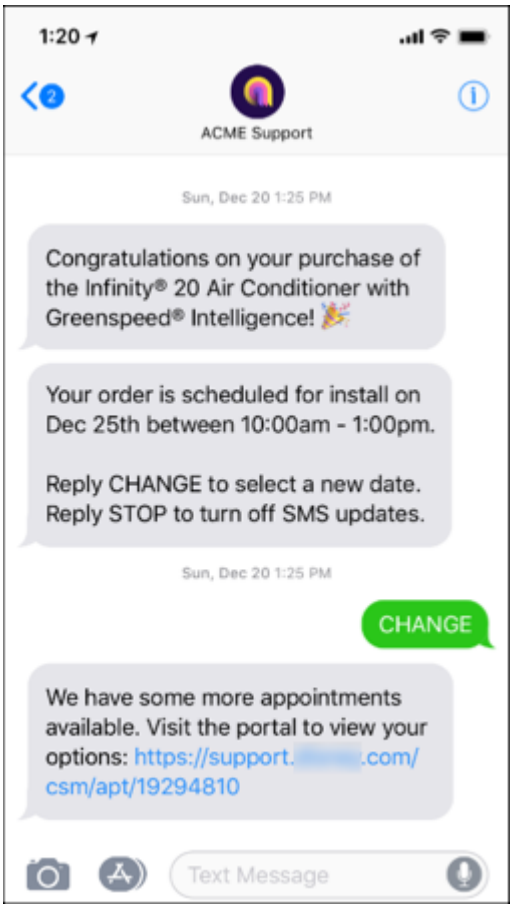
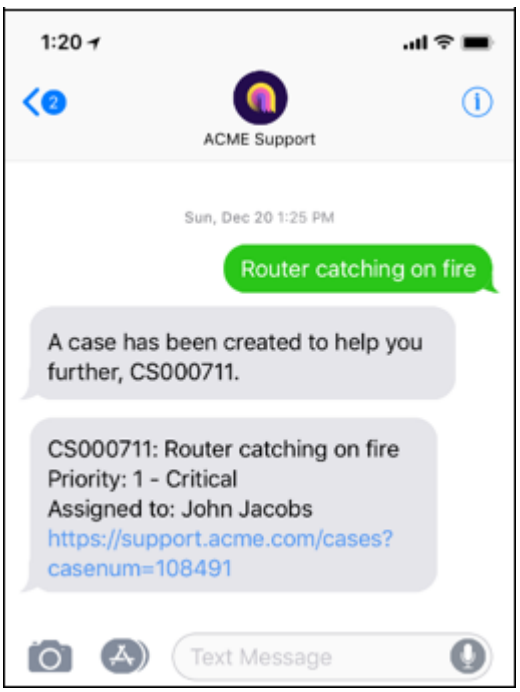
Supported bot responses (continued)

Bot response	Description
	
Card	Bot sends selected information from a record on your instance. 

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For more information on configuring bot responses, see Virtual Agent Designer bot responses.

Live agents can use the Text, Card, and Image response controls to reply to users in SMS conversations.

User subscriptions for SMS update notifications

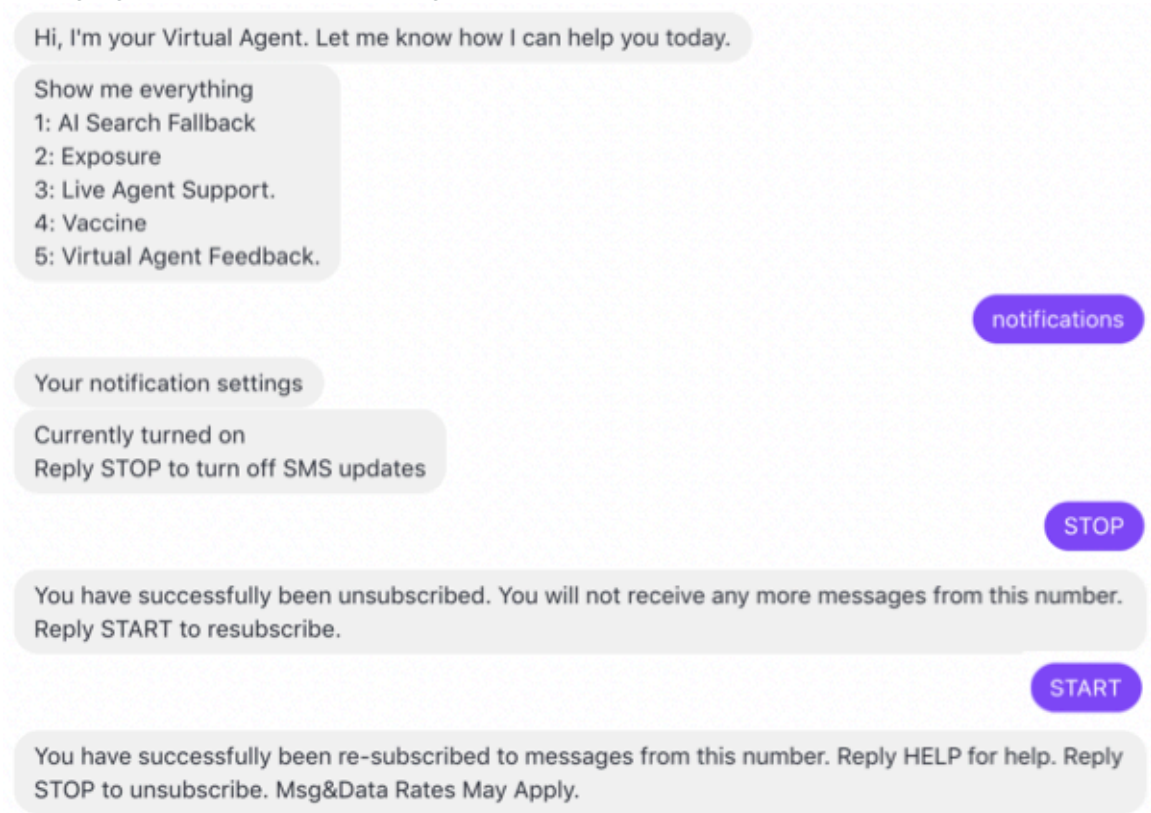
Beginning with version 1.1.1, your users with ServiceNow accounts (sys_user profiles) can choose to start or stop receiving SMS updates in their conversations.

> **Note:**
> Notifications in messaging channels can be sent to users with ServiceNow accounts. Other recipients, such as consumer and customer contacts, are considered to be guests and cannot receive notifications on messaging channels.

To comply with privacy regulations, user notifications are turned off by default. Users can opt in or change their settings in the following ways:

- To check SMS notification settings for the account, send this text: `Notification`
- To receive SMS notifications, send this text: `START`
- To stop receiving SMS notifications, send this text: `STOP`

Changing SMS notification settings



To learn more about Virtual Agent notifications, see Configuring Virtual Agent notifications.

For details about creating content for a messaging notification, see Define Virtual Agent notification contents.

Install Conversational SMS Integration with Twilio

You can install the Conversational SMS Integration with Twilio (sn_va_sms_twilio) application to host Virtual Agent conversations in the SMS Twilio application.

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Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the Conversational SMS Integration with Twilio application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin or virtual_agent_admin

Procedure

1. Navigate to **System Applications** > **All Available Applications** > **All**.
2. Find the Conversational SMS Integration with Twilio (sn_va_sms_twilio) application using the filter criteria and search bar.

   You can search for the application by its name or ID.

   If you cannot find the application, you may have to request it from the ServiceNow Store. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.

What to do next

Set up the Conversational SMS Integration with Twilio.

Set up the Conversational SMS Integration with Twilio

Integrate Twilio with Virtual Agent so that you can engage in SMS bot conversations.

Before you begin

Before you can set up the Conversational SMS Integration with Twilio, complete the following tasks:

1. Ensure that you have valid ServiceNow entitlements for the following products and applications:
   - Integration Hub
   - Twilio spoke
   - Conversational SMS Service Channel
   - Conversational SMS Integration with Twilio

   For more information, see Get entitlement for a ServiceNow product or application.
2. Install the following applications on your instance:
   - Integration Hub
   - Twilio spoke

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- Conversational SMS Service Channel
- Conversational SMS Integration with Twilio

3. Set up Twilio spoke
4. Ensure that the Conversational Custom Chat Integration plugin (com.glide.cs.custom.adapter) is active on your instance.

Role required: external_app_install_admin or va_admin

Procedure

1. Create a Hash Message Verification record.

   a. In the navigation filter, enter `hash_message_verification.list` and click **New**.

   b. On the form, fill in the fields.

   Hash Message Verification form

Field	Description
Name	Name of the auth token, such as TwilioSMSTestAppAuthToken.
Description	Description of the auth token, such as "Twilio SMS Testing application Auth Token."
Secret	Auth token that is associated with your Twilio phone number.

   c. Click **Submit**.

2. Create a Message Auth record.

   a. In the navigation filter, enter `message_auth.list` and click **New**.

   b. On the form, fill in the fields.

   Message Auth form

Field	Description
Name	Name of the message auth, such as VA Twilio SMS Test App Message Auth.
Provider	Provider of the auth token. Enter `Twilio`.
Group name	Name of the recipient group. Leave this field blank.
Service Portal	Service Portal that is associated with the message auth. Leave this field blank.
Inbound message verification	Hash message token that you created.
Outbound message verification	Hash message token that you created.

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Field	Description
Outbound service token	Authorized outbound service token. Leave this field blank.

c. Click **Submit**.

3. Create a Messaging Provider Application record.

a. Navigate to **Conversational Interfaces** > **SMS integration with Twilio** and click **New**.

b. On the form, fill in the fields.

Messaging Provider Application form

Field	Description
Name	Name of the entity that users are contacting, such as IT Service Desk.
Phone Number	Twilio phone number that users are contacting. **Note:** Be sure to include the '+' symbol and the country code in front of the phone number. For example: +18185559485.
Message auth	Message auth that you created.

c. Click **Submit**.

4. In the Twilio Console, for the phone number that you specified in Step 3, update the SMS incoming web-hook.
To update the web-hook, navigate to the phone number in your Twilio console: **Phone Numbers** > **Manager** > **Active numbers**. Click on the phone number and enter the following address in the Messaging web-hook field:

```
https://<instance-name>.service-now.com/api/sn_va_sms_twilio/message
```

What to do next

After you set up the Conversational SMS Integration with Twilio, you can create SMS conversation topics in Virtual Agent Designer. For more information on using the tool, see Virtual Agent Designer.

Related topics

Install Conversational SMS Integration with Twilio

Install a ServiceNow Store application

Activate a plugin

Using Conversational SMS Integration with Twilio

Enable a requester to converse with an agent using the SMS conversations.

An administrator can configure the Conversational SMS Integration with Twilio application for integrating the SMS messaging app with a ServiceNow application.

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A requester can initiate SMS conversations with a virtual agent or live agent.

A live agent can:

- Accept SMS conversations as work items from their Agent Workspace Inbox to converse with a requester.
- Initiate SMS chat conversations from interactions of type Chat from their Agent Workspace Inbox to converse with a requester.
- For logged in customers, the system automatically identifies the customer by matching their phone number against the customer contact.

Accepting SMS conversations

As a live agent interacting with a requester over the SMS service channel, you can:

- Converse with the requester through text messages.
- Share a knowledge article displayed as a link to the requester.
- Share a record, for example, a customer service case.
- Share any URLs as links.
- Share any images as attachments.

Note:
You accept a work item from the SMS conversation in your Agent Workspace Inbox when an administrator has configured the SMS service channel for transfer of chat conversations. For more information, see Conversational SMS service channel.

Initiating SMS conversations

As a live agent, you can initiate an SMS conversation with a requester when the Agent-Initiated Messaging Interface application is configured for the SMS messaging channel. By default, the application is configured for agent to initiate SMS conversations with consumers and customer contacts. For more information, see Initiate messaging conversations from the CSM Configurable Workspace and Initiate SMS conversations from CSM Agent Workspace.

Configure SMS authentication

Authenticate all users using Conversational SMS Integration with Twilio with Soft PIN (SN) and Google authenticators as the 2-factor authentication mechanisms for account linking.

Before you begin
Role required: virtual_agent_admin or admin

Procedure

1. On your ServiceNow instance, enter `sys_cs_provider.list` and open **VA SMS Twilio Adapter Provider** record.
2. In the VA SMS Twilio Adapter Provider record, select the **Allow account linking** check box. Selecting the **Allow account linking** check box populates the **Link account action** and **Account linking type** options.
3. Select **Verification question and MFA** from the **Allow account linking** drop-down.

   When **Verification question and MFA** is selected, the **Automatic link action** field populates with the **sn_va_sms_twilio.va_sms_auto_link_account** value.

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With **Verification question and MFA** selected, the end user is asked to enter the Soft Pin along with an MFA (Multi-factor Authentication) OTP (One Time Password) and Google authenticator is the default MFA method for SMS Twilio for enhanced security.

If there is an invalid input/failure, you can continue the conversation as a guest user. Upon success, the session is elevated to the authenticated user session.

Also, you can also look up the automatic link flow action from the Flow Designer.

4. Navigate to the **Define the identity and messages for this connection** section on the SMS Twilio provider channel record and click the **Provider Properties** tab to configure the following mandatory MFA Provider Properties.
   - *verification_question_id*: Default sys_id for SoftPIN verification. The default value can be customized.
   - *two_factor_methods*: By default, Google authenticator is the two factor method if **Verification question and MFA** is selected.

     google_autheticator or **sms** are the supported values.

     Note:
     If this property value is updated, then the *mfa_question_id* property value must be updated to the sys_id of the corresponding verification Id.

   - *mfa_question_id*: Corresponds to the two-factor method. The value is the default sys_id for the google authenticator verification type.

     Note:
     If you set the value of two_factor_methods property to **sms**, then you must update the sys_id of this property to SMS verification type.

     To get the SMS verification type sys_id, navigate to **Verification Types** and copy the **SMS Code Verification Type** sys_id record.

5. To use account linking in SMS Twilio, navigate to the User [sys_user] table by entering `sys_user.list`, pick a user, and update the user's mobile phone number with a valid incoming mobile phone number.
   After the incoming phone number is authenticated, the system authenticates the user and links the phone number to the respective User [sys_user] ID.
6. To Enroll the Soft PIN, perform the following steps:
   Setting up your Soft PIN enables you to use this PIN for identifying yourself when you try to have a conversation via SMS.
   a. Impersonate the user that you picked in the Step 5 and navigate to **Password Reset** > **Enroll**.
   b. In the Password Reset Enrollment record, under the Soft PIN Verification tab, enter the Soft Pin in the **Enter the Soft PIN** field.
   c. Under the **Authenticator App Verification** tab, click **Generate a new QR code** to generate the QR code for your Google authenticator if you have downloaded one.
   d. Click **Submit**.

   When authentication is enabled for SMS, even when an actionable notification is triggered for the user in SMS conversation, user is expected to enter the Soft PIN and MFA to execute the action. For example, when an incident is updated, an actionable notification is triggered on the SMS app and you are asked to input your authentication code (Soft PIN or MFA code).

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Rate limiting policy for SMS Authentication

Rate limiting policy locks out a user when an invalid or incorrect Soft PIN is entered consecutively for 3 times in a span of 24 hours.

Rate limiting policy

Rate limiting policy is enabled by default for SMS for better security. To configure it, navigate to **All**, and then enter `sys_cs_provider.list` in the filter. Open the SMS record, and configure the following properties on the **Provider Properties** tab.

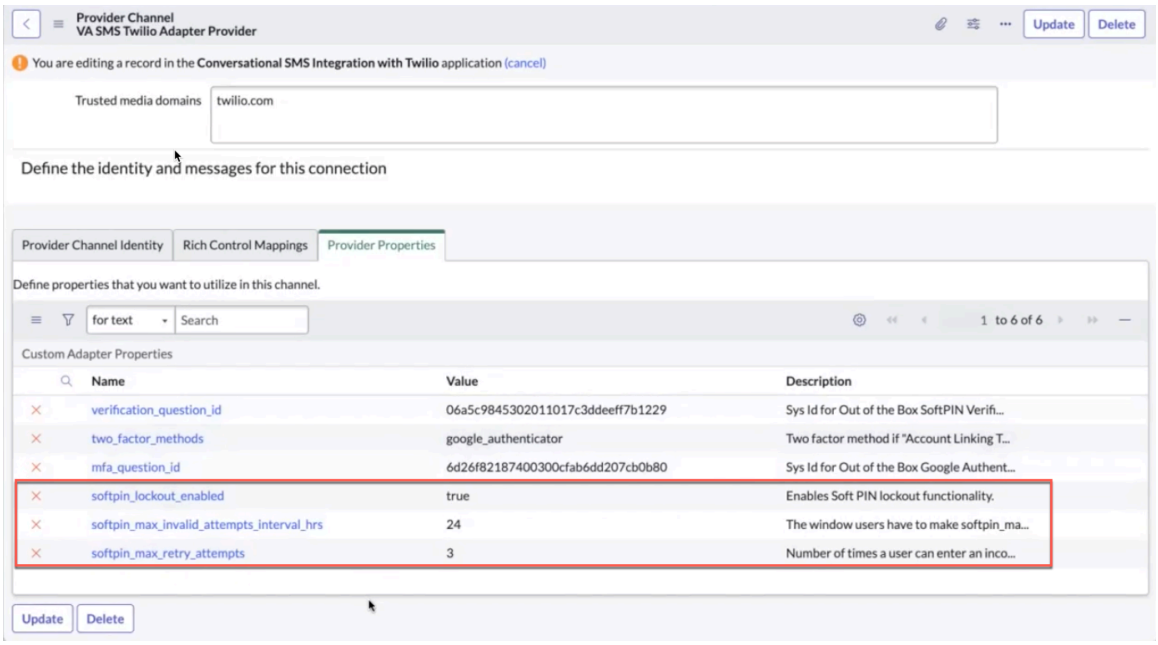
- *`softpin_lockout_enabled`*: Enables Soft PIN lockout functionality. The default Value is **true**.
- *`softpin_max_invalid_attempts_interval_hrs`*: The window where users can make the maximum Soft PIN attempts.

  Note:
  The maximum window is **24** hours.

- *`softpin_max_retry_attempts`*: Number of attempts for the user to enter an incorrect Soft PIN after the user account is locked out.

  Note:
  The maximum number of attempts is **3**.

  If your account is locked, you are treated as a guest user when you start a new conversation. The bot confirms that your account is locked. You are then provided with the public topics and you can also unlock the account using the **Setup/Reset Verification Profile** Virtual Agent topic to reset the Soft PIN and Google authenticator.



Conversational Integration with WhatsApp (powered by Twilio)

Engage with requesters who prefer the WhatsApp messaging app to interact with your business. Requesters include customer contacts and consumers.

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Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Overview

Enable requesters to interact on WhatsApp chat with a virtual agent or live agent using the ServiceNow® Conversational Integration with WhatsApp (powered by Twilio) application. The application connects a requester with a virtual agent or live agent using your company's WhatsApp-enabled Twilio phone number. To get started with the Conversational Integration with WhatsApp (powered by Twilio) application, see Configure Conversational Integration with WhatsApp (powered by Twilio).

Configure Conversational Integration with WhatsApp (powered by Twilio)

Install and set up the Conversational Integration with WhatsApp (powered by Twilio) application to enable requesters to interact with virtual and live agents.

Before you begin

Role required: admin

About this task

This task provides the general steps to integrate the WhatsApp messaging app with a ServiceNow application using the Conversational Integration with WhatsApp (powered by Twilio) application.

Procedure

1. Install Conversational Integration with WhatsApp (powered by Twilio).
2. Set up Conversational Integration with WhatsApp (powered by Twilio).
3. Design virtual agent topics to capture information from a WhatsApp chat conversation.
4. **Optional:** Close idle WhatsApp chat conversations.
5. **Optional:** Transfer WhatsApp chat conversations to live agents.

Install Conversational Integration with WhatsApp (powered by Twilio)

Install the Conversational Integration with WhatsApp (powered by Twilio) so that your business can interact with requesters on the WhatsApp app. The application includes demo data and installs related ServiceNow Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.

Role required: admin

About this task

The following applications or plugins are installed with Conversational Integration with WhatsApp (powered by Twilio):

Twilio Spoke (sn_twilio_spoke)

Provides Integration Hub actions that may be used to create, update, delete, and look up records on the Twilio app.

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For more information on activating this application, see Twilio spoke.

Conversational Custom Chat Integration (com.glide.cs.custom.adapter)

Provides custom chat integration framework of scriptable APIs to enable the Virtual Agent application on any conversational interface.

For more information on this plugin, see Conversational custom chat integrations.

ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Enables execution of Integration Hub actions and flows.

Complex Object (com.glide.cobject)

Enables complex objects.

Agent-Initiated Messaging Interface (sn_agent_initiated)

Provides configurations for the agent-initiated messaging capabilities.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Conversational Integration with WhatsApp (powered by Twilio) application (sn_va_whatsapp_twi) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install Conversational Integration with WhatsApp (powered by Twilio).

4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.

5. Select **Install**.

Set up Conversational Integration with WhatsApp (powered by Twilio)

Set up the Conversational Integration with WhatsApp (powered by Twilio) application so that you can engage requesters in bot conversations. Integrating with ServiceNow Virtual Agent enables you to interact on WhatsApp chat with a Virtual Agent or Live Agent.

Before you begin

Before you begin, do the following:

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- Get ServiceNow entitlements for the following products and applications:
  - Integration Hub
  - Twilio spoke
  - Conversational Integration with WhatsApp (powered by Twilio)

  For more information, see Get entitlement for a ServiceNow product or application.
- Install the following applications on your ServiceNow instance:
  - Integration Hub
  - Twilio spoke
  - Conversational Integration with WhatsApp (powered by Twilio)
- Connect your Twilio Number to your WhatsApp Business Profile.
- Set up Twilio spoke.

Role required: external_app_install_admin or va_admin

Procedure

1. Connect your company's Twilio account with your ServiceNow instance.

   a. Log in to your Twilio Console.

   b. From the Project Info pane of the Console Dashboard page, note down the authentication token.
   You will later use this token to authenticate the Twilio account on your ServiceNow instance.
   For more information, see the Twilio documentation.

   c. To specify the webhook URL, in the Twilio console, navigate to **Programmable Messaging** > **Senders** > **WhatsApp Senders**.
   To enable your Twilio account to send messages to your ServiceNow instance, enter the webhook URL in the following format: `https://<instance-name>.service-now.com/api/sn_va_whatsapp_twi/message`.

   d. Click your WhatsApp-enabled Twilio phone number.

   e. In the **A MESSAGE COMES IN** field of the Configure WhatsApp Number dialog box, enter the webhook URL of your ServiceNow instance and click **Configure**.

2. To authenticate incoming hash messages from the Twilio account, create a Hash Message Verification record that stores the Twilio authentication token.

   a. In the navigation filter of your ServiceNow instance, enter `hash_message_verification.list`.

   b. In the Hash Message Verifications list, click **New**.

   c. On the form, fill in the fields.

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Hash Message Verification form

Field	Description
Name	Name of the record in the Hash Message Verification [hash_message_verification] table that stores the authentication token that is associated with your company's WhatsApp-enabled Twilio phone number. For example, `TwilioWhatsappTestAppAuthToken`.
Description	Description of the record. For example, `Twilio Whatsapp Testing application Auth Token`.
Secret	Twilio authentication token that is associated with your company's WhatsApp-enabled Twilio phone number.

d. Take note of the name of the Hash Message Verification record.

e. Click **Submit**.

3. Associate inbound message records with a Message Auth record.

a. In the navigation filter of your ServiceNow instance, enter `message_auth.list` and click **New**.

b. On the form, fill in the fields.

Message Auth form

Field	Description
Name	Name of the record in the Message Auth [message auth] table. For example, `VA Twilio WhatsApp Test App Message Auth`.
Provider	Provider of the auth token. Enter `Twilio`.
Group name	Name of the group that you created.
Service Portal	Customer service portal that you created.
Outbound service token	Authorized outbound service token.
Inbound message verification	Name of the Hash Message Verification record that you created for the inbound hash messages in step 2.
Outbound message verification	Name of the Hash Message Verification record that you created for the inbound hash messages in step 2. **Note:** The values for the **Inbound message verification** and **Inbound message verification** fields are the same.

c. Click **Submit**.

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4. Associate the Message Auth record with the WhatsApp-enabled Twilio phone number.

   a. In the navigation filter of your ServiceNow instance, enter `sys_cs_provider.list`.

   b. In the Provider Channels list, click **Twilio** from the **Name** column corresponding to the **WhatsApp** channel.
   If the **Twilio** entry is not present, enter `sys_cs_provider_application.list` in the navigation filter to create the list.

   c. In the Provider Channel Identity related list, click **New**.

   d. On the form, fill in the fields.

Provider Channel Identity form

Field	Description
Name	Name of the entity that users are contacting, such as IT Service Desk.
Inbound ID	Twilio phone number that users are contacting. **Note:** Be sure to include the '+' symbol and the country code in front of the phone number. For example: +18185559485.
Message auth	Message auth that you created in step 3.

   e. Click **Submit**.

Set the URL navigation for WhatsApp chat

When agents share links in their WhatsApp chat conversations, customize the portal that those links point to. For example, you can configure links to point to your brand's portal, or to the ServiceNow portal.

Before you begin

Install the Conversational Integration with WhatsApp (powered by Twilio) application on your ServiceNow instance.

Activate the Consumer Service Portal plugin (`com.glide.service-portal.consumer-portal`).

Role required: admin

Procedure

1. In the navigation filter of your ServiceNow instance, enter `sys_cs_provider_application_list.do` and click **New**.
2. On the form, fill in the fields.

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Provider Channel Identity form

Field	Description
Name	Name of the channel you are using. Enter `WhatsApp`.
Provider	Name of the provider. Enter `WhatsApp`.
Default Portal	Portal to be used in the mapping. Select a portal from the list of portals.
Message Auth	Message auth that you created.
Inbound ID	Your WhatsApp phone ID. For example: `+1415XXXXXXX`

3. Click **Submit**.

What to do next

For more information on setting up URL navigation, see Configure URL navigation for chat links.

Capturing information from a user in a WhatsApp chat conversation

Use the collection of input controls provided by the Virtual Agent Designer to prompt and capture information from a requester in a WhatsApp chat conversation.

Virtual Agent Designer is a diagram tool for creating and managing topics, which are blueprints for conversations between a virtual agent and user. For more information, see Getting started with Virtual Agent Designer.

User notification consent

Users must opt in to receive notifications. No notifications can be delivered until the user grants consent.

There are two ways for users to grant consent to receive notifications:

- The user can enter `Notification` into the WhatsApp chat with your business. The user gets a bot response with the option to subscribe or unsubscribe from receiving notifications for your business on WhatsApp.
- As the administrator, you can set up the option for users to subscribe or unsubscribe from notifications from your portal. See Configure system settings for more information.

User input controls

The Conversational Integration with WhatsApp (powered by Twilio) application supports the following user input controls in Virtual Agent Designer.

Supported user input controls

User input control	Description
Text	User enters a plain text string in the conversation.
Static Choice	User selects an item from a predefined list.
Boolean	User enters a Boolean response to the bot. For example, the user can reply `Yes` or `No` in a chat conversation.

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Supported user input controls (continued)

User input control	Description
File Picker	User sends a file to the bot.
Date Time	User selects a calendar date, time (hours and minutes), or both.
Carousel	User selects a single item from the carousel.

For more information about configuring user input controls, see Virtual Agent Designer user input controls.

The Conversational Integration with WhatsApp (powered by Twilio) application supports the following bot responses in Virtual Agent Designer.

Supported bot responses

Bot response	Description
Text	Bot sends a plain text string to the user.
Image	Bot sends an image to the user.
Link	Bot sends a web link to the user.
Web UI image card output	Bot sends content from a record in a compact format, including an image with text.
Table	Bot response is displayed as a table.

For more information about configuring bot responses, see Virtual Agent Designer bot responses.

Closing idle WhatsApp chat conversations

Enable agents to effectively manage their active WhatsApp chat conversations by automatically closing idle conversations after they have been inactive for a pre-configured amount of time.

The Virtual Agent conversations are configured for the WhatsApp messaging app. By default, any conversations abandoned by requesters remain open or idle until they are automatically closed daily by the *Time Out Abandoned VA Conversations* scheduled job. For more information, see Closing Virtual Agent and Agent Chat conversations.

As an administrator, you can change the default timeout period for idle Virtual Agent conversations configured for the WhatsApp messaging app by setting the *com.glide.cs.whatsapp_idle_timeout* system property to the number of seconds that abandoned conversations remain open after the requester's last response. The system property value must be less than the time interval set for the *Time Out Abandoned VA Conversations* scheduled job, set to two hours (7200 seconds) by default. Because the *com.glide.cs.whatsapp_idle_timeout* system property isn't available by default, you must add it with the data type set to integer. For more information, see Add a system property.

Transfer WhatsApp chat conversations to live agents

Configure the Advanced Work Assignment application to transfer a WhatsApp chat conversation initiated by a requester to a live agent.

Before you begin

Your administrator must have completed the following tasks:

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- Install Conversational Integration with WhatsApp (powered by Twilio).
- Activate Advanced Work Assignment.
- Set the application scope to Conversational Integration with WhatsApp (powered by Twilio) using the application picker. For more information, see Application picker.
- Activate the Conversational Messaging plugin (com.glide.messaging.awa). For more information, see Activate Conversational Messaging.

Role required: admin

About this task

Procedure

1. Enable the WhatsApp service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Service Channels**.
   b. In the **Name** column of the Queues list, search for `WhatsApp`.
   c. Click **WhatsApp**.
   d. On the Service Channel form, select the **Active** check box.
   e. Click **Update**.
   For more information, see Service channels.
2. Automatically route work items for WhatsApp chat conversations to agents by configuring the queue for the WhatsApp service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Queues**.
   b. In the **Name** column of the Queues list, search for `Agent WhatsApp Queue`.
   c. Click **Agent WhatsApp Queue**.
   d. On the Queue form, select the **Active** check box.
   e. Click **Update**.

   Note:
   By default, the *`WhatsApp - Most Capacity`* assignment rule is associated with the Agent WhatsApp Queue. You can create another assignment rule and associate it with the queue. For more information, see Configure agent assignment rules and Work item queues.

3. Configure agent presence states for the WhatsApp service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Presence States**.
   b. In the **Name** column of the Presence States list, click an existing state.
   c. In the Apply to groups section of the Presence State form, click the add icon (>) to move the **Agent WhatsApp Group** group from the **Available** column to the **Selected** column.

      Note:
      You can ignore this step if you have selected the **Apply to all groups** check box.

   d. Click **Update**.

   For more information, see Configure agent presence states.

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Using Conversational Integration with WhatsApp (powered by Twilio)

Enable a requester to converse with an agent at their convenience using the WhatsApp chat conversations through Virtual Agent.

An administrator can configure the Conversational Integration with WhatsApp (powered by Twilio) application for integrating the WhatsApp messaging app with a ServiceNow application. For more information, see Integrating the WhatsApp messaging app with other applications.

Agents and requesters can do the following:

- A live agent can initiate WhatsApp chat conversations with a requester.
- A requester can initiate WhatsApp chat conversations with a virtual agent or live agent.
- A live agent can accept WhatsApp chat conversations as work items from their Agent Workspace Inbox to converse with a requester.
- For logged in customers, the system automatically identifies the customer by matching their phone number against the customer contact.

Initiating WhatsApp chat conversations

As a live agent, you can initiate WhatsApp chat conversations with a requester in two ways:

- Send a message from either an active interaction record, a contact record, or a consumer contact record. See Setting up Agent Chat in legacy workspace.
- Set up notifications to be sent to the requester when a business event occurs or when a record is updated. See Create a provider notification.

Note:
The requester must subscribe and opt in to receive notifications.

Accepting WhatsApp chat conversations

As a live agent interacting with a requester over the WhatsApp service channel, you can do the following:

- Converse with the requester through text messages.
- Share a knowledge article displayed as a link to the requester.
- Share a record. For example, a customer service case.
- Share any URLs as links.
- Share any files as attachments.

Note:
If an administrator has configured the WhatsApp service channel for transfer of chat conversations, then you can accept a work item from the WhatsApp chat conversation in your Agent Workspace Inbox. For more information, see Transfer WhatsApp chat conversations to live agents and Service channels.

Create a provider notification

Execute the following steps to create a provider notification for Virtual Agent and Workspace providers.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **System Notification** > **Provider** > **Notifications** and select **New**.
2. On the form, fill in the fields.

Notifications form

Field	Description
Name	Name of the notification.
Application	Application scope of the notification.
Active	Option to activate the notification. The notification is active by default.
Trigger	
Triggered By	System action that triggers the notification. You can send the notification after a record is changed or after an event is triggered.
Table	Table to receive notifications about.
Inserted	Option to send the notification after a record is inserted. This field appears when you select **Record Change** in the **Triggered By** field.
Updated	Option to send the notification after a record is updated. This field appears when you select **Record Change** in the **Triggered By** field.
Event	Event that triggers the notification. For example, to send a notification after an incident is closed or resolved, you would select the *incident.inactive* event. By default, this event is logged in the system each time a user resolves or closes an incident. **Note:** You can select only an event that shares the same table as the notification. This field appears when you select **Event** in the **Triggered By** field.
Conditions	Filter to specify the table records that users receive notifications about. For example, to send notifications about top-priority incidents, you would select **Incident [incident]** in the **Table** field and set the conditions to **[Priority] [is] [1 - Critical]**.
Recipients	
Users	Users who receive the notification. **Note:** Notifications in messaging channels are sent only to users with ServiceNow accounts (sys_user profiles). Consumers and customer contacts are considered as guests and cannot receive notifications in messaging channels.

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Field	Description
Recipients in fields	Record fields that include users who receive the notification. For example, to send the notification to the record assignee, select **Assigned to**. **Note:** This field shows up only if you select a table.
Is originating user included?	Option to include the user who changed the record or triggered the event.
Event Parm1 contains recipient(s)?	Option to select if Parm 1 contains a list of comma separated sys_ids
Event Parm2 contains recipient(s)?	Option to select if Parm 2 contains a list of comma separated sys_ids
Resolve Parm1 recipients from table	Table that is used to resolve the sys_id of the recipient **Note:** This field appears only when you select Event parm 1.
Resolve Parm2 recipients from table	Table that is used to resolve the sys_id of the recipient **Note:** This field appears only when you select Event parm 2.
Advanced event condition	Option to select when the recipients are from more than 2 tables. These are dynamic conditions.

3. Select **Submit**.

Note:
Use the **Submit** button for Virtual Agent notifications. The **Submit and Add Common Content** button is for other use cases.

All the validation messages given by different providers are retained. Warning messages of one provider is not overridden by warning messages of another provider.

Integrating the WhatsApp messaging app with other applications

Other ServiceNow applications and features can use the Conversational Integration with WhatsApp (powered by Twilio) application.

As a live agent, when you accept a request from the WhatsApp service channel, you can converse with the requester within the same channel.

Integrating with Customer Service Management

Integrate the Conversational Integration with WhatsApp (powered by Twilio) application with the ServiceNow® Customer Service Management application to enable your customer contacts and consumers to initiate a WhatsApp chat conversation with a virtual agent or live agent. An agent can initiate a conversation, or accept a conversation initiated from a WhatsApp chat conversation. For more information, see Integrate WhatsApp with Customer Service Management through Twilio.

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Conversational Integration with LINE

Engage with requesters who prefer the LINE messaging app to interact with your business. Requesters include customer contacts and consumers.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Overview

Conduct user-initiated, system-initiated, or agent-initiated conversations using the Conversational Integration with LINE application. The application connects a requester with a virtual agent or live agent using your company's LINE account. To get started with the Conversational Integration with LINE application, see Configure Conversational Integration with LINE.

Configure Conversational Integration with LINE

Install and set up the Conversational Integration with LINE application to enable your users to interact with virtual and live agents.

Before you begin

Role required: admin

About this task

This task provides the general steps to integrate the LINE messaging app with a ServiceNow application using the Conversational Integration with LINE application.

Procedure

1. Install Conversational Integration with LINE.
2. Set up Conversational Integration with LINE.
3. Design virtual agent topics to capture information from a LINE chat conversation.
4. **Optional:** Close idle LINE chat conversations.
5. **Optional:** Transfer LINE chat conversations to live agents.

Install Conversational Integration with LINE

Install the Conversational Integration with LINE so that your business can interact with requesters on the LINE app. The application includes demo data and installs related ServiceNow Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- For existing customers, ensure that you install the Conversational Integration with LINE application on ServiceNow instances that have been upgraded to at least the Rome release.

Role required: admin

About this task

The following applications or plugins are installed with Conversational Integration with LINE:

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Conversational Custom Chat Integration (com.glide.cs.custom.adapter)

Provides the custom chat integration framework of scriptable APIs to enable the Virtual Agent application on any conversational interface.

For more information on this plugin, see Conversational custom chat integrations.

ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Enables execution of Integration Hub actions and flows.

IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)

Enables utility or global scripts that can be invoked from the Integration Spokes.

Agent-Initiated Messaging Interface (sn_agent_initiated)

Provides configurations for the agent-initiated messaging capabilities.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Conversational Integration with LINE application (sn_va_line) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install Conversational Integration with LINE.
4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.
5. Select **Install**.

Set up Conversational Integration with LINE

Set up the Conversational Integration with LINE application so that you can engage customers in conversations with bots.

Before you begin

Before you begin, do the following:

- Get ServiceNow entitlements for the following products and applications:
  - Integration Hub
  - Conversational Integration with LINE

  For more information, see Get entitlement for a ServiceNow product or application.

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- Install the following applications on your ServiceNow instance:
  - Integration Hub
  - Conversational Integration with LINE
- Activate the IHUB Spoke Util Pack plugin (com.snc.ihub_spoke_util_pack). For more information, see Activate a plugin.
- Get a developer account in the LINE Developers console.

Role required: external_app_install_admin or va_admin

About this task

The LINE messaging app supports only one LINE channel for a ServiceNow instance. If you would like to configure a different LINE channel for your ServiceNow instance, you must first remove the previously configured LINE channel, and then set up the new channel.

Procedure

1. Connect your company's LINE account with your ServiceNow instance.
   a. Log in to your LINE Developers Console.
   b. Create a channel on the LINE Developers Console.
   c. Take note of the channel secret and the channel access token.
   You will use later use this information for authenticating the LINE account on your ServiceNow instance.
   d. To enable your LINE account to send data to your ServiceNow instance, enter the webhook URL and click **Verify**
   You specify the webhook URL in the **Webhook URL** field on the Messaging API tab of the LINE Developers Console. Use the following format for the URL: `https://<instance-name>.service-now.com/api/sn_va_line/va_adapter_line`.
2. On your ServiceNow® instance, go to **All** > **Conversational Interfaces** > **Channels and Integrations**.
3. On the LINE integration section, click **Manage**.
   The Line Channel integration page opens.
4. Click the three dots on the right hand side and choose **Edit Integration**.
5. On the form, update the name of the bot if desired.
6. Enter the channel secret and the access token from your LINE account.
7. Click **Submit**.
   A success message displays confirming the integration with the LINE app.

Capturing information from a user in a LINE chat conversation

Use the collection of input controls provided by the Virtual Agent Designer to prompt and capture information from the user in a LINE chat conversation.

Virtual Agent Designer is a diagram tool for creating and managing topics, which are blueprints for conversations between a virtual agent and user. For more information, see Using Virtual Agent Designer.

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User notification consent

Users must opt in to receive notifications. No notifications can be delivered until the user grants consent.

There are two ways for users to grant consent to receive notifications:

- The user can enter `Notification` into the LINE chat with your business. The user gets a bot response with the option to subscribe or unsubscribe from receiving notifications for your business on LINE.
- As an administrator, you can set up the option for users to subscribe or unsubscribe from notifications from your portal. See Configure system settings for more information.

User input controls

The Conversational Integration with LINE application supports the following user input controls in Virtual Agent Designer.

Supported user input controls

User input control	Description
Text	User enters a plain text string in the conversation. The maximum character limit is 5000 characters.
Static Choice	User selects an item from a predefined list. In a quick reply, the label has the maximum character limit of 20 characters. At a time, a user can view only 13 quick replies. If there are more than 13 quick replies, the pagination format is used to view more options. The default value of the maximum number of replies for a page is set in the *`sn_va_line.max.picker.choices`* system property. The property is located in the System Property [sys_properties] table.
Boolean	User enters a Boolean response to the bot. For example, the user can reply `Yes` or `No` in a chat conversation.
File Picker	User sends a file to the bot. The supported file types are JPG, PNG, BMP, and MP4. Files have a maximum size limit based on file type: • For images, the maximum size limit is 10 MB. • For videos, the maximum size limit is 200 MB.
Date Time	User selects a calendar date, time (hours and minutes), or both.
Carousel	User selects a single item from the carousel. In a carousel, the title for an image has a maximum limit of 40 characters and the text for the image has a maximum character limit of 60 characters. At a time, a user can view only 10 images. If there are more than 10 images, the pagination format is used to view more options. The default value of the maximum number of images in the carousel for a page is set in the

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Supported user input controls (continued)

User input control	Description
	sn_va_line.max.carousel.cards system property. The property is located in the System Property [sys_properties] table.

For more information about configuring user input controls, see Virtual Agent Designer user input controls.

The Conversational Integration with LINE application supports the following bot responses in Virtual Agent Designer.

Supported bot responses

Bot response	Description
Text	Bot sends a plain text string to the user.
Image	Bot sends an image to the user.
Link	Bot sends a web link to the user.
Web UI image card output	Bot sends content from a record in a compact format, including an image with text.
Table	Bot response is displayed as a table.

For more information about configuring bot responses, see Virtual Agent Designer bot responses.

Closing idle LINE chat conversations

Enable agents to effectively manage their active LINE chat conversations by automatically closing conversations after they have been inactive for a pre-configured amount of time.

The Virtual Agent conversations are configured for the LINE messaging app. By default, any conversations abandoned by requesters remain open or idle until they are automatically closed daily by the *Time Out Abandoned VA Conversations* scheduled job. For more information, see Closing Virtual Agent and Agent Chat conversations.

As an administrator, you can change the default timeout period for idle Virtual Agent conversations configured for the LINE messaging app by setting the *com.glide.cs.line_idle_timeout* system property to the number of seconds that abandoned conversations remain open after the requester's last response. The system property value must be less than the time interval set for the *Time Out Abandoned VA Conversations* scheduled job, set to two hours (7200 seconds) by default. Because the *com.glide.cs.line_idle_timeout* system property isn't available by default, you must add it with the data type set to integer. For more information, see Add a system property.

Transfer LINE chat conversations to live agents

Configure the Advanced Work Assignment application to transfer a LINE chat conversation initiated by a requester (customer contact or consumer) to a live agent.

Before you begin

Your administrator must have completed the following tasks:

- Activate Advanced Work Assignment.
- Install Conversational Integration with LINE.

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- Set the application scope to Conversational Integration with LINE using the application picker. For more information, see Application picker.
- Activate the Conversational Messaging plugin (com.glide.messaging.awa). For more information, see Activate Conversational Messaging.

Role required: admin

About this task

Procedure

1. Enable the Line service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Service Channels**.
   b. In the **Name** column of the Queues list, search for `Line`.
   c. Click **Line**.
   d. On the Service Channel form, select the **Active** check box.
   e. Click **Update**.
   For more information, see Service channels.
2. Automatically route work items for LINE chat conversations to agents by configuring the queue for the Line service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Queues**.
   b. In the **Name** column of the Queues list, search for `Agent Line Queue`.
   c. Click **Agent Line Queue**.
   d. On the Queue form, select the **Active** check box.
   e. Click **Update**.

   Note:
   By default, the *`Line - Most Capacity`* assignment rule is associated with the Agent Line Queue. You can create another assignment rule and associate it with the queue. For more information, see Configure agent assignment rules and Work item queues.

3. Configure agent presence states for the Line service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Presence States**.
   b. In the **Name** column of the Presence States list, click an existing state.
   c. On the Presence State form, in the Service channels section, click the add icon (>) to move the **Line** service channel from the **Available** column to the **Selected** column.
   d. In the Apply to groups section of the Presence State form, click the add icon (>) to move the **Agent Line Group** group from the **Available** column to the **Selected** column.

      Note:
      You can ignore this step if you have selected the **Apply to all groups** check box.

   e. Click **Update**.

   For more information, see Configure agent presence states.

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Using Conversational Integration with LINE

Enable a requester to converse with an agent using the LINE chat conversations.

An administrator can configure the Conversational Integration with LINE application for integrating the LINE messaging app with a ServiceNow application. For more information, see Integrating the LINE messaging app with other applications.

The following options are available:

- An administrator can configure system-initiated messages to be delivered as LINE chat conversations.
- A live agent can initiate LINE chat conversations with a requester.
- A requester can initiate LINE chat conversations with a virtual agent or live agent.
- A live agent can accept LINE chat conversations as work items from their Agent Workspace Inbox to converse with a requester.

Initiating LINE chat conversations

As a live agent, you can initiate LINE chat conversations with a requester in two ways:

- Send a message from either an active interaction record, a contact record, or a consumer contact record. See .
- Set up notifications to be sent to the requester when a business event occurs or when a record is updated. See Create a provider notification.

Note:
The requester must subscribe and opt in to receive notifications.

Accepting LINE chat conversations

As a live agent interacting with a requester over the LINE service channel, you can do the following:

- Converse with the requester through text messages.
- Share a knowledge article displayed as a link to the requester.
- Share a record, for example, a customer service case.
- Share any URLs as links.
- Share any files as attachments.

Note:
If an administrator has configured the Line service channel for transfer of chat conversations, then you can accept a work item from the LINE chat conversation in your Agent Workspace Inbox. For more information, see Transfer LINE chat conversations to live agents and Service channels.

Integrating the LINE messaging app with other applications

Other ServiceNow applications and features can use the Conversational Integration with LINE application.

As an administrator, you can use the Conversational Integration with LINE application to integrate the LINE messaging app with other ServiceNow applications. You can enable requesters and agents to converse with an agent using the LINE messaging app.

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Integrating with Customer Service Management

Integrate the Conversational Integration with LINE application with the ServiceNow® Customer Service Management application to enable your customer contacts and consumers to initiate a LINE chat conversation with a virtual agent or live agent. An agent can initiate a conversation, or accept a conversation initiated from a LINE chat conversation. For more information, see Integrate LINE with Customer Service Management.

Remove Conversational Integration with LINE

Users can remove the Conversational Integration with LINE application when the app is no longer needed.

Before you begin

Role required: admin

Procedure

1. Go to **All** > **Conversational Interfaces** > **Channels and Integrations**.
2. On the LINE integration section, click **Manage**.
   The Line Channel integration page opens.
3. Click the three dots on the right hand side and choose **Remove Integration**.
   A confirmation message displays.
4. Click **Remove**.
   The Facebook Messenger application and all of its data is removed.

Conversational Integration with Facebook Messenger

Engage with requesters including customer contacts and consumers who prefer the Facebook Messenger app to chat with an agent.

As of July 31, 2025, Conversational Integration with Facebook Messenger is being prepared for future deprecation. It will be hidden and no longer installed on new instances but will continue to be supported. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Overview

Enable your users to initiate a Facebook Messenger chat conversation with a virtual agent by using the Conversational Integration with Facebook Messenger application. The application connects a requester with a virtual agent or live agent using your company's Facebook Messenger account. To get started with the Conversational Integration with Facebook Messenger application, see Configure Conversational Integration with Facebook Messenger.

Notice regarding use by customers

Customers are solely responsible for the implementation of the Conversational Integration with Facebook Messenger application. The use of this application in a Facebook app requires a review of the app by the Facebook Developer Support team. It is the responsibility of customers to complete this app review process. The following links from the Facebook site provide guidance on how to complete the app review process:

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1. Facebook Platform Policy Overview: https://developers.facebook.com/docs/messenger-platform/policy/policy-overview
2. Facebook Pre-Launch Checklist: https://developers.facebook.com/docs/messenger-platform/prelaunch-checklist
3. Facebook review and submission process for applications: https://developers.facebook.com/docs/messenger-platform/#review---submission-process

Configure Conversational Integration with Facebook Messenger

Install and set up the Conversational Integration with Facebook Messenger application to enable your users to interact with virtual and live agents.

Before you begin

Role required: admin

About this task

This task provides the general steps to integrate the Facebook Messenger messaging app with a ServiceNow application using the Conversational Integration with Facebook Messenger application.

Procedure

1. Install Conversational Integration with Facebook Messenger.
2. Set up Conversational Integration with Facebook Messenger.
3. Design virtual agent topics to capture information from a Facebook Messenger chat conversation.
4. **Optional:** Close idle Facebook Messenger chat conversations.
5. **Optional:** Transfer Facebook Messenger chat conversations to live agents.

Install Conversational Integration with Facebook Messenger

You can install the Conversational Integration with Facebook Messenger application (sn_va_fb_messenger) if you have the admin role. The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.

Role required: admin

About this task

The following applications or plugins are installed with Conversational Integration with Facebook Messenger:

Conversational Custom Chat Integration (com.glide.cs.custom.adapter)

Provides custom chat integration framework of scriptable APIs to enable the Virtual Agent application on any conversational interface.

For more information on this plugin, see Conversational custom chat integrations.

ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Enables execution of Integration Hub actions and flows.

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Conversational Integration with Facebook Messenger application (sn_va_fb_messenger) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install Conversational Integration with Facebook Messenger.
4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.
5. Select **Install**.

Set up Conversational Integration with Facebook Messenger

Integrate Facebook Messenger with your ServiceNow instance using the Conversational Integration with Facebook Messenger application. Use the application to engage customers in conversations with bots.

Before you begin

- Get ServiceNow entitlements for the following products and applications:
  - Integration Hub
  - Conversational Integration with Facebook Messenger

  For more information, see Get entitlement for a ServiceNow product or application.
- Install the following applications on your ServiceNow instance:
  - Integration Hub
  - Conversational Integration with Facebook Messenger
- Complete Facebook Messenger settings.
  1. Set up a Facebook developer account.
  2. Create a Facebook app.
  3. Review the Messenger Platform Policy and Pre-Launch Checklist prior to submission.
  4. Submit the app for review.

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5. Create a Facebook page within the Facebook app you created earlier.
6. Enable Facebook Messenger.

Role required: external_app_install_admin or va_admin

Procedure

1. Connect your company's Facebook Messenger service with your ServiceNow instance.
   a. Log in to your Facebook developer account and open the Facebook app you created.
   b. Enable your Facebook app to send data to your ServiceNow instance by entering the webhook URL.
      i. Click **Add Callback URL** in the Webhooks section of the app.
      ii. In the Edit Callback URL dialog box, fill in the fields.

Field	Description
Callback URL	Public URL for webhook. Enter the webhook URL in the following format: `https://<instance-name>.service-now.com/api/now/v1/cs/adapter/messenger/message`
Token	Token for webhook. By default, the token for ServiceNow webhook is `nowbot`. As a user with the admin role, you can set the *`glide.cs.facebook_messenger_verify_token`* system property to a desired value and then enter that value in this field. Because the *`glide.cs.facebook_messenger_verify_token`* system property isn't available by default, you must add it with the data type set to string. For more information, see Add a system property.

      iii. Click **Verify and Save**.
   c. Make a note of your Facebook page ID and access token.
      i. Click **Add or Remove Pages** and select your Facebook page.
      ii. Make a note of the page ID displayed below the page name.
      You can click the page ID to copy the ID to your clipboard.
      iii. In the Access Tokens section, click **Generate Token** for the Facebook page you created.

      Note:
      Make note of the page access token used later for authenticating the Facebook Messenger on your ServiceNow instance.

   d. Subscribe your Facebook app to your Facebook page.

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i. In the Webhooks section, click **Add Subscriptions**.

   For each authorized Page, the Webhooks section contains the fields the app can subscribe to.

ii. In the Edit Page Subscriptions dialog box, select **messages** and **messaging_postbacks**.

iii. Click **Save**.

e. Make a note of the App secret from Basic Settings.

f. **Optional:** Send messages with timestamp in the customer's time zone by navigating to **Page settings** > **Advanced messaging**, selecting the **Time zone** option in the Requested Features section, and clicking **Request** displayed next to the selected option.

2. On your ServiceNow® instance, go to **All** > **Conversational Interfaces** > **Channels and Integrations**.
3. On the Facebook Messenger integration section, click **Add**.
   The Facebook Messenger Channel integration page opens.
4. Click the three dots on the right hand side and choose **Edit Integration**.
5. On the form, update the name of the bot if desired.
6. Enter the callback URL and the token from your Facebook Messenger account.
7. Click **Submit**.
   A success message displays confirming the integration with the Facebook Messenger app.

Capturing information from a user in a Facebook Messenger chat conversation

Use the collection of input controls provided by the Virtual Agent Designer to prompt and capture information from the user in a Facebook Messenger chat conversation.

Virtual Agent Designer is a diagram tool for creating and managing topics, which are blueprints for conversations between a virtual agent and user. For more information, see Getting started with Virtual Agent Designer.

The Conversational Integration with Facebook Messenger application supports the following user input controls in Virtual Agent Designer.

Supported user input controls

User input control	Description
Text	User enters a plain text string in the conversation. The maximum character limit is 5000 characters.
Static Choice	User selects an item from a predefined choice list. In a quick reply, the label has the maximum character limit of 20 characters. At a time, a user can view only 13 quick replies. If there are more than 13 quick replies, the pagination format is used to view more options. The default value of the maximum number of replies for a page is set in the *sn_va_fb_messenger.max_quick_replies* system property (location: System Property [sys_properties] table).

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Supported user input controls (continued)

User input control	Description
Boolean	User enters a Boolean response to the bot. For example, the user can reply Yes or No in a chat conversation.
File Picker	User sends a file to the bot. The supported file types are JPG, PNG, BMP, and MP4. Note the following points about the maximum size limit for a file type: • For images, the maximum size limit is 10 MB. • For videos, the maximum size limit is 200 MB.
Date Time	User selects a calendar date, time (hours and minutes), or both. **Note:** If your administrator has set the option to request time zone from the customer, the selected date and time reflect customer's time zone. Else, they appear in the UTC time zone. For more information about the time zone setting, see 1.f.
Carousel	User selects a single item from the carousel. In a carousel, the title for an image has maximum limit of 40 characters and the text for the image has maximum character limit of 60 characters. At a time, a user can view only 10 images. If there are more than 10 images, the pagination format is used to view more options. The default value of the maximum number of images in a carousel for a page is set in the *sn_va_fb_messenger.max_carousel_cards* system property (location: System Property [sys_properties] table).

For more information about configuring user input controls, see Virtual Agent Designer user input controls.

The Conversational Integration with Facebook Messenger application supports the following bot responses in Virtual Agent Designer.

Supported bot responses

Bot response	Description
Text	Bot sends a plain text string to the user.
Image	Bot sends an image to the user.
Link	Bot sends a web link to the user. **Note:** The web link appears as a URL button in the conversation.
Card	Bot sends selected information from a record on your instance.

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Note:
You can also return search results as bot responses in Facebook Messenger chat conversations when there are no relevant topics to display to end users. For more information, see Improving the user experience with AI Search.

For more information about configuring bot responses, see Virtual Agent Designer bot responses.

Closing idle Facebook Messenger chat conversations

Enable agents to effectively manage their active Facebook Messenger chat conversations by automatically closing conversations after they have been inactive for a pre-configured amount of time.

The Virtual Agent conversations are configured for the Facebook Messenger app. By default, any conversations abandoned by requesters remain open or idle until they are automatically closed daily by the *Time Out Abandoned VA Conversations* scheduled job. For more information, see Closing Virtual Agent and Agent Chat conversations.

As an administrator, you can change the default timeout period for idle Virtual Agent conversations configured for the Facebook Messenger app by setting the *com.glide.cs.facebook_messenger_idle_timeout* system property to the number of seconds that abandoned conversations remain open after the requester's last response. The system property value must be less than the time interval set for the *Time Out Abandoned VA Conversations* scheduled job, set to two hours (7200 seconds) by default. Because the *com.glide.cs.facebook_messenger_idle_timeout* system property isn't available by default, you must add it with the data type set to integer. For more information, see Add a system property.

Transfer Facebook Messenger chat conversations to live agents

Configure the Advanced Work Assignment application to transfer a Facebook Messenger chat conversation initiated by a requester (customer contact or consumer) to a live agent.

Before you begin

Your administrator must have completed the following tasks:

- Activate Advanced Work Assignment.
- Install Conversational Integration with Facebook Messenger.
- Set the application scope to Conversational Integration with Facebook Messenger using the application picker. For more information, see Application picker.
- Activate the Conversational Messaging plugin (com.glide.messaging.awa). For more information, see Activate Conversational Messaging.

Role required: admin

About this task

Procedure

1. Enable the Facebook Messenger service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Service Channels**.
   b. In the **Name** column of the Queues list, search for `Line`.
   c. Click **Facebook Messenger**.
   d. On the Service Channel form, select the **Active** check box.
   e. Click **Update**.

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For more information, see Service channels.

2. Automatically route work items for Facebook Messenger chat conversations to agents by configuring the queue for the Facebook Messenger service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Queues**.
   b. In the **Name** column of the Queues list, search for `Agent Facebook Messenger Queue`.
   c. Click **Agent Facebook Messenger Queue**.
   d. On the Queue form, select the **Active** check box.
   e. Click **Update**.

   Note:
   By default, the *`Facebook Messenger - Most Capacity`* assignment rule is associated with the Agent Facebook Messenger Queue. You can create another assignment rule and associate it with the queue. For more information, see Configure agent assignment rules and Work item queues.

3. Configure agent presence states for the Facebook Messenger service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Presence States**.
   b. In the **Name** column of the Presence States list, click an existing state.
   c. On the Presence State form, in the Service channels section, click the add icon (>) to move the **Facebook Messenger** service channel from the **Available** column to the **Selected** column.
   d. In the Apply to groups section of the Presence State form, click the add icon (>) to move the **Agent Facebook Messenger Group** group from the **Available** column to the **Selected** column.

      Note:
      You can ignore this step if you have selected the **Apply to all groups** check box.

   e. Click **Update**.

   For more information, see Configure agent presence states.

Using Conversational Integration with Facebook Messenger

Enable a requester to converse with an agent using the Facebook Messenger chat conversations.

An administrator can configure the Conversational Integration with Facebook Messenger application for integrating the Facebook Messenger app with a ServiceNow application. For more information, see Integrating the LINE messaging app with other applications.

A requester can initiate Facebook Messenger chat conversations with a virtual agent or live agent.

A live agent can accept Facebook Messenger chat conversations as work items from their Agent Workspace Inbox to converse with a requester.

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Accepting Facebook Messenger chat conversations

As a live agent interacting with a requester over the Facebook Messenger service channel, you can:

- Converse with the requester through text messages.
- Share a knowledge article displayed as a link to the requester.
- Share a record, for example, a customer service case.
- Share any URLs as links.
- Share any files as attachments.

Note:
You accept a work item from the Facebook Messenger chat conversation in your Agent Workspace Inbox when an administrator has configured the Facebook Messenger service channel for transfer of chat conversations. For more information, see Transfer Facebook Messenger chat conversations to live agents and Service channels.

Integrating the Facebook Messenger messaging app with other applications

Review this topic to see which ServiceNow applications and features can use the Conversational Integration with Facebook Messenger application.

As an administrator, you can use the Conversational Integration with Facebook Messenger application to integrate the Facebook Messenger messaging app with other ServiceNow applications and enable requesters to converse with agents using the Facebook Messenger messaging app.

Integrating with Customer Service Management

Integrate the Conversational Integration with Facebook Messenger application with the ServiceNow® Customer Service Management application to enable your customer contacts and consumers to initiate a Facebook Messenger chat conversation with a virtual agent or live agent. For more information, see Integrate Facebook Messenger with Customer Service Management.

Set up the Virtual Agent integration with Facebook Messenger (Legacy)

Configure the Virtual Agent integration for Facebook Messenger and associate the app with your instance.

Before you begin
You should already have the following:

- Facebook page (see https://www.facebook.com/pages/creation/ for more information)
- Facebook developer account (see https://developers.facebook.com/ for more information)
- Facebook app (see https://developers.facebook.com/quickstarts for more information, make note of the app secret that is generated)

Roles required:

- virtual_agent_admin and external_app_install_admin or admin
- Administrator for third-party applications

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Procedure

1. In Facebook developer, navigate to **Messenger** > **Settings**.

   a. Locate the Token Generation section.

   b. From the page list, select the Facebook page you created and make note of the Page Access Token that is generated.

   c. Locate the Webhooks section and click **Setup Webhooks**.

   d. On the New Page Subscription pop-up window that displays, enter these fields:

Field	Value
Callback URL	Your ServiceNow instance URL followed by `/api/now/v1/cs/adapter/messenger/message`
Verify Token	`nowbot`
Subscription Fields	Select **messages** and **messaging_postbacks**

   e. Click **Verify and Save**.

2. In your ServiceNow instance, enter `hash_message_verification.list` in the Filter navigator.

   a. In the Hash Message Verifications form, click **New** to create a new record.

   b. Enter these fields:

Field	Value
Name	Name that helps to identify this record. This field may default to `sample-fb-messenger-inbound-app-token` but this default can be changed.
Description	Description for the record
Secret	App secret of your Facebook Messenger app (the secret was generated when you created the app)

   c. Click **Submit**.

3. In your ServiceNow instance, enter `token_verification.list` in the Filter navigator.

   a. In the Token Verifications form, click **New** to create a new record.

   b. Enter these fields:

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Field	Value
Name	Name that helps to identify this record. This field may default to `sample-fb-messenger-outbound-app-token` but this default can be changed.
Description	Description for the record
Token	Page access token of your Facebook Messenger app (from step 1b of this procedure)

c. Click **Submit**.

4. In your ServiceNow instance, enter `message_auth.list` in the Filter navigator.

a. In the Message Auth page, click **New** to create a new record.

b. Enter these fields:

Field	Value
Name	Name that helps to identify this record. This field may default to `sample-fb-messenger-app` but this default can be changed.
Provider	Name of the provider
Inbound message verification	Name specified on the Hash Message Verifications form (this token verifies if the request is actually from the provider)
Outbound message creation	Name specified on the Token Verification form (this token interacts with the provider on behalf of the user)

c. Click **Submit**.

5. In your ServiceNow instance, enter `sys_cs_adapter_configuration_page_messenger.list` in the Filter navigator.

a. In the Facebook Messenger Adapter Configuration Page, click **New** to create a new record.

b. Enter these fields:

Field	Value
App Type	Defaults to Facebook Messenger and cannot be changed
Messenger Page ID	Your page ID (the page ID can be found in the URL of the Facebook page)

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Field	Value
Name	Name that helps to identify this record. This field may default to `sample-fb-messenger-app` but this default can be changed.
Provider Auth	Name specified on the Message Auth page

6. Click **Submit**.
7. Configure whether users should be prompted to link their profile to their ServiceNow profile.
   a. In the Navigation filter, enter `sys_properties.list`.
   b. Navigate to and click *va.messenger.account.auth*.
   c. In the **Value** field, enter **true** or **false**.

true	Prompt users to link their account to their ServiceNow profile. Users who link their account to their ServiceNow profile can access all topics and also chat with a live agent. Users who do not link their account can access only guest topics.
false	Do not prompt users to link their account to their ServiceNow profile. Users can access only guest topics but can still chat with a live agent.

   d. Click **Update**.

Configure the help link for the Virtual Agent Facebook Messenger integration (Legacy)

Use the *va.messenger.help.url* system property to create the link that opens a web help page when requesters use the **Help** command in the Virtual Agent Facebook Messenger integration.

Before you begin

- Determine the web page that provides the help content that your Facebook Messenger users need.
- Role required: virtual_agent_admin or admin

Procedure

1. Set the application scope to **Global**.
2. In the Navigation filter, enter `sys_properties.list`.
3. Click **New**.
4. Complete the following:
   a. In the **Name** field, enter the system property name: *va.messenger.help.url*.
   b. In the **Description** field, enter a brief explanation of this property.
   c. In the **Value** field, enter the URL of the website page that the link opens.
   d. Click **Submit**.

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Result

When your Facebook Messenger users type `help`, they are directed to the URL of the website specified in the *`va.messenger.help.url`* property.

Remove Conversational Integration with Facebook Messenger

Users can remove the Conversational Integration with Facebook Messenger application when the app is no longer needed.

Before you begin

Role required: admin

Procedure

1. Go to **All** > **Conversational Interfaces** > **Channels and Integrations**.
2. On the Facebook Messenger integration section, click **Manage**.
   The Facebook Messenger Channel integration page opens.
3. Click the three dots on the right hand side and choose **Remove Integration**.
   A confirmation message displays.
4. Click **Remove**.
   The Facebook Messenger application and all of its data is removed.

Conversational Integration with Apple Messages for Business

The Conversational Integration with Apple Messages for Business application allows customers to engage with your business using their Apple devices. Conversational Integration with Apple Messages for Business provides rich messaging capabilities such as Apple pay, forms, time picker, and authentication.

Overview

Enable requesters to interact in a Apple Messages for Business chat with a virtual agent or live agent using the ServiceNow® Conversational Integration with Apple Messages for Business application. The application connects a requester with a virtual agent or live agent using your company's Apple Messages for Business account. To get started with the Conversational Integration with Apple Messages for Business application, see Install Conversational Integration with Apple Messages for Business.

Apple Messages for Business entry points

Customers can start a conversation with an agent from a variety of entry points. From each of these entry points, customers can launch the Apple messages app and compose a message. You can add custom buttons to a website, app, or social media page, so that customers can start a conversation with a Virtual Agent or live agent. For a full overview of the options available, see the Apple documentation.

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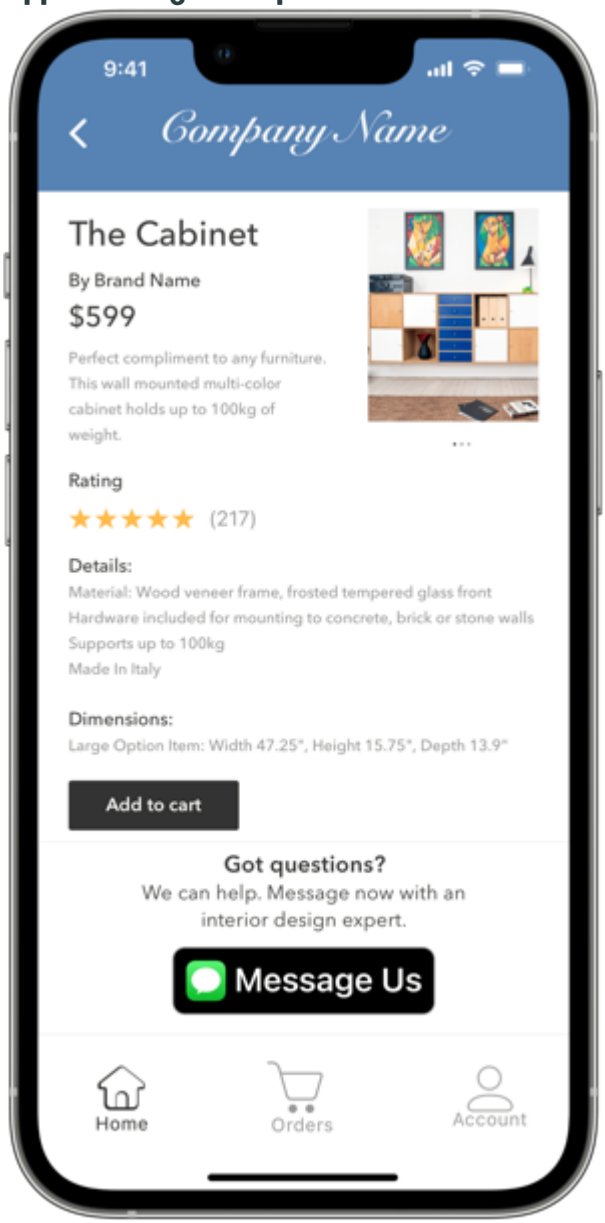
Apple message example



- iMessage
- Apple Maps
- Apple Pay
- Search
- Apple apps
- QR codes
- Social media

Apple Messages for Business interactive features

Apple Messages for Business includes a set of interactive features such as list picker, time picker, authentication, and Apple pay.

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Interactive features

Feature	Description
Rich links	Adds a picture or video preview to a URL
Quick replies	The user can make an inline choice with a single tap. This includes responses like star ratings or thumbs up or down.
List pickers	Gives the user a list of options to choose from. For example, a travel site can show flights, accommodations, car rentals, and bookings.
Time pickers	Provides time slots for users to choose for appointments, deliveries, and services. To use time pickers, you must have Conversational Appointment Booking installed.
Apple Pay	Send Apple Pay requests over Messages. For more information on setting up Apple Pay, refer to the Apple documentation.
Authentication	Apple Messages for Business supports OAuth2 protocol to integrate sign-in authentication to the Messages app.
iMessage App	Users can interact with your business directly from the Messages app on their iPhone, where they are accustomed to messaging their contacts.
Image sharing	Users or live and virtual agents can send photos during a chat.
Video sharing	Users or live or virtual agents can send videos during a chat.
Document attachments	Users or live or virtual agents can send PDF documents during a chat.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Configure Conversational Integration with Apple Messages for Business

Install and set up the Conversational Integration with Apple Messages for Business application to enable requesters to interact with virtual and live agents.

This task provides the general steps to integrate Apple Messages for Business with your ServiceNow instance using the Conversational Integration with Apple Messages for Business application.

1. Install Conversational Integration with Apple Messages for Business.
2. Set up the integration on Apple Messages for Business.
3. Capturing information from a user in a Apple Messages for Business chat conversation.
4. Enable authentication with your Identity Provider (IdP) by configuring the OAuth setup for Apple Messages for Business

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5. Enable Apple Pay on Apple Messages for Business interactions.
   - Refer to the Apple documentation for details about configuring your Apple merchant account.
   - Refer to Complete the Payment Provider Configuration to to connect your payment provider information to your ServiceNow® instance.

Install Conversational Integration with Apple Messages for Business

Install the Conversational Integration with Apple Messages for Business so that your business can interact with requesters on the Apple Messages for Business app. The application installs related ServiceNow Store applications and plugins if they are not already installed.

Before you begin

- Review the Conversational Integration with Apple Messages for Business application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.
- Create an Apple Messages for Business account at Apple Business Register.

Role required: admin

About this task

The following applications or plugins are installed with Conversational Integration with Apple Messages for Business:

Conversational Custom Chat Integration (com.glide.cs.custom.adapter)

Provides custom chat integration framework of scriptable APIs to enable the Virtual Agent application on any conversational interface.

For more information on this plugin, see Conversational custom chat integrations.

ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Enables execution of Integration Hub actions and flows.

IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)

Enables utility or global scripts that can be invoked from the Integration Spokes.

Conversational Messaging (com.glide.messaging.awa)

Enables messaging actions that are performed when an event occurs.

The following applications and plugins are not installed with Conversational Integration with Apple Messages for Business, but are required in order to use specific features.

Conversational Appointment Booking (sn_va_appt_schedul)

Book, reschedule, and cancel appointments from Virtual Agent conversations. This application is required in order to use the time picker feature in Apple Messages for Business.

Payment framework for conversational channels (sn_va_payment_ctrl)

Enables the payment framework custom control for live agent and virtual agent conversations in Apple Messages for Business.

Procedure

1. Make sure that your Apple Messages for Business account is set up and active.
   See the Apple documentation for more information.

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2. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
3. Find the Conversational Integration with Apple Messages for Business application (sn.va.abc.adapter) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
4. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.
5. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
6. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.
7. Select **Install**.

Set up the integration on Apple Messages for Business

To integrate Apple Messages for Business with your ServiceNow® instance, you need to set up your Apple Messages for Business account, and then link your Apple Messages for Business messaging service provider account to your ServiceNow® instance.

Before you begin

- Role required: admin
- If your business doesn't already have an Apple ID, create one. Make sure to use the ServiceNow® Messaging Service Provider (MSP).

  Note:
  For more information about creating a business Apple ID, refer to the Apple documentation.
- Create a Apple Messages for Business account.

Procedure

1. Go to Apple Messages for Business (register.apple.com).
2. Click **Messages for Business Accounts** to go to your business account.
3. Click **Test your Messaging Service Provider connection**, and **Connect**.
   You are redirected to your Now Support portal. Log in if necessary.
4. On your Now Support portal, complete the connection of your Apple Messages for Business account with your ServiceNow instance.

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a. Use the dropdown to select the instance that you want to connect to your Apple Messages for Business account.
Ensure that the instance has the Conversational Integration with Apple Messages for Business application installed.

b. If the connection is successful, the message "Your request on the instance <instance name> is successfully submitted" displays.
If the connection is not successful, you are redirected to the landing page on Now Support. Try again by repeating the connection steps.

5. Once the connection is complete, click **Go to instance** to go to your customer instance and log in if necessary.
6. On the Apple Messages for Business account page, enter the Provider Application name. This should be a name that will help you identify this connection on your instance.
7. Click **Complete installation**.
If the installation was successful, you are redirected to the instance homepage and the following message displays: "Bot registration successful. View the provider record here."

What to do next

If you want to integrate your Identity Provider (IdP), go to: OAuth setup for Apple Messages for Business.

OAuth setup for Apple Messages for Business

Integrate your Identity Provider (IdP) with Apple Messages for Business using OAuth2 authentication.

Connect Apple Messages for Business to your ServiceNow® instance

Complete the following steps on the Apple Messages for Business site to connect your Apple Messages for Business account to your ServiceNow® instance.

1. Go to the Apple Messages for Business page (register.apple.com) and log in to your Messages for Business account.
2. Go to the **Integrated OAuth2 Authentication** section.
3. Add the Authorization URL from your Identity Provider (IdP) to the **OAuth URL** field.
4. Add the Token URL from your IdP to the **Token URL** field.
5. Add the Client ID from your IdP to the **Client Identifier** field.
6. Refer to the Apple documentation for further instructions on configuring OAuth2 authentication on your Apple Messages for Business account.

Set up OAuth on your ServiceNow® instance

1. Go to your ServiceNow® instance to set up OAuth.
2. Create a new record in the Application Registries (oauth_entity) table using these instructions: Use a third-party OAuth provider.
   - Use the grant type **Authorization code**.
   - Add the **Token URL**.
3. Create a new record in the OAuth Entity Scopes (oauth_entity_scope) table using these instructions: Specify an OAuth scope. If you have multiple scopes, then add a new record for each scope, and create a corresponding Entity Profile Scope record for each scope.

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4. Create a new record in the Connection and Credential Aliases (sys_alias) table using these instructions: Create a Connection & Credential alias. This connection alias is used for fetching the http connection record which you create in the next step.
5. Create a new record in the HTTP(s) Connection (http_connection) table using these instructions: Create an HTTP(s) connection.
   - Type of connection - Select HTTP(s) Connection
   - Set the Connection alias to the `sys_alias` record created in previous step.
   - Set the connection url to fetch the user information API as per your IdP. (For example: `https://<your-idp-app>.com/api/v1/users`)
6. Create a Profile Parser Action using Action Designer. See the code snippets shown here for an example: Create a profile parser action for Apple Messages for Business. See Building actions for more details.
7. Create a new record in the Provider Application Authentications (sys_cs_provider_app_authentication) table using these instructions:
   - Set the Provider Channel Identity to your provider app (`sys_cs_provider_application`)
   - Set the OAuth Entity Profile to the `oauth_entity_profile` record created with your OAuth Provider (`oauth_entity`) record.
   - Set the Profile API Connection to the `http_connection` record created previously.
   - Set the Profile Response Parser Action to the `sys_hub_action_type_definition` record that you have defined.

Create a profile parser action for Apple Messages for Business

Create an action to parse the user information response and find the corresponding user on the ServiceNow® instance for Conversational Integration with Apple Messages for Business using the information provided here.

Before you begin

Role required: admin

Procedure

1. Refer to the following procedure to create a new action. Create an action.
2. In the Flow Designer Integration Hub, set the **Input** field to `response_body (string)`.

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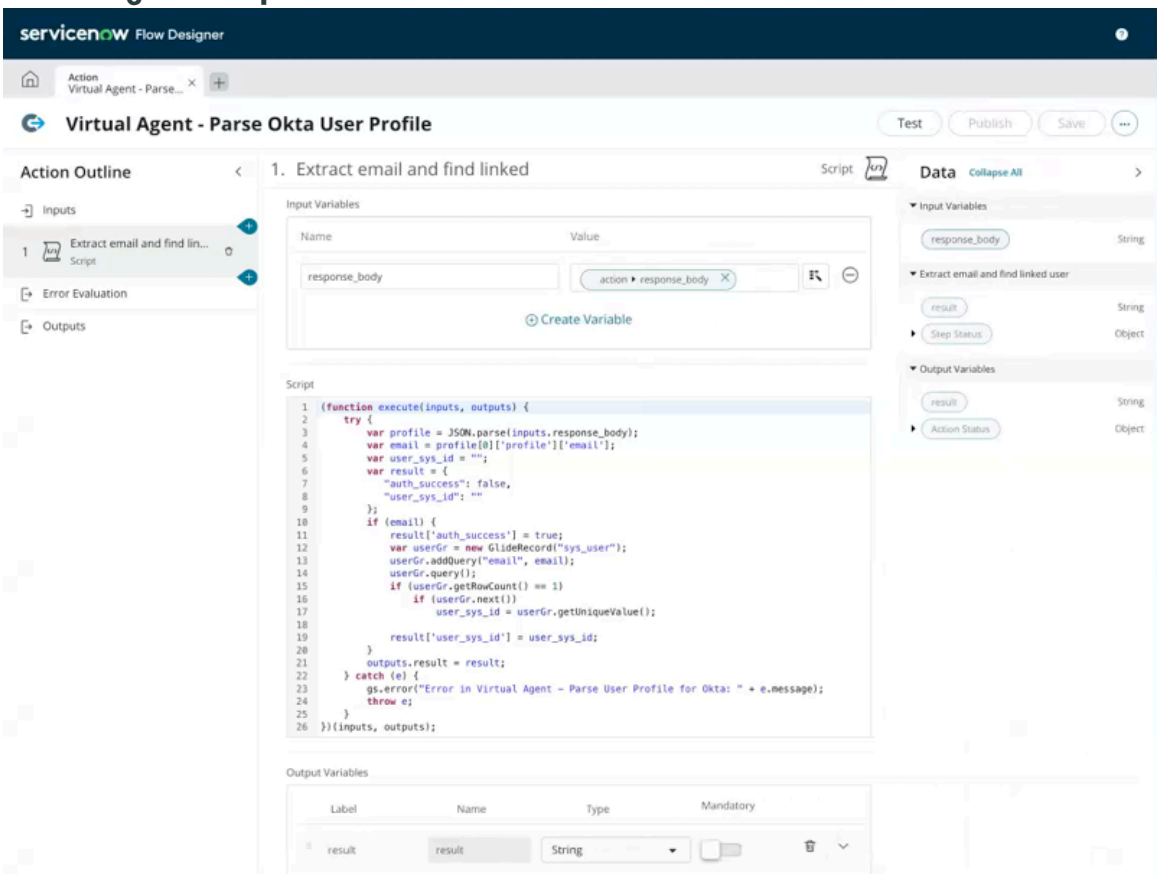
Flow designer example



3. You can use the following example script to help create your script for the action.

```
(function execute(inputs, outputs) {
    try {
        var profile = JSON.parse(inputs.response_body);
        var email = profile[0]['profile']['email'];
        var user_sys_id = "";
        var result = {
            "auth_success": false,
            "user_sys_id": ""
        };
        if (email) {
            result['auth_success'] = true;
            var userGr = new GlideRecord("sys_user");
            userGr.addQuery("email", email);
            userGr.query();
            if (userGr.getRowCount() == 1)
                if (userGr.next())
                    user_sys_id = userGr.getUniqueValue();

            result['user_sys_id'] = user_sys_id;
        }
        outputs.result = result;
    } catch (e) {
        gs.error("Error in Virtual Agent - Parse User Profile:
 " + e.message);
        throw e;
```

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```
    }
})(inputs, outputs);
```

4. Set the **Output** field to the following:

```
result = {
    "auth_success": false,
    "user_sys_id": "1234"
    };
```

Complete the Payment Provider Configuration

Fill out the information in the Payment Provider Configuration table to connect your payment provider information to your ServiceNow® instance.

Before you begin

Role required: admin

About this task

Each payment provider has their own procedures for certification, or configuration of your merchant profile. Refer to the payment provider's documentation for more details.

Procedure

1. Navigate to `sn_va_payment_ctrl_payment_provider_configuration.list`.
2. On the form, fill in the fields.

   All information must match the information you have input with the payment provider.

Payment Provider Configuration form

Field	Description
Name	The name of the payment provider. For example: Apple Pay, Google Pay, Stripe
Merchant Name	Your merchant name from your payment provider.
Merchant Identifier	Your merchant id from your payment provider.
Payment Gateway URL	The URL for the payment gateway you host which processes the customer credit card details.
Merchant Capabilities	The types of payment you can accept. For example: Debit, credit, 3DS
Supported Networks	The types of credit cards supported by the payment provider. For example: Mastercard, Visa, American Express
Protocol Profile	The name of the profile you have configured for processing payments.

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Field	Description
Order Tracking URL	The URL that the user can access to track their order.
Shipping Contact Update URL	This URL allows the user to update their shipping contact information.
Fallback URL	An alternate URL to allow the user to access the order information.
Payment Method Update URL	This URL allows the user to update their payment method preference.
Supported Countries	Countries that you sell to.
Shipping Method Update URL	This URL allows the user to update their shipping method preference.

3. Click **Update**.

Remove the integration for Apple Messages for Business

To remove the integration of Apple Messages for Business with your ServiceNow® instance, you need to log in to your Apple Messages for Business account, and then unlink your Apple Messages for Business partner account from your ServiceNow® instance.

Before you begin

- Role required: admin

Procedure

1. Go to Apple Messages for Business (register.apple.com).
2. Click **Messages for Business Accounts** to go to your business account.
3. Select the Business Account that you want to unlink from your ServiceNow® instance.
4. Click **Test your Messaging Service Provider connection**, and **Connect**.
   You are redirected to your Now Support portal. Log in if necessary.
5. On the **Remove Apple Messages for Business Account connection** page, click **Delete connection**.
   A new tab opens to confirm you want to remove the connection.
6. Click **Remove connection**.
7. Upon successful deletion, you are redirected to your the instance homepage and shown this message: “Business account registration was successfully deleted."

Capturing information from a user in a Apple Messages for Business chat conversation

Virtual Agent Designer is a diagram tool for creating and managing topics, which are blueprints for conversations between a virtual agent and user.

Use the collection of input controls provided by the Virtual Agent Designer to prompt and capture information from a requester in a Apple Messages for Business chat conversation. For more information, see Getting started with Virtual Agent Designer.

For more information about displaying images along with external links, see Using link unfurling in Virtual Agent.

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Apple Messages for Business has an array of interactive features that are native to the app. For more information about these interactive features, see Conversational Integration with Apple Messages for Business.

User notification consent

Note:

Notifications are turned off by default for the Apple Messages for Business channel. Make sure to enable notifications at the channel level.

Users must opt in to receive notifications. No notifications can be delivered until the user grants consent.

There are two ways for users to grant consent to receive notifications:

- The user can enter `Notification` into the Apple Messages for Business chat to get a bot response with the option to subscribe or unsubscribe from receiving notifications for your business on Apple Messages for Business.
- As the administrator, you can set up the option for users to subscribe or unsubscribe from notifications from your portal. See Configure system settings for more information.

User input controls

The Conversational Integration with Apple Messages for Business application supports the following user input controls in Virtual Agent Designer.

Supported user input controls

User input control	Description
Text	User enters a plain text string in the conversation.
Static Choice	User selects an item from a predefined list.
Dynamic Choice	User selects an item from a list that is created dynamically. For example, the user can select from a list of cases that they opened.
Boolean	User enters a Boolean response to the bot. For example, the user can reply `Yes` or `No` in a chat conversation.
File Picker	User sends a file to the bot.
Date Time	User selects a calendar date, time (hours and minutes), or both.
Carousel	User selects a single item from the carousel.

For more information about configuring user input controls, see Virtual Agent Designer user input controls.

The Conversational Integration with Apple Messages for Business application supports the following bot responses in Virtual Agent Designer.

Supported bot responses

Bot response	Description
Text	Bot sends a plain text string to the user.
Image	Bot sends an image to the user.

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Supported bot responses (continued)

Bot response	Description
Link	Bot sends a web link to the user. **Note:** Any URLs must be added to the allowed domain list (`sys_cs_hostname_allow_list`) table.
Table	Bot sends information in a table format so that users can see information in a more organized way. For example, you can organize and display information such as the following: • Planned service changes • Company holidays • Contact information • Testing sites
Card	Bot uploads and displays selected information from a record on your instance. You can choose a record card, video card, or small or large image card.

For more information about configuring bot responses, see Virtual Agent Designer bot responses.

Transfer Apple Messages for Business chat conversations to live agents

Configure the Advanced Work Assignment application to transfer a Apple Messages for Business chat conversation initiated by a requester to a live agent.

Before you begin

Your administrator must have completed the following tasks:

- Activate Advanced Work Assignment.
- Set the application scope to Conversational Integration with Apple Messages for Business using the application picker. For more information, see Application picker.
- Activate the Conversational Messaging plugin (com.glide.messaging.awa). For more information, see Activate Conversational Messaging.

Role required: admin

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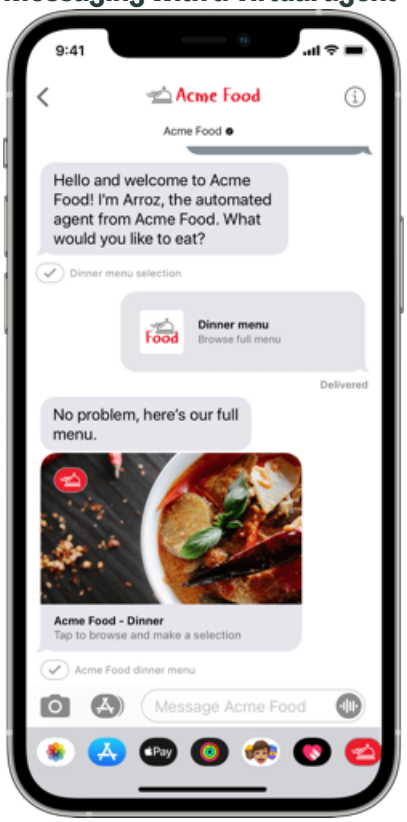
About this task

Messaging with a virtual agent



Messaging with a live agent



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Procedure

1. Enable the Apple Messages for Business service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Service Channels**.
   b. In the **Name** column of the Queues list, search for `Apple Messages for Business`.
   c. Click **Apple Messages for Business**.
   d. On the Service Channel form, select the **Active** check box.
   e. Click **Update**.
   f. Add agents to the `Agent Apple Messages for Business Queue`.
   For more information, see Service channels.
2. Automatically route work items for Apple Messages for Business chat conversations to agents by configuring the queue for the Apple Messages for Business service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Queues**.
   b. In the **Name** column of the Queues list, search for `Apple Messages for Business Queue`.
   c. Click **Agent Apple Messages for Business Queue**.
   d. On the Queue form, select the **Active** check box.
   e. Click **Update**.

   Note:
   By default, the *`Apple Messages for Business - Most Capacity`* assignment rule is associated with the Agent Apple Messages for Business Queue. You can create another assignment rule and associate it with the queue. For more information, see Configure agent assignment rules and Work item queues.

3. Configure agent presence states for the Apple Messages for Business service channel.
   a. Navigate to **Advanced Work Assignment** > **Settings** > **Presence States**.
   b. In the **Name** column of the Presence States list, click an existing state.
   c. In the Apply to groups section of the Presence State form, click the add icon (>) to move the **Agent Apple Messages for Business Group** group from the **Available** column to the **Selected** column.

      Note:
      You can ignore this step if you have selected the **Apply to all groups** check box.

   d. Click **Update**.

   For more information, see Configure agent presence states.

Using Conversational Integration with Apple Messages for Business

Enable a requester to converse with an agent using Apple Messages for Business chat conversations. An administrator can configure the Conversational Integration with Apple Messages for Business application for integrating the Apple Messages for Business messaging app with a ServiceNow application.

Agents and requesters can do the following:

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- A requester can initiate Apple Messages for Business chat conversations with a virtual agent or live agent.
- A live agent can accept Apple Messages for Business chat conversations as work items from their Agent Workspace Inbox to converse with a requester.
- A live agent can continue to interact with a customer conversation in Apple Messages for Business for as long as the customer would like.

For more information, see Integrating Apple Messages for Business with Customer Service Management.

Accepting Apple Messages for Business chat conversations

As a live agent interacting with a requester over the Apple Messages for Business service channel, you can do the following:

- Converse with the requester through text messages or iMessages.
- Share a knowledge article displayed as a link to the requester.
- Share a record. For example, a customer service case.
- Share any URLs as links with photo or video previews.
- Share photos or videos.
- Share any files as attachments.

Note:
If an administrator has configured the Apple Messages for Business service channel for transfer of chat conversations, then you can accept a work item from the Apple Messages for Business chat conversation in your Agent Workspace Inbox. For more information, see Transfer Apple Messages for Business chat conversations to live agents and Service channels.

Integrating the Conversational Integration with Apple Messages for Business app with other applications

Other ServiceNow applications and features can use the Conversational Integration with Apple Messages for Business application.

As a live agent, when you accept a request from the Apple Messages for Business service channel, you can converse with the requester within the same channel.

Integrating with Customer Service Management

Integrate the Conversational Integration with Apple Messages for Business application with the ServiceNow® Customer Service Management application to enable your customer contacts and consumers to initiate a Apple Messages for Business chat conversation with a virtual agent or live agent. An agent can accept a conversation initiated from a Apple Messages for Business chat conversation.

Virtual Agent integration with Voice channels

Enable users to run voice-based Virtual Agent bot conversations by integrating with supported third-party Contact Center applications and voice-assistant-based applications. Use the Conversational Integration apps that are available from the ServiceNow® Store to configure these voice-based apps for your ServiceNow instance.

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Conversational IVR (Interactive Voice Response) integrates third-party Contact Center applications with your ServiceNow instance. This enables users to have voice-based conversations with your Virtual Agent.

The Virtual Agent integration with voice assistant applications enables interactions with touch or speak commands. For more information, see Conversational Integration with Alexa

Conversational IVR with Amazon Connect

ServiceNow's Conversational IVR with Amazon Connect enables Conversational Interactive Voice Response (IVR) to be conducted by your instance. Users will be able to conduct conversations with a bot via the phone channel, powered by ServiceNow Virtual Agent. Conversational IVR with Amazon Connect is available with the installation of Conversational IVR with Amazon Connect (com.sn.va.amz.connect) plugin.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Enable your users to initiate an IVR (Interactive Voice Response) conversation with your Virtual Agent Agent by building an integration with Amazon Connect. Using the Conversational IVR with Amazon Connect, you can enable a user to have a voice-based conversation with your Virtual Agent using Amazon Connect to help provide this functionality. This integration also provides the user the flexibility to connect with an agent using ServiceNow AWA Advanced Work Assignment (AWA) over SoftPhone.

Conversational IVR highlights

- Use Virtual Agent topics as a Conversational IVR to enable deflection in Phone channels, providing consistent end-user experience.
- Enable true-omnichannel flow including routing Phone to the Conversational VA-IVR.
- In case of escalations, route calls smoothly to live agents using AWA via conversational infrastructure.

To get started with the Conversational Integration with Amazon Connect application, see Install Conversational IVR with Amazon Connect.

Setup Conversational Integration with Amazon Connect

Install and configure the Conversational Integration with Amazon Connect application to enable users to have a conversational voice response with their Virtual Agent.

1. To install the pre-built adapter for Conversational Integration with Amazon Connect, see Install Conversational IVR with Amazon Connect.
2. To set up your Amazon Connect account if not already configured, see Configuring your AWS account for use with Conversational IVR.
3. To configure Conversational Integration with Amazon Connect, see Configure Conversational IVR with Amazon Connect.
4. To set up Live Agent transfer for Conversational IVR, see Sync Agents to setup Live Agent transfer.
5. To configure user authentication, see Configure user authentication for Conversational IVR.

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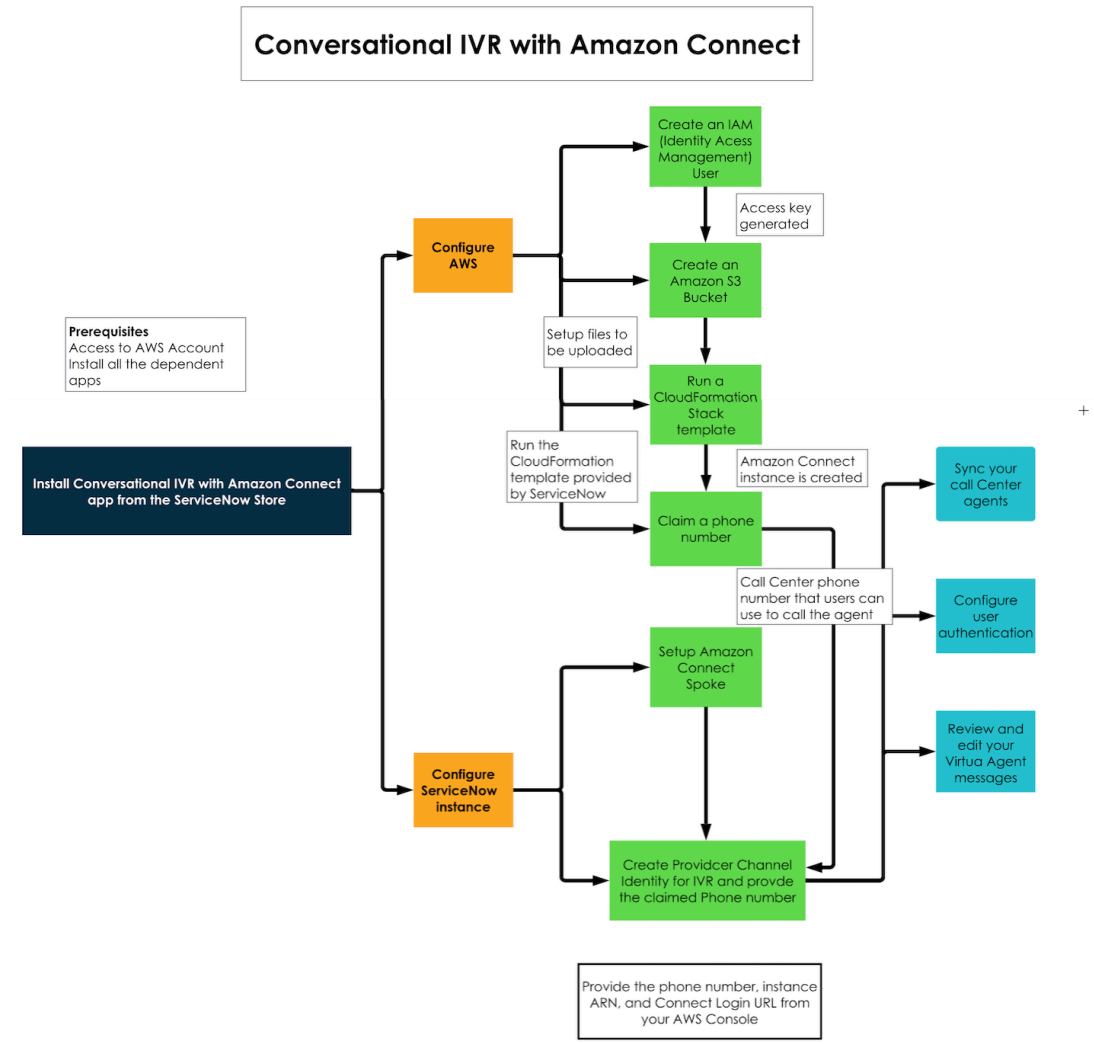
6. To modify the Conversational Integration with Amazon Connect settings for the best interactive voice response, see Manage bot messages for Conversational IVR.
7. To configure callback functionality, see Configure callback behavior for a channel.

Workflow of Conversational IVR with Amazon Connect



Install Conversational IVR with Amazon Connect

Install Conversational IVR with Amazon Connect application, to use interactive voice response (IVR) with Virtual Agent.

Before you begin

Role required: admin

Note:
Before installing Conversational IVR with Amazon Connect, ensure that you have installed the Glide Virtual Agent (com.glide.cs.custom.adapter) plugin in your ServiceNow instance.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select **Virtual Agent** on the left pane and navigate to **Add virtual agent to your contact center**.

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3. Click **Install**.
   You are directed to the ServiceNow Store where you can search and get the Conversational IVR with Amazon Connect application to use IVR.

What to do next

To learn how to configure your AWS account for enabling Conversational IVR, see Configuring your AWS account for use with Conversational IVR.

Components installed with Conversational IVR with Amazon Connect

After installing the Conversational IVR with Amazon Connect application from the ServiceNow Store, the additional dependant plugins and spokes get auto-installed to enable other features for interactive voice response.

Plugin	Description
OpenFrame - (com.sn_openframe)	An interface to integrate external communication systems with a ServiceNow instance. This plugin brings a UI frame that is accessible and available anywhere within a ServiceNow screens.
Virtual Agent API - (sn_va_as_service)	Connects a user with a Virtual Agent using the company's Amazon Connect account.
Advanced Work Assignment - (com.glide.awa)	Automatically assigns work items to agents based on their availability, capacity, and skills.
Amazon Connect Spoke - (sn_amzn_connect_spk)(ih-amazon-connect-actions)	Simplifies how you integrate with Amazon Connect.
Amazon S3 Spoke - (ih-amazon-s3-action-pack)(ih-s3-actions)	Simplifies how you integrate with Amazon S3.
Omnichannel Callback - (sn_omni_callback) (com.sn.omnichannel.callback)	Provides a consistent omnichannel experience for requesters whether they are coming from the digital channel or from the phone.

Configuring your AWS account for use with Conversational IVR

To enable the Conversational IVR functionality within your ServiceNow instance, you must utilize a third-party Contact Center application. One such option is Amazon Connect, which is part of the Amazon Web Services (AWS) platform. You must configure your organization's AWS account prior to making it available for use in the Conversational IVR feature.

Configure your AWS account

1. To grant a ServiceNow user the required permissions to complete the Conversational Integration with Amazon Connect on the AWS Console, see Grant access to an IAM (Identity and Access Management) role.
2. To create an Amazon S3 bucket and to store objects within your AWS account, see Create an Amazon S3 bucket.

   This will host the files required to complete the configuration.

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3. To create an AWS CloudFormation Stack and to provide a common language to describe and provision all the infrastructure resources required to enable the Conversational IVR feature in your environment in a safe and repeatable way, see Create an Amazon CloudFormation Stack.

   You will be populating a template provided by ServiceNow that will then generate the required configuration.

4. To claim a phone number for setting up Conversational IVR, see Claim a Phone number .
5. To configure Conversational IVR with Amazon Connect application in your ServiceNow instance to store the conversation between the agent and the user over Softphone as a transcript, see Setup Transcript for Amazon Connect.

Grant access to an IAM (Identity and Access Management) role

Grant a ServiceNow user the required permissions to complete the Conversational Integration with Amazon Connect on the AWS Console.

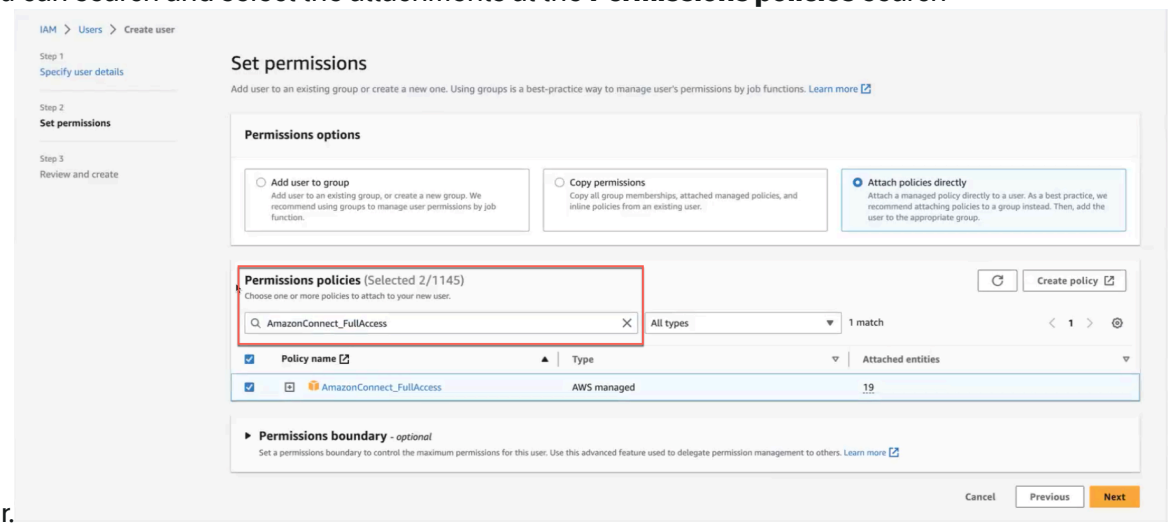
Before you begin

Role required: admin

Procedure

1. Log in to your AWS (Amazon Web Services) account and search for **IAM**.
2. Navigate to **Users**.
3. Click **Add users**, provide the **User name**, and click **Next**.
4. On the Set permissions page, under Permissions options, select **Attach policies directly** and select the following permissions:
   - AWSLambdaExecute
   - AmazonConnect_FullAccess
   - AmazonS3FullAccess

   Note:
   You can search and select the attachments at the **Permissions policies** search bar.



5. After selecting the required roles, click **Next**.
6. Click **Create user**.

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Create an Amazon S3 bucket

Create an Amazon S3 bucket to store the files required for configuring Conversational IVR within your AWS account.

Before you begin
Role required: admin

Note:
Before creating the Amazon S3 Bucket, ensure that you have downloaded the `Lambda function`, `Lex Bot`, and `HelperLambda` files from this Knowledge Base article.

For additional information about Amazon S3 Buckets, refer to the Amazon S3 documentation.

Procedure

1. Log in to the AWS Admin Console.
2. Navigate to **Amazon S3** and click **Create bucket**.
3. Provide a **Bucket name** (for example: sn-ci-cc-amazon-connect-setup) and note it down.
   This Bucket name will be used during the creation of a CloudFormation Stack at a later stage.
4. Select the **AWS Region** from the drop-down and ensure that this region remains consistent throughout the setup process.
5. Click **Create bucket**.
   You will be redirected to the list of Amazon S3 buckets that you have on your instance.
6. Search for the bucket that you created and click the bucket name to open it.
   Clicking the bucket name takes you to the **Objects** tab of the bucket.
7. On the Objects tab, click **Upload**.
8. Click **Add Files** and browse for the following downloaded files:
   - Lambda function
   - Lex Bot
   - HelperLambda
   - Prompt

   Note:
   - The Prompt file is not provided by ServiceNow. You must create your own Prompt file, note its name, and provide the name while creating the CloudFormation Stack. For more information about creating a Prompt, see https://docs.aws.amazon.com/connect/latest/adminguide/prompts.html.
   - Also make sure that you do not rename any files while uploading them.
9. Select all the files that you uploaded and select **Upload**.
   Once the files are uploaded, you will receive the

   ```
   Upload succeeded
   ```

   message.

Create an Amazon CloudFormation Stack

Create an AWS CloudFormation stack to provision all the infrastructure resources required to enable the Conversational IVR feature. You will be populating a template provided by ServiceNow that will then generate the required configuration.

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Before you begin

Role required: admin

Ensure that you downloaded the Cloud Formation Template (CFT) YAML file from this Knowledge Article before creating an Amazon CloudFormation Stack and also make sure that you select the same region as that of the S3 bucket region.

For more information about creating an Amazon CloudFormation stack, refer to Amazon CloudFormation documentation.

Procedure

1. Log in to the Amazon Web Services Console.
2. Navigate to **CloudFormation** > **Stacks**.
3. Click the **Create stack** drop-down and select **With new resources (standard)**.
4. On the Create stack form, under Prepare template section, select **Template is Ready**.
5. In the Template resource section, select **Upload a template file** to the choose your downloaded CFT template and click **Next**.
   You will be directed to the Specify stack details page.
6. On the Specify stack details page, provide a **Stack name** (for example: sn-ci-cc-amazon-connect-setup-stack) and specify the following details in the Parameters section:

Parameters

Parameters	Description	Example Value
AWS Configuration		
S3 Bucket Name	The name of the S3 Bucket that you created during the IVR setup process. S3 bucket must contain the required files to be uploaded. Populate this parameter with that bucket name.	sn-ci-cc-amazon-connect-setup
ServiceNow Instance Configuration		
ServiceNow Instance	The URL of the ServiceNow instance being used in this configuration. Be sure to include `https://`.	https://[instance-name].service-now.com
Username	Name of the ServiceNow user to be used for establishing a basic authentication configuration in your ServiceNow instance. The user with this username must have the 'sn_va_as_service.contact_center_api' role.	n/a
Password	ServiceNow user's password to establish a basic	n/a

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Parameters	Description	Example Value
	authentication configuration in your ServiceNow instance.	
Token Type	The type of token used in this connection. If you do not know the token type, then use Static.	Static/Hash
Token Value	The secure token value for the connection between Amazon Connect and ServiceNow. **Note:** Ensure that the token you provide does not contain any non-alphanumeric values and ensure that you save the token value for later use.	rLRU5tyNHVj39MdA
Amazon Connect Instance Configuration - (Ignore if there is an existing amazon connect instance)		
Amazon connect instance alias	Name for the Amazon Connect instance that will be created.	n/a
Prompt audio S3 file key	Provide the name of the Prompt file that you have uploaded in Create an Amazon S3 bucket. The Prompt file is an audio file containing the ringtone when customer connects to an agent.	n/a
Amazon Connect Instance Admin Configuration (Optional)		
Username	Provide an Amazon Connect username to create the administrator for the newly created Amazon Connect instance.	n/a
Email	Email of the administrator for the Amazon Connect instance.	n/a
First Name	First name of the user who is the administrator of the Amazon Connect instance.	n/a

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Parameters	Description	Example Value
Last Name	Last name of the user who is the administrator of the Amazon Connect instance.	n/a
Password	Password to log into the Amazon Connect instance as an administrator.	n/a

7. Click **Next**.
8. Review the parameters that you provided for your Stack, select the **I acknowledge that AWS CloudFormation might create IAM resources with custom names.** checkbox, and **Submit**.
   The Stack creates the required resources needed for the Amazon Connect IVR setup.
9. Review the progress of the CloudFormation Stack to ensure that the process completes with a CREATE_COMPLETE status.
   Once the Cloud Formation Stack is created, you will see the Amazon Connect instance.

What to do next
Claim a Phone number.

Configure localization in Conversational IVR with Amazon Connect

Configure localization in Conversational IVR to use localization with Virtual Agent in other supported languages.

Before you begin
Role required: admin

Ensure that you have completed the IVR setup on both AWS Console and ServiceNow instance.

Procedure
1. Log in to the AWS Management Console and open the **Amazon Lex** bot named **SN_CI_CC_LexBot**.
2. Change the language of the amazon IVR Contact.

   a. Navigate to Amazon Connect from the AWS Console.

   b. On the instance page, open the connect instance.

   c. Hover over the Routing icon  on the left navigation bar and select **Contact flows**.

   d. Select the **SN_CI_CC_Inbound_Contact_Flow**.
   SN_CI_CC_Inbound_Contact_Flow is the default contact that is shipped to the user for use with Conversation IVR.

   e. On the Contact flow, click the **Set voice** flow.

   f. On the Set voice pop-up, select the language that you added from the **Language** drop-down and select the **Set language attribute** check box.
   English (US) is the default voice language and the English (US) language code is sent to the LexBot. The LexBot then collects the intents from the English (US) language.

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Note:
There are different dialects available for a language. Therefore, ensure that you select the correct language with its dialect that you have added previously.

g. Click **Save**.

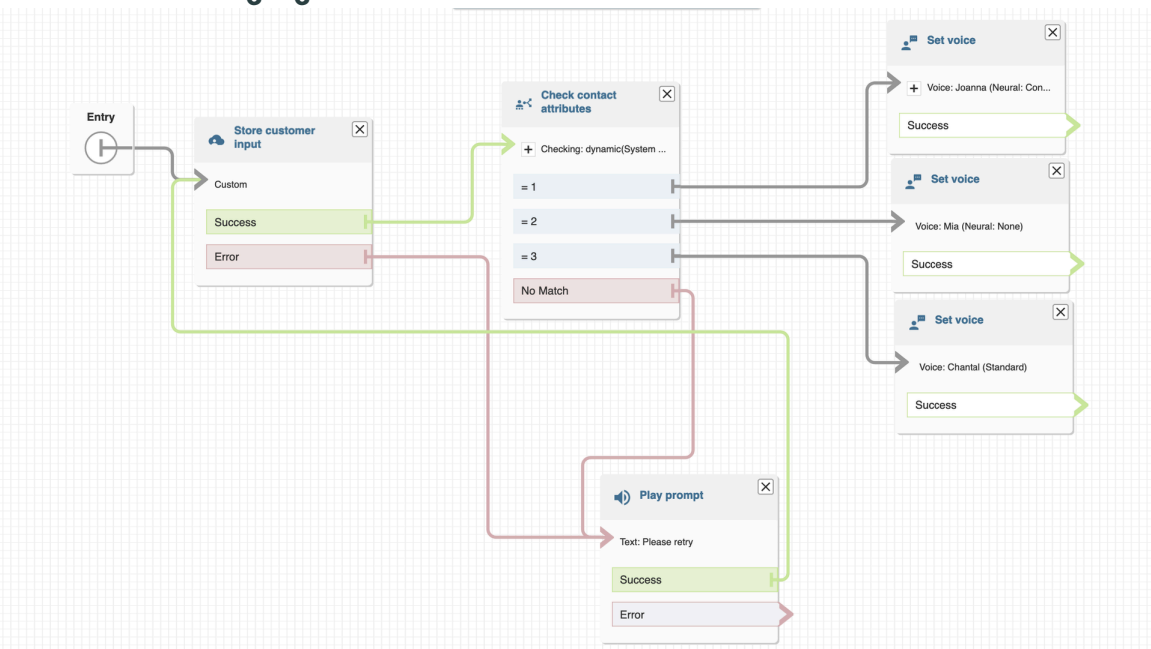
h. Click **Publish** to publish the Contact flow with the new language.

The entire process of setting up the language attribute in **Set voice** block works only if you use Virtual Agent integration with one language.

If you wish to select the language dynamically for every conversation, you must manually add a list of language choices to get the input from the user and use **Set voice** block to set the appropriate language code.

The following image illustrates the flow:

Workflow to set language attribute



Customize keywords in Conversational IVR

Customize the IVR integration-specific keywords that are provided by default for better conversation in another language with the Virtual Agent.

Before you begin

Role required: admin

Ensure that you have completed the IVR setup on both AWS Console and ServiceNow instance.

Note:
Any customizations done to the Lex bot must be redone in case of any updates to the Lex bot resource in the future versions of the application.

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Procedure

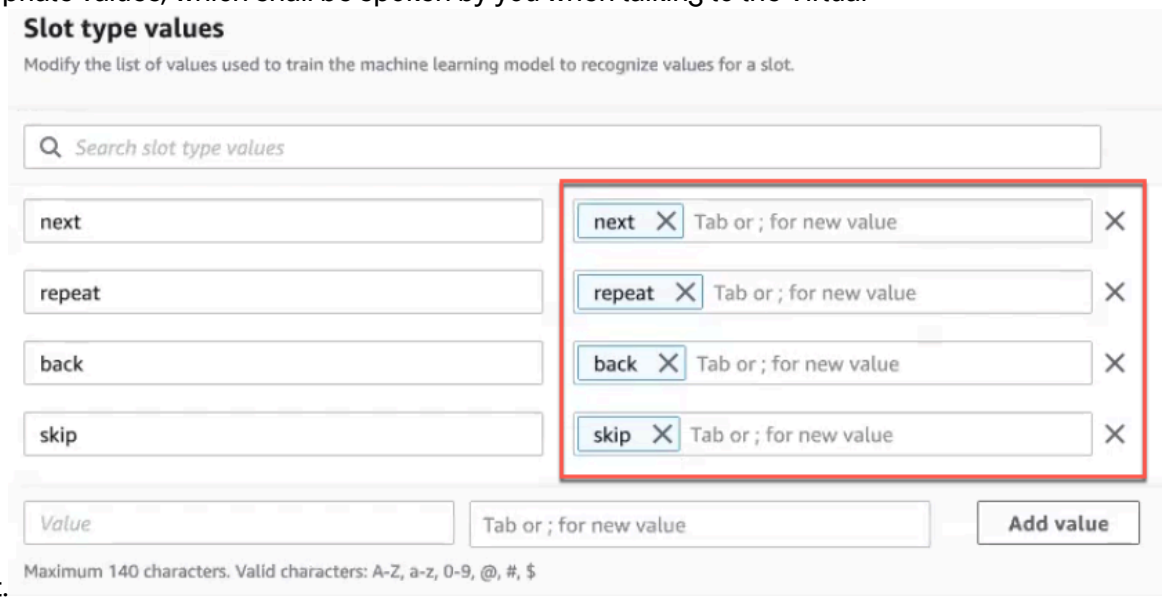
1. Log in to the AWS Admin Console and open the **Amazon Lex** bot named **SN_CI_CC_LexBot**.
2. If you want to customize the default keywords, you can edit the **amz_ivr_keywords** slot type and give preferred values, and here's how you can do that.

   a. Under the Conversation structure section in Slot types, select **View slot types**.

   b. On the Slot types page, select **AMZ_IVR_KEYWORDS** slot type.
   The slot type is used for customizing the IVR integration-specific keywords namely **next**, **repeat**, **back**, and **skip**. These keywords can be used when talking to the Virtual Agent to navigate the paginated options/list of choices to skip a control.

   > **Important:**
   > Ensure that you are editing the values only on the right column. Do not edit the values on the left column as they should not be changed regardless of the language.

   By default the slot type values (on the right column) are in English. If the values on the right are not suitable for the another, change them to equivalent appropriate values, which shall be spoken by you when talking to the Virtual Agent.



   If you have edited the slot type values on the right column, you must also ensure that you edit their respective bot messages on your instance to reflect these changes. For more information, see Manage bot messages for Conversational IVR.

   c. Click **Save Slot type** and click **Build** on the top right of the page.

   > **Note:**
   > You must build the Slot types for any new changes you made.

   The language is successfully built and on the All languages page, you can notice the **Successfully built** status against the language you have customized.

3. Create a new version of the bot to include both the languages.

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a. On the left navigation, select **Bot versions**.

b. On the Versions page, select **Create version** on the top-right.

> **Note:**
> Ensure that all the languages that you need in this bot have the **Successfully built** status before creating the version as only the built languages will be included in the version.

c. On the Create version page, provide a **Description** for the version and click **Create**.
A version gets created with the next number. For example, Version 2 when there is only the default version 1 on your AWS instance.

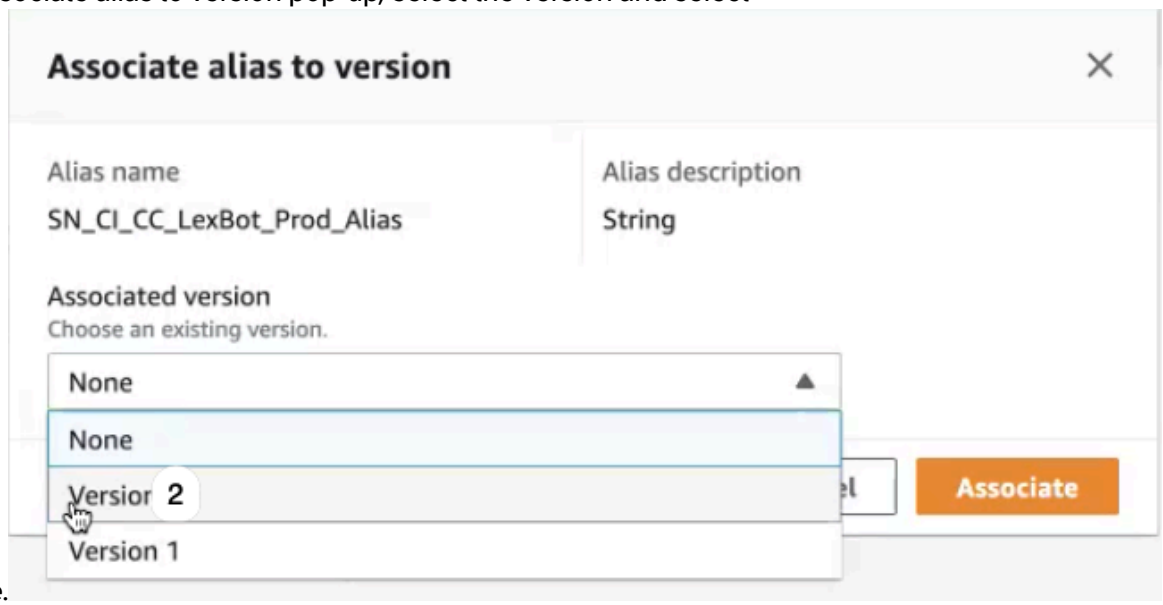
4. Associate the version that you created with the production alias.

a. One left pane, navigate to **Deployment** > **Aliases** and select **SN_CI_CC_LexBot_Prod_Alias**, the default production Alias associated with Version 1 for a newly set up integration.

b. On the Alias page, select **Associate version with alias** and select the version you created for the language being customized.

> **Note:**
> Ensure to always have the production alias to point to the latest version number.

c. On the Associate alias to version pop-up, select the version and select **Associate**.



At this step, the bot is available for use in the language that you customized.

Claim a Phone number

Claim a Phone number to set up IVR (Interactive Voice Response).

Before you begin
Role required: admin

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Procedure

1. Log into your AWS Console and look for the Amazon Connect Instance you created.
2. Log in as an administrator into your Amazon Connect instance.
3. Navigate to **Channels** > **Phone numbers** and click **Claim a number**.
4. On the Claim Phone number form, select either the **Toll free** Country or the **DID (Direct Inward Dialing)** Prefix and select the number.
5. Claim a phone number to the SN_CI_CC_Inbound_Contact_Flow from the Phone numbers section in the navigator.
6. Provide a description of your choice in the **Description** field, select SN_CI_CC_Inbound_Contact_Flow from the **Contact flow / IVR** drop-down, and click **Save**. After the number is published, customers can make a call and start conversations with the Virtual Agent.
7. Navigate to **Routing** > **Queues** and select **BasicQueue**.
8. On the Edit BasicQueue page, under Settings, specify a name for **Default caller ID name**.
9. For the **Outbound caller ID number**, select the Phone number you claimed in Step 4.
10. Select **SN_CI_CC_Outbound_Contact_Flow** for the **Outbound whisper flow**.
11. Click **Save**.

What to do next

Invoke an automated caller interaction with bots to fulfill the caller's request within the ServiceNow instance. For more information, see Configure a contact flow for an automated caller interaction.

Create inbound and outbound Amazon Connect contact flows

Create the inbound and outbound Amazon Connect contact flows to set up IVR (Interactive Voice Response).

Before you begin

Role required: admin

Procedure

1. Log in to your AWS account and select **Contact Flows**.

   a. Select the region where the Lambda function/LexBot was created. For more information see, Create an Amazon S3 bucket.

   > **Note:**
   > Ensure that the region that you selected matches across the Amazon Connect setup.

   b. In the Amazon Lex section, search and select your bot (for example: SN_CI_CC_LexBot) in the **Bot** drop-down, select **SN_CI_CC_LexBot_Prod_Alias** file from the **Alias** drop-down, and click **Add Amazon Lex Bot**.

   c. In the AWS Lambda section, search for your Lambda function (for example: SN_CI_CC_Process_Request) from the drop-down and click **Add Lambda Function**.

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d. Navigate to the Approved Origins section, click **Add Domain** to add your ServiceNow instance URL and click **Add Domain**.

> **Note:**
> Do not select the **Enable Contact flow logs** check box under the Contact flow logs section.

2. Log in to your Amazon Connect Instance as an Administrator.

a. Hover over the **Routing** icon on the left navigation bar and select **Prompts**.

b. Click **Create new prompt**, upload a prompt file of your choice with .wav file extension, and click **Create**.

> **Note:**
> Ensure that the .wav audio file is no more than 10 seconds for optimal results.

c. Hover over the **Routing** icon on the left navigation bar and select **Contact flows**.

d. Click the drop-down next to Create contact flow button and select **Create customer queue flow**.

e. On the Contact flow form, click the drop-down next to the Save button and select **Import flow (beta)**.

f. On the Import flow (beta) pop-up screen, select a contact flow JSON file of your choice (for example: SN_CI_CC_Inbound_Customer_Queue_Flow) and click **Import**.

g. After the JSON is uploaded, locate and click the **Loop prompts** tile.

h. On the Loop prompts pop-up, select an audio file of your choice with the .wav extension (for example: SN_CI_CC_Inbound_Prompt.wav) from the Audio recording drop-down and click **Save**.

> **Note:**
> Ensure that the .wav audio file which you upload, does not exceed more than five-minutes duration.

i. Click **Save** to save the Contact flow and click **Publish** to publish the Contact flow.

j. Navigate to **Routing** > **Contact flows**, click **Create contact flow** and import the SN_CI_CC_Inbound_Contact_Flow JSON file that you downloaded from the KB article.

k. Locate and click the **Set customer queue flow** tile.

l. In the Set customer queue flow pop-up, select the customer queue flow from the drop-down (for example: SN_CI_CC_Inbound_Customer_Queue_Flow) and click **Save**.

m. Locate and click the **Invoke AWS Lambda function** tile.

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n. In the Invoke AWS Lambda function pop-up, select the SN_CI_CC_Process_Request lambda function file from the drop-down, that you have already added at Step 1, C, and click **Save**.

o. Locate and click the **Get customer input** tile.

p. In the Get customer input pop-up, navigate to the Lex bot section and select the SN_CI_CC_LexBot file from the Name drop-down and SN_CI_CC_LexBot_Prod_Alias file from the Alias drop-down and click **Save**.

q. Click the **Play Prompt** tile next to the **Set Working Queue** tile.

r. In the Audio prompt drop-down, select the .wav file of your choice and click **Save.**

s. Click **Save** to save the Contact flow and click **Publish** to publish the Contact flow.

t. Navigate to **Channels** > **Phone numbers** and click **Claim a number**.

u. On the Claim Phone number form, select either the **Toll free** Country or the **DID (Direct Inward Dialing)** Prefix and select the number.

v. Provide a description of your choice in the **Description** field, select SN_CI_CC_Inbound_Contact_Flow from the **Contact flow / IVR** drop-down, and click **Save**. You can edit the number description and also associate it with a new contact flow on the Manage Phone numbers page.
After the number is published, customers can make a call and start conversations with the Virtual Agent.

For more information about creating a Contact Flow, see Amazon Contact flow documentation.

For more information about creating Prompts, see Create prompts in Amazon Connect documentation.

What to do next
Invoke an automated caller interaction with bots to fulfill the caller's request within the ServiceNow instance. For more information, see Configure a contact flow for an automated caller interaction.

Setup Transcript for Amazon Connect

Configure Conversational IVR with Amazon Connect application to store the conversation between the Agent and the User over Softphone as a transcript.

Before you begin
Role required: admin

About this task

- The voice transcript is stored by Amazon Connect, a third-party provider, post the voice conversation in the [sys_cs_message] table.
- Messages between the User and the Agent are fetched by transcript API and attached to the Conversation. Also, the sentiment score from Amazon for each message is considered to derive overall Sentiment of User and Agent Conversation.

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- From Utah, the voice transcription is available real-time with the APIs that persist transcribed messages of an on-going phone call in real time. The messages are displayed in the Agent workspace chat panel along with previous conversation history (if enabled) and allows the Agent to leverage features like agent assist and search while actively talking to the caller. For more information about using Transcript API for real-time transcription, see Voice Interaction Resource API.

  To date, we ensure that performance is acceptable for the volume of transactions, about 5 million utterances/day/customer.

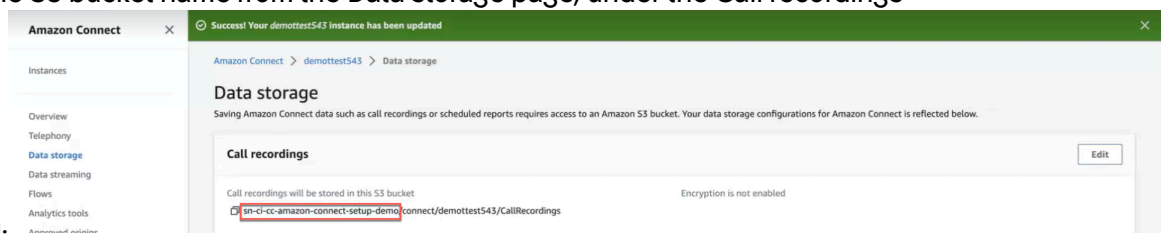
  We have also updated the system to store all details associated to a voice call in standard CI tables (e.g., conversation and interaction tables) instead of the sn_openframe_phone_log table.

Procedure

1. Open your Amazon Connect instance page in AWS Console.
2. Navigate to **Analytics tools** page and click **Enable contact lens**.
3. Click **Save**.
4. Navigate to **Data storage** > **Call recordings** and click **Edit**.
5. On the Call recordings page, select **Enable call recording**.
   To enable Call recordings, you can either create a new S3 bucket by selecting **Create a new S3 bucket (recommended)** or use an existing s3 bucket by selecting **Select an existing S3 bucket**.

   Note:
   This procedure explains creating a transcript using an existing S3 bucket.

6. Select the **Name** of the existing S3 bucket from the drop-down and click **Save**.
7. Copy the S3 bucket name from the Data storage page, under the Call recordings section.



8. Navigate to **AWS Lambda** > **Functions** and select the**SN_CI_CC_ProcessRequest** Function name.
9. Click **Add trigger** and select **S3** from the Select a source drop-down.
10. In the **Bucket** drop-down, paste the copied bucket name.
11. Select the acknowledgement check box and click **Add**.
12. Configure Google Sentiment Analysis.

    a. Log in to your ServiceNow instance and navigate to **All** > **System Applications** > **All Available Applications** > **All**.

    b. Find the Sentiment Analysis (com.glide.cs.sentiment) application using the filter criteria and search bar and click **Install**.

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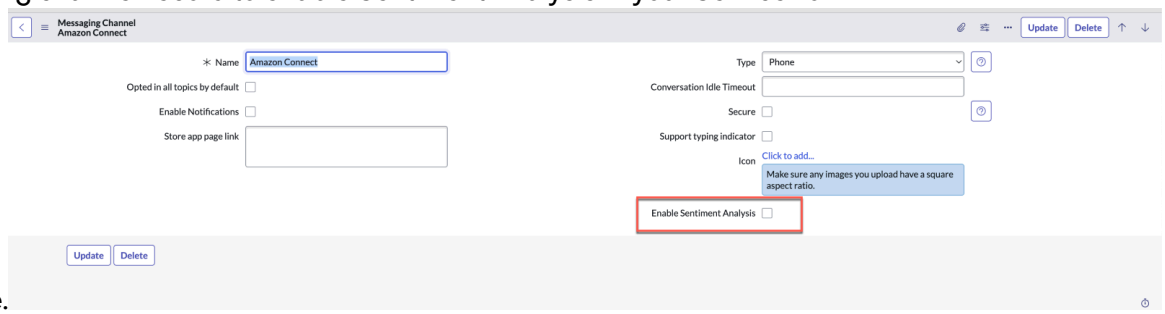
c. Select the **Enable Sentiment Analysis** check box on the Amazon Connect's messaging channel record to enable Sentiment Analysis in your ServiceNow instance.



d. Create a connection for the Google Sentiment Analysis API.

- Create a service account on Google Cloud and the Cloud Natural Language API. For more information, see https://cloud.google.com/natural-language/docs/sentiment-analysis-gcloud.
- Download JSON file and create a JAVA Key Store Certificate. For more information, see Create a Java KeyStore certificate
- Navigate to **Flow Designer** > **Connections** > **Google Sentiment Analysis**.

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- Set the following fields using the JSON and generated `.jks` file.
- Click **Get Auth Token**.

Note:
The Connection details shared previously are related to the personal google service account. To set up a new account and get the JSON key file, use see Google Documentation.

After you get that JSON Key file, the `.jks` file can be generated using the following code:

```
createJKS() {

  cd $(dirname $1)

  cat $1 | jq -r .private_key > GCPNaturalLanguage_pk.pem;

  kid=$(cat $1 | jq -r .private_key_id);

  cert_url=$(cat $1 | jq -r .client_x509_cert_url);

  curl ${cert_url} | jq -r --arg jq_kid "$kid"
 '.[$jq_kid]' > GCPNaturalLanguage_cert.pem;

  openssl pkcs12 -export -in GCPNaturalLanguage_cert.pem
 -inkey GCPNaturalLanguage_pk.pem
 -certfile GCPNaturalLanguage_cert.pem -out
 GCPNaturalLanguage_pkcs12.p12;

  keytool -importkeystore -srckeystore
 GCPNaturalLanguage_pkcs12.p12 -srcstoretype pkcs12
 -destkeystore GCPNaturalLanguage.jks -deststoretype JKS

}

createJKS /
Users/firstname.lastname/git/ServiceAccountKey/core-period
-341405-9e1ed1673139.json (Path of JSON Key)
```

Configure Conversational IVR with Amazon Connect

Configure Amazon Connect service provider to integrate with Virtual Agent and use interactive voice response.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **Virtual Agent**.
2. On the Virtual Agent Settings page, navigate to the **Configure your interactive voice response (IVR)** tile.

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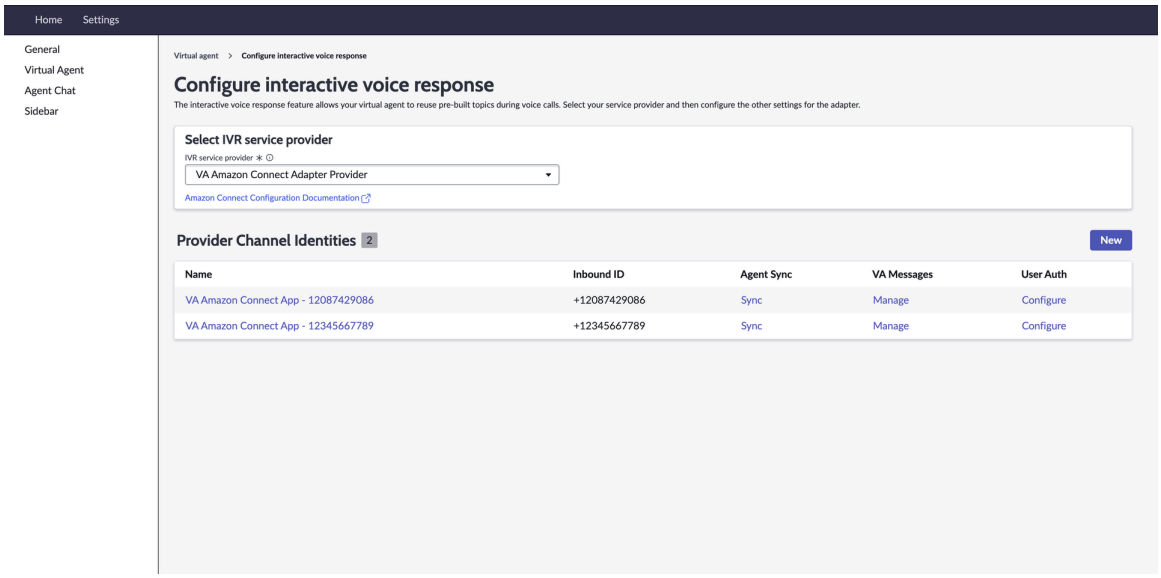
Note:
To see the **Configure your interactive voice response (IVR)** tile on your Virtual Agent Settings page, ensure that you have updated the Omni-Experience Standard Feature Set plugin (sn_oe_sfs).

3. In the Configure pre-built adapter section, click **Configure IVR**.
4. In the Select IVR service provider page, select **VA Amazon Connect Adapter Provider** as the IVR service provider from the drop-down.

Note:
VA Amazon Connect Adapter Provider is available by default, with the Conversational IVR with Amazon Connect application installation. To use the Amazon Connect adapter, get the Conversational IVR with Amazon Connect app from the ServiceNow Store.

Conversational IVR with Amazon Connect supports multiple service provider applications and you can create new ones if you want.



5. To finish setting up Amazon Connect, select the application name from the Provider Channel Identities section.
6. On the form, fill in the fields.

Note:
From the AWS Console, copy and paste the authentication information for Amazon Connect below:

Amazon Connect information form

Field	Description
Identifier Type	Indicates the type of identifier for the provider channel identity. For example, you can configure Amazon Connect on your ServiceNow instance via Phone number or ARN.
Phone number	The phone number being configured for this provider channel identity.

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Field	Description
	Note: ○ The **Phone number** field is available only when you select Phone Number in the **Identifier Type** drop-down. ○ From Vancouver release, you can use multiple phone numbers from an AWS account and create provider identity channels for each configuration to accommodate multiple points of contact.
Instance ARN	The instance ARN from the AWS Console.
Static/hash token	Your static or hash token from AWS Console.
Token type	Confirmation for the token provided in the **Static/hash token** field.
Connect Login URL	The login URL from the AWS Console.

7. Click **Save**.

What to do next

- Sync Agents to setup Live Agent transfer
- Configure user authentication for Conversational IVR
- Manage bot messages for Conversational IVR

Enroll user Soft PIN and Device in ServiceNow instance

Enroll the user Soft PIN and Device in your ServiceNow instance to setup callback authentication.

Before you begin

Role required: admin

Procedure

1. Log in to your ServiceNow instance.
2. Impersonate the user whose Soft PIN and Device must be authenticated.
3. Navigate to **Password Reset** > **Enroll**.
4. In the SoftPin Verification for Amazon Connect tab, provide the soft Pin in the **Enter the SoftPIN** field and click **Submit**.
5. In the SMS Verification for Amazon Connect tab, authorize the user device.

   a. Select **Add Device**.

   b. On the form, fill in the details.

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Add an SMS Device pop up

Field	Description
Device name	Name of the device that you are authenticating.
Phone number	Phone number of the user that you want to authenticate.
Service provider	Name of the service provider that you want to authenticate the device with.

c. Click **Submit**.

What to do next
After adding the phone number, verify the device. An OTP is sent to the user's phone number.

Setup the Amazon Connect spoke for VA IVR

Set up the Amazon Connect spoke for Conversational IVR to integrate your ServiceNow instance with Amazon Connect.

Before you begin
Role required: admin

Procedure

To set up the Amazon Connect spoke for Conversational IVR with Amazon Connect, see Setup Amazon Connect spoke.

Sync Agents to setup Live Agent transfer

After the installation and configuration of Amazon Connect, you must sync agents to enable live transfer. You can sync agents stored in Amazon Connect with the agents on your ServiceNow agents.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **Virtual Agent**.
2. On the Virtual Agent Settings page, navigate to the Configure your interactive voice response (IVR) section and click **Configure IVR** under Configure pre-built adapter.
3. On the Configure interactive voice response page, select **VA Amazon Connect Adapter Provider** from the Select IVR service provider drop-down.
4. Under Provider Channel Identities, select the identity provider that you want to sync agents for.
5. On the Amazon Connect information form, in the Sync your call center agents tile, click **Sync agents**.
6. Add the following roles to the agents to sync them with your ServiceNow instance and the Amazon Connect account.
   - sn_va_as_service.contact_center_api
   - awa_agent

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- interaction_agent
- agent_workspace_user
- sn_openframe_user
- awa_integration_user

Add each user, who must handle a Live Agent Transfer, to the Agent Phone Group by navigating to **System Security** > **Users and Groups** > **Groups**.

7. In the filter navigation bar on your ServiceNow instance, enter `awa_presence_state.list` to find the Presence States table.
8. Open the **Available** state, move the **Phone** Service Channel from the Available field to the Selected field and click **Update**.
   Login as the synced user and make sure that the agent is available in Agent Workspace and also login to the Amazon Connect instance with the same ServiceNow user to verify.

Configure user authentication for Conversational IVR

You must configure the authentication level for how the end-user can be authenticated to be the logged-in ServiceNow user using Voice.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **Virtual Agent**.
2. On the Virtual Agent Settings page, navigate to the Configure your interactive voice response (IVR) section and click **Configure IVR** under Configure pre-built adapter.
3. On the Configure interactive voice response page, select **VA Amazon Connect Adapter Provider** from the Select IVR service provider drop-down.
4. Under Provider Channel Identities, select the identity provider that you want to edit the user authentication for.
5. On the Amazon Connect information form, in the Configure user authentication tile, click **Configure authentication**.
6. On the User authentication method setup form, swipe the **Enable authentication** toggle switch to the right.

   Note:
   Ensure that the application scope of your ServiceNow instance is set to the Conversational IVR with Amazon Connect application before editing the User authentication method setup form.

7. Select the **Authentication style**.
   - **Phone**: Customer's phone number.

     Note:
     Only requires the incoming phone number to match the record in [sys_user] profile **Business Phone** field, in order for user to log in.

   - **Phone + Soft PIN**: Customer's phone number requiring a pre-configured Soft PIN to authenticate.

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Note:
Requires not only the phone number to match, but also for end user to identify user's personal Soft PIN registered with the customer's ServiceNow record.

- **Phone + Soft PIN + MFA**: Customer's phone number, requiring a Soft PIN and adds an extra layer of security with MFA (Multi-factor Authentication).

Note:
Requires the phone number to match and also for end user to identify user's personal Soft Pin registered with the customer's ServiceNow record, in addition to have the end user authenticate using MFA.

To set up your end users with Soft PIN or MFA, see Configure your Password Reset process to auto-enroll users.

8. Provide the authentication details as per the selected authentication style.
   - **Verification question**: Add a verification question of your choice.

     Note:
     This option is only available for Phone + Soft PIN.

   - **Verification PIN length**: Set up the length of your Soft PIN.

     Note:
     This option is only available for Phone + Soft PIN.

   - **One-time password length**: Set up the length of the one-time password

     Note:
     This option is only available for Phone + Soft PIN and Phone + Soft PIN + MFA.

   - **one-time-password expiration time**: Set up the expiration time for the password.

     Note:
     This option is only available for Phone + Soft PIN and Phone + Soft PIN + MFA.

   Changing the values or messages updates the record on the Password Reset verification record. For more information, see Configure your Password Reset process to auto-enroll users
9. Click **Save**.

Manage bot messages for Conversational IVR

Edit your custom messages to ensure that your conversations are optimized for Conversational IVR.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** and select **Virtual Agent** from the Chat Settings tab.
2. On the Virtual Agent Settings page, navigate to the Configure your interactive voice response (IVR) section and click **Configure IVR** under Configure pre-built adapter.

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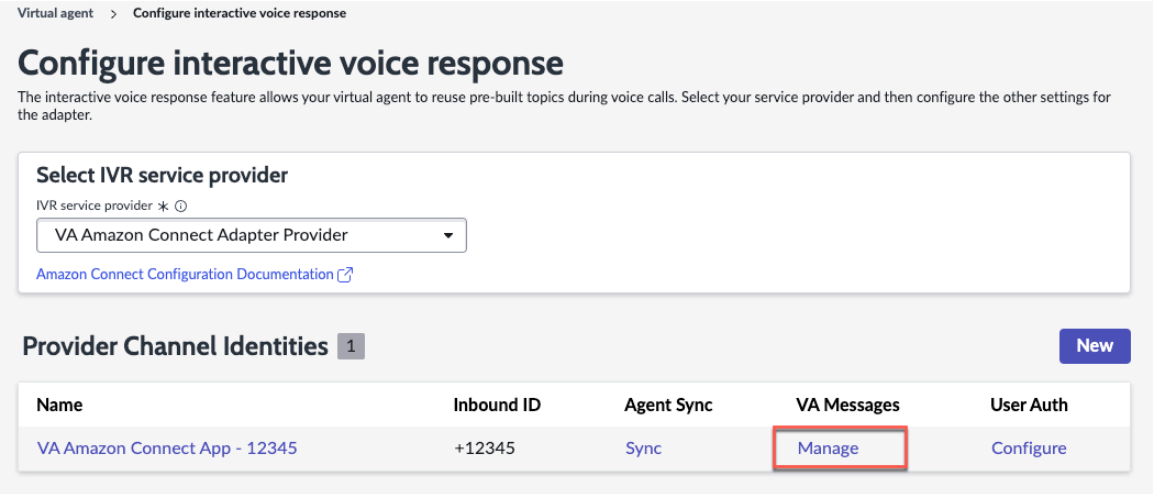
3. On the Configure interactive voice response page, select **VA Amazon Connect Adapter Provider** from the Select IVR service provider drop-down.
4. Under Provider Channel Identities, select the identity provider that you want to edit the custom messages for.
5. Under Review and edit your virtual agent messages section, click **Review VA messages**.

   Additionally, you can also select the **Manage** button in the VA Messages column against the identity provider.

Manage custom messages for Conversational IVR



6. On the Custom virtual agent messages page, select the custom message that you wanted to update.
7. Edit the **Value** for the message and click **Update.**

Unsupported Virtual Agent features for Conversational IVR

Refer to the unsupported features of Virtual Agent in Conversational IVR with Amazon Connect.

Unsupported features

Chat Surveys: Conversational IVR with Amazon Connect supports surveys but it cannot read the contents of the survey summary card, which is a card type control that IVR does not support currently.

To effectively use a survey with Conversational IVR, you must ensure to turn off the **Show Summary** check box when creating or configuring a survey that is applicable to IVR conversation.

Conversational Integration with Alexa

ServiceNow® Conversational Integration with Alexa enables ServiceNow® Virtual Agent to interact with requesters through the Amazon Alexa voice interface using the Virtual Agent topics. Conversational Integration with Alexa uses the custom conversational chat integration framework to interact with the Virtual Agent chatbot.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Overview

Enable your users to initiate an Alexa voice chat conversation with a virtual agent by using the Conversational Integration with Alexa application. The application connects a requester with a Virtual Agent using your company's Alexa account. You can name your Alexa skill and manage it using your company's Amazon account while enabling end users to link their accounts to the ServiceNow instance. You can also customize the way that a virtual agent speaks to you in a voice-friendly manner without having to change the topic.

Note:
The Conversational Integration with Alexa supports both screen-less and screen-based Alexa-enabled devices.

To get started with the Conversational Integration with Alexa application, see Configure Conversational Integration with Alexa.

Configure Conversational Integration with Alexa

Install and set up the Conversational Integration with Alexa application to enable users to interact with a virtual agent.

Configure Conversational Integration with Alexa to enable interaction with Virtual Agent through the Alexa voice interface.

1. To install Conversational Integration with Alexa, see Install Conversational Integration with Alexa.
2. To set up Conversational Integration with Alexa, see Set up Conversational Integration with Alexa.
3. To modify the Virtual Agent settings for the best voice chat experience with Alexa, see Fine-tune Virtual Agent settings and topics for the best Alexa voice chat experience.

Install Conversational Integration with Alexa

You can install the Conversational Integration with Alexa application (sn.va.alexa) if you have the admin role. The application installs the related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Role required: external_app_install_admin, va_admin, or admin

About this task

The following applications are installed with Conversational Integration with Alexa:

Conversational Custom Chat Integration (com.glide.cs.custom.adapter)

Provides the custom chat integration framework of scriptable APIs to enable the Virtual Agent application on any conversational interface.

For more information, see Conversational custom chat integrations.

ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Enables the execution of ServiceNow® Integration Hub actions and flows.

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Procedure

1. **All** > **System Applications** > **All Available Applications** > **All**
2. Find the Conversational Integration with Alexa application (sn_va_alexa) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   All the dependent plugins and applications are listed if they will be installed, or currently installed, or must be installed. If any plugins or applications must be installed, you must install them before you can install Conversational Integration with Alexa.
4. Click **Install**.

Set up Conversational Integration with Alexa

Set up the Conversational Integration with Alexa application so that you can engage customers in conversations with bots.

Before you begin

- Get ServiceNow entitlements for the following products and applications:
  - Integration Hub
  - Conversational Integration with Alexa

  For more information, see Get entitlement for a ServiceNow product or application.
- Install the following applications on your ServiceNow instance:
  - Integration Hub
  - Conversational Integration with Alexa
- Complete the Alexa settings.
  1. Create your Amazon Developer account.

     For more information, see the Alexa documentation.
  2. Create an Alexa skill.

     For more information, see the Alexa documentation.
  3. Build an Alexa skill model.

     For more information, see the Alexa documentation.
  4. Configure an Alexa skill.

     For more information, see Configure an Alexa skill

     .
  5. Test an Alexa skill on the developer console.

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For more information, see the Alexa documentation.

6. Account linking with Alexa.

   For more information, see the Alexa documentation.

Role required: external_app_install_admin, va_admin, or admin

Procedure

1. Associate a provider channel identity record with your Alexa account.
   For more information, see Create a provider channel identity record for Alexa.
2. Associate inbound message records with a message auth record.
   For more information, see Set up message authentication for Alexa.

Create an Alexa skill

Create an Alexa-hosted skill using the Alexa developer console. Creating an Alexa skill helps you prepare to use the Alexa app.

Before you begin

Role required: admin

Procedure

1. Log in to the Alexa developer console with your Amazon developer account.
2. Click **Create Skill**.
3. In the **Skill name** field, enter a skill name.
4. From the Default language list, select a default language to add your skill.
5. Under Choose a model to add your skill, select **Custom**.
6. Under Choose a method to host your skill's backend resources, select **Alexa-Hosted (Node.js)**.
7. Click **Create skill**.
8. To add your skill, select the **Start from Scratch** template.
9. Click **Continue with Template**.

   Note:
   Creating an Alexa-hosted skill takes a few minutes.

10. In the skill, navigate to **Interaction Model** > **Intents** > **JSON Editor**.
11. Replace the **JSON Editor** with the following JSON script.

```
{
    "interactionModel": {
        "languageModel": {
            "invocationName": "now agent",
            "intents": [
                {
                    "name": "AMAZON.CancelIntent",
                    "samples": []
                },
                {
                    "name": "AMAZON.HelpIntent",
```

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```
                    "samples": []
                },
                {
                    "name": "AMAZON.StopIntent",
                    "samples": []
                },
                {
                    "name": "AMAZON.NavigateHomeIntent",
                    "samples": []
                },
                {
                    "name": "EverythingIntent",
                    "slots": [
                        {
                            "name": "EverythingSlot",
                            "type": "Bag_of_words"
                        }
                    ],
                    "samples": [
                        "{EverythingSlot}"
                    ]
                }
            ],
            "types": [
                {
                    "name": "Bag_of_words",
                    "values": [
                        {
                            "name": {
                                "value": "value: Hello world"
                            }
                        },
                        {
                            "name": {
                                "value": "name: bag_of_words"
                            }
                        }
                    ]
                }
            ]
        }
    }
}
```

12. Click **Save Model**.
13. Navigate to **Invocations** > **Skill Invocation Name**.
14. In the **Skill Invocation Name** field, provide the skill Invocation name.

    Note:
    The skill name is the name which you use in your Alexa device to invoke the skill.

    For example: `<ask <skill name>`.

15. Navigate to **Interfaces** and enable **Alexa Presentation Language**.

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Note:
This option enables all the screen devices which you want to use in Alexa.

16. Click **Save Interfaces**.

Configure an Alexa skill

Configure your Alexa skill to talk to your ServiceNow instance.

Before you begin

Note:
Linking your Alexa account with your ServiceNow instance is optional and only the Virtual Agent topics with the public role are accessible with guest user access.

Role required: admin

Procedure

1. Log in to the Alexa developer console with your Amazon developer account.
2. Click the **Code** tab.
3. Click **Import Code**.

   Note:
   Browse for the `lambda_funtion_sn_va_alexa.zip` file that you downloaded from the Supporting Documents section of the Conversational Integration with Alexa application on the ServiceNow Store and click **Import**.

4. In the *endpoint* field, replace the hostname with the host name from your ServiceNow instance URL where your Alexa store app is installed.

   Example endpoint: `xxxxxxxxx.service-now.com/api/v1/alexa/message`.

5. In the *secretkey* field, replace `<Provide secret key>` with your token (static or hash-based).

   Use the following tokens as per your authentication type.

   - Hash-based token

     If you are using hash-based authentication, provide the hash token which you provided during the ServiceNow instance setup.

     ```
     `"var security = <Token>
              "var genratedHash = generateHmac(eventJSON,
     secretKey);
              'X-Voice-Type': 'hash',
              'X-Voice-Token': genratedHash,"
     ```

     Note:
     Hash-based authentication is provided by default.

   - Static token

     If you are using static authentication, provide the static token.

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```
`"var security = <Token>
         'X-Voice-Type': 'static',
        `'X-Voice-Token': <Token>,`
```

6. Click **Deploy**.

Build an Alexa skill model

Build your Alexa-hosted skill on the Alexa developer console. Building a saved Alexa skill model helps you prepare the skill for testing.

Before you begin
Role required: admin

Procedure

1. Log in to the Alexa developer console with your Amazon developer account.
2. Select the skill that you want to build.

   Note:
   Selecting a skill navigates you to the Alexa Developer Console.

3. Click the **Build** tab.
4. In the Skill builder checklist, click **Build Model**.

   Note:
   Building the model takes a few minutes.

   The build successful message appears and you can test the sample utterances while the build is being trained.

Get the Alexa skill ID

Get the Alexa Skill ID from your Alexa developer console after configuring the skill. The Skill ID is the Alexa identifier for the application.

Before you begin
Role required: admin

Procedure

1. Log in to the Alexa developer console with your Amazon developer account.
   You can get the skill ID in two ways.
   a. On the Alexa developer console:
      i. Click the **Your Skills** tab.
      ii. Navigate to the skill name for which you want to copy the skill ID.
      iii. Under the skill name, click **Copy Skill ID**.
   b. On the left Custom navigator pane of the Alexa developer console:
      i. Select a skill from the **Your Skills** tab.
      ii. Navigate to **Assets** > **Endpoint** on the Custom navigator pane.
      iii. In the AWS Lambda ARN section, click **Copy to Clipboard**.

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2. In the Provider Channel Identity record of your ServiceNow instance, paste the copied skill ID in the **Inbound ID** field.
3. Click **Update**.

Test an Alexa skill on the developer console

Test your Alexa skill using the Alexa simulator and developer account once the installation is complete and the skill is built.

Before you begin
Role required: admin

> **Note:**
> The Conversational Integration with Alexa application works for guest users. All published Virtual Agent topics (set up topics or topic blocks) are presented even if account linking is not done. For any regular topic, you must specify the Alexa channel in the **Additional channel support** field of the Topic Properties page. For more information about adding channel support to a Virtual Agent topic, see Deploying Virtual Agent topics in other channels.

Role required: admin

Procedure

1. Log in to the Alexa developer console with your Amazon developer account.
2. Click the **Test** tab.
3. In the Alexa Simulator, type or speak the invocation name of your skill.

   For example, `ask now virtual agent`.

   Alexa responds to the Virtual Agent and returns a greeting message.

Test a skill on the Alexa mobile app

Test your Alexa skill using the Alexa mobile app.

Before you begin
Role required: none

Procedure

1. Log in to the Alexa mobile application using your email address that you used for logging in to the developer console.
2. Speak the invocation name of your skill.

   For example, `alexa now virtual agent`.

   Alexa responds to the Virtual Agent and returns a greeting message.

Test a skill on the Alexa Echo or Echo Show screen device

Test your Alexa skill using the Alexa Echo or Echo Show screen device.

Before you begin
Role required: none

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Procedure

1. Log in to the Alexa Echo or Echo Show using your email address that you used for logging in to the developer console.
2. Speak the invocation name of your skill or use the touch screen option to select the list option.

   For example, `alexa now virtual agent`.

   Alexa responds to the Virtual Agent and returns a greeting message.

Supported Alexa intents

Use the Alexa intents supported by Conversational Integration with Alexa to receive an appropriate response during custom chat integrations with Alexa.

Supported custom intents

Custom intents

Intent	Utterance	Language understanding
AMAZON.YesIntent	yes, yeah	Sends the message “yes”
AMAZON.NoIntent	no, nope	Sends the message “no”
AMAZON.HelpIntent	help, help me, and can you help me	Help message is displayed
AMAZON.PauseIntent	pause	End conversation; End Alexa Session
AMAZON.StopIntent	stop, off, and shut up	End conversation; End Alexa Session
AMAZON.CancelIntent	cancel, never mind, and forget it	End conversation; End Alexa Session

Create a provider channel identity record for Alexa

Create a provider channel identity record to connect to your Alexa account.

Before you begin

Role required: va_admin or admin

Procedure

1. In the navigation filter of your ServiceNow instance, enter `sys_cs_provider_application.list`.
2. Click **New**.
3. On the form, fill in the fields.

Provider Channel Identity form

Field	Description
Name	Name of your provider.
Provider	Provider channel that you created. Select **VA Alexa Adapter Provider** as the provider channel.

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Field	Description
	Note: The provider is available with the installation of the Conversational Integration with Alexa plugin (sn_va_alexa).
Default portal	Default portal used in the mapping.
Short description	Short description for your channel identifier. For security reasons, the Virtual Agent checks that the URLs for attachments in conversations are from trusted domains specified here. If the URL is not from a trusted domain, the Virtual Agent does not upload the attachment. If an attachment upload fails because Virtual Agent did not trust the domain, Virtual Agent does not inform the end user about the attachment upload failure.
Message auth	Message authentication for the channel identifier. Choose a message authentication type from the following options: ○ ServiceNow Virtual Agent Alexa App - Static ○ ServiceNow Virtual Agent Alexa App - Hash
Inbound ID	Identifier for your bot. In this field, provide your Alexa Skill ID that you copied from the Amazon developer console. For example: `amzn1.ask.skill.XXXXXXX-XXXX-XXXX-XXXX-XXXXXXX`.

4. Click **Submit**.

Set up message authentication for Alexa

Define a token in your ServiceNow instance to set up a message authentication with your Alexa account.

Before you begin
Role required: admin

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Procedure

1. In the navigation filter of your ServiceNow instance, enter `message_auth.list` and click **New**.
2. Select a message authentication type for Alexa and open the record.

   Your ServiceNow instance provides you with the following authentication types by default.

   - **ServiceNow Virtual Agent Alexa App - Static**
   - **ServiceNow Virtual Agent Alexa App - Hash**
3. On the form, fill in the fields.

Message Auth form

Field	Description
Name	Name of the record in the Message Auth [message auth] table. For example, **ServiceNow Virtual Agent Alexa App - Hash** or **ServiceNow Virtual Agent Alexa App - Static**
Provider	Provider of the auth token. Enter `Alexa`.
Inbound message verification	Name of the Hash or Static Message Verification record that you created for the inbound hash or static messages. Select an inbound message verification option as per the selected authentication type. Your ServiceNow instance provides you with the following authentication tokens by default: ○ **ServiceNow Virtual Agent Alexa App Static Token** ○ **ServiceNow Virtual Agent Alexa App Hash Token**
Outbound message creation	Name specified on the Token Verification form (this token interacts with the provider on behalf of the user). Select an outbound message option as per the selected authentication type. Your ServiceNow instance provides you with the following authentication tokens by default: ○ **ServiceNow Virtual Agent Alexa App Static Token** ○ **ServiceNow Virtual Agent Alexa App Hash Token**

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Field	Description
	Note: Outbound message verification is not required for Alexa. However, select the same option provided for Inbound message verification because it is a required field.
Outbound service token	Authorized outbound service token. Navigate to the Inbound message verification record to procure the Outbound service token from the Alexa setup and provide it in the **Outbound service token** field.

4. Click **Update**.

Account linking with Alexa

Link your Alexa account with your ServiceNow instance to retrieve information from your custom skill.

Link your Alexa account with your ServiceNow® instance

1. Configure your ServiceNow instance to link it with your Alexa account.

   For more information, see Create an OAuth API endpoint for external clients.
2. To configure your Alexa account for account linking, see Configure your Alexa account.
3. To link the Alexa events with your ServiceNow instance using your macOS Terminal, see Link Alexa events using the macOS Terminal.
4. To link your ServiceNow instance with your Alexa account using the Alexa app, see Link your account using the Alexa app.

Configure your Alexa account

Configure your Alexa account to link it with your ServiceNow instance.

Before you begin
Role required: admin

Procedure

1. Log in to your Alexa developer console with your Alexa developer account.
2. Navigate to the **Build** > **MODELS** > **ACCOUNT LINKING**.
3. On the Account Linking form, swipe the **Do you allow users to create an account or link to an existing account with you?** toggle switch to the right.
4. In the Settings section of the form, swipe the **Allow users to authenticate using your mobile application** toggle switch to the right.
5. In the Security Provider Information section of the form, click **Auth Code Grant**.
6. On the form, fill in the fields.

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Auth Code Grant form

Field	Description
Your Web Authorization URI	The URI that authorizes your web access. For example: `https://<instance-name>.service-now.com/oauth_auth.do`. **Note:** The instance-name for Alexa is `voice`.
Your iOS App Authorization URI	The URI that authorizes your iOS app. Provide `voice` as the value.
Your Android App Authorization URI	The URI that authorizes your Android app. Provide `voice` as the value.
Access Token URI	The URI that authorizes the access to the API requests. For example, `https://<instance-name>.service-now.com/oauth_token.do` **Note:** The instance-name for Alexa is `voice`.
Your Client ID	Auto-generated unique ID of the client application requesting the access token. **Note:** Provide the Client ID generated while creating an OAuth API endpoint for external clients.
Your Secret	The shared secret string that the instance and the OAuth application use to authorize communications with one another.

7. Click **Save**.
8. Copy one of the URLs from the **Alexa Redirect URLs** field in the Auth Code Grant section.

   Note:
   Insert the copied URL in the Redirect URL field of the OAuth API record created in your ServiceNow instance.

   If you face an issue with one of the URLs, try to use the next available URL and pick the one that works.

9. Click **Save**.

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Link Alexa events using the macOS Terminal

Link Alexa events using your macOS Terminal to complete the Alexa account linking process with your ServiceNow instance.

Before you begin

Note:
Copy the Skill ID of your skill from the Alexa developer console. The Skill ID is the same inbound ID used in the sys_cs_provider_application record.

Role required: admin

Procedure

1. On your macOS, open the Terminal.
2. Execute the *`npm install -g ask-cli`* command.
   Executing this command installs the Alexa command-line interface on your machine if it was not previously installed.
3. Execute the *`ask configure`* command.
4. Log in with your Amazon developer account credentials when prompted.

   Note:
   Choose **No** if you are asked the question **Do you want to link your AWS account in order to host your Alexa skills?**

5. To download the manifest file, execute the *`ask smapi get-skill-manifest -s {<provide skillId>} > skill.json`* command.
6. To edit the *`skill.json`* file, add the following JSON script inside the manifest object.

```
"events": {
      "endpoint": {
        "uri": <provide lambda ID>.
      },
      "subscriptions": [
        {
          "eventName": "SKILL_ENABLED"
        },
        {
          "eventName": "SKILL_DISABLED"
        },
        {
          "eventName": "SKILL_PERMISSION_ACCEPTED"
        },
        {
          "eventName": "SKILL_PERMISSION_CHANGED"
        },
        {
          "eventName": "SKILL_ACCOUNT_LINKED"
        }
      ]
    },
```

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Note:
Be sure to edit the URL endpoint with the Lambda ID. You can copy one of the endpoints from the *skill.json* file and replace it with the Lambda ID. You can also fetch it from the Alexa console from **Build** > **Endpoints**.

7. To upload the updated manifest file, execute the *ask smapi update-skill-manifest -s {<provide skillId>} --manifest "$(cat skill.json)* command.

Result
Your Alexa account is linked with your ServiceNow instance.

Your Alexa account is linked with your ServiceNow instance.

Link your account using the Alexa app

Link your ServiceNow account using your Alexa mobile application.

Before you begin
Role required: admin

Procedure

1. Download the Alexa app on your Android or iOS device.
2. Log in with the same email address that you used for the Amazon developer account.
3. In the lower-right area of the app, click **More**.
4. Select **Skills & Games**.
5. Select **Your Skills** tab.
6. Click **Dev**.
7. Select the skill that you created.
8. If the **enable skill** button does not appear, click **Disable Skill**.
9. Click **Enable**.
10. Log in with the ServiceNow® instance credentials of any user of the instance.
You should see that the account is linked.

Note:
Insert the user record in the provider_user_map record to complete the account linking.

Fine-tune Virtual Agent settings and topics for the best Alexa voice chat experience

Fine-tune your Virtual Agent settings and topics provided by the Virtual Agent Designer for the best voice chat experience with Alexa.

- Virtual Agent Designer is a diagram tool for creating and managing topics, which are blueprints for conversation between a Virtual Agent and a user. For more information, see Getting started with Virtual Agent Designer.

Note:
Be sure that you specify Alexa as the applicable channel in the **Additional channel support** field if you want the topics that you designed using the Virtual Agent Designer to work on Alexa. For more information about the channel selection, see Deploying Virtual Agent topics in other channels.

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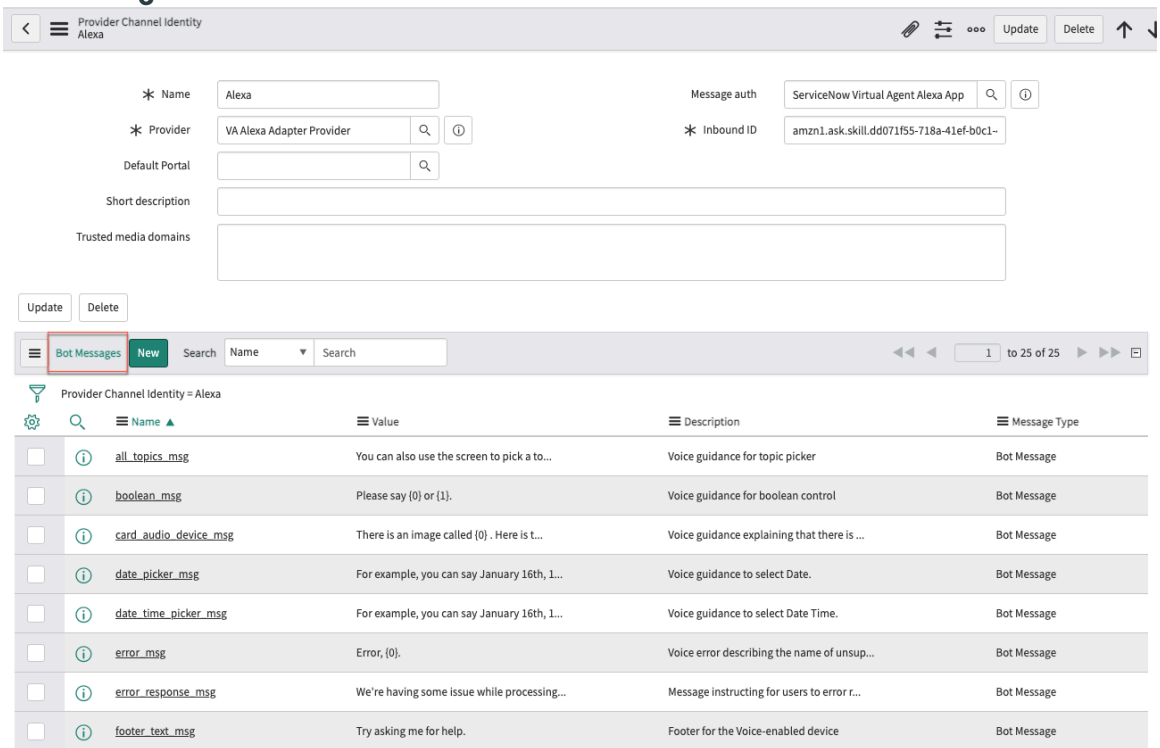
- Bot messages help you to interact with Alexa. You can change the bot messages for interaction in a voice chat conversation. To access the bot messages, enter `sys_cs_provider_application.list` in the navigation filter and navigate to your Alexa application profile to find the bot messages.

Bot messages for Alexa



- You can change the greeting message and other messages only for the voice channels using the Custom Greeting and Setup page. For example, you can create a custom topic, edit it, and assign it to be used if the end user is on a voice channel. For more information about accessing the Custom Chat and to change the greeting section of the message, see Configure a Virtual Agent chat experience.

- You can also change the system-generated messages by entering `sys_properties.list` in the navigation filter, and filter them by the criteria `com.glide.cs` to confirm that these messages work for voice channels. You can review the following key messages:
  - com.glide.cs.topic_picker_msg
  - com.glide.cs.no_topic_found_message
  - com.glide.cs.no_topic_sorry_message
  - com.glide.cs.link_account_msg
  - com.glide.cs.topic_choice_list_message
  - com.glide.cs.topic_confirmation_message

  Note:
  Most of the messages unique to the voice channels are listed in the Bot Messages section of the Provider Channel Identity record.

  For more information, see Change the Virtual Agent greeting messages in the Greeting setup topic.

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- Most components work for screen-based and screen-less devices accessed in Alexa. However, some components are not compatible especially for the screen-less devices.

Note:
On the screen-based Alexa enabled devices, the presentation of cards and images has limitations as per the Alexa skill kit specification.

The Conversational Integration with Alexa application supports the following user input controls in Virtual Agent Designer.

Note:
Conversational Integration with Alexa also supports touch input for screen-based devices.

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- **User input controls**

User input control	Description	Screen	No screen
Text input/ output	Text format that is validated when a user enters certain text items.	Yes.	Yes.
Static Choice	User selects an item from a predefined list.	Yes, touch scroll.	Yes, voice pagination.
Dynamic Choice	User selects a choice from the list of dynamically created choices.	Yes, no clicking links.	Yes, voice pagination.
Boolean	User enters a Boolean response to the bot. For example, the user can reply Yes or No in a chat conversation.	Yes.	Yes.
Date Time	User selects a calendar date, time (hours and minutes), or both.	Yes (NLU recommended at the node).	Yes (NLU recommended at the node).
File Picker	User sends a file to the bot.	No.	No.
Pause	Breaks the conversation with Alexa.	No.	No.
Carousel	User selects a single item from the carousel.	Yes, touch scroll.	Yes, reading labels.
Image/Link/ HTML output	Bot sends an image, a link, or an HTML to the user.	Yes, no clicking links.	error_msg
Video	User can choose a video card from the header card.	video_screen_device_msg	video_audio_device_msg
Card	Type of header card. Choose the contents: ○ Large image with text ○ Small image with text ○ YouTube Video Card The fields in the dialog box change based on your choice.	Yes, no clicking.	Yes, reading labels.

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User input control	Description	Screen	No screen
Table	If you selected Record as the **Reference Type**, select the table to be searched.	Yes Shows the table headers, followed by rows with column header: value pair, Speak (Table header). Please say Done to continue.	No, reading labels Unfortunately, I cannot show you the content on this device. Please say Done to continue.

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- **Note:**
  To edit or change any of the following bot messages, enter sys_cs_provider_application.list in the navigation filter of your ServiceNow instance, select **Alexa** > **Bot Messages**, and click the name of the bot message that you want to edit.
  - error_msg
  - video_screen_device_msg
  - video_audio_device_msg
  - table_msg

  If you find the message name <EMPTY> and want to add a Boolean confirmation message to the end users, you can configure the bot message with the value [0] or [1].
- Conversational Integration with Alexa supports contextual actions that serve an appropriate response from custom chat integrations when user input is mapped to them. For more information, see Contextual actions for Alexa.

Contextual actions for Alexa

Use the contextual actions supported by Conversational Integration with Alexa to receive an appropriate response during custom chat integrations with Alexa.

Hi

You can type or speak the `hi` command to initiate a conversation, in the middle of a conversation, or even inside a specific topic.

When you type or say `hi` in the middle of the topic, you are shown an option to either **End conversation** or to **Cancel**. If you end the conversation, the Alexa skill is reset and you can restart the skill by speaking your invocation name. If you cancel the conversation, you are redirected to the last topic that you were at.

Bye

The `Bye` command is used to end a conversation.

You can type `bye` or speak this command in the middle of a conversation to end the conversation.

Help

The `help` command is used to request help using the bot.

You can type `help` or speak this command to ask your Alexa skill any questions. If you want to restart the conversation, say `hi` or restart the conversation.

Restart

The `restart` command is used to end a bot conversation that is either in progress or runs into an error, and then begin a new conversation.

You can type `restart` or speak this command anywhere in the middle of a conversation.

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Closing idle Alexa chat conversations

Enable virtual agents to effectively manage their active Alexa chat conversations by automatically closing the conversations after they have been inactive for a preconfigured amount of time.

Virtual Agent conversations are configured for the Alexa application. By default, any conversation is closed once the session with Alexa closes. Any conversation that is abandoned by requesters remains open or idle until they are automatically closed daily by the *`Time Out Abandoned VA Conversations`* scheduled job. For more information, see Closing Virtual Agent and Agent Chat conversations.

Conversational Integration with Google Assistant

ServiceNow® Conversational Integration with Google Assistant enables ServiceNow® Virtual Agent to interact with requesters through the Google voice interface using the Virtual Agent topics. Conversational Integration with Google Assistant uses the custom conversational chat integration framework to interact with the Virtual Agent chatbot.

Important:
Conversational Integration with Google Assistant is no longer deployed, enhanced, supported, or available for new activation. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

Analyzing Virtual Agent performance

Analyze the performance of Virtual Agent through preconfigured dashboards.

A new build of Conversational Analytics dashboard on Platform Analytics experience is available starting in Washington DC. The dashboard offers many of the same visualizations in the form of indicators and breakdowns, with no dependency on Usage Insights for data aggregations. The dashboard also meets the compliance requirements of data regulated market environments, for example, Government Community Cloud (GCC), and thus FedRAMP authorized. See Conversational Analytics dashboard in Platform Analytics experience for more information.

The existing Conversational Analytics dashboard will be deprecated in Yokohama.

Conversational Analytics dashboard in Platform Analytics experience

The Conversational Analytics dashboard in Platform Analytics experience helps you improve Virtual Agent (VA) interactions with users by providing insights into conversational data. The dashboard helps you refine topics and improve the deflection rate of VA.

Get started

Select a tile to get started with the Conversational Analytics dashboard.

Explore	Set up
	
For VA users and system administrators to learn about the dashboard.	For system administrators setting up the dashboard.

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Use	Reference
For VA users to learn how to use the dashboard.	Get information about the dashboard roles and system parameters

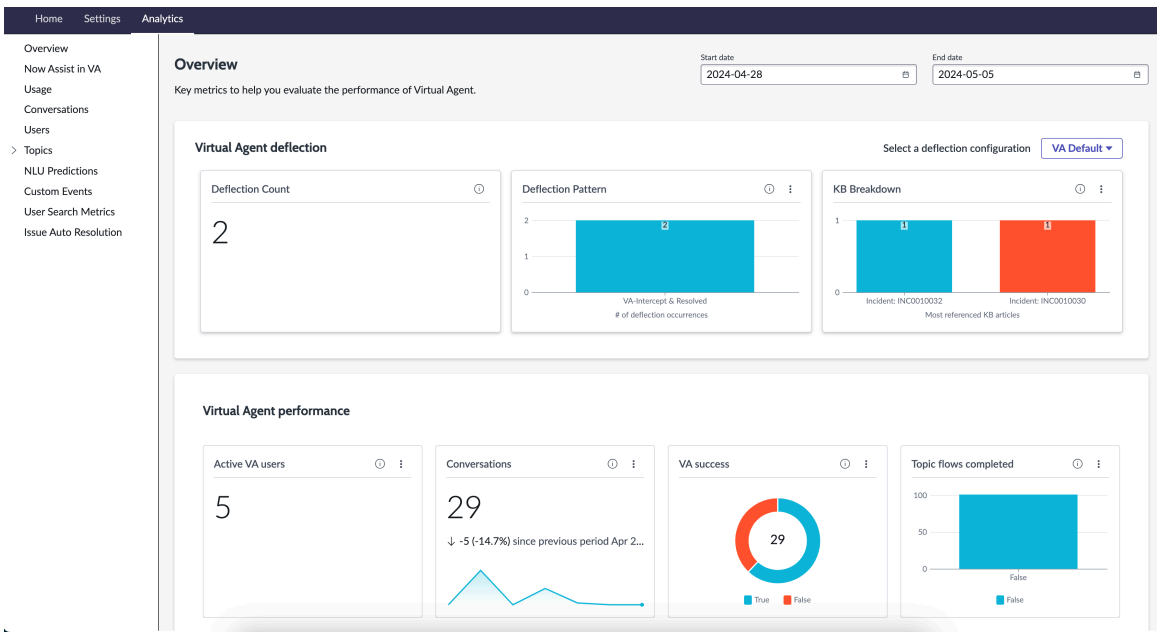
Exploring the Conversational Analytics dashboard in Platform Analytics experience

Use Conversational Analytics dashboard to improve Virtual Agent (VA) interactions with users. The dashboard provides insights into conversational data, and helps you refine topics and improve the deflection rate of VA.

Conversational Analytics dashboard

Conversational Analytics dashboard provides insights into conversations so you can see how well Virtual Agent understood and resolved user issues. Virtual Agent keeps conversational data, that is, records of conversations with the users, and analytics data for up to two years. The dashboard contains indicators which, for example, reveal:

- What percentage of users transfer from VA to a live agent
- How to increase engagement rate and reduce user drop-offs
- Whether the user reached the last node in a topic
- Most and least used topics
- Conversation details using advanced filters
- How to optimize conversation design



Key features

Underperforming topics

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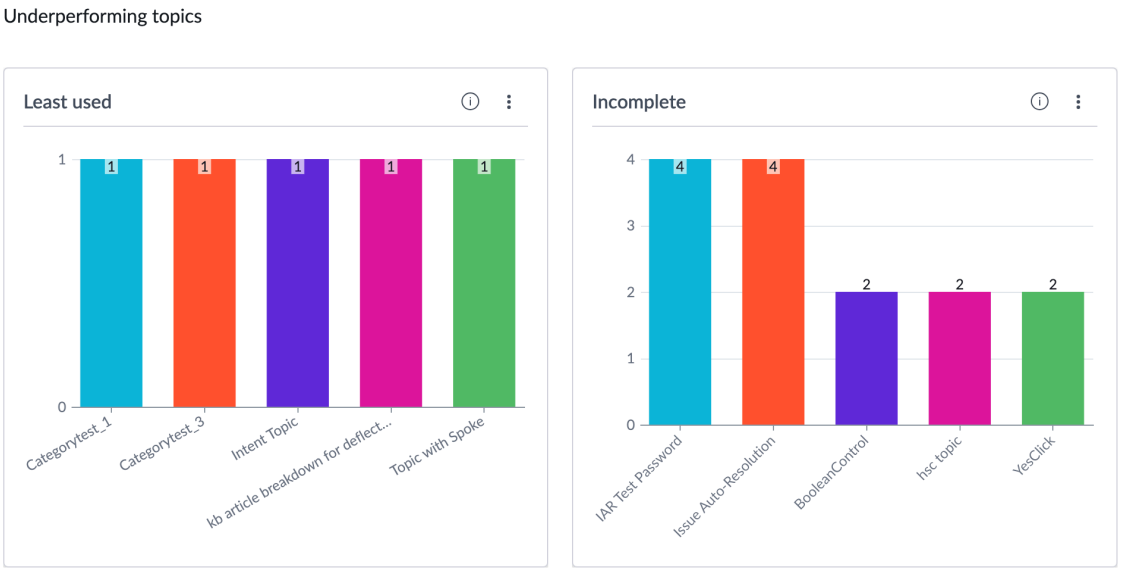
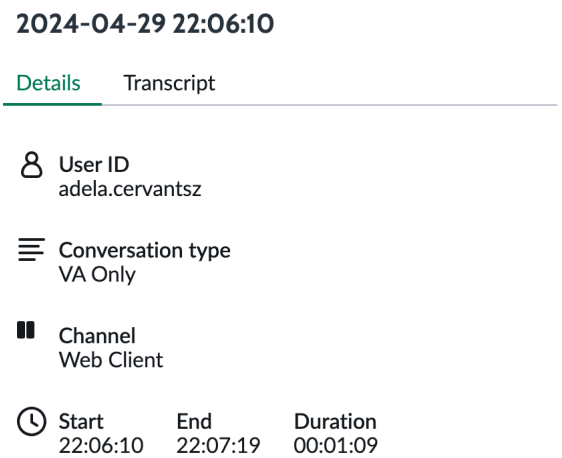
See the underperforming VA topics to investigate and improve topic performance.



Conversation details

Discover metadata about each VA interaction, including the user, chat duration, conversation type, and channel.

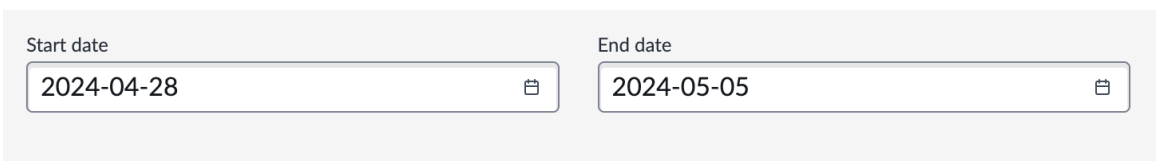


Overview

The following sections provide a high-level overview of how to use each section of the dashboard from the top down.

Date range of data displayed

The **Start date** and **End date** fields at the top of the dashboard specify the data range of the data summarized on each page.



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All data is continually pushed from Virtual Agent to the dashboard in real time, and retained for up to two years.

For information about setting the date range, see Set the date range of the data.

Certain data visualizations might not have data available for the start date and end date selected in the **Start date** and **End date** fields. In this case, the widget shows a start date and end date for the visualization based on the data availability within the selected date range.

Getting detailed data

The **Overview** tab contains key indicators to help you evaluate the performance of VA. You can view more details in the following ways:

- Select a tab, for example, **Usage**.
- Select an indicator, for example, **Active VA users**.

Dashboard tabs

Dashboard tabs

Tab	Description
Overview	View the key indicators of the performance of VA.
Now Assist in VA	View key indicators to monitor the performance of Now Assist in Virtual Agent. This is visible only when Now Assist in Virtual Agent is enabled.
Usage	View VA conversation usage, for example, the language and conversation type.
Conversations	View conversation details and troubleshoot individual conversations. Advanced filtering enables you to filter the list of conversations by conversation type, duration, user, and language.
Users	View how your users are conversing with VA. Advanced filtering enables you to filter the list by user, channel, and last conversation.
Topics	View topic performance indicators. Some of the indicators are most and least used topics, topics corresponding to VA conversations that were transferred to a live agent, average length of conversations per topic, and topic blocks used.
NLU Prediction	View NLU performance indicators such as number of times the NLU prediction model accurately understood the intent of the user's conversation or auto-selected a topic. The indicator links to the NLU Workbench if your instance includes NLU.
Custom Events	View the number of custom chat events that you created using the Events page.
Issue Auto-Resolution	View details about the number of user issues intercepted by the auto-resolution service and resolved by the Virtual Agent.

Virtual Agent performance

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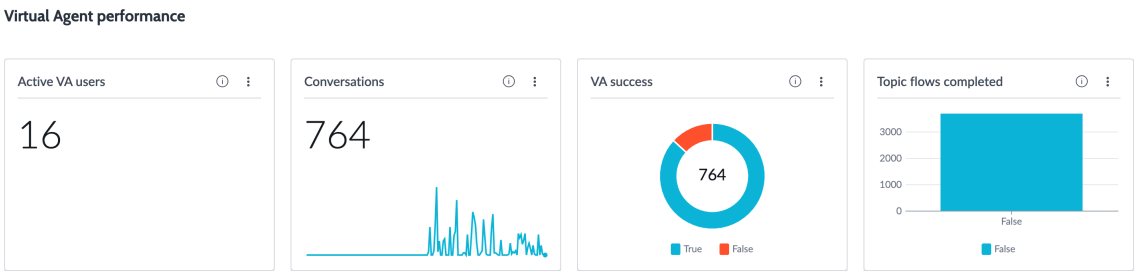
This area of the dashboard contains key VA performance indicators that you can drill down into for more details.



The indicators show data trends, such as increase or decrease of the data values in the date range specified on the dashboard. Clicking on the info icon displays the description of the indicator.

Certain trend visualizations on the dashboard such as the trends in intent and topic matching do not support viewing monthly, weekly, and daily data.

Setting up the Conversational Analytics dashboard

Set up custom events and formula definitions to create more targeted analytics.

The Conversational Analytics dashboard enables you to customize the data you monitor in the following ways:

- Date range—Specify the date range for the data displayed on the dashboard.
- Custom events—The dashboard can display analytics about custom events you create. All events must relate to conversations. For example, you can store data about every conversation that used a specific channel, such as Slack.
- Formula Override—Customize parameter definitions used in analytic reports. For example, by default, duration is the total time from the first to the last exchange in a conversation. You might like to override that formula by subtracting inactive times in the conversation.

Role requirements

For information on roles, see Conversational Analytics dashboard roles.

Dependencies

The Conversational Analytics Dashboard requires the Quebec or later version of Virtual Agent.

Install Conversational Analytics Dashboard

Get updates to the Conversational Analytics dashboard from the ServiceNow Store.

Before you begin

Note:
Starting with the San Diego release, the Conversational Analytics app is automatically installed when you initially activate the Glide Virtual Agent (com.glide.cs.chatbot) plugin. Subsequent updates for this app must be downloaded and installed from the ServiceNow Store.

Role required: Chat Analytics Admin

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Procedure

1. Confirm that your instance has the Glide Virtual Agent plugin [com.glide.cs.chatbot] activated. Starting with the San Diego release, the Conversational Analytics Dashboard app is automatically installed when you activate the Glide Virtual Agent plugin [com.glide.cs.chatbot].
2. Go to the ServiceNow Store, and search for analytics .
3. Select the latest version of Conversational Analytics app.
   The store installs the updates to the Conversational Analytics app and the analytics data configuration tools. The plugin name is com.sn.conversational.analytics and the scope name is sn_ci_analytics. Some of the main tables for the Conversational Analytics dashboard include:

Table	Description
sn_ci_analytics_conversation	The main table for conversations. It lists Virtual Agent conversations.
sn_ci_analytics_event	List of events. An event is something that happens, for example, an actionable notification. The dashboard can display analytics about default events or ones you create. For more information, see Set up custom events.
sn_ci_analytics_event_prop	List of values used in events.
sn_ci_analytics_formula_override	Lists formula overrides for properties used by the dashboard. For more information, see Set up custom definitions.

Note:
You do not need a license or a plugin for Performance Analytics.

Create custom events to monitor

Create custom events and monitor them in the Conversational Analytics dashboard.

Before you begin
Role required: Chat Analytics Admin.

About this task
An event is a combination of conditions that apply to a subset of Virtual Agent (VA) conversations. For example, an event might be conversations originating on a Slack channel that VA transferred to a live agent.

Most metrics you see on the dashboard, for example topic and conversation details, are derived from pre-built events. The dashboard displays these events on the **Topics** and **Conversations** tabs. To build custom events, you can use the Custom Events feature. Use custom events to create analytics about data you're interested in, for example:

- Number of conversations on a Slack channel that transferred to a live agent.
- Number of conversations on a Slack channel where the user never returned.

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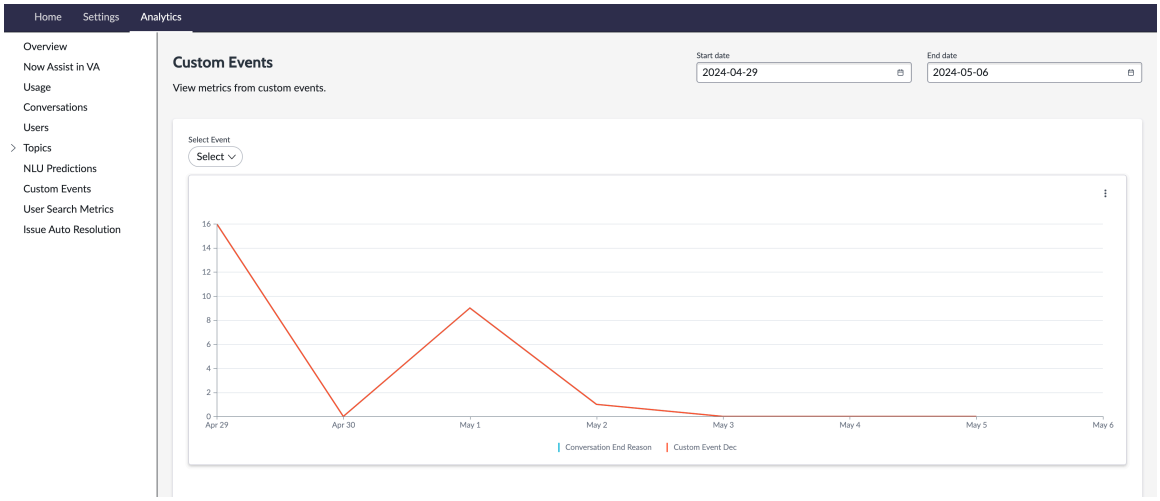
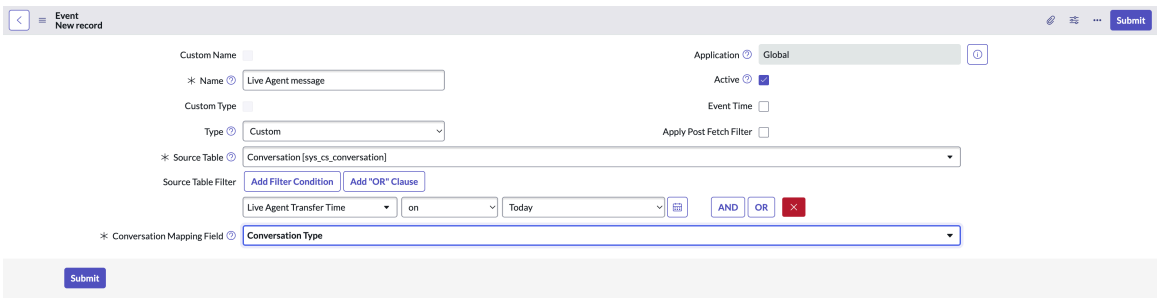


Custom events appear on the **Custom Events** tab. If you haven't configured any custom events, the dashboard won't display any. You can create up to 20 custom events.

Custom events take effect when you create them. You cannot use them to analyze data collected before you created the custom event.

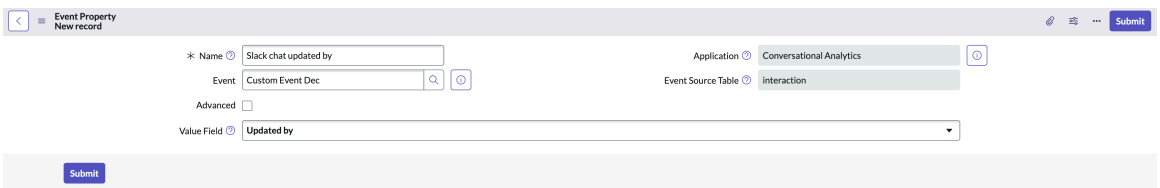
Procedure

1. Navigate to **All** > **Conversational Analytics** > **Event Configuration** and select **New**.
   The Event New record page appears.



2. In the form, fill in the fields.

3. Click **Submit**.
   The Events page appears, which lists all custom events. You've specified the table to look for custom events. Now, you must specify the parameter values that trigger the custom event.
4. Click the custom event you created.
5. In the Event Properties related list, select **New**.
   The Event Property New Record page appears where you specify the properties for a custom event that you want to track on the dashboard.



   In this example, the **Custom Event** tab shows metrics for *Updated by* for the custom event, Messages-from-Slack.

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6. In the form, fill in the fields.

7. Click **Submit**.
   The Event page appears.
8. Click **Update**.
   The Events page appears, which lists all custom events. You can open the **Custom Events** tab on the dashboard to see the custom event. This custom event is not retroactive; the dashboard only displays new events that satisfy the custom event criteria.

Create custom override definitions

Use scripts to override the default formulas used to create the analytics on the Conversational Analytics Dashboard.

Before you begin

Role required: Chat Analytics Admin

Be sure to set the application scope to Conversational Analytics.

About this task

The Conversational Analytics Dashboard uses formulas to determine analytics, such as how to calculate duration. You can override the default formulas to tailor the analytics to your needs. For example, the default formula for duration in the dashboard is the time between the first and last exchanges in a conversation. You might like to override that formula by subtracting inactive times in the conversation.

The default formulas and formula overrides are in the sn_ci_analytics_formula_override table. You can only modify the existing formulas that are in the table by deactivating the default formula and creating a new formula override record. You cannot override some formulas because they are system dependent. You can, however, create custom events to achieve a similar goal.

The default definitions are:

- Duration—Time from the start of a conversation session until the last message is sent, rather than when the conversation session closes. You cannot replace the supplied script for Duration. You can only turn it on or off. If you deselect the **Active** check box, the duration is calculated until the end of the session. If you select the **Active** check box, the duration is calculated to the last message sent.
- Self-solve rate—Number of conversations that did not have negative feedback, contained a topic that went through to the last node, and did not escalate to a live agent. The dashboard divides that number by the number of all conversations to get the rate.
- Feedback—Defined as positive, neutral, and negative. For example, to override this behavior, first, use Virtual Agent (VA) Designer to create a ranking from 1 to 10. Then, you can use a script to override the dashboard's default behavior by grouping 1–4 as negative, 5–7 as neutral, and 8–10 as positive.
- End state—Defined by default in 12 ways. For more information, see Formula override examples.
- Valid conversation—Defined as a conversation record that is included in the dashboard results for satisfying at least one of the following criteria.

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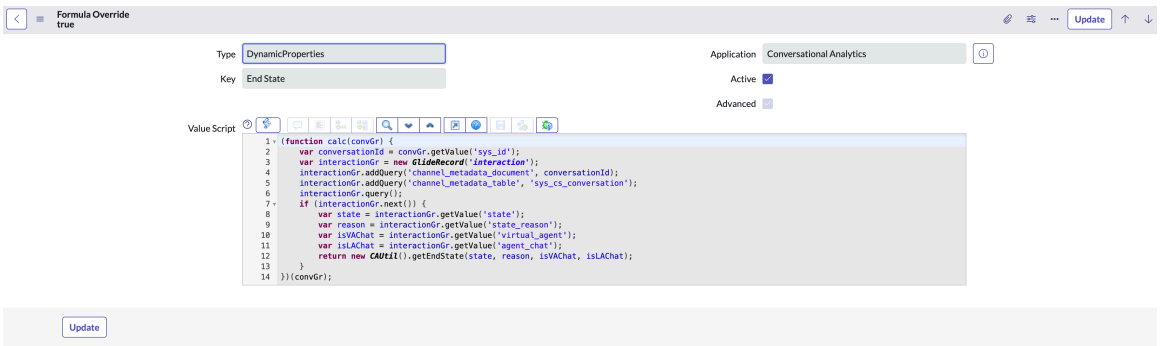
- Non-actionable notification conversations, which do not require validation from the user, are counted as active conversations.
- Actionable notifications that are not part of an existing conversation are considered valid conversations when the status of the notification is either Sent or Completed.
- Conversation engages Virtual Agent topic discovery or direct live agent conversation.

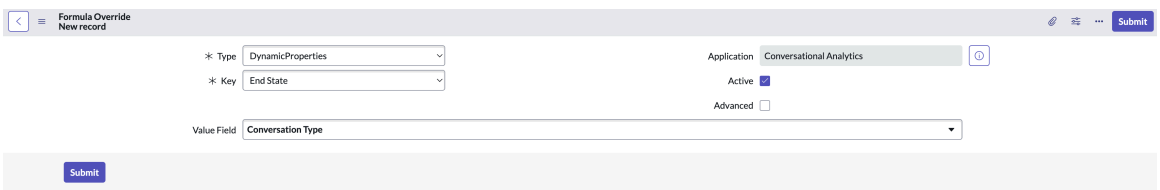
Note:
Formula overrides do not change the stored data. They only change how the dashboard displays the data by computing existing data in a different way.

Procedure

1. Navigate to **All** > **Conversational Analytics** > **Formula Override**.
   Alternatively, you can enter *sn_ci_analytics_formula_override.list* in the Filter Navigator to display the sn_ci_analytics_formula_override table.
2. Select the formula you want to override.
   You cannot override the Duration formula, you can only activate or deactivate it. You can alter the scripts for other definitions. These are the only definitions you can alter.
   The Formula Override page appears and shows the existing formula.



3. Copy the script in the Value Script field.
   The default formulas are read-only. So, to modify them, you must make a copy.
4. Deselect the **Active** check box to make the default formula inactive.
5. Click **Update**.
6. Click **New** to create a formula override record that overrides the default formula.
   The Formula Override New Record page appears.



7. In the form, fill in the fields.
8. Click **Submit**.

Formula override example

Use the following formula override example to craft your own formula overrides.

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Group End State definitions

The end state of a conversation specifies how a conversation ended. For example, it could end with the user not responding, or the user closed the chat window. There are 12 default definitions of end state. For more information on conversation end states, see Virtual Agent interaction records. The following script groups them as follows:

- VA closed the chat session
  - System Closed VA – User No Response
  - System Closed VA – Topic Complete
  - System Closed VA – Left With AI Search
  - System closed VA – Auto Closed
  - System Closed VA – User Never Engaged
- Live agent closed the chat session
  - System Closed LA – User No Response
  - System Closed LA – Chat Complete
  - Agent Closed LA – Clicked End/X
  - System Closed LA – Before Agent Engagement
- User closed the chat session
  - User Closed LA – Clicked End/X
  - User Closed VA – Clicked End/X
  - User Closed LA - Before Agent Engagement

To create these groupings of the 12 end states, follow the instructions for creating a formula override and use the following script.

```
(function calc(convGr) {
    // Returns 'System Closed VA', 'System Closed LA', 'User
 Closed' states.
    function getFinalEndState(state) {
        var arrayUtil = new global.ArrayUtil();
        VA_END_STATE = ['System Closed VA - User No Response',
            'System Closed VA - Topic Complete',
            'System Closed VA - Left With AI Search',
            'System closed VA - Auto Closed',
            'System Closed VA - User Never Engaged'
        ];
        LA_END_STATE = ['System Closed LA - User No Response',
            'System Closed LA - Chat Complete',
            'Agent Closed LA - Clicked End/X',
            'System Closed LA - Before Agent Engagement'
        ];
        USER_CLOSED_END_STATE = ['User Closed LA - Clicked
 End/X',
            'User Closed VA - Clicked End/X',
            'User Closed LA - Before Agent Engagement'
        ];
        if (state) {
            if (arrayUtil.contains(VA_END_STATE, state))
                return 'System Closed VA';
```

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```
            if (arrayUtil.contains(LA_END_STATE, state))
                return 'System Closed LA';

            if (arrayUtil.contains(USER_CLOSED_END_STATE,
 state))
                return 'User Closed';
        }
        return state;
    }

    var conversationId = convGr.getValue('sys_id');
    var interactionGr = new GlideRecord('interaction');
    interactionGr.addQuery('channel_metadata_document',
 conversationId);
    interactionGr.addQuery('channel_metadata_table',
 'sys_cs_conversation');
    interactionGr.query();
    if (interactionGr.next()) {
        var state = interactionGr.getValue('state');
        var reason = interactionGr.getValue('state_reason');
        var isVAChat = interactionGr.getValue('virtual_agent');
        var isLAChat = interactionGr.getValue('agent_chat');
        var endState = new CAUtil().getEndState(state, reason,
 isVAChat, isLAChat);
        return getFinalEndState(endState);
    }
})(convGr);
```

Using the Conversational Analytics Dashboard

Use the Conversational Analytics dashboard to get insights into Virtual Agent (VA) conversations.

The following sections explain how to use the dashboard to investigate VA interactions with users. You must have the Chat Analytics Viewer (chat_analytics_viewer) role to use the Conversational Analytics dashboard.

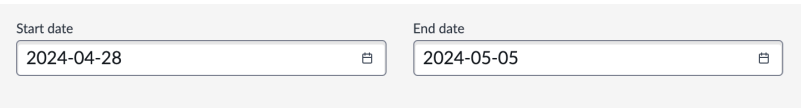
Set the date range of the data

Set the **Start date** and **End date** fields at the top of the Overview tab to specify the date range of the data visualizations on the page. The date range set on this tab applies to all the other tabs on the dashboard.

Before you begin

Role required: Chat Analytics Viewer (chat_analytics_viewer)

About this task



You can set the date range in two ways.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Analytics**.
2. **Optional:** Use the **Start date** and **End date** fields to set the date range.

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a. Select the **Start date** calendar icon ( ).

b. Double-select the start date on the calendar.

c. Select **OK**.

d. Select the **End date** calendar icon ( ).

e. Double-select the end date on the calendar.

f. Select **OK**.
The data displayed on the dashboard adjusts according to the data in the new date range.

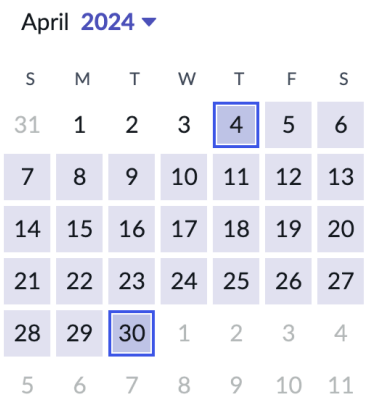
3. **Optional:** Use the **Start date** date calendar to set the date range.

a. Select the **Start date** calendar icon ( ).

b. Double-select the start date of the date range.

c. While holding down the control-key on the keyboard, double-select the end date.
The dashboard highlights the range of dates.

(Optional)



d. Select **OK**.

(Optional) The data displayed on the dashboard adjusts according to the new date range.

Overview tab

Use the Overview tab to view key indicators that help you evaluate the performance of Virtual Agent.

The **Overview** tab is the landing page for the dashboard. The visualizations in the **Overview** tab are important indicators of how VA is performing. You must have the Chat Analytics Viewer (chat_analytics_viewer) role to use the **Overview** tab.

Note:
Now Assist in Virtual Agent Analytics appears in the left navigation only when you have Now Assist in Virtual Agent enabled.

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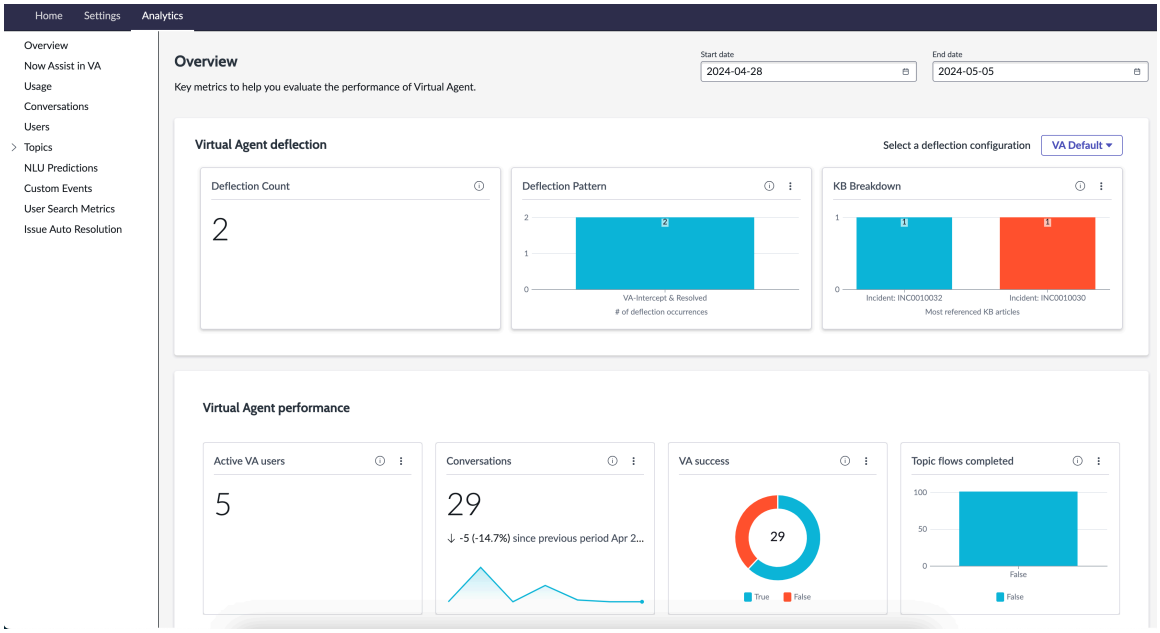

Key performance indicators

Indicators	Descriptions
Deflection Count	Number of deflection occurrences measured by the execution count of the Deflection topic block. A deflection occurs when Virtual Agent resolves or helps to resolve an issue for a user.
Deflection Pattern	Number of deflections per deflection patterns.
KB Breakdown	Titles of KB articles with the number of times they were presented as part of deflections.
Active VA users	Cumulative number of unique active end users (not agents) who used the conversational interface.
Conversations	Count of all interactive conversations initiated from the Virtual Agent.
VA success	Percentage of conversations that were completed without escalation and with an intended topic flow. Completed conversations are those that reach the end of a Virtual Agent topic or conversation, are closed by the user, or are automatically closed. Completed without escalation means that the conversation was not routed to a live agent, and the user did not give negative feedback. (Feedback types include negative, positive, neutral, and no feedback.)
Topic flows completed	Percentage of topics that end users completed till the last node out of all topics invoked and ran.

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Key performance indicators (continued)

Indicators	Descriptions
Topic Category - Complete	Number of completed conversations shown per topic Category.
Topic Category - Incomplete	Number of incomplete conversations shown per topic category.
Topic - Complete	Number of occurrences per topic when the user completed to the last node.
Topic - Incomplete	Number of occurrences per topic where users abandoned the conversation before the topic reached the last node.
User feedback	Feedback results categorized as good, bad and neutral. The feedback results are calculated from the Feedback Setup topic. **Note:** A user with Chat Analytics Admin role can change how frequently the Feedback Setup topic shows after the completion of chat using the system properties.
Channels	Number of conversations executed across the configured channels of the Virtual Agent.
Conversation end state	Number of conversations that have ended in the out-of-the-box conversation end state.

Typical actions on the **Overview** tab include:

- Selecting a deflection configuration to view the deflection indicators such as deflection count, deflection patter, and KB Breakdown.
- Selecting the visualized data, for example, a bar in a bar chart, to get additional information about the data.
- Changing the date range of the data displayed.

Usage tab

The **Usage** tab provides usage information related to conversation type, language used in the conversations, and engagement rate of actionable notifications delivered by Virtual Agent (VA).

The indicators in the **Usage** tab provide the following information.

Usage indicators

Indicators	Descriptions
Conversation type	Number of conversations escalated from VA to a live agent, initiated and completed in VA only, or initiated and completed by a live agent.
Topic sent via the Actionable notification	The number of actionable notifications delivered from virtual agent to the users for the selected time range, and the

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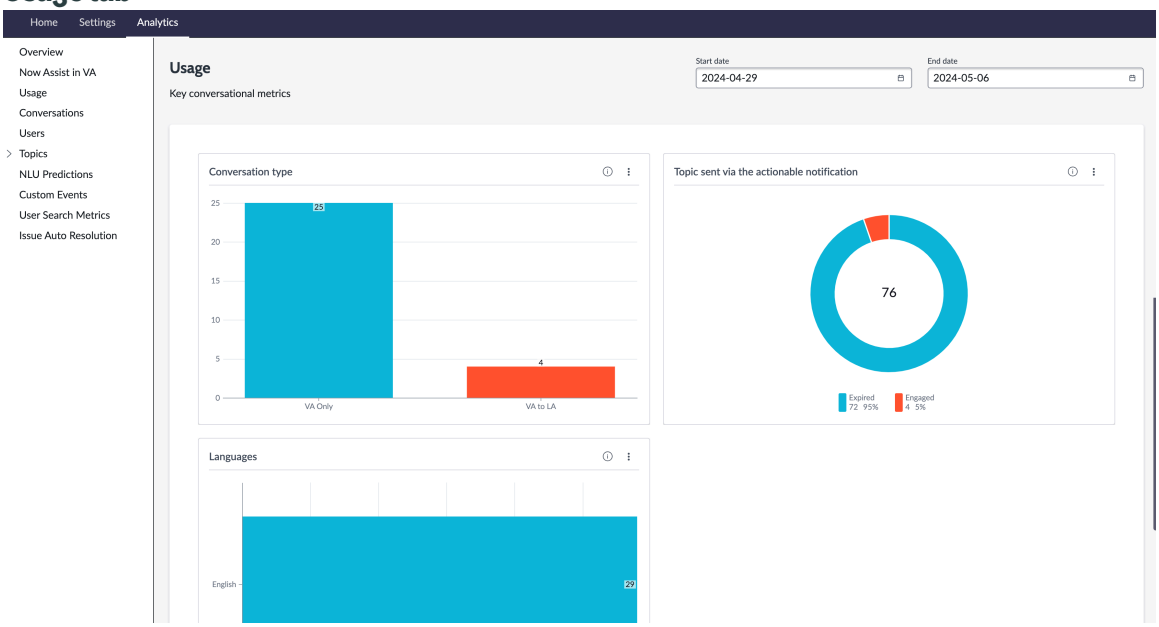
Usage indicators (continued)

Indicators	Descriptions
	number and percentage of actionable notifications that users engaged with, and did not engage with.
Languages	Languages used by users and the number of conversations in each language.

You must have the Chat Analytics Admin or Chat Analytics Viewer role to access the **Usage** tab.

Usage tab



Conversations tab

Use the **Conversations** tab to view the list of Virtual Agent conversations and details of each conversation that occurred during the selected date range.

All conversations from the Conversation table [sys_cs_conversation], that run on the Virtual Agent Designer are listed on the Conversations page, except for notifications, open (ongoing) conversations, and previews.

Virtual Agent conversations and analytics data is retained for a period of two years.

To access the **Conversations** tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.

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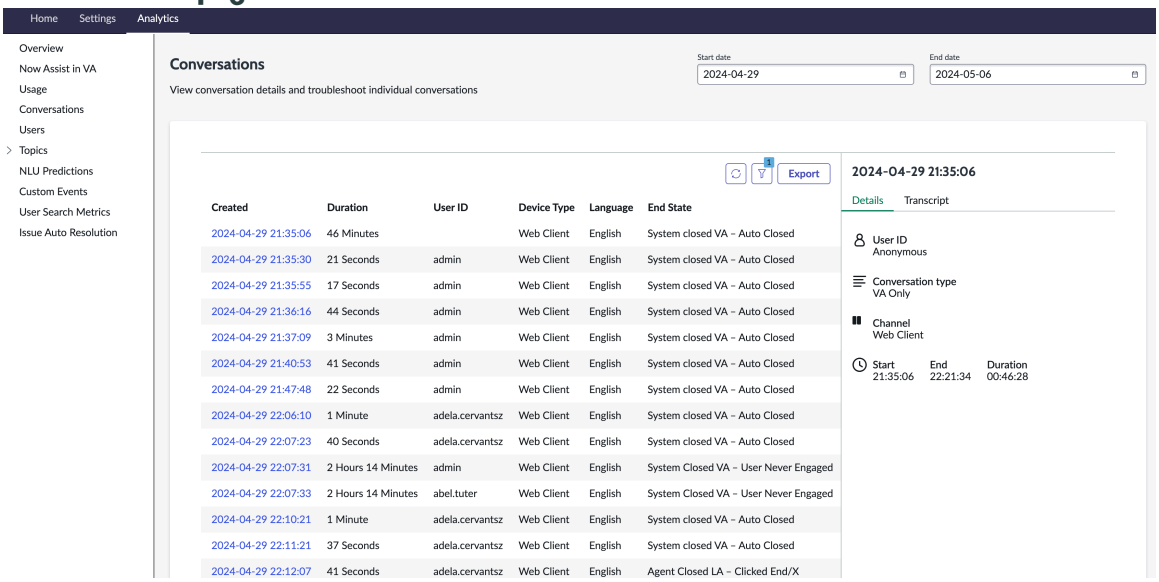
Conversations page



Conversations tab benefits

The **Conversations** tab enables you to do the following:

- Filter the list of conversations based on specific conditions using the filter editor. For more information, see Use filters in the Conversation tab
- Learn more about each conversation by viewing conversation details. For more information, see Get conversation details.
- Export the list of conversations to a file. For more information, see Export the conversations list.
- Download the conversation transcript to troubleshoot individual conversations. For more information, see Download the conversation transcript.

Get conversation details

To get more information about a conversation, select one of the conversations in the list. The information appears on the side panel.

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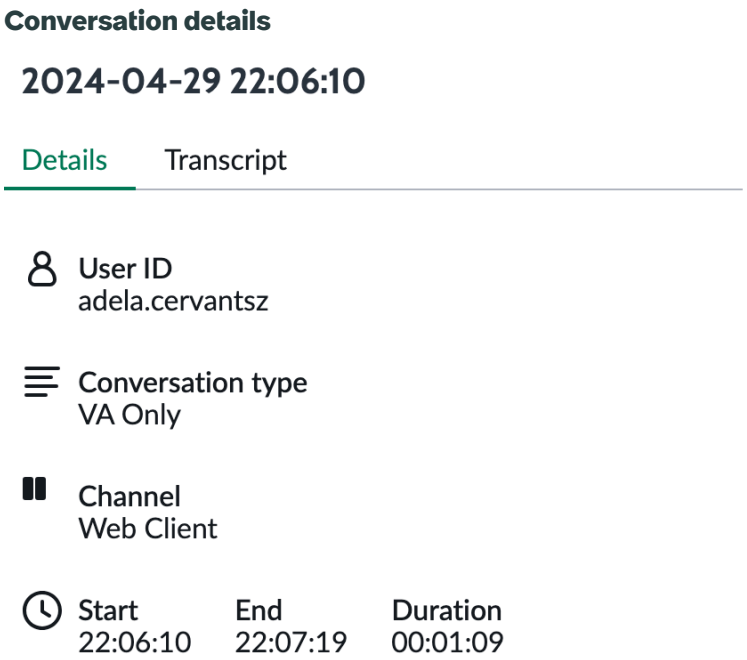

To view and download the conversation transcript, select the **Transcript** tab.

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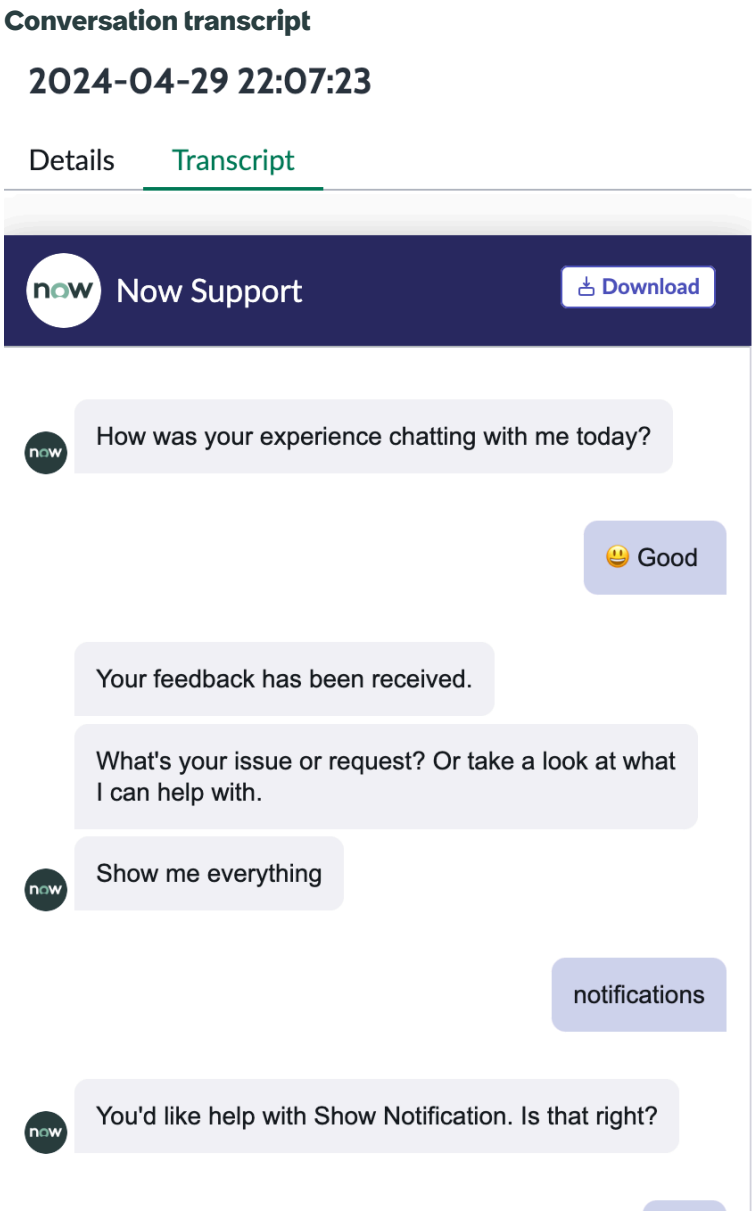

Export the conversations list

To export the conversations list on the Conversations page to a file, select **Export**. In the Export pop-up window, specify the format for the file such as Excel, CSV, JSON, or PDF, and the delivery type such as email or download.

Note:
You can export up to 1000 records only from the list on the page. This limit is not configurable.

Conversation information

The following table describes details of conversations listed in the **Conversations** tab.

User information

Column	Description
Created	Date of the conversation.

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User information (continued)

Column	Description
Duration	Duration of the conversation.
User ID	Unique identifier that the system creates and permanently assigns to a Virtual Agent user. The Id becomes a part of conversation records. This number is not the same as the system user ID.
Device Type	Conversational channel used for the chat.
Language	Language used for the conversation.
End state	How the conversation ended. For more information on various conversation end states, see Virtual Agent interaction records.
Type	Type of conversation, for example, VA Only (conversation initiated and completed in VA).
Conversation	

Download the conversation transcript

To download the conversation transcript, select a conversation from the conversations list and click **Download**.

The conversation transcript .txt file includes various data elements such as user input, Virtual Agent response, Flow Designer Integration Hub, flow action, custom controls, and topic block information for the selected conversation. This information helps Virtual Agent administrators to troubleshoot conversations, for example, conversations where there were errors or transfers to a live agent. For more information on the .txt file, see Conversation transcript template.

Conversation transcript template

The conversation transcript .txt file contains information used to troubleshoot individual conversations.

Data element	Description
Conversation ID (sys_id)	Unique identifier of the conversation, autogenerated by the Virtual Agent.
Conversation Start Time	Start time of the conversation.
Channel	Channel from which the conversation was initiated. For example, the Slack application, Microsoft Teams, and so on.
User Name	Name of the user who initiated the conversation.
User Status	Status of the user in the ServiceNow AI Platform® instance. For example, Active or Inactive.
Bot Response	Control that displays Virtual Agent responses in a conversation.
User Input	Control that prompts and captures information from the user in a conversation.

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Data element	Description
Message Date and Time	Timestamp of individual messages.
FDIH logs	Action or Subflow • Id: sys_id of the action or subflow. • Inputs: Input passed to the action or subflow. • Outputs: Output received from the action or subflow.
Topic Block	Name of the topic block defined in the current topic. • Id: sys_id of the topic block invoked. • Inputs: Input passed to the topic block. • Outputs: Output received from the topic block.

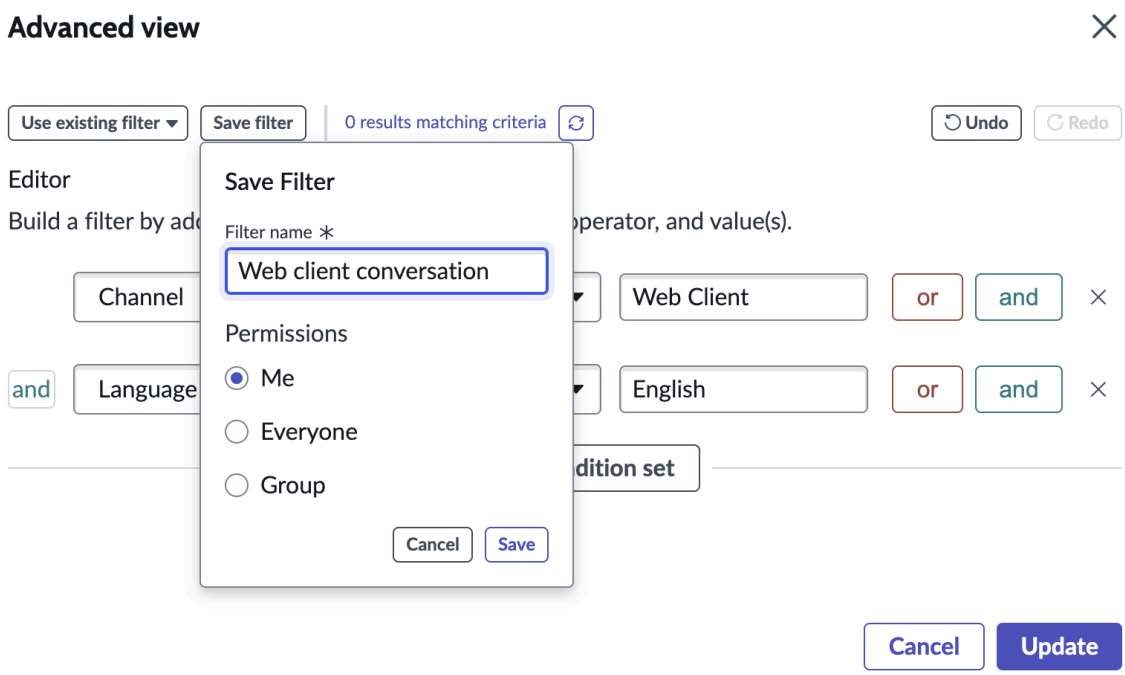
Use filters in the Conversation tab

You can filter out conversation for a deeper understanding.

Filtering using the Filter Editor

To filter the conversations, click filter icon and select **Advanced view** button to use the filter editor. You can either select an existing filter from the list or create a new filter condition.

Building filters in the filter editor



The filter editor consists of the following:

- Field: A list based on relevant tables. For more information about the field options, see Field options in the Filter Editor.
- Operator: A list of operators that is contextually generated based on the selected field.
- Value: A text entry field or a list that is contextually generated based on the selected field.

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To add a dependent condition in the filter editor, either click **or** or **and**. To filter the conversations list using the condition, click **Update**.

To remove a condition, click the delete icon ( ) next to the condition.

To save a condition that you created in the condition builder, click **Save filter**. In the Save Filter pop-up window, specify a name for the filter. You can also set permissions for the filter in the Save Filter window. Users having the Chat Analytics Viewer (chat_analytics_viewer) role can select and modify saved filters.

Field options in the Filter Editor

Field options

Option	Description
Channel	Conversations that used the specified channel.
Conversation Time	Conversations within the specified date and time.
Duration	Conversations within the specified time duration. You can edit the definition of duration to be a session duration, rather than an active messaging duration. For more information, see Create custom override definitions.
End State	Conversations with the specified state that is based on how conversations ended. The values for the end states are stored in the Interactions [interactions] table. For more information, see Virtual Agent interaction records.
Events	Specific events that are triggered in a conversation.
Feedback Result	Conversations for the specified feedback type.
Language	Conversations for the specified language based on the user's language setting.
Message Count	Conversations for the specified message count in the chat.
Provider Name	Conversations for the specified provider.
VA Success	Conversations resolved by the Virtual Agent.
Setup Topic Types	Conversations that used the specified setup topic type.
Topic Blocks	Conversations that used the specified topic block.
Topic Categories	Conversations that have topics which belong to a specified topic category.
Topic Count	Conversations that used the specified topic count. Each conversation can use multiple topics and this option filters conversations based on the count of topics used in it.
Topics	Conversations that used the specified topics in the chat.
Type	Conversations that are of the specified type such as live agent only or Virtual Agent only.

Users tab

Get detailed information on Virtual Agent users such as the time of the last conversation and duration of the conversation.

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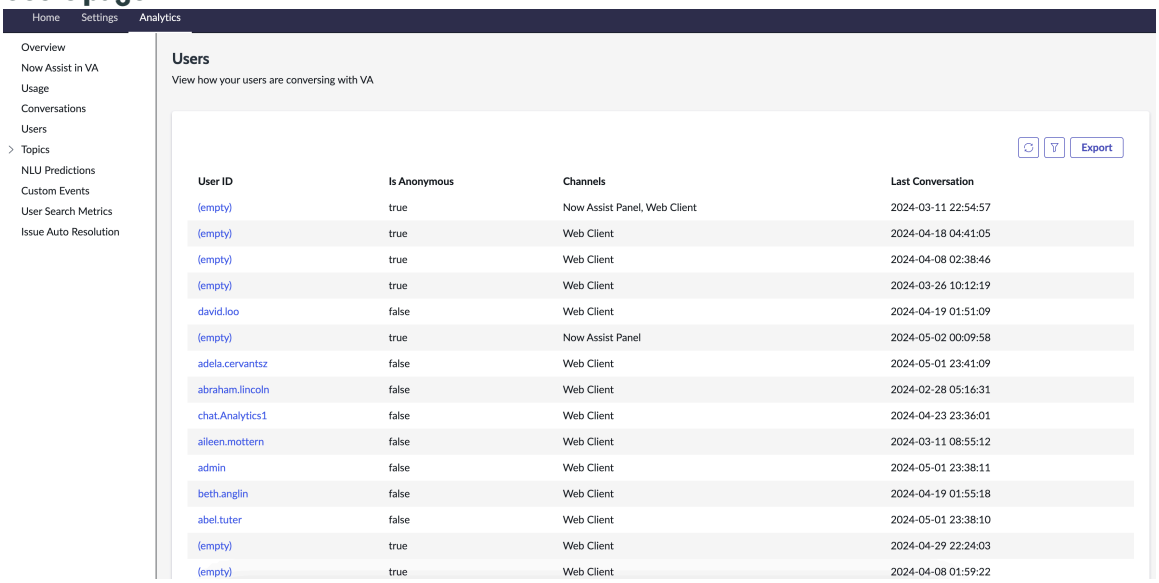
The **Users** tab provides information about users interacting with Virtual Agent.

To access the **Users** tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.

Users page



Users tab benefits

The **Users** tab enables you to do the following:

- Filter the list of users based on specific conditions using the filter editor. For more information, see Use filters in the Users tab
- View user details. For more information, see User information section on this page.
- Export the list of users to a file. For more information, see Export the list of users section on this page.

Export the list of users

To export the list of users in the Users page to a file, select **Export**. In the Export pop-up window, specify the format for the file such as Excel, CSV, JSON, or PDF, and the delivery type such as email or download.

Note:
You can export up to 1000 records only from the list on the page. This limit is not configurable.

User information

The following table describes user details listed on the Users tab.

User information

Column	Description
User ID	User ID of the logged in user. If users don't log in, they appear in sessions as **Anonymous**.
Is Anonymous	If users didn't log in, they appear in the sessions as anonymous.
Channel	Conversation channel used by the user.

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User information (continued)

Column	Description
Last conversation	Timestamp of the user's last conversation with the Virtual Agent.

Use filters in the Users tab

You can use filters to get a deeper understanding of User data.

Filter using the filter editor

The filter editor enables you to filter users based on one or more conditions. You can either select an existing filter from the list or create a new filter using the editor.

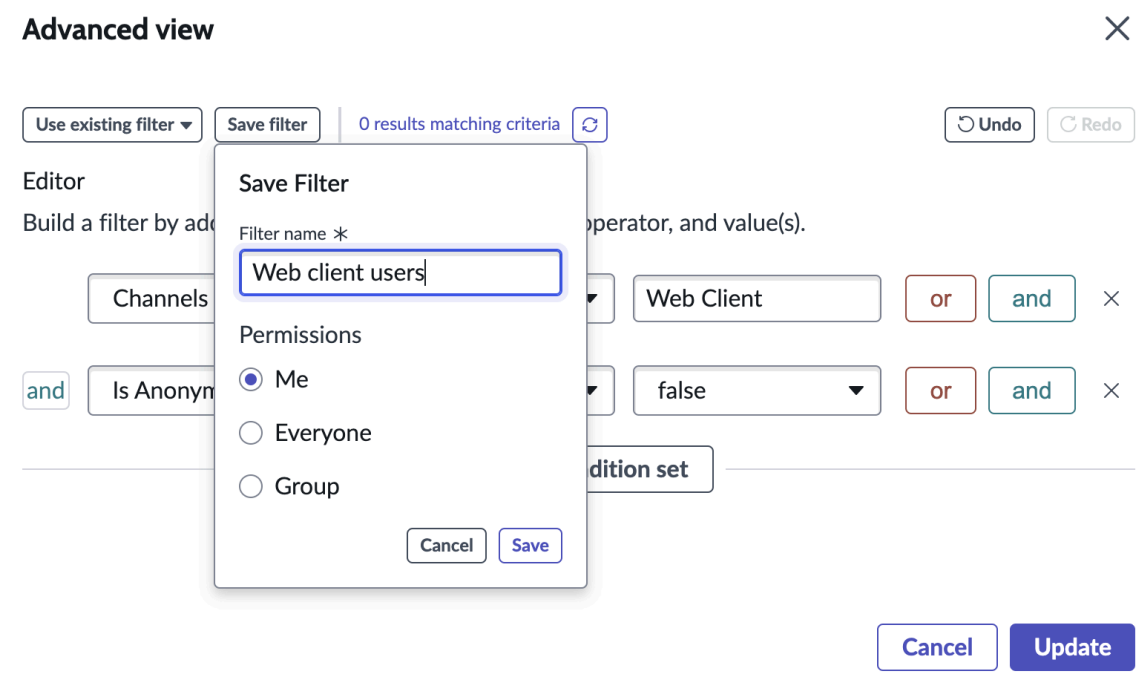
The filter editor consists of the following:

- Field: A list based on relevant tables.
- Operator: A list of operations that is contextually generated based on the selected field.
- Value: A text entry field or a list that is contextually generated based on the selected field.

To remove a condition, click the delete icon ( ) next to the condition. To add dependent conditions in the condition builder, either click **or** or **and**. To filter the conversations list using the condition, click **Update**.

To save a condition that you created in the filter editor, click **Save filter**. In the Save Filter pop-up window, specify a name for the filter. You can also set permissions for the filter in the Save Filter window. Users having the Chat Analytics Viewer (chat_analytics_viewer) role can select and modify your saved filters.

Saved condition



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Field options in the Filter Editor

User filters

Option	Description
User ID	User ID of the logged in user.
User Index	Unique number that the system creates and permanently assigns to a Virtual Agent user. This number becomes a part of conversation records.
Conversation Exists	Container for subfilter properties. For example, in the previous image, the subfilter is **Duration**.
Channel Count	Number of channels a user used. A channel is the client app the user used, such as Slack. For example, if all users have used only one channel to chat with Virtual Agent, then setting the filter value to 2 eliminates all the users in the list.
Channels	Only displays users that used the specified channel to chat.
Conversation Count	Only displays users that have the number of conversations specified in the filter.
First Conversation Time	Only displays users where the first conversation is within the time period specified.
Language	Only displays users that chat using the specified language.
Last Conversation Time	Only displays users where the last conversation is within the time period specified.
Time in Chat	Only displays users whose chat durations are within the time period specified, for example, more than 30 seconds.

Topics tab

Use the **Topics** tab in the Conversational Analytics dashboard to identify the best and underperforming topics.

The **Topics** tab provides insights into which Virtual Agent (VA) topics are performing well and which aren't. To use the Topics tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.

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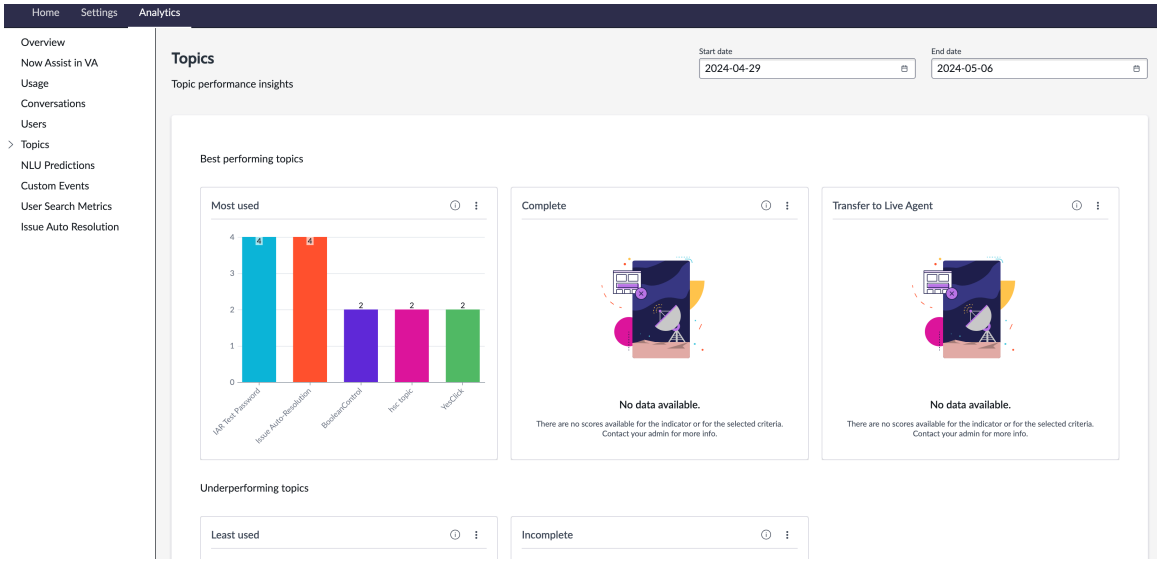

Best performing topics

The Best performing topics indicator shows topics that are performing well. The horizontal axis lists the topics. The count on the vertical axis refers to the number of times the topic was invoked by VA.

- Most Used—Topics that were least invoked by VA in conversations.
- Complete—Number of times VA completed the topic without transferring to a live agent.
- Transfer to Live Agent—The topics that were transferred to a live agent because VA couldn't resolve user's query.

Underperforming topics

The Underperforming topics indicator shows topics that didn't perform well. The horizontal axis lists the topics. The count on the vertical axis refers to the number of times the topic was invoked by VA.

- Least used— Topics that were least invoked by VA in conversations.
- Incomplete—The topics the user abandoned without resolution.

Spokes

The Spokes indicator provides details of the spoke, actions, subflows, and topics that executed the spoke. For more information, see Spokes.

Spokes

Use the Spokes indicators to view details such as spoke usage, spoke actions, and subflows for the selected spoke.

In Virtual Agent, conversations contain topics, topics contain spokes, and spokes contain spoke actions or subflows. The **Spokes** indicators show which spokes, actions, and subflows were used and how often.

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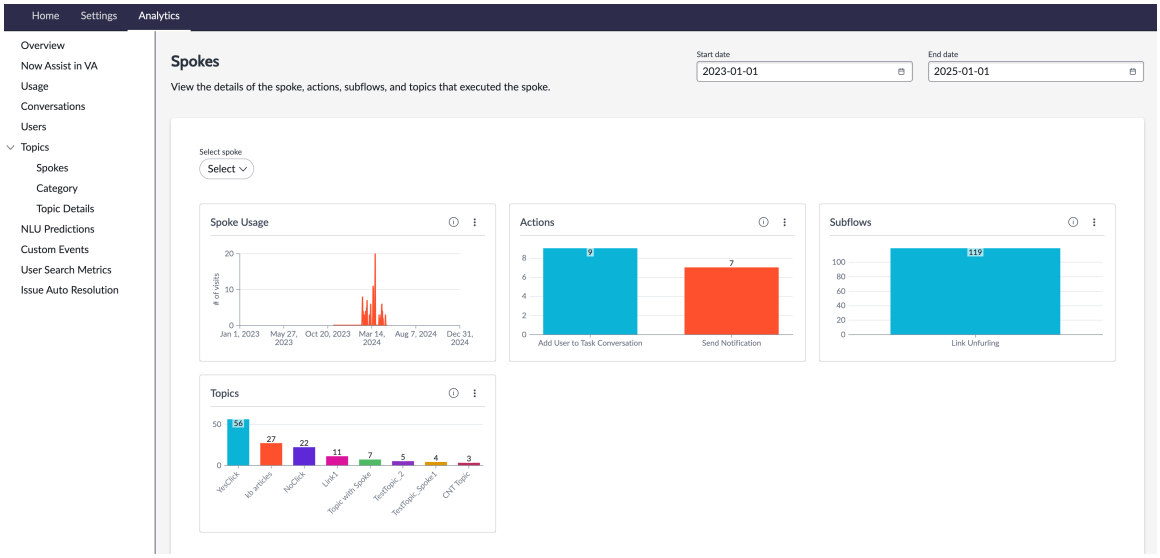

Spokes tab

The Spokes tab contains the following indicators.

- **Spoke Usage**—Spoke Usage indicator shows the number of times the selected spoke was executed in the date range.
- **Actions**—Actions indicator shows which actions were executed for the selected spoke, which.
- **Subflows**—Subflows indicator shows which subflows were executed for the selected spoke.
- **Topics**—Topics indicator shows which topics executed the selected spoke. The horizontal axis shows the topics that triggered the spoke. The vertical axis shows the number of times the spoke was triggered in a topic.

Topic categories

Use the Category page in the Conversational Analytics dashboard to view the performance of Virtual Agent (VA) topics by the selected topic category.

Topic categories group related conversation topics. Topics can belong to more than one category. Select the drop-down list to show the categories that you can display in the visualizations. The visualizations show the aggregate performance of Virtual Agent conversations that ran in the topics belonging to a category.

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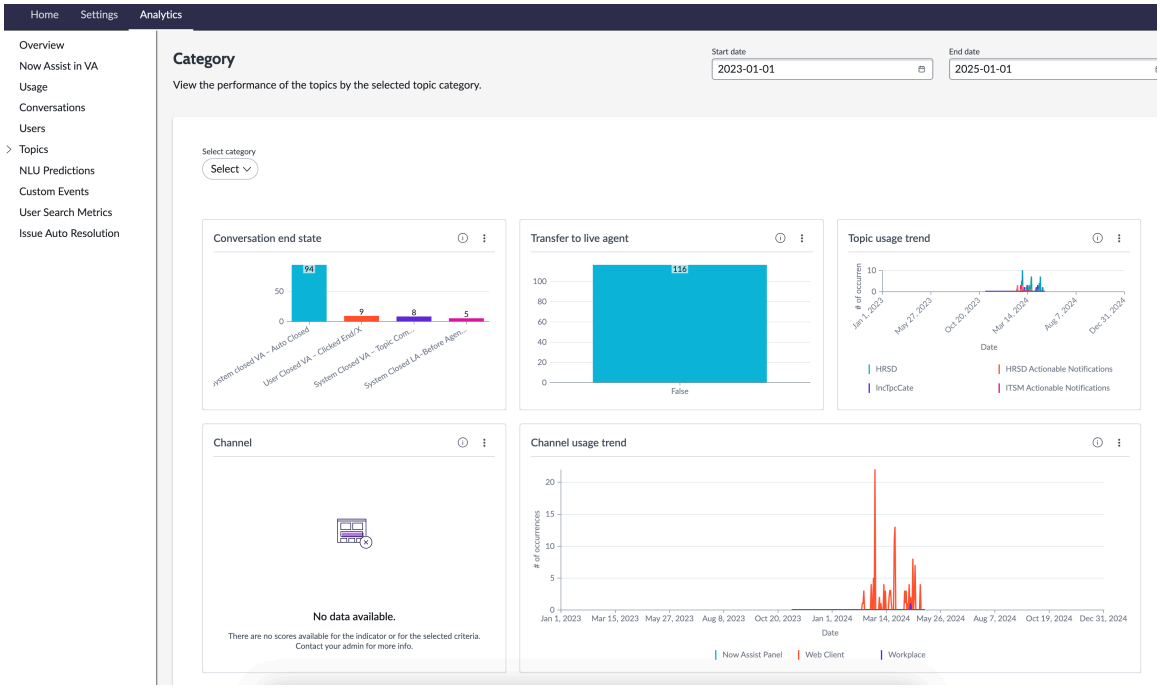

For more information about creating or modifying VA categories, see Create or modify custom categories.

Topic category visualizations

Visualization	Description
Conversation end state	The number of users that reached a specific node in a topic in the VA category. In the example, six users reached the node labeled, **System closed VA - Auto Closed**. Use this field to see where topics stopped working for users. For definitions of each conversation end state, see Virtual Agent interaction records.
Transfer to live agent	The number of users that transferred from VA to a live agent in that VA category. A high number indicates that the topic is not meeting user needs.
Topic usage trend	Number of topics users used in a specified topic category over the course of the date range. The example shows the number of topics per day users used in the IT category. Use this field to monitor updates to topics.
Channel	The application the user used to chat with VA in that topic category, for example, Slack or web client.
Channel usage trend	Number of users using a specified channel over the course of the date range for topics in that VA category.

Topics details

Use the Topic Details page in the Conversational Analytics dashboard to view key performance indicators of Virtual Agent (VA) topics.

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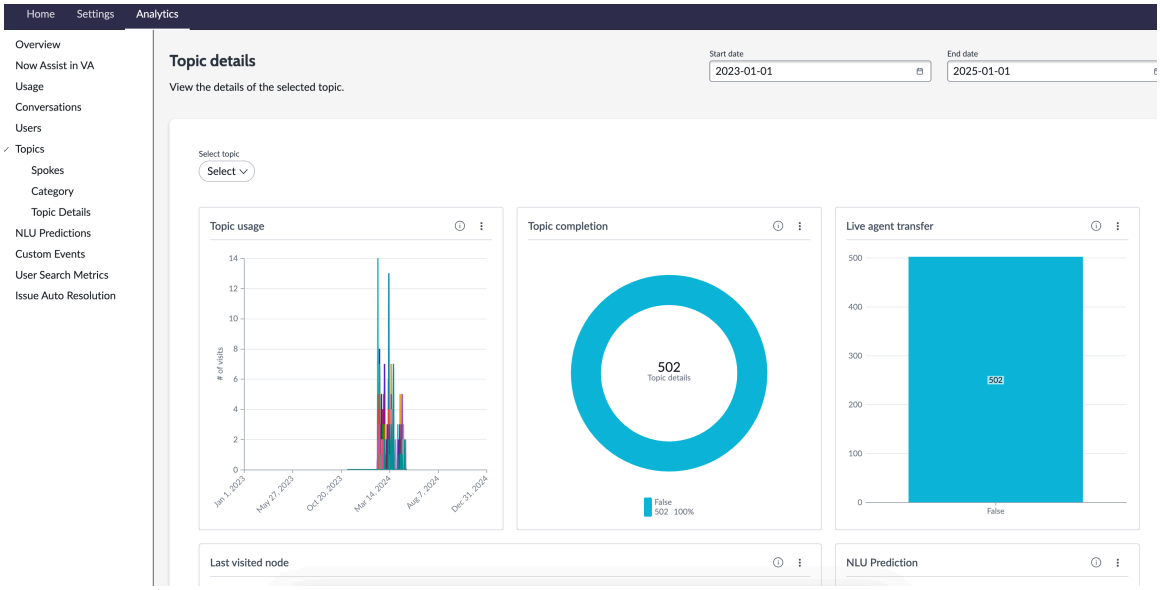
Get additional information about the topics

Select a topic from the drop-down to view the indicators associated with the topic.



The Topic Details page provides the following indicators.

- **Topic Usage**—The number of times the topic was used each day.
- **Topic completion**—Number of times the user went to the final node in the topic.
- **Live Agent Transfer**—Number of VA chats transferred to a live agent.
- **Last Visited Node**—Last nodes users visited before leaving the chat.

  The presumption is the users gave up after the last node they visited.
- **NLU Prediction**—NLU prediction stats for the selected topic.
- **Topic block breakdown**—Execution count of the selected topic block in different topics. Use this indicator to view which topic block is executed the most across topics.

Natural Language Understanding of Virtual Agent responses

Use the **NLU Prediction** tab to see how well NLU predicts intents, and to improve the intents so NLU makes better predictions.

Virtual Agent (VA) uses the Natural Language Understanding (NLU) service to understand user input. **NLU Prediction** tab on the Conversational Analytics dashboard shows how well NLU is understanding user input in VA conversations. Virtual Agent comes with NLU models, but you can use the Activate the NLU Workbench to modify or create new models.

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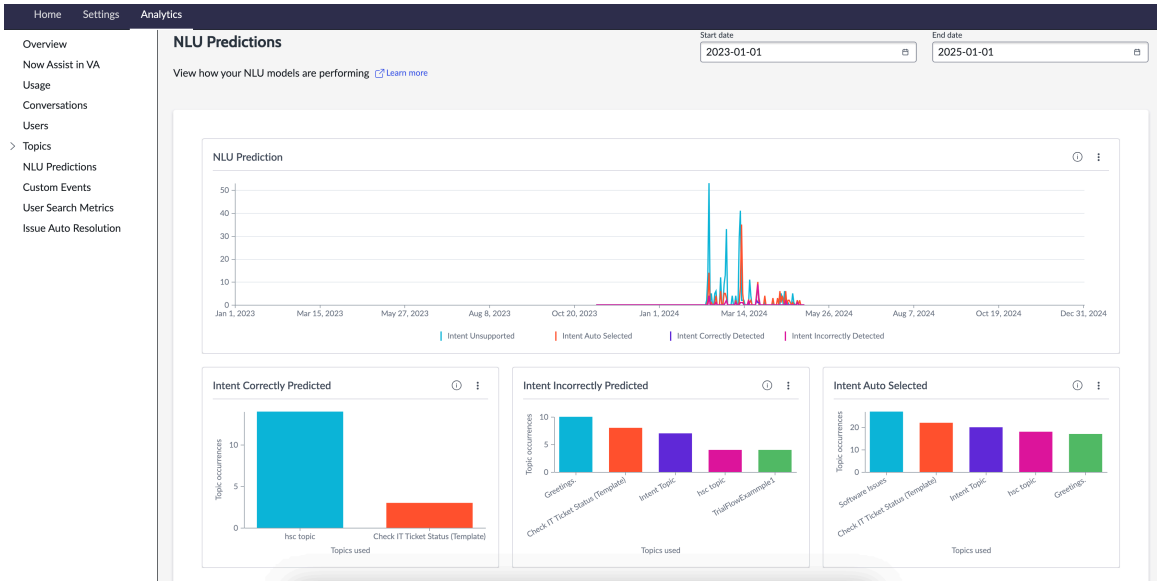

To use the NLU Prediction tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.

NLU Prediction indicator

The NLU Prediction indicator shows the daily performance of NLU predictions mapped against the user intent.

- **Intent Unsupported**—NLU did not recognize user intent.
- **Intent Auto Selected**—NLU predicted a single intent based and the user selected the same. Sometimes, NLU returns multiple topics, each from a separate intent, and the user selects one.
- **Intent Correctly Predicted**—NLU predicted multiple intents and the user selected one of them.
- **Intent Incorrectly Predicted**—NLU predicted multiple intents and the user indicated that none of them were what they were looking for.

Note:
The vertical axis can have duplicate values because the axis has 10 increments. If the number of intents is less than 10, some values on the vertical axis appear more than once.

The dashboard collects the following data points to arrive at the indicators.

1. Did the NLU prediction model determine an intent?
2. Did the predicted intent match the topic bound in the model to the intent?
3. What's the prediction score and did the dashboard show multiple options to the end user to specify the correct intent, or did the dashboard just display the topic associated with one intent.
4. After showing the user multiple intents, did the user select one?

It's possible for intents to appear in several categories. For example, an intent can appear in the **Intent Correctly Detected** and **Intent Auto Selected** because NLU correctly predicted the intent and only presented a single response, which the user accepted.

Improving NLU predictions

Clicking anywhere on the NLU Prediction indicator opens the Model Performance page. It shows a summary of intents predicted or not predicted over the date range specified on the graph.

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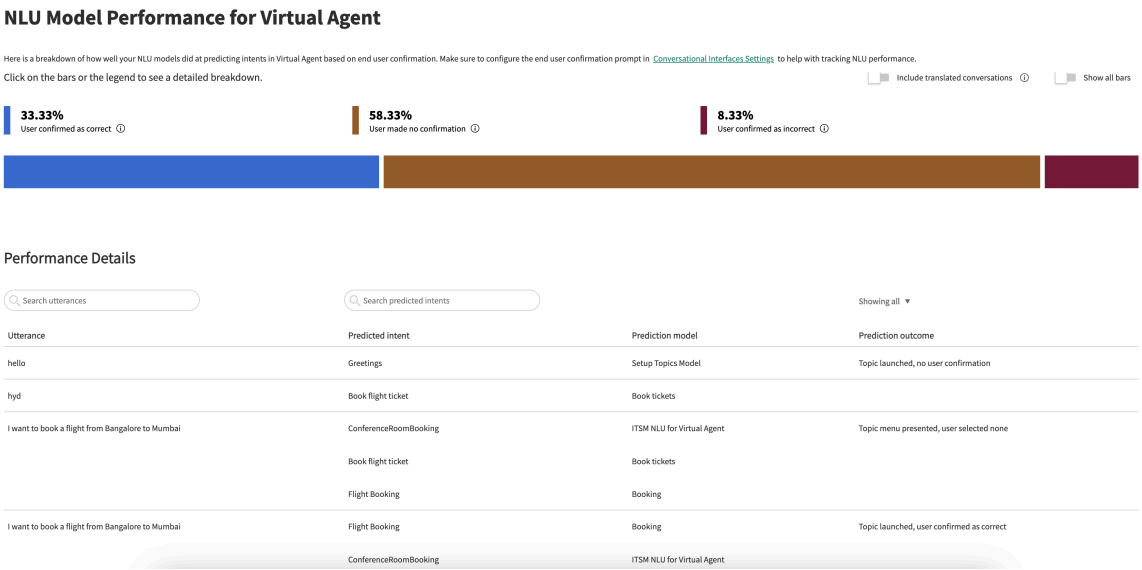


See Activate the NLU Workbench for information on how to use NLU Workbench to improve NLU predictions.

Modify models

Test and modify the Virtual Agent models so they more accurately predict user intents.

Before you begin

Role required: Chat Analytics Admin

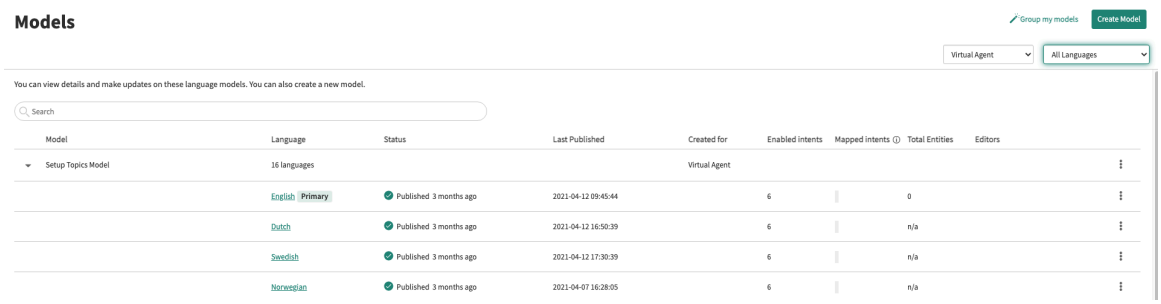
About this task

Many ServiceNow products, such as ITSM, HRSD, and CSM include NLU models for Virtual Agent (VA) topics. The NLU plugin contains entities that are common across all products. You can modify those models. To learn how to train and test the models used for VA conversations, see Natural Language Understanding.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Home** > **Analytics** and select the **NLU Prediction** tab.
2. Select **View more** .

   The Models page opens that displays the models that predict intents in your setup.



3. **Optional:** If none of the models contain intents and utterances you'd like in your setup, select **Create Model** and follow the instructions in Create an NLU model.
4. Click a model to display the intents the model predicts.

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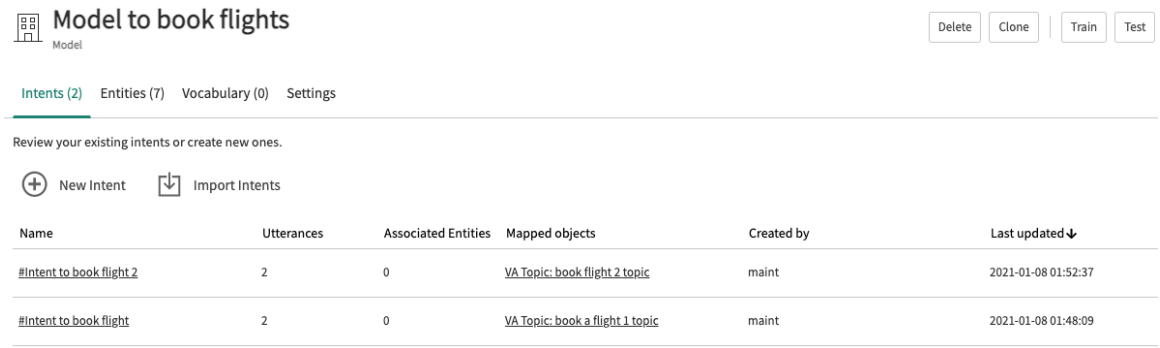
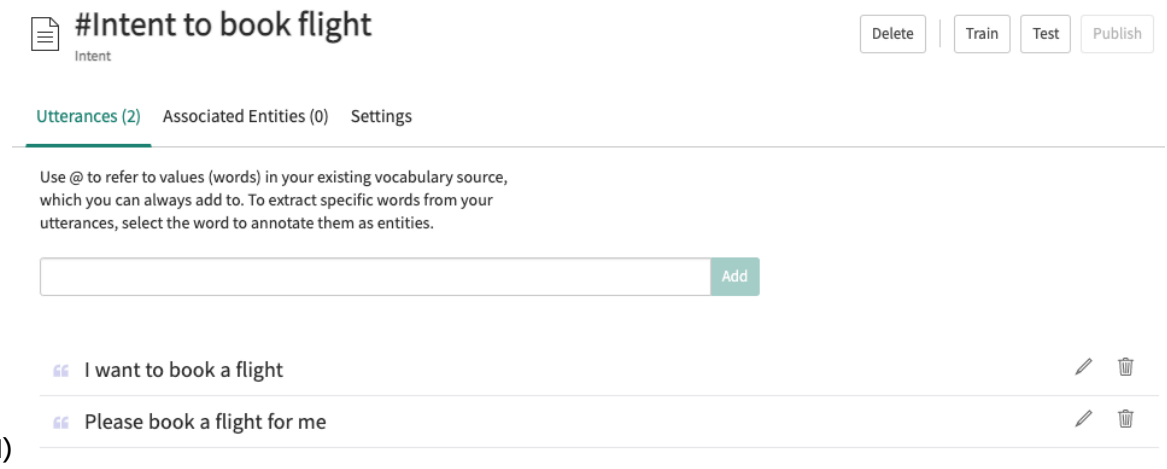


5. Optional: Click an intent to display the utterances associated with it.

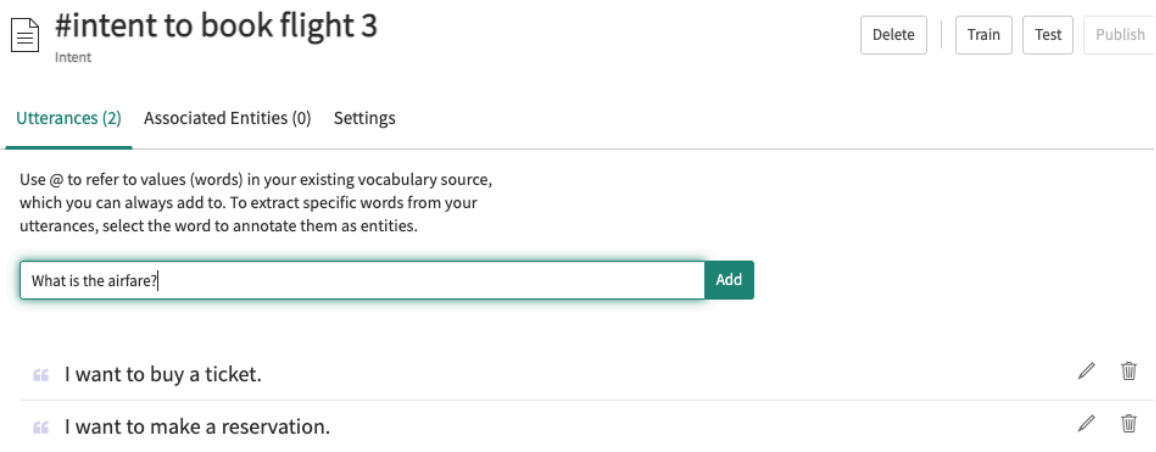


(Optional)

6. Optional: To create a new intent and add it to the model:

a. Select **New Intent**.
The **Create a new intent** dialog box opens.

b. Enter the name of the new intent in **Intent Name**, a description of it in the **Description** field, and select **Save**.
A page for your new intent opens.



(Optional)

c. Enter an utterance for your new intent and select **Add**.
You can repeat this step multiple times to add multiple utterances.

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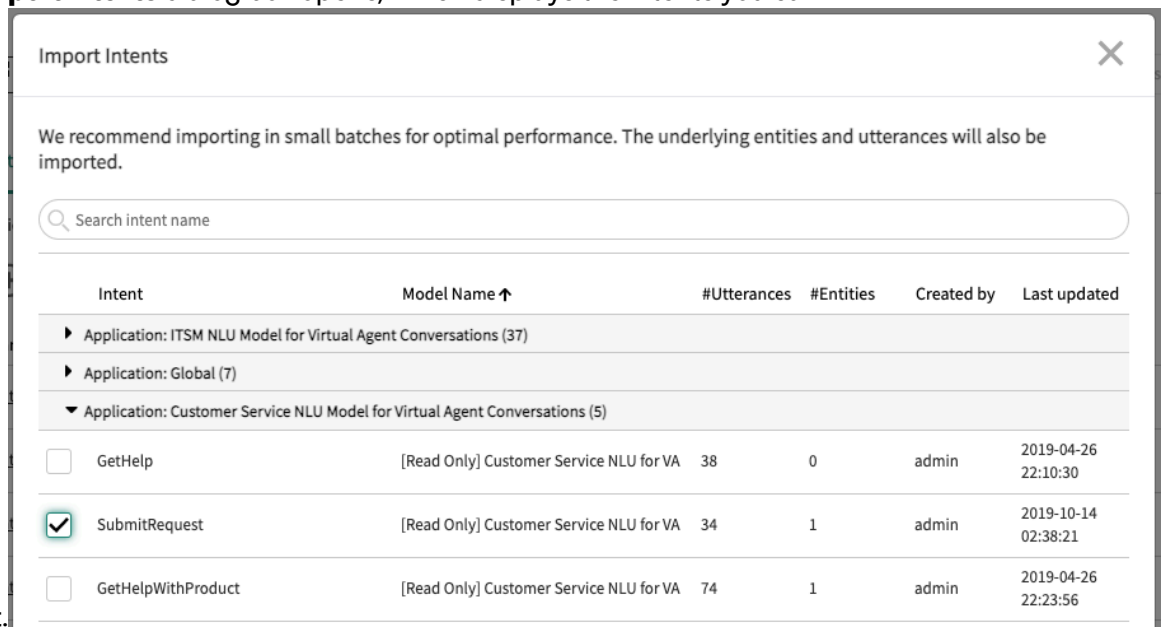
7. **Optional:** Import one or more intents by selecting **Import Intents**.
   The **Import Intents** dialog box opens, which displays the intents you can import.



   a. Find the intent(s) to import by entering a search term, or by clicking an arrowhead to display the intents in a folder, and then selecting one or more check boxes.

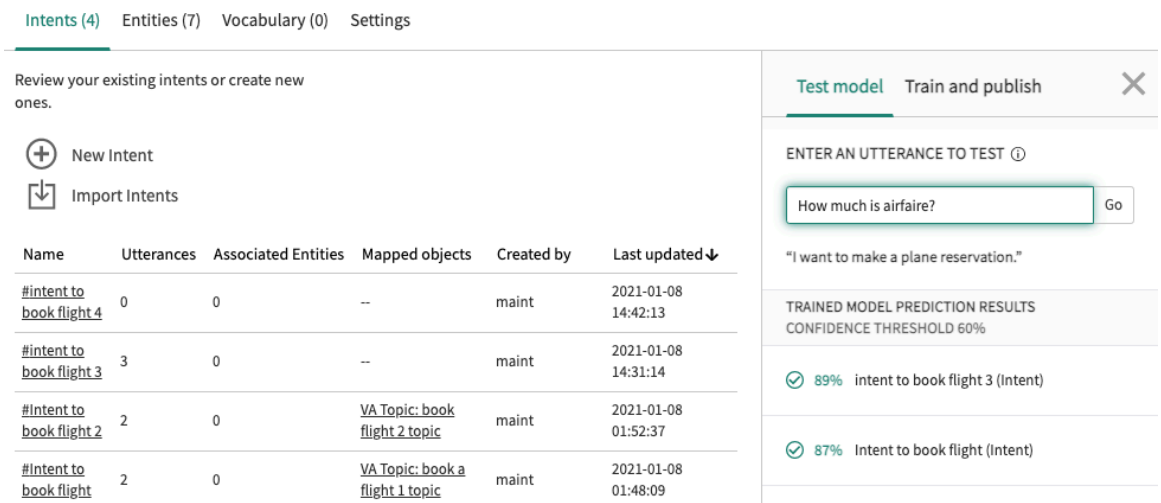
   b. Select **Import**.

8. **Optional:** If you added or imported intents:

   a. Select **Train** to add the intents to the model.

   b. Select **Train** to train the model.
   If successful, a banner at the top reads, **The model has been successfully trained.**

9. To test all the utterances, select **Test** and enter a sentence a user might enter in a chat to see if NLU understands the intent of your sentence.



10. If the models fail to predict the intent, add additional intents to the model, or utterances to the intents, as described in step 6.

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Using user search metrics with Virtual Agent

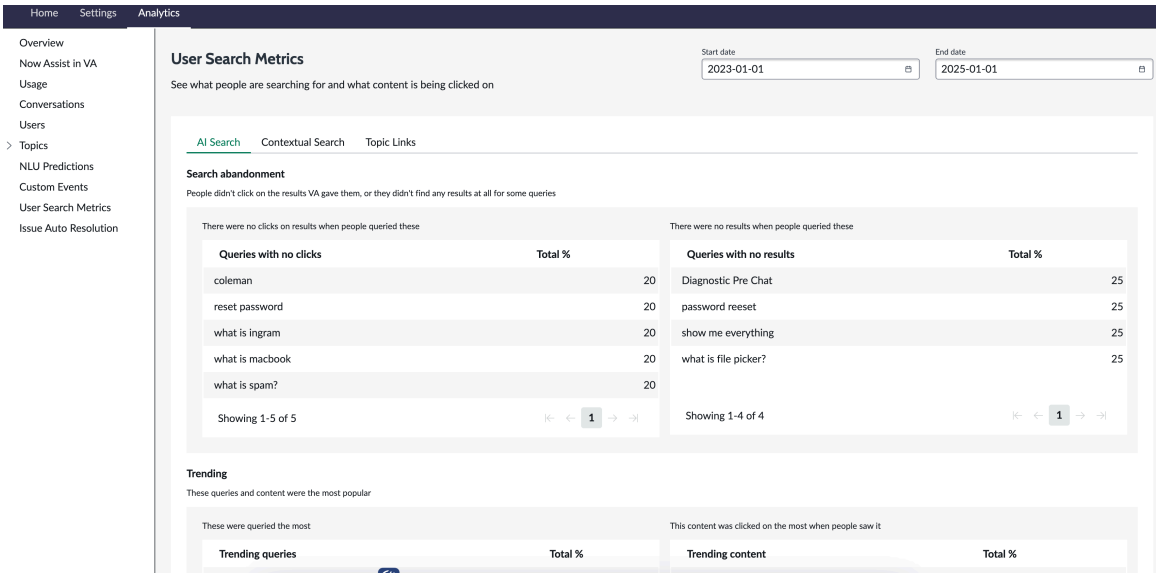
By using user search metrics with the Virtual Agent application, you can see your users' queries and the results from their searches. With these metrics, you can identify the areas where you can improve Virtual Agent to offer more meaningful search results.

Use the **User Search Metrics** tab in the Conversational Analytics dashboard to view key indicators about the queries that users searched on and the corresponding search results. By using this tab, you can get the answers to the following questions:

- Which search results were not useful to the users?
- Which queries did not have any search results?
- Which were the most common queries from users?
- Which search results did the users select most often?

To access the **User Search Metrics** tab, you must have the chat analytics admin role or the chat analytics viewer role. The following example shows the data included in the **User Search Metrics** tab.

User Search Metrics tab



AI Search

Virtual Agent topics may use AI search to suggest helpful resources to the user. When a user enters a query, AI search provides the most relevant results by using intelligent query features. To know more about AI search, see AI Search . To integrate Virtual Agent with AI Search, see Improving the user experience with AI Search.

Contextual Search

Contextual search matches keywords to an existing database search to find potential matches to a query. Virtual Agent topics may use contextual search to resolve queries. For more information, see Maximizing code reuse with topic blocks.

Topic Links

Some Virtual Agent topics have links to useful resources that are embedded within them. When a user invokes one of these topics, the link shows up without having to do any back-end search.

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User Search information

The following table describes user search indicators visualized on the **User Search Metrics** tab.

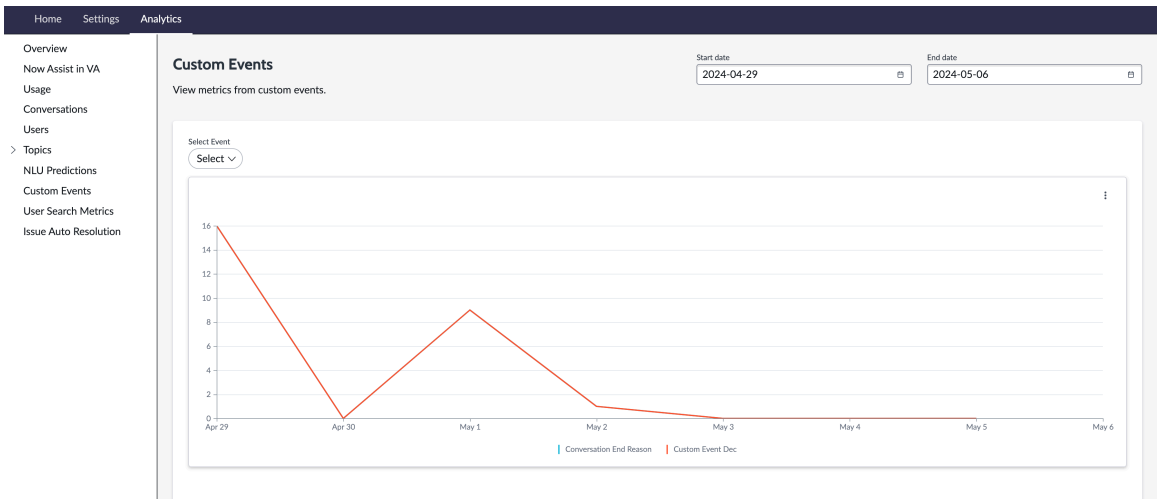
User search indicators

Visualization	Description
Queries with no clicks	Queries that users did not click on any of the search results.
Queries with no results	Queries that did not yield any search result.
Trending queries	Queries that users most commonly asked.
Trending content	Search results that users clicked on the most.

Custom Events tab

Use the Custom Events tab to view the list of custom events created for Virtual Agent.

To use the Custom Events tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.



The Custom Events tab shows the dates when custom events were triggered. If no one created custom events, the list of custom events is empty. The maximum number of custom events displayed is 20.

Use the drop-down list to specify the custom event you want view analytics for.

Issue auto-resolution tab

The **Issue auto-resolution** tab helps you understand how well your Virtual Agent (VA) chatbot anticipates user needs. It displays information about the number of user issues intercepted by the auto-resolution service and resolved by VA.

Issue auto-resolution takes place when a user is diverted to VA from a non-conversational interface. For example, a user might request a new keyboard through a service portal or email. The auto-resolution service can detect the user request and use VA to resolve the user's request in a VA chatbot session. For more information, see Auto Resolution for Virtual Agent.

The indicators in the **Issue auto-resolution** tab display how well the auto-resolution service is working. This tab is available only when Issue Auto Resolution is enabled and the **Auto Resolution Configuration** record is set as active.

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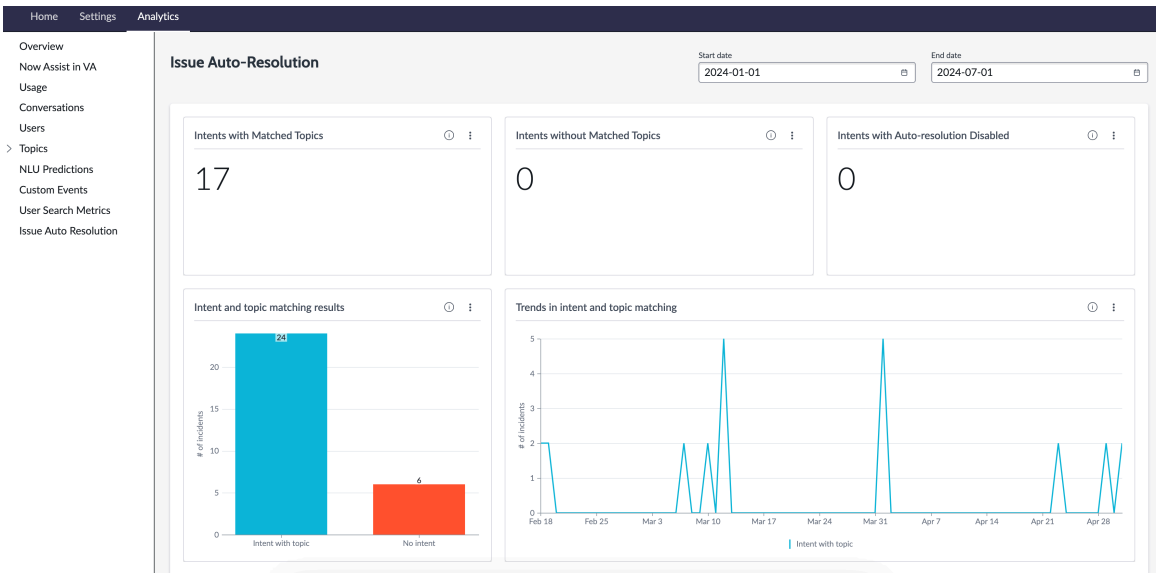
To access the **Issue auto-resolution** tab, you must have the chat analytics admin role or the chat analytics viewer role.

Issue auto-resolution tab



Selecting the data or pointing to the data in the visualizations displays additional information about the data.

Auto-resolution visualizations

Visualization	Description
Intents with Matched Topics	Number of intents that match topics enabled for auto-resolution.
Intents without Matched Topics	Number of intents that do not have matching topics.
Intents with Auto-resolution Disabled	Number of intents that match topics not enabled for issue auto-resolution.
Intent and topic matching results	Breakdown of incidents by intent matching. For example, incidents with matching intents and topics, and incidents without matching intents.
Trends in intent and topic matching	Trend showing incidents that have intents with or without matching topics.
Auto resolution conversations	Issue auto-resolution conversations that were resolved or unresolved. Resolved means incidents are in the resolved state after the users interacted with VA.
Auto resolution conversation trends	Usage trend showing all the issue auto-resolution conversations and how many incidents were successfully resolved.
Issue auto-resolution acceptance rate	Shows the issue auto-resolution notifications that were accepted and declined by users.
Top topics in auto resolution conversations	Frequently used topics in auto resolution conversations.

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Conversational Analytics dashboard reference

Reference topics provide descriptions about the Conversational Analytics dashboard roles and system parameters to configure the dashboard.

Conversational Analytics dashboard roles

Conversational Analytics dashboard is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Virtual Agent administrator [virtual_agent_admin]

Provides read and write access to all dashboard-related tables, for example, sys-conversation.

Contains Roles

List of roles contained within the role.

- chat_analytics_admin
- ui_builder_admin
- chat_analytics_viewer

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Chat analytics administrator [chat_analytics_admin]

Provides access to view dashboard-related tables, create custom events, create custom formula overrides, reconfigure the dashboard using UI Builder, and set system parameters.

Contains Roles

List of roles contained within the role: chat_analytics_viewer.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

UI builder administrator [ui_builder_admin]

Enables you to add, remove, and rearrange dashboard contents. Needs UI Builder, which is a separate ServiceNow product.

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Contains Roles

List of roles contained within the role.

- workspace_admin
- canvas_user

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Chat analytics viewer [chat_analytics_viewer]

Provides read access to view the dashboard.

Contains Roles

List of roles contained within the role: sn_ace.ace_user.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

System parameter configuration

Use system parameters to configure some of the Conversational Analytics Dashboard.

Use the following system parameters to reconfigure Conversational Analytics Dashboard functionality. You must have the role, Chat Analytics Admin.

Dashboard system parameters

Functionality	System parameter	Description
Debug	sn_ci_analytics.logging.verbosity	Set this parameter to "debug" to see the debug logs for conversational analytics. The setting makes the logs verbose with debug information.
Reasons	sn_ci_analytics.ca.reason_max	Sets the maximum length of reason strings. The default is 1000 characters.

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Conversational Analytics dashboard

The Conversational Analytics dashboard helps you improve Virtual Agent (VA) interactions with users by providing deep insights into conversational data. The dashboard helps you refine topics and increase the percentage of issues resolved by VA.

Get started

Select a tile to get started with the VA Analytics Dashboard.

Explore  For VA users and system administrators to learn about the dashboard.	**Set up**  For system administrators setting up the dashboard.
Use  For VA users to learn how to use the dashboard.	Reference  Get information about the dashboard roles and system parameters

Exploring the Conversational Analytics Dashboard

Use Conversational Analytics dashboard to improve Virtual Agent (VA) interactions with users. The dashboard provides deep insights into conversational data, and helps you refine topics and increase the percentage of issues resolved by VA.

Virtual Agent Analytics

Virtual Agent keeps records of interactions with users for up to 90 days. The metrics extracted from the conversations are retained for a period of two years. The Conversational Analytics dashboard provides insights into those interactions so you can see how well Virtual Agent understood and resolved user issues. Dashboard metrics, for example, reveal:

- What percentage of users transfer from VA to a live agent
- How to increase engagement rate and reduce user drop-offs
- Whether the user reached the last node in a topic
- Most and least-used topics
- Conversation details using advanced filters
- How to optimize conversation design

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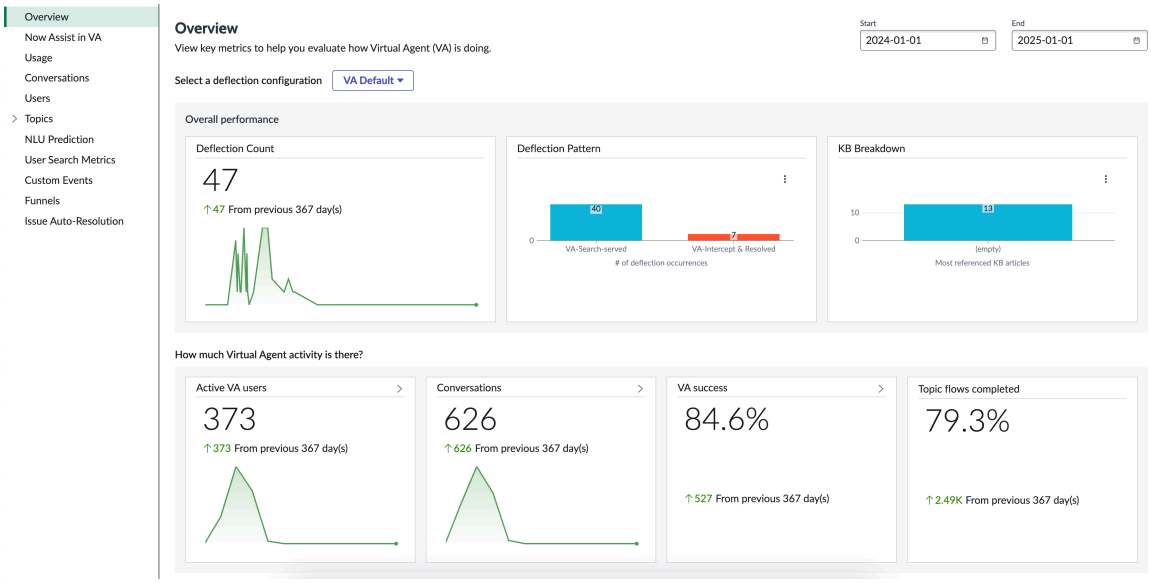

Key Features

Worst performing topics

See the worst-performing VA topics over a given time period.

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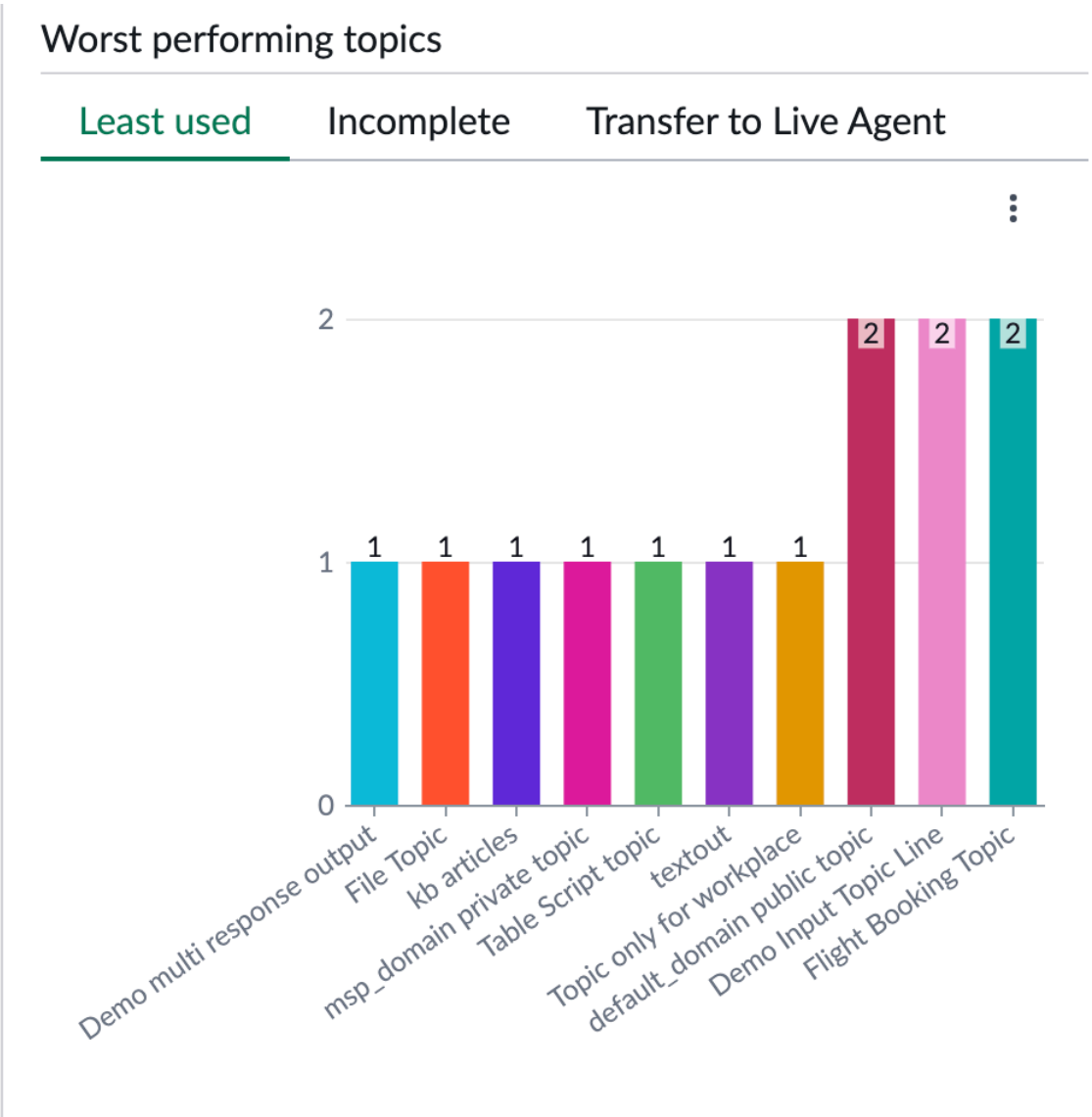
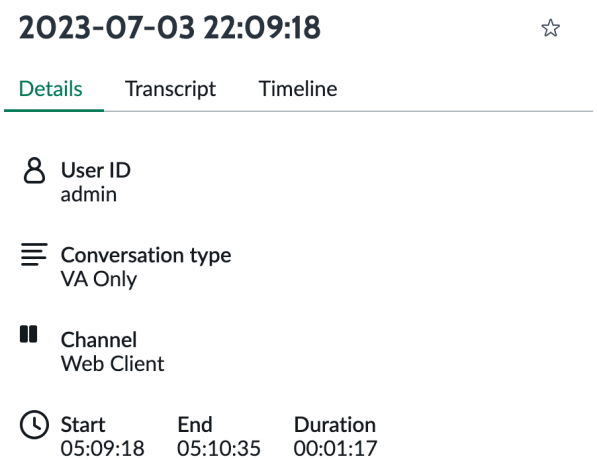


Conversation details

Discover metadata about each VA interaction, including the user, the chat duration, and which node a user stopped at in a topic.



User insights

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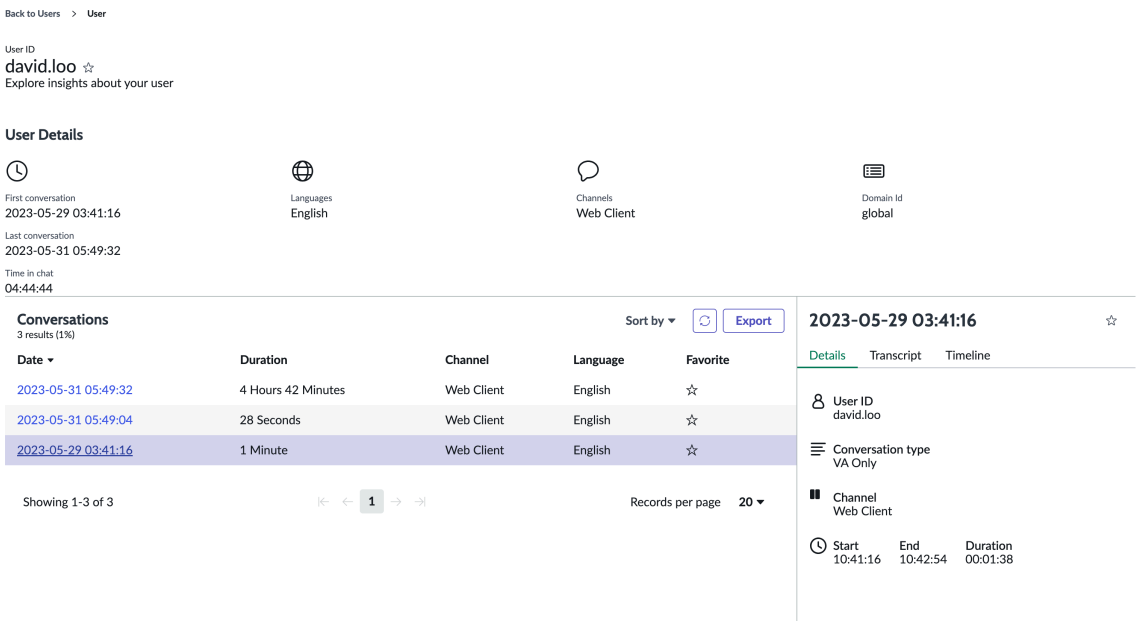
Get a history of a user's chats.

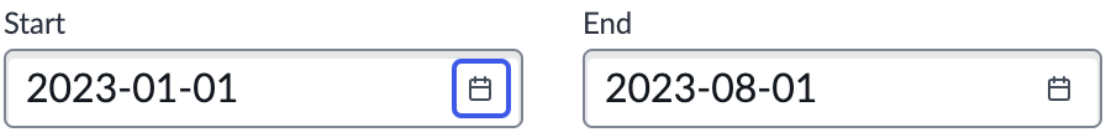


Overview

The following sections provide a high-level overview of how to use each section of the dashboard from the top down.

Date range of data displayed

The **Start** and **End** dates at the top of the dashboard specify the data range of the data summarized on each page.



All data is continually pushed from Virtual Agent to the dashboard in real time, and retained for up to 3 months. The analytics dashboard can also accept conversation data up to 30 days old, to support scenarios involving temporary technical issues.

All dates and times on the dashboard are UTC. Even though the conversation table lists conversation dates and times in different time zones, Virtual Agent (VA) converts them to UTC when displaying them on the dashboard. Additionally, if you select a preset date range, such as last week, the dates might be slightly different from what you expect.

For information about setting the date range, see Set the date range of the data.

Certain data visualizations might not have data available for the start date and end date selected in the **Start** and **End** fields. In this case, the widget shows a start date and end date for the visualization based on the data availability within the selected date range.

Getting detailed data

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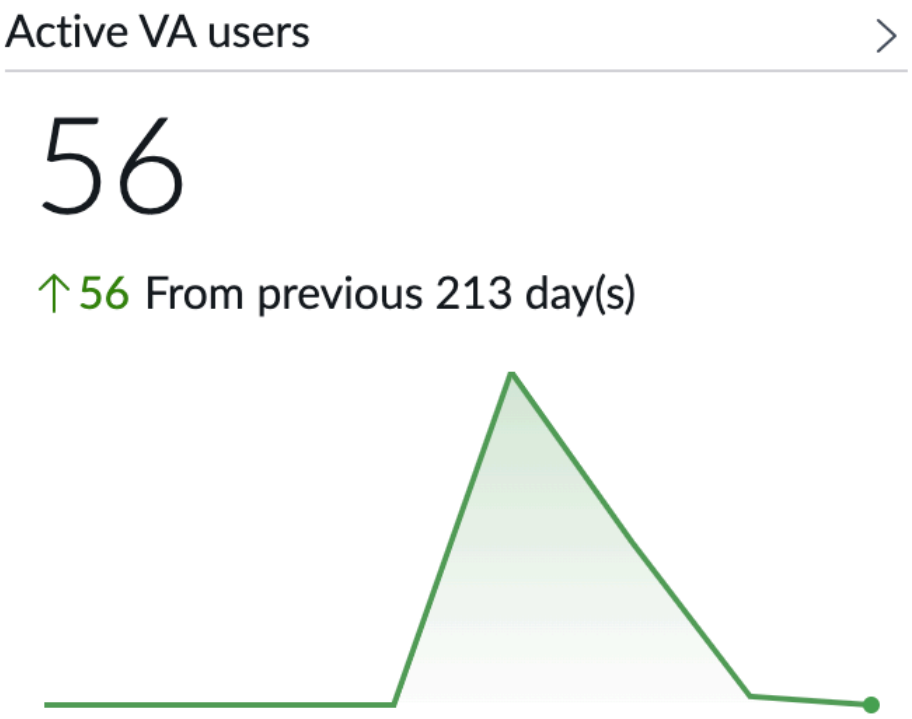
The **Overview** tab provides summaries of the data displayed on the other tabs. You can get to more detailed data in several ways:

- Click a tab, for example, **Usage**.
- Click the arrowhead in one of the cards.



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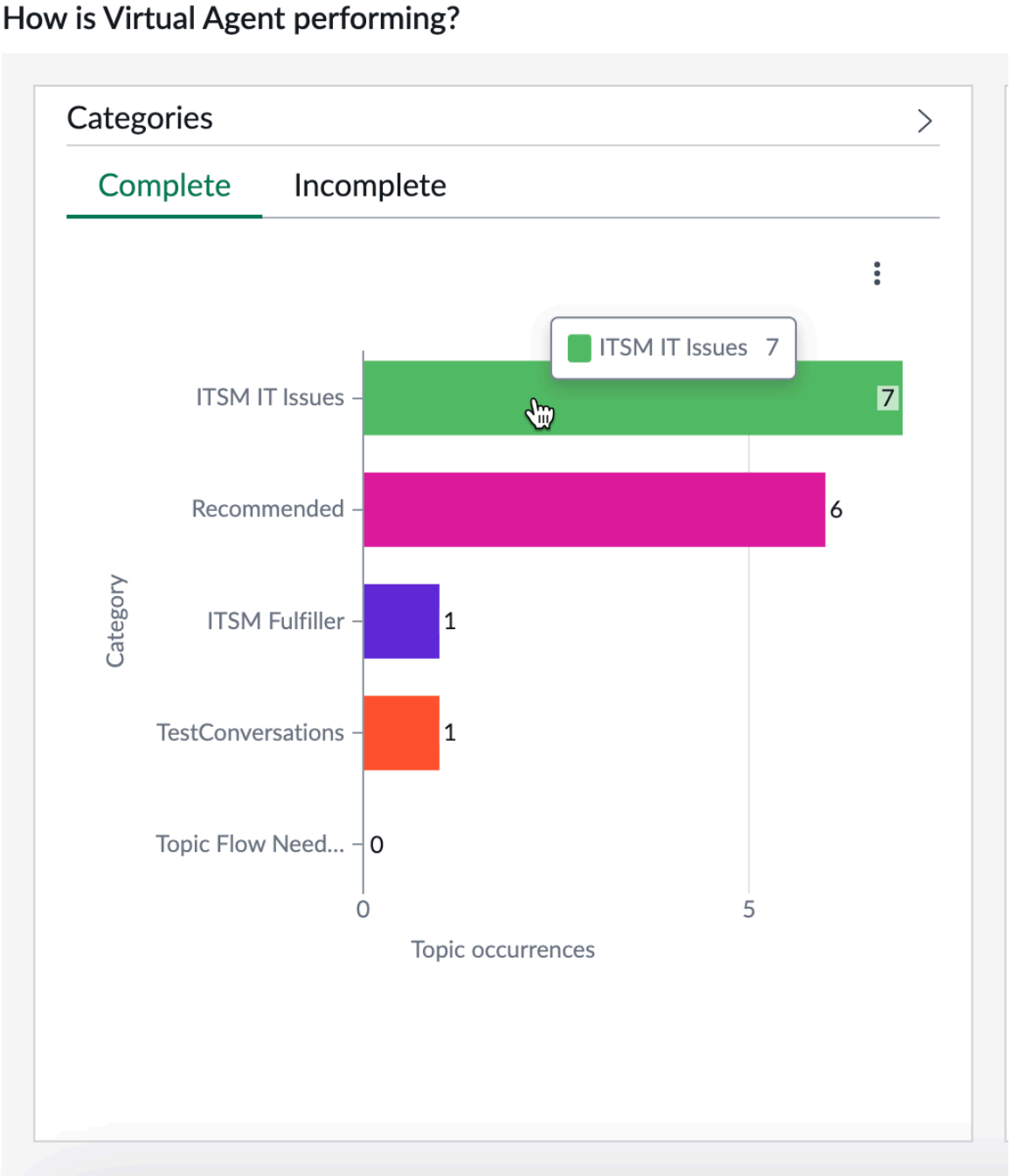
- Click a visualization.



Dashboard tabs

Dashboard tabs

Tab	Description
Overview	Landing page for the dashboard that shows summary information for all the other tabs.

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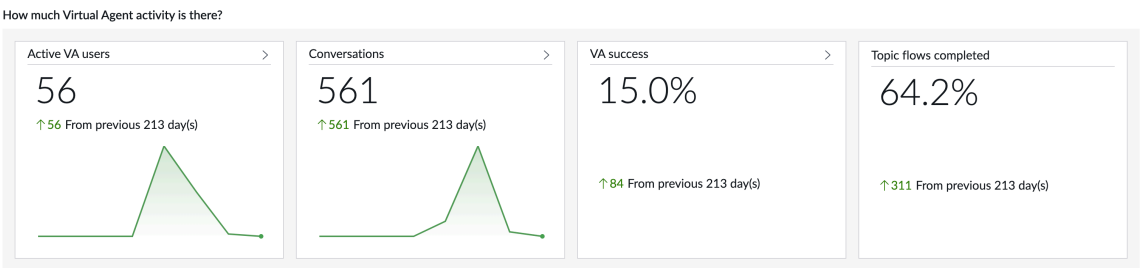
Dashboard tabs (continued)

Tab	Description
Usage	Describes VA conversation usage, for example, the language of the conversations, their durations, and the types of conversations.
Conversations	Summary information for a user's conversations. Advanced filtering enables you to filter by conversation nodes or topics, and get details about the conversation duration, the channel the conversation occurred in, and the number of messages exchanged. You can link to details about each conversation on this tab.
Users	Lists the users who have had VA conversations. Advanced filtering provides analytics about usage frequency, by conversation, the duration of the conversation for each user, the user's first and last conversation, and the language used. You can link to user details from this tab, including their conversations.
Topics	Shows metrics about topics used by VA in conversations. Metrics include how many VA conversations moved to a live agent, average length of conversations per topic, and topic blocks used.
NLU Prediction	Shows the number of times the NLU prediction model accurately understood the intent of the user's conversation or auto-selected a topic. The chart links to the NLU Workbench if your instance includes NLU.
Custom Events	Displays the number of custom chat events that you create using the Events page. If you don't create custom events, the tab content is empty.
Funnels	Provides metrics for conversation flows.
Issue Auto-Resolution	Displays information about the number of user issues intercepted by the auto-resolution service and resolved by the Virtual Agent.

Trends and scores

Many tabs use scorecards that show the current value for a data point, for example, the number of conversations currently online.



Scorecards also show data trends, such as the increase or decrease of the data values over the date range specified on the dashboard. Hovering over the title of a scorecard displays a description of the scorecard.

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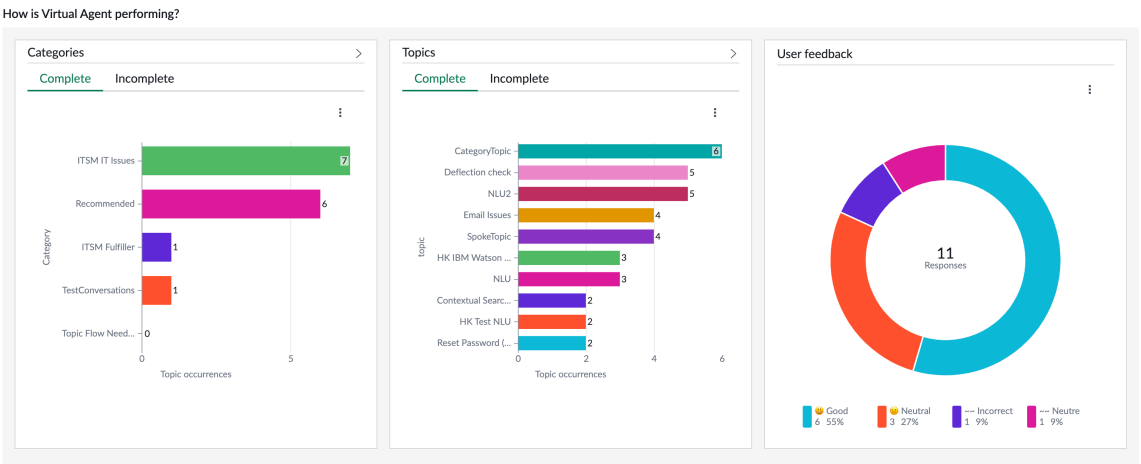
Certain trend visualizations on the dashboard such as the trends in intent and topic matching do not support viewing monthly, weekly, and daily data.

Visualizing data

Many tabs show visualizations of the recorded VA data.



The cards have a common setup.

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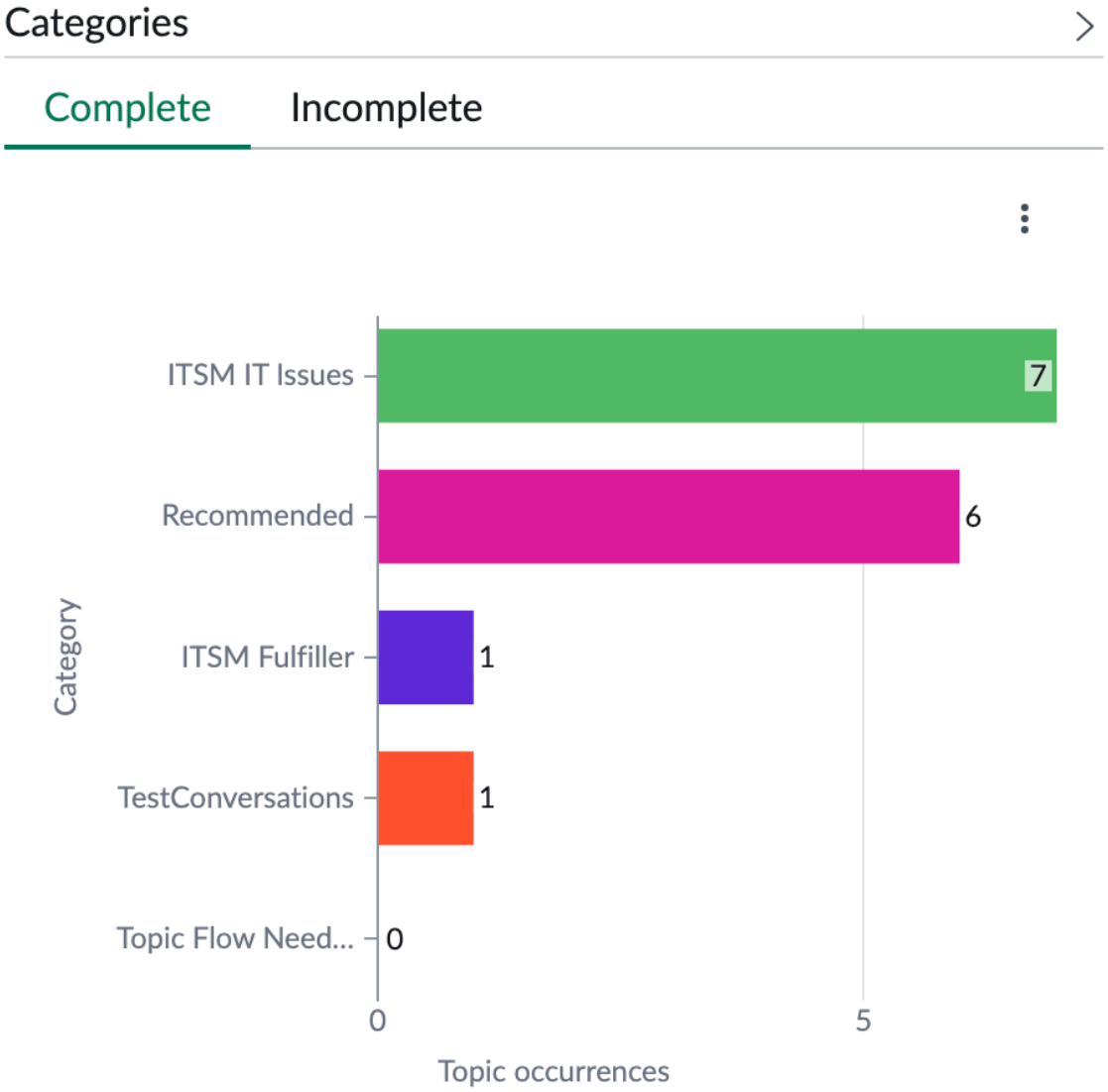

In each visualization, you can select:

- Subtabs to visualize different datasets in the visualization.
- Arrowhead icon ( ), which takes you to the corresponding tab that provides more detailed information.

  For example, select the arrowhead in the **Active Users** scorecard to go to the **Users** tab, which shows a list of users currently using VA chat.

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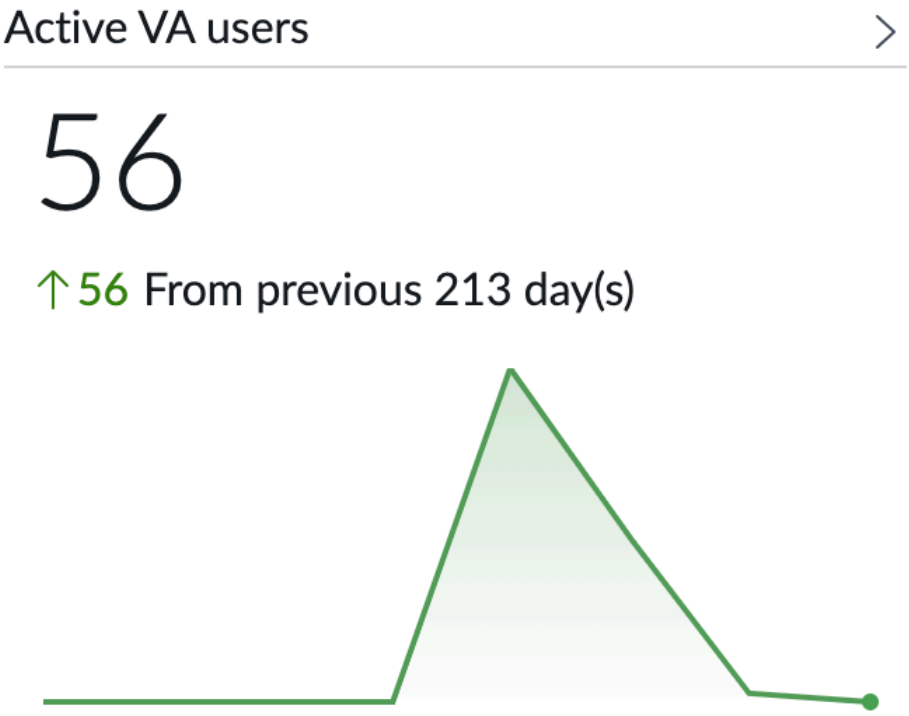

- Click displayed data, such as a bar in a bar chart, to display detailed information about that data.

Tutorial

Now that you are familiar with the user interface, you can try the tutorial. It shows how the parts of the dashboard work together to provide insights for improving VA.

Trying out the dashboard

Use this tutorial to get familiar with the Conversational Analytics Dashboard.

Before you begin
Role required: Chat Analytics Viewer (chat_analytics_viewer)

Note:
This tutorial is intended for use in your own instance. Test instances can be used but may not provide meaningful feedback unless they contain pre-loaded data.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Conversational Analytics** > **Virtual Agent Dashboard**.
   The **Overview** tab on the dashboard appears. The **Topic flows completed** scorecard shows that the number of users completing all the nodes in a topic has decreased. I'd like to know why.
2. In the **Topics** visualization, click **Incomplete**.

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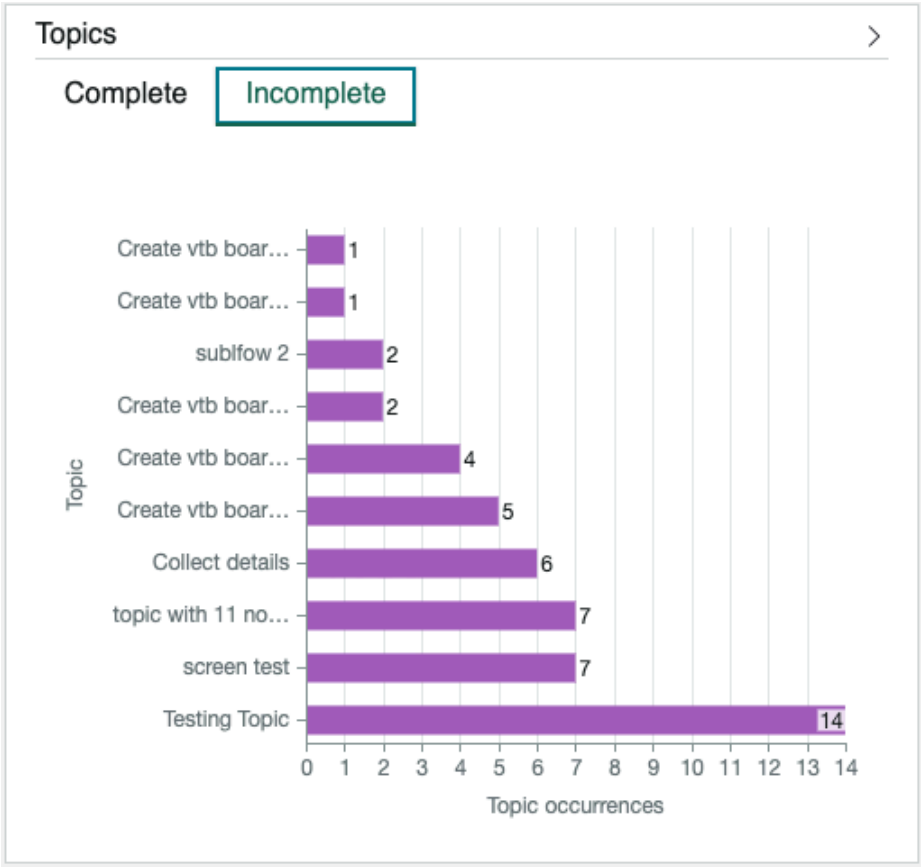

I see that users did not complete the **Testing Topic** the most times, 14. So, I want to find out where the user got lost.

3. Click the **Testing Topic** bar to drill down on that topic.

   The Topic details page opens. In the **Total completion** scorecard, the example shows that Virtual Agent (VA) resolved 15 conversations but couldn't resolve 5 conversations. The **Live Agent Transfer** scorecard shows that no one transferred to a live agent. The **Last visited node** scorecard shows the three nodes in the topic where the user abandoned the conversation: **Start**, **Testing**, and **link to requested screen**. Review those nodes to clarify the communication or add a different intent.

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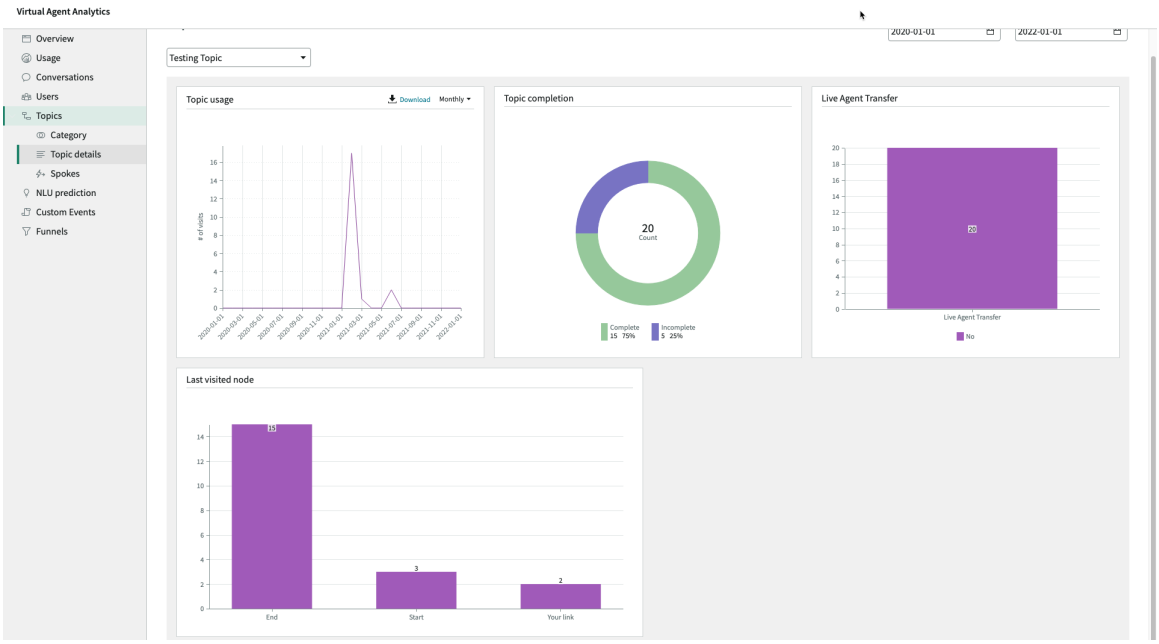

No conversations in this topic transferred from VA to a live agent. But I wonder if there are topics where users did transfer.

4. Click the **Conversations** tab.
   The **Conversations** tab displays all the conversations within the specified date range. I decide to use filters to see only the conversations that VA transferred to a live agent.
5. Select **Live Agent Transfer**.

   I notice that the condition builder automatically entered the filter parameters, setting **Type** to **VA to LA**.



   I'd like to know which topic node the user last visited before transferring to a live agent.

6. Click a conversation date.

   The conversation details appear.

7. Expand the **Greetings** action in the **Timeline** tab.

   I see that the last node the user visited was **Send Topic Picker**. Now, I know I should revise that node in that topic.

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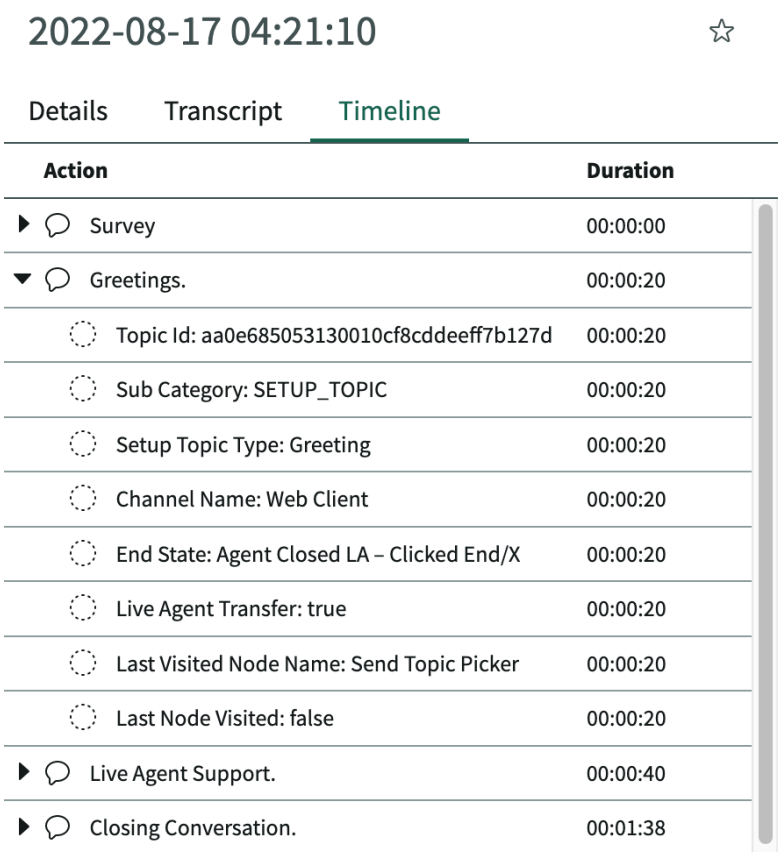

I decide to see which topics are working better.

8. Select the **VA Success** filter.
   The list contains conversations that VA was able to resolve. Perhaps I want to find out if the problem resolution took too long.
9. To add a condition, click **View/edit filter** and use the condition builder in the Filter Editor pop-up window. You can either select a default filter from the list or create a new filter condition.
10. Select **Duration** for the condition, the greater-than sign for the operator, enter 180 for the number of seconds, and click **Run**.
    The list shows VA conversations that lasted over three minutes. It's a small percentage of all the conversations. So, I conclude the topic is working well.

    Finally, I want to know which topics are most and least used so I know what topics to prioritize.
11. Click the **Topics** tab.

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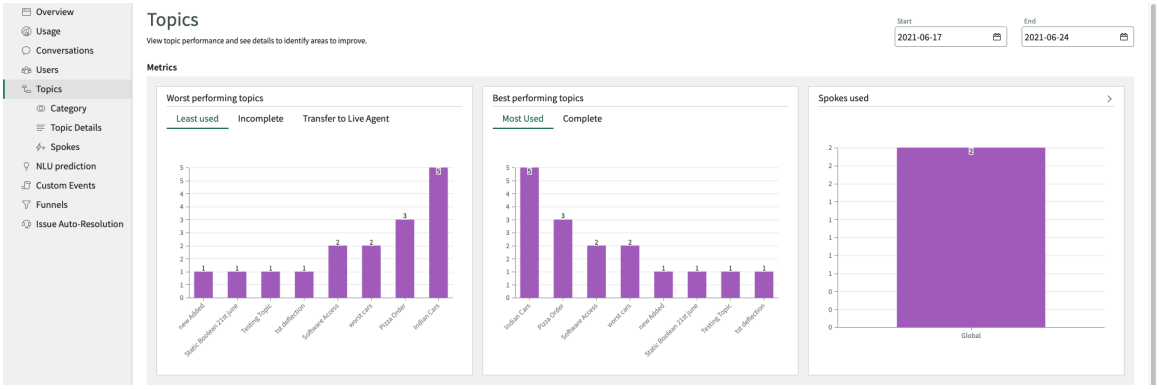
The Topics page shows the best and worst performing topics.



Setting up the Conversational Analytics Dashboard

Set up custom events and formula definitions to create more targeted analytics.

The Conversational Analytics Dashboard enables you to customize the data you monitor in the following ways:

- Date range—Specify the date range for the data displayed on the dashboard.
- Custom events—The dashboard can display analytics about custom events you create. All events must relate to conversations. For example, you can store data about every conversation that used a specific channel, such as Slack.
- Formula Override—Customize parameter definitions used in analytic reports. For example, by default, duration is the total time from the first to the last exchange in a conversation. You might like to override that formula by subtracting inactive times in the conversation.

Role requirements

For information on roles, see Conversational Analytics dashboard roles.

Dependencies

The Conversational Analytics Dashboard requires the Quebec or later version of Virtual Agent.

Install Conversational Analytics Dashboard

Get updates to the Conversational Analytics dashboard from the ServiceNow Store. Use this dashboard to gain insights on Virtual Agent (VA) chats with customers.

Before you begin

Note:
Starting with the San Diego release, the Conversational Analytics app is automatically installed when you initially activate the Glide Virtual Agent (com.glide.cs.chatbot) plugin. Subsequent updates for this app must be downloaded and installed from the ServiceNow Store.

Conversational Analytics dashboard is not available for on-premise installation.

Using the Conversational Analytics dashboard may incur Integration Hub transaction costs. This transaction metering was unintended and will be removed in an upcoming release. If the issue persists, please create a case for our Customer Service and Support team.

Role required: Chat Analytics Admin

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Procedure

1. Confirm that your instance has the Glide Virtual Agent plugin [com.glide.cs.chatbot] activated. Starting with the San Diego release, the Conversational Analytics Dashboard app is automatically installed when you activate the Glide Virtual Agent plugin [com.glide.cs.chatbot].
2. Go to the ServiceNow Store, and search for analytics .
3. Select the latest version of Conversational Analytics Dashboard.
   The store installs the updates to the Virtual Agent Analytics Dashboard and the Analytics data configuration tools. The plugin name is com.sn.conversational.analytics and the scope name is sn_ci_analytics. Some of the main tables for the Conversational Analytics Dashboard include:

Table	Description
sn_ci_analytics_conversation	The main table for conversations. It lists Virtual Agent conversations.
sn_ci_analytics_event	List of events. An event is something that happens, for example, an actionable notification. The dashboard can display analytics about default events or ones you create. For more information, see Set up custom events.
sn_ci_analytics_event_prop	List of values used in events.
sn_ci_analytics_formula_override	Lists formula overrides for properties used by the dashboard. For more information, see Set up custom definitions.

Note:
You do not need a license or a plugin for Performance Analytics.

Reconfigure dashboard contents

Conversational Analytics Dashboard is created from Next Experience Components. You can use the UI Builder to customize the dashboard provided you have chat_analytics_admin and ui_builder_admin roles.

The dashboard pages that ServiceNow® ships with the Conversational Analytics Dashboard have a protection-policy, which makes the dashboard pages read-only. However, you can copy the dashboard pages using the **Duplicate** menu option or create a variant of the default page in the UI Builder tool. After copying a page, you can customize the page content according to your requirements.

For information about using UI Builder, see UI Builder.

Note:
The protection-policy is enforced to preserve dashboard pages for future upgrades. At any point, if you want to fall back to the default pages, you can delete the duplicate pages.

Create custom events to monitor

Create custom events and monitor them in the Conversational Analytics Dashboard.

Before you begin

Role required: Chat Analytics Admin.

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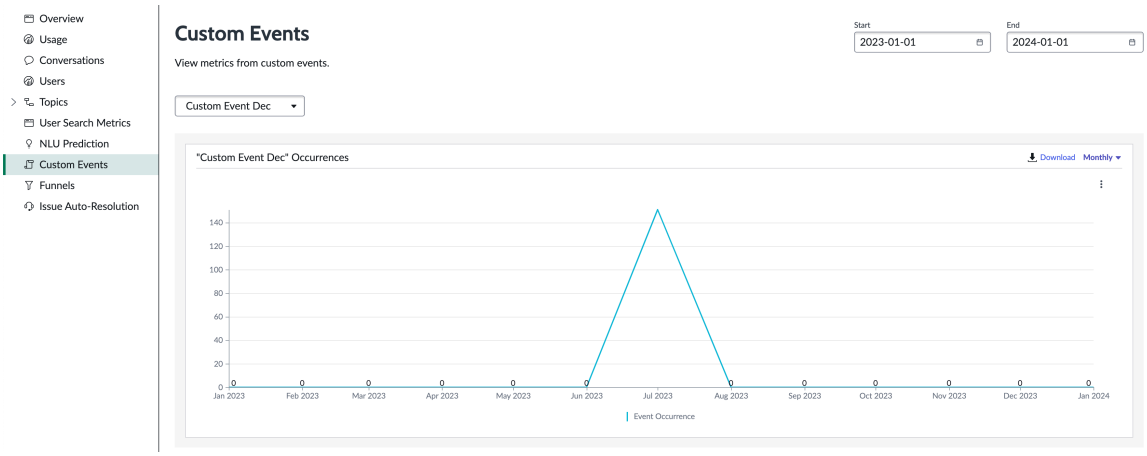
About this task

An event is a combination of conditions that apply to a subset of Virtual Agent (VA) conversations. For example, an event might be conversations originating on a Slack channel that VA transferred to a live agent.

Most metrics you see on the dashboard, for example topic and conversation details, are derived from pre-built events. The dashboard displays these events on the **Topics** and **Conversations** tabs. To build custom events, you can use the Custom Events feature. Use custom events to create analytics about data you're interested in, for example:

- Number of conversations on a Slack channel that transferred to a live agent.
- Number of conversations on a Slack channel where the user never returned.

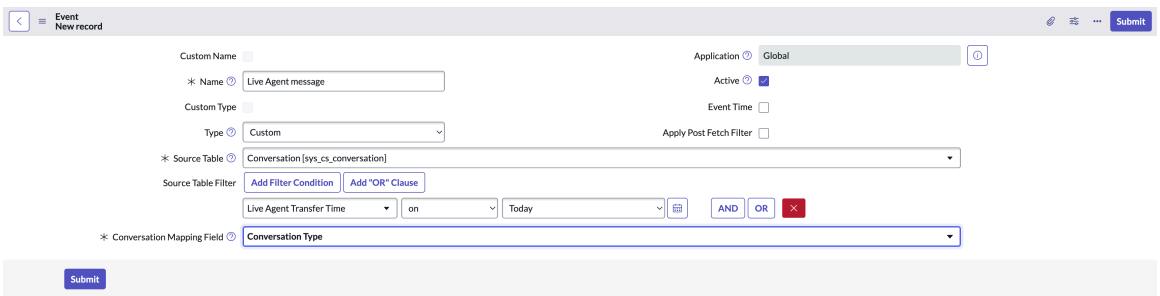


Custom events appear on the **Custom Events** tab. If you haven't configured any custom events, the dashboard won't display any. You can create up to 20 custom events.

Custom events take effect when you create them. You cannot use them to analyze data collected before you created the custom event.

Procedure

1. Navigate to **All** > **Conversational Analytics** > **Event Configuration** and select **New**.
   The Event New record page appears.



2. In the form, fill in the fields.

3. Click **Submit**.
   The Events page appears, which lists all custom events. You've specified the table to look for custom events. Now, you must specify the parameter values that trigger the custom event.
4. Click the custom event you created.
5. In the Event Properties related list, select **New**.

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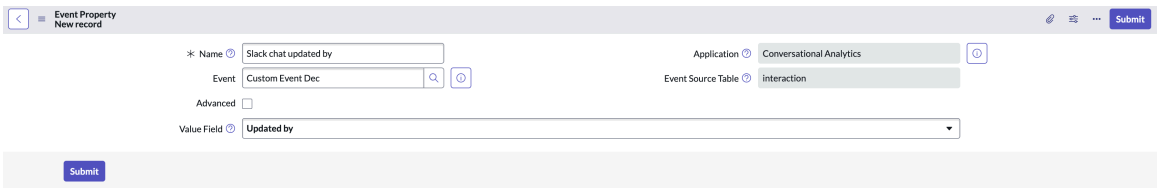
The Event Property New Record page appears where you specify the properties for a custom event that you want to track on the dashboard.



In this example, the **Custom Event** tab shows metrics for *Updated by* for the custom event, Messages-from-Slack.

6. In the form, fill in the fields.

7. Click **Submit**.
   The Event page appears.
8. Click **Update**.
   The Events page appears, which lists all custom events. You can open the **Custom Events** tab on the dashboard to see the custom event. This custom event is not retroactive; the dashboard only displays new events that satisfy the custom event criteria.

Create custom override definitions

Use scripts to override the default formulas used to create the analytics on the Conversational Analytics Dashboard.

Before you begin

Role required: Chat Analytics Admin

Be sure to set the application scope to Conversational Analytics.

About this task

The Conversational Analytics Dashboard uses formulas to determine analytics, such as how to calculate duration. You can override the default formulas to tailor the analytics to your needs. For example, the default formula for duration in the dashboard is the time between the first and last exchanges in a conversation. You might like to override that formula by subtracting inactive times in the conversation.

The default formulas and formula overrides are in the sn_ci_analytics_formula_override table. You can only modify the existing formulas that are in the table by deactivating the default formula and creating a new formula override record. You cannot override some formulas because they are system dependent. You can, however, create custom events to achieve a similar goal.

The default definitions are:

- Duration—Time from the start of a conversation session until the last message is sent, rather than when the conversation session closes. You cannot replace the supplied script for Duration. You can only turn it on or off. If you deselect the **Active** check box, the duration is calculated until the end of the session. If you select the **Active** check box, the duration is calculated to the last message sent.
- Self-solve rate—Number of conversations that did not have negative feedback, contained a topic that went through to the last node, and did not escalate to a live agent. The dashboard divides that number by the number of all conversations to get the rate.
- Feedback—Defined as positive, neutral, and negative. For example, to override this behavior, first, use Virtual Agent (VA) Designer to create a ranking from 1 to 10. Then, you can use a script

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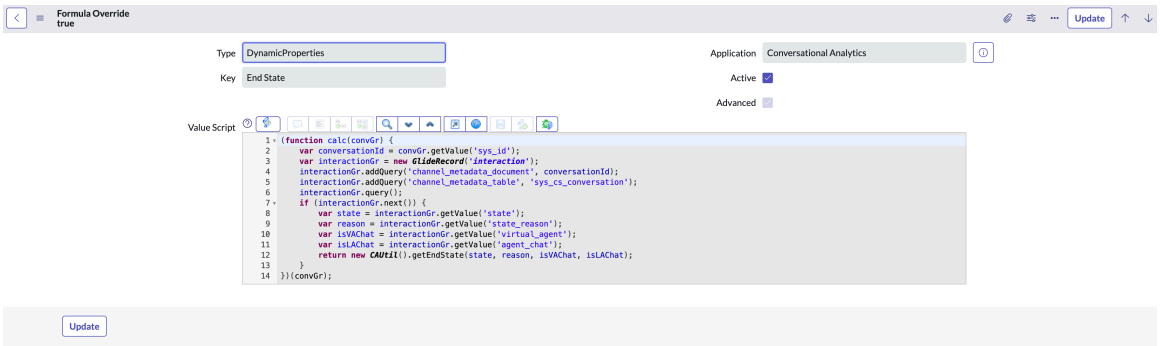
to override the dashboard's default behavior by grouping 1–4 as negative, 5–7 as neutral, and 8–10 as positive.

- End state—Defined by default in 12 ways. For more information, see Formula override examples.
- Valid conversation—Defined as a conversation record that is included in the dashboard results for satisfying at least one of the following criteria.
  - Non-actionable notification conversations, which do not require validation from the user, are counted as active conversations.
  - Actionable notifications that are not part of an existing conversation are considered valid conversations when the status of the notification is either Sent or Completed.
  - Conversation engages Virtual Agent topic discovery or direct live agent conversation.

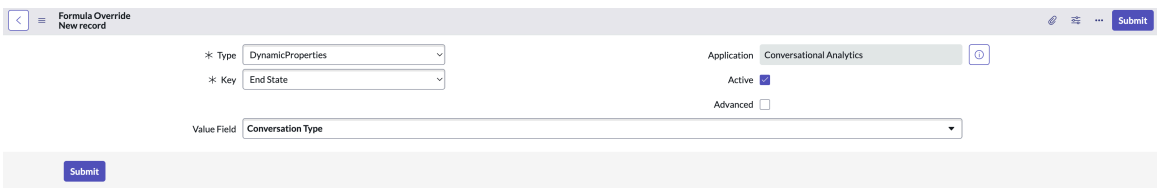
Note:
Formula overrides do not change the stored data. They only change how the dashboard displays the data by computing existing data in a different way.

Procedure

1. Navigate to **All** > **Conversational Analytics** > **Formula Override**.
   Alternatively, you can enter *sn_ci_analytics_formula_override.list* in the Filter Navigator to display the sn_ci_analytics_formula_override table.
2. Select the formula you want to override.
   You cannot override the Duration formula, you can only activate or deactivate it. You can alter the scripts for other definitions. These are the only definitions you can alter.
   The Formula Override page appears and shows the existing formula.



3. Copy the script in the Value Script field.
   The default formulas are read-only. So, to modify them, you must make a copy.
4. Deselect the **Active** check box to make the default formula inactive.
5. Click **Update**.
6. Click **New** to create a formula override record that overrides the default formula.
   The Formula Override New Record page appears.



7. In the form, fill in the fields.

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8. Click **Submit**.

Formula override example

Use the following formula override example to craft your own formula overrides.

Group End State definitions

The end state of a conversation specifies how a conversation ended. For example, it could end with the user not responding, or the user closed the chat window. There are 12 default definitions of end state. For more information on conversation end states, see Virtual Agent interaction records. The following script groups them as follows:

- VA closed the chat session
  - System Closed VA – User No Response
  - System Closed VA – Topic Complete
  - System Closed VA – Left With AI Search
  - System closed VA – Auto Closed
  - System Closed VA – User Never Engaged
- Live agent closed the chat session
  - System Closed LA – User No Response
  - System Closed LA – Chat Complete
  - Agent Closed LA – Clicked End/X
  - System Closed LA – Before Agent Engagement
- User closed the chat session
  - User Closed LA – Clicked End/X
  - User Closed VA – Clicked End/X
  - User Closed LA - Before Agent Engagement

To create these groupings of the 12 end states, follow the instructions for creating a formula override and use the following script.

```
(function calc(convGr) {
    // Returns 'System Closed VA', 'System Closed LA', 'User
 Closed' states.
    function getFinalEndState(state) {
        var arrayUtil = new global.ArrayUtil();
        VA_END_STATE = ['System Closed VA - User No Response',
            'System Closed VA - Topic Complete',
            'System Closed VA - Left With AI Search',
            'System closed VA - Auto Closed',
            'System Closed VA - User Never Engaged'
        ];
        LA_END_STATE = ['System Closed LA - User No Response',
            'System Closed LA - Chat Complete',
            'Agent Closed LA - Clicked End/X',
            'System Closed LA - Before Agent Engagement'
        ];
```

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```
        USER_CLOSED_END_STATE = ['User Closed LA - Clicked
End/X',
            'User Closed VA - Clicked End/X',
            'User Closed LA - Before Agent Engagement'
        ];
        if (state) {
            if (arrayUtil.contains(VA_END_STATE, state))
                return 'System Closed VA';

            if (arrayUtil.contains(LA_END_STATE, state))
                return 'System Closed LA';

            if (arrayUtil.contains(USER_CLOSED_END_STATE,
state))
                return 'User Closed';
        }
        return state;
    }

    var conversationId = convGr.getValue('sys_id');
    var interactionGr = new GlideRecord('interaction');
    interactionGr.addQuery('channel_metadata_document',
conversationId);
    interactionGr.addQuery('channel_metadata_table',
'sys_cs_conversation');
    interactionGr.query();
    if (interactionGr.next()) {
        var state = interactionGr.getValue('state');
        var reason = interactionGr.getValue('state_reason');
        var isVAChat = interactionGr.getValue('virtual_agent');
        var isLAChat = interactionGr.getValue('agent_chat');
        var endState = new CAUtil().getEndState(state, reason,
isVAChat, isLAChat);
        return getFinalEndState(endState);
    }
})(convGr);
```

Using the Conversational Analytics Dashboard

Use the Conversational Analytics Dashboard to get insights into Virtual Agent (VA) conversations.

The following sections explain how to use the dashboard to investigate VA interactions with users. You must have the Chat Analytics Viewer (chat_analytics_viewer) role to use the Conversational Analytics Dashboard.

Set the date range of the data

Set the **Start** and **End** dates at the top of the Overview tab to specify the date range of the data summarized on a page. The date range set on this tab applies to all the other tabs on the Virtual Agent Analytics dashboard.

Before you begin

Role required: Chat Analytics Viewer (chat_analytics_viewer)

About this task



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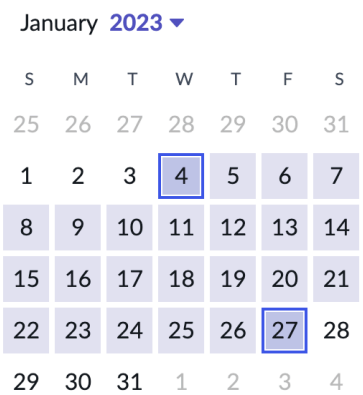
All dates and times on the dashboard are UTC. Even though the conversation table lists conversation dates and times in different time zones, Virtual Agent (VA) converts them to UTC when displaying them on the dashboard. Additionally, if you select a preset date range, such as last week, the dates might be different from what you expect.

You can set the date range in two ways.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Conversational Analytics** > **Virtual Agent dashboard**.
2. **Optional:** Use the **Start** and **End** dates to set the date range.
   a. Select the **Start** calendar icon ( ).
   b. Double-select the start date on the calendar.
   c. Select **OK**.
   d. Select the **End** calendar icon ( ).
   e. Double-select the end date on the calendar.
   f. Select **OK**.
   The data displayed on the dashboard adjusts according to the data in the new date range.
3. **Optional:** Use the **Start** date calendar to set the date range.
   a. Select the **Start** calendar icon ( ).
   b. Double-select the start date of the date range.
   c. While holding down the control-key on the keyboard, double-select the end date.
   The dashboard highlights the range of dates.



   (Optional)
   d. Select **OK**.

   (Optional) The data displayed on the dashboard adjusts according to the new date range.

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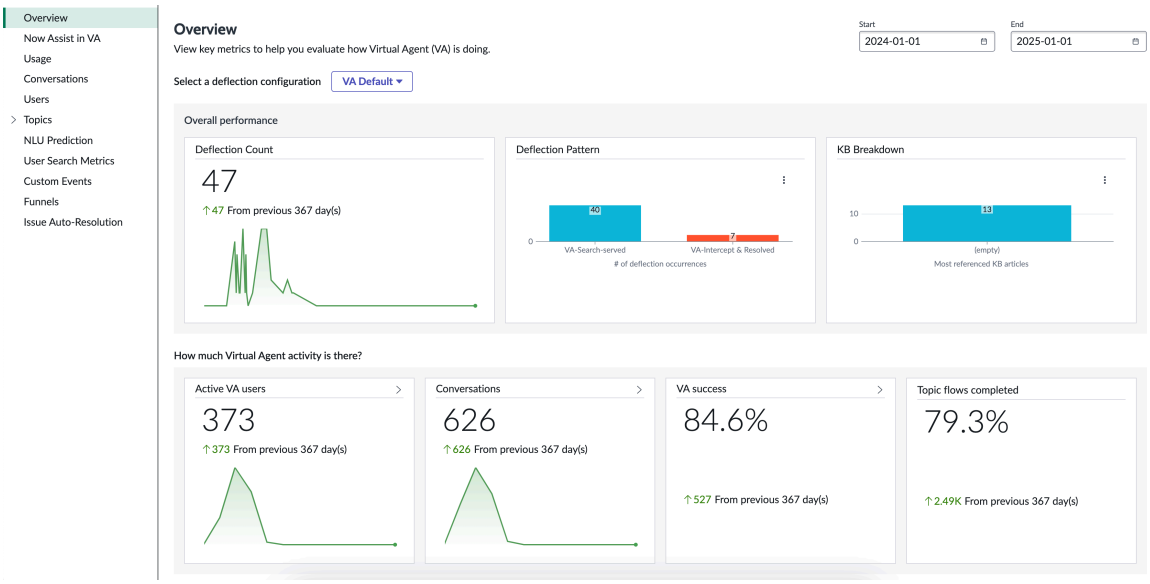
Overview tab

Use the Overview tab to get a snapshot of some of the information collected in the Conversational Analytics dashboard.

The **Overview** tab is the landing page for the dashboard. It provides a summary of the information on all the other dashboard tabs. To use the **Overview** tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.

Note:
Now Assist in Virtual Agent Analytics appears in the left navigation only when you have Now Assist in Virtual Agent enabled.



For directions about using the widgets on the **Overview** tab, see Explore the Virtual Agent Analytics Dashboard.

Visualized overall data

Visualisation	descriptions
Deflection Count	Number of deflection occurrences measured by the execution count of the Deflection topic block. A deflection occurs when Virtual Agent resolves or helps to resolve an issue for a user.
Deflection Pattern	Number of deflections per deflection patterns.
KB Breakdown	Titles of KB articles with the number of times they were presented as part of deflections.
Active VA users	Cumulative number of unique active end users (not agents) who used the conversational interface.
Conversations	Count of all interactive conversations initiated from the Virtual Agent.
VA success	Percentage of conversations that were completed without escalation and with an intended topic flow.

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Visualized overall data (continued)

Visualisation	descriptions
	Completed conversations are those that reach the end of a Virtual Agent topic or conversation, are closed by the user, or are automatically closed. Completed without escalation means that the conversation was not routed to a live agent, and the user did not give negative feedback. (Feedback types include negative, positive, neutral, and no feedback.)
Topic flows completed	Percentage of topics that end users completed till the last node out of all topics invoked and ran.
Categories	Number of completed conversations shown per the Topic Category.
Topics	Number of occurrences when the user completed to the last node or left a conversation midway through for each topic.
User feedback	Feedback Results categorized as good, bad and neutral. The Feedback results are calculated from the Feedback Setup Topic. **Note:** Analytics Administrator can change how frequently the Feedback Setup topic show post-chat by changing the system properties.
Channels	Number of conversations executed across the configured channels of the Virtual Agent.
Conversation end state	Number of conversations that have ended in the OOTB Conversation End state.

Typical actions on the **Overview** tab include:

- Selecting the arrowhead icon (>) in any of the widgets to open other dashboard tabs that display more detailed information.
- Selecting the visualized data, for example, a bar in a bar chart, to get additional information about the data.
- Changing the date range of the data displayed.
- Selecting a tab inside one of the widgets to change the set of data displayed. For example, in **Categories** bar chart, select the **Incomplete** tab.

Note:
Your **Overview** tab might look different because it can be configured.

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Edit the Overview page

Add or subtract the widgets on the **Overview** page to suit your users.

Before you begin

Role required: admin

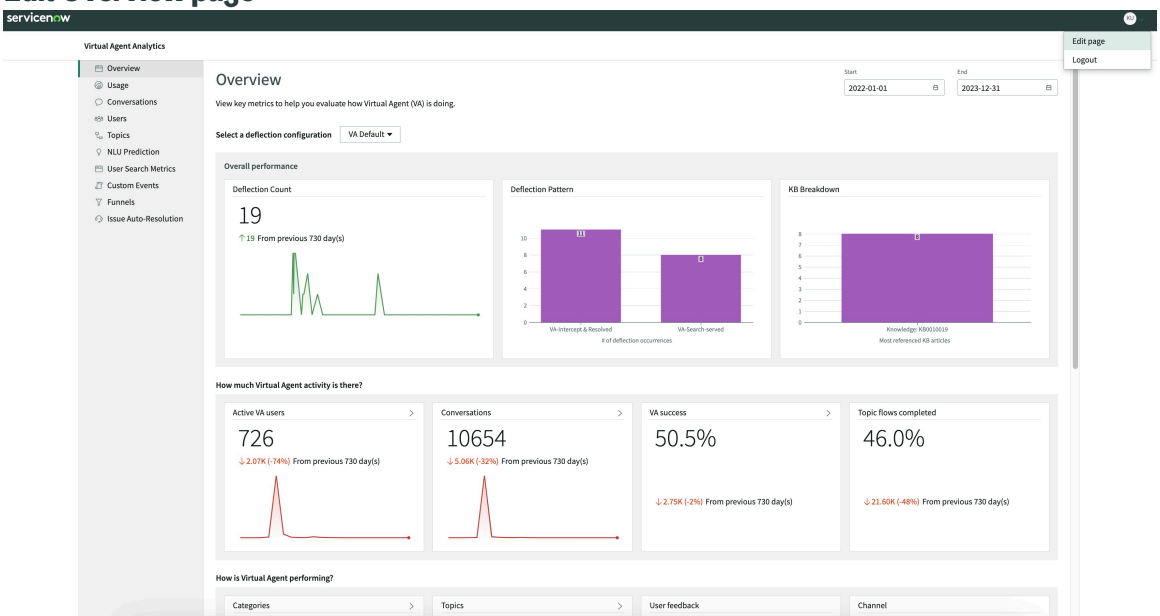
About this task

The **Overview** page displays widgets with links to all the dashboard data. You can edit the page to remove or add back widgets.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Conversational Analytics** > **Virtual Agent Dashboard**.
2. To add or remove widgets from the **Overview** page, select **Edit page**.

Edit Overview page



The UI Builder opens.

3. To add or remove components in the Conversational Analytics Dashboard, use the UI Builder.

Usage tab

The **Usage** tab provides summary information about conversations.

The **Usage** tab answers questions such as:

- What languages are used in conversations?
- What is the average duration of conversations on different days?
- How many Virtual Agent (VA) conversations transition to live agents?

To access the **Usage** tab, you must have the chat analytics admin role or the chat analytics viewer role.

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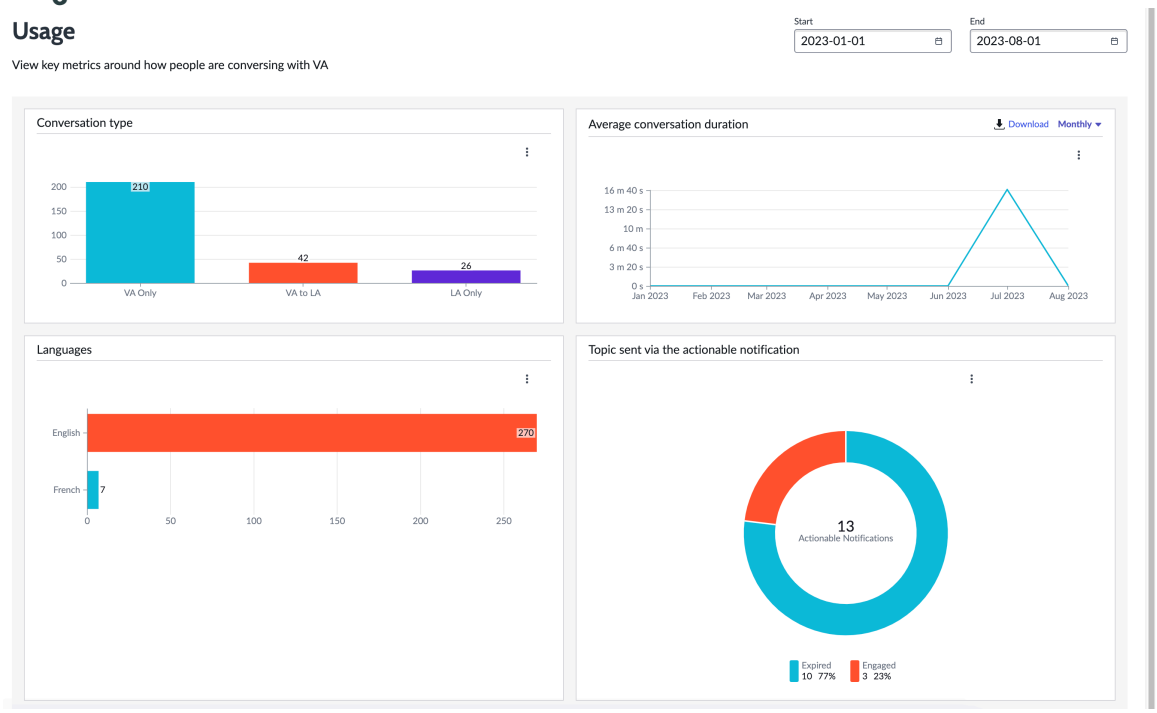
Usage tab



Selecting the data or pointing to the data in the visualizations displays additional information about the data.

Visualized usage data

Visualization	Description
Conversation type	Number of conversations escalated from VA to a live agent, initiated and completed in VA only, or initiated and completed by a live agent.
Average conversation duration	Average duration of conversations in minutes. The duration is calculated from the beginning of the conversation to the last message sent.
Languages	Languages used by users and the number of conversations in each language.
Topic sent via the Actionable notification	The number of actionable notifications delivered from virtual agent to the users for the selected time range, and the number and percentage of actionable notifications that users engaged with, and did not engage with.

Conversations tab

Use the **Conversations** tab to view the list of Virtual Agent conversations and details of each conversation that occurred during the selected date range.

All conversations from the Conversation table [sys_cs_conversation], that run on the Virtual Agent Designer are listed on the Conversations page, except for notifications, open (ongoing) conversations, and previews.

Virtual Agent conversations data is retained for a period of 90 days. The analytics data extracted from the conversations is retained for a period of two years.

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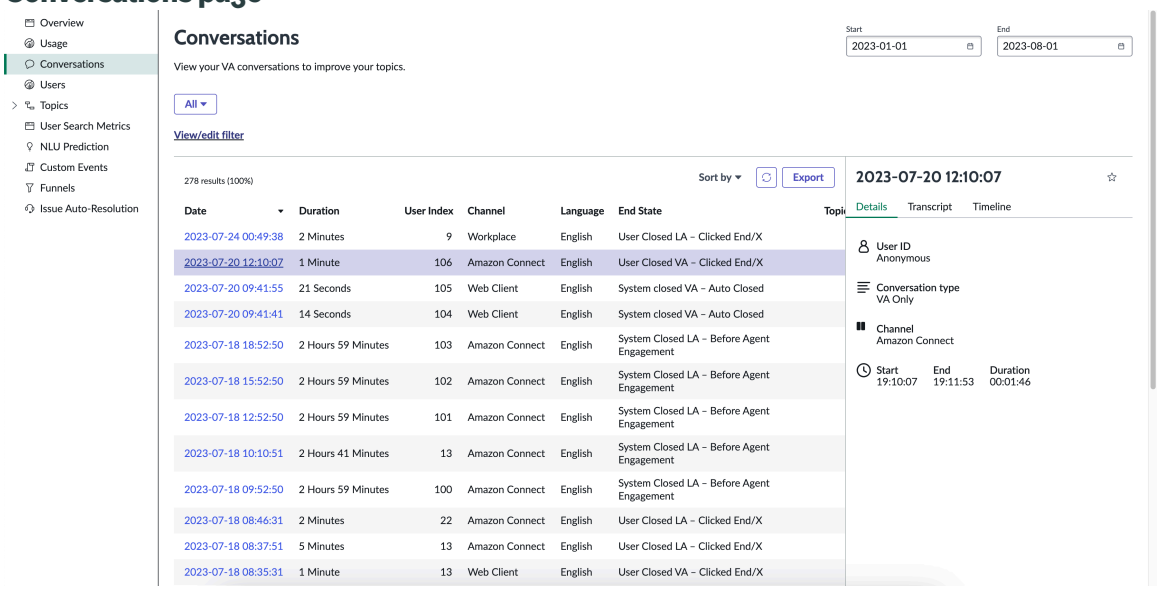
To access the **Conversations** tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role. Conversation dates and times are in UTC.

Conversations page



Conversations tab benefits

The **Conversations** tab enables you to do the following:

- Filter the list of conversations easily by using pre-built filtering options. For more information, see Filtering using list options.
- Filter the list of conversations based on a specific condition and save conditions for filtering. For more information, see Filtering using the Filter Editor.
- Learn more about each conversation, view the conversation transcript, and mark a conversation as a favorite. For more information, see Get conversation details.
- Export the list of conversations to a file. For more information, see Export the conversations list.
- Download the conversation transcript to troubleshoot individual conversations. For more information, see Download the conversation transcript.

Get conversation details

To get more information about a conversation, select one of the conversations in the list. The information appears on the side panel.

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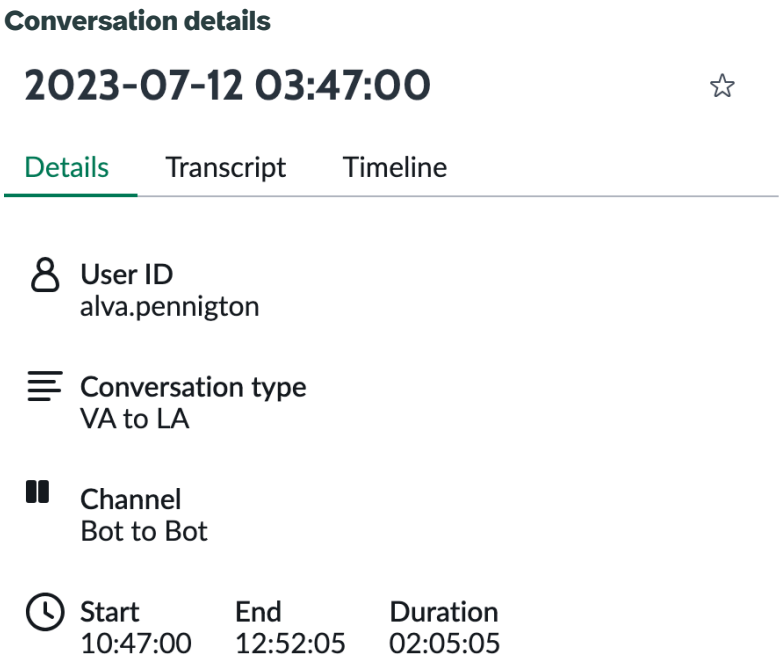

To view and download the conversation transcript, select the **Transcript** tab.

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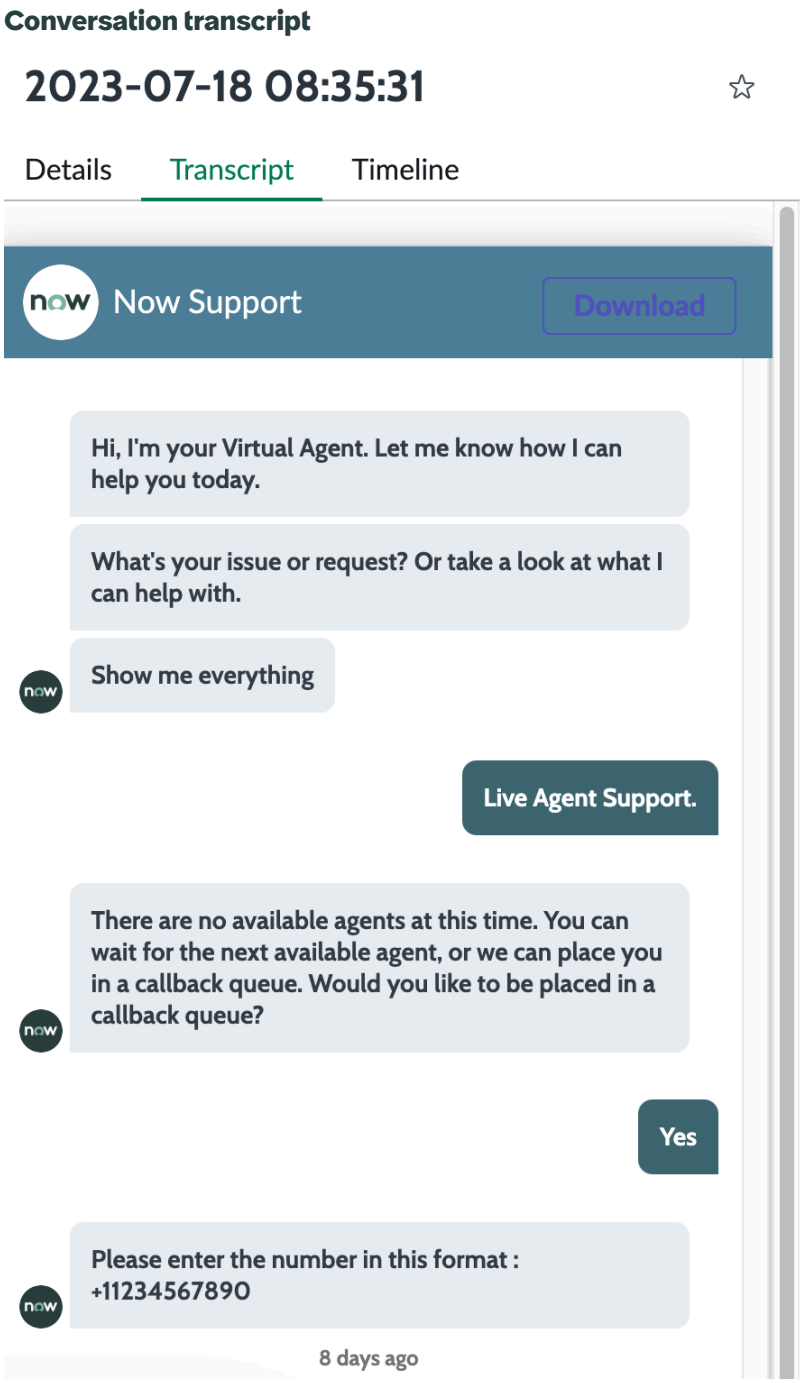

To view the conversation timeline, select the **Timeline** tab.

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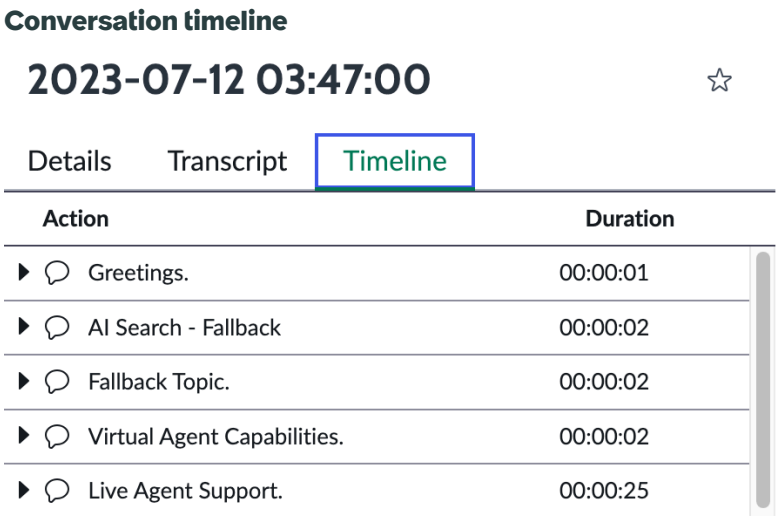

To tag a conversation as a favorite, you can select the star icon on the side panel. On the Conversations page, you can easily list the conversations that are marked as favorite using the Filter Editor.

Export the conversations list

To export the conversations list on the Conversations page to a file, select **Export**. In the Export pop-up window, specify the format for the file such as Excel, CSV, JSON, or PDF, and the delivery type such as email or download.

Note:
You can export up to 1000 records only from the list on the page. This limit is not configurable.

Conversation information

The following table describes the summarized Virtual Agent conversation information on the **Conversations** tab.

User information

Column	Description
Date	Date of the conversation.
Duration	Duration of the conversation.
User index	Link to go to the User Details page. It's a unique number that the system creates and permanently assigns to a Virtual Agent user. This number becomes a part of conversation records. This number is not the same as the system user ID.
Channel	Client software that the user used to chat.
Language	Language used for the conversation.
End state	How the conversation ended. For more information on various conversation end states, see Virtual Agent interaction records.

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User information (continued)

Column	Description
Topics	Virtual Agent topics that were invoked during the chat conversation.
Favorites	Indicates whether the user is tagged as favorite.

Download the conversation transcript

To download the conversation transcript, select a conversation from the conversations list and click **Download**.

The conversation transcript .txt file includes various data elements such as user input, Virtual Agent response, Flow Designer Integration Hub, flow action, custom controls, and topic block information for the selected conversation. This information helps Virtual Agent administrators to troubleshoot conversations, for example, conversations where there were errors or transfers to a live agent. For more information on the .txt file, see Conversation transcript template.

Use filters in the Conversation tab

You can filter out conversation for a deeper understanding.

Filtering using list options

You use the list options to filter the conversations.

Note:
The dashboard converts the dates to UTC, which might not match the dates in the conversations list.

List options

Option	Description
All	Lists all conversations.
VA Success	List all conversations that are considered successful. You can edit the default formula that defines successful conversations by using formula overrides. For more information, see Create custom override definitions. In the base system, the default formula is set as a percentage of conversations that did not escalate to a live agent, did not have negative feedback, and contained a topic that went through to the last node.
Fallback	Lists all conversations where Virtual Agent didn't understand the user and used fallback text to prompt the user for additional information.
Live Agent Transfer	Lists all conversations where Virtual Agent transferred the user to a live agent.

Filtering using the Filter Editor

To filter the conversations, click **View/edit filter** and use the condition builder in the Filter Editor pop-up window. You can either select a default filter from the list or create a new filter condition. For example, the following image shows a condition in the Filter Editor pop-up window. This condition lists conversations that use the **Pizza Order** topic, and that have the **Pizza Type** topic node (a static choice control) in which the user has selected the **Pepperoni** value.

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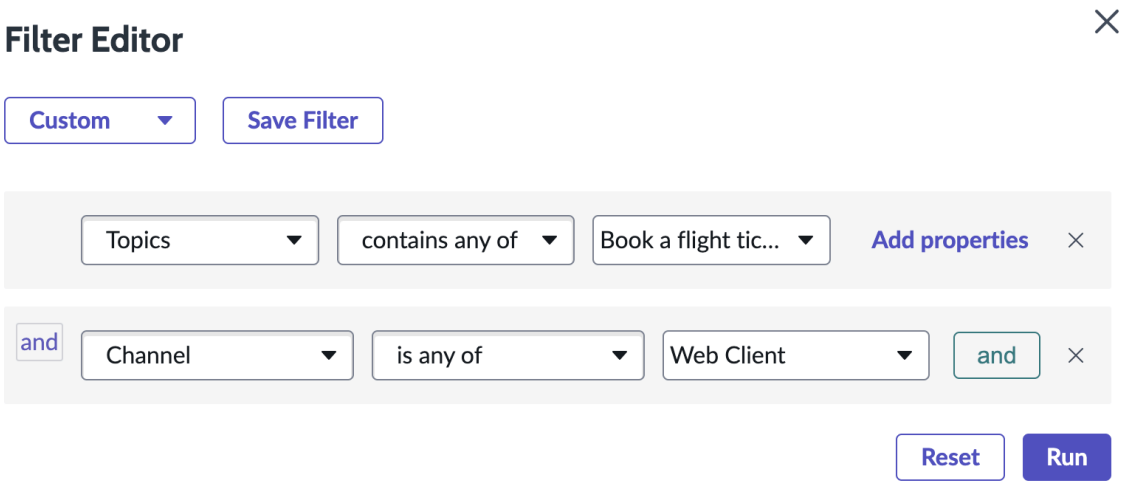
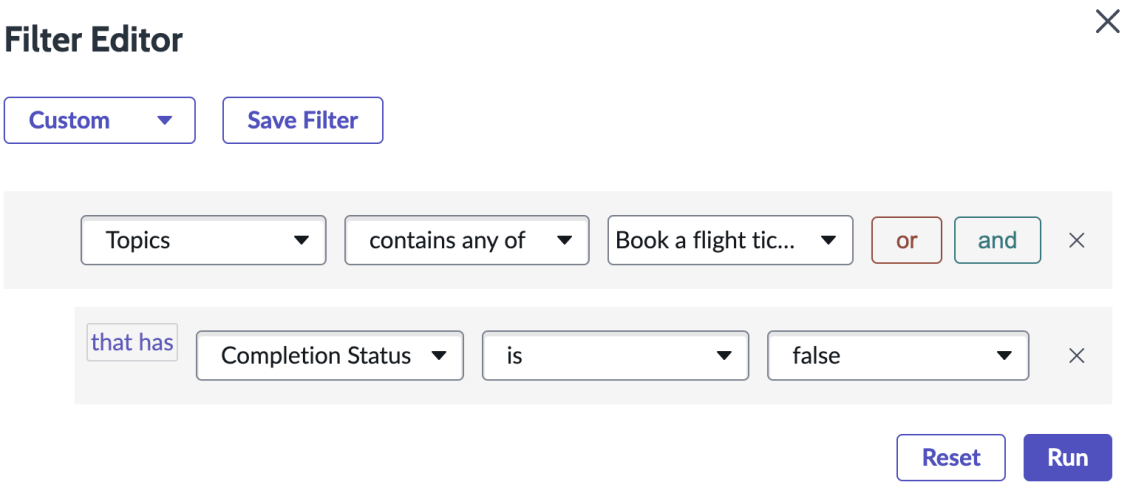
Condition using a static choice value



Another example condition is shown in the following image. This condition lists conversations that use the **Pizza Order** topic and that have the **Confirm** topic node (a boolean control) in which the user has selected the **true** value.

Condition using a boolean value



The condition builder consists of the following:

- Field: A list based on relevant tables. For more information about the field options, see Field options in the Filter Editor.
- Operator: A list of operators that is contextually generated based on the selected field.
- Value: A text entry field or a list that is contextually generated based on the selected field.

To add a dependent condition in the condition builder, either click **or** or **and**. To filter the conversations list using the condition, click **Run**.

To remove a condition, click the delete icon ( ) next to the condition.

To save a condition that you created in the condition builder, click **Save Filter**. In the Save Filter pop-up window, specify a name for the condition. Users having the Chat Analytics Viewer (chat_analytics_viewer) role can select and modify your saved filters.

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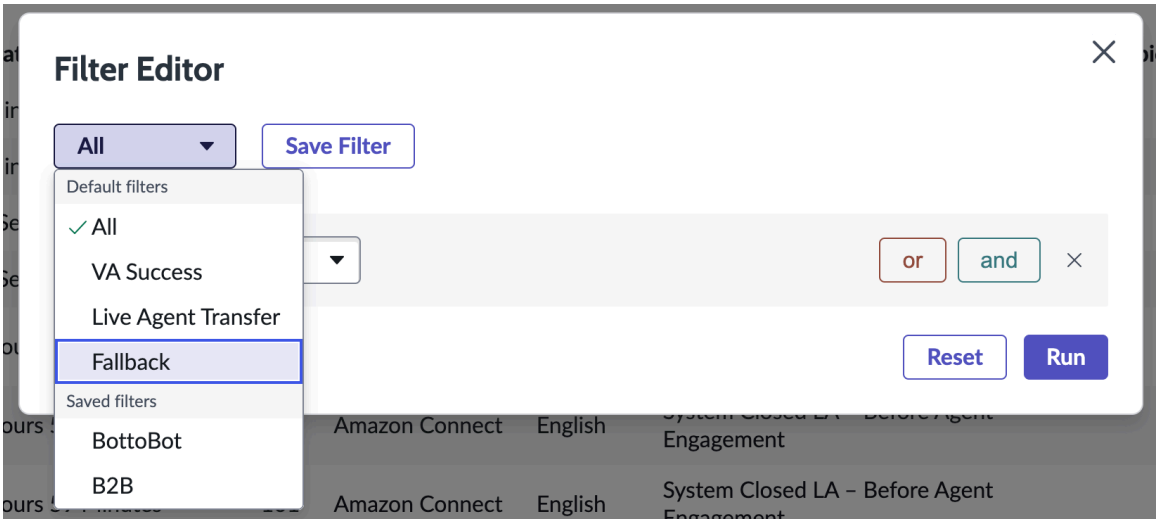
Saved condition



Field options in the Filter Editor

Field options

Option	Description
Channel	Conversations that used the specified channel.
Conversation Time	Conversations within the specified date and time.
Duration	Conversations within the specified time duration. You can edit the definition of duration to be a session duration, rather than an active messaging duration. For more information, see Create custom override definitions.
End State	Conversations with the specified state that is based on how conversations ended. The values for the end states are stored in the Interactions [interactions] table. For more information, see Virtual Agent interaction records.
Events	Specific events that are triggered in a conversation.
Favorite	Conversations that are marked as favorite. You can also mark a conversation as favorite in the User Details page. For more information, see User Details page.
Feedback Result	Conversations for the specified feedback type.
Language	Conversations for the specified language based on the user's language setting.
Message Count	Conversations for the specified message count in the chat.
Provider Name	Conversations for the specified provider.
VA Success	Conversations resolved by the Virtual Agent.
Setup Topic Types	Conversations that used the specified setup topic type.
Topic Blocks	Conversations that used the specified topic block.
Topic Categories	Conversations that have topics which belong to a specified topic category.

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Field options (continued)

Option	Description
Topic Count	Conversations that used the specified topic count. Each conversation can use multiple topics and this option filters conversations based on the count of topics used in it.
Topics	Conversations that used the specified topics in the chat.
Type	Conversations that are of the specified type such as live agent only or Virtual Agent only.

Conversation transcript template

The conversation transcript .txt file contains information used to troubleshoot individual conversations.

Data element	Description
Conversation ID (sys_id)	Unique identifier of the conversation, autogenerated by the Virtual Agent.
Conversation Start Time	Start time of the conversation.
Channel	Channel from which the conversation was initiated. For example, the Slack application, Microsoft Teams, and so on.
User Name	Name of the user who initiated the conversation.
User Status	Status of the user in the ServiceNow AI Platform® instance. For example, Active or Inactive.
Bot Response	Control that displays Virtual Agent responses in a conversation.
User Input	Control that prompts and captures information from the user in a conversation.
Message Date and Time	Timestamp of individual messages.
FDIH logs	Action or Subflow • Id: sys_id of the action or subflow. • Inputs: Input passed to the action or subflow. • Outputs: Output received from the action or subflow.
Topic Block	Name of the topic block defined in the current topic. • Id: sys_id of the topic block invoked. • Inputs: Input passed to the topic block. • Outputs: Output received from the topic block.

Users tab

Get detailed information on Virtual Agent users such as the time of the last chat, length of the chat, and other metrics.

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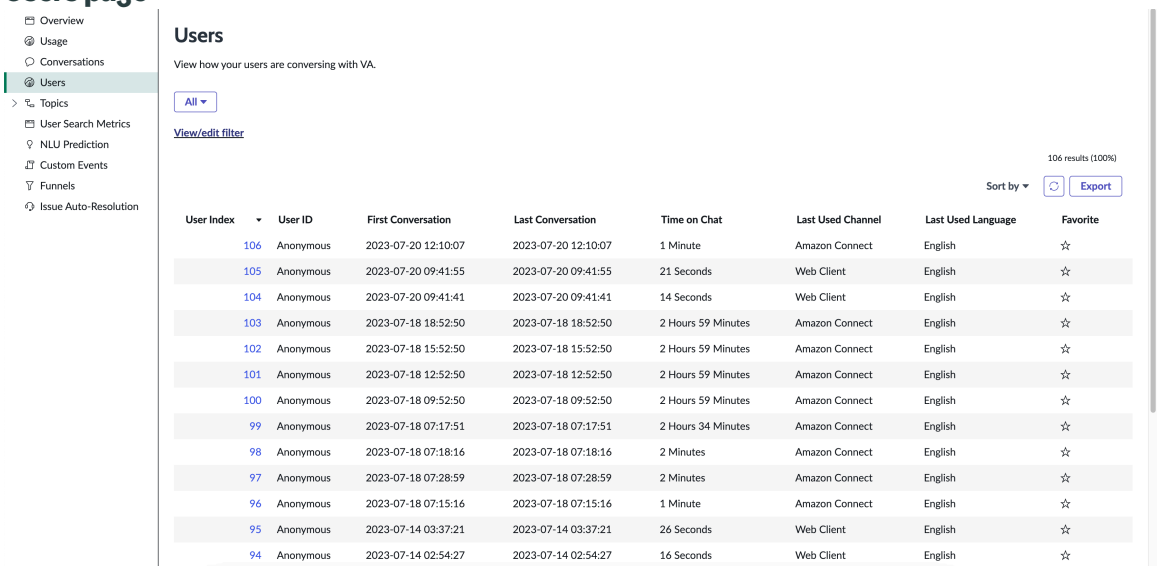
The **Users** tab provides summary information about all users and detailed information about each user conversation with Virtual Agent.

To access the **Users** tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.

Users page



Users tab benefits

The **Users** tab enables you to do the following:

- Filter the list of users by using pre-built filtering options. For more information, see Filtering the list of users.
- Filter the list of users based on a specific condition and save conditions for filtering. For more information, see Filter using the condition builder.
- View summarized information about users. For more information, see User information.
- Export the list of users to a file. For more information, see Export the list of users.

Export the list of users

To export the list of users in the Users page to a file, select **Export**. In the Export pop-up window, specify the format for the file such as Excel, CSV, JSON, or PDF, and the delivery type such as email or download.

Note:
You can export up to 1000 records only from the list on the page. This limit is not configurable.

User information

The following table describes the summarized Virtual Agent user information on the Users tab.

User information

Column	Description
User Index	Link to go to the User Details page. It is a unique number that the system creates and permanently assigns to a Virtual Agent user. This number becomes a part of conversation records.

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User information (continued)

Column	Description
	This number is not the same as the system user ID.
User ID	User ID of the logged in user. If users don't log in, they appear in sessions as **Anonymous**.
First conversation	How long ago the user first started the Virtual Agent conversation.
Last conversation	How long ago the user last had a Virtual Agent conversation.
Time on Chat	Duration of the Virtual Agent chat.
Last Used Channel	Client software the user last used to chat.
Last Used Language	Language the user last used in a Virtual Agent conversation.
Favorite	Indicates whether the user is tagged as favorite.

Field options in the Filter Editor

User filters

Option	Description
User ID	User ID of the logged in user.
User Index	Unique number that the system creates and permanently assigns to a Virtual Agent user. This number becomes a part of conversation records.
Conversation Exists	Container for subfilter properties. For example, in the previous image, the subfilter is **Duration**.
Channel Count	Number of channels a user used. A channel is the client app the user used, such as Slack. For example, if all users have used only one channel to chat with Virtual Agent, then setting the filter value to 2 eliminates all the users in the list.
Channels	Only displays users that used the specified channel to chat.
Conversation Count	Only displays users that have the number of conversations specified in the filter.
Favorite	Only displays users that you marked as favorite, or conversely, not marked as favorite in the User Details page. For more information, see User Details page.
First Conversation Time	Only displays users where the first conversation is within the time period specified.
Language	Only displays users that chat using the specified language.
Last Conversation Time	Only displays users where the last conversation is within the time period specified.
Time in Chat	Only displays users whose chat durations are within the time period specified, for example, more than 30 seconds.

User Details page

Use the User Details page to see the history of a user's conversations.

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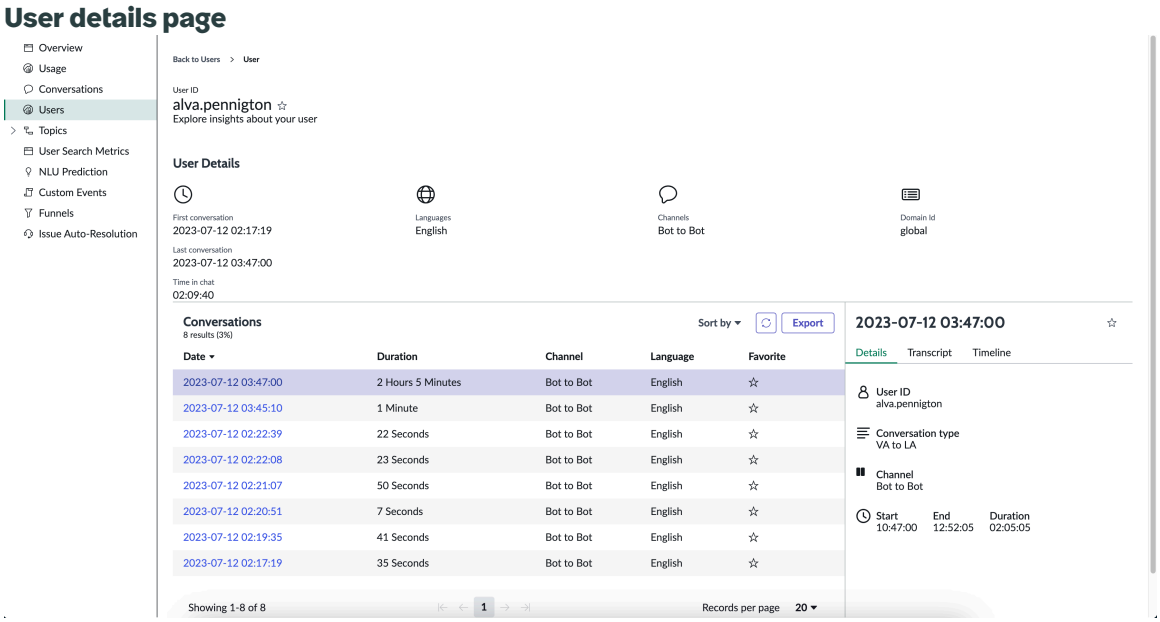
The User Details page lists all chats that a user had with the Virtual Agent. It also displays the summary such as the language used in the chats, the first and last chats, and the channels.



You can select the star icon on the User Details page to tag the user as a favorite. In the Users page, you can easily list the users that are marked as favorite using the Filter Editor.

Benefits

The User Details page enables you to do the following:

- View detailed information about each chat, and mark chats as favorite. For more information, see Get information about each chat.
- View details about each user. For more information, see Get information about each user.

Get information about each chat

You can get more information about a chat that a user had with the Virtual Agent. To get detailed information about one of the chats listed on the User Details page, select a date in the list of conversations. The information appears on the side panel.

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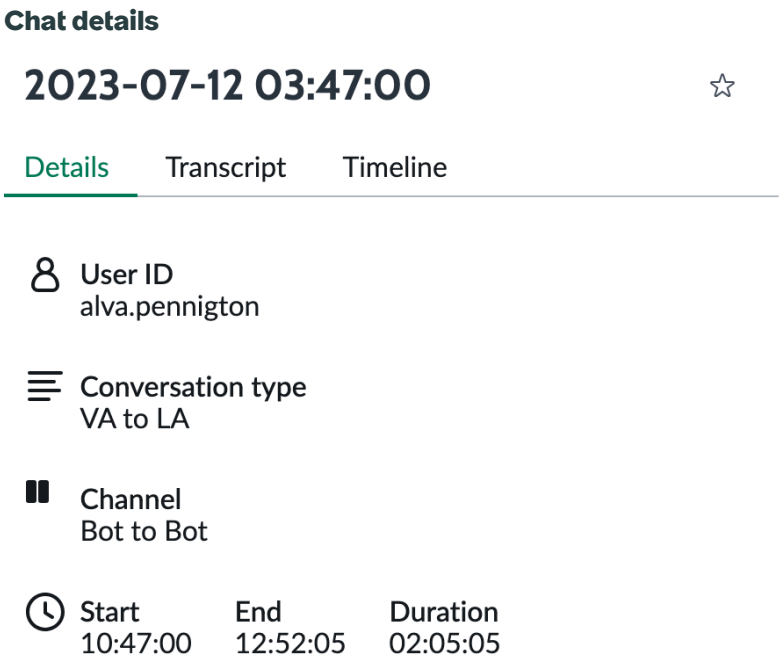
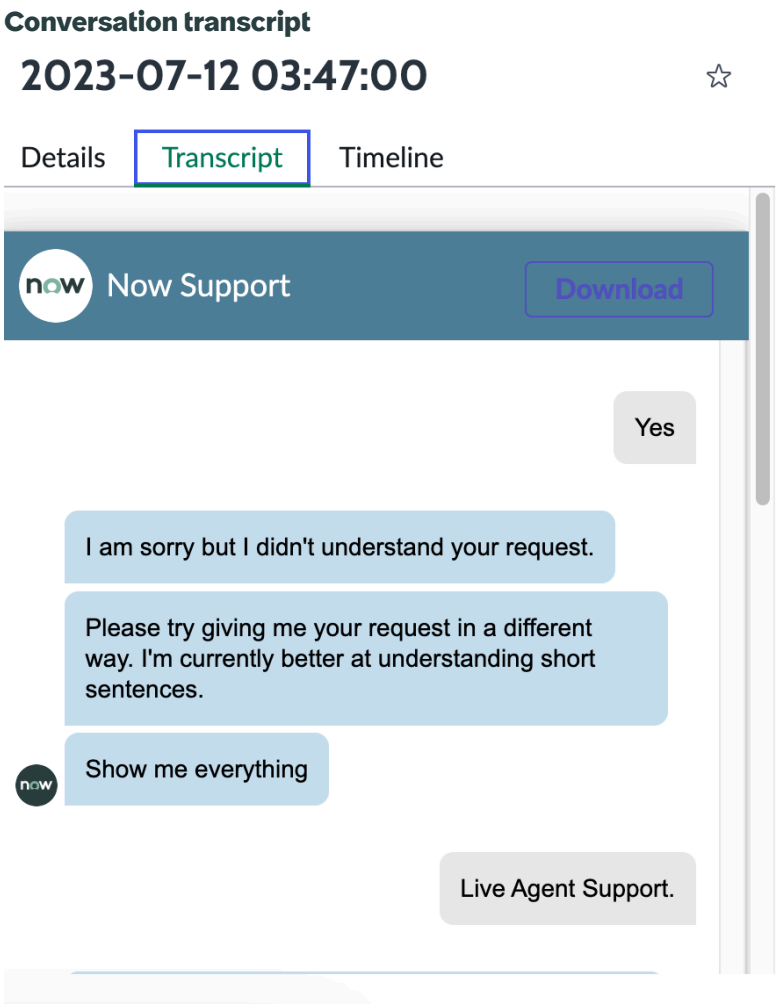


To view the chat transcript for a user's conversation, select the **Transcript** tab.



To view the chat timeline, select the **Timeline** tab.

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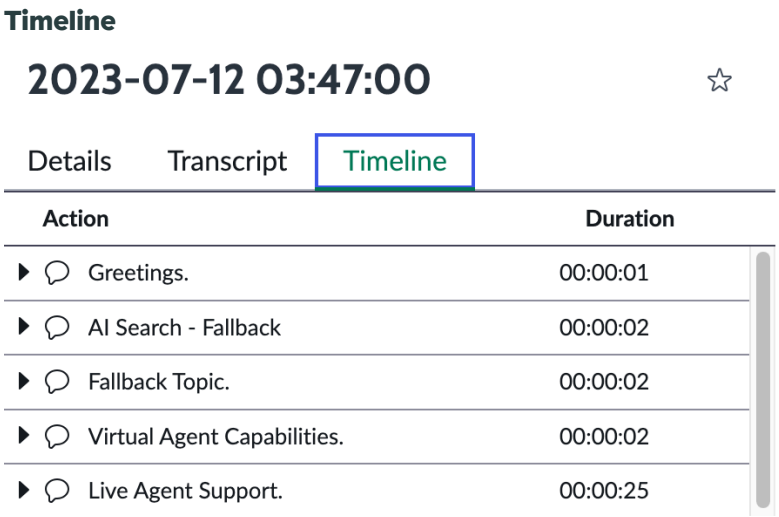
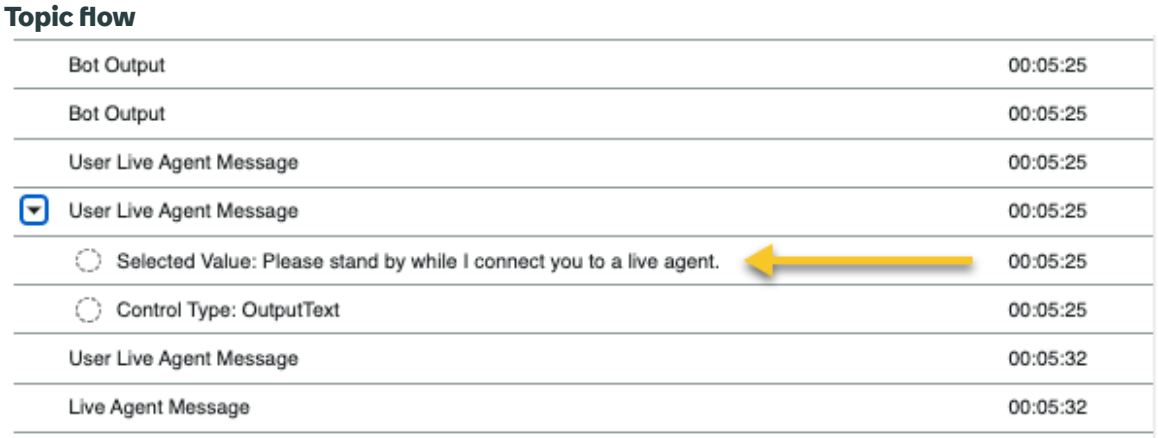
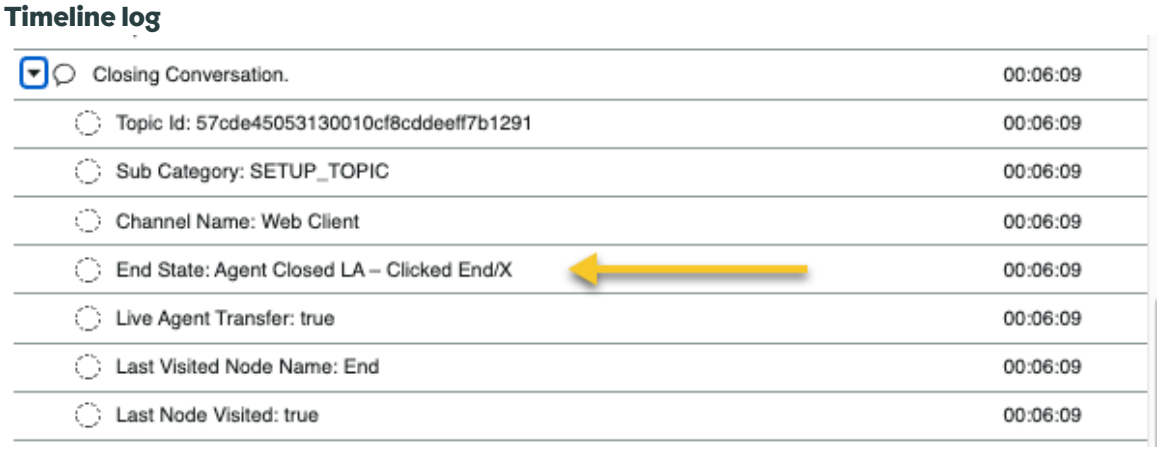


The **Timeline** tab shows the topic flow in the chat. For example, the following image shows that the chat started in Virtual Agent and moved to a live agent.



The timeline shows that the user chatted with Virtual Agent until 5:25. Then the user requested to talk to a live agent, who joined the chat at 5:32. The timeline shows events such as how many responses Virtual Agent made, and when the live agent closed the chat.



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To tag the chat as favorite, select the star icon on the side panel. On the Conversations page, you can easily list the chats that are marked as favorite using the Filter Editor. For more information, see Conversations tab.

Get information about each user

The following table explains the fields in the User Details page:

Details

Field	Description
User ID	User ID of the logged in user. If users don't log in, they appear in the sessions as anonymous.
First conversation	How long ago the user first started the Virtual Agent chat.
Last conversation	How long ago the user last had a Virtual Agent chat.
Time in chat	Duration of the Virtual Agent chat.
Languages	Language the user used in the chats.
Channels	Software that the user used to chat.

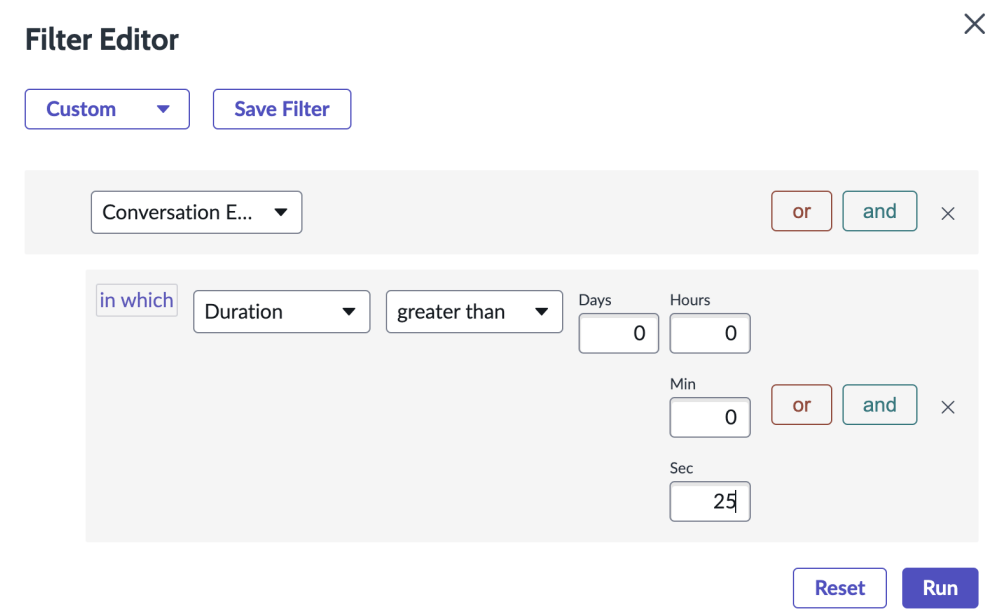
Use filters in the Users tab

You can use filters to get a deeper understanding of User data.

Filter using the condition builder

The condition builder enables you to filter users based on one or more conditions. You can either select a default filter from the list or create a new filter condition. In the following example, the condition lists users whose conversations with the Virtual Agent lasted greater than 21 seconds.

Condition builder



The condition builder consists of the following:

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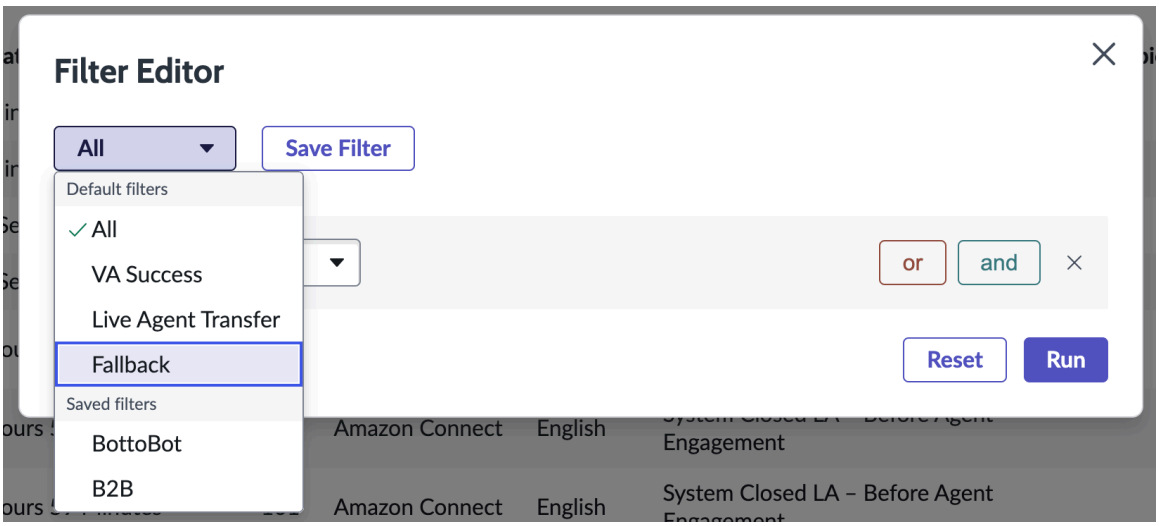
- Field: A list based on relevant tables.
- Operator: A list of operations that is contextually generated based on the selected field.
- Value: A text entry field or a list that is contextually generated based on the selected field.

To remove a condition, click the delete icon ( ) next to the condition. To add dependent conditions in the condition builder, either click **or** or **and**. To filter the conversations list using the condition, click **Run**.

To save a condition that you created in the condition builder, click **Save Filter**. In the Save Filter pop-up window, specify a name for the condition. Users having the Chat Analytics Viewer (chat_analytics_viewer) role can select and modify your saved filters.

Saved condition



Filtering the list of users

Use the list options to filter users.

List options

Option	Description
All	All Virtual Agent users.
New	First conversation happened within the past seven days.
Returning	Users who previously used Virtual Agent.
Never Returned	Users who used Virtual Agent once, but haven't used it again. The conversation count is 1.

Selecting a **User Index** takes you to the User Details page that provides detailed information about all of a user's conversations.

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Field options in the Filter Editor

User filters

Option	Description
User ID	User ID of the logged in user.
User Index	Unique number that the system creates and permanently assigns to a Virtual Agent user. This number becomes a part of conversation records.
Conversation Exists	Container for subfilter properties. For example, in the previous image, the subfilter is **Duration**.
Channel Count	Number of channels a user used. A channel is the client app the user used, such as Slack. For example, if all users have used only one channel to chat with Virtual Agent, then setting the filter value to 2 eliminates all the users in the list.
Channels	Only displays users that used the specified channel to chat.
Conversation Count	Only displays users that have the number of conversations specified in the filter.
Favorite	Only displays users that you marked as favorite, or conversely, not marked as favorite in the User Details page. For more information, see User Details page.
First Conversation Time	Only displays users where the first conversation is within the time period specified.
Language	Only displays users that chat using the specified language.
Last Conversation Time	Only displays users where the last conversation is within the time period specified.
Time in Chat	Only displays users whose chat durations are within the time period specified, for example, more than 30 seconds.

Topics tab

Use the **Topics** tab in the Conversational Analytics dashboard to identify the least and best performing topics.

The **Topics** tab provides insights into which Virtual Agent (VA) topics are performing well and which aren't. You can also select multiple topic categories using the **Select Categories** dropdown to visualize data based on your selection. To use the Topics tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.

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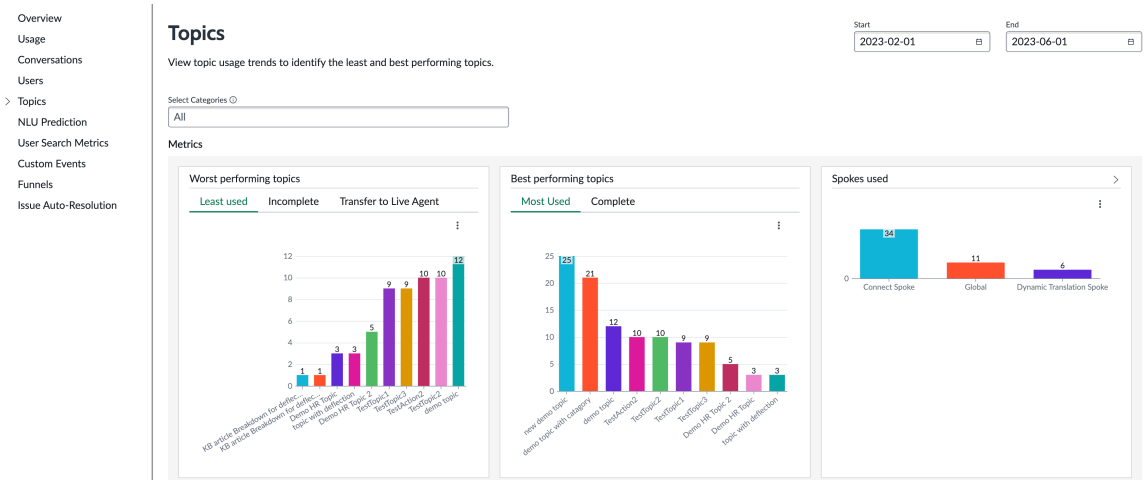


Worst performing topics

The Worst performing topics chart provides multiple ways of detecting chat topics that didn't work. The horizontal axis lists the chat topics. The subtabs include:

- Least used—The topics used least in chats.
- Incomplete—The topics the user abandoned without resolution.
- Transfer to Live Agent—The topics the user couldn't resolve with Virtual Agent. So, the user transferred to a live agent.

Best performing topics

The topics in this chart are performing well. The horizontal axis lists the topics. The count on the vertical axis varies depending on the subtab selected:

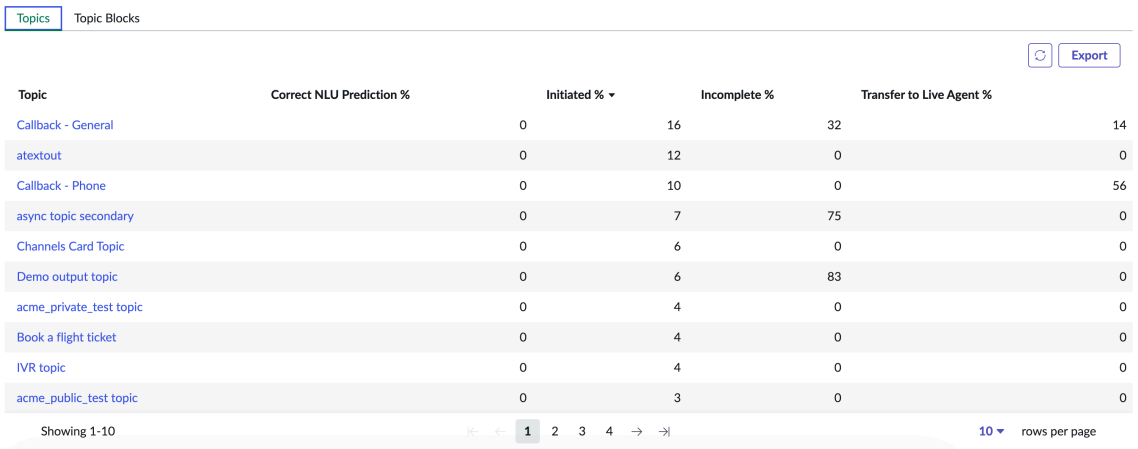
- Most Used—Number of times users used a topic.
- Complete—Number of times users completed a topic without the assistance of a live agent.

Spokes used

For more information about the spokes used, see Spokes.

List of topics

The **Topics** page list the topics used in the date range specified in the Conversational Analytics Dashboard.



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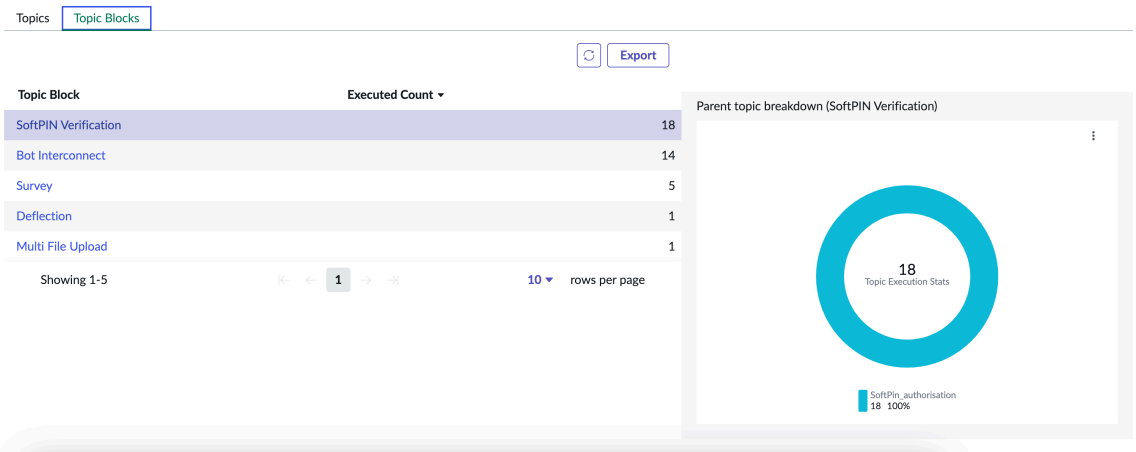
Topic details

Topic information	Description
Correct NLU Prediction %	Percentage of times this topic name was predicted correctly out of all times this topic name was predicted. A correct prediction means that VA showed that a predicted topic and a user selected it.
Initiated %	Percentage of times this topic ran out of all the topics that ran.
Incomplete %	Percentage of times the user didn't reach the last node in the topic out of all times this topic ran. For example, if the 2 users didn't complete all the nodes in a topic but 8 other users did, the incomplete percentage would be 20%.
Transfer to Live Agent %	Percentage of occurrences where this topic transferred from VA to a live agent out of all the time this topic ran.

List of topic blocks

The **Topic Blocks** page list the topic blocks used in the date range specified in the Conversational Analytics Dashboard.



The chart shows the number of times each topic block was executed.

Topic categories

Use the Category page in the Conversational Analytics dashboard to see the performance of Virtual Agent (VA) topics divided into categories.

Topic categories group related conversation topics. Topics can belong to more than one category. Select the drop-down list to show the categories that you can display in the visualizations. The visualizations show the aggregate performance of Virtual Agent conversations that ran in the topics belonging to a category.

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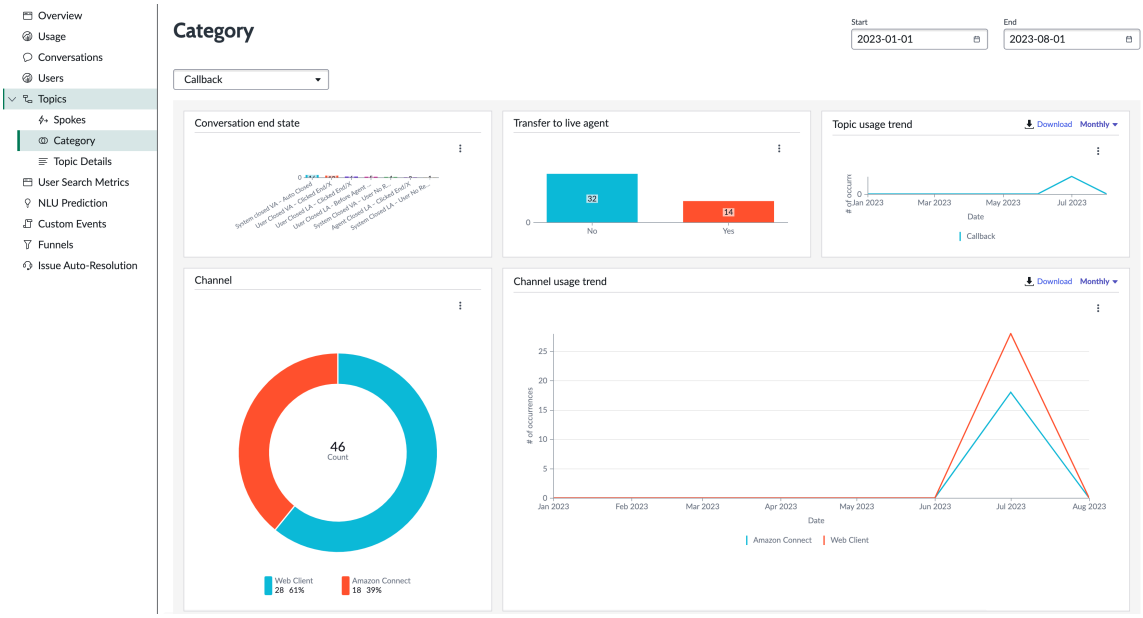

For more information about creating or modifying VA categories, see Create or modify custom categories.

Topic category visualizations

Visualization	Description
Conversation end state	The number of users that reached a specific node in a topic in the VA category. In the example, six users reached the node labeled, **System closed VA - Auto Closed**. Use this field to see where topics stopped working for users. For definitions of each conversation end state, see Virtual Agent interaction records.
Transfer to live agent	The number of users that transferred from VA to a live agent in that VA category. A high number indicates that the topic is not meeting user needs.
Topic usage trend	Number of topics users used in a specified topic category over the course of the date range. The example shows the number of topics per day users used in the IT category. Use this field to monitor updates to topics.
Channel	The application the user used to chat with VA in that topic category, for example, Slack or web client.
Channel usage trend	Number of users using a specified channel over the course of the date range for topics in that VA category.

Topics details

Use the Topic Details page in the Conversational Analytics dashboard to see the details of the Virtual Agent (VA) topics.

Get additional information about the topics

You can select the visualized data selecting the topic from the list. Details about the data you selected displays.

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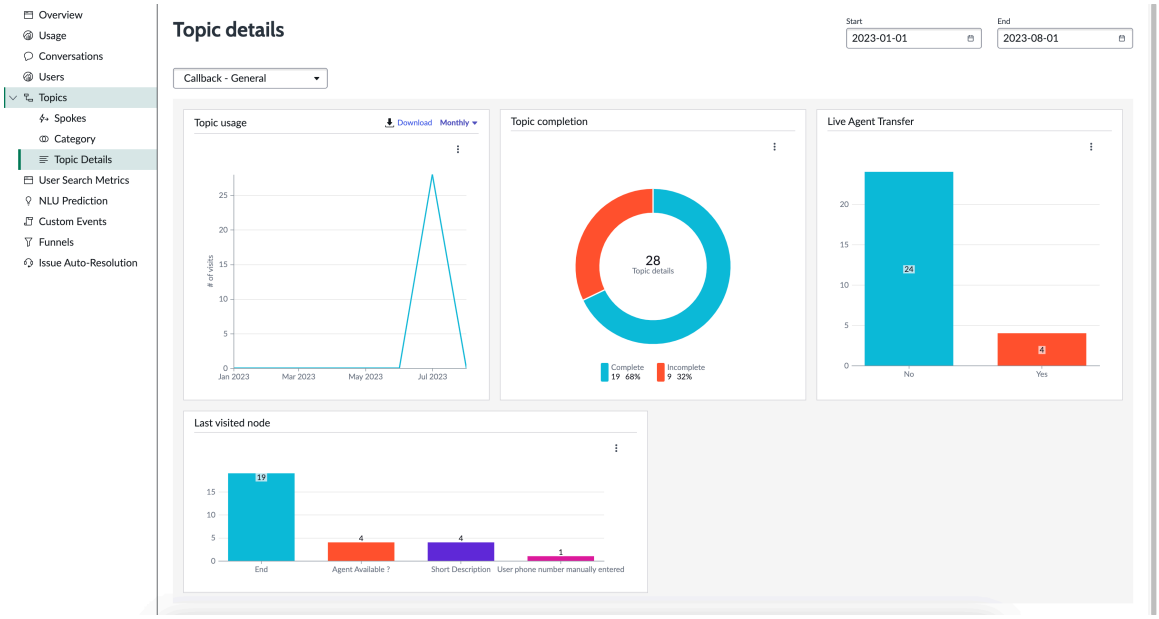

Note:
The Y axis is evenly divided over 10 increments. If there are fewer than ten values on the Y axis, some values repeat, for example, five 1's in the previous image.

Use the list menu to display one of the chat interactions in the topic you selected. This page shows:

- **Topic Usage**—The number of times the topic was used each day.

  You can display the number of occurrences and user sessions of the selected topic by selecting **Download**.

sn_ci_analytics_st_event_occurrence

date	event_name	occurrences	sessions
2021-02-01 00:00:00	VPN Connectivity (Template)	34	27
2020-01-01 00:00:00	VPN Connectivity (Template)	0	0
2020-02-01 00:00:00	VPN Connectivity (Template)	0	0
2020-03-01 00:00:00	VPN Connectivity (Template)	0	0
2020-04-01 00:00:00	VPN Connectivity (Template)	0	0
2020-05-01 00:00:00	VPN Connectivity (Template)	0	0
2020-06-01 00:00:00	VPN Connectivity (Template)	0	0

  In this example, one chat session happened on 2020-12-16.

- **Topic completion**—Number of times the user went to the final node in the topic.
- **Live Agent Transfer**—Number of VA chats transferred to a live agent.
- **Last Visited Node**—Last nodes users visited before leaving the chat.

  The presumption is the user gave up after the last node they visited.

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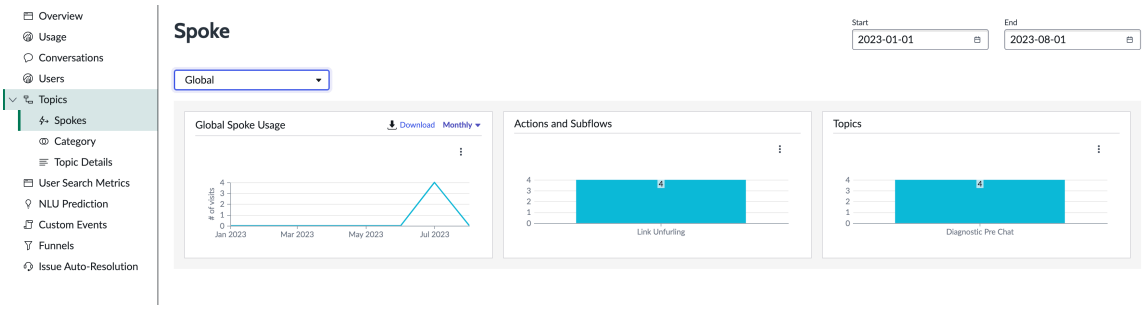
Spokes

Use the Spokes page to see the details of the spoke actions and subflows for the Virtual Agent (VA) topic.

Spokes used

The **Spokes used** chart shows which spokes, actions, and subflows were used and how often. In Virtual Agent, conversations contain topics, topics contain spokes, and spokes contain spoke actions or subflows. Selecting a spoke from the list displays the following details.



The three charts show:

- **Spoke Usage**—The number of times the specified spoke ran each day.

  You can display the number of occurrences and user sessions of the selected topic by selecting **Download**.

sn_ci_analytics_st_event_occurrence (2)

date	event_name	occurrences	sessions
2021-02-01 00:00:00	Global	16	16
2021-06-01 00:00:00	Global	3	3
2020-01-01 00:00:00	Global	0	0
2020-02-01 00:00:00	Global	0	0
2020-03-01 00:00:00	Global	0	0
2020-04-01 00:00:00	Global	0	0

- **Actions and Subflows**—Within the specified spoke, which actions and subflows were executed. In the previous **Actions and Subflows** chart, one action, Create Freeform VTB was triggered 22 times.
- **Topics**—Which topics executed the spoke. The horizontal axis in the **Topics** chart shows the topics that triggered the spoke. The vertical axis shows how many times the topic triggered the spoke.

Natural Language Understanding of Virtual Agent responses

Virtual Agent (VA) uses the Natural Language Understanding (NLU) service to understand user input. Use the **NLU Prediction** tab to see how well NLU predicts intents, and to improve the intents so NLU makes better predictions.

The **NLU Prediction** tab on the Conversational Analytics Dashboard shows how well NLU is understanding user input in chat conversations. Virtual Agent comes with NLU models, but you can use the Activate the NLU Workbench to modify or create new models.

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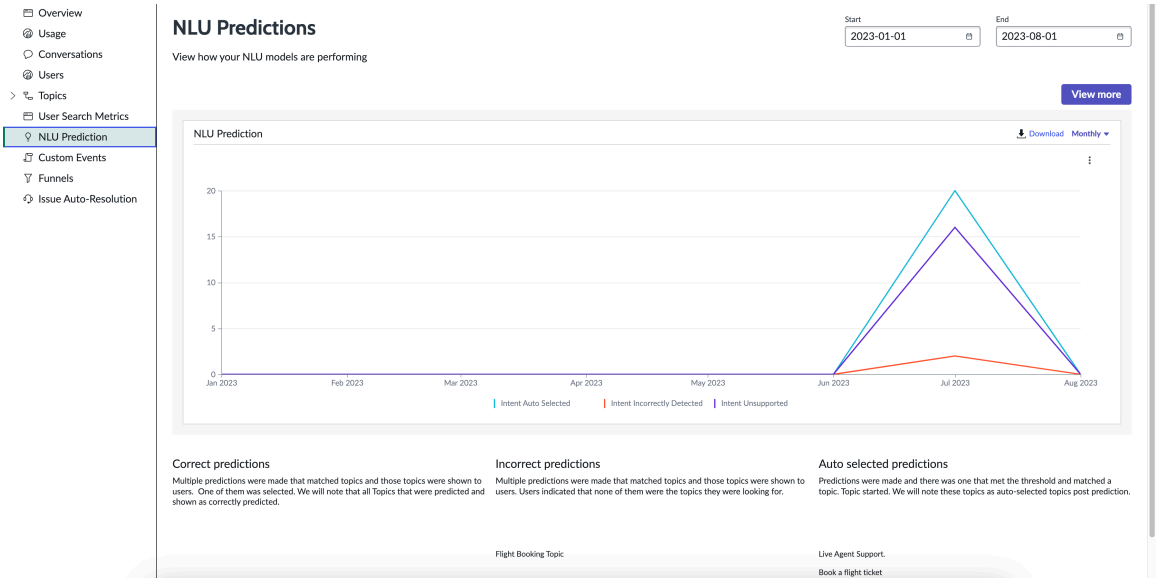

To use the NLU Prediction tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.

NLU Prediction graph

The graph shows the daily performance of NLU predictions. The graph can show up to three lines, which represent:

- **Correct Predictions**—NLU predicted multiple intents and showed them to users. They selected one.
- **Incorrect Predictions**—NLU predicted multiple intents and showed them to users. They indicated that none of them were what they were looking for.
- **Auto Selected Predictions**—NLU predicted a single intent based on chat input from the user. Sometimes, NLU returns multiple topics, each from a separate intent, and the user selects one.

The example graph only shows Auto Selected Predictions. On 2021-01-27, one intent was auto-selected, and on 2021-01-31, two intents were auto-selected.

Note:
The vertical axis can have duplicate values because the axis has 10 increments. If the number of intents is less than 10, some values on the vertical axis appear more than once. For example, in the previous image, the maximum number of intents of all the days in the date range is 5. So, on the vertical axis there are two 1s, two 2s, two 3s, and so forth.

How are these values determined? The dashboard collects the following data:

1. Did the NLU prediction model determine an intent?
2. Did the predicted intent match the topic bound in the model to the intent?
3. What's the prediction score and did the dashboard show multiple options to the end user to specify the correct intent, or did the dashboard just display the topic associated with one intent.
4. After showing the user multiple intents, did the user select one?

The Conversational Dashboard uses the following algorithms on the data to populate the intent lists:

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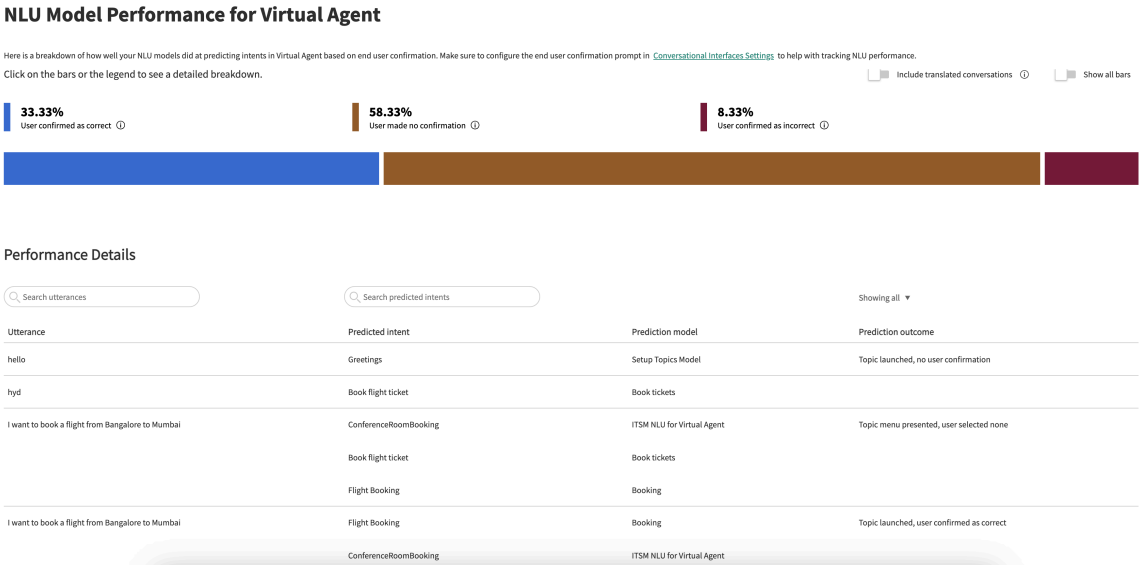
- Correct Predictions—1, 2, 3, and 4 are true.
- Incorrect Predictions—4 was false.
- Auto Selected Predictions—3 was auto-selected, and there was no 4.

It's possible for intents to appear in several categories. For example, the Activate Account (Ben) intent appears in the **Correct Predictions** and the **Auto Selected Predictions** columns because NLU correctly predicted the intent and only presented a single response to the user.

Improving NLU predictions

Clicking anywhere on the graph opens the Model Performance page. It shows a summary of intents predicted or not predicted over the date range specified on the graph.



See Activate the NLU Workbench to see how to use the NLU Workbench to improve NLU predictions.

Modify models

Test and modify the Virtual Agent models so they more accurately predict user intents.

Before you begin

Role required: Chat Analytics Admin

About this task

Many ServiceNow products, such as ITSM, HRSD, and CSM include NLU models for Virtual Agent (VA) topics. The NLU plugin contains entities that are common across all products. You can modify those models. To learn how to train and test the models used for VA conversations, see Natural Language Understanding.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Conversational Analytics** > **Virtual Agent Dashboard** and select the **NLU Prediction** tab.
2. Select **View more** .

   The Models page opens that displays the models that predict intents in your setup.

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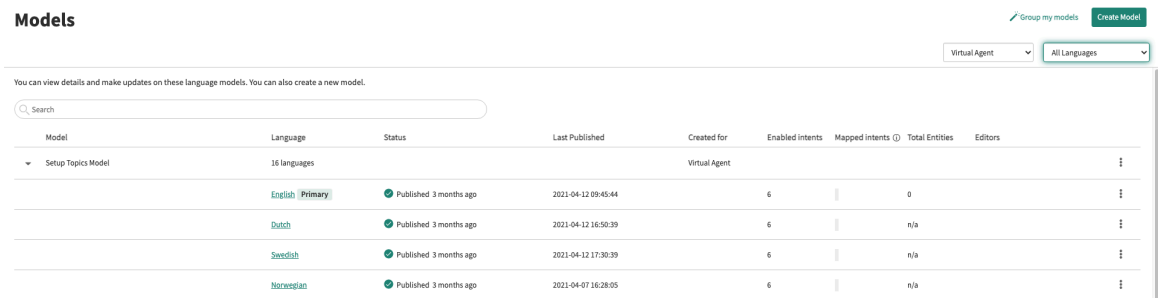
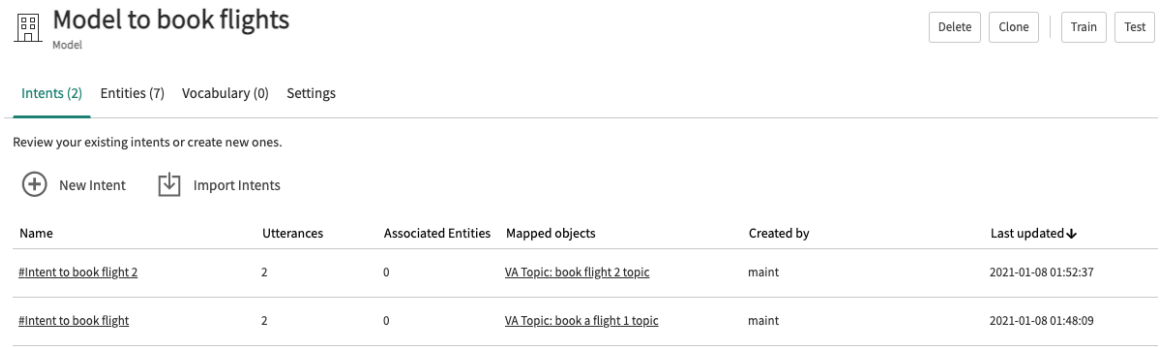
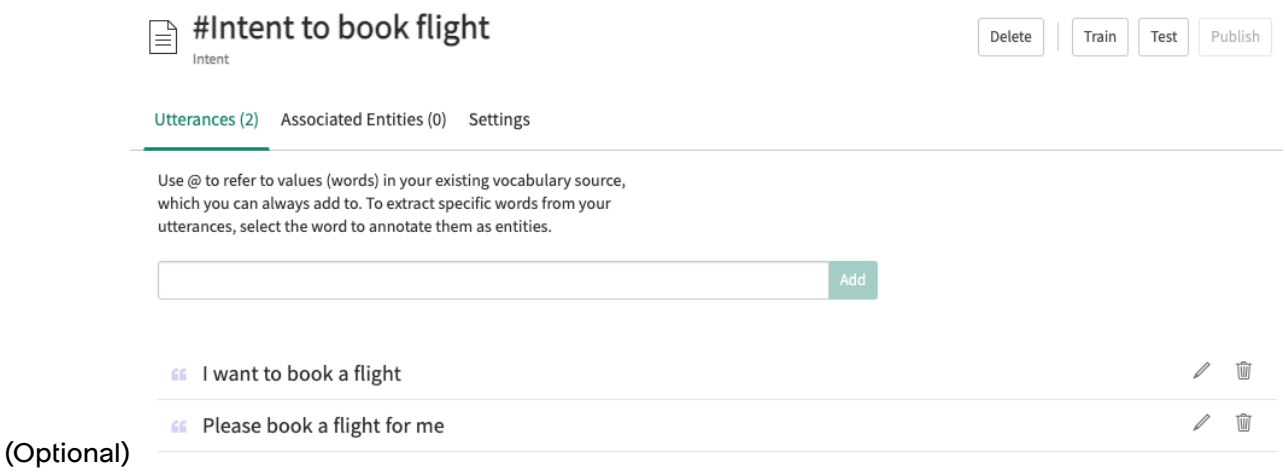


3. **Optional:** If none of the models contain intents and utterances you'd like in your setup, select **Create Model** and follow the instructions in Create an NLU model.
4. Click a model to display the intents the model predicts.



5. **Optional:** Click an intent to display the utterances associated with it.



(Optional)

6. **Optional:** To create a new intent and add it to the model:

   a. Select **New Intent**.
   The **Create a new intent** dialog box opens.

   b. Enter the name of the new intent in **Intent Name**, a description of it in the **Description** field, and select **Save**.
   A page for your new intent opens.

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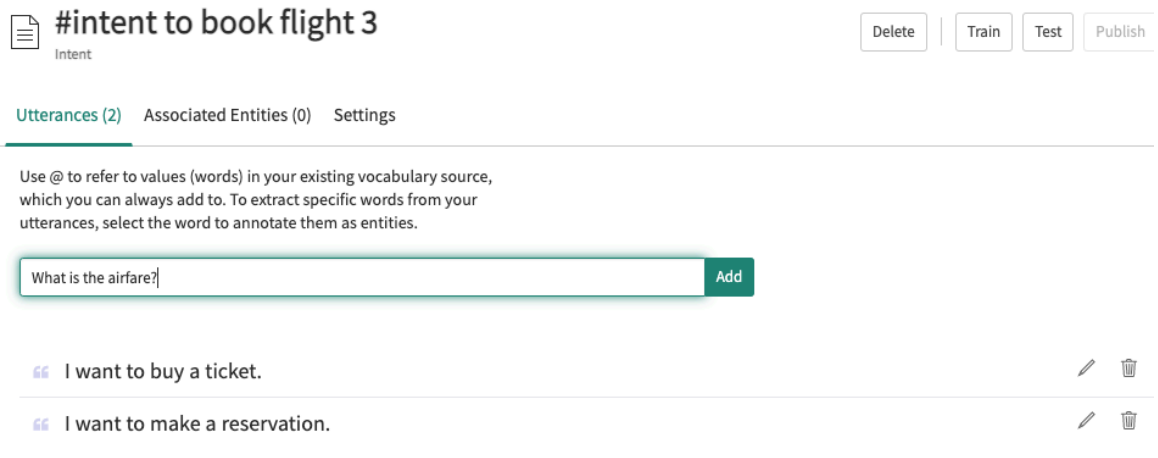
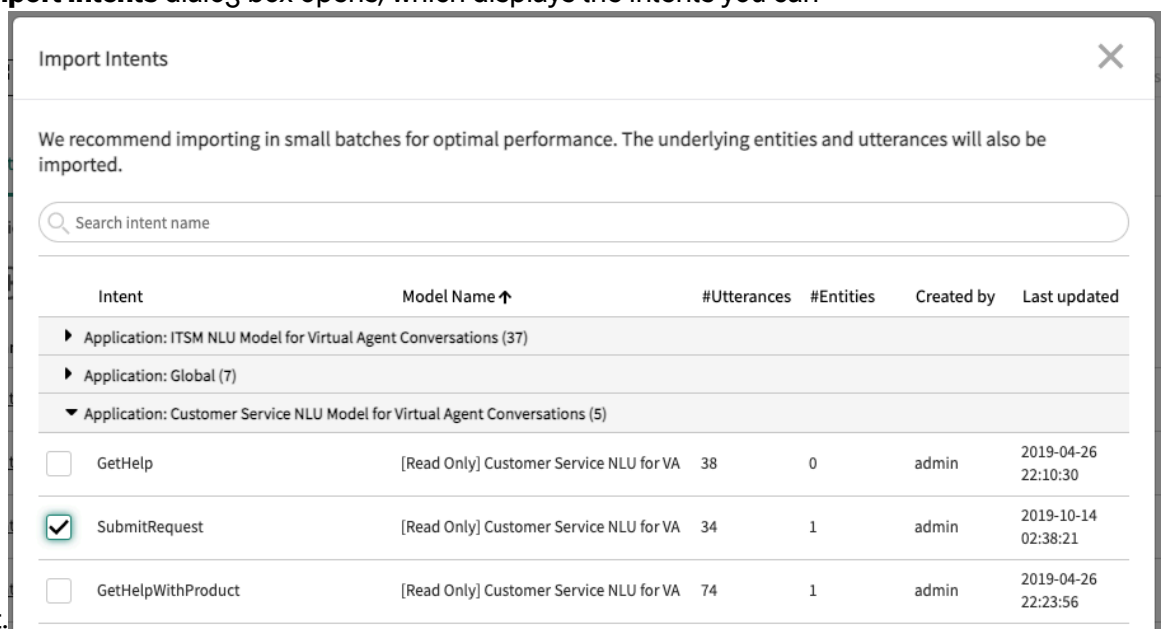


(Optional)

c. Enter an utterance for your new intent and select **Add**.
You can repeat this step multiple times to add multiple utterances.

7. Optional: Import one or more intents by selecting **Import Intents**.
The **Import Intents** dialog box opens, which displays the intents you can import.



a. Find the intent(s) to import by entering a search term, or by clicking an arrowhead to display the intents in a folder, and then selecting one or more check boxes.

b. Select **Import**.

8. Optional: If you added or imported intents:

a. Select **Train** to add the intents to the model.

b. Select **Train** to train the model.
If successful, a banner at the top reads, **The model has been successfully trained.**

9. To test all the utterances, select **Test** and enter a sentence a user might enter in a chat to see if NLU understands the intent of your sentence.

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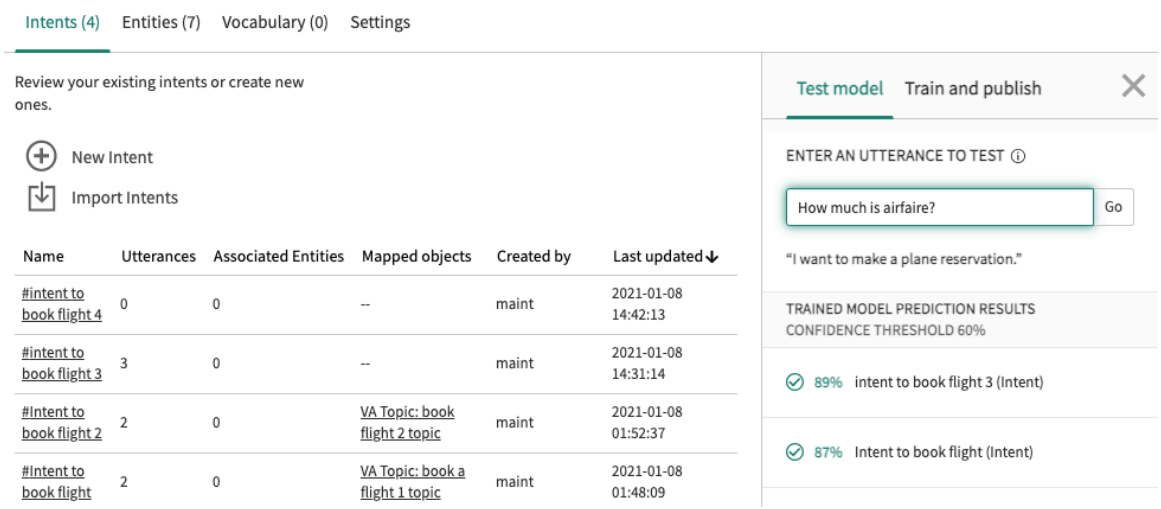

10. If the models fail to predict the intent, add additional intents to the model, or utterances to the intents, as described in step 6.

Using user search metrics with Virtual Agent

By using user search metrics with the Virtual Agent application, you can see your users' queries and the results from their searches. With these metrics, you can identify the areas where you can improve Virtual Agent to offer more meaningful search results.

Use the **User Search Metrics** tab in the Conversational Analytics dashboard to see the key details about the queries that your users searched on and their search results. By using this tab, you can get the answers to the following questions:

- Which search results were not useful to the users?
- Which queries did not have any search results?
- Which were the most common queries from users?
- Which search results did the users select most often?

Note:
You can also use Financial Services Remote Tables to view user-search data in Dashboards. For more information, see Remote tables.

To access the **User Search Metrics** tab, you must have the chat analytics admin role or the chat analytics viewer role. The following example shows the data included in the **User Search Metrics** tab.

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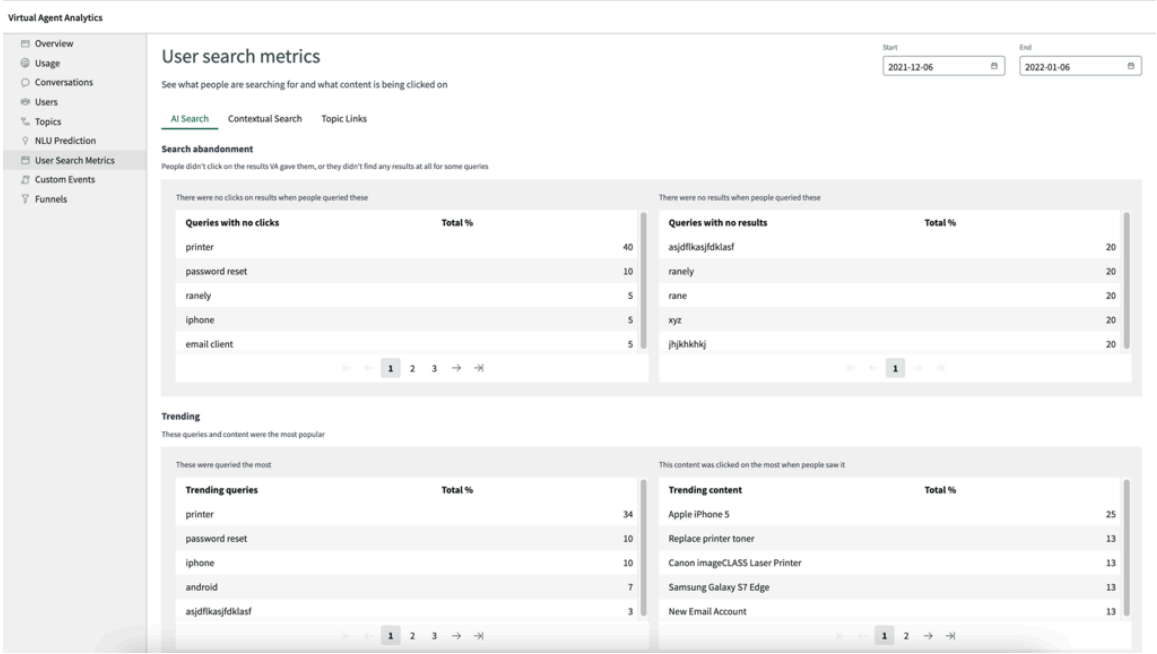
User Search Metrics tab



AI Search

Virtual Agent topics may use AI search to suggest helpful resources to the user. When a user enters a query, AI search provides the most relevant results by using intelligent query features. To know more about AI search, see AI Search . To integrate Virtual Agent with AI Search, see Improving the user experience with AI Search.

Contextual Search

Contextual search matches keywords to an existing database search to find potential matches to a query. Virtual Agent topics may use contextual search to resolve queries. For more information, see Maximizing code reuse with topic blocks.

Topic Links

Some Virtual Agent topics have links to useful resources that are embedded within them. When a user invokes one of these topics, the link shows up without having to do any back-end search.

User Search information

The following table describes the summarized User Search information that is visualized on the **User Search Metrics** tab.

User search data

Visualization	Description
Queries with no clicks	Queries that users did not click on any of the search results.
Queries with no results	Queries that did not yield any search result.
Trending queries	Queries that users most commonly asked.
Trending content	Search results that most users clicked on.

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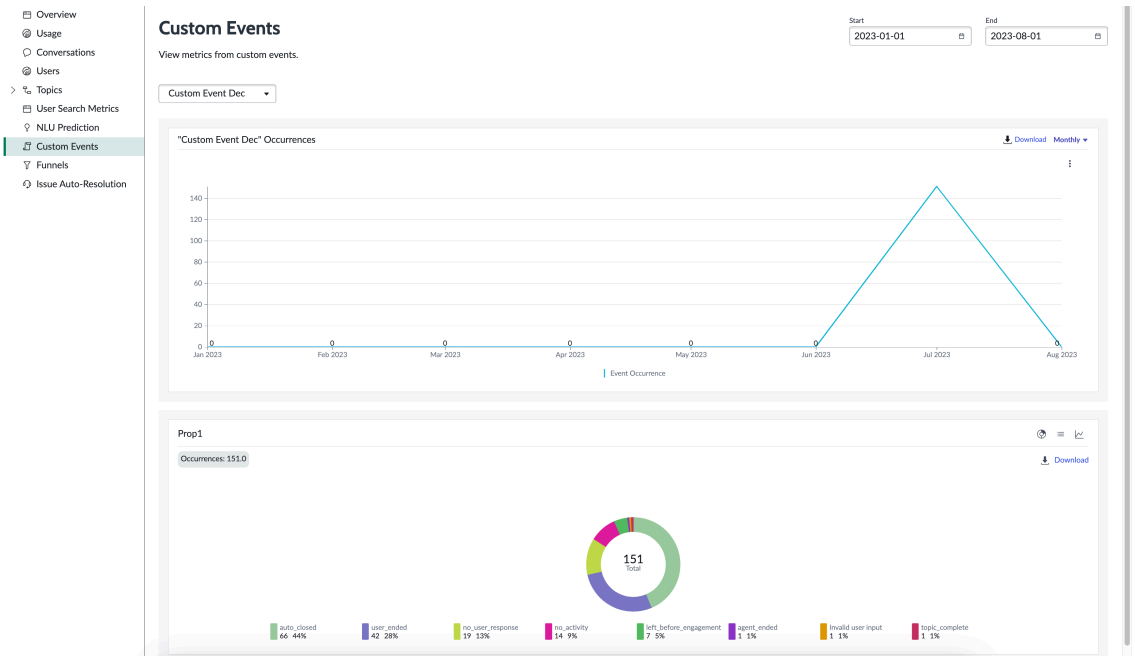
Custom Events tab

Use the Custom Events tab to see the list of custom events created for Virtual Agent.

To use the Custom Events tab, you must have the Chat Analytics Viewer (chat_analytics_viewer) role.



The Custom Events tab shows the dates when custom events were triggered. If no one created custom events, the list of custom events is empty. The maximum number of custom events displayed is 20.

Use the drop-down list to specify the custom event you want analytics for.

The graphics are unique for each custom event. For more information about them, consult the person who created the custom event.

Funnels tab

Funnels provide cumulative filtering of conversation flows. Using funnels, you can identify whether your conversation flows are performing effectively when users chat with Virtual Agent.

Funnels page



Funnels demo Watch this video for an overview of Funnels.

Overview of funnels

Funnels filter conversation flows using steps that are defined when a user creates the funnel.

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A funnel can contain up to 10 filtering steps for a conversation flow. Each subsequent step further refines the results from the previous step. This type of cumulative filtering helps you to easily narrow down on the data of interest at each step of the conversation flow.

When you run a funnel for a particular date range, the system displays the following metrics that show the number of users at each step:

- The percentage and number of users who have used the specified conversation flow.
- The percentage and number of users who proceeded to the next conversation step specified in the funnel.
- The percentage of users who dropped off at a particular conversation step.
- The percentage and number of users who completed all specified conversation steps in the flow.
- The biggest drop-off point or step where users left the conversation flow.

Each step in a funnel consists of the following:

- Field: The item on which the step is evaluated.
- Operator: A list of operators that is contextually generated based on the selected field.
- Value: A text entry field or a list that is contextually generated based on the selected field.

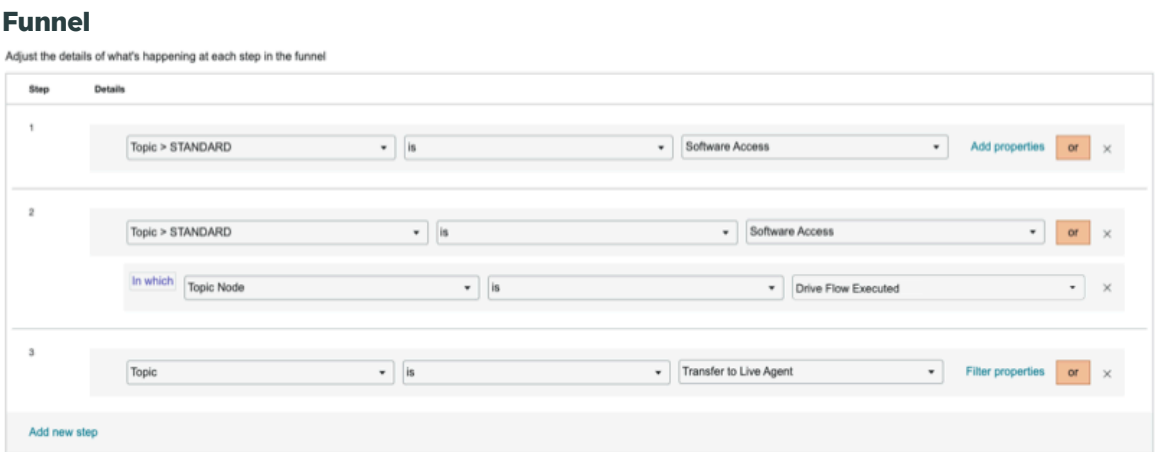
For more information about filtering options in steps, see Filter options in funnels.

Use case for funnels

Consider an example scenario where an admin has to get insights about how Virtual Agent is handling user queries in a conversation flow. To review the efficiency of the conversation flow, the admin might look for information such as the following:

- What percentage or number of users have interacted with Virtual Agent.
- Out of the users who interacted with Virtual Agent, what percentage or number of users have followed a specific node in the topic during the conversation.
- Out of the users who used the specific node, what number of users requested for a transfer to a live agent.

For example, see the following funnel for fetching metrics on a conversational flow that provides software access.



Here, the funnel has three filtering steps:

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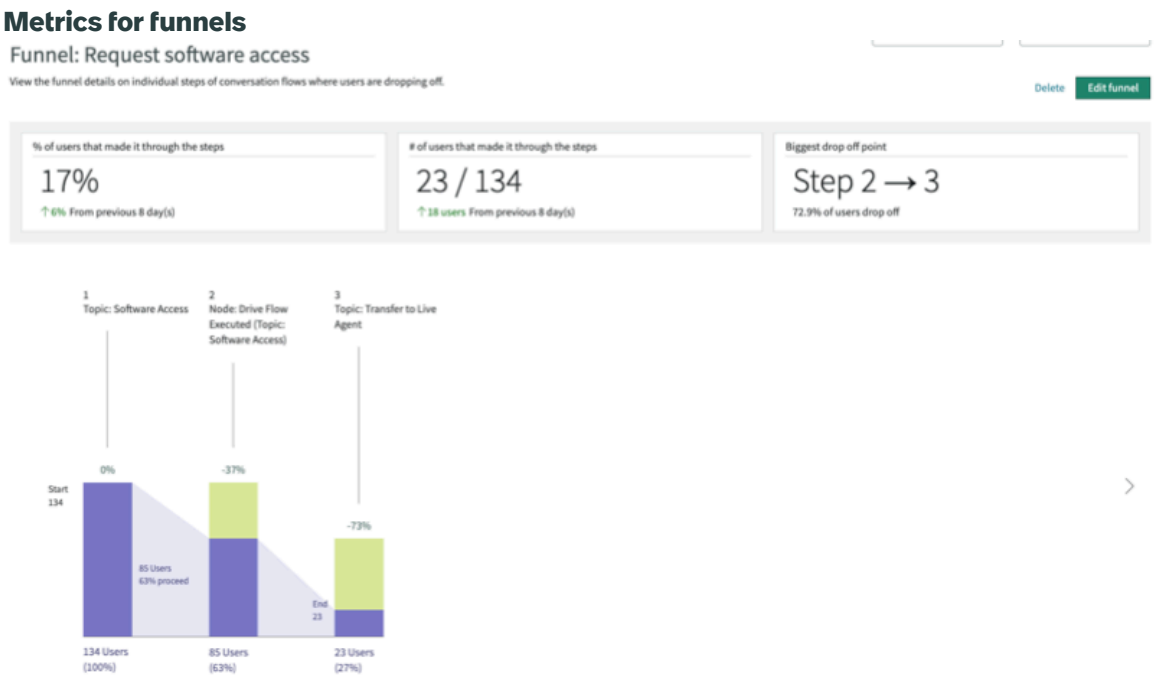
- Step 1 fetches users who have followed the **Software Access** topic while interacting with the Virtual Agent.
- Out of the retrieved users from step 1, step 2 fetches users who requested for a drive access in the **Drive Flow Executed** node.
- Out of the retrieved users from step 2, step 3 fetches users who requested transferring to a live agent.

Metrics for funnels

Using Funnels, you can easily filter conversation flows and get information as metrics. Metrics indicate what percentage or number of users are active at each step of the conversation flow.

You can improve the conversation flows based on the performance metrics derived from using funnels. The metrics help identify opportunities for improving conversation flows so that Virtual Agent can handle your user queries better.

Using the previous example, that funnel displays the following metrics:



Here, the metrics indicate the following for the selected date range:

1. 134 users followed the Software Access topic.
2. Out of these 134 users, 85 users requested for a drive access.
3. Out of these 85 users, 23 users requested for transferring to a live agent.

These example metrics indicate an opportunity for improvement because 23 users requested for a transfer to a live agent.

Other benefits of using funnels

Users can create funnels to get insights on their conversation flows. Additionally, they can edit and delete existing funnels created by other users. For more information, see Create and manage funnels.

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You can compare the performance of previous and current conversation flows. Funnels show metrics for the specified date range. Additionally, it shows the comparison for the same number of days in the date range prior to the specified start date. You can know the increase or decrease in users who have made through all the steps.

Previous metrics



Create and manage funnels

Use funnels to review the performance of your conversation flows.

Before you begin

Role required: chat_analytics_viewer, virtual_agent_admin, chat_analytics_admin, or admin

About this task

You can create, edit, and delete funnels.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Conversational Analytics** > **Virtual Agent Dashboard**.
2. Click the **Funnels** tab.
3. Click **New funnel**.
   The Create a new funnel page appears.
4. In the **Give this funnel a name** field, provide a meaningful and short name for the funnel.

   Note:
   Funnel names must be unique, so provide a different name for each funnel.

5. To create steps for filtering the conversation flow, click **Add new step**.
   A funnel can contain up to 10 filtering steps. Each subsequent step further refines the results from the previous step. This type of cumulative filtering helps you easily narrow down on the data of interest in the conversation flow. For more information about the filtering options, see Filter options in funnels.
6. To define a step, click **or** and add an OR condition.

   If needed, you can do any of the following with your steps:

   - To remove an OR condition, click the delete icon ( ) next to it.
   - To reset a step, click the delete icon next to it.
   - To remove the step, click the delete icon again.
7. Click **Create funnel**.
   The metrics for the conversation flow appear. You can select a date range in the **Start** and **End** fields for reviewing the metrics.
8. **Optional:** To edit a funnel, click the funnel name on the Funnels page, and then click **Edit funnel**.
9. **Optional:** To remove a funnel, click the funnel name on the Funnels page, and then click **Delete**.

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Filter options in funnels

Use filter options for creating steps in funnels. You can create steps in funnels for cumulative filtering of a conversation flow.

Overview of filter options

You can define each step depending on your data of interest in the conversation flow. For more information, see Funnels tab.

A step consists of the following:

- Field: The item on which the step is evaluated.
- Operator: A list of operators that is contextually generated based on the selected field.
- Value: A text entry field or a list that is contextually generated based on the selected field.

The field options are listed in the following table:

Field options

Option	Description
Conversation start (1st)	New users who had a conversation with Virtual Agent.
Conversation start (Any)	All users who had conversations with Virtual Agent. This option includes all users regardless of the number of times the users have interacted with Virtual Agent.
Events	Events that are triggered in a conversation.
Topic	List of all topics that were used in the conversation flow. The list of topics can be refined further to these topic types: • Setup topics: List of topics that provide basic conversational flows such as the conversation greeting or closing. • Standard topics: List of topics only and not topic blocks or pre-built topics. • Topic blocks: List of topic blocks only. **Note:** When a funnel contains topics that were modified, for example, nodes were added or removed, after the funnel was created, the funnel does not consider those changes. You have to create a new funnel to account for those changes.

Issue auto-resolution tab

The **Issue auto-resolution** tab helps you understand how well your Virtual Agent (VA) chatbot anticipates user needs. It displays information about the number of user issues intercepted by the auto-resolution service and resolved by VA.

Issue auto-resolution takes place when a user is diverted to VA from a non-conversational interface. For example, a user might request a new keyboard through a service portal or email. The auto-resolution service can detect the user request and use VA to resolve the user's request in a VA chatbot session. For more information, see Auto Resolution for Virtual Agent.

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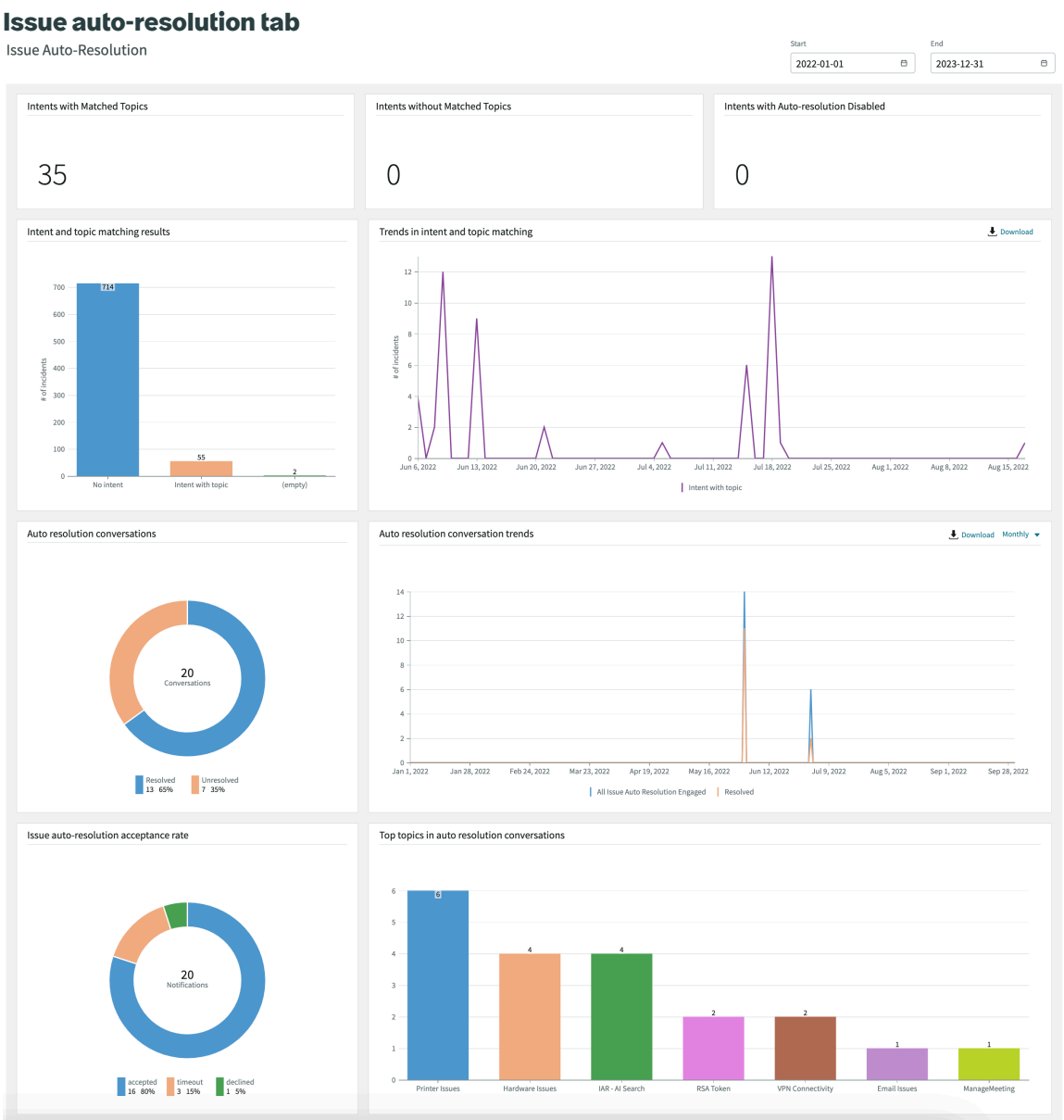
The data visualizations in the **Issue auto-resolution** tab displays how well the auto-resolution service is working. This tab is available only when Issue Auto Resolution is enabled and the **Auto Resolution Configuration** record is set as active.

To access the **Issue auto-resolution** tab, you must have the chat analytics admin role or the chat analytics viewer role.



Selecting the data or pointing to the data in the visualizations displays additional information about the data.

Auto-resolution visualizations

Visualization	Description
Intents with Matched Topics	Number of intents that match topics enabled for auto-resolution.
Intents without Matched Topics	Number of intents that do not have matching topics.

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Auto-resolution visualizations (continued)

Visualization	Description
Intents with Auto-resolution Disabled	Number of intents that match topics not enabled for issue auto-resolution.
Intent and topic matching results	Breakdown of incidents by intent matching. For example, incidents with matching intents and topics, and incidents without matching intents.
Trends in intent and topic matching	Trend showing incidents that have intents with or without matching topics.
Auto resolution conversations	Issue auto-resolution conversations that were resolved and unresolved. Resolved means incidents are in the resolved state after the users interacted with VA.
Auto resolution conversation trends	Usage trend showing all the issue auto-resolution conversations and how many incidents were successfully resolved.
Issue auto-resolution acceptance rate	Shows the issue auto-resolution notifications that were accepted and declined by users.
Top topics in auto resolution conversations	Frequently used topics in auto resolution conversations.

Conversational Analytics dashboard reference

Reference topics provide descriptions about the Conversational Analytics dashboard roles and system parameters to configure the dashboard.

Conversational Analytics dashboard roles

Conversational Analytics dashboard is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Virtual Agent administrator [virtual_agent_admin]

Provides read and write access to all dashboard-related tables, for example, sys-conversation.

Contains Roles

List of roles contained within the role.

- chat_analytics_admin
- ui_builder_admin
- chat_analytics_viewer

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Chat analytics administrator [chat_analytics_admin]

Provides access to view dashboard-related tables, create custom events, create custom formula overrides, reconfigure the dashboard using UI Builder, and set system parameters.

Contains Roles

List of roles contained within the role: chat_analytics_viewer.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

UI builder administrator [ui_builder_admin]

Enables you to add, remove, and rearrange dashboard contents. Needs UI Builder, which is a separate ServiceNow product.

Contains Roles

List of roles contained within the role.

- workspace_admin
- canvas_user

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Chat analytics viewer [chat_analytics_viewer]

Provides read access to view the dashboard.

Contains Roles

List of roles contained within the role: sn_ace.ace_user.

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Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

System parameter configuration

Use system parameters to configure some of the Conversational Analytics Dashboard.

Use the following system parameters to reconfigure Conversational Analytics Dashboard functionality. You must have the role, Chat Analytics Admin.

Dashboard system parameters

Functionality	System parameter	Description
Debug	sn_ci_analytics.logging.verbosity	Set this parameter to "debug" to see the debug logs for conversational analytics. The setting makes the logs verbose with debug information.
Reasons	sn_ci_analytics.ca.reason_max	Sets the maximum length of reason strings. The default is 1000 characters.

Virtual Agent reference

Reference topics provide descriptions about the Virtual Agent Designer interface components and technical details to learn more about scripting methods, Natural Language Understanding system entities, and the Virtual Agent Interactions table.

Virtual Agent Designer interface reference

The Virtual Agent Designer interface lets you create, modify, test, publish, and localize topics, topic blocks, and custom controls.

Virtual Agent Designer provides the following views. Some tabs may not be available, depending on how you configured your instance or the type of topic you are working with.

- Virtual Agent Designer Topics page
- Create a topic form
- Topic Properties tab
- Topic Flow tab

  The topic Flow tab contains the following elements:
  - Virtual Agent Designer controls
  - Virtual Agent Designer user input controls
  - Virtual Agent Designer bot responses
  - Virtual Agent Designer utilities
- Topic NLU Intent tab (visible if the topic type is NLU)
- Topic Languages tab

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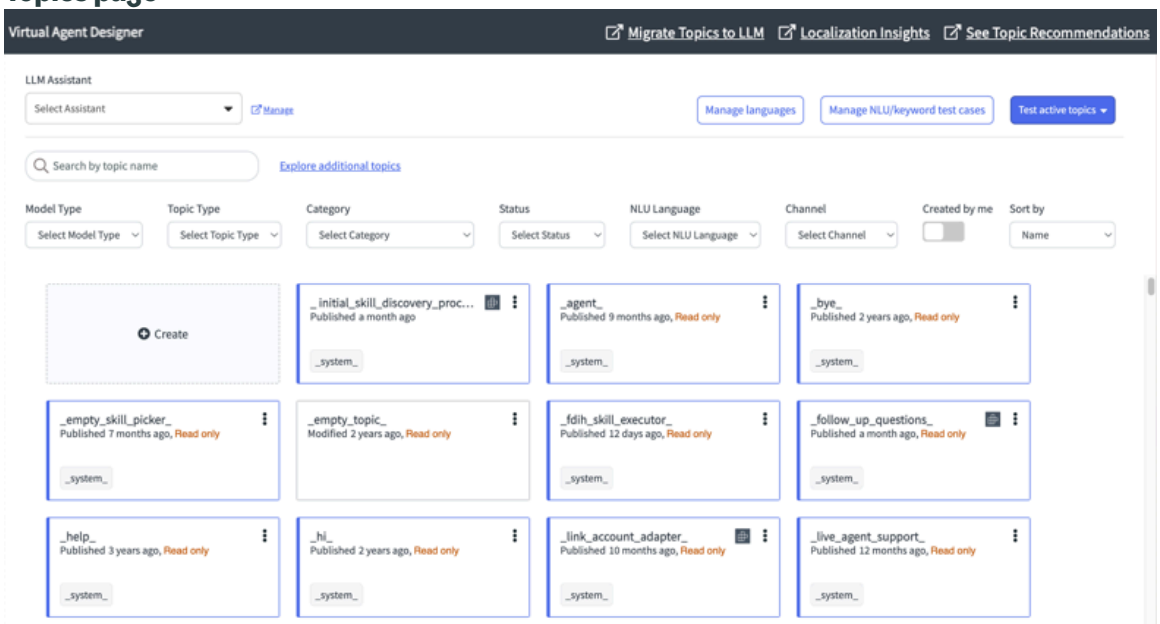
Virtual Agent Designer Topics page

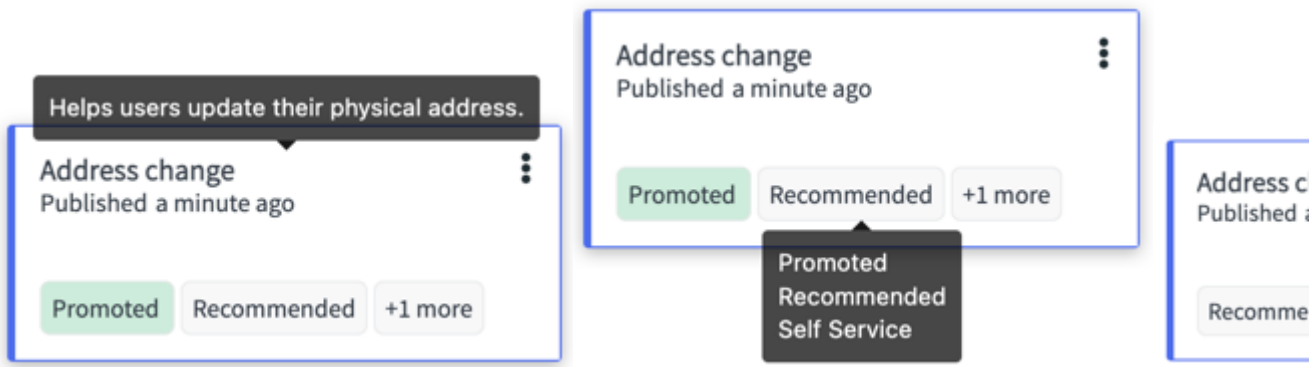
The Virtual Agent Designer Topics page lists all objects in your instance. These objects include topics, topic blocks, custom controls, setup topics, and small talk topics.

Topics page



Topic cards

Each topic is represented by a card on the topic page. A description of the topic (from the Properties tab) appears when you hover on the title, and all categories are shown when you hover on the list of tags. Options to promote or demote (if it uses LLM topic discovery) or delete the topic appears when you hover on the Topic actions (⋮) icon. For more information, see Promote or demote Virtual Agent LLM topics



Filters and options in the Topics page

Field	Description
Migrate Topics to LLM	Button that opens the NLU to LLM topic migration workflow. For more information, see LLM topic migration.
Localization Insights	Button that opens the Localization Insights dashboard. It shows reports of topics with their translation statuses. For more information, see Localization Insights dashboard.

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Filters and options in the Topics page (continued)

Field	Description
See Topic Recommendations	Button that opens Topic Recommendations (if installed). Review recommendations and manage jobs. For more information, see Using Virtual Agent Topic Recommendations.
LLM Assistant	Filter that lets you view objects associated with a large language model (LLM) assistant. If a topic block or custom control isn't associated with an LLM assistant, but is called by a topic that's associated with an LLM assistant, those objects appear in this filtered LLM assistant view. Nested topic blocks or custom controls don't appear in the filtered view unless they're directly associated with an LLM assistant. If you select an LLM Assistant, the **Manage languages** and **Manage *NLU*/keyword test cases** options disappear from the Topics page. This option is only visible when Now Assist in Virtual Agent is installed. For more information, see Configuring Now Assist in Virtual Agent. **Tip:** Either a **Settings** or **Manage** option appears next to the **LLM Assistant** filter. **Settings** appears if there is a specific LLM assistant selected in the **LLM Assistant** filter and **Manage** appears if no assistant is selected in the filter. Use this option to quickly navigate to the Conversational Interfaces guided setup area to review or update your LLM assistants.
Manage languages	Button that opens the Manage languages page. You can view the localization status of an NLU model and request translations for the model and related topics. This field is available only when NLU discovery is enabled on the instance.
Manage NLU/keyword test cases	Button that opens the Manage test cases page, where you can manage automated testing for Virtual Agent topics. For more information, see Automated testing for Virtual Agent topics that use NLU topic discovery.
Test Active Topics	Button that opens the chat test window, which runs active topics in the Virtual Agent web client. This option becomes a drop-down menu only when Now Assist for Virtual Agent is installed. The drop-down menu options specify which types of topics you want to test: • **Test NLU/keyword topics** • **Test LLM topics** **Note:** Topics must be associated with the Now Assist in Virtual Agent LLM assistant prior to testing from the Topics page. For more information about this assistant, see LLM assistants. Use this feature to test and verify that your active topics work as intended.
Search by topic name	Option for finding a topic that matches the name or search string that you enter.

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Filters and options in the Topics page (continued)

Field	Description
Explore additional topics	Link that opens the All prebuilt topics page, which shows prebuilt topics that are available when you activate their dependent spokes or plug-ins. For more information, see Virtual Agent Designer All pre-built topics page.
Model Type	Filter that displays either NLU/Keyword or large language model (LLM) topics. If this option is cleared, both topic types are displayed. This option is only visible when Now Assist in Virtual Agent is installed. For more information, see Configuring Now Assist in Virtual Agent.
Topic Type	Filter for displaying Virtual Agent objects: • **Topics**: Lists only topics (and not blocks or custom controls), including prebuilt topics. • **Topic Blocks**: Lists prebuilt and custom topic blocks. • **Setup Topics**: Lists topics that are basic conversational elements, such as the conversation greeting or closing. • **Small Talk Topics**: Lists topics that serve as casual conversations between the bot and end users, where the bot answers questions generally not related to the original task or issue. • **Custom Controls**: Lists custom controls that represent custom components used in a conversation. By default, the Topics page lists all active (published) and inactive (in development) objects, unless you use filters to list only certain object types.
Category	Filter that displays a list of topics belonging to a category that you specify. A category is a label that identifies a group of objects, such as setup topics or prebuilt topics for a particular business application. You can also define your own custom categories. For details, see Create or modify custom categories.
Status	Filter that displays a list of objects by their state: • **Active**: Display only published objects • **Inactive**: Display only objects in development
NLU Language	Filter that displays only if you're using multi-language NLU models. Lists Natural Language Understanding (NLU)-enabled topics by the language that you select. Enable the languages for the NLU service in NLU settings. This field is available only when NLU discovery is enabled on the instance.

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Filters and options in the Topics page (continued)

Field	Description
Channel	If other channels are configured for the instance, filter that lists topics by the channel (chat client) that you select. The default channels for Virtual Agent are the web chat client and the messaging integrations for Slack, Microsoft Teams, Workplace, and Facebook Messenger. Your instance may have other channels, such as SMS that were created using custom chat integrations.
Created by me	Option that, when enabled, displays only the topics that you created.
Sort by	Filter that displays topics by the sort filter that you select: • Name: Specified topic or object. • Updated time: Recently updated topics. • Promoted Topics: Topics promoted by an LLM assistant. This sort filter option is only available if an LLM assistant is selected in the **LLM Assistant** filter.
+ Create	Option that opens the Properties page to create a topic or topic element and define the topic properties.
Topic actions (⋮)	Button that opens a drop-down menu with the following options: • **Promote topic**: Adds a `Promoted` flag to the topic when you select an **LLM Assistant** to associate with the topic. The option is deactivated and a tool tip appears when you try to promote any of the following: ◦ Setup topics ◦ Topic blocks ◦ Small talk topics ◦ Unpublished topics ◦ Topics with no LLM Assistant selected ◦ Saved but unpublished topics with an LLM Assistant associated ◦ [store-future: BEGIN review]The LLM Assistant has reached the maximum number of associated topics[End] ◦ Any NLU/Keyword topics **Note:** You can promote NLU topics in Conversational Interfaces settings, under **Virtual Agent Custom Greetings and Setup**. for more information, see Configure a Virtual Agent chat experience • **Demote topic**: Replaces the **Promote** option in a promoted topic, to remove the `Promoted` flag. • **Delete topic**: Opens a confirmation dialog box to delete the topic.

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Filters and options in the Topics page (continued)

Field	Description
	For more information, see Promote or demote Virtual Agent LLM topics and Delete a Virtual Agent topic.

Virtual Agent Designer All pre-built topics page

When you install pre-built conversations, such as ITSM Virtual Agent, some topics may not appear on the Topics page unless you install their dependent plugins. This page shows the additional topics that are available.

For more information about ITSM pre-built topics, see ITSM Virtual Agent.

Explore all pre-built topics page

Field	Description
Topic	Name of the topic. If its Status is Available to use, select the topic to open it in the conversation builder.
Documentation	Link to related ServiceNow documentation for the topic, if available.
Dependencies	The plugins that are needed to use the topic. Select a dependency to go to its documentation and learn how to install it. **Note:** Some plugins may require the admin role to install.
Status	Value denoting whether you need to install a spoke or plugin, or if the requirements are met and the topic is available to use.

Create a topic form

The Create a topic form is used to set the properties for a new conversational topic for Virtual Agent.

The Create a topic form layout is similar to the Edit topic properties form layout found in the Topic Properties tab.

Note:
Large language model (LLM) topics are faster and easier to set up and configure compared with NLU topics. The LLM model type doesn't need you to select, configure, or train models or intents. For more information, see LLM topic discovery in Virtual Agent.

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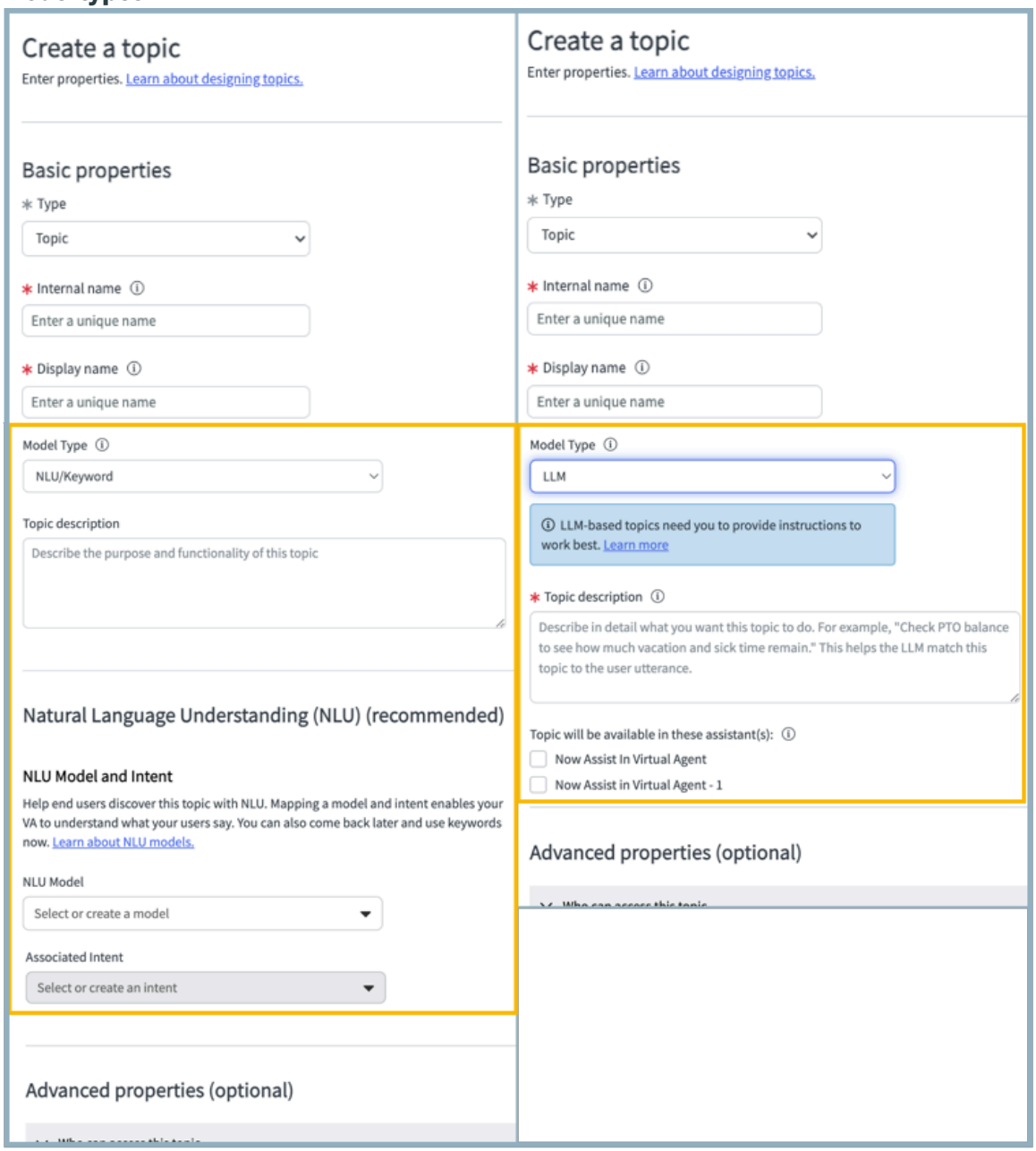
Example of the Create a topic form compared between NLU/Keyword and LLM model types



Field	Description
Type	List of objects that you can create. Select **Topic**.
Internal name	Internal name for topics, small talk topics, and setup topics that reflects its business purpose. Internal name displays on the Virtual Agent Designer Topics page and must be unique across the platform.
Display name	Topic name that displays to users when they interact with Virtual Agent. Display name must be unique for either NLU/Keywords or LLM model type.
Model Type	The **LLM** value is used for topic discovery within LLMs, and the **NLU/Keywords** value is used for either keyword or NLU discovery. For more information, see LLM topic discovery in Virtual Agent.

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Field	Description
	Note: If this field doesn't appear, ensure that both the Now Assist panel and Now Assist in Virtual Agent are turned on. For more information, see Turn on the Now Assist panel and Configuring Now Assist in Virtual Agent.
LLM topics [LLM topic discovery only]	
Topic description	A detailed explanation of the LLM topic's purpose to differentiate it from other topics. For example: `Help users see how many vacation days they have left.`
Topic will be available in these assistant(s)	The LLM assistant that you associate with the topic for more accurate topic discovery. If you associate a topic block and a related topic with the same LLM assistant, both are shown as associated with that assistant. When you add an LLM assistant or remove one from your topic, the topic reverts to unpublished. When you associate an LLM topic with an LLM assistant and publish it, a record for the association is created in the Profile and Document Mapping [sys_cs_document_context_profile] table. If you dissociate the Setup topic from the LLM assistant before republishing, the record is deleted. For more information, see LLM assistants.
Natural Language Understanding (NLU) topics [NLU/Keywords topic discovery only]	
Topic description	Brief explanation of the topic purpose and functionality. If you use single quotes (' ') in your description, do the following to avoid problems with your conversation: 1. Navigate to **All**, then enter `sys_properties.list` in the filter. 2. Search for and select `glide.ui.escape_all_script`, then set its value to **True**.
NLU Model	Natural Language Understanding model to be mapped to the topic. The model contains the user utterances that are associated with the trained intents and entities. This combination enables your bot to understand what a user says. Do one of the following: • Choose an existing model. • Select **Create Model** to create a new model group. 1. In the **Model Name** field, enter a name for the new model group. 2. In the **Intent name** field, accept the default value or enter a name for the new intent. **Note:** New models are created in **Draft** state.

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Field	Description
	Tip: To see how and where the NLU model is used, navigate to **NLU Workbench** > **Models**, and sort on the **Created for** column.
Associated Intent	The intent, when recognized by Virtual Agent, that launches this topic. If you specified or created a model, the intent is required. Do one of the following: • Choose an existing intent. • Select **Create intent** to create a new intent. In the **Intent Name** field, accept the default value or enter a name for the new intent. **Note:** This option is not available for read-only models.
Enable DialogActs	Toggle switch (active by default in new topics) to enable Virtual Agent to detect when a user modifies utterances or applies updates in an NLU model, and dynamically reacts to unexpected utterances and modifications. Slide this toggle to the off position to prevent users from using the keyboard instead of the options available in the topic. For more information, see Dialog Acts for Virtual Agent. **Note:** This toggle is decoupled from the topic switching option found in all User Inputs aside from Grouped Choice and File Picker. It's available for all topic types aside from a Topic Block. This feature is currently available only for English.
Confirm modified values with users	Toggle switch to enable Virtual Agent to send a confirmation message to the user when the Virtual Agent detects a value change. This value is Active by default. **Note:** This toggle appears when **Enable DialogActs** is activated.
Advanced properties (optional)	
Who can access this topic	
System Roles	Roles that a user must have to view and run the topic. If a topic is public (available to users, including guest users, who aren't authenticated in the ServiceNow platform), select only the Public role.
Channels	Chat clients in which the topic or topic block will run. These channels are different from the default channels that are natively supported by Virtual Agent. Your instance may have additional channels for custom chat integrations created for it. For more information about channels, see Deploying Virtual Agent topics in other channels.
Context	Expression logic to specify a condition for presenting this topic to users. The condition must evaluate to true. You can set this field using either the condition builder or a script.

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Field	Description
	• **Condition**: Use the condition builder to add or edit conditions. • **Script**: Use the script editor to create or edit a script that contains a condition statement.
Live agent	
Live agent context variables	Live agent context variables that are defined in the General Chat Settings. Select the variables that provide dynamic context, which means information from the Virtual Agent chat. This information is transferred from the bot conversation to the live agent. For information about the default list of live agent variables, see Live agent chat context variables.
Available for Agent Autopilot	Toggle switch that determines whether the topic is available to a live agent. When enabled, an agent can search for and invoke the topic. For details, see Conversation Autopilot. Applicable to only keyword or NLU topic discovery.
Additional	
Resume flow after topic switching	Toggle switch that lets the user return to the original conversation after changing topics during a conversation. Applicable to only keyword or NLU topic discovery. Not applicable to Small Talk topics.
Categories	Label used to identify and group-related topics, topic blocks, or custom controls.
Keywords [NLU/ Keywords topic discovery only]	List of key phrases or terms that users enter to initiate the conversation with the Virtual Agent. Press **Enter** after each phrase. Keywords are also used for languages that are currently not available in NLU.

Topic Properties tab

Use the **Topic Properties** tab to identify a topic and how it's used. You can control who uses the topic and what channels it can run in.

The properties that you can specify depend on the method of topic discovery.

Two methods are available in Virtual Agent Designer: Large Language Model (LLM) or Natural Language Understanding (NLU).

For example, if you enable NLU in Virtual Agent settings, the topic **Properties** tab includes fields for identifying the NLU model and intent for the topic.

For a complete description of topic properties, see Create a Virtual Agent topic.

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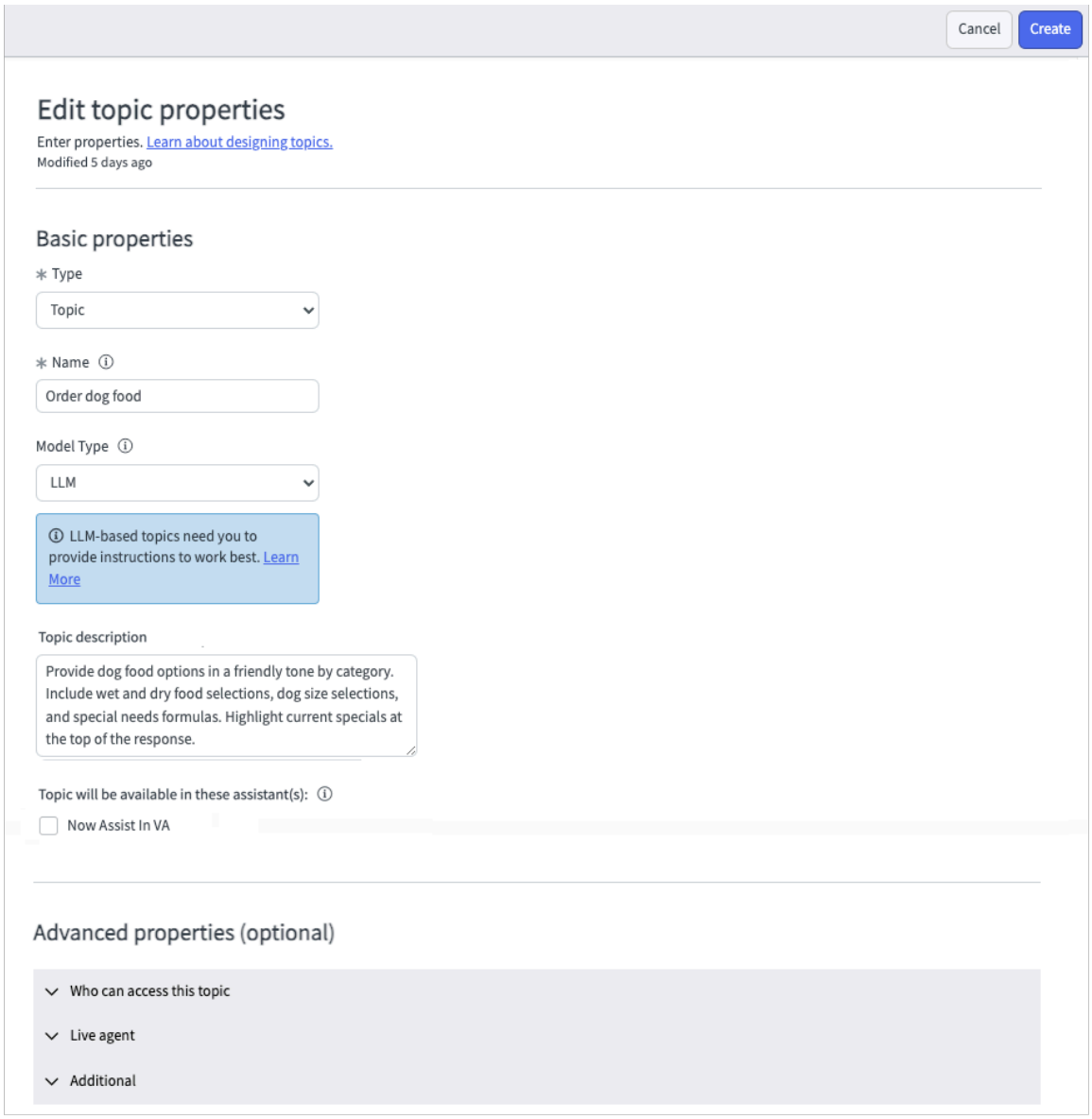
Topic Properties tab with LLM topic discovery



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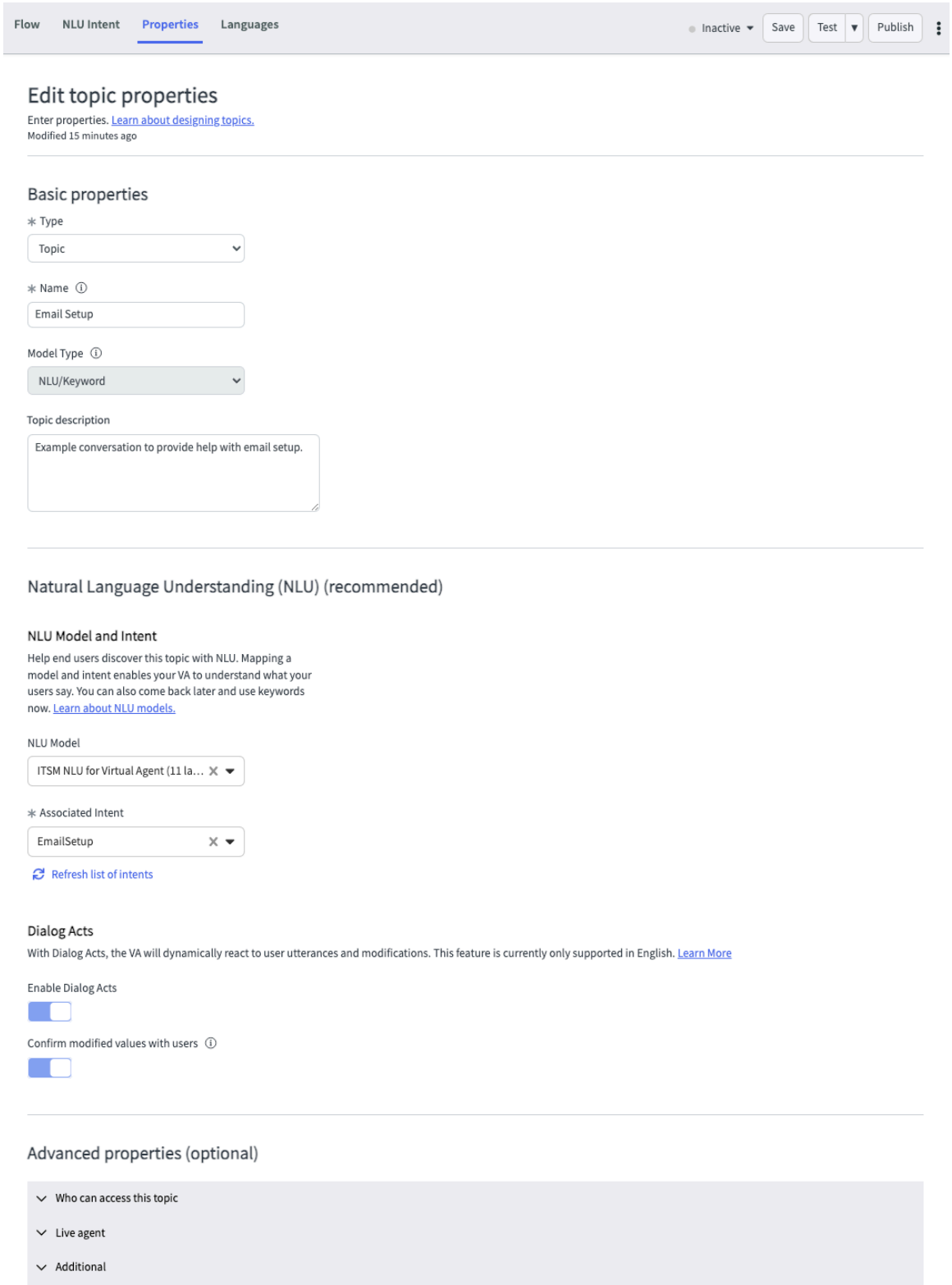
Topic Properties tab with NLU topic discovery



Topic Flow tab

Use the topic **Flow** tab to build the conversation flow. Use the controls for user inputs, bot responses, and utilities to define the flow.

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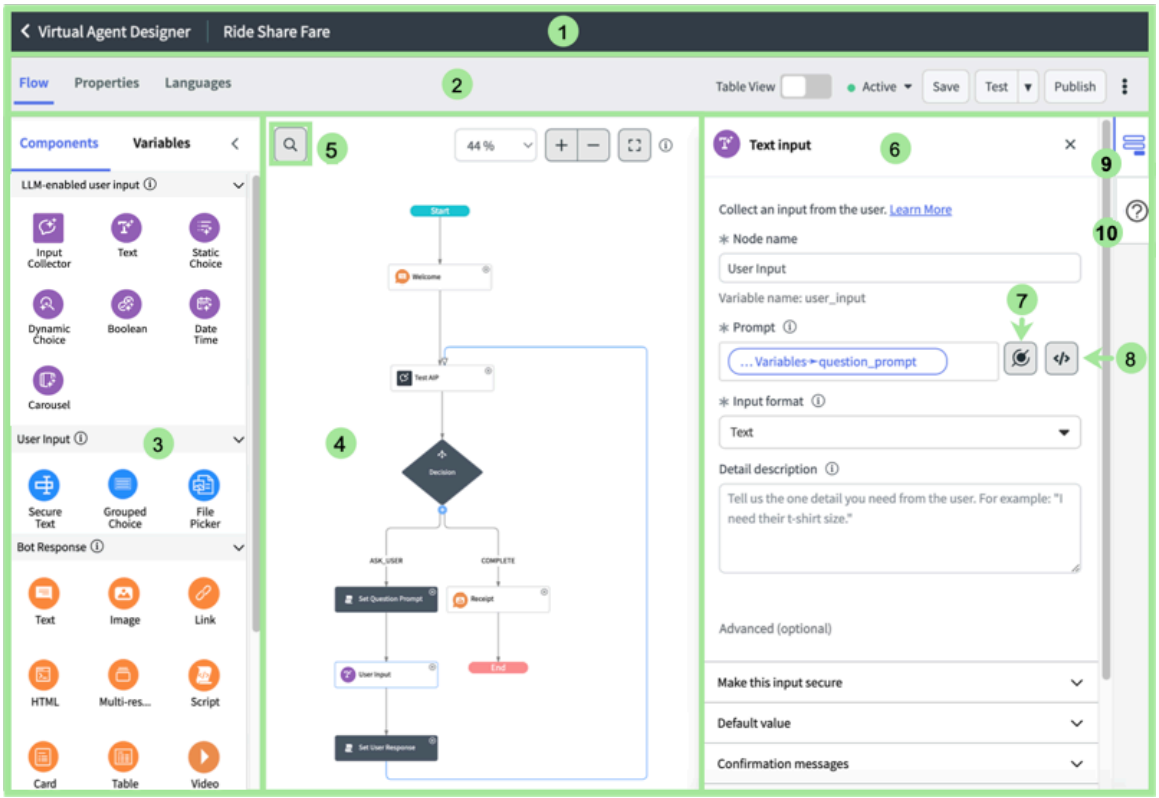
Flow tab (default view)

Example Flow tab in the default view



Legend (default view)

Feature	Description
1. Navigation bar	Breadcrumbs to navigate from your design back to the Topics page. When updating designs, a message in the corner indicates the status of the design. For example, a message might indicate that you have unpublished changes for your topic or Natural Language Understanding (NLU) language mappings.

2. Topic header bar	Tabs and design options for your topic:
	• Tabs: Each tab provides a different view for working on your conversation.
	  ○ **Flow**: Displays the canvas for building your conversation flow.
	  ○ Topic NLU Intent tab (NLU topics only).
	  ○ Topic Properties tab.
	  ○ Topic Languages tab (available if multiple languages are configured for Virtual Agent.
	  For more information, see Localizing Virtual Agent conversations.
	• **Table View**: Option that displays a table view of the nodes in the conversation flow. You can use this option to switch

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Legend (default view) (continued)

Feature	Description

	between table view and diagram view as you design your conversation.
	• **Active/Inactive**: Option that changes the design state so that it's active (available to users) or inactive (in development and not available to users). Select it to see the following options:
	  ○ **Included in Topic Discovery**: Option to make the topic discoverable via keywords, NLU, or Now LLM Service. If inactive, the topic is included when performing search fallback.
	  ○ **Included in List of Topics**: Option to make the topic visible under the "show me everything" list of topics.
	• **Save**: Saves the current design.
	• **Test**: Opens the design in a chat test window so that you can preview and test the conversation. If the Now Assist panel or Microsoft Teams is configured for your environment, preview options for those channels display in the Test button list. Select **Preview in Now Assist panel** or **Preview in Microsoft Teams** in the list to test your topic in those environments.
	• **Publish**: Activates the design and makes it available to the chat clients. If you're using language-specific NLU models, select **Review and publish** from the Publish list to specify languages.
	• More actions on topics icon ( ).
	  ○ **Duplicate**: Copy the current design to create an unpublished version of the design.
	  ○ **Delete**: Remove the current and published version of the design.

3. Palette	Collapsible sidebar with **Components** and **Variables** tabs. The **Components** tab shows a list of controls that you can drag onto the canvas to build a conversation. The following types of controls are available: • User Input: Controls used to prompt and capture information from the user in a conversation. When Now Assist is enabled and you're working with a large language model (LLM) topic, the LLM-enabled User Input section indicates which controls are LLM compatible. • Bot Response: Controls for showing Virtual Agent responses in a conversation. • Utilities: Controls for performing actions within a topic, such as running a script, adding different conversation paths (branches) in a topic, or adding topic blocks. The **Variables** tab includes inputs and scripts. **Input section**

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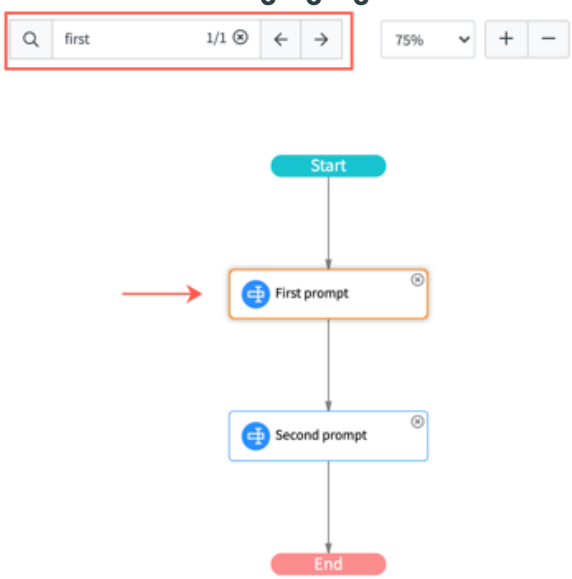
Legend (default view) (continued)

Feature	Description
	• Live agent variables specified on the topic **Properties** tab to provide contextual information from the Virtual Agent session to the live agent. • Input variables defined by User Input controls and Utilities that are added to the flow on the canvas. • "Nodeless" NLU entities added by the topic author that are used as slot-filled input variables for the topic. **Script section** The Script section includes the scripts found in nodes on the canvas. The topic author can add further script variables to store values outside of control variables. Scripting variables enable more complex scripting scenarios.
4. Canvas	Area that displays the conversation flow graphically. As you drag a control onto the canvas, that control becomes a node in the conversation flow. The canvas includes a related property sheet that opens in a pane when you select a node. Each flow has a **Start** and **End** node. When you add or remove controls, the layout of controls on the canvas is adjusted automatically.
5. Node search	Option for quickly finding specific nodes in the conversation flow. Select the node search icon ( ) to expand the search field and enter the name of the node that you want to find. When a matching node is found, the node is highlighted in the flow. Use the arrows next to the search bar to go to the previous or subsequent node that matches the search node name. **Node search showing highlighted node** 
6. Property sheet	Properties specific to the selected node on the canvas. The list of properties changes based on the node you select. Each

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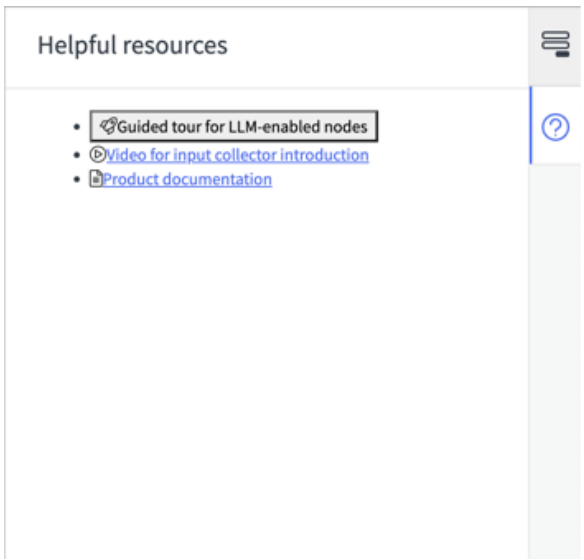
Legend (default view) (continued)

Feature	Description
	node has its own set of properties that you can define, which can include scripts that control the behavior or processing that is performed in the node. If NLU is enabled, the property sheets for Input controls contain additional NLU fields. For further information, see Virtual Agent Designer controls.
7. Data pill picker	A tool for selecting data pills from input variables or script variables to use in the property field. Select the data pill picker to select from the existing variables accessible in the topic. You can also drag data pills directly into property fields.
8. Script editor	A tool for adding or editing JavaScript scripts used in a property. Provides scripting assistance, including a list of valid elements at the insertion point. Elements include function names, object names, and variable names available for the topic. For more information, see the JavaScript syntax editor.
9. Property sheet tab	Opens the property sheet view for the currently selected node on the canvas.
10. Resources tab	Opens the Helpful resources view, containing resources including Guided tours on the canvas, and links to videos for LLM-enabled nodes and product documentation. 

Flow tab with the Table View enabled

Most of the functionality of the **Flow** tab is the same in the Table View. The following figure and table highlight the differences.

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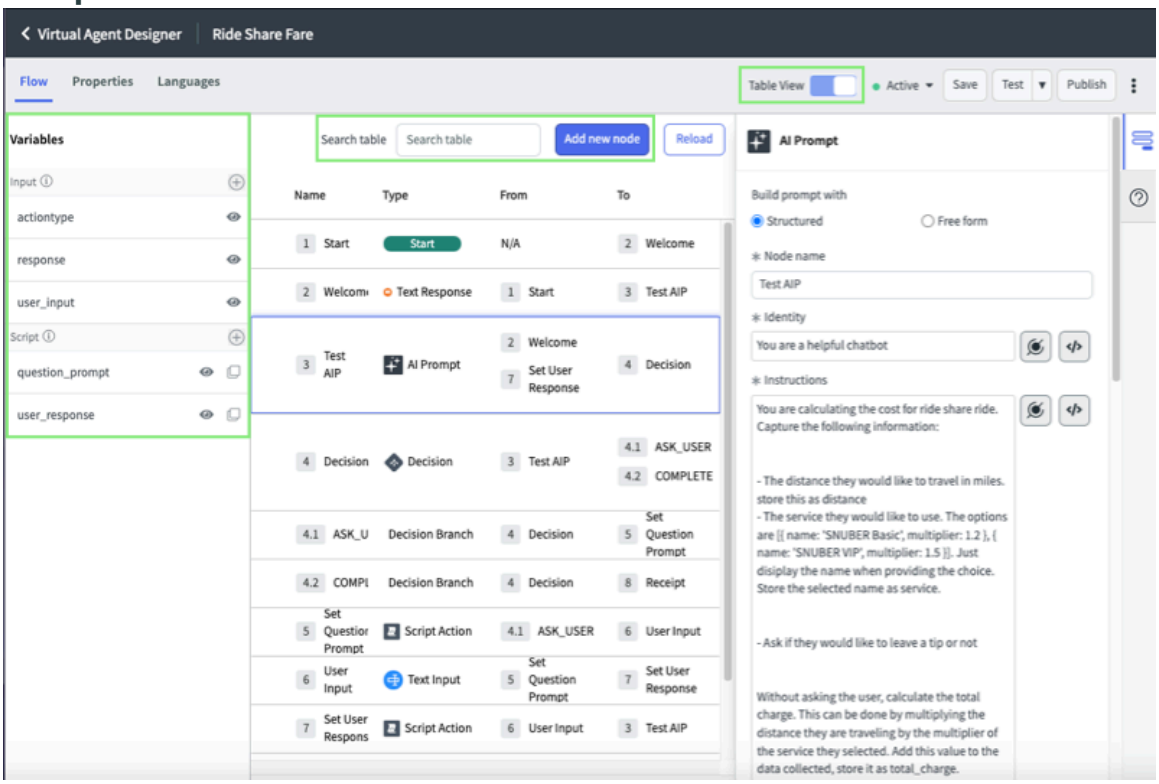
Example Flow tab in the Table View



Legend (Table View)

Feature	Description
Palette: Variables sidebar	The **Components** tab is not shown. Only the Variables sidebar is visible.
Table view	A list of table rows, where each row corresponds to a node in the conversation flow. You can add nodes in this section. When you add or remove nodes, the table rows adjust automatically. A node can be any of the following controls, aside from the **Start** and **End** nodes: • **User Input**: Controls used to prompt and capture information from the user in a conversation. • **Bot Response**: Controls for displaying Virtual Agent responses in a conversation. • **Utilities**: Controls for performing actions within a topic, such as running a script, adding different conversation paths (branches) in a topic, or adding topic blocks. Select **Add new node** to add a node. You can specify the type of control in the dialog box.
Search table	Option for searching nodes in the conversation (table).

LLM components guided tour

When you create or open an LLM topic, a dialog box appears and displays an option to take a guided tour of the LLM-enabled components in Virtual Agent Designer. Select the close icon (✕) to close the window or **Start guided tour** to be shown the various components. To stop

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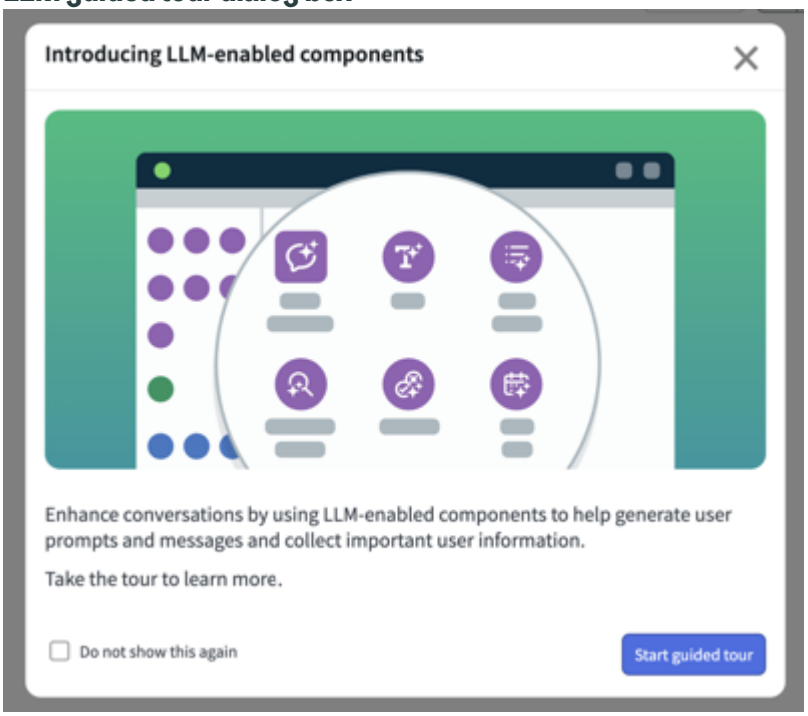
seeing the dialog box open each time that you open an LLM topic, select **Do not show this again** before closing the dialog box or starting the tour. To restore the dialog box, navigate to **All** > **sys_cb_user_preference_list.do** and set the value for *LLM_INTRO_MODAL_ENABLED* to `true`. You can also take a tour by selecting **Guided tour for LLM enabled nodes** on the **Helpful resources** tab.

LLM guided tour dialog box

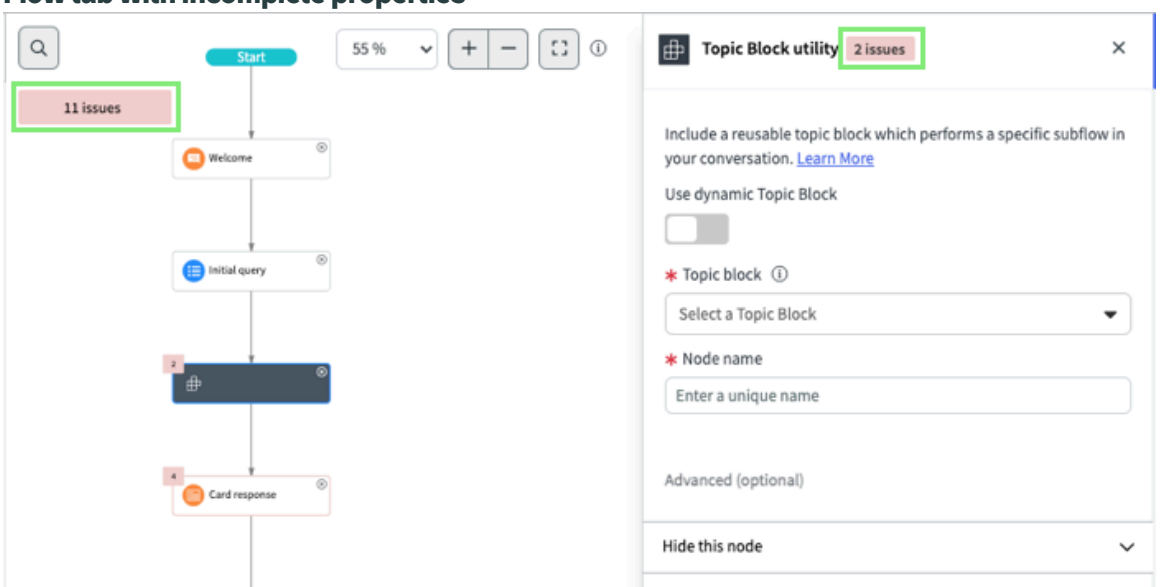


Incomplete property warnings

Controls on the canvas have required properties. If required properties are missing, Virtual Agent Designer displays the total number of missing required properties and the controls that are missing them. All incomplete warnings must be addressed to test or publish the topic.

In the following example, the topic is missing two required properties. Two nodes are affected, and each is missing one property. The Text response node is missing the Message response.

Flow tab with incomplete properties



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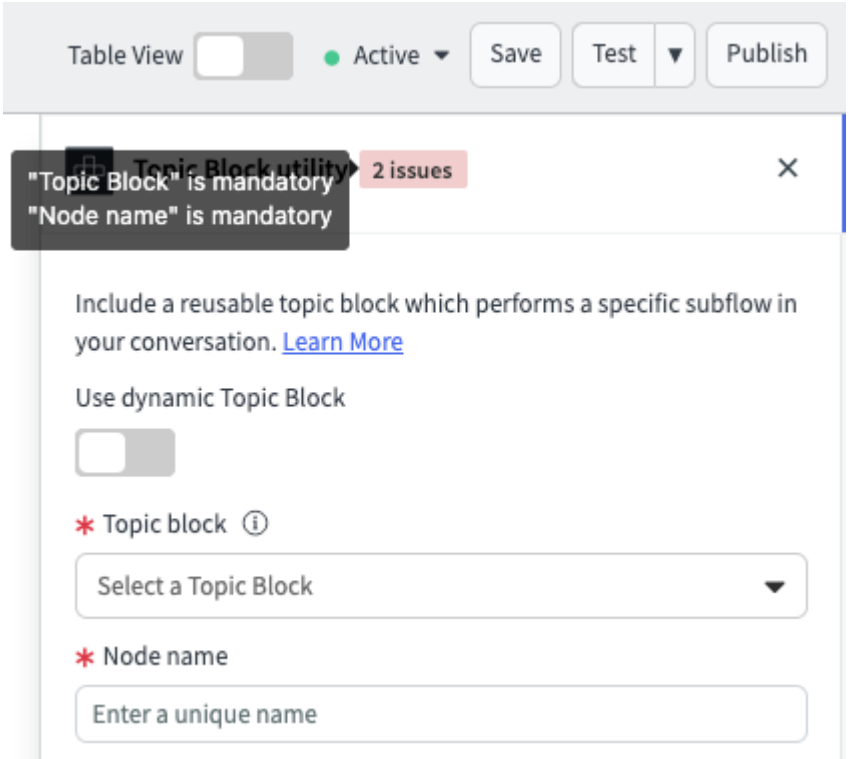
Point to the incomplete message to see a tooltip that describes what is missing.

Select the message to get more information



Topic NLU Intent tab

You can edit and refine ServiceNow NLU models from within Virtual Agent Designer. When a conversation topic is bound to an associated NLU model and intent, use the **NLU Intent** tab to review and edit utterances and associated entities.

If your topic uses NLU discovery, the topic **NLU Intent** tab appears on the Virtual Agent Designer interface. Test your topic to see the prediction results for topic discovery and the corresponding confidence scores for the results. Depending on the results, you can modify the associated utterances and entities in the NLU model for your topic intent.

Utterances tab

Use the **Utterances** tab to perform the following tasks.

Using the Utterances tab

I want to...	Do this
Add an utterance	Use the **Add** field to enter an utterance for an intent. Each utterance must be unique and contain fewer than 200 characters.
Edit an utterance	Select the Edit icon next to the utterance.
Duplicate an utterance	Select the Copy icon next to the utterance.
Move an utterance	Select the Menu icon, and then select **Move this utterance to another intent**.

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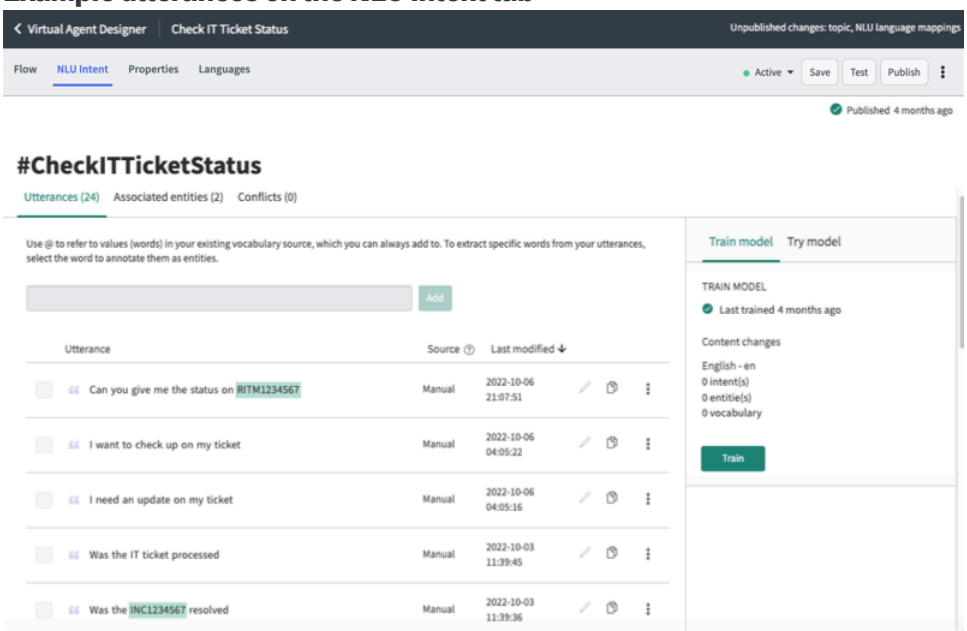
Using the Utterances tab (continued)

I want to...	Do this
to another intent	
Delete an utterance	Select the Menu icon ⋮, and then select **Delete this utterance**.
Define a new entity	**1.** Select a word in an utterance to use as an entity. **2.** In the Create New Entity picker, select the type of entity to be created, such as a simple or system-derived entity. For information about the types of entities that you can define, see NLU entities. For information about system entities, see NLU system entities. When you add an entity, it is also displayed in the **Associated Entities** tab.

Example utterances on the NLU Intent tab



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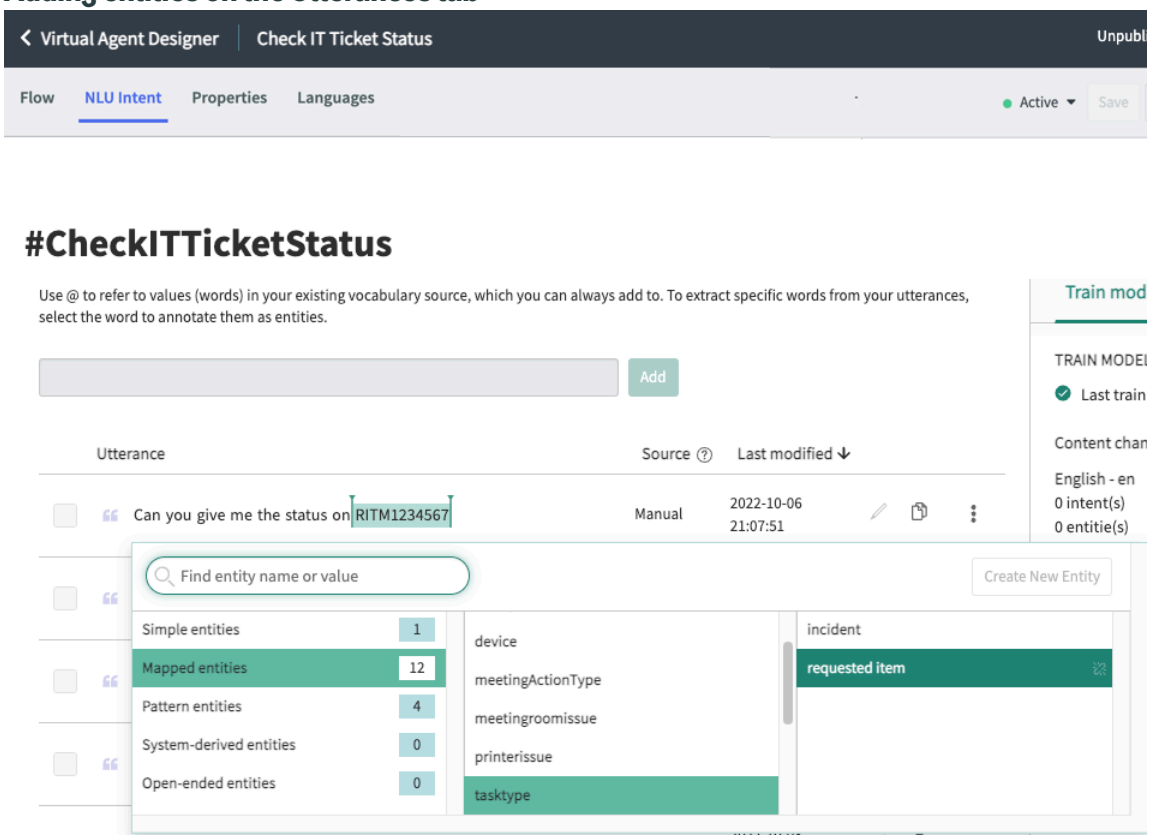
Adding entities on the Utterances tab



Associated Entities tab

Use the **Associated Entities** tab to view the entities defined for the intent. Select the name to view the utterances that the entity is associated with.

Entities defined for an intent named UpdatePhoneNumber



You can also associate system entities, such as date and time, with an intent. For more information about supported system entities, see NLU system entities.

Conflicts tab

Use the **Conflicts** tab to view conflicts among your intents. For example, if two different intents use the same utterance, this will appear as a conflict in both Virtual Agent Designer and

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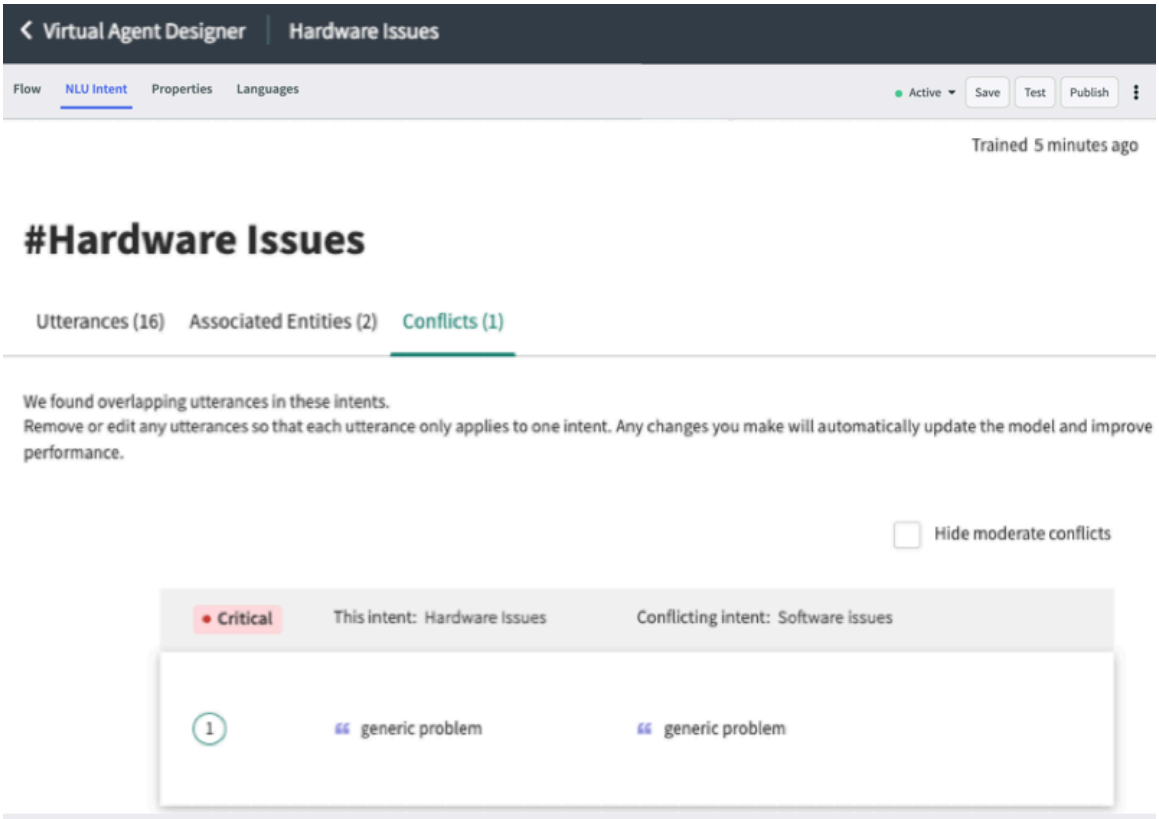
NLU Workbench. Identifying and resolving conflicts improves the effectiveness of NLU topic discovery.

Utterance conflict between two intents



Topic Languages tab

Use the **Languages** tab to view the topic's translation status for languages that have been activated in Virtual Agent. If NLU is enabled on your instance, you can also view model mappings for each language.

Some features on the Languages tab require the appropriate localization roles. For more information, see Localization roles for Virtual Agent.

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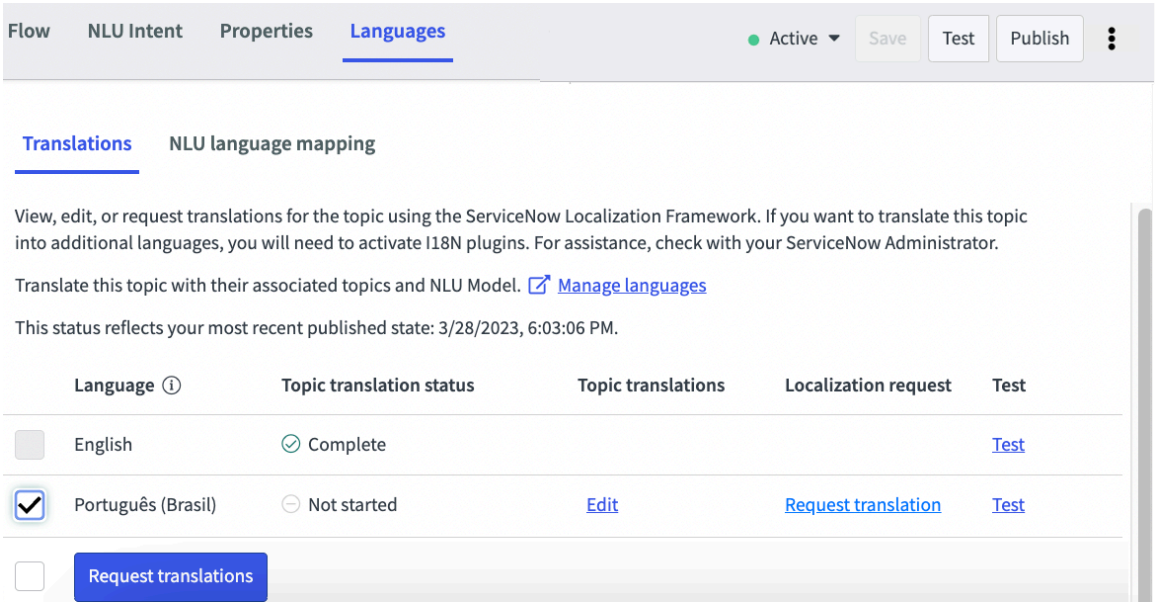
Translations tab

Example Translations tab



Translations tab columns

Column	Description
Language	List of available languages in Virtual Agent. Only installed languages are displayed (the language plugins are activated). If a language appears as unavailable, it means the language plugin is installed, but it has not been activated in Virtual Agent settings or in the Localization Framework. For more information, see Configure Natural Language Understanding in Virtual Agent and Languages table.
Topic translation status	Indicates translation status: • **Complete**: Topic is completely translated • **Partial**: Topic is partially translated • **In progress**: Translation is in progress • **Not started**: Translation has not begun • **Needs publishing**: Topic is unpublished or in Draft state The ServiceNow platform provides translations for interface features and pre-built topics, so languages may display as partially translated.
Topic translations	Depending on the state of the localization process and your role, you can either view the current content for the language, or you can edit the language content. Only users with the Localization editor [localization_editor] role can edit translated content.
Localization request	Click **Request translation** to create a Localization Framework task. Translation will begin depending on how the flow was set up in the Localization Framework.

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Translations tab columns (continued)

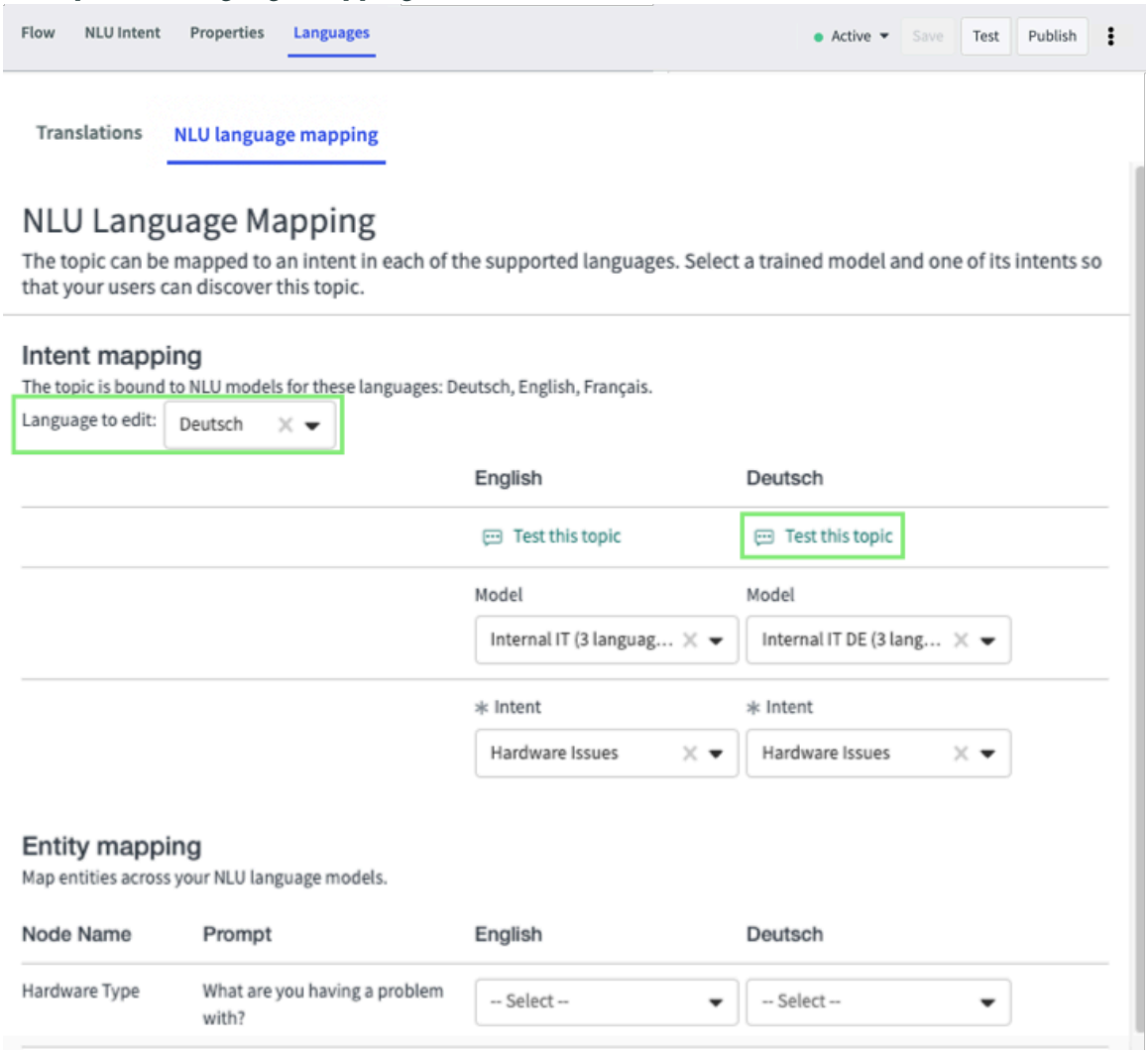
Column	Description
	If translation has already begun and you have the Localization fulfiller [localization_fulfiller] role, click **View requested item** to view the task.
Test	Click the link to test the topic in a particular language.

NLU language mapping tab

If you've enabled NLU on your instance, you can view or modify the topic mappings on this tab. You can also map your entities and test the translated topic here.

Note:
Unless you're using legacy, single-language models, all secondary languages in a topic must be mapped to the same model group. In most cases, changing the mapping for one secondary language will change the mappings for all secondary languages in the topic. For more information, see NLU model mapping in Virtual Agent Designer.

Example NLU language mapping tab



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Virtual Agent Designer controls

A Virtual Agent topic consists of a collection of controls within a topic flow. Use these controls to collect, process, and present information to your users. Controls can also read, create, and update records on your instance.

Each set of controls performs specific functions in a conversation flow.

Control types

Category	Description
Start segment	Appears automatically in a topic flow and cannot be added to or removed from a conversation. This control can be configured with a greeting response that appears when a conversation begins.
End segment	Appears automatically in a topic flow and cannot be added to or removed from a conversation. This control can be configured with a final confirmation message before the end of a conversation. Ensure that all branches of your topic eventually connect to this control.
User Input	Prompts and captures information from the user in a conversation.
Bot Response	Displays bot responses in a conversation.
Utilities	Handles actions and logic within a topic, such as running a script or adding different conversation paths (branches) in a topic. You can also use them to call automated Flow Designer workflows.

For controls that have prompts, messages, default values, or confirmation messages, you can enter any of the following input values:

- Text strings
- Data pills
- Strings with embedded data pills
- Scripts that return strings

Data pills

Use data pills to quickly and easily add dynamic information to your controls without using a script. Click the data pill icon ( ) to open the data pill picker interface. In this interface, you can select data from script variables and from input variables set by your User Input controls.

Using data pills enables you to quickly and easily access the data in your variables. In contrast, scripting provides more complex options, like handling translation. The following examples illustrate how to use a text bot response that includes the name of the customer, handled both as a data pill and a script.

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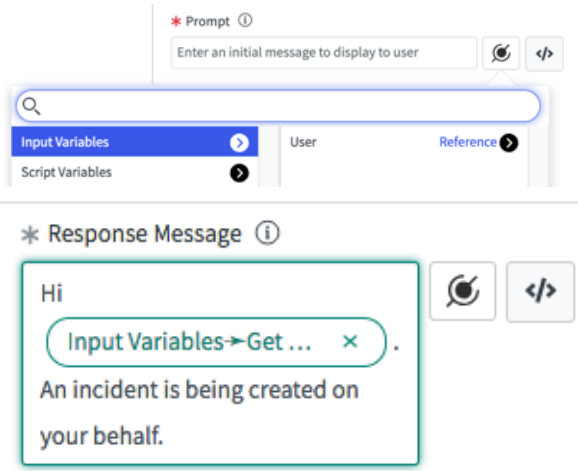
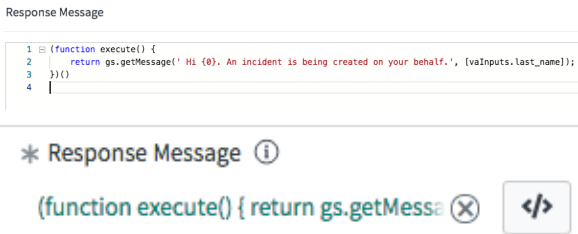
Data pill and scripted responses

Method	Result
Data pill	
Script	

The first example uses the data pill selector to choose **Get Name**, an input variable that contains the name of the customer. The second example accomplishes the same thing using a script. The script example also uses `gs.getMessage` to handle translating the message.

Hide or skip this node (condition property)

Almost all controls have a condition property. The exceptions are the Decision utility and the Start and End nodes.

In user input controls, the condition property determines whether the control is used or skipped in a conversation. To always use the control, leave the condition field empty. To determine the conditions under which the control is used, do one of the following:

- Create a condition using the condition builder interface, which lets you add data pills to specify conditions built using this interface.
- Provide a script for the condition property that returns a value of true or false. If the return value is false, the control is not used and the conversation will continue to the next control along that branch of the topic.

Use conditions to make your conversations more dynamic based on context, data, or scripted logic.

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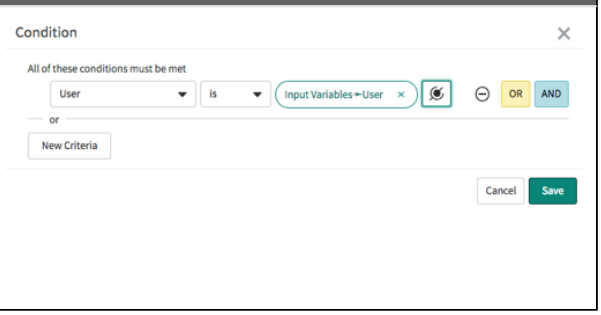
Scripted condition	Condition builder condition

Sample script for conditionally showing the node:
`(function execute() {`
`  var gr = new GlideRecord('incident');`
`  return gr.canCreate();`
`})()`
	

In this example, a condition script returns a value of true if the current user is able to create incident records. This condition prevents a utilities control from creating an incident when the user does not have permission to do so.

Virtual Agent Designer user input controls

Use the collection of input controls provided by Virtual Agent Designer to prompt and capture information from the user in a conversation.

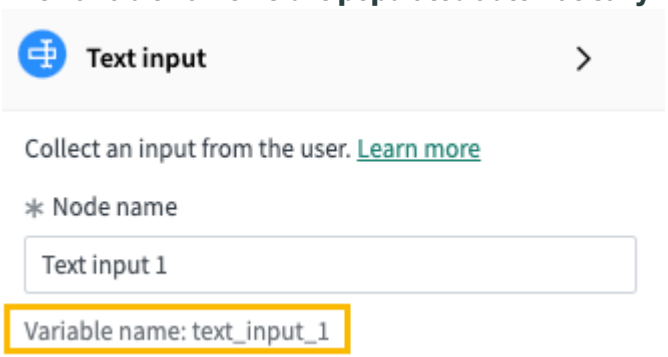
Common input control properties

In addition to data pills and condition controls, each input control has the following common properties:

Input variable for the user response

Each control stores the user response in an input variable that is accessible from other controls within the same topic using the `getValue` and `getDisplayValue` methods. The variable name is based on the name that you assign to the input control. For example, if you assign the name `First prompt` to an input control, the variable name is `first_prompt`. The variable name is lowercase, with an underscore character instead of a space. For more information on these methods, see Virtual Agent scripts.

The Variable name field is populated automatically



Natural Language Understanding (NLU) entity properties

If NLU is enabled, the following properties are displayed in the property sheet for the **Text**, **Static Choice**, **Dynamic Choice**, **Boolean**, **Date Time**, and **Carousel** input controls. To view or enable these properties, go to the Advanced options section.

- **NLU entity**: The entity that corresponds to the input variable for the control. You select the entity from the list of entities associated with the topic intent, as defined in the NLU model that you're using for the topic. When Virtual Agent recognizes the entity value in user utterances and if the value meets the entity prediction confidence threshold, then Virtual Agent extracts the value. The value

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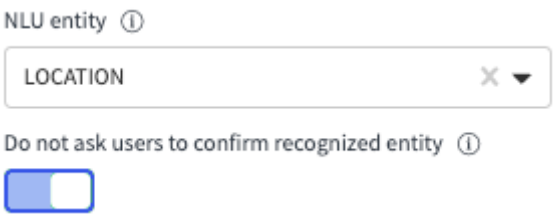
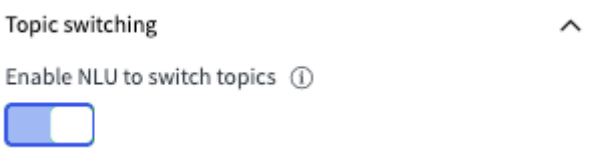
is stored in the input variable for the node. This storing action is called slot filling. Slot filling recognizes when multiple values for the same NLU entity occur in a conversation. Users are prompted with a list to confirm which node value to select when multiple nodes are tied to the same NLU entity. This property is available only for NLU topic discovery.

NLU entity property



- **Enable NLU to switch topics**: Enables NLU prediction for the node. If enabled, users can enter text to answer questions, regardless of the type of input control being used. Virtual Agent uses this utterance to match another existing intent, letting the user switch topics. To enable this property on a node, navigate to **Advanced options** > **Topic switching**.

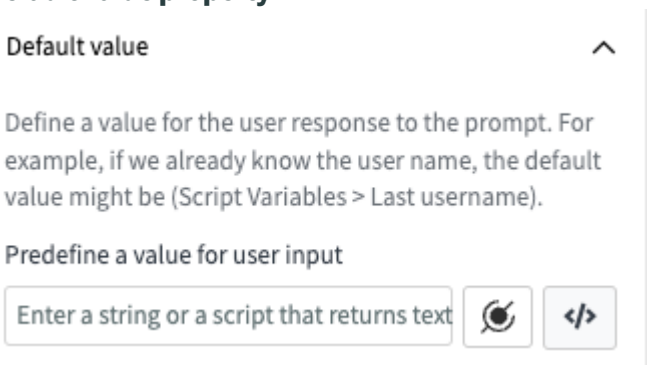
Enable NLU to switch topics property



Default value

An input prompt can have a preset value that you define. This value can be either a string or a script that returns a string. This property is in the Advanced options section.

Default value property



Confirmation messages

These bot response messages signal the end of the node interaction and ask the users to confirm their response. This property is in the Advanced options section.

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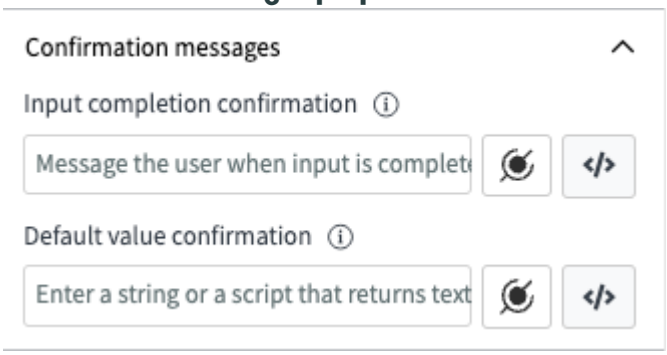
Confirmation messages properties



Input Collector user input control

Use the Input Collector control to gather data for use by Now Assist or other AI chat systems.

[store-future: BEGIN review]

Overview

For an overview of the Input Collector from a user perspective, watch this video.

Virtual Agent Designer Input Collector user input control video

[End]

Input Collector properties

The Input Collector is only available for topics that use large language model (LLM) discovery.

The Input Collector can hold up to 5 of any of the LLM-enabled user inputs aside from another Input Collector. Place multiple Input Collector nodes in sequence to collect more than 5 user inputs. You can reorder nodes inside the Input Collector on both the canvas and table views. To reorder nodes on the canvas, select a given node inside the Input Collector and drag it up or down in the list. You can add or remove nodes from an Input Collector, or nodes between multiple Input Collectors, by selecting a node and dragging it into or out of an Input Collector node on the canvas. To reorder nodes in an Input Collector in the table view, select a given node in the list, then select the up or down arrow next to the node.

Specify the flow action properties for the node that you want to create.

Property	Description
Node name	Name of the node.
Advanced	
Additional instructions for LLM	Further instructions to the LLM, such as adding data formats, restrictions, or default values for user responses. You can create additional instructions in plain language, input a script, or define conditions with the data pill picker.
Confirmation message	Toggle switch to display a summary of collected inputs to the user at the end of a conversation. If Summary message is activated, the Virtual Agent, when activated, presents the information that you have entered and asks if everything is correct. Select **Yes** to continue the chat or **No** to restart collecting user input. You can also reply by typing a response in the chat window, to confirm or deny the summary or to change your answer.

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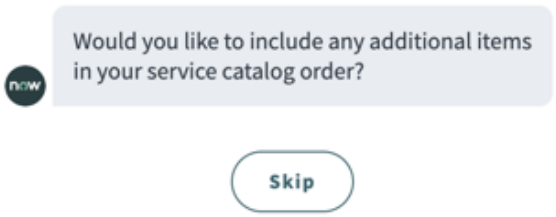
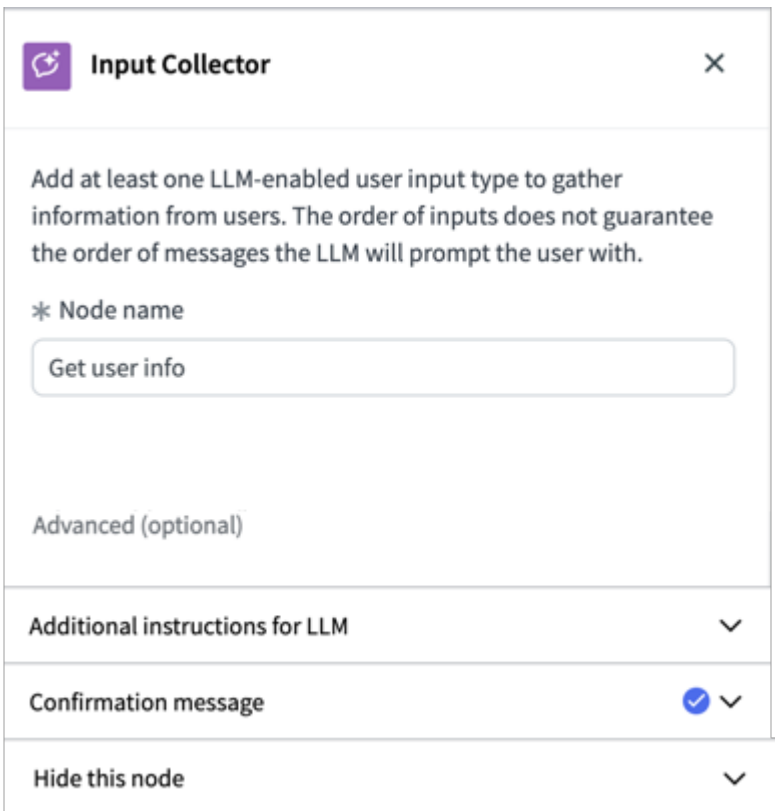
Property	Description
	This option is active by default, and shows an enabled icon when activated.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 

Example Input Collector



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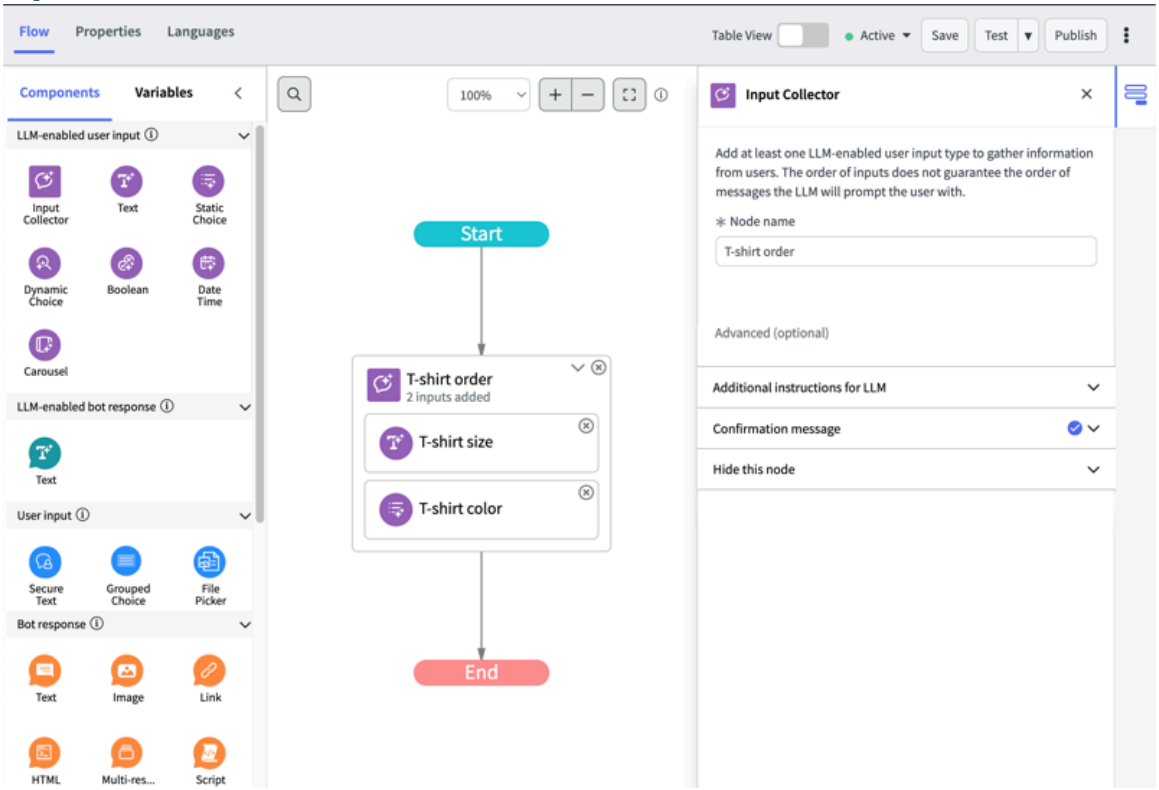
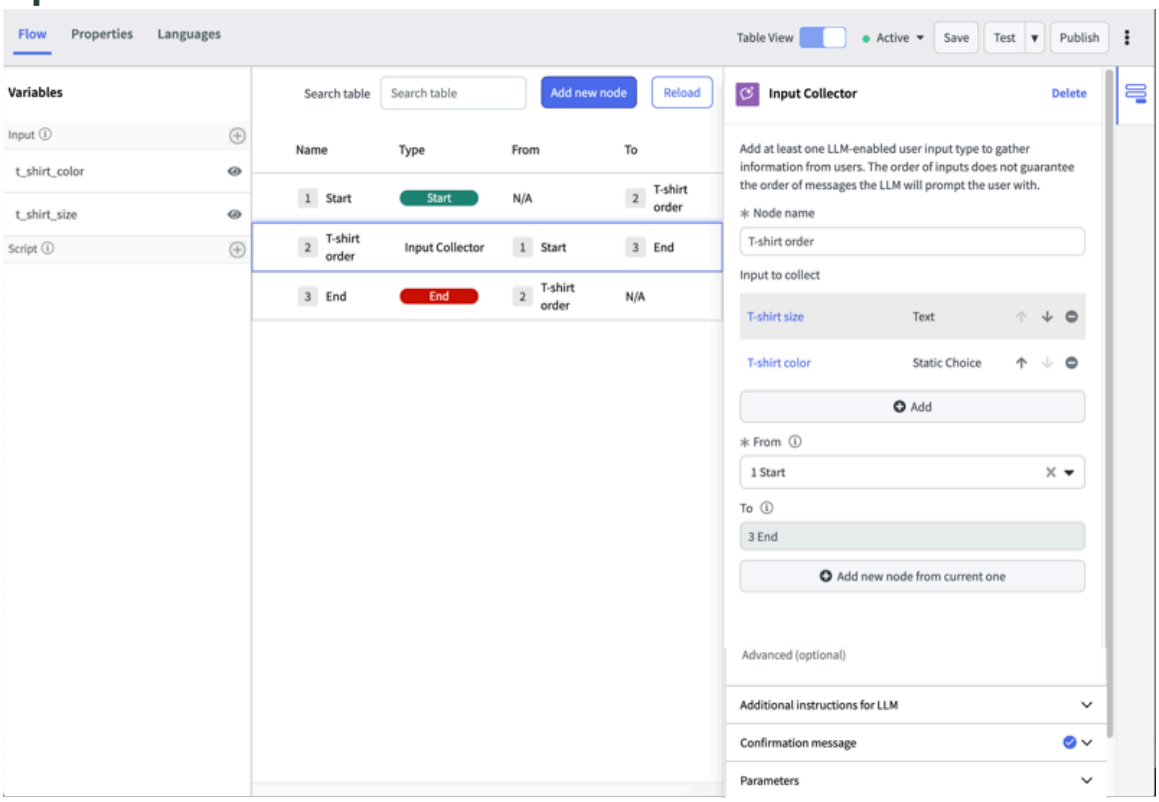
Input Collector canvas view



Input Collector table view



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Channel support

Channel support for the Input Collector control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Supported	None
Microsoft Teams	Supported	None
Slack	Not supported	Not applicable
Workplace	Not supported	Not applicable
Facebook Messenger	Not supported	Not applicable
SMS Twilio	Not supported	Not applicable
LINE	Not supported	Not applicable
WhatsApp	Not supported	Not applicable
Apple Messages for Business	Not supported	Not applicable
Alexa (Voice)	Not supported	Not applicable

Text user input control

The Text user input control in a Virtual Agent topic prompts the user for a text string.

Text user input control properties for LLM topic discovery

Property	Description
Node name	Name that identifies this Text user input control node in the topic flow.
Detail description	The one piece of information needed from the user. For example, `Ask the user which service catalog item they need.`
Input format	Text format that is validated when a user enters certain text items. If the user doesn't enter the expected format, an error message indicates that the format is not valid and asks the user to reenter the text. Choose the format of the text item to be validated: • Text: Any text string (no validation) • Email: Format that consists of an email prefix (user name), the @ symbol, and domain. • IP address (IPV4, IPV6): Data communication delivery format for Internet Protocol version 4 or version 6. • Phone number (E.164): Internationally recognized standard phone number format.

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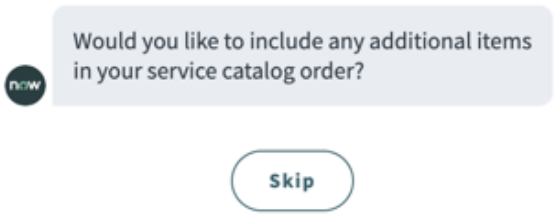
Property	Description
	• URL: Web address format • Custom: A script that provides a validation rule for a custom text format. The script should include related error messages that are displayed when the expected format is not entered. For phone and IP address format examples, see E.164 phone formats and IP address field types.
Advanced	
Enforce user prompt	Toggle to open a field for a custom message shown to the user instead of the message generated by the LLM. You can create custom messages in plain language, input a script, or define conditions with the data pill picker.
Additional instructions for LLM	Further instructions to the LLM, such as adding data formats, restrictions, or default values for user responses. You can create additional instructions in plain language, input a script, or define conditions with the data pill picker.
Hide or skip this node	
Conditionally use this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 

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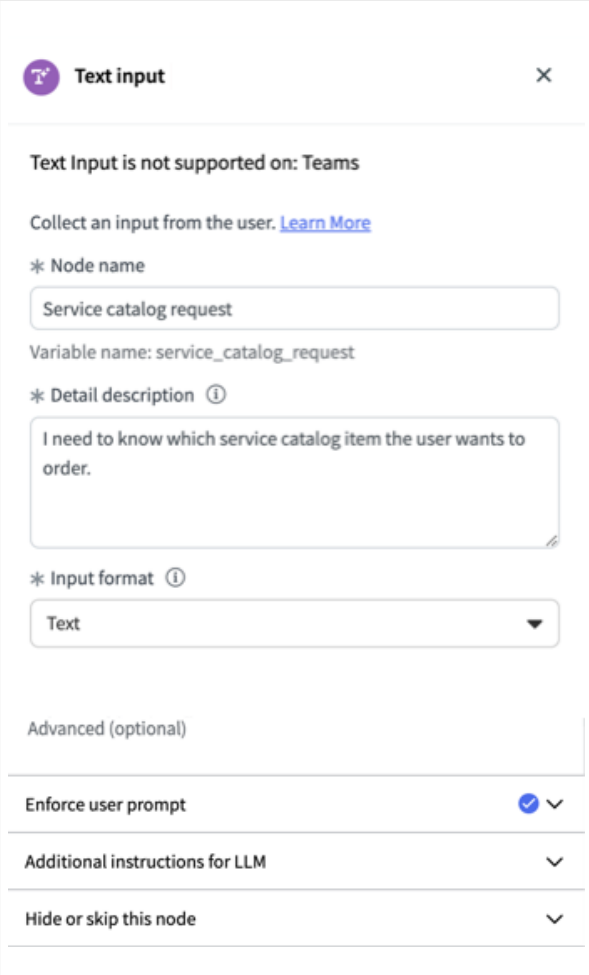
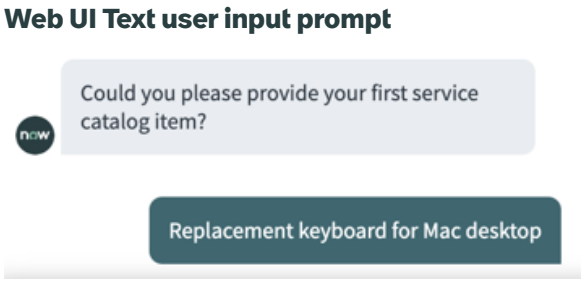
Example Text user input control for LLM topic discovery

LLM topic input control properties

Input properties	Input prompt
	

Text user input control properties for NLU topic discovery

Property	Description
Node name	Name that identifies this Text user input control node in the topic flow.
Variable name	Name of the variable that stores the user response to this prompt. The variable name is automatically created from the **Node name** property.
Prompt	Prompt or question for the user. The prompt can be either a text string or a script that returns text. This value is used only when the default value is not specified. For example: `What's your name?`
Input format	Text format that is validated when a user enters certain text items. If the user doesn't enter the expected format, an error message indicates that the format is not valid and asks the user to reenter the text. Choose the format of the text item to be validated:

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Property	Description
	• Text: Any text string (no validation) • Email: Format that consists of an email prefix (user name), the @ symbol, and domain. • IP address (IPV4, IPV6): Data communication delivery format for Internet Protocol version 4 or version 6. • Phone number (E.164): Internationally recognized standard phone number format. • URL: Web address format • Custom: A script that provides a validation rule for a custom text format. The script should include related error messages that are displayed when the expected format is not entered. For phone and IP address format examples, see E.164 phone formats and IP address field types.
NLU entity	Option to associate an NLU entity with the node. If an NLU entity is associated with the input variable for this node, Virtual Agent can slot-fill the specified value based on the user's utterance. Select an entity from the list of entities associated with the topic intent. When you specify an entity for the node, the *Do not ask users to confirm recognized entity* toggle switch displays. When enabled, users are not prompted to confirm the extracted entity.
Advanced	
Make this input secure	
Enable	Toggle switch that encrypts the Text bot user input. When enabled, the user input is masked and appears as a series of dots in the chat window.
Hash function [Visible when Make this input secure is enabled]	The method digest algorithm based on the standard WS-security standard. Choose one of the following: • **SHA-256 (lower case)** • **SHA-1 (lower case)** For more information about the WS-security standards, see WS-Security properties.
Encryption salt [Visible when Make this input secure is enabled]	Random data that is used as an additional input to a one-way function that hashes data.
Default value	
Predefine a value for user input	Predefined value for the user response to the question or prompt. The response defined in the **Default value confirmation** field asks the user to confirm the

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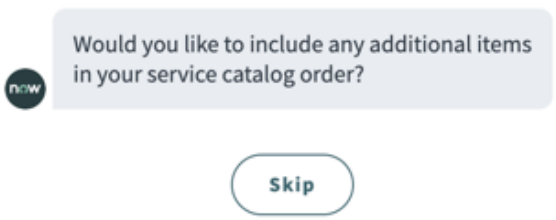
Property	Description
	default value. If the user responds with no, the value becomes null. The default value can be either a text string or a script that returns text. For example, if you're using dot-walking, the default value might be: `Script Variables > Last username`. Or if you're using a script, the default value might be: `{{vaScripts.lastUsername}}`.
Confirmation messages	
Input completion confirmation	Bot response shown to the user when the node interaction is complete. The message can be either a text string or a script that returns text. For example, if you're using dot-walking: `Thanks, (Input Variables > Username)!` Or if you're using a script, the acknowledgement might be: `Thanks, {{vaInputs.username}}!`
Default value confirmation	Message that asks the user to verify that the value in the **Default value** field is correct. This message is used instead of a value in the **Prompt** field. It can contain either a text string or a script that returns text. For example, if you're using dot-walking: `Are you (Input Variables > Username)?` Or if you're using a script, the confirmation message might be: `Are you {{vaScripts.lastUsername}}?`.
Conversation switching	
Turn on to let users change the subject	Option to enable NLU prediction for this node. If enabled, users can enter text to answer questions, regardless of the type of input control being used. Virtual Agent uses this utterance to match another existing intent, letting the user switch topics.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 
Skip reprompting if	No-code condition statement or low-code script that specifies a condition for letting users skip reprompting in the conversation. When a preceding node is revisited through a topic loopback or Dialog Act, the Virtual Agent bypasses this node and automatically retain its original value.

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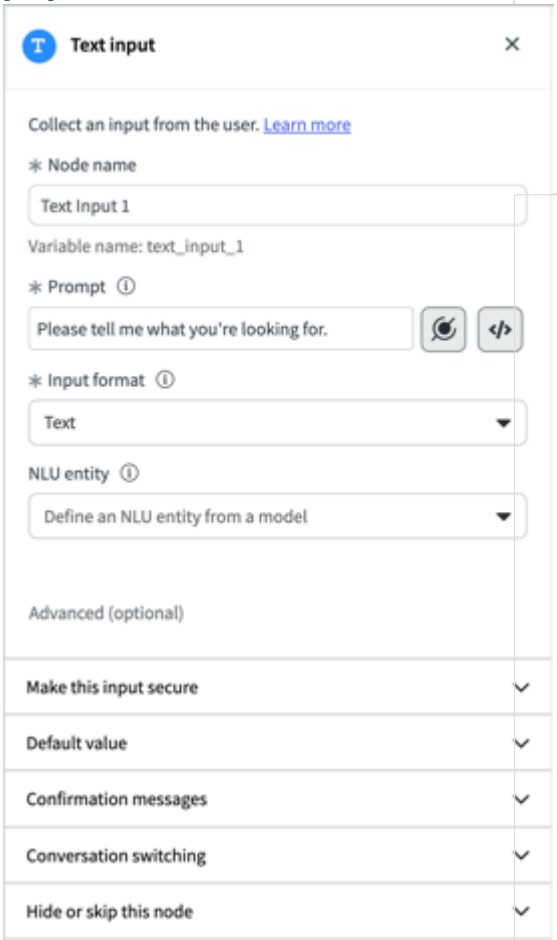
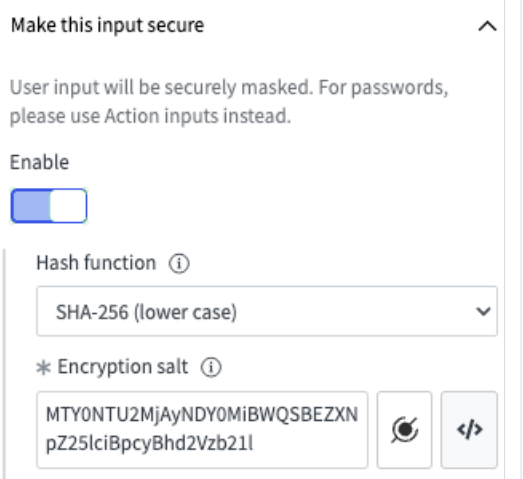
Example Text user input control for NLU topic discovery

Input properties	Input prompt

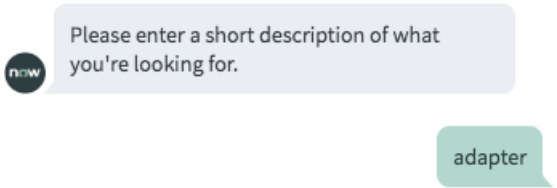
Text input control basic properties



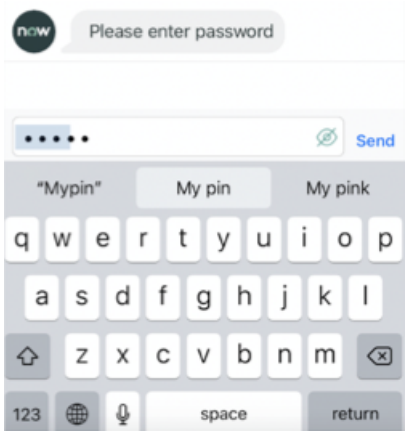
Make this input secure (Advanced properties)



Web UI Text user input prompt



User input prompt on a mobile app with the Make this input secure toggle switch enabled



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Channel support

Note:
Virtual Agent Designer controls may display and function differently in other channels.

Channel support for the Text user input control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Supported	None
Microsoft Teams	Supported	None
Slack	Supported	Slack users can edit text previously entered in a conversation. However, Virtual Agent processes messages as they are first entered. If a Slack user edits text input, such as a comment to update a case, then Virtual Agent does not evaluate the edited update.
Workplace	Supported	None
Facebook Messenger	Supported	The maximum character limit is 5000 characters.
SMS Twilio	Supported	None
LINE	Supported	The maximum character limit is 5000 characters.
WhatsApp	Supported	None
Apple Messages for Business	Supported	None
Alexa (Voice)	Supported	For screen devices, character limits may apply. For more information, see the Alexa developer documentation.

Static Choice user input control

Use the Static Choice user input control in a Virtual Agent topic to list predefined choices available to the user. You can select only one item from a choice list.

Choice display

The choice list contains up to 10 items per page. When more than 10 items exist, you have the option to display the additional items and filter the search results. The choice list prompt contains a search icon that users can select to filter the results.

The Static Choice control provides the option to add a header card that displays above the choice list. Header cards are supported in web and mobile channels.

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- The header card can contain a large or small image or a YouTube video card, along with descriptive text. The choice list contains up to five items by default, but the search feature is suppressed. If there are more than five items, users can choose to show the additional items.

- To control the number of items displayed below a header card, add the *com.glide.cs.web_header_picker_page_limit* system property. Use the **Value** to specify the number of items displayed in the choice list. For details about creating a system property, see Add a system property.

Static Choice user input control properties for LLM topic discovery

Property	Description
Name	Name that identifies this Static Choice user control node in the topic flow.
Detail description	The one piece of information needed from the user. For example, `Ask the user which service catalog item they need.`
Choices	
Display name	For each choice, the text that appears to the user for that choice. Use short phrases in your choice lists. • Slack has a limit of 30 characters for choice list labels. • Workplace has a limit of 20 characters for choice list labels.
Value	For each choice, the string that is stored in the variable when the corresponding choice is selected.
Advanced	
Header card	Toggle to open a field to add cards which may include images or YouTube videos. For more information, see Insert a header card in a Static Choice or Dynamic Choice control
Additional instructions for LLM	Further instructions to the LLM, such as adding data formats, restrictions, or default values for user responses. You can create additional instructions in plain language, input a script, or define conditions with the data pill picker.
Enforce user prompt	Toggle to open a field for a custom message shown to the user instead of the message generated by the LLM. You can create custom messages in plain language, input a script, or define conditions with the data pill picker.
Hide or skip this node	
Conditionally use this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or

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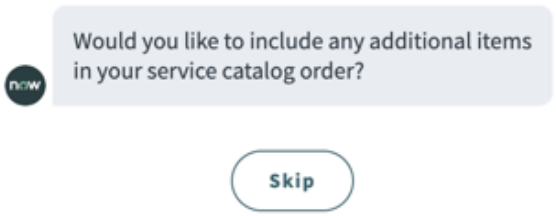
Property	Description
	a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 

Example Static Choice user input control for LLM topic discovery

Note:
Virtual Agent Designer controls may display and function differently in other channels.

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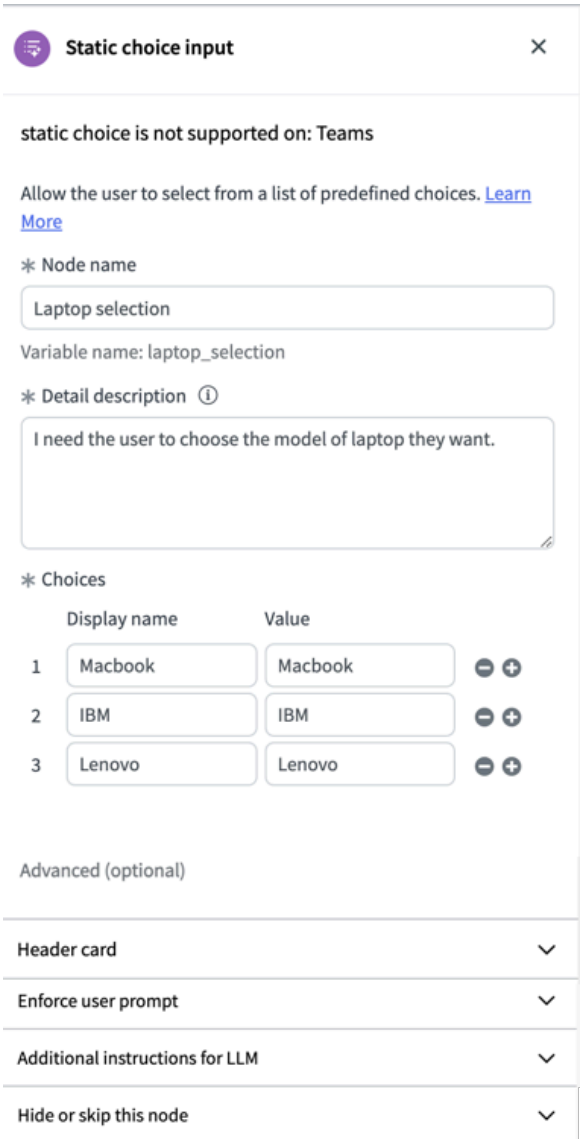
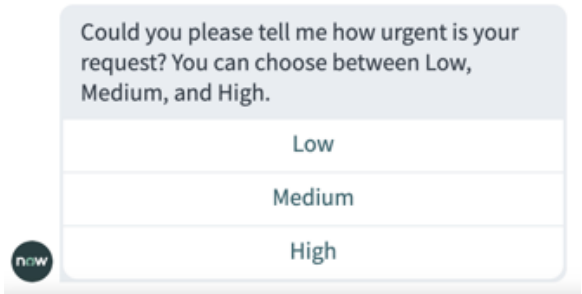
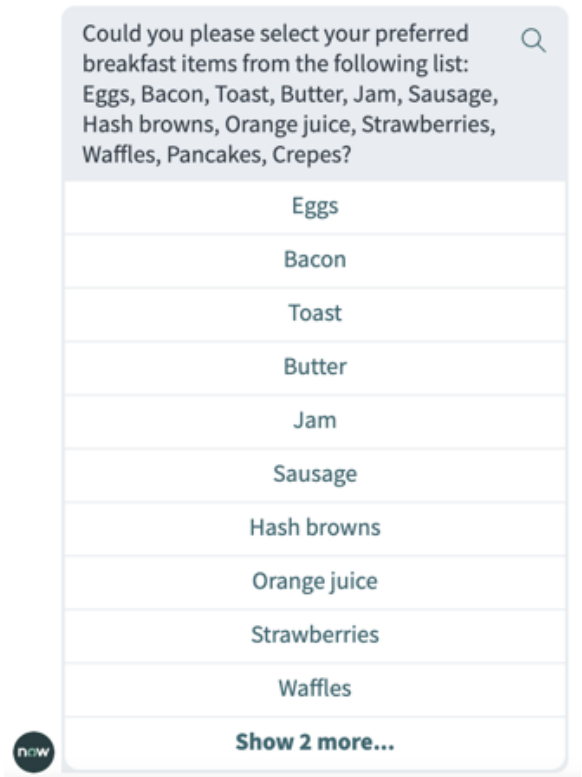
Input properties	List prompt
	**Web UI Static Choice list prompt**  **Web UI Static Choice list prompt with more than 10 items**  The choice list displays 10 items per page. When 10 or more results are returned, the following occurs: • The list includes a link at the end of the list to show more results. • A search icon displays in the prompt for filtering search results. Select the icon to open a search box and enter the filter.

Static Choice user input control properties for NLU topic discovery

Property	Description
Node name	Name that identifies this Static Choice user control node in the topic flow.

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Property	Description
Detail description	The one piece of information needed from the user. For example, `Ask the user which service catalog item they need.`
Variable name	Name of the variable that stores the user response to this prompt. The variable name is automatically created from the **Node name** property.
Prompt	Prompt or question for the user. The prompt can be either a text string or a script that returns text. This value is used only when the default value is not specified. For example: `What's your name?`
NLU entity	Option to associate an NLU entity with the node. If an NLU entity is associated with the input variable for this node, Virtual Agent can slot-fill the specified value based on the user's utterance. Select an entity from the list of entities associated with the topic intent. When you specify an entity for the node, the *Do not ask users to confirm recognized entity* toggle switch displays. When enabled, users are not prompted to confirm the extracted entity. This field is available only when NLU discovery is enabled on the instance.
Choices	
Display name	For each choice, the text that appears to the user for that choice. Use short phrases in your choice lists. • Slack has a limit of 30 characters for choice list labels. • Workplace has a limit of 20 characters for choice list labels.
Value	For each choice, the string that is stored in the variable when the corresponding choice is selected.
Advanced	
Header card	Toggle to open a field to add cards which may include images or YouTube videos. For more information, see Insert a header card in a Static Choice or Dynamic Choice control
Default value	
Default Value	Predefined value for the user response to the question or prompt. The response defined in the **Default value confirmation** field asks the user to confirm the default value. If the user responds with `no`, the value becomes null. The default value can be either a text string or a script that returns text. For example, if you're using dot-walking, the default value might be: `Script Variables > Last username`. Or if you're using a script, the default value might be: `{{vaScripts.lastUsername}}`.
Confirmation messages	
Input completion confirmation	Bot response shown to the user when the node interaction is complete. The message can be either a text string or a script that returns text. For example, if you're using dot-walking: `Thanks, (Input Variables >`

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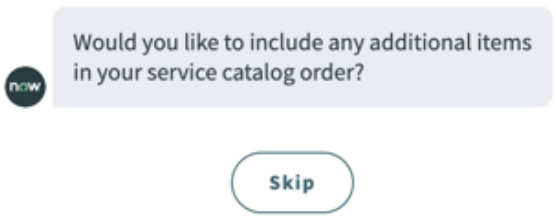
Property	Description
	`Username)!` Or if you're using a script, the acknowledgement might be: `Thanks, {{vaInputs.username}}!`
Default value confirmation	Message that asks the user to verify that the value in the **Default value** field is correct. This message is used instead of a value in the **Prompt** field. It can contain either a text string or a script that returns text. For example, if you're using dot-walking: `Are you (Input Variables > Username)?` Or if you're using a script, the confirmation message might be: `Are you {{vaScripts.lastUsername}}?`.
Conversation switching	
This section is available only when NLU discovery is enabled on the instance.	
Turn on to let users change the subject	Option to enable NLU prediction for this node. If enabled, users can enter text to answer questions, regardless of the type of input control being used. Virtual Agent uses this utterance to match another existing intent, letting the user switch topics.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 
Skip reprompting if	No-code condition statement or low-code script that specifies a condition for letting users skip reprompting in the conversation. When a preceding node is revisited through a topic loopback or Dialog Act, the Virtual Agent bypasses this node and automatically retain its original value.

Example Static Choice user input control for NLU topic discovery

Note:
Virtual Agent Designer controls may display and function differently in other channels.

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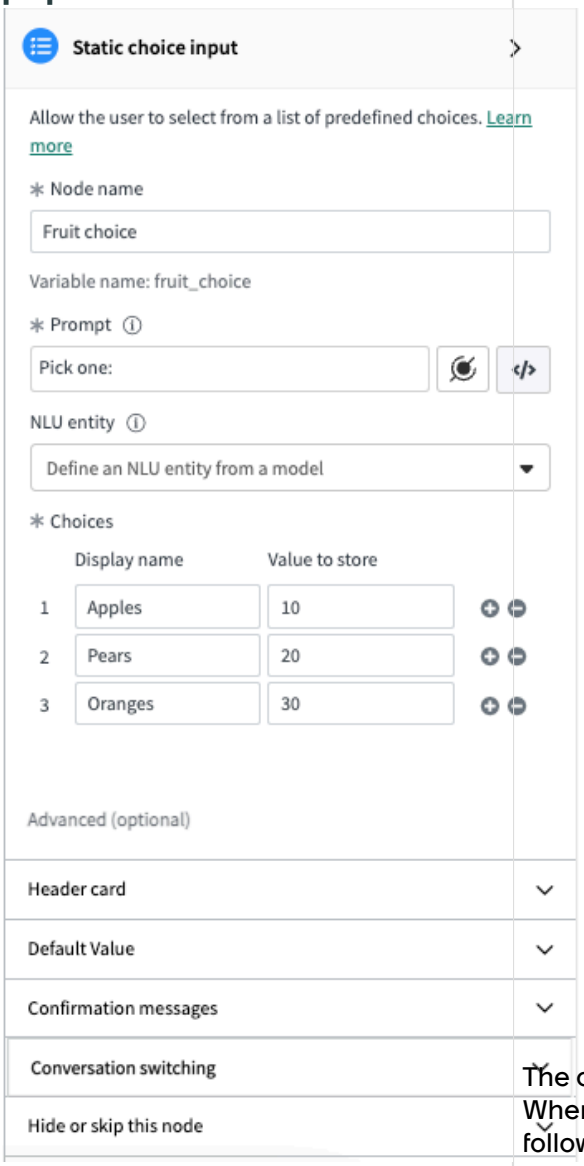
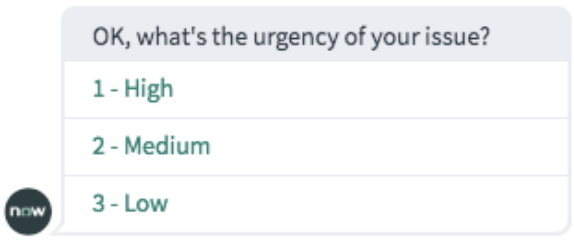
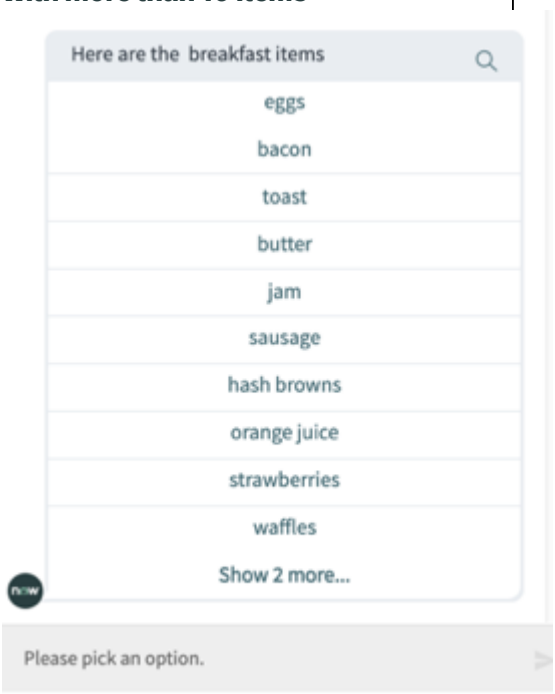
Input properties	List prompt
Static choice input control basic properties 	**Web UI Static Choice list prompt**  **Web UI Static Choice list prompt with more than 10 items**  The choice list displays 10 items per page. When 10 or more results are returned, the following occurs:

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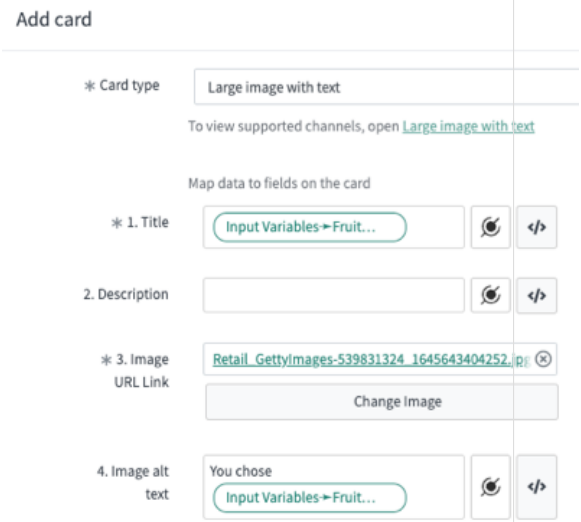
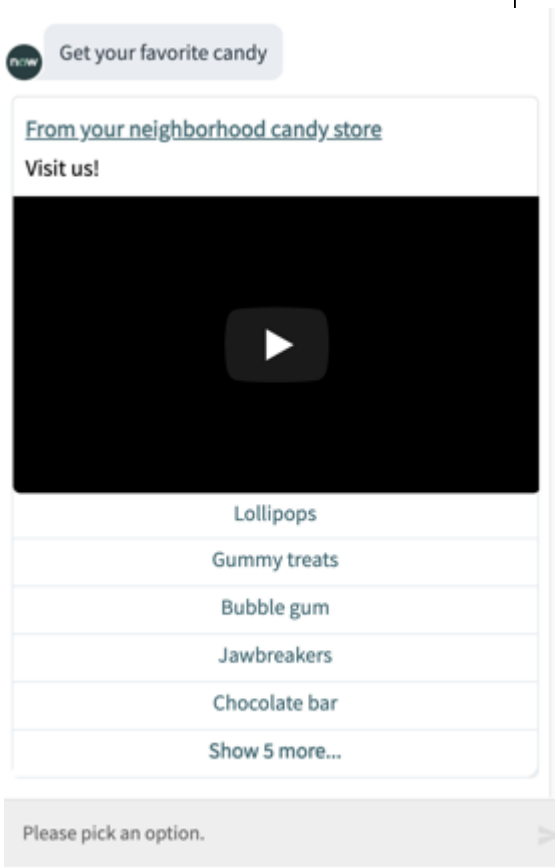
Input properties	List prompt
Add card dialog box (Header card advanced option)  	• The list includes a link at the end of the list to show more results. • A search icon displays in the prompt for filtering search results. Select the icon to open a search box and enter the filter. **Web UI Static Choice list with header card**  The choice list contains five items per page. When five or more results are returned, the list provides an option to show more results. **Note:** The search feature is suppressed when a header card is used.

Channel support

Channel support for the Static Choice user input control

Channel	Support	Constraints
Web UI	Supported	None

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Channel support for the Static Choice user input control (continued)

Channel	Support	Constraints
Mobile UI	Supported	None
Now Assist panel	Supported	None
Microsoft Teams	Supported	None
Slack	Supported	Header cards aren't supported. When a choice list has three or fewer choices, Slack displays the list as buttons.
Workplace	Supported	Header cards aren't supported.
Facebook Messenger	Supported	In a quick reply, the label has the maximum character limit of 20 characters. You can view only 13 quick replies at a time. If there are more than 13 quick replies, the pagination format is used to view more options. The default value of the maximum number of replies for a page is set in the *sn_va_fb_messenger.max_quick_replies* system property. This property is located in the System Property [sys_properties] table.
SMS Twilio	Supported	Header cards aren't supported.
LINE	Supported	In a quick reply, the label has a maximum limit of 20 characters. You can view only 13 quick replies at a time. If there are more than 13 quick replies, the pagination format is used to view more options. The default value of the maximum number of replies for a page is set in the *sn_va_line.max.picker.choices* system property. The property is located in the System Property [sys_properties] table.
WhatsApp	Supported	None
Apple Messages for Business	Supported	None
Alexa (Voice)	Supported	For screen devices, use touch scroll. For nonscreen devices, use voice pagination.

Grouped Choice user input control

Use the Grouped Choice user input control in a Virtual Agent topic to list multiple groups of choices in one message.

Grouped Choice list display

The Grouped Choice list prompts users to select related choices in one message through the default **Select a choice** button. You can enable multi-select for each choice's group and also provide images and short descriptions to create a richer user experience. Users are presented with groups of choices where they're required to submit one selection before returning to the Virtual Agent topic.

Inputs are recorded on the Interactions [interactions] table. For more information, see .

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Grouped Choice user input control properties

Property	Description
Node name	Name that identifies this Grouped Choice user control node in the topic flow.
Prompt	Prompt or question for the user. The prompt can be either a text string or a script that returns text. For example: `Please select your meal preference`.
Group name	Name that identifies the grouped choice list in the property sheet. Add one (required) or multiple groups of related choices. Users must select one choice out of all groups. Use short phrases in your choice lists.
Choices	Number of choices added to each group.
Add a group of choices dialog box	
This dialog box only appears after **Add** is selected.	
Group name	Name that identifies the grouped choice list in the property sheet. A limit of 40 characters for choice list labels exists. The **Variable name** field is automatically generated from the group name. This read-only variable name appears in all lower-case text and substitutes any spaces in the group name for underscores. If multiple lists with the same name exist, the variable name is appended with _1, _2, _3, and so on. Use this variable in your conversation flow to retrieve user responses for each group within the Grouped Choice node.
Display as	Group heading title that appears in the rendered client.
Display name	Choice name that is displayed to users. At least two unique choices are required.
Value	String that is stored in the variable when the corresponding choice is selected. This value is automatically generated from the display name, but you can edit the field as needed.
Image	Option to an add image for the choice. Individual choice images are entered after you select **Add details**. To set this field, do one of the following: • Specify the URL link by either entering the link text, using a data pill, or using a script. • Upload an image file by selecting **Upload Image**.
Description	Option to provide additional information about the choice. Individual choice descriptions are entered after you select **Add details**. For example: If the grouped choice list is about passengers selecting airplane amenities, like headphones, you could include a description about the type of headphones such as `Over-ear wired headphones`.

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Property	Description
Allow the user to select more than one choice	Option to allow users to choose multiple options from the choice list by selecting **Yes**.
Advanced	
Customize group selection	
Update title	Option to customize the title of the grouped choice's prompt button. A limit of 40 characters for choice list labels exists. If this field is left empty, the default title that users see is `Select a choice`.
Image	Option to add an image for the grouped choice's prompt button. To set this field, do one of the following: • Specify the URL link by either entering the link text, using a data pill, or using a script. • Upload an image file by selecting **Upload Image**.
Confirmation messages	
Input completion confirmation	Bot response shown to the user when the node interaction is complete. The message can be either a text string or a script that returns text. For example, if you're using dot-walking: `Thanks, (Input Variables > Username)!` Or if you're using a script, the acknowledgement might be: `Thanks, {{vaInputs.username}}!`.
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Example Grouped Choice user input control

Note:
Virtual Agent Designer controls may display and function differently in other channels.

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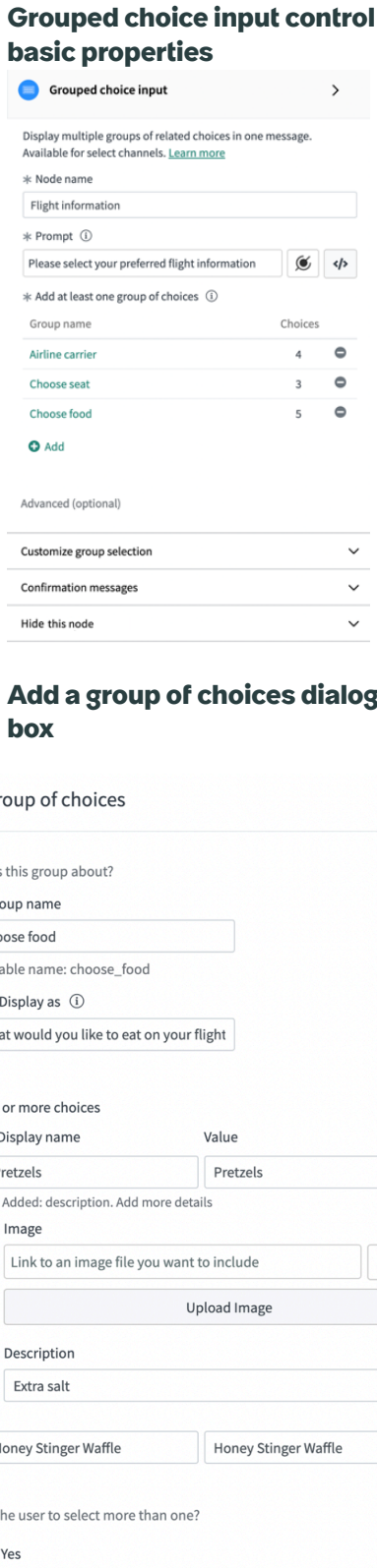
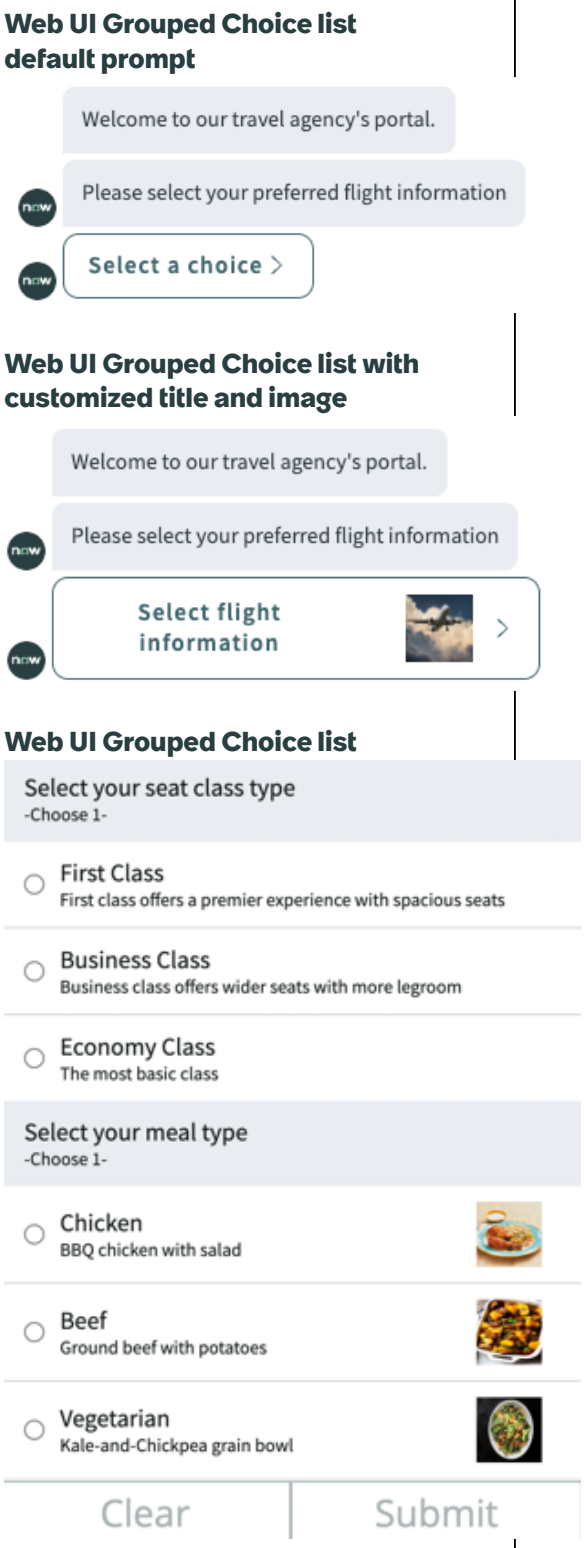
Input properties	List prompt
	

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Channel support

Channel support for the Grouped Choice user input control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Not supported	Not applicable
Now Assist panel	Supported	None
Microsoft Teams	Not supported	Not applicable
Slack	Not supported	Not applicable
Workplace	Not supported	Not applicable
Facebook Messenger	Not supported	Not applicable
SMS Twilio	Not supported	Not applicable
LINE	Not supported	Not applicable
WhatsApp	Not supported	Not applicable
Apple Messages for Business	Not supported	Not applicable
Alexa (Voice)	Not supported	Not applicable

Dynamic Choice user input control

Use the Dynamic Choice user input control in a Virtual Agent topic to dynamically create a list of available choices for your users. Create these choices by querying a table or by using a script to dynamically create them.

Choice list display

The Dynamic Choice list contains up to 10 items per page. When more than 10 items exist, users have the option to display the additional items and also filter the search results. The choice list prompt contains a search icon that users can select to filter the results.

Tip:
If you want to change the default number of listed items per page, you can modify the *com.glide.cs.picker_page_limit* system property. The default value is 10.

If selecting multiple choices is turned on, you can search within the **Search for options** field for filtering search results. Select or type all choices that apply, and then select the send icon . When you send your choices through an LLM-enabled Virtual Agent, the LLM responds with whether your choices meet the validation criteria.

You can also select a choice or choices from a list in an LLM-enabled conversation by entering an utterance in the chat window. If there is no match for your input, the Virtual Agent informs you that it is not a valid choice, and prompts you to try a different input.

The Dynamic Choice control also provides the option to add a header card that displays above the choice list. Header cards are supported in web and mobile channels.

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- The header card can contain a large or small image or a YouTube video card, along with descriptive text. The choice list contains up to five items by default, but the search feature is suppressed. If there are more than five items, users can choose to show the additional items.

- To control the number of items displayed below a header card, add the *com.glide.cs.web_header_picker_page_limit* system property. Use the **Value** to specify the number of items in the choice list. For details about creating a system property, see Add a system property.

Note:

If you populate a Dynamic Choice list node with only one choice, when testing or using the node, you receive a message reading `We have [choice] as [node name], is this correct?`. Use multiple choices in the Dynamic Choice list node to avoid receiving this message.

You can also alter the message content by navigating to **ALL** > **sys_properties.list** and editing the *glide.cs.retry_question_message* system property. This message value is by default a string `We have {0} as {1}, is this correct?` and is used for slot-filling in multiple cases outside the Dynamic Choice list. Any changes you make are reflected in every use of this property.

Dynamic Choice user input control properties for LLM topic discovery

Property	Description
Node name	Name that identifies this Dynamic Choice user control node in the topic flow.
Detail description	The one piece of information needed from the user. For example, `Ask the user to select an incident.`
Choices	
Populate choices by	Type of dynamic variable to be used. Select one of the following options:

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Property	Description

	• **Record**: Returns records from the table selected. The values for these options are GlideRecord objects.
	• **Script**: Expression that returns an array of options.
	
	Note:
	
	For more efficient pagination return results for a large data set when using a script expression, review the following script and determine whether you want to use this script:
	
	`(function execute() {`
	
	`var pagingUtil = new global.VirtualAgentChoicePagingUtil(null, "sys_user", null, "user_name,name", "active=true", null, vaVars);`
	
	`var gr = pagingUtil.getPagingGlideRecordSecure("name", false);`
	
	`var options = pagingUtil.getSecureOptions(gr, null,'user_name', ['user_name','name']);`
	
	`return options;`
	`})()`
	
	For more information about the preceding scripting details, review information about GlideRecords and the additional information:
	
	◦ *`fieldName`*: Field name is optional information. Pass with `null`.
	◦ *`table`*: Table name to query for displaying the available options.
	◦ *`pageSize`*: Page size is optional information. Pass with `null`.
	◦ *`searchColumns`*: Table columns in a comma-delimited list that applies to any searchText.
	◦ *`encodedQuery`*: Initial query to apply to table rows. For example, `active=true`.
	◦ *`searchText`*: Search text is optional information. Pass with `null`.
	◦ *`vaVars`*: Reference to virtual agent context variables (`vaVars`).
	◦ *`orderByColumn`*: Table column used to order the options.
	◦ *`orderDescending`*: Options appear in descending order. Only `true` or `false` values accepted.
	◦ *`gr`*: Glide record name.
	◦ *`startRow`*: Starting row is optional information. Pass with `null`.
	◦ *`valueColumn`*: Table column name to use as the value of each option.
	◦ *`labelColumns`*: Array of table columns to use for each option display.

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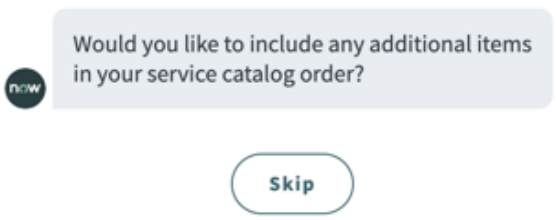
Property	Description
Table	If you selected **Record** as the method to populate choices, select the table to be searched. This field is available only when the **Record** option is selected.
Filter choices	Option to use the Virtual Agent Designer condition builder or provide a script. Select one of the following: • **Condition Builder**: Creates a filter used to select a subset of records from the table. • **Script**: Defines the enumeration list for the options (choice list) to be displayed. The name-value pair is stored as a string object. This field is available only when the **Record** option is selected.
Advanced	
Header card	Toggle to open a field to add cards which may include images or YouTube videos. For more information, see Insert a header card in a Static Choice or Dynamic Choice control
Enforce user prompt	Toggle to open a field for a custom message shown to the user instead of the message generated by the LLM. You can create custom messages in plain language, input a script, or define conditions with the data pill picker.
Additional instructions for LLM	Further instructions to the LLM, such as adding data formats, restrictions, or default values for user responses. You can create additional instructions in plain language, input a script, or define conditions with the data pill picker.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 

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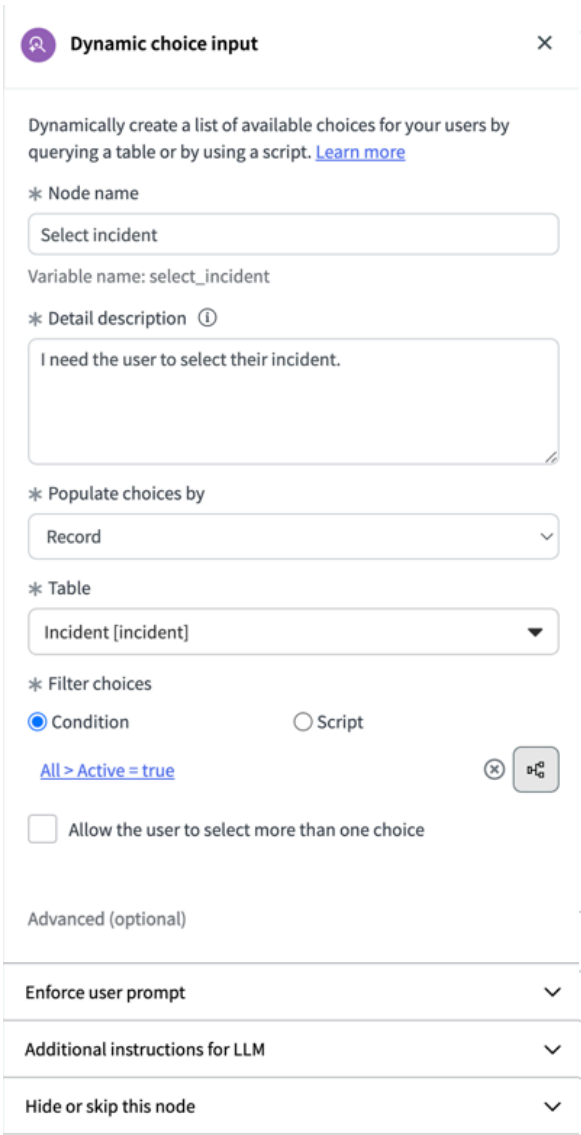
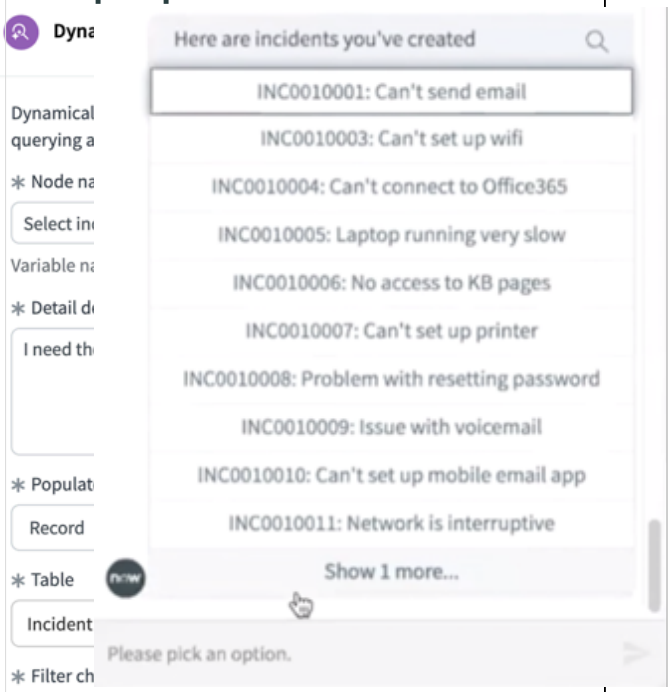
Example Dynamic Choice user input control for LLM topic discovery

Note:
Virtual Agent Designer controls may display and function differently in other channels.

Input properties	List prompt
	**Web UI Dynamic Choice list prompt**  The choice list displays 10 items per page. When 10 or more results are returned: • The list includes a link at the end of the list to show more results. • A search icon ( ) displays in the prompt for filtering search results. Users select the icon to open a search box and enter the filter. • When selecting multiple choices, you can search within the **Search for options** field for filtering search results. Select or type all choices that apply, and then select the send icon . When you send your choices, the LLM responds with whether your choices meet the validation criteria.
Header card	Toggle to open a field to add cards which may include images or YouTube videos. For more information, see Insert a header card in a Static Choice or Dynamic Choice control

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Dynamic Choice user input control properties for NLU topic discovery

Property	Description
Node name	Name that identifies this Dynamic Choice user control node in the topic flow.
Variable name	Name of the variable that stores the user response to this prompt. The variable name is automatically created from the **Node name** property.
Prompt	Prompt or question for the user. The prompt can be either a text string or a script that returns text. This value is used only when the default value is not specified. For example: `What's your name?`
NLU entity	Option to associate an NLU entity with the node. If an NLU entity is associated with the input variable for this node, Virtual Agent can slot-fill the specified value based on the user's utterance. Select an entity from the list of entities associated with the topic intent. When you specify an entity for the node, the *Do not ask users to confirm recognized entity* toggle switch displays. When enabled, users are not prompted to confirm the extracted entity. This field is available only when NLU discovery is enabled on the instance.
Choices	
Populate choices by	Type of dynamic variable to be used. Select one of the following options: • **Record**: Returns records from the table selected. The values for these options are GlideRecord objects. • **Script**: Expression that returns an array of options.
Table	If you selected **Record** as the method to populate choices, select the table to be searched. This field is available only when the **Record** option is selected.
Filter choices	Option to use the Virtual Agent Designer condition builder or provide a script. Select one of the following: • **Condition Builder**: Creates a filter used to select a subset of records from the table. • **Script**: Defines the enumeration list for the options (choice list) to be displayed. The name-value pair is stored as a string object. This field is available only when the **Record** option is selected.
No records response message	Message displayed to the user when the table search doesn't return any records. The message can be either a text string or a script that returns text.
Advanced	

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Property	Description
Header card	Toggle to open a field to add cards which may include images or YouTube videos. For more information, see Insert a header card in a Static Choice or Dynamic Choice control
Default value	
Default Value	Predefined value for the user response to the question or prompt. The response defined in the **Default value confirmation** field asks the user to confirm the default value. If the user responds with `no`, the value becomes null. The default value can be either a text string or a script that returns text. For example, if you're using dot-walking, the default value might be: `Script Variables > Last username`. Or if you're using a script, the default value might be: `{{vaScripts.lastUsername}}`.
Confirmation messages	
Input completion confirmation	Bot response shown to the user when the node interaction is complete. The message can be either a text string or a script that returns text. For example, if you're using dot-walking: `Thanks, (Input Variables > Username)!` Or if you're using a script, the acknowledgement might be: `Thanks, {{vaInputs.username}}!`
Default value confirmation	Message that asks the user to verify that the value in the **Default value** field is correct. This message is used instead of a value in the **Prompt** field. It can contain either a text string or a script that returns text. For example, if you're using dot-walking: `Are you (Input Variables > Username)?` Or if you're using a script, the confirmation message might be: `Are you {{vaScripts.lastUsername}}?`.
Conversation switching	
This section is available only when NLU discovery is enabled on the instance.	
Turn on to let users change the subject	Option to enable NLU prediction for this node. If enabled, users can enter text to answer questions, regardless of the type of input control being used. Virtual Agent uses this utterance to match another existing intent, letting the user switch topics.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you

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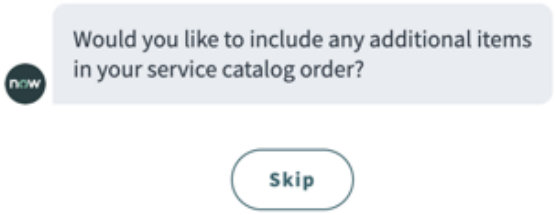
Property	Description
	can reply with an utterance such as `I want to skip this question`. 
Skip reprompting if	No-code condition statement or low-code script that specifies a condition for letting users skip reprompting in the conversation. When a preceding node is revisited through a topic loopback or Dialog Act, the Virtual Agent bypasses this node and automatically retain its original value.

Example Dynamic Choice user input control for NLU topic discovery

Note:
Virtual Agent Designer controls may display and function differently in other channels.

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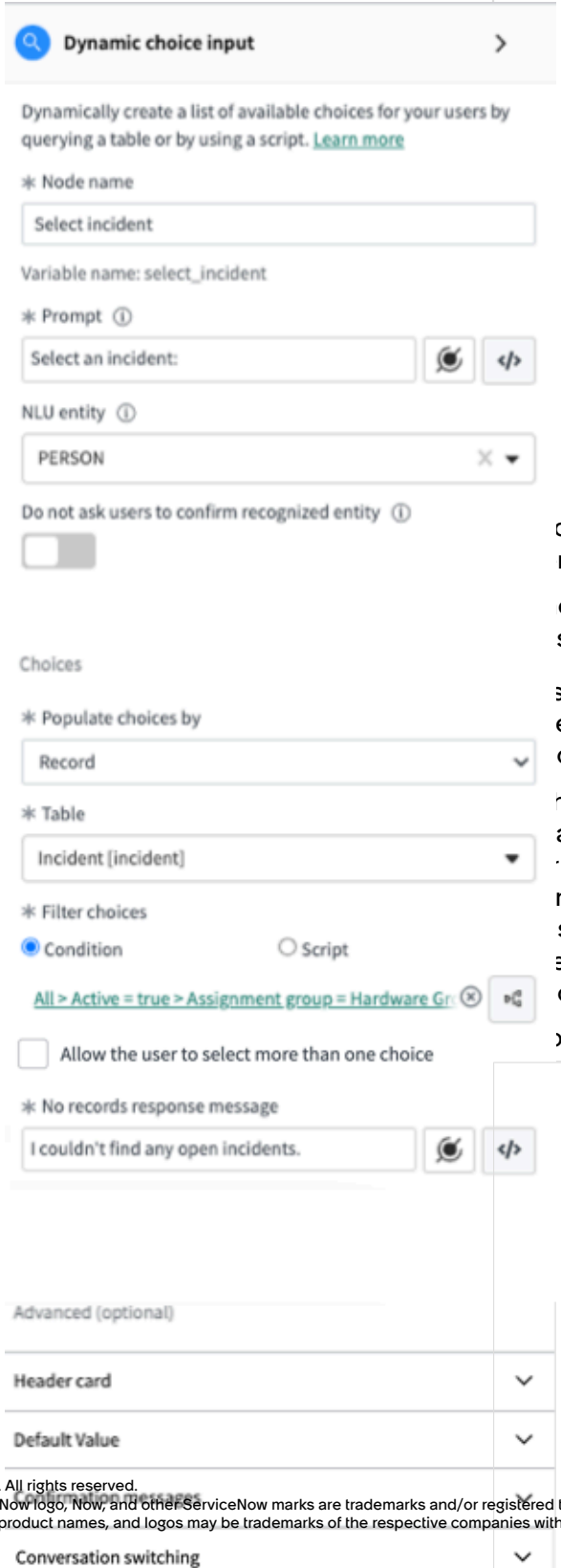
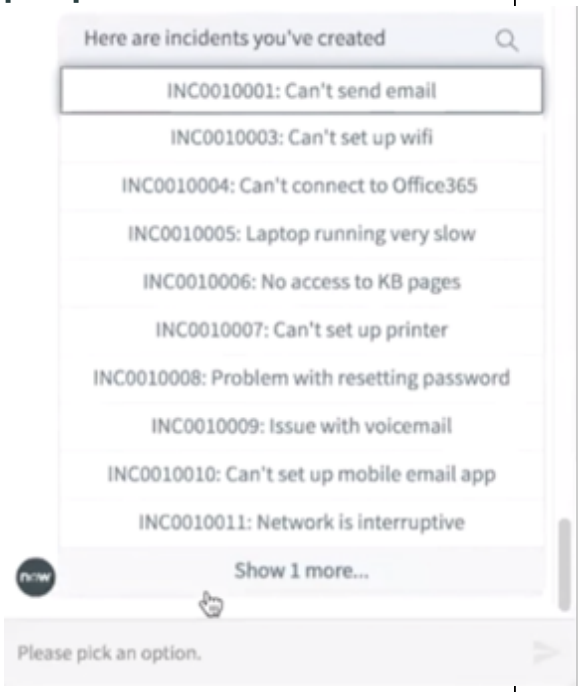
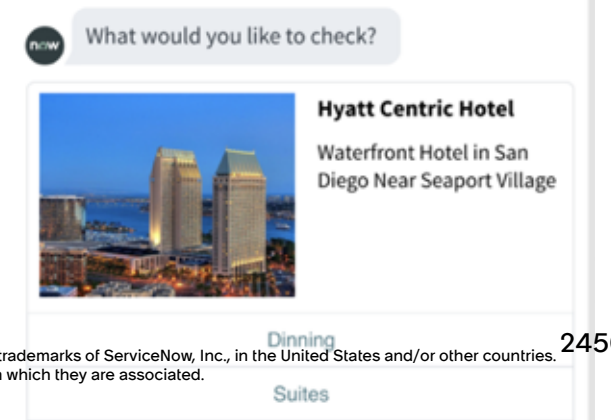
Input properties	List prompt
Dynamic Choice user input control basic properties 	**Web UI Dynamic Choice list prompt**  choice list displays 10 items per page. n 10 or more results are returned: e list includes a link at the end of the list show more results. search icon ( ) displays in the prompt for ering search results. Users select the icon open a search box and enter the filter. hen selecting multiple choices, you can arch within the **Search for options** field filtering search results. If you input the ript to enable secondary fields found in s topic, the search filter results apply to e secondary fields, too. Select or enter all oices that apply, and then select the send on . **Web UI Dynamic Choice list prompt with header card** 

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Input properties	List prompt
	The choice list contains five items per page. When five or more results are returned, the list provides an option to show more results. **Note:** The search feature is suppressed when a header card is used.

Dynamic Choice script examples

The following script example can be used in the **Define choices** field only if the value for **Populate choice by** is set to **Script**. This script enables requesters to see their previously selected choices if they choose to edit their choices later in the conversation. This script also displays secondary fields to requesters, such as an email address, gender marker, or both, to help them further differentiate their available choices. Displaying the secondary field to requesters can be especially helpful when dealing with similar values, such as selecting the correct employee name when working with the same or similar names (that is, Christopher Smith or Chris Smith).

```
(function execute() {
    var pagingUtil = new
 global.VirtualAgentChoicePagingUtil(null, "sys_user", 10,
 "user_name,name",
      "active=true", null, vaVars);
    var selectedOptions =
 pagingUtil.getSavedSelectedOptions("user", vaSystem);
    if (!selectedOptions || selectedOptions.length == 0) {
      // Secondary labels can be passed to selected options
       selectedOptions.push({ "value": "abel.tuter", "label":
 "Abel Tuter"
        ,"secondary_label": ["abel.tuter@example.com", "male"]
        });
       selectedOptions.push({ "value": "Beth.anglin", "label":
 "Beth Anglin"
        ,"secondary_label": ["beth.anglin@example.com",
 "female"]
        });
    }
    vaSystem.setSelectedOptions(selectedOptions, "user", false);
    // Topic authors have the ability to define which values
 should go in the
    // secondary labels by adding secondary label functions
    pagingUtil.addSecondaryLabelFunction(function (gr) {
      return gr.getValue("email");
    });
    pagingUtil.addSecondaryLabelFunction(function (gr) {
      return gr.getValue("gender");
    });
    var gr = pagingUtil.getPagingGlideRecordSecure("name",
 false);
    var options = pagingUtil.getSecureOptions(gr,
 null,'user_name', ['user_name']);
    return options;
})()
```

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Example Dynamic Choice list value expression

```
(function execute(table) {
        var options = [];
        var gr = new GlideRecordSecure(table);
        gr.addEncodedQuery('active=true');
        gr.setLimit(5);
        gr.query();
        while(gr.next()) {
            options.push({ 'value': gr.getUniqueValue(),
 'label': gr.getValue('short_description') });
        }
        return options;
})(table)
```

The script in the *Choice Value Expression* property defines and returns an array of choices. In the example, the script creates an array called `options`, and adds each record found in a GlideRecord query to this array. Each element in the array is given a value in the `value` and `label` keys using data from that GlideRecord. The *Table* property of the control defines the table used by the script. This example script uses `gr.setLimit(5)` to limit the number of records returned to 5. Using this method helps prevent returned records from creating an overly large choice list.

Dynamic choice control value expression keys

Key	Description
value	The value for the choice. When a user selects a choice from the control, this value is stored in the variable named in the *Variable name* property.
label	The label that appears for this choice in the choice list.

Channel support

Channel support for the Dynamic Choice user input control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Supported	None
Microsoft Teams	Supported	None
Slack	Supported	Header cards aren't supported.
Workplace	Supported	Header cards aren't supported.
Facebook Messenger	Not supported	Not applicable
SMS Twilio	Supported	Header cards aren't supported.

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Channel support for the Dynamic Choice user input control (continued)

Channel	Support	Constraints
LINE	Not supported	Not applicable
WhatsApp	Supported	None
Apple Messages for Business	Supported	None
Alexa (Voice)	Supported	For screen devices, use touch scroll; selecting links not supported. For nonscreen devices, use voice pagination.

Boolean user input control

Use the Boolean user input control in a Virtual Agent topic to present a Yes/No prompt to the user.

Boolean user input controls prompt the user to answer a Yes/No question, and store the response as a string with a value of *true* or *false*. Use this value in topic utilities, such as the prompted Decision utility, to branch the topic flow based on the answer.

Boolean user input control properties for LLM topic discovery

Property	Description
Node name	Name that identifies this Boolean user input control node in the topic flow.
Detail description	The one piece of information needed from the user, presented as a binary choice. For example, `Ask the user if they have performed the latest software update to their machine.`
Advanced	
Enforce user prompt	Toggle to open a field for a custom message shown to the user instead of the message generated by the LLM. You can create custom messages in plain language, input a script, or define conditions with the data pill picker.
Additional instructions for LLM	Further instructions to the LLM, such as adding data formats, restrictions, or default values for user responses. You can create additional instructions in plain language, input a script, or define conditions with the data pill picker.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you

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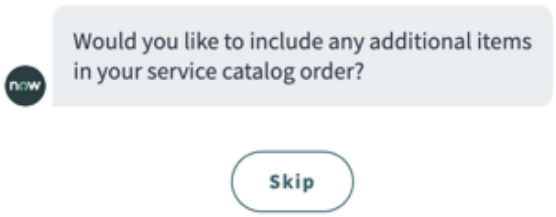
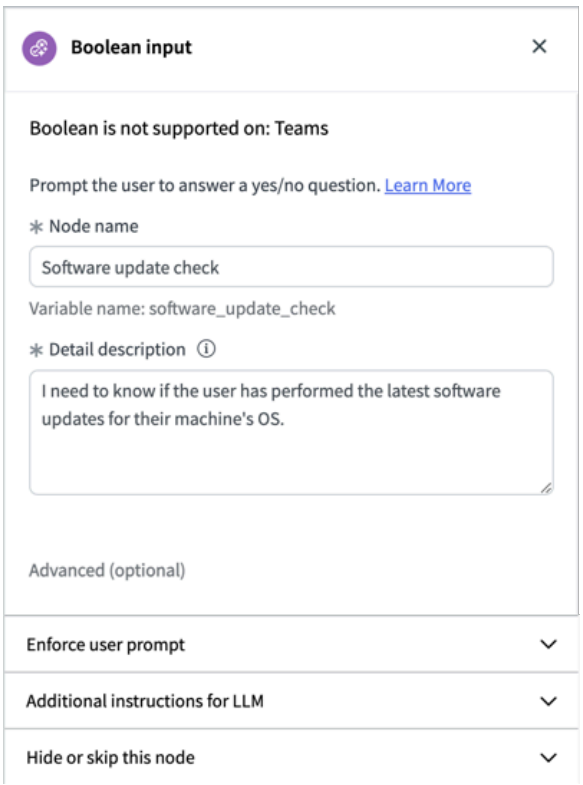
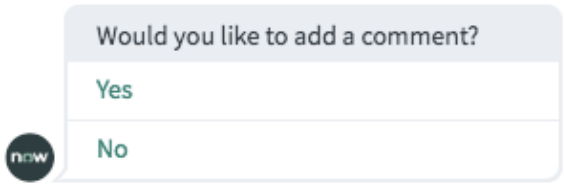
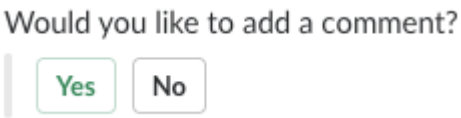
Property	Description
	can reply with an utterance such as `I want to skip this question`. 

Example Boolean user input control for LLM topic discovery

Note:
Virtual Agent Designer controls may display and function differently in other channels.

Input properties	Input prompt
	**Web UI Boolean user input prompt**  **Slack Boolean user input prompt** 

Boolean user input control properties for NLU topic discovery

Property	Description
Node name	Name that identifies this Boolean user input control node in the topic flow.
Variable name	Variable that stores the choice selected by the user. The variable name is automatically created from the *Node name* property.

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Property	Description
Prompt	Prompt or question for the user. The prompt can be either a text string or a script that returns text. This value is used only when the default value is not specified. For example: `What's your name?`
NLU entity [NLU topic discovery only]	Option to associate an NLU entity with the node. If an NLU entity is associated with the input variable for this node, Virtual Agent can slot-fill the specified value based on the user's utterance. Select an entity from the list of entities associated with the topic intent. When you specify an entity for the node, the *Do not ask users to confirm recognized entity* toggle switch displays. When enabled, users are not prompted to confirm the extracted entity.
Advanced	
Default value	
Predefine a value for user input	Predefined value for the user response to the question or prompt. The response defined in the **Default value confirmation** field asks the user to confirm the default value. If the user responds with `no`, the value becomes null. The default value can be either a text string or a script that returns text. For example, if you're using dot-walking, the default value might be: `Script Variables > Last username`. Or if you're using a script, the default value might be: `{{vaScripts.lastUsername}}`.
Confirmation messages	
Input completion confirmation	Bot response shown to the user when the node interaction is complete. The message can be either a text string or a script that returns text. For example, if you're using dot-walking: `Thanks, (Input Variables > Username)!` Or if you're using a script, the acknowledgement might be: `Thanks, {{vaInputs.username}}!`
Default value confirmation	Message that asks the user to verify that the value in the **Default value** field is correct. This message is used instead of a value in the **Prompt** field. It can contain either a text string or a script that returns text. For example, if you're using dot-walking: `Are you (Input Variables > Username)?` Or if you're using a script, the confirmation message might be: `Are you {{vaScripts.lastUsername}}?`.
Conversation switching	
This section is available only when NLU discovery is enabled on the instance.	
Turn on to let users change the subject	Option to enable NLU prediction for this node. If enabled, users can enter text to answer questions, regardless of the type of input control being used. Virtual Agent uses this utterance to match another existing intent, letting the user switch topics.
Hide or skip this node	

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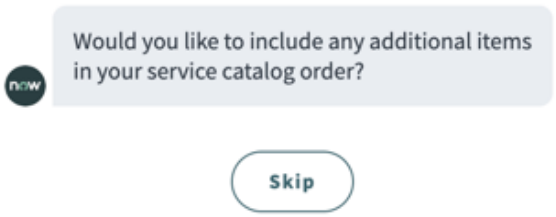
Property	Description
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 
Skip reprompting if	No-code condition statement or low-code script that specifies a condition for letting users skip reprompting in the conversation. When a preceding node is revisited through a topic loopback or Dialog Act, the Virtual Agent bypasses this node and automatically retain its original value.

Example Boolean user input control for NLU topic discovery

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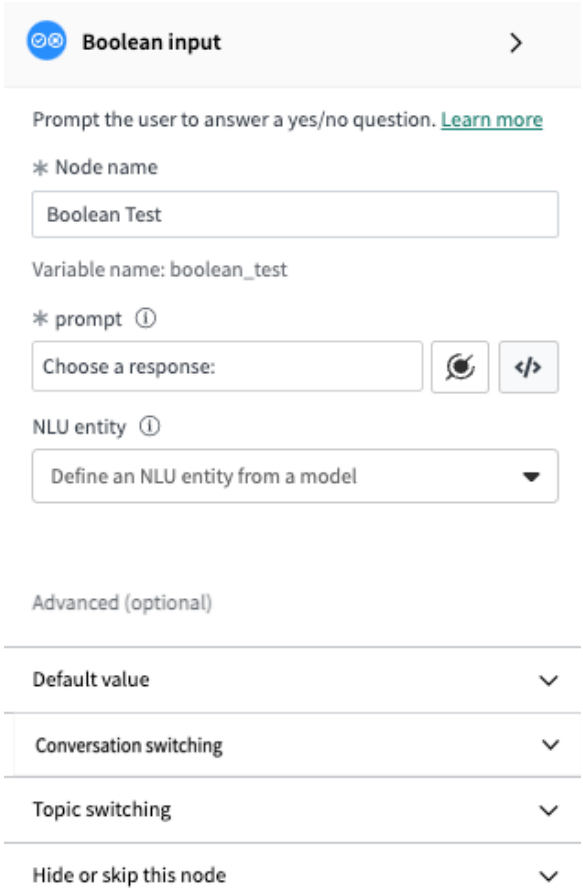
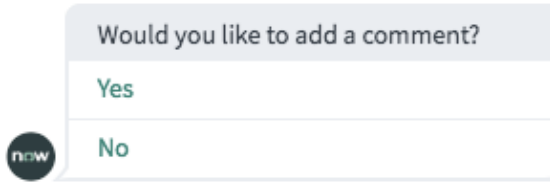
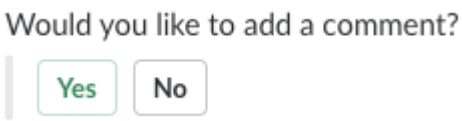
Input properties	Input prompt
Boolean user input control basic properties 	**Web UI Boolean user input prompt**  **Slack Boolean user input prompt** 

Channel support

Channel support for the Boolean user input control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Supported	None
Microsoft Teams	Supported	None
Slack	Supported	None
Workplace	Supported	None
Facebook Messenger	Supported	None
SMS Twilio	Supported	None
LINE	Supported	None
WhatsApp	Supported	None
Apple Messages for Business	Supported	None

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Channel support for the Boolean user input control (continued)

Channel	Support	Constraints
Alexa (Voice)	Supported	None

Date Time user input control

Use the Date Time user input control in a Virtual Agent topic to enable the user to select a calendar date, time (hours and minutes), or both.

Date Time user input control properties for LLM topic discovery

The Date Time user input control accepts inputs from a calendar selection, or by entering plain language in the Virtual Agent chat window. If you type your answer, the Virtual Agent accepts different inputs depending on how your region handles dates. For example, if you're in the United States, the input control supports the MM-DD-YYYY format, while a user in Spain enters the date in DD-MM-YYYY format.

Date Time property	Description
Name	Name that identifies this Date Time user input control node in the topic flow.
Detail description	The one piece of information requested from the user. For example, `Ask the user when they would like to schedule their departure.`
Input format	Type of Date Time control to be displayed. Select one of the following formats: • **Date**: Shows only the monthly calendar for the user to select the date. • **DateTime**: Shows both a monthly calendar and time picker. • **Time**: Shows only the time picker for the user to select the time (hours and minutes).
Advanced	
Enforce user prompt	Toggle to open a field for a custom message shown to the user instead of the message generated by the LLM. You can create custom messages in plain language, input a script, or define conditions with the data pill picker.
Additional instructions for LLM	Further instructions to the LLM, such as adding data formats, restrictions, or default values for user responses. You can create additional instructions in plain language, input a script, or define conditions with the data pill picker.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you

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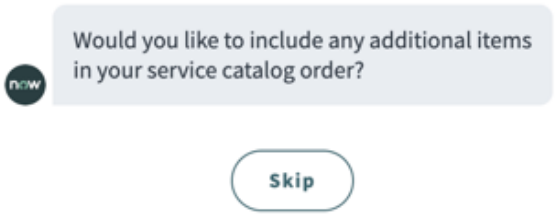
Date Time property	Description
	can reply with an utterance such as `I want to skip this question`. 

Example Date Time user input control for LLM topic discovery

Note:
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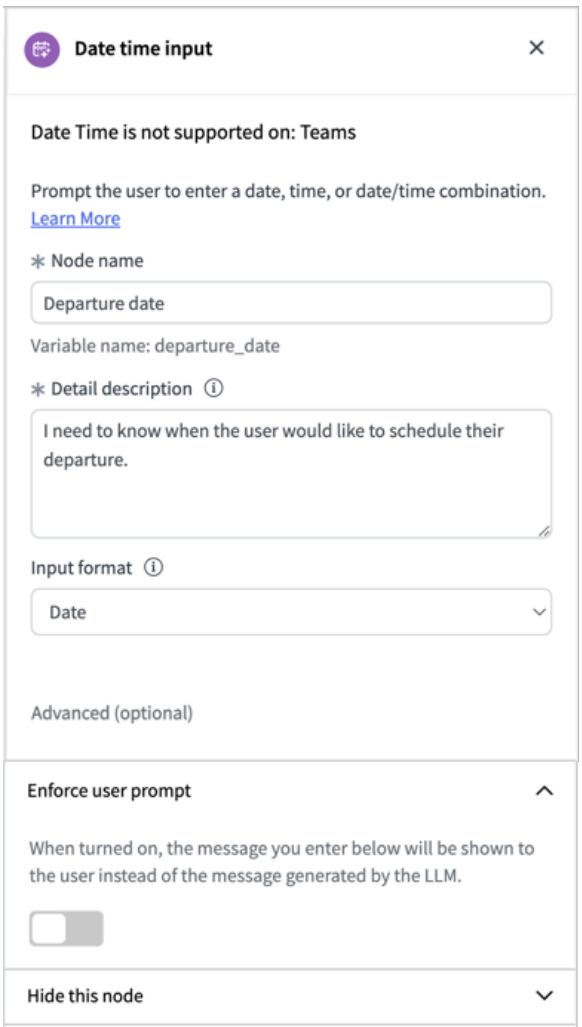
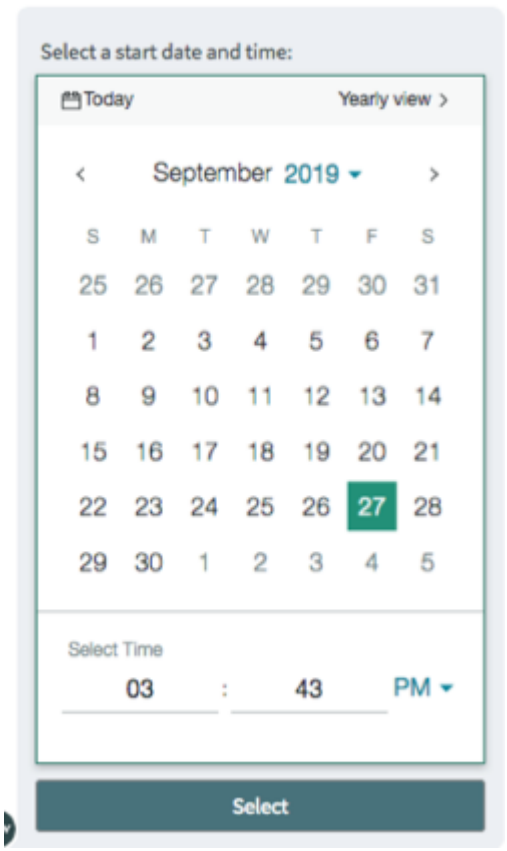
Input properties	Date Time prompt
	**Web UI Date Time prompt** 

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Date Time user input control properties for NLU topic discovery

Date Time property	Description
Name	Name that identifies this Date Time user input control node in the topic flow.
Variable Name	Name of the variable that stores the user response to this prompt. The variable name is automatically created from the *Name* property.
Prompt	Prompt or question for the user. The prompt can be either a text string or a script that returns text. This value is used only when the default value is not specified. For example: `What's your name?`
NLU entity [NLU topic discovery only]	Option to associate an NLU entity with the node. If an NLU entity is associated with the input variable for this node, Virtual Agent can slot-fill the specified value based on the user's utterance. Select an entity from the list of entities associated with the topic intent. When you specify an entity for the node, the *Do not ask users to confirm recognized entity* toggle switch displays. When enabled, users are not prompted to confirm the extracted entity.
Input format	Type of Date Time control to be displayed. Select one of the following formats: • **Date**: Shows only the monthly calendar for the user to select the date. • **DateTime**: Shows both a monthly calendar and time picker. • **Time**: Shows only the time picker for the user to select the time (hours and minutes).
Advanced	
Default value	
Predefine a value for user input	Predefined value for the user response to the question or prompt. The response defined in the **Default value confirmation** field asks the user to confirm the default value. If the user responds with `no`, the value becomes null. The default value can be either a text string or a script that returns text. For example, if you're using dot-walking, the default value might be: `Script Variables > Last username`. Or if you're using a script, the default value might be: `{{vaScripts.lastUsername}}`.
Confirmation messages	
Input completion confirmation	Bot response shown to the user when the node interaction is complete. The message can be either a text string or a script that returns text. For example, if you're using dot-walking: `Thanks, (Input Variables > Username)!` Or if you're using a script, the acknowledgement might be: `Thanks, {{vaInputs.username}}!`
Default value confirmation	Message that asks the user to verify that the value in the **Default value** field is correct. This message is used instead of a value in the **Prompt** field. It can contain either a text string or a script that returns text. For example, if you're

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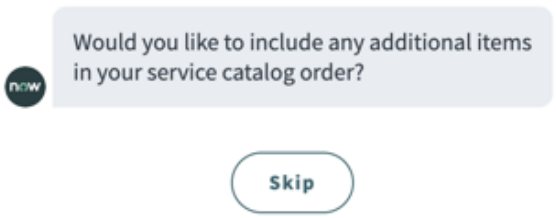
Date Time property	Description
	using dot-walking: `Are you (Input Variables > Username)?` Or if you're using a script, the confirmation message might be: `Are you {{vaScripts.lastUsername}}?`.
Conversation switching	
This section is available only when NLU discovery is enabled on the instance.	
Turn on to let users change the subject	Option to enable NLU prediction for this node. If enabled, users can enter text to answer questions, regardless of the type of input control being used. Virtual Agent uses this utterance to match another existing intent, letting the user switch topics.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 
Skip reprompting if	No-code condition statement or low-code script that specifies a condition for letting users skip reprompting in the conversation. When a preceding node is revisited through a topic loopback or Dialog Act, the Virtual Agent bypasses this node and automatically retain its original value.

Example Date Time user input control for NLU topic discovery

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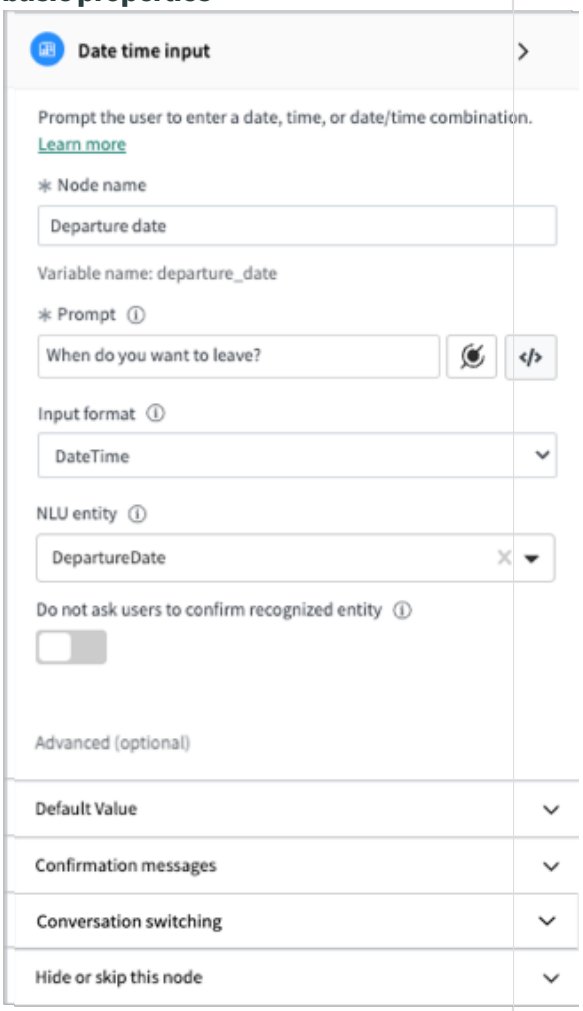
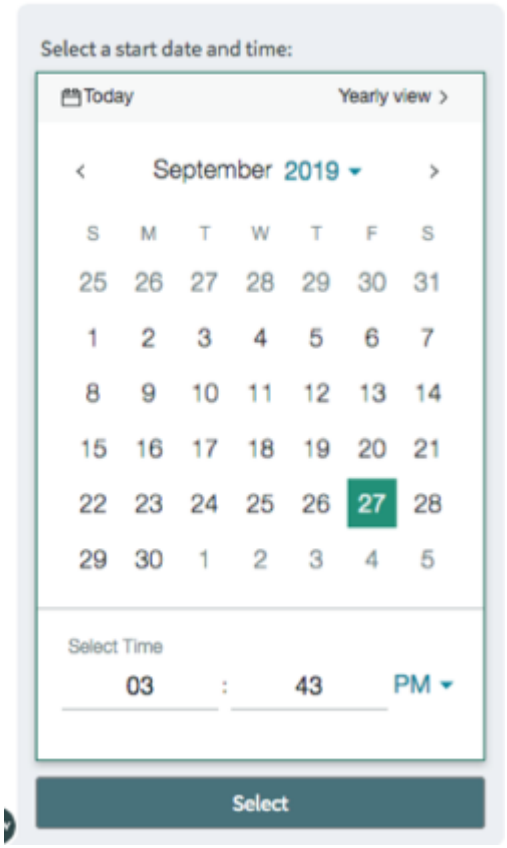
Input properties	Date Time prompt
Date Time user input control basic properties  	**Web UI Date Time prompt** 

Channel support

Channel support for the Date Time user input control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Supported	None
Microsoft Teams	Supported	None
Slack	Supported	None
Workplace	Supported	The Workplace interface does not natively support a date selection widget. Date and time selection is instead done with the buttons that are supported in these interfaces.

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Channel support for the Date Time user input control (continued)

Channel	Support	Constraints
		The Date Time user input control prompts the user for a date, showing the current date and time. The user clicks the month, day, year, or time button to modify that value. The time and day fields prompt the user to type in a new value. The month and year fields show a set of buttons with the current and upcoming months or years. Select one of these buttons or type in a value to set the time or year.
Facebook Messenger	Supported	If your administrator has set the option to request the time zone from the customer, the selected date and time reflect the customer's time zone. Otherwise, they appear in the UTC time zone. For more information about the time zone setting, see Set up Conversational Integration with Facebook Messenger.
SMS Twilio	Not supported	Not applicable
LINE	Supported	None
WhatsApp	Supported	None
Apple Messages for Business	Supported	None
Alexa (Voice)	Supported	For best results, enable NLU at the node.

File Picker user input control

Use the File Picker user input control in a Virtual Agent topic to prompt a user to upload an image or any file type. After the user uploads an image file, the image appears immediately in the Virtual Agent client.

File Picker user input control properties

All file types are supported by the file picker, except the SVG format for image files. Although the image can be high resolution, the image displayed in the Virtual Agent client is scaled based on the aspect ratio. Images scale to fit within the chat window.

In Microsoft Teams, a file can be uploaded through the paper clip (attachment) icon, or using drag-and-drop. Copying and pasting only works for image files. Users can share attachments on Microsoft Teams through the Virtual Agent file picker user input control, and by sending attachments while chatting with a live agent. Multi-attachments are supported for both live agent and file picker scenarios.

Learn what the live agent picker scenario supports or doesn't support:

- Supports multiple files.
- Doesn't support the SVG format for image files.
- Supports a combination of text, files, and emojis. However, orders may show up differently between how a user sends these items versus how an agent views these items.
- Doesn't support formatted text.

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When a file upload is in progress, you can't upload or enter text for the live agent picker scenario. The uploaded files go through a virus scan and validation.

Learn what the File Picker control supports or doesn't support:

- Supports multiple files.
- Doesn't support the SVG format for image files.

When a file upload is in progress, you can't upload or enter text for the file picker control. The uploaded files go through a virus scan and validation.

You can link an uploaded file to a case you create using the Record Action utility. For more information, see Record Action utility.

The following table lists the details about the properties of the File Picker.

File Picker properties

Property	Description
Node name	Name that identifies the File Picker user input control node in the topic flow.
Variable name	Name of the variable that stores the user response to this prompt. The variable name is automatically created from the *Node name* property.
Prompt	Prompt or question asking the user to upload the item. The prompt can be a text string that includes variables or a script that returns text.
Allow user to upload	Type of file to upload. All file types are supported, except the SVG format for image files.
Advanced	
Confirmation messages	
Input completion confirmation	Bot response shown to the user when the node interaction is complete. The message can be either a text string or a script that returns text. For example, if you're using dot-walking: `Thanks, (Input Variables > Username)!` Or if you're using a script, the acknowledgement might be: `Thanks, {{vaInputs.username}}!`
Default value confirmation	Message that asks the user to verify that the value in the **Default value** field is correct. This message is used instead of a value in the **Prompt** field. It can contain either a text string or a script that returns text. For example, if you're using dot-walking: `Are you (Input Variables > Username)?` Or if you're using a script, the confirmation message might be: `Are you {{vaScripts.lastUsername}}?`.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip**

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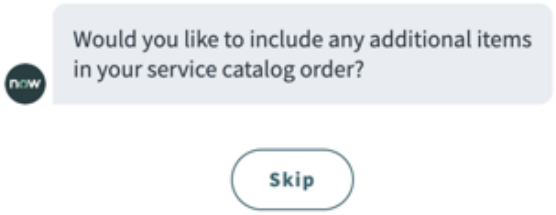
File Picker properties (continued)

Property	Description
	option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 
Skip reprompting if	No-code condition statement or low-code script that specifies a condition for letting users skip reprompting in the conversation. When a preceding node is revisited through a topic loopback or Dialog Act, the Virtual Agent bypasses this node and automatically retain its original value.

Using the File Picker control in different client interfaces

The process to select an image differs based on the Virtual Agent client interface. Use the following steps to select an image in the client interface of your choice.

The following table lists details about the File Picker control in different client interfaces.

File Picker control in different client interfaces

Platform	Steps to select an image or file
Web UI	1. Select **Click here to upload an image.** or **Click here to upload a file.** 2. Select a file from your local computer. All file types are supported.
Slack	1. Select the Green **+** icon. 2. Select **Your computer**. 3. Select an image file from your local computer. All file types are supported.
Microsoft Teams	1. On your local computer, copy an image file. 2. Paste the image file into the text input field in Microsoft Teams.

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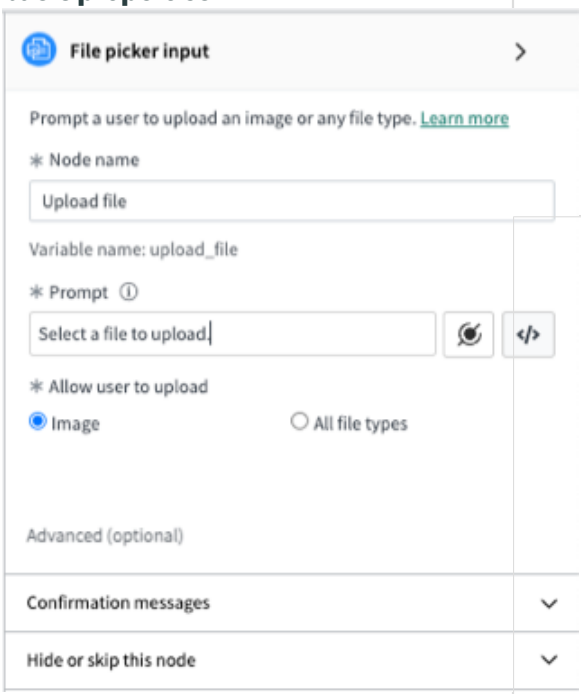
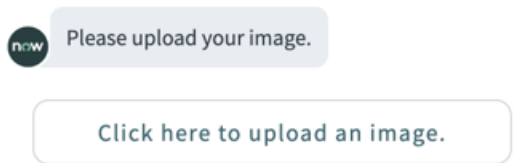
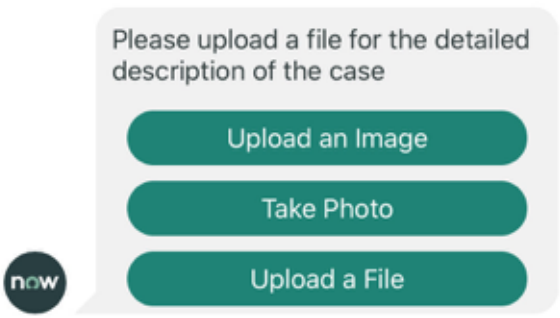
File Picker control in different client interfaces (continued)

Platform	Steps to select an image or file
Workplace	1. Select the Workplace image icon . 2. Select an image file from your local computer. All file types are supported.
ServiceNow mobile	1. Touch **Upload an image**. 2. Select an image file from the photo library on your mobile device. **Note:** The **Upload a file** button is only available when you enable the **All file types** file picker property.

Example of a File Picker user input control

Note:
Virtual Agent Designer controls may display and function differently in other channels.

File Picker properties	File Picker prompt
File Picker user input control basic properties  	**Web UI file picker prompt (image)**  **ServiceNow mobile file picker prompt** 

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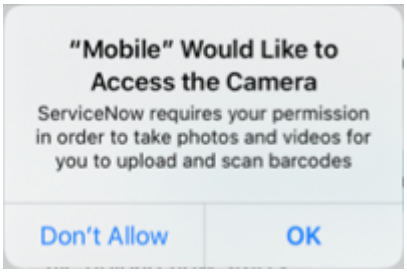
Channel support

The following table lists the details about the channel support for the File Picker user input control.

Channel support for the File Picker user input control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	Prompt that users see asking for permission for the app to access a camera or file system if the user has not already given the permission. 
Now Assist panel	Supported	None
Microsoft Teams	Supported	None
Slack	Supported	None
Workplace	Supported	None
Facebook Messenger	Supported	Supported file types are JPG, PNG, BMP, and MP4. The files have a maximum size limit based on the file type: • For images, the maximum size limit is 10 MB. • For videos, the maximum size limit is 200 MB.
SMS Twilio	Partial support	Image files only
LINE	Supported	Supported file types are JPG, PNG, BMP, and MP4. The files have a maximum size limit based on the file type: • For images, the maximum size limit is 10 MB. • For videos, the maximum size limit is 200 MB.
WhatsApp	Supported	None
Apple Messages for Business	Supported	None
Alexa (Voice)	Not supported	Not applicable

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Carousel user input control

Use the Carousel user input control in a Virtual Agent topic to present a prompt and a horizontal series of labeled images. The user can select a single item from the carousel.

Tip:
If you want to change the default number of listed items per page, you can modify the `com.glide.cs.picker_page_limit` system property. The default value is 10.

Carousel input control properties for LLM topic discovery

Property	Description
Node name	Name that identifies this Carousel user input control node in the topic flow.
Variable name	Name of the variable that stores the selection made by the user. The variable name is automatically created from the **Node name** property.
Detail description	Description of the information that you need from users.
Define carousel items	Use a script to create items for selection in your carousel. The script should return an array containing one or more items. See the Example carousel item expression section in this topic.
Advanced (optional)	
Enforce user prompt	
Enforce user prompt	Toggle to open the **User prompt** field. The value in the **User prompt** field is shown to users rather than the LLM-generated message. You can create custom messages using plain language, scripts, or define conditions with the data pill picker.
Additional instructions for LLM	Further instructions to the LLM, such as adding data formats, restrictions, or default values for user responses. You can create additional instructions in plain language, input a script, or define conditions with the data pill picker.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true. This field is not applicable when the Carousel node is used within the Input Collector node.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you

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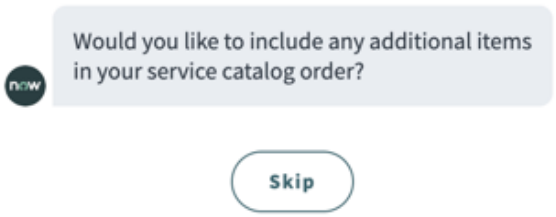
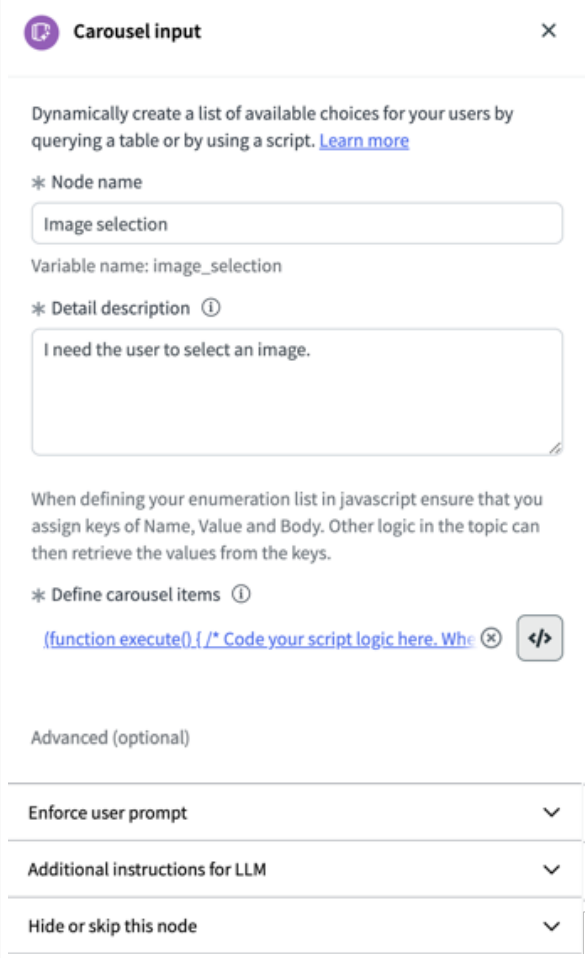
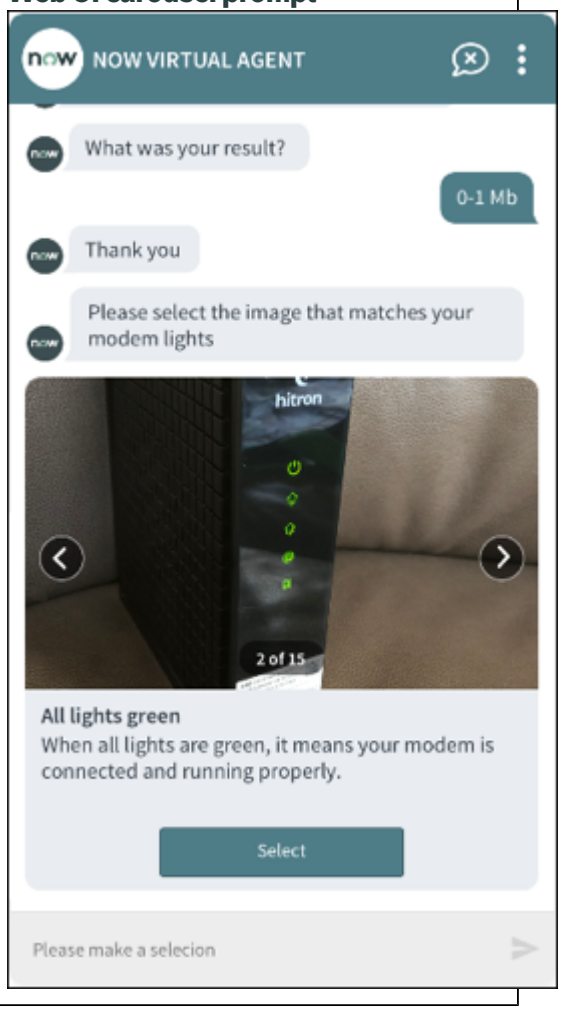
Property	Description
	can reply with an utterance such as `I want to skip this question`. 

Example Carousel input control for LLM topic discovery

Carousel properties	Carousel prompt
	**Web UI carousel prompt** 

Carousel input control properties for NLU topic discovery

Property	Description
Node name	Name that identifies this Carousel user input control node in the topic flow.

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Property	Description
Variable name	Name of the variable that stores the selection made by the user. The variable name is automatically created from the **Node name** property.
Prompt	Prompt or question for the user. The prompt can be either a text string or a script that returns text. This value is used only when the default value is not specified. For example: `What's your name?`
NLU entity	Option to associate an NLU entity with the node. If an NLU entity is associated with the input variable for this node, Virtual Agent can slot-fill the specified value based on the user's utterance. Select an entity from the list of entities associated with the topic intent. When you specify an entity for the node, the *Do not ask users to confirm recognized entity* toggle switch displays. When enabled, users are not prompted to confirm the extracted entity. This field is available only when NLU discovery is enabled on the instance.
Define carousel items	Use a script to create items for selection in your carousel. The script should return an array containing one or more items. See the Example carousel item expression section in this topic.
No records response message	Message to the user indicating that no records were found. The message can be either a text string or a script that returns text.
Advanced	
Default value	
Default value	Predefined value for the user response to the question or prompt. The response defined in the **Default value confirmation** field asks the user to confirm the default value. If the user responds with `no`, the value becomes null. The default value can be either a text string or a script that returns text. For example, if you're using dot-walking, the default value might be: `Script Variables > Last username`. Or if you're using a script, the default value might be: `{{vaScripts.lastUsername}}`.
Confirmation messages	
Input completion confirmation	Bot response shown to the user when the node interaction is complete. The message can be either a text string or a script that returns text. For example, if you're using dot-walking: `Thanks, (Input Variables > Username)!` Or if you're using a script, the acknowledgment might be: `Thanks, {{vaInputs.username}}!`.
Default value confirmation	Message that asks the user to verify that the value in the **Default value** field is correct. This message is used instead of a value in the **Prompt** field. It can contain either a text string or a script that returns text. For example, if you're using dot-walking: `Are you (Input Variables > Username)?` Or if you're using a script, the confirmation message might be: `Are you {{vaScripts.lastUsername}}?`.
Conversation switching	

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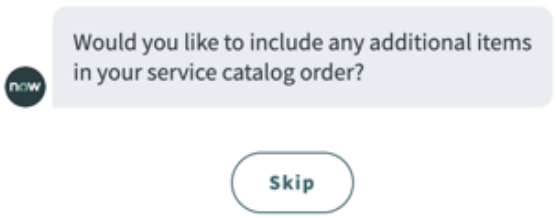
Property	Description
This section is available only when NLU discovery is enabled on the instance.	
Turn on to let users change the subject	Option to enable NLU prediction for this node. If enabled, users can enter text to answer questions, regardless of the type of input control being used. Virtual Agent uses this utterance to match another existing intent, letting the user switch topics.
Hide or skip this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 
Skip reprompting if	No-code condition statement or low-code script that specifies a condition for letting users skip reprompting in the conversation. When a preceding node is revisited through a topic loopback or Dialog Act, the Virtual Agent bypasses this node and automatically retain its original value.

Example Carousel input control for NLU topic discovery

Note:
Virtual Agent Designer controls may display and function differently in other channels.

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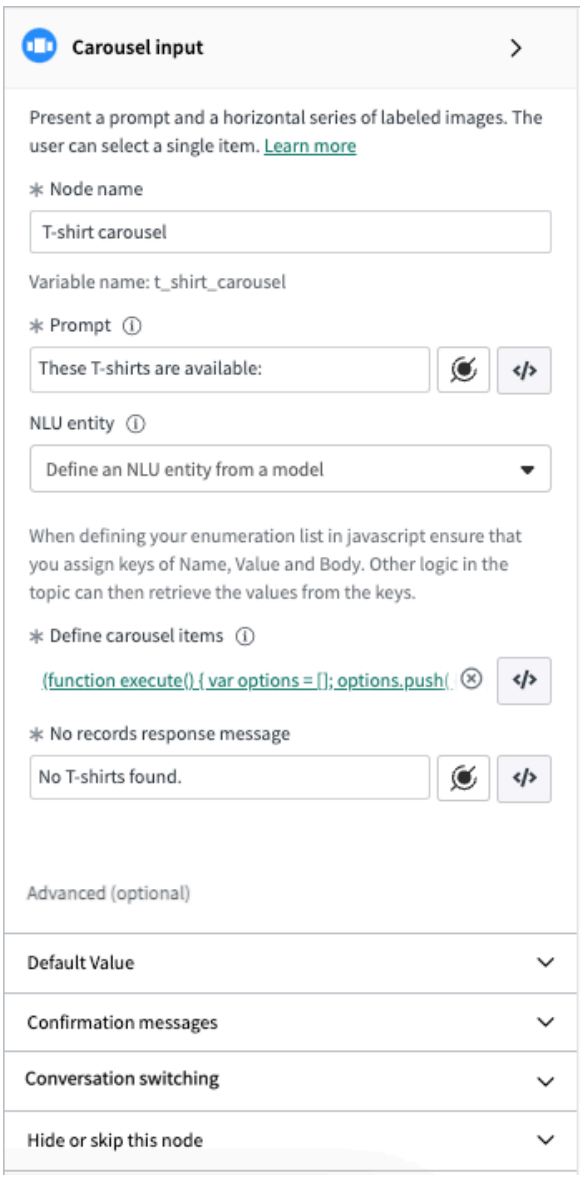
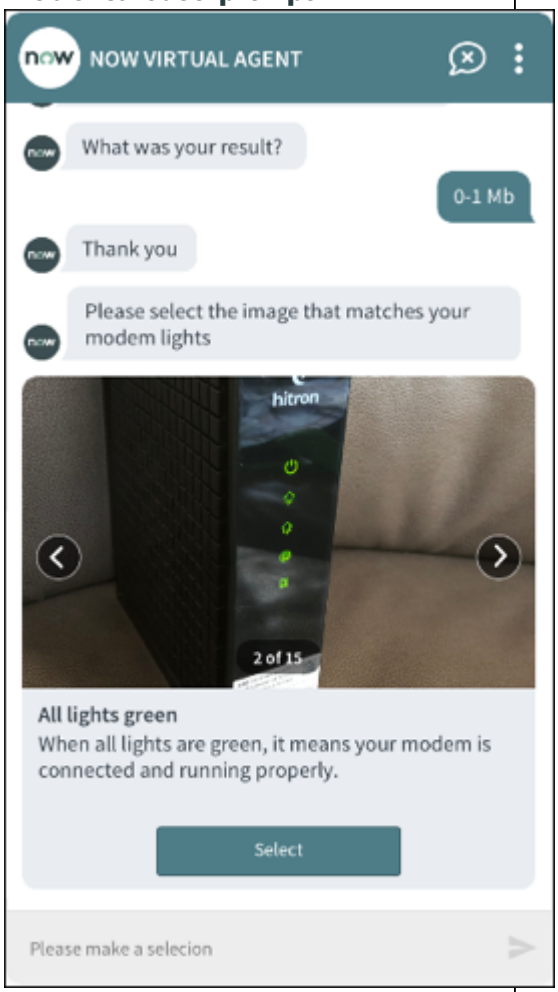
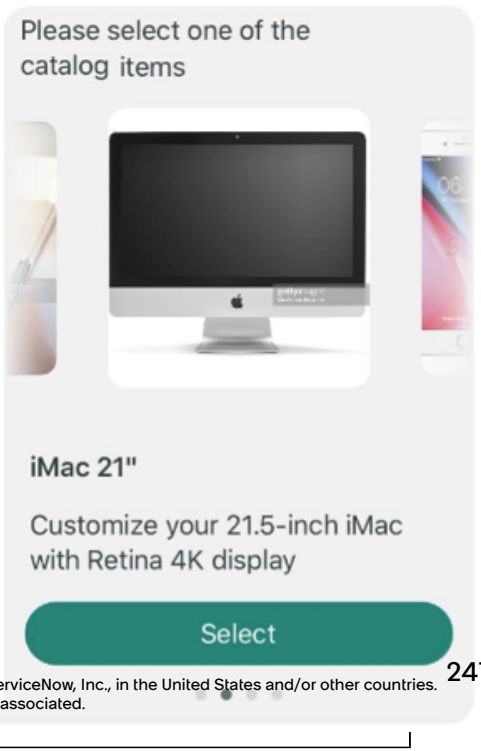
Carousel properties	Carousel prompt
	**Web UI carousel prompt**  **ServiceNow mobile carousel prompt** 

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Example carousel item expression

```
(function execute() {
    var options = [];
       options.push(
            {
                'Name': 'Item 1',
                'Value': 'item_1',
                'Description': 'Acme keyboard model 200',
                'Body':
 'https://images.pexels.com/photos/688666/pexels-photo-688666.jp
eg'
            }
       );
       options.push(
            {
                'Name': 'Item 2',
                'Value': 'item_2',
                'Description': 'Acme keyboard model 300',
                'Body':
 'https://images.pexels.com/photos/916472/pexels-photo-916472.jp
eg'
            }
       );
       return options;

})()
```

The script in the *Carousel Item Expression* property defines and returns an array containing the items that appear in your carousel. The elements of this array must contain `name`, `value`, and `body` keys. In the example, the script creates an array called `options` and adds two elements, each with the required keys. The images here are hard-coded as an example.

Example code key

Key	Description
Name	Name of the carousel item. This name is shown below the image on the carousel.
Value	Value for the item. When a user selects a carousel item, this value is stored in the variable named in the *Variable name* property.
Description	Text string that describes the carousel item. The description is shown below the image name. A carousel with more than three items displays left and right arrows for scrolling through the images and a **Select** button under each item. If a description is over 140 characters, users can expand the content.
Body	Image used in the carousel item. The value is a URL for an image file.

Channel support

Channel support for the Carousel user input control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None

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Channel support for the Carousel user input control (continued)

Channel	Support	Constraints
Now Assist panel	Supported	None
Microsoft Teams	Supported	None. If the carousel contains more than 10 items, users must select **Next** to review the remaining items.
Slack	Supported	None
Workplace	Supported	None
Facebook Messenger	Supported	The title for an image has a maximum limit of 40 characters. The text for the image has a maximum character limit of 60 characters. A user can view only 10 images at a time. If there are more than 10 images, the pagination format is used to view more options. The default value of the maximum number of images in a carousel for a page is set in the *sn_va_fb_messenger.max_carousel_cards* system property. This property is found in the System Properties [sys_properties] table.
SMS Twilio	Not supported	Not applicable
LINE	Supported	The title for an image has a maximum limit of 40 characters. The text for the image has a maximum character limit of 60 characters. A user can view only 10 images at a time. If there are more than 10 images, the pagination format is used to view more options. The default value of the maximum number of images in the carousel for a page is set in the *sn_va_line.max.carousel.cards* system property. The property is located in the System Properties [sys_properties] table.
WhatsApp	Supported	None
Apple Messages for Business	Supported	None
Alexa (Voice)	Supported	For screen devices, use touch scroll. For nonscreen devices, use voice pagination.

Secure Text user input control

The Secure Text control provides a means to encrypt sensitive information provided as simple text or other formats. Use this control to encrypt sensitive information in topics that use large language model (LLM) discovery.

Use this control to gather and encrypt user information for topics using large language model (LLM) topic discovery. The Secure Text input also avoids sensitive information from being sent through an LLM.

Secure Text user input control properties

Property	Description
Node name	Name that identifies this Secure Text user input control node in the topic flow.

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Property	Description
Prompt	Text string or script that returns text. This value is used only when the default value isn't specified. For example: `What is your password?`
Input format	Text format that is validated when a user enters certain text items. When the input isn't valid, the bot asks the user to reenter the text. Choose the format of the text item to be validated: • Text: Any text string (no validation). • Email: Format that consists of an email prefix (user name), the @ symbol, and domain. • IP address (IPV4, IPV6): Data communication delivery format for internet Protocol version 4 or version 6. • Phone number (E.164): Internationally recognized standard phone number format. • URL: Web address format. • Custom: A script that provides a validation rule for a custom text format. The script should include related error messages that are displayed when the expected format isn't entered. For phone and IP address format examples, see E.164 phone formats and IP address field types.
Hash function	The method digest algorithm based on the standard WS-Security specification.
Encryption salt	Random data that is used as an additional input to a one-way function that hashes data.
Advanced	
Default value	A value for the user response to the prompt. For example, if you already know the user name, the default value might be `(Script Variables > Last username)`.
Confirmation messages	
Input completion confirmation	Bot response shown to the user when the node interaction is complete. The message can be either a text string or a script that returns text. For example, if you're using dot-walking: `Thanks, (Input Variables > Username)!` Or if you're using a script, the acknowledgement might be: `Thanks, {{vaInputs.username}}!`
Default value confirmation	Message that asks the user to verify that the value in the Default value field is correct. This message is used instead of a value in the Prompt field. For example: `Are you (Script Variables > Username)?`
Hide or skip this node	
Conditionally show this node	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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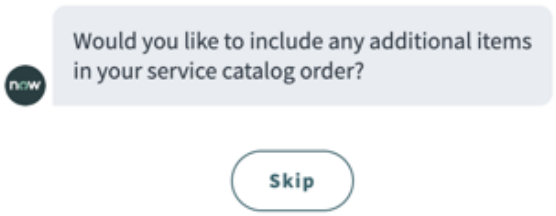
Property	Description
Allow user to skip this node if	No-code condition statement or low-code script that specifies a condition for letting users skip this node in the conversation. The condition must evaluate to true. You can set this field using either the condition builder or a script. When this field is active, the node presents the user with a **Skip** option in the Virtual Agent conversation. Alternatively, in an LLM topic, you can reply with an utterance such as `I want to skip this question`. 
Skip reprompting	No-code condition statement or low-code script that specifies a condition for letting users skip reprompting in the conversation. When a preceding node is revisited through a topic loopback or Dialog Act, the Virtual Agent bypasses this node and automatically retain its original value.

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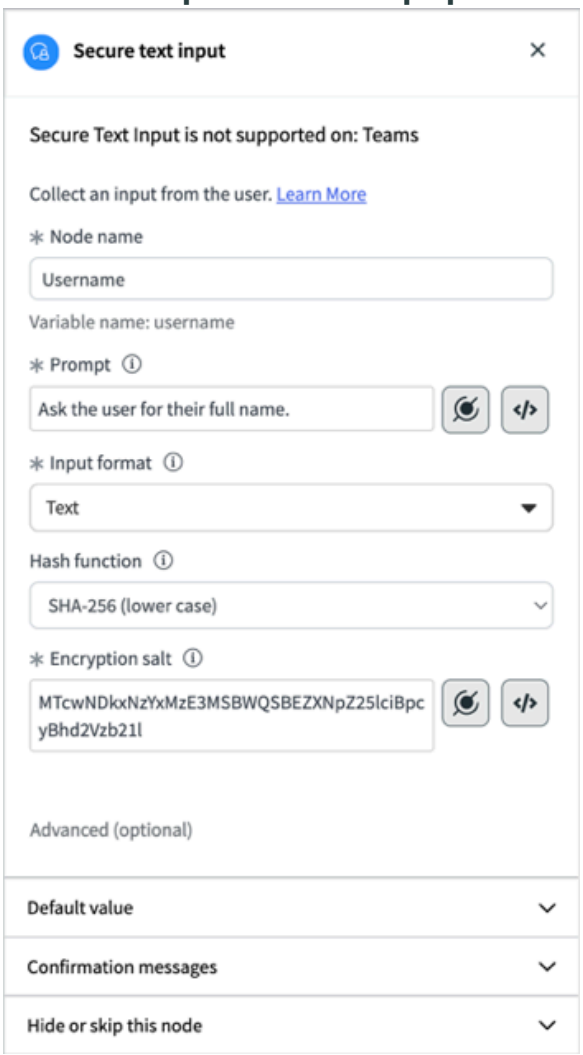
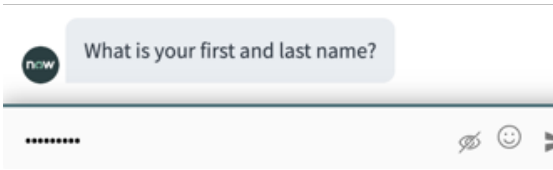
Example Secure Text user input control

Input properties	Input prompt
Secure Text input control basic properties  	**Web UI Secure Text user input prompt** 

Channel support

Note:
Virtual Agent Designer controls may display and function differently in other channels.

Channel support for the Text user input control

Channel	Support	Constraints
Web UI	Supported	None.
Mobile UI	Supported	None.
Now Assist panel	Supported	None.
Microsoft Teams	Supported	None.

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Channel support for the Text user input control (continued)

Channel	Support	Constraints
Slack	Supported	Slack users can edit text previously entered in a conversation. However, Virtual Agent processes messages as they're first entered. If a Slack user edits text input, such as a comment to update a case, then Virtual Agent doesn't evaluate the edited update.
Workplace	Supported	None.
Facebook Messenger	Supported	The maximum character limit is 5000 characters.
SMS Twilio	Supported	None.
LINE	Supported	The maximum character limit is 5000 characters.
WhatsApp	Supported	None.
Apple Messages for Business	Supported	None.
Alexa (Voice)	Supported	For screen devices, character limits may apply. For more information, see the Alexa developer documentation.

Virtual Agent Designer bot responses

Virtual Agent Designer offers various controls for displaying bot responses in a conversation. Because the bot responses occur in third-party platforms, the format for each output may vary.

The following bot response controls are available for use within a Virtual Agent topic.

Text bot response control

Use the Text bot response control in a Virtual Agent topic to display a bot response as text. You can format the Text bot responses using the text editor controls. For example, you can bold or italicize the text, as well as include links, bulleted lists, and emojis.

Text bot response properties

Property	Description
Node name	Name that identifies this Text bot response node in the topic flow.
Response message	The Text bot response to the user. The response can be one of the following: • Rich text message. • Script, which can include Glide record variables or script variables. **Note:** The script can also include a temporary password for the end user. You can format the text messages using the text editor controls. For example, you can use the icons on the **Response Message** field to bold or italicize the text, as well as include links, bulleted lists, numbered lists, and emojis.

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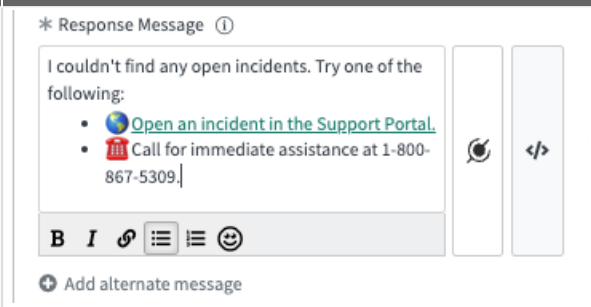
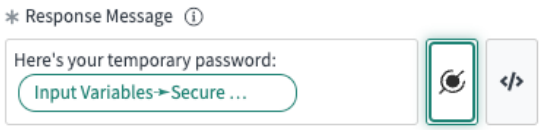
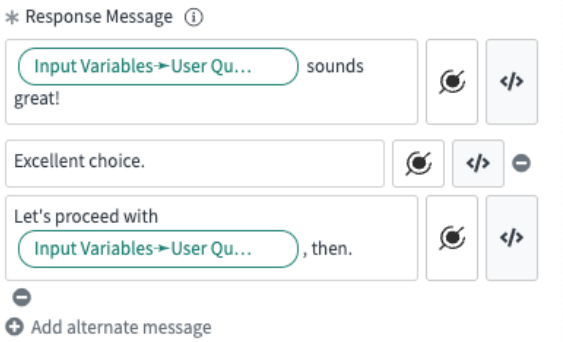
Property	Description
	 You can also include an input variable, such as a temporary password, in the response message.  To include a link, do one of the following: • Click the link icon: . • Add your response message. Select the text to use as a link, and then click the link icon. Fill in the fields in the Confirmation window. Enter the text to use as the link, and then enter the URL in the Link field. Enter the display label for the link and a static URL, or use the data pill picker to create a dynamic URL.
Add alternate message	Add one or more alternate response messages for the user. Virtual Agent randomly chooses one of your responses for each conversation. 
Advanced	
Make this response secure	
Enable	When enabled, the bot response is displayed to the user, but thereafter securely masked and not viewable by others.
Hide this node	

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Property	Description
Conditionally show this node if	A no-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Channel support

Channel support for the Text bot response control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Supported	None
Microsoft Teams	Supported	None
Slack	Supported	None
Workplace	Supported	None
Facebook Messenger	Supported	Plain text string only
SMS Twilio	Supported	None
LINE	Supported	None
WhatsApp	Supported	None
Apple Messages for Business	Supported	None
Alexa (Voice)	Supported	For screen devices, full support. For nonscreen devices, the header is read.

Example Text bot response script

In this example, the script returns a string that greets the user. The *`gs.getUser().getFirstName()`* property is used to append the first name of the current user.

```
(function execute() {
    return 'Hello ' + gs.getUser().getFirstName();
})()
```

In this example, the script returns links to three instances in the response. Use **Markdown** to include multiple links in the script.

```
(function execute() {
    var output = 'Hello\n';
    output += '\n- [Instance 1](http://instance1.com)';
    output += '\n- [Instance 2](http://instance2.com)';
    output += '\n- [Instance 3](http://instance3.com)';
    return output;
})()
```

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Example Text bot response control

Note:
Virtual Agent Designer controls may display and function differently in other channels.

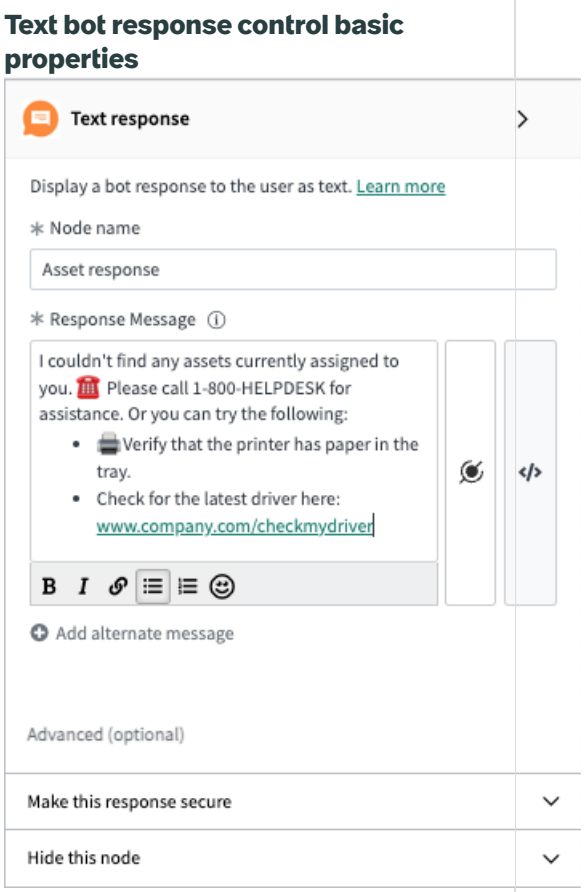
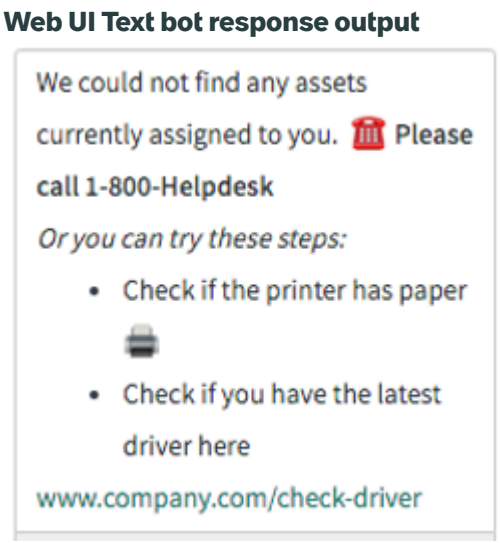
Response properties	Text bot response output
	

Image bot response control

Use the Image bot response control in a Virtual Agent topic to upload and display an image from a URL link. The image aspect ratio determines how the image is sized in the bot chat bubble.

Image bot response control properties

Property	Description
Node name	Name that identifies this Image bot response control node in the topic flow.
Image URL link	The URL link to an image file you want to include in the conversation. To set a value, do one of the following: • Specify the image URL by using the text field, data pill, or script. • Upload an image by clicking **Upload Image**. If you upload an image, then the selected image is uploaded to the server and is stored in the Images [sys_db_image] table and in the update sets. When the

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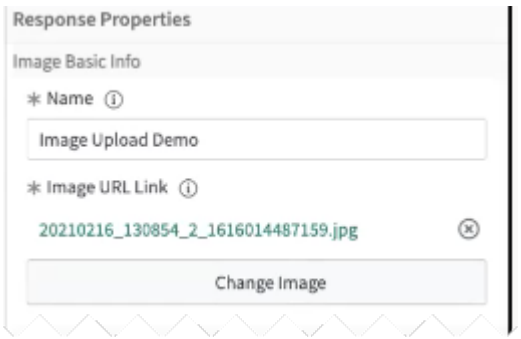
Property	Description
	image is stored in the Images table and the update sets, then you can use the image in a production or non-production instance, as needed. After the image is uploaded, the URL link is included in the**Response Properties** sheet:  Click the link to view the image. The URL is generated dynamically. The name of the instance is inserted at the front of the URL path. You can change or delete the link to the image. If you delete the link on this property sheet, only the reference to the URL is deleted. The image remains on the server for future use.
Image alt text	Alternative, screen-readable text included for accessibility. This text is used along with the image. Enter the text using the text field, data pill, or script. For more information about using data pills or scripts, see Virtual Agent Designer controls.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Channel support

Channel support for the Image bot response control

Channel	Support	Constraints
Web UI	Supported	The maximum image size is determined by the *com.glide.attachment.max_size* system property. The default value is 1024 MB.
Mobile UI	Supported	The maximum image size is determined by the *com.glide.attachment.max_size* system property. The default value is 1024 MB.
Now Assist panel	Not supported	Not applicable
Microsoft Teams	Supported	None

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Channel support for the Image bot response control (continued)

Channel	Support	Constraints
Slack	Supported	For details about the maximum image size allowed, check the Slack documentation.
Workplace	Supported	For details about the maximum image size allowed, check the Workplace documentation.
Facebook Messenger	Supported	For details about the maximum image size allowed, check the Facebook Messenger documentation.
SMS Twilio	Supported	File size limits may vary. For Twilio limitations, check their Accepted Content Types for Media.
LINE	Supported	File size limits may vary. For details, see the LINE documentation.
WhatsApp	Supported	File size limits may vary. For details, see the WhatsApp documentation.
Apple Messages for Business	Supported	None
Alexa (Voice)	Partial support	Supported on devices with screens. For nonscreen devices, the user receives a message: `We found an image`. For details, see Fine-tune Virtual Agent settings and topics for the best Alexa voice chat experience.

Example Image bot response control

Note:
Virtual Agent Designer controls may display and function differently in other channels.

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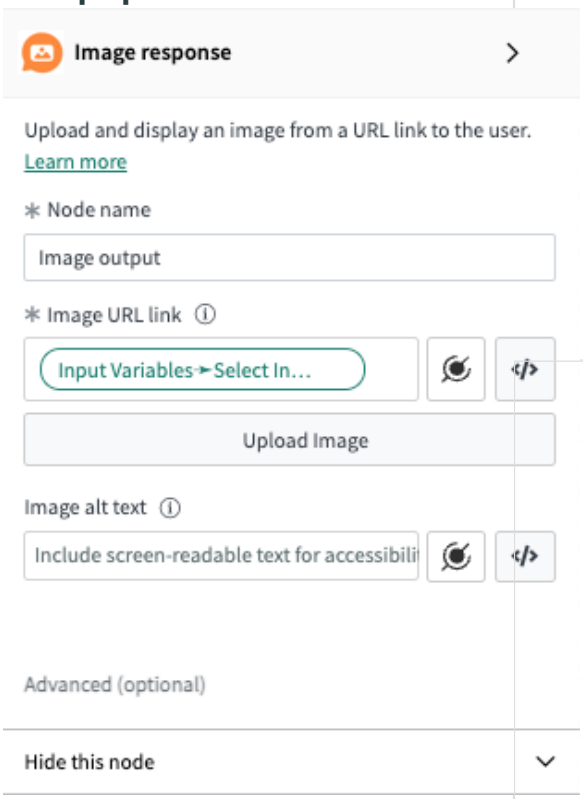
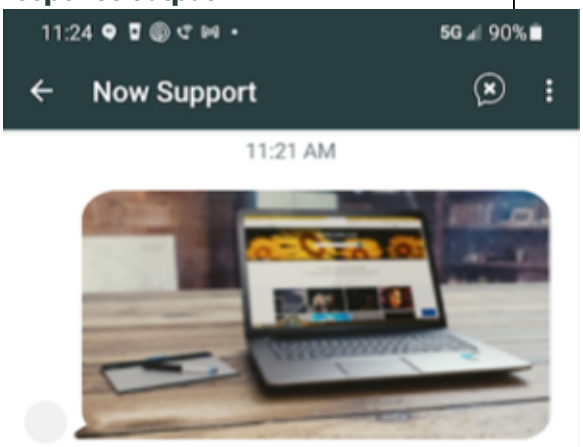
Response properties	Image bot response output
Image bot response control basic properties 	**Web UI Image bot response output**  **ServiceNow mobile Image bot response output** 

Link bot response control

Use the Link bot response control in a Virtual Agent topic to present a bot response. The response contains a header prompt with either a single URL link to an item or multiple URL links for up to three items.

Note:
If you are using the link bot response control for Virtual Agent conversations on Now mobile apps, web links open in the mobile browser. If you want links to open in a native mobile screen within the mobile app, create deep links for items in your conversation topics. For details about deep linking in mobile apps, see the MobileDeepLinkGenerator - Global API.

Link bot response control properties

Property	Description
Node name	Name that identifies this Link bot response control node in the topic flow.
Link list	Type of links returned in the output result.

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Property	Description
	• Select **Single Link** to return one item in the output results. • Select **Multiple Links** to return up to three items in the output results.
Single link properties	
Header	Message displayed above the URL link. The message can be a string with variables or a script.
Label	Text that identifies a single link in the bot bubble. The text can be a string with variables or a script.
Link	Link to a single item, such as a website page or a particular record. The link can be a string with variables or a script that returns a valid URL as a string. For example, you can enter the complete URL, such as `https://servicenow.com`.
Multiple links properties	
Header Message	Text prompt that is displayed above the list of links. The prompt can be a string with variables or a script.
Link List Value Expression	Script that creates a list of links to display. The script includes the following parameters: link URL, link display label, link description, and link context.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Channel support

Channel support for the Link bot response control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Supported	None
Microsoft Teams	Supported	None
Slack	Supported	None
Workplace	Supported	None
Facebook Messenger	Supported	The web link appears as a URL button in the conversation.
SMS Twilio	Supported	None
LINE	Supported	None
WhatsApp	Supported	None

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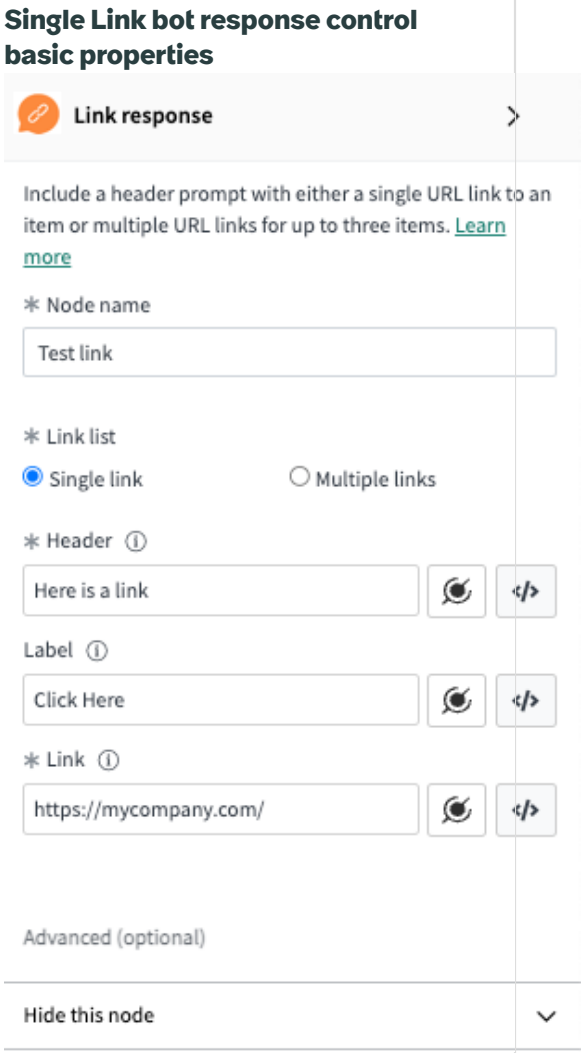
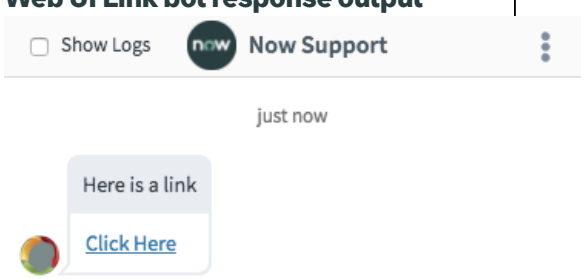
Channel support for the Link bot response control (continued)

Channel	Support	Constraints
Apple Messages for Business	Supported	Any URLs must be added to the allowed domain list [sys_cs_hostname_allow_list] table.
Alexa (Voice)	Partial support	Supported on devices with screens. For nonscreen devices, the user receives a message: `We found a link`. For details, see Fine-tune Virtual Agent settings and topics for the best Alexa voice chat experience.

Example single-link bot response control

Note:
Virtual Agent Designer controls may display and function differently in other channels.

Single link bot response properties	Link bot response output
	

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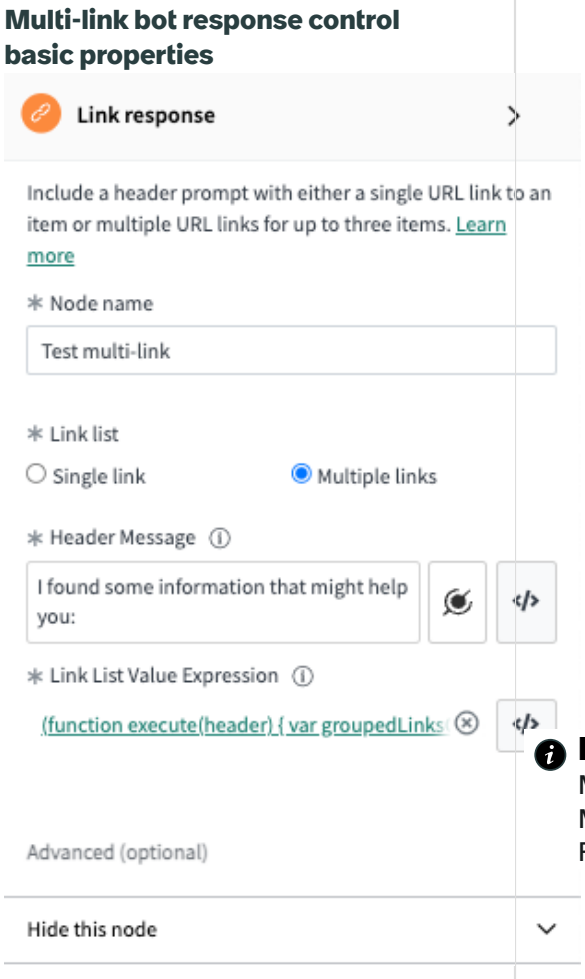
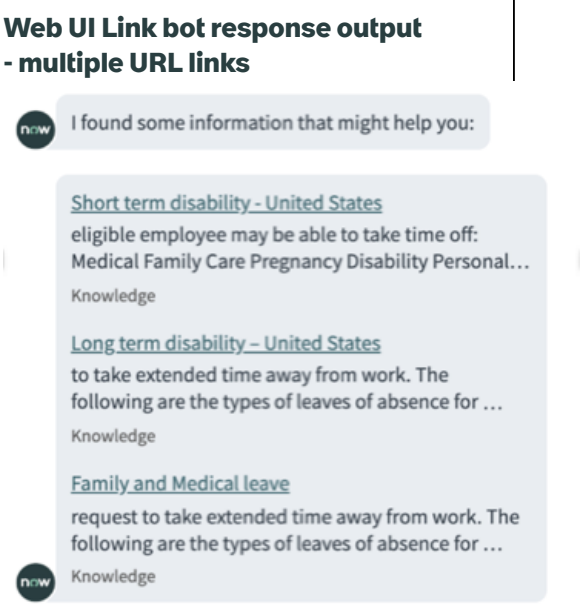
Example multiple-link bot response control properties

Multi-link bot response properties	Link bot response output
	

Note:
Multi-link bot output is also supported in Microsoft Teams, Slack, Workplace, and Facebook Messenger.

HTML bot response control

Use the HTML bot response control to display static HTML text in the Virtual Agent bot response.

Note:
If you created conversations in earlier releases that use this bot response control to generate card layouts, consider updating your conversations to use the Card bot response control. The Card displays information from a record in your instance and contains a link to that related record.

Security considerations for HTML markup

For security reasons, an HTML sanitizer script runs automatically and checks all HTML markup used in the instance, including Virtual Agent conversations. The sanitizer script removes elements or attributes that might enable cross-site scripting attacks. You can edit the HTML sanitizer script to change the list of markup items to be preserved or removed. For details, see HTML sanitizer. For examples of adding markup items to the exclusion or inclusion lists, see Configure HTML sanitizer.

To disable the HTML sanitizer script only for Virtual Agent conversations, add the *com.glide.cs.html.sanitizer.enabled* system property and set the value to false. For details about creating a system property, see Add a system property.

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HTML bot response control properties

Property	Description
Node name	Name that identifies this HTML bot response control node in the topic flow.
HTML message	HTML output to be displayed. Click the Script icon </> to open the HTML editor and enter the HTML text.
Height (Pixel)	Maximum height of the area for displaying HTML output in third-party messaging applications.
Width (Pixel)	Maximum width of the bot bubble for displaying HTML output in third-party messaging applications.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Channel support

Note:
As shown in the examples, HTML output can vary in third-party messaging applications. Determine an appropriate **Height** and **Width** area by setting initial height and width values, previewing the HTML output in the messaging applications you intend to use, and then adjusting the height and width values.

Channel support for the HTML bot response control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Supported	None
Microsoft Teams	Supported	Since HTML is rendered as an image in Microsoft Teams, other controls are recommended. For example, use images or cards instead of HTML for Microsoft Teams.
Slack	Supported	None
Workplace	Supported	None
Facebook Messenger	Not supported	Not applicable
SMS Twilio	Not supported	Not applicable

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Channel support for the HTML bot response control (continued)

Channel	Support	Constraints
LINE	Not supported	Not applicable
WhatsApp	Not supported	Not applicable
Apple Messages for Business	Not supported	Not applicable
Alexa (Voice)	Partial support	Supported on devices with screens. For nonscreen devices, the user receives a message: `We found a link`. For details, see Fine-tune Virtual Agent settings and topics for the best Alexa voice chat experience.

Example HTML bot response output

The HTML bot response shows a static HTML as a chat response. This example includes an image, headings, and paragraph text. The web UI presents this content as HTML. The Slack, Microsoft Teams, and Workplace user interfaces display the same content as a PNG image. URL links within the HTML are extracted and displayed below the image. The URL can be either an absolute or a relative link. If you use a relative link, it must be relative to the ServiceNow instance.

Note:
Virtual Agent Designer controls may display and function differently in other channels.

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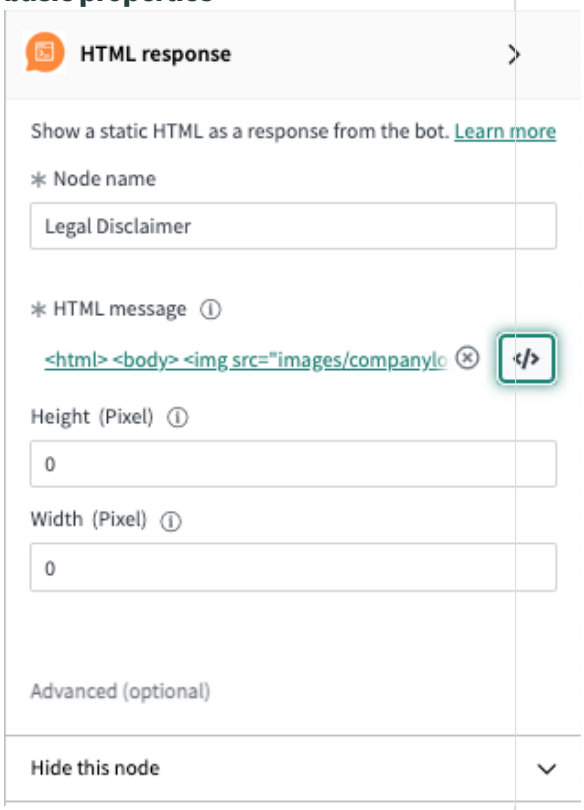
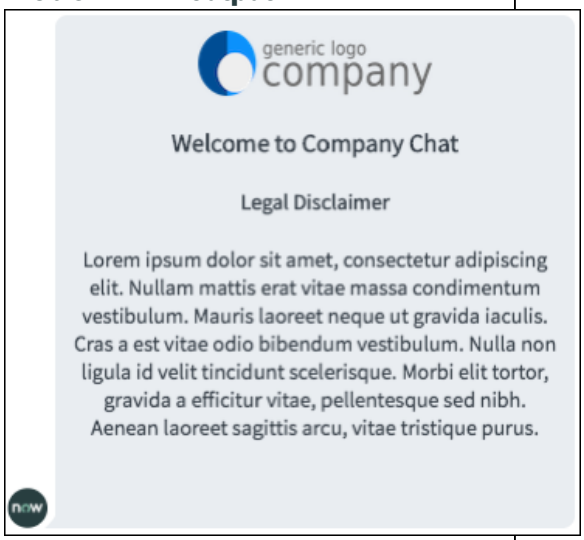
HTML bot response properties	HTML bot response output
HTML bot response control basic properties 	**Web UI HTML output** 

Multi-response bot response control

Use the Multi-response bot response control in a Virtual Agent topic to sequentially display two or more outputs. Outputs can be text, image, link, or HTML. Users can move from one output to the next through a provided navigation button.

Multi-response bot response control properties

Property	Description
Node name	The name that identifies this Multi-response control node in the topic flow.
Add a response	One or more bot responses. For each output type, select **+ Add a Response** to specify the output and define the output properties. **1.** In the Add a Response dialog box, select the **Type**, and specify the associated values: ○ **Text**: In the **Value** field, enter the text to be displayed in the response. ○ **HTML**: Enter the **Height** and **Width**, in pixels, to set the dimensions of the HTML block. In the HTML editor, enter the HTML markup to be displayed.

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Property	Description
	○ **Image**: Enter a URL in the **Image** field, or select **Upload Image** and choose the image file to upload. ○ **Link**: Enter the **Header**, **Label** (label for the link), and the **Link** (path or URL for the link). **2.** Select **Save**.
Advanced	
Navigation button label	
Label the button that lets the user continue the conversation	The label for the button displayed below the output. The button enables the user to move to the next output in the flow.
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Channel support

Channel support for the Multi-response bot response control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Not supported	Not applicable
Microsoft Teams	Supported	None
Slack	Supported	None
Workplace	Supported	None
Facebook Messenger	Not supported	Not applicable
SMS Twilio	Not supported	Not applicable
LINE	Not supported	Not applicable
WhatsApp	Not supported	Not applicable
Apple Messages for Business	Not supported	Not applicable

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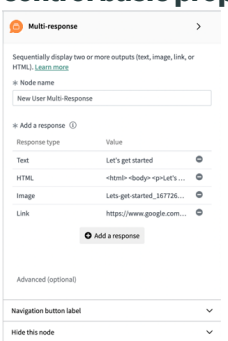
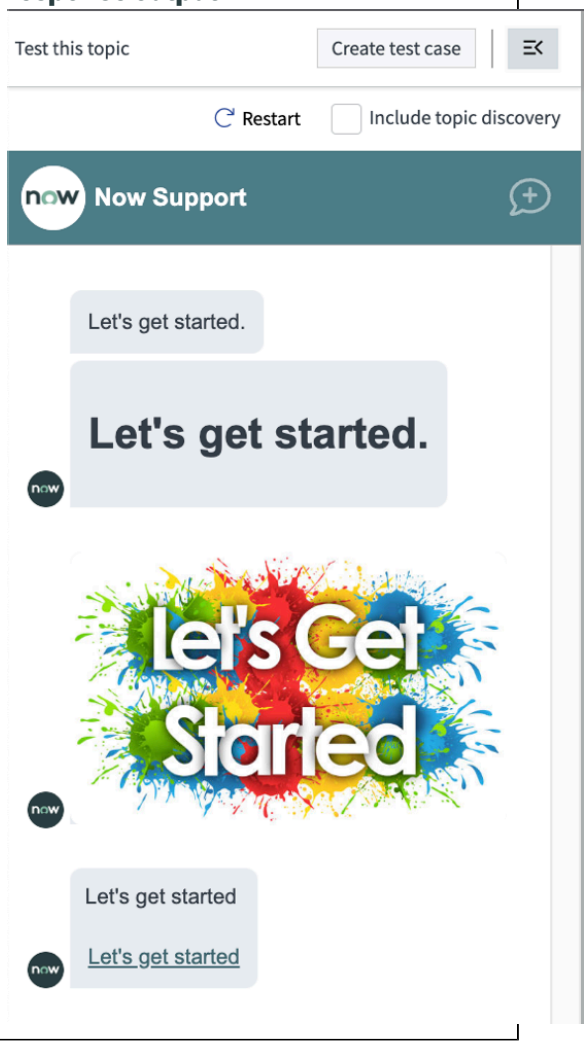
Channel support for the Multi-response bot response control (continued)

Channel	Support	Constraints
Alexa (Voice)	Partial support	Supported on devices with screens. For non-screen devices, the user receives a message if unsupported elements are used: `We found a link`. For details, see Fine-tune Virtual Agent settings and topics for the best Alexa voice chat experience.

Example Multi-response control

Note:
Virtual Agent Designer controls may display and function differently in other channels.

Output properties	Multi-response output
Multi-response bot response control basic properties 	**Web UI Multi-response bot response output** 

Script bot response control

Use the Script bot response control in a Virtual Agent topic to run a script that returns a single response or a multi-part response.

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Use the Script bot response control when creating a more complex response that relies on scripted calculations or requires a multi-part response. Scripted output can include text, image, cards, links, and HTML to create a versatile response.

Script bot response control properties

Property	Description
Node name	The name that identifies this Script bot response control node in the topic flow.
Script output type	The type of output returned by the script, either single-part or multi-part.
Script response message	The script that generates the selected output type.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Channel support

Channel support for the Script bot response control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Not supported	Not applicable
Microsoft Teams	Supported	None
Slack	Supported	None
Workplace	Supported	None
Facebook Messenger	Not supported	Not applicable
SMS Twilio	Not supported	Not applicable
LINE	Not supported	Not applicable
WhatsApp	Not supported	Not applicable
Apple Messages for Business	Not supported	Not applicable

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Channel support for the Script bot response control (continued)

Channel	Support	Constraints
Alexa (Voice)	Partial support	Support depends on the type of response. For example, images and links may only be available on devices with screens. For details, see Fine-tune Virtual Agent settings and topics for the best Alexa voice chat experience.

Example script

In this example, the script calculates the time two hours from the current time and outputs a multi-part message that includes this information.

```
(function execute() {
      var gdt = new GlideDateTime();
      var gt = new GlideTime();
      gdt.addSeconds(7200);
      gt = gdt.getTime();
      var multiOutMsg = new sn_cs.MultiPartOutMsg();
      multiOutMsg.addPlainTextPart('Thank you for submitting an
 incident.');
      multiOutMsg.addPlainTextPart('You should receive a
 response from a technician by ' + gt.getByFormat('HH:mm'));
      return multiOutMsg;
})()
```

Example Script bot response control

Note:
Virtual Agent Designer controls may display and function differently in other channels.

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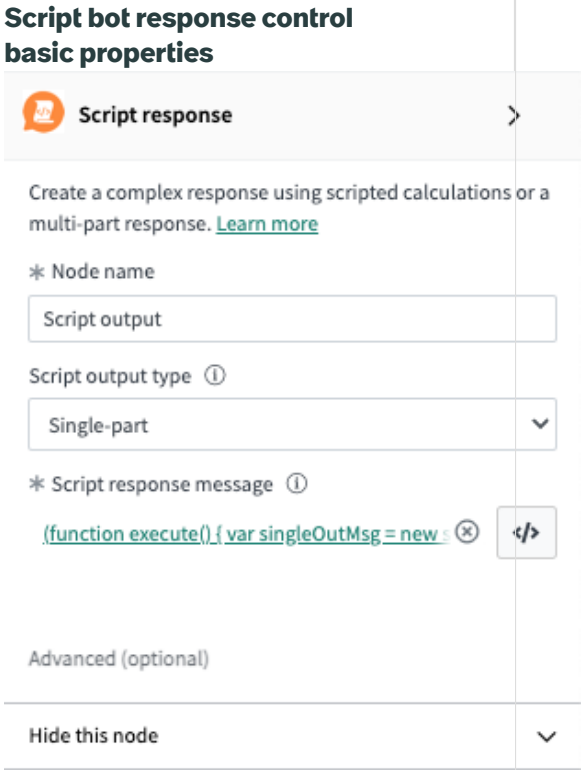
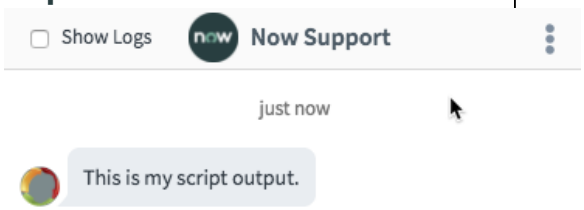
Script properties	Script bot response output
	

Card bot response control

Use the Card bot response control in a Virtual Agent topic to upload and display selected information from a record on your instance, along with rich content, such as a video or image.

A card can contain record information, an image, or a YouTube video content in a compact format. The compact format is designed for readability within the chat window.

The Card bot response can show the following types of content:

- Record: Displays content from a single record on your instance. This record can be referenced from variables in the flow or queried using a script that returns a single Glide record from a selected table. The record content includes the display field for the table at the top of the card, followed by any other fields specified by the properties of the bot response.
- Image: Displays a large or small image that you provide, along with a title and description. The property sheet provides a pre-configured template for the card layout. Specify the title, description, and the image source.
- YouTube video: Displays in an inline video player if supported on the channel. The image is displayed along with a title, description, and hyperlink to relevant content.

  In the Washington DC release, only YouTube videos are supported.

Tip:
You can also use the Video bot response control to include YouTube videos in conversations. The Video bot response control includes a navigation button that pauses the conversation. If you want the user to watch the video before continuing with the conversation, use this navigation button. When users have finished watching the video, they can click this navigation button to continue with the conversation.

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Note:
If you previously created conversations that use the HTML bot response control to generate card layouts, consider updating your conversations to use the Card bot response control. The Card displays information from a record in your instance and contains a link to that related record. Or, it can display images and can include rich content such as a video.

Card bot response control properties

Property	Description
Node name	Name that identifies this Card bot response control node in the topic flow.
Card type	Type of card to be used. Choose one of the following options: • **Record** • **Large image with text** • **Small image with text** • **YouTube Video Card** **Note:** In the Washington DC release, only YouTube video cards are supported.
Type: Record	
Record	Reference to a specific record. Data for the card comes from a record referenced in a variable from another node in the flow. For example, the reference could be a Choice List or Glide Action. **1.** Select a variable from the current flow that contains a record object. **2.** Use the **fields** list to determine the fields displayed in the card.
Table	Table that references a single Glide record that contains the data shown in the card.
Filter this table by using	Enter the condition or script to filter data in the table and return the record. • **Condition**: Condition statement that returns the table record. • **Script**: Glide record query that returns the glide record.
fields	Fields from the ServiceNow record to be displayed in the card. Specify each field by clicking **Add Field**. **Note:** If you're using Workplace, a maximum of four fields is rendered on the card. If you have more than four fields, the remaining fields are displayed on a subsequent card, with up to four fields per card.
Type: Large image with text or Small image with text	
Template	A visual representation that shows the image card layout. Each area of the template is numbered.

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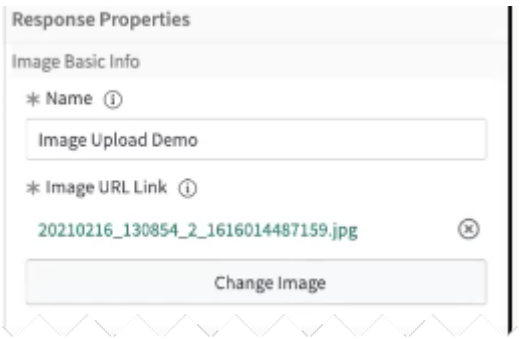
Property	Description
Map data to fields on the card	Fields that correspond to the numbers shown on the template. These fields are the following: 1. **Title**: Name or label for the card 2. **Description**: Explanation of the image 3. **Image URL link**: Specify the image displayed in the card in one of the following ways: ○ Specify the image URL, using the text field, data pill, or script. ○ Upload the image by clicking **Upload Image**. If you upload an image, the selected image is uploaded to the server and is stored in the Images [sys_db_image] table and in the update sets. When the image is stored in the Images table and the update sets, you can use the image in a production or non-production instance, as needed. After the image is uploaded, the URL link is included in the**Response Properties** sheet.  Click the link to view the image. The URL is generated dynamically. The name of the instance is inserted at the front of the URL path. You can change or delete the link to the image. If you delete the link on this property sheet, only the reference to the URL is deleted. The image remains on the server for future use. 4. **Image alt text**: Alternative, screen-readable text that describes the image for accessibility programs. This text is used along with the image. Enter the text using the text field, data pill, or script.
Type: YouTube Video card	
Template	A visual representation of the layout of the video included in the card.
Map data to fields on the card	Fields that correspond to the numbers shown on the template. These fields are the following: • **Title**: Title of the card. • **Title Link**: URL to any relevant content. • **Description**: Description the card, such as the topic the video addresses.

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Property	Description
	• **YouTube Video ID**: Unique identifier for the video used in the card. This identifier is the string following the equal sign (=) at the end of the video's URL path. For example, in the path shown below, the video identifier is `FVgtjdEOa5M`.  
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Channel support

Channel support for the Card bot response control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Partial support	Record cards and record cards with action only.
Microsoft Teams	Supported	The video control displays a thumbnail image of the video that users select to open the video in their preferred web browser.
Slack	Supported	Conversational Integration with Slack Version 2.0.0 and later. The video control displays a thumbnail image of the video that users select to open the video in their preferred web browser.
Workplace	Partial support	Image card output not available. Facebook apps no longer support vertical list templates. The card layout uses a horizontal, scrollable carousel template effective August 15, 2019. Cards also feature a button template.
Facebook Messenger	Supported	None
SMS Twilio	Supported	Records and image cards only.
LINE	Partial support	Records and image cards only.
WhatsApp	Partial support	Records and image cards only.
Apple Messages	Supported	None

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Channel support for the Card bot response control (continued)

Channel	Support	Constraints
for Business		
Alexa (Voice)	Partial support	Some types of output are only available on devices with screens. For nonscreen devices, the card title is read. For details, see Fine-tune Virtual Agent settings and topics for the best Alexa voice chat experience.

Example Glide record query

```
(function execute(table) {
    /* Write a glide record query, and return the glide record.
       For example:

       var now_GR = new GlideRecord(table);
       gr.addEncodedQuery('active=true^number=INC0010099');
       gr.query();
       if(gr.next()) {
          return gr;
    }
    */
})(table)
```

In this example, the script creates a GlideRecord object, populates this object using a query that should return a single result, then returns the object. The **Table** property defines the table used in this query.

Example Card bot response output for records

Note:
Virtual Agent Designer controls may display and function differently in other channels.

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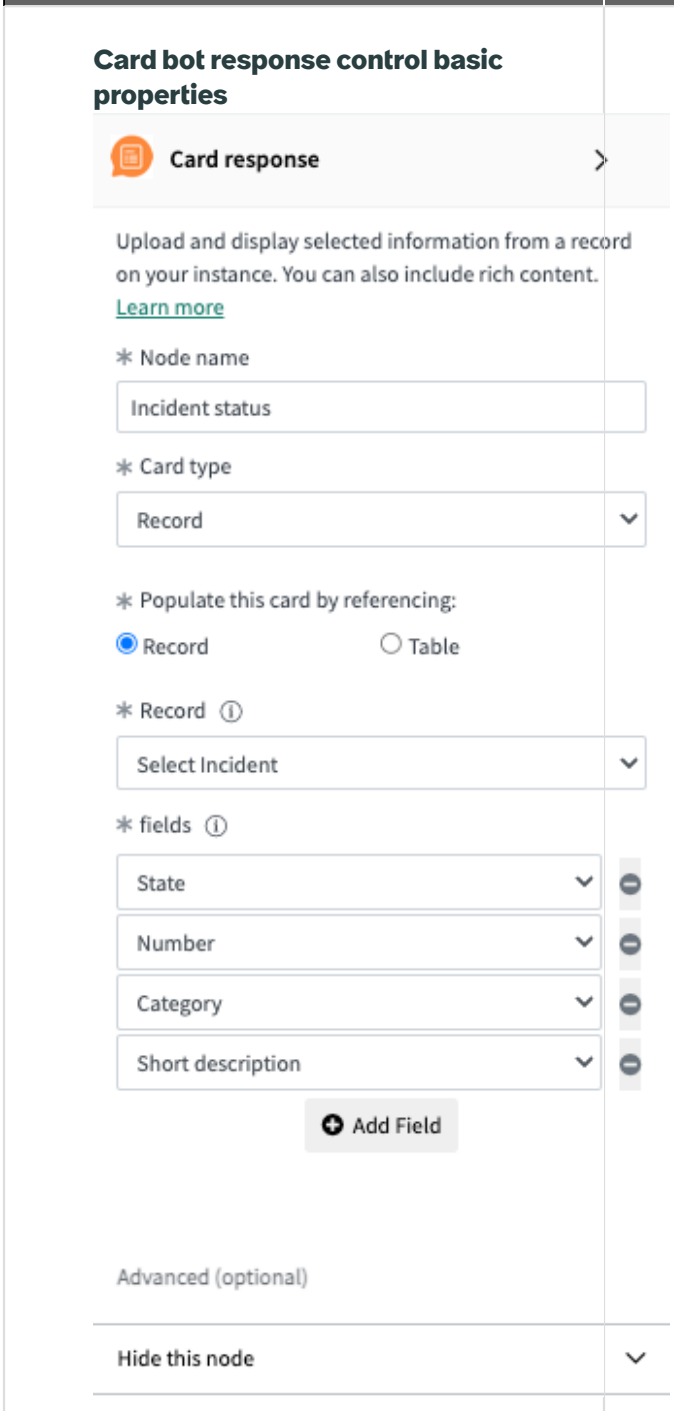
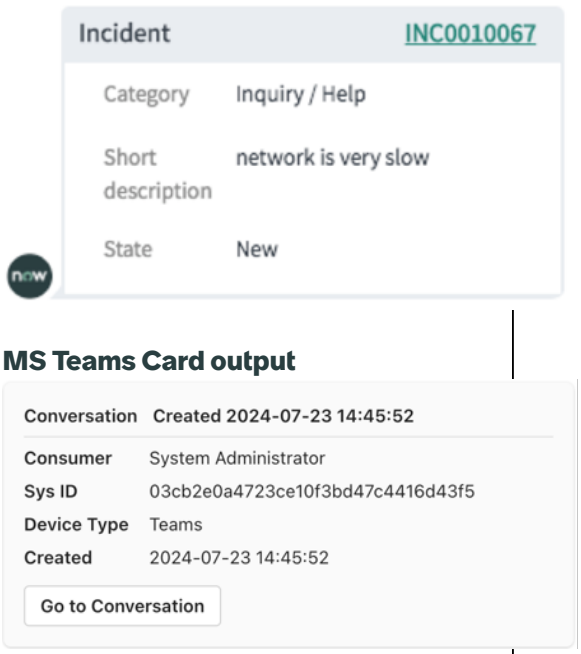
Response properties	Card output
	

Example Card bot response for a large image

The Card response layout for images may vary across channels.

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Response properties	Card output

Card response

Upload and display selected information from a record on your instance. You can also include rich content. Learn more

* Node name

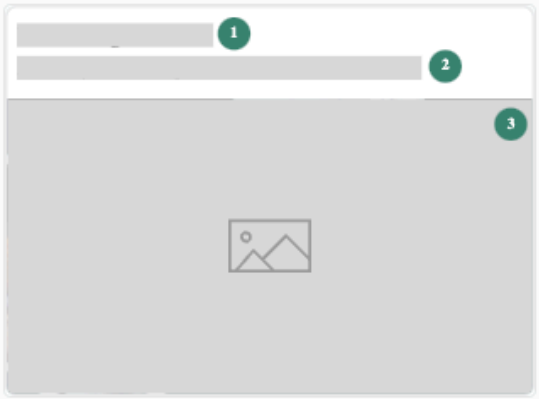
Image large card

* Card type

Large image with text

To view supported channels, open Large image with text

Template



Illustrative card layout. May vary across channels based on template definitions.

Map data to fields on the card

* 1. Title

Don't forget we are going back to the office soon!

2. Description

You're scheduled to return to work October 7.

* 3. Image URL link

Tele_GettyImages-556454119_1647376622096.jpg

Change Image

4. Image alt text

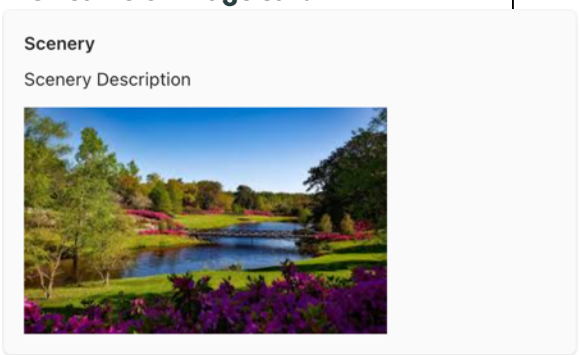
Advanced (optional)

Hide this node

Web UI image card output



MS Teams UI image card



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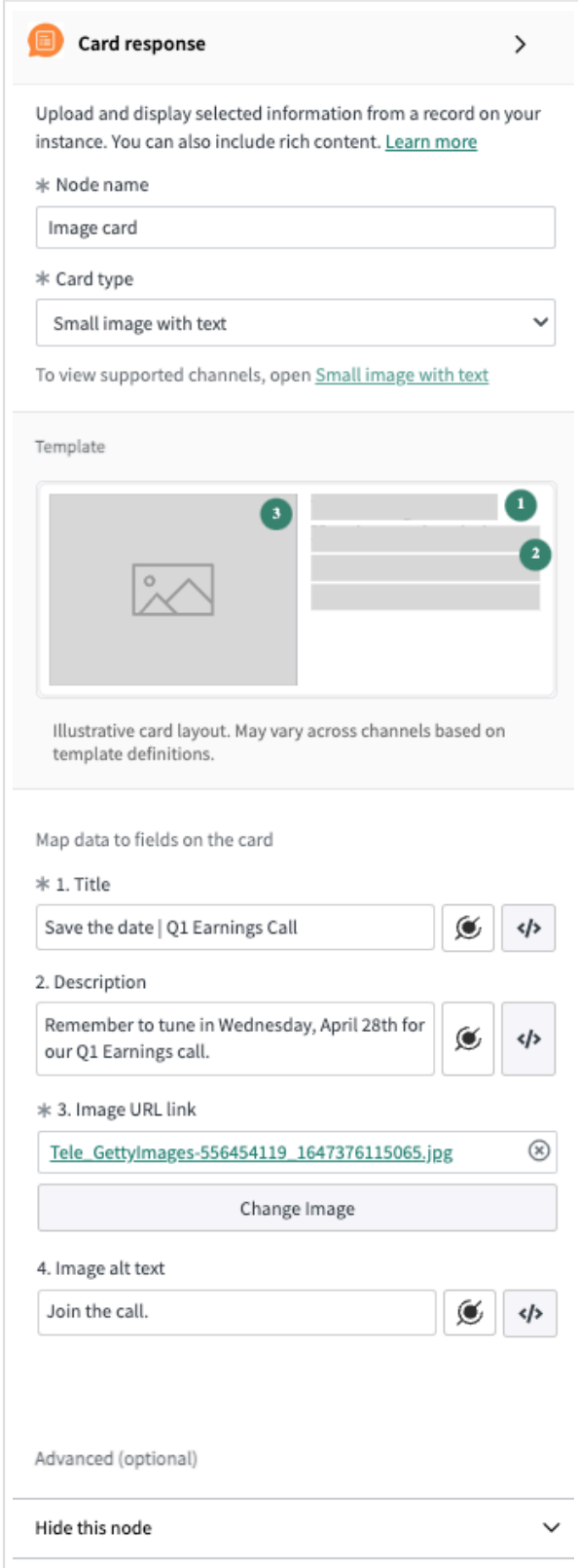
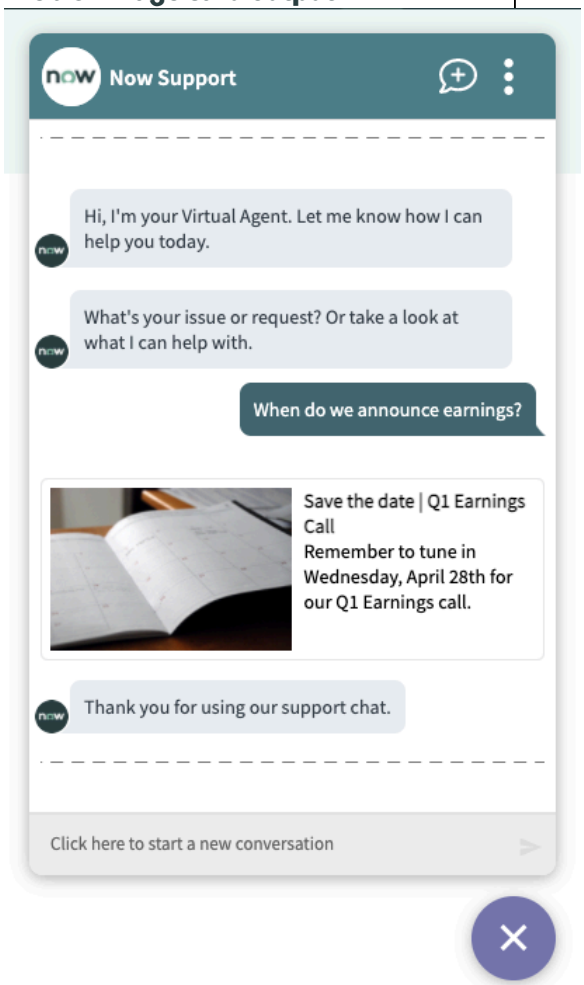
Example Card bot response for a small image

The Card response layout for images may vary across channels.

Response properties	Card output
	

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Example Card bot response with video content

The way the Card bot response displays videos may vary across channels. For example, the display you see in Slack messages may be different from what you see on Microsoft Teams or Workplace from Facebook. Also, if an embedded player is supported on that channel, the player is included in the display. For more information about channels, see the documentation for the channel that you're using.

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Response properties	Card output

Card response

Upload and display selected information from a record on your instance. You can also include rich content. Learn more

* Node name

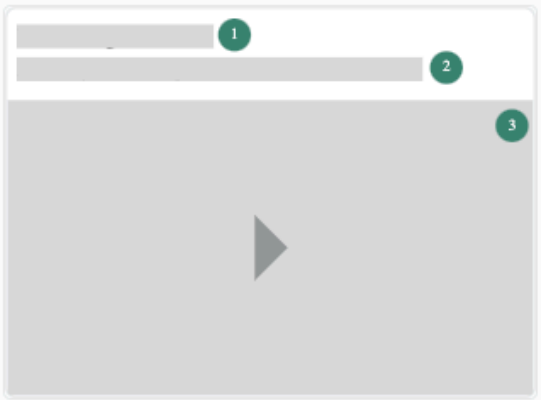
Video card response

* Card type

Youtube Video Card

To view supported channels, open Youtube Video Card

Template



Illustrative card layout. May vary across channels based on template definitions.

Map data to fields on the card

* 1. Title

Chief Holiday Officer | Let's workflow it

1B. Title Link

https://www.servicenow.com/

2. Description

Ready for work to work better? Our digital workflows are here to bring simplicity to your complexity and transform how work gets done across your enterprise.

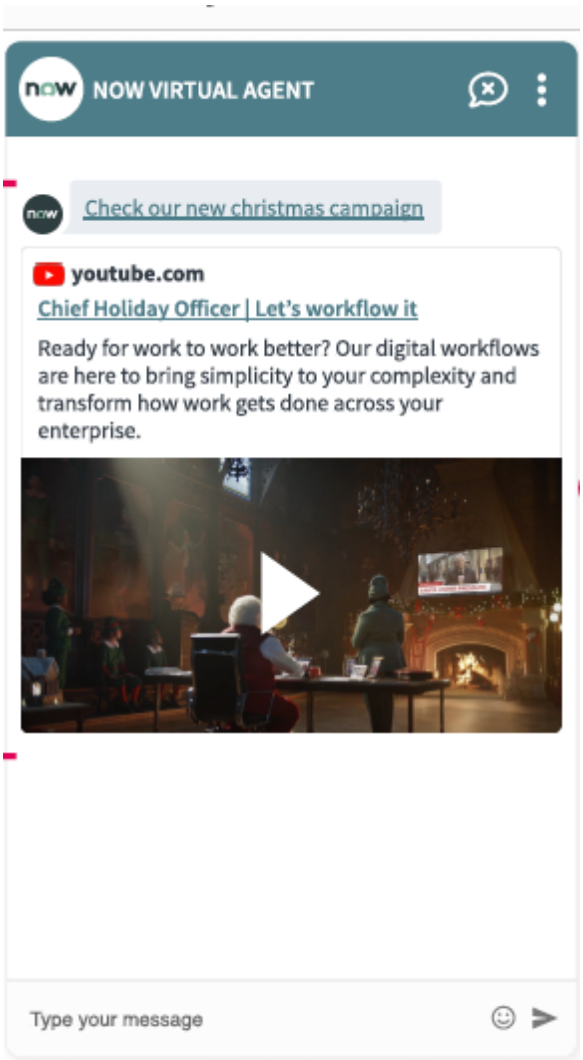
* 3. Youtube Video ID

FVgtjdEOa5M

Advanced (optional)

Hide this node

Card bot response output with video on the Web client



Card bot response output with video on Microsoft Teams

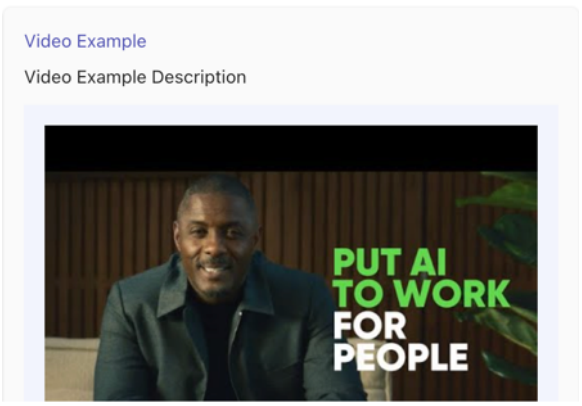


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Table bot response control

Use the Table bot response control in a Virtual Agent topic to display a bot response as a table.

Table bot responses enable users to see information in a more organized way.

For example, you can organize and display information such as the following:

- Planned service changes
- Company holidays
- Contact information
- Testing sites

Output tables can have between one and four columns and may include optional column headers. You can populate tables using the conditioner builder or scripts.

Table bot response properties

Property	Description
Node name	Name that identifies this Table bot response control node in the topic flow.
Populate this table by	Options for populating the table. Select one of the following: • **Table**: Select the ServiceNow table that contains the data to be displayed. • **Script**: Enter code in the Define rows dialog box.
Table	The name of the table that contains the data. This field is available only when the **Table** option is selected.
Filter rows	Options for filtering the contents of the table. Choose one of the following: • **Condition**: Specify a no-code condition statement using the condition builder. For more information, see Condition builder. • **Script**: Enter a low-code script that specifies a condition. This field is available only when the **Table** option is selected.
No records response message	Message displayed if no records are found.
Columns and rows	
Columns (left to right)	Table columns that you want to display in the conversation. You can have up to 4 columns. • **Field**: Select a field from the ServiceNow table to be displayed in the column. • **Display name**: Reflects the selected column name. Use the default name or change the name. This field is available only when the **Table** option is selected.
Sort rows by	Option for sorting returned rows by column. You can sort by one of the selected columns, or by a column not shown in the response to the user. Choose **Ascending** or **Descending** order for the sort.

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Property	Description
	If you don't specify a sort order, rows are sorted by creation date in descending order. If you specify a different sort order, creation date is used as a secondary sort order. This field is available only when the **Table** option is selected.
Advanced	
Headers	
Header	Header or title for the table when the table is displayed in the response output. The header can be a text string, variables, or a script.
Display Column Headers	Toggle switch that enables the display of column headings.
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Channel support

Channel support for the Table bot response control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Not supported	Not applicable
Microsoft Teams	Supported	None
Slack	Supported	None
Workplace	Supported	None
Facebook Messenger	Not supported	Not applicable
SMS Twilio	Not supported	Not applicable
LINE	Supported	None
WhatsApp	Not supported	Not applicable
Apple Messages for Business	Supported	None
Alexa (Voice)	Partial support	Supported on devices with screens. For nonscreen devices, the table will be read, if possible. For details, see Fine-tune Virtual Agent settings and topics for the best Alexa voice chat experience.

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Example Table bot response output

Note:
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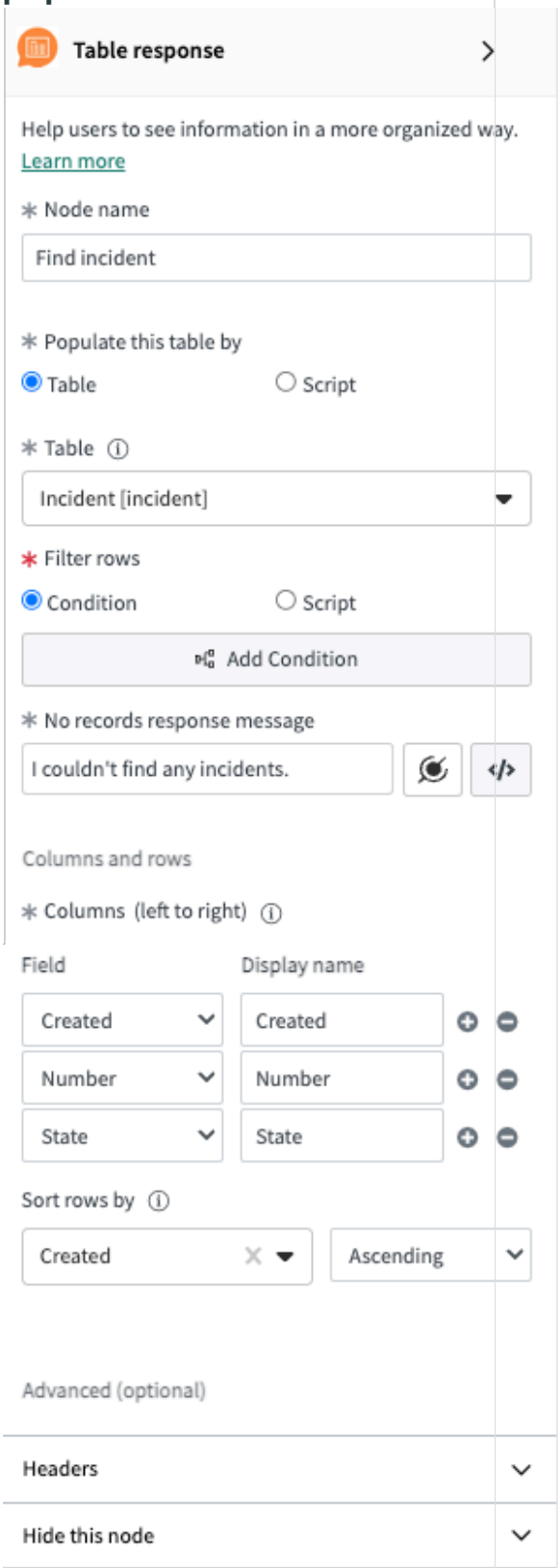
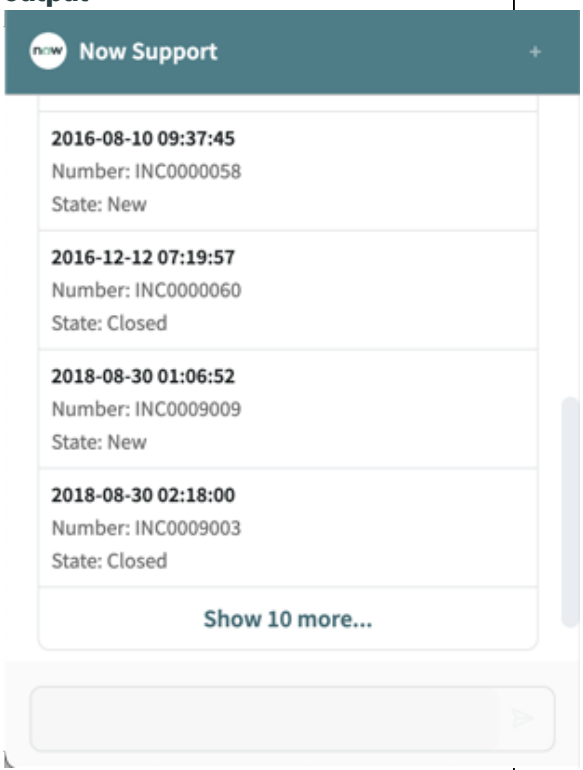
Response properties	Table bot response output

Table bot response control basic properties



Web UI Table bot response output



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Video bot response control

Use the Video bot response control in a Virtual Agent topic to include a video in the conversation.

The Video bot response control includes a navigation button, which gives users time to watch the video. If you want the user to the watch the video before continuing with the conversation, use this navigation button.

When users have finished watching the video, they can click the navigation button to continue with the conversation.

Note:
Topic authors can also use the Card bot response control to include a video in conversations. However, the Card bot response control doesn't include the navigation button, which gives users time to watch the video.

Video bot response control properties

Property	Description
Node name	Name that identifies this video bot response control node in the topic flow.
Card type	Type of card. Select **YouTube Video Card**. **Note:** In the Washington DC release, only YouTube video cards are supported.
Template	A visual representation of the layout of the video included in the card.
Map data to fields on the card	Fields that correspond to the numbers shown on the template. These fields are the following: • **Title**: Title of the card. • **Title Link**: URL to any relevant content. • **Description**: Description the card, such as the topic the video addresses. • **YouTube Video ID**: Unique identifier for the video used in the card. This identifier is the string following the equal sign (=) at the end of the video's URL path. For example, in the path shown below, the video identifier is `FVgtjdEOa5M`.  
Advanced	
Navigation button label	Navigation button used to continue with the conversation. By default, the button is labeled **Got it**, but you can change it. For example, you change the label to **Continue**. Users click this navigation button in the chat window to continue with the conversation.
Hide this node	

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Property	Description
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.
Node Conditions	Expression logic to specify a condition for presenting this topic to users. The condition must evaluate to true. You can set this field using either the condition builder or a script. • **Condition**: Use the condition builder to add or edit conditions. • **Script**: Use the script editor to create or edit a script that contains a condition statement.

Channel support

Note:
The way the Video bot response displays videos may vary across channels. For example, the video display you see in Slack messages may be different from what you see on Microsoft Teams or Workplace from Facebook. Also, if an embedded player is supported on that channel, the player is included in the display. For more information about channels, see the documentation for the channel you're using.

Channel support for the Video bot response control

Channel	Support	Constraints
Web UI	Supported	None
Mobile UI	Supported	None
Now Assist panel	Not supported	Not applicable
Microsoft Teams	Supported	The video control displays a thumbnail image of the video that users select to open the video in their preferred web browser.
Slack	Supported	Conversational Integration with Slack version 2.0.0 and later. The video control displays a thumbnail image of the video that users select to open the video in their preferred web browser.
Workplace	Supported	None
Facebook Messenger	Not supported	Not applicable
SMS Twilio	Not supported	Not applicable
LINE	Not supported	Not applicable
WhatsApp	Not supported	Not applicable
Apple Messages for Business	Not supported	Not applicable

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Channel support for the Video bot response control (continued)

Channel	Support	Constraints
Alexa (Voice)	Not supported	Not applicable

Example Video bot response control

Note:
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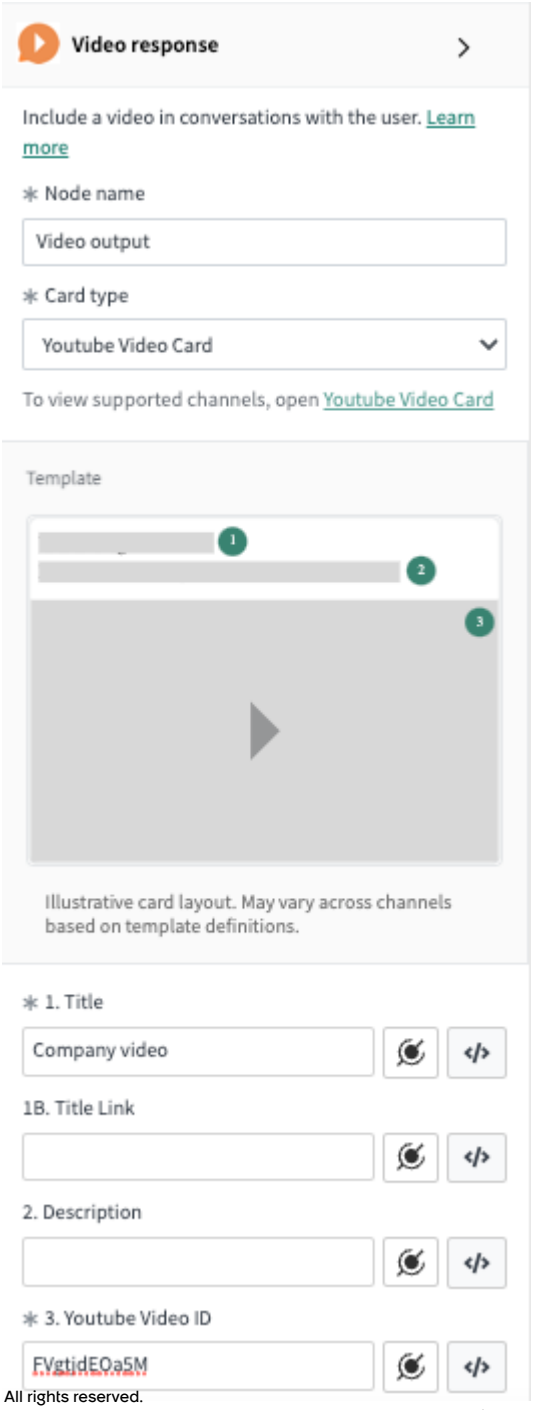
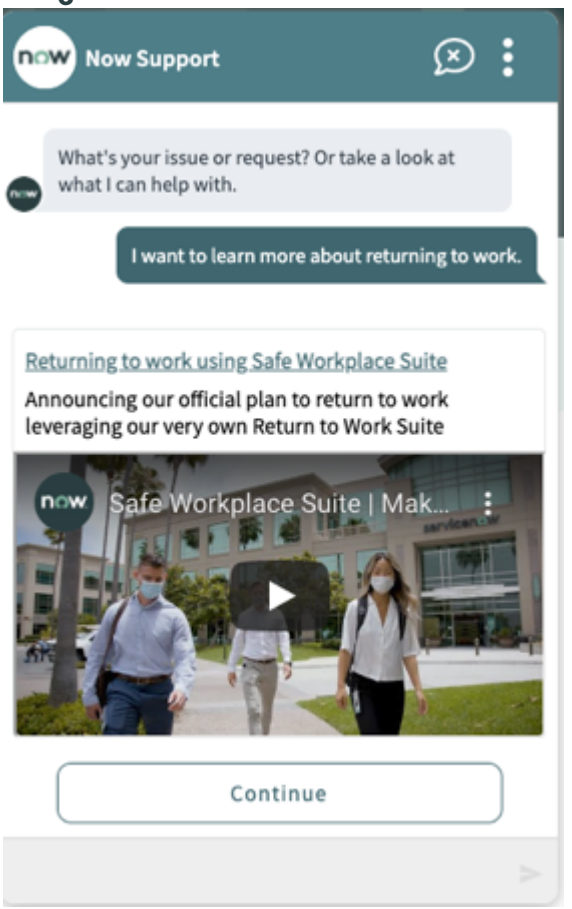
Response properties	Card output

Video bot response control basic properties



Video bot response output on the Web client with the navigation button



Video bot response output on the Web client without the navigation button



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Virtual Agent Designer utilities

You can control interactions within a topic by using utilities in Virtual Agent Designer. These utilities perform various actions such as adding topic blocks (reusable components), running a script, or adding different conversation paths (branches) in a topic. Utilities are represented as nodes in a conversation flow but do not display anything to the user.

The following utilities are available for use within a Virtual Agent topic.

Lookup utility

Use the Lookup utility in a Virtual Agent topic to return a ServiceNow record query.

Lookup utility properties

Property	Description
Node name	The name that identifies this Lookup utility node in the topic flow.
Variable name	The variable that stores the record returned by the script. The variable name is automatically created from the *Node name* property.
Table	The table used for the query.
Filter this table by using	The query to retrieve the record. Use the condition builder or a script to specify a query condition.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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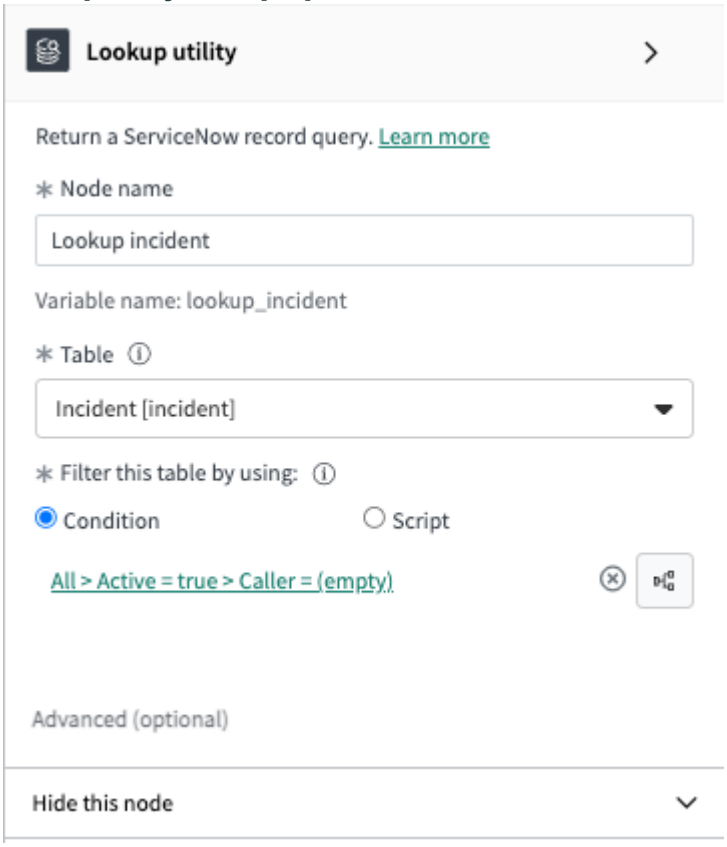
Example Lookup utility

Lookup utility basic properties



Example Lookup script

```
(function execute(table) {

       var now_GR = new GlideRecord(table);
       gr.addEncodedQuery('active=true');
       gr.setLimit(1);
       gr.query();
       if(gr.next()) {
          return gr;
    }
})(table)
```

In this example, a table is queried for the first active record. The table to be queried is defined in the **Table** property found in the lookup utility control. The `setLimit()` method ensures that only a single record is returned from the database. If a record is found, it is returned. For more information on GlideRecord queries, see Querying tables in script .

Script Action utility

Use the Script Action utility in a Virtual Agent topic to run a script.

Script Action utility properties

Property	Description
Node name	The name that identifies this Script Action node in the topic flow.

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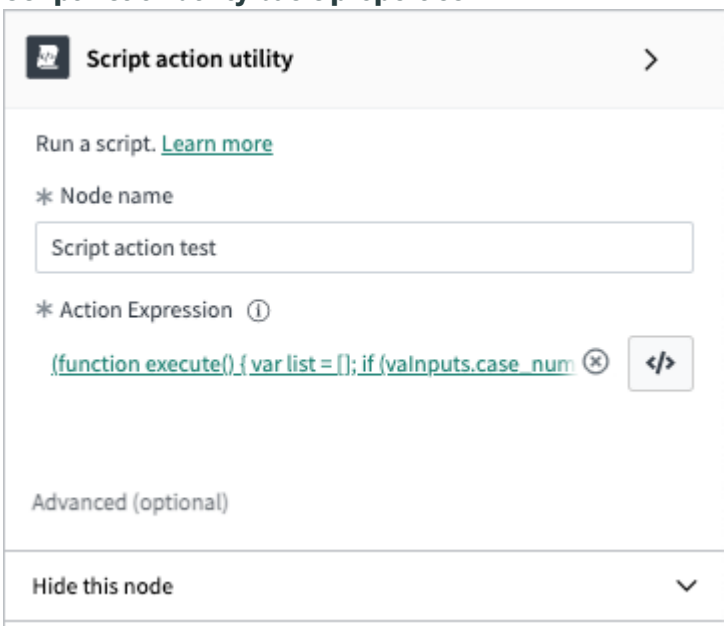
Property	Description
Action expression	The script that performs an action.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

Example Script Action utility

Script Action utility basic properties



Example script action

```
(function execute() {
    var list = [];
    if (vaInputs.case_number != "") {
        var gr = new GlideRecord("sn_customerservice_case");
        gr.addQuery("number", "CONTAINS", vaInputs.case_number);
        gr.addQuery("active", "true");
        gr.orderBy("number");
        gr.query();
        while (gr.hasNext()) {
            gr.next();
            list.push(gr.getUniqueValue().toString());
        }
    }
    vaVars.case_list = list;
})()
```

This example performs a search on the [sn_customerservice_case] table for a specific case number based on the input from another control called `case_number`. The script then places the results in an array and stores them in the `case_list` variable, which is accessible by other nodes in the same topic. Because `vaVars` only supports string, number, and Boolean values,

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the script uses `toString()` to store these values as strings. The code is contained in an `if` statement, so it only executes if the `case_number` variable has a value. This `if` statement prevents the code from running if the user has not entered a number.

For more information about writing scripts for Virtual Agent, see Virtual Agent scripts.

Record Action utility

Use the Record Action utility in a Virtual Agent topic to create or update a ServiceNow record in a table.

Record Action utility properties

Property	Description
Node name	Name that identifies this record action node in the topic flow.
Variable name	Name of the variable that stores the created or updated record values. The variable name is automatically created from the **Node name** property. This option is not visible when the Action Type is **Update a Record**.
Action type	The type of action to perform. Select one of the following: • **Create a Record**: Creates a new record in the table that you specify. • **Update a Record**: Updates an existing record based on the context of the conversation.
Table	If you're creating a record, select any table that is available in the instance. If you're updating a record, select a variable for a record that is referenced in the conversation. For example, **User**.
Field	Select one or more fields in the ServiceNow table to be modified. For each field, select a valid value or specify input variables or script variables.
Advanced	
Attach file to record	A low-code method of attaching an image or other file to a record of your choosing. **Note:** Ensure that you've an uploaded file using the File Picker node before attaching it to a record with the Record Action node. The uploaded file is initially linked to the conversation table. When the incident is created with the uploaded file using the Record Action node, the file is linked to the incident table. It is no longer referenced through the conversation table, but the incident instead.
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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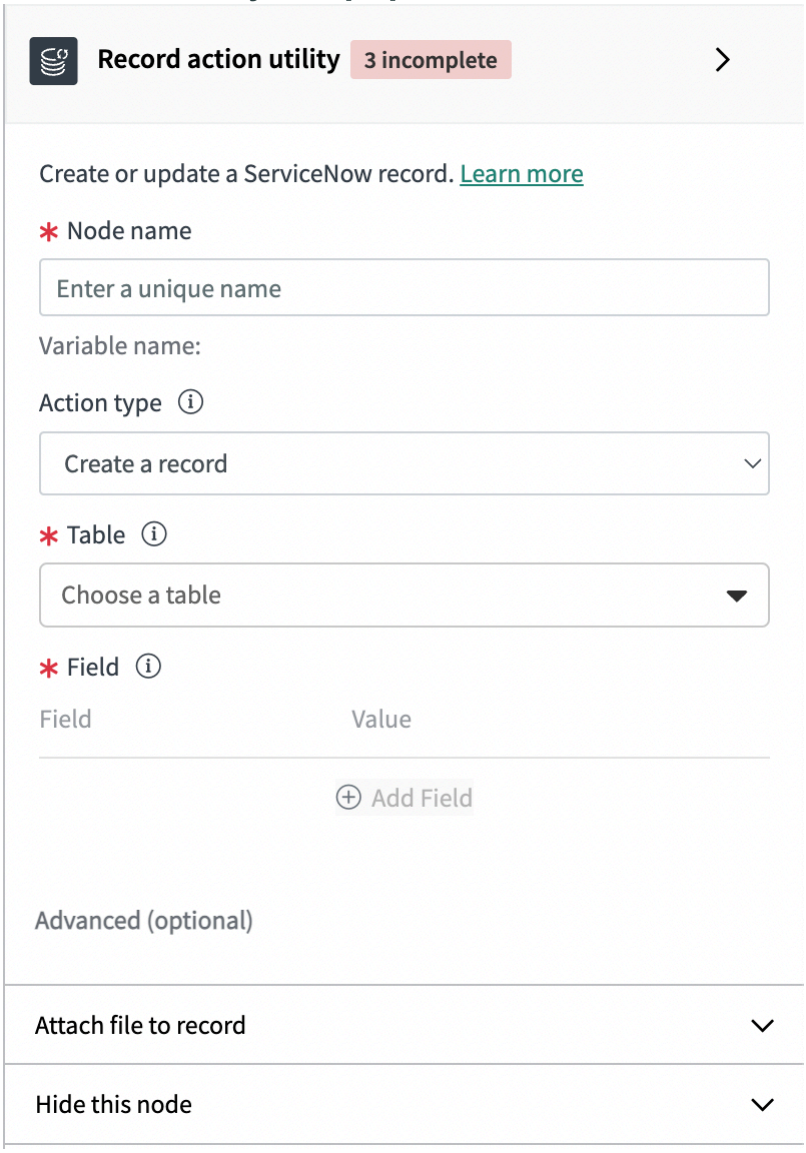
Example Record Action utility

Record Action utility basic properties



Decision utility

Use the Decision utility in a Virtual Agent topic to add two or more branches that represent different paths in a conversation.

Use scripts or variable conditions to set decision branches

Each branch below a Decision utility node has a condition property. You can define the condition using the condition builder or a script that returns a value of true or false. A branch that returns a value of true is followed, while a branch returning a value of false is not. When creating these scripts or conditions, ensure that only one branch in each Decision utility node evaluates to true.

Note:
If you insert a **Boolean** user input control, you're prompted to add a **Decision** utility directly after the Boolean node on the canvas. Selecting **Yes** on the Boolean node's Decision utility prompt automatically generates two branches named *`True`* and *`False`*. The two branches conditions are automatically set through the condition builder.

For more information, see Branch a Virtual Agent conversation with a Decision utility.

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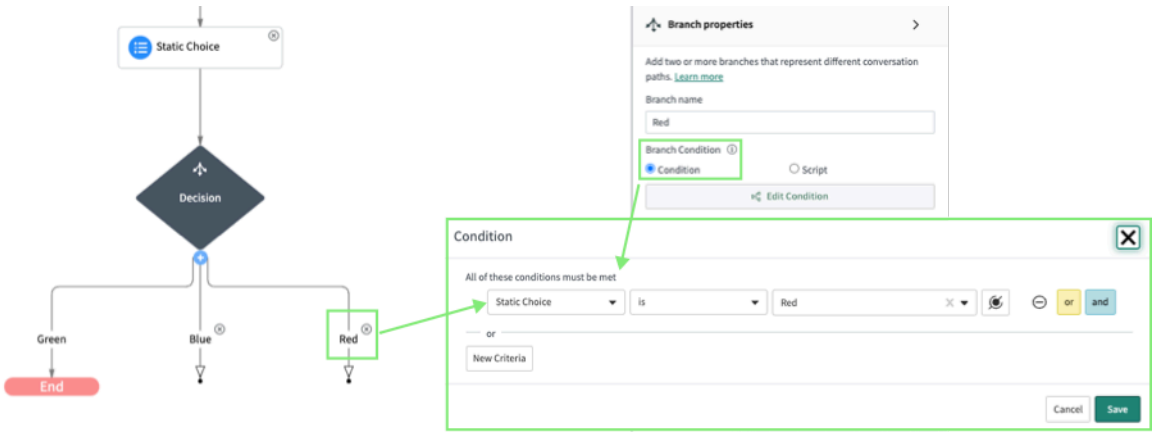
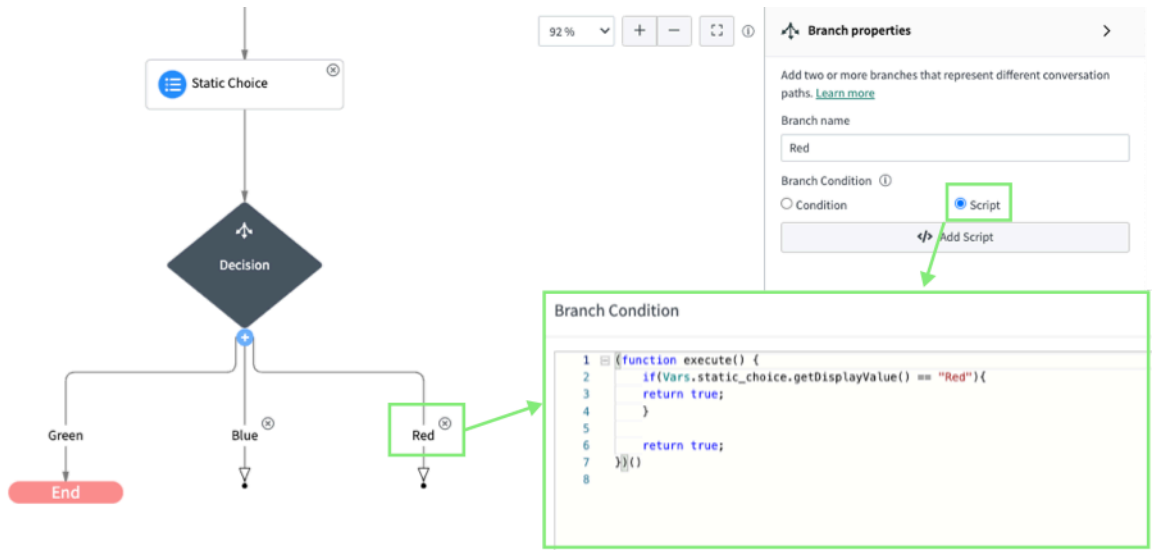
Example Decision utility node with branches

In this example, a static choice control prompts the user to select from three available colors and the selection is stored in a variable. The Decision utility control is configured with a branch for each possible selection. Each branch uses the condition builder, which returns true when the corresponding color is selected. In the example, the condition builder returns true when the choice is Red.



You can also use the Script option for branch conditions. In the following example, the script provides the same functionality as the condition builder.



Topic Block utility

Use a Topic Block in a Virtual Agent conversation to perform a specific function or subflow that runs certain steps in a calling topic.

Topic Block utility properties

For more information, see Add a reusable topic block to a calling topic or topic block.

Property	Description
Use dynamic Topic Block	Set this toggle to activate dynamic Topic Block options.
Topic block	A list of published topic blocks. Select a topic block to add to the calling topic.

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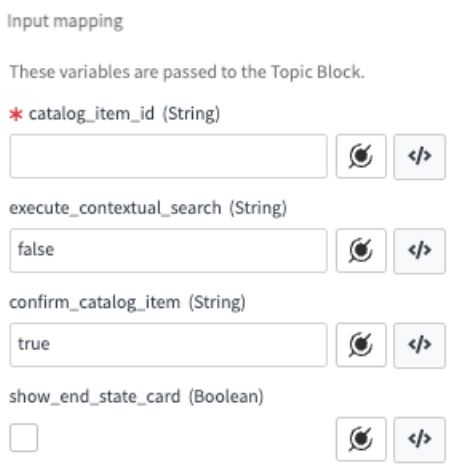
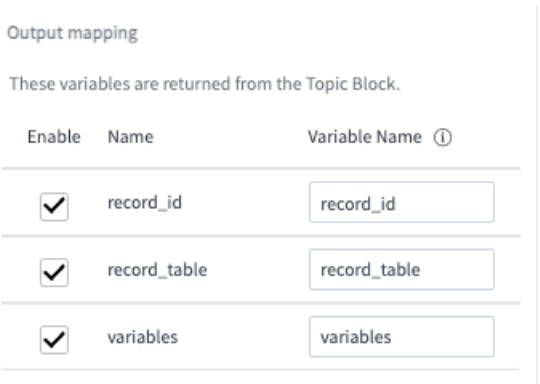
Property	Description
	With **Use dynamic Topic Block** active, use the condition builder to input a condition or script instead.
Node name	Name of the topic block node. The name is automatically assigned based on the topic block that you select. For example, if you choose the Acme Contextual Search topic block, the **Name** is Acme Contextual Search. With **Use dynamic Topic Block** active, input a name of your choice.
Input mapping	The variables to be used as input to the selected topic block. For example, the following image has example variables:  The contents of this area change according to the topic block you selected. Options may include string input, referenced records, scripts, and so forth. With **Use dynamic Topic Block** active, you add all input mappings manually instead by selecting the Manage inputs to define icon ( ). Inputs are handled similarly to the Input Parameters dialog box in the Start segment of a reusable topic block.
Output mapping	The variables to be output by the selected topic block. For example, the following image has example variables that are enabled:  The contents of this area change according to the topic block you selected.

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Property	Description
	With **Use dynamic Topic Block** active, you add all input mappings manually instead by selecting the Manage outputs to define icon ( ). Inputs are handled similarly to the Input Parameters dialog box in the Start segment of a reusable topic block.
Advanced	
Hide this node	
Conditionally use this node if	A no-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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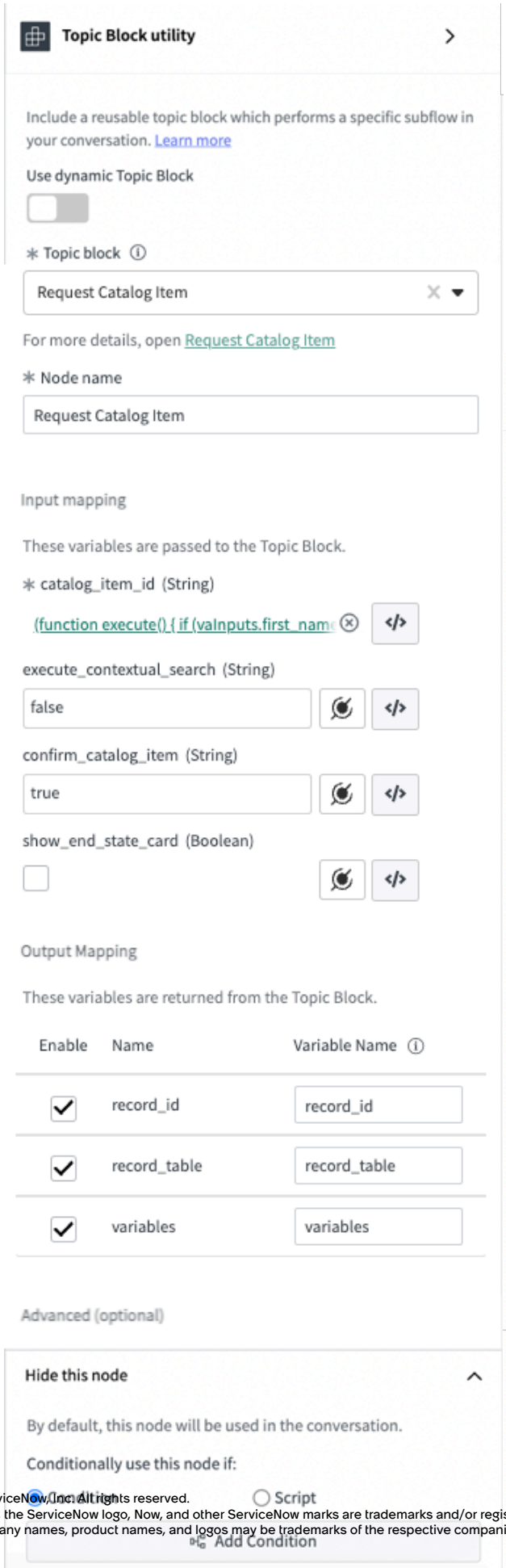
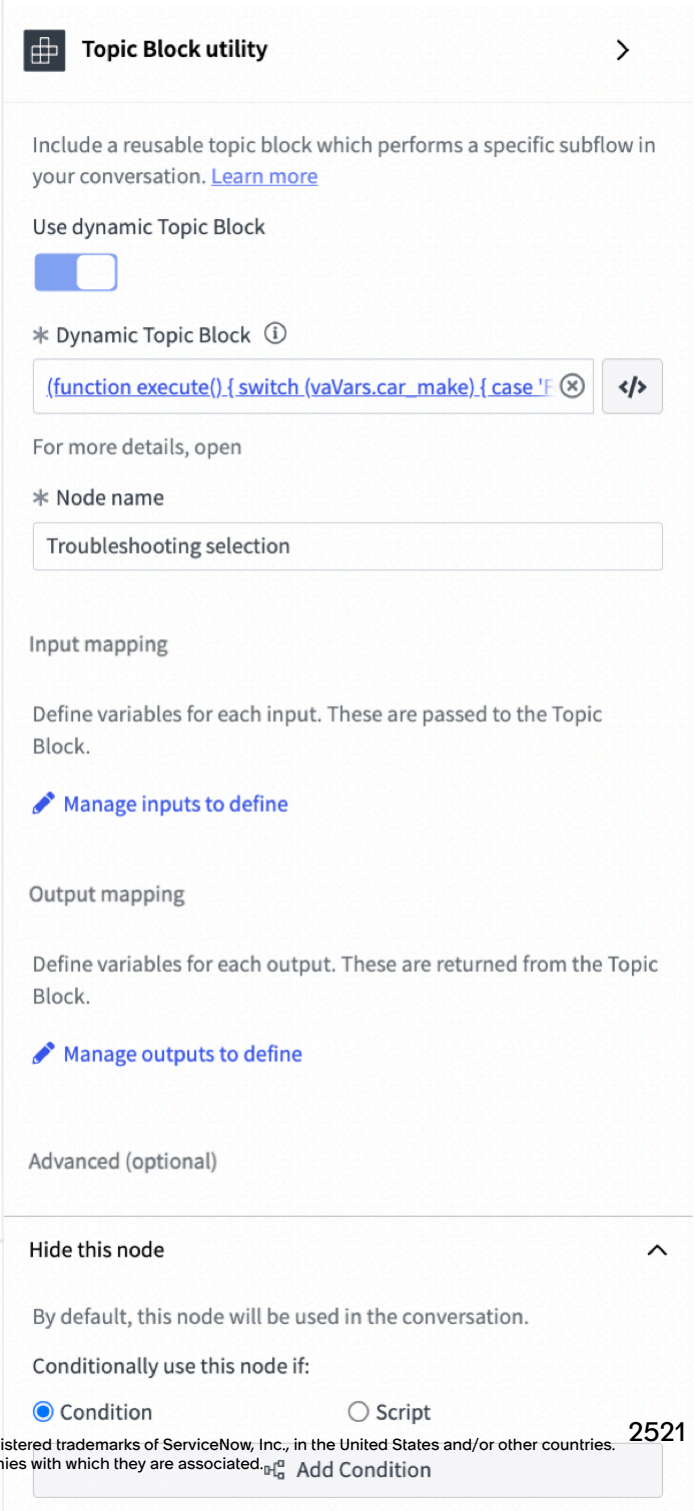
Example Topic Block utilities





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Using dynamic Topic Blocks

Toggling the dynamic setting on the Topic Block enables you to programmatically choose which topic block or blocks to invoke, based on any number of conditions. You can pass in a dynamic set of inputs without an explicit, one-to-one match for a Topic Block definition.

For example, assume you have two Topic Blocks. One sets your password by taking your username and returning a success or fail message. The other resets your password, but requires that you send two-factor authentication (2FA) token with the request before returning a success or fail message and a temporary password.

You can create two separate Topic Block invocations to handle the password-reset procedure, or you can create one Topic Block with the dynamic setting active and defined as follows:

- Add a script that checks if the reset type is `includesTwoFactor = true`. If the statement evaluates to `true`, then you return `TwoFactorReset`, otherwise you return `NormalPasswordReset`.
- Define two input mappings: `password` and `twoFactorToken`, both set equal to an object passed in which contains their values.
- Define two output mappings: `successful` and `tempPass`, the latter of which is only set if it exists in the return value for the Topic Block.
- Define two output nodes to output success or failure, and an output to confirm to you whether the `tempPass` value is true.

Example dynamic Topic Block expression

```
(function execute() {
    /* Return the name of the topic block to run. For example:
        switch (vaVars.car_make) {
            case 'Ford':
                return 'Ford troubleshooting';
            case 'Toyota':
                return 'Toyota troubleshooting';
            default:
                return 'General car troubleshooting';
        }
    */
})()
```

The sample script in the dynamic Topic Block script field returns a value based on your input. In this example, if you input `Ford` or `Toyota`, the Virtual Agent will call for the appropriate troubleshooting topic. If you input any other value, the Virtual Agent returns a general troubleshooting topic instead.

Custom control utility

Use the Custom Control utility in a Virtual Agent topic or topic block to reference a custom input control or a custom response control. Custom controls complement the controls provided in Virtual Agent Designer.

Custom control utility properties

Specify the properties of the custom input control or custom response control that you are adding to a topic or topic block. For more information about custom controls and their use, see Customizing Virtual Agent with custom controls.

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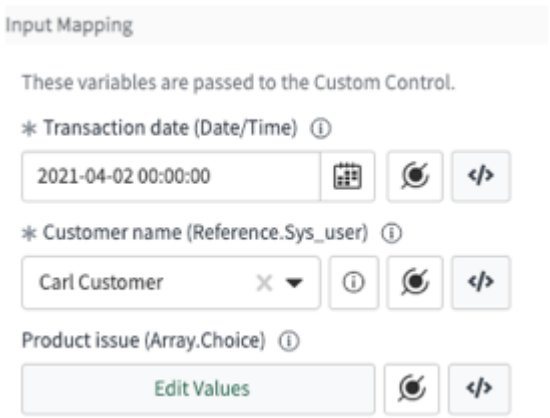
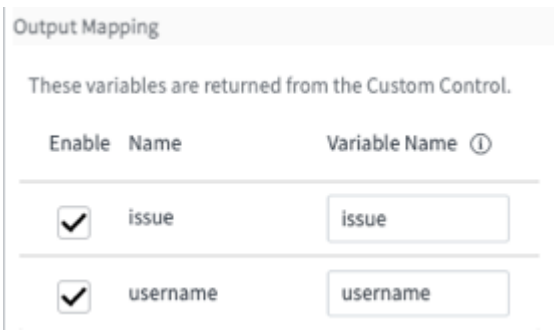
Note:
Custom controls do not work on Internet Explorer version 11.

Custom control utility properties sheet

Property	Description
Custom control	The name of a custom control object that has been published in Virtual Agent Designer.
Node name	The name of the custom control you selected.
Input mapping	The variables to be used as input to the selected custom control. For example, the following image has example variables:  The contents of this area change according to the custom control you selected. Options may include string input, referenced records, scripts, and so forth.
Output mapping	The variables to be output by the selected custom control. For example, the following image has example variables that are enabled:  The contents of this area change according to the custom control you selected.
Advanced	
Hide this node	
Conditionally use this node if	A no-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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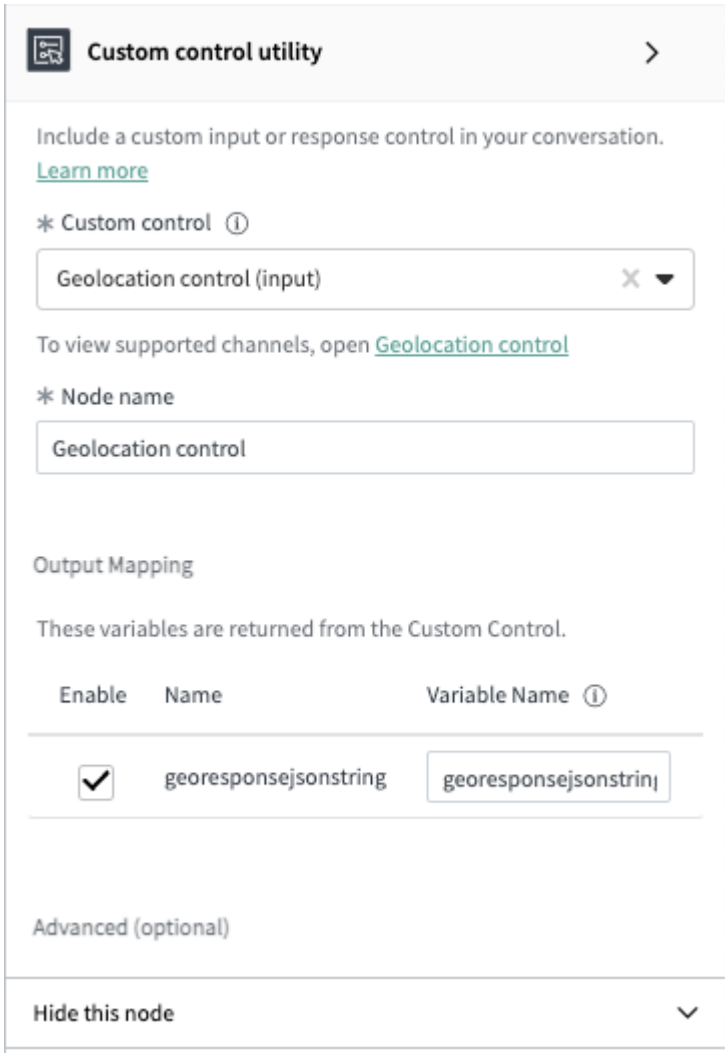
Example custom control utility



Action utility

Use the Action utility in a Virtual Agent topic to select the flow action properties that the node should create. The Action utility integrates Virtual Agent with the ServiceNow Flow Designer product.

Action utility properties

Specify the flow action properties for the node you want to create.

Property	Description
Node name	The name of this Action node.
Invoke Flow Designer object	Flow Designer component type. Select one of the following: • **Action**: A reusable operation. • **Subflow**: An automated process that consists of a sequence of reusable actions, data inputs, and outputs.
Spoke	Name of the scoped application that contains Flow Designer content that is dedicated to a particular application or record type.

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Property	Description
	For a list of default spokes, see Spokes.
Action/ Subflow	The Flow Designer action or subflow to be performed in the instance. The **Input mapping** and **Output mapping** areas change depending on your selection. For details about the action, click the link beneath your selection to view it in Flow Designer.
Wait for response?	Toggle switch that determines whether Virtual Agent waits for a response from the specified action before continuing.
Input mapping	The variables to be used as input to the selected action. The contents of this area change according to the action you selected. Options may include string input, referenced records, scripts, and so forth. For options that require a password, enable the **Include a password input** toggle switch to prompt the user for a password. Secure inputs must use the password2 data type. Input is securely masked and not viewable by others. **Note:** If a field is locked and you can't enter a string, the pill picker value must match the field type. For example, if the field type is document_id, the referenced value type must also be document_id. If no matching field exists, reference a field created in another FDIH action output or use a script.
Output mapping	The variables to be output by the selected action. The contents of this area change according to the action you selected.
Advanced	
Permissions	
Run as	Permissions to use for the action. Select one of the following options: • **User who initiates session**: When selected, the action runs using the same permissions that the current user has. • **System User**: When selected, the action runs using system privileges, some of which may be unavailable to the current user.
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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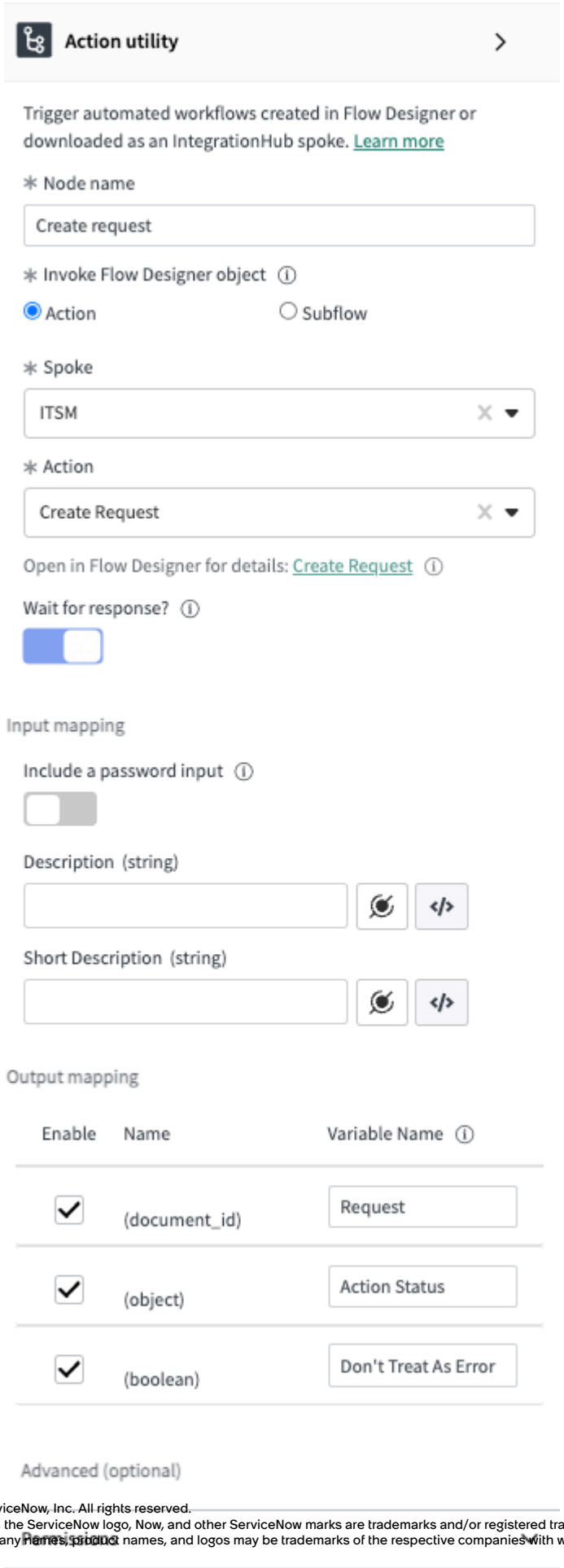
Example Action utility



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Deflection utility

Use the Deflection utility in Virtual Agent to track issues that Virtual Agent helped to resolve or actually resolved for a user.

Deflection utility properties

Specify the flow action properties for the node that you want to create.

Property	Description
Node name	Name of the Deflection node.
Input mapping	
Deflection configuration	Select from a list of pre-defined deflection configurations. For more information, see Create deflection configurations and patterns.
Deflection pattern	Select from a list of pre-defined deflection patterns. Ensure that your selection is tied to a pre-defined deflection. See Create deflection configurations and patterns for more.
Activity table	Table name where the deflection activity occurs. Add incident or task tables related to the deflection.
Activity IDs	List of comma-separated Activity IDs. Add AI Search results or related tasks in the deflection occurrence.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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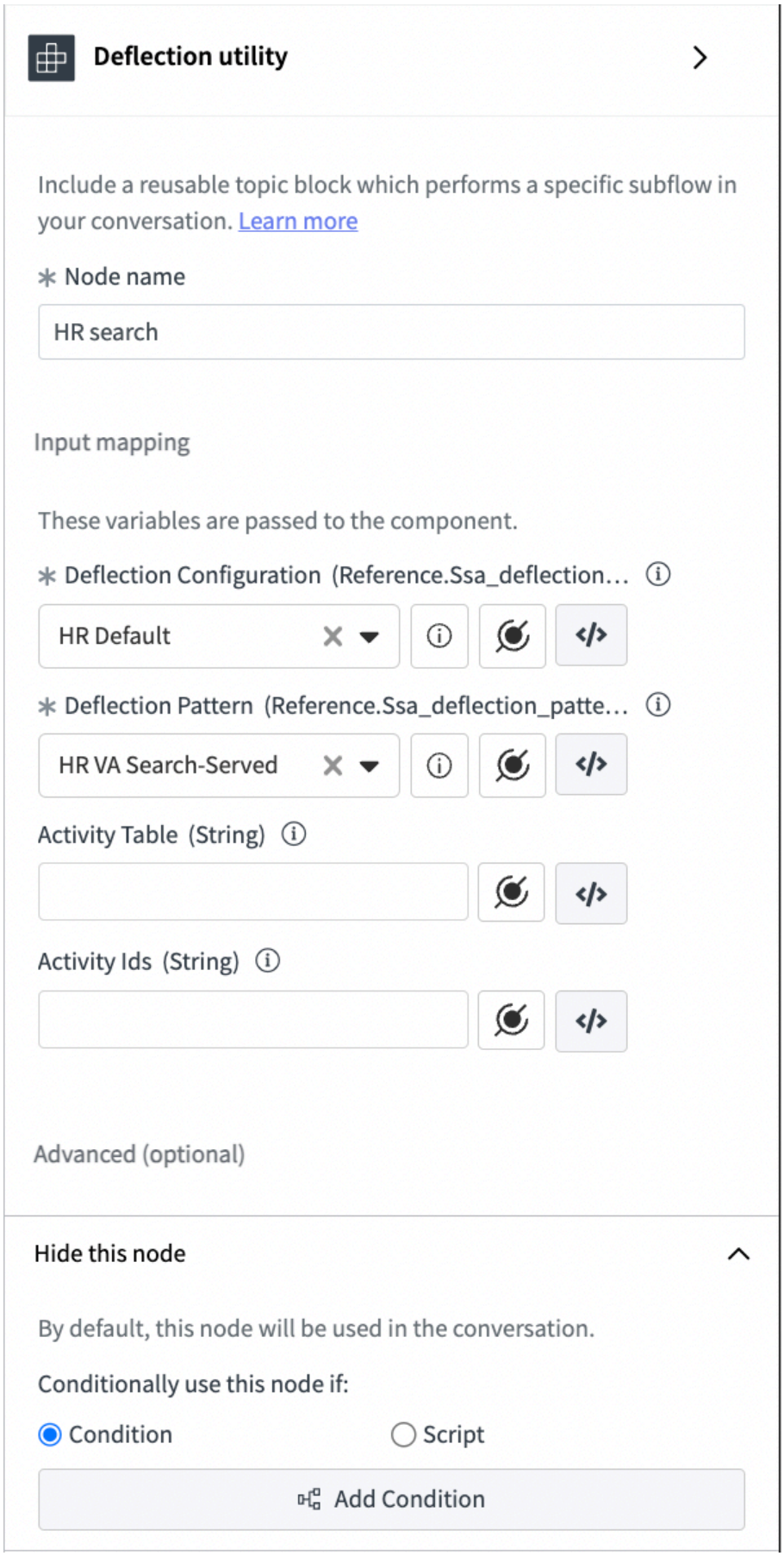
Example Deflection utility



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Diagnostic Topic Executor utility

Use the Diagnostic Topic Executor utility in Virtual Agent to ensure the proper function of components in a topic.

Diagnostic Topic Executor utility properties

Specify the flow action properties for the node that you want to create.

Property	Description
Node name	Name of the node.
Input mapping	
Diagnostic content	String that is passed to the component being diagnosed.
Output mapping	
Is topic executed	Option to confirm that the topic executed properly, with variable data returned by the component. Select **Enable** to activate, and enter a custom variable name for the value if desired.
Is data collection topic executed	Option to confirm that the data collection executed properly, with variable data returned by the component. Select **Enable** to activate, and enter a custom variable name for the value if desired.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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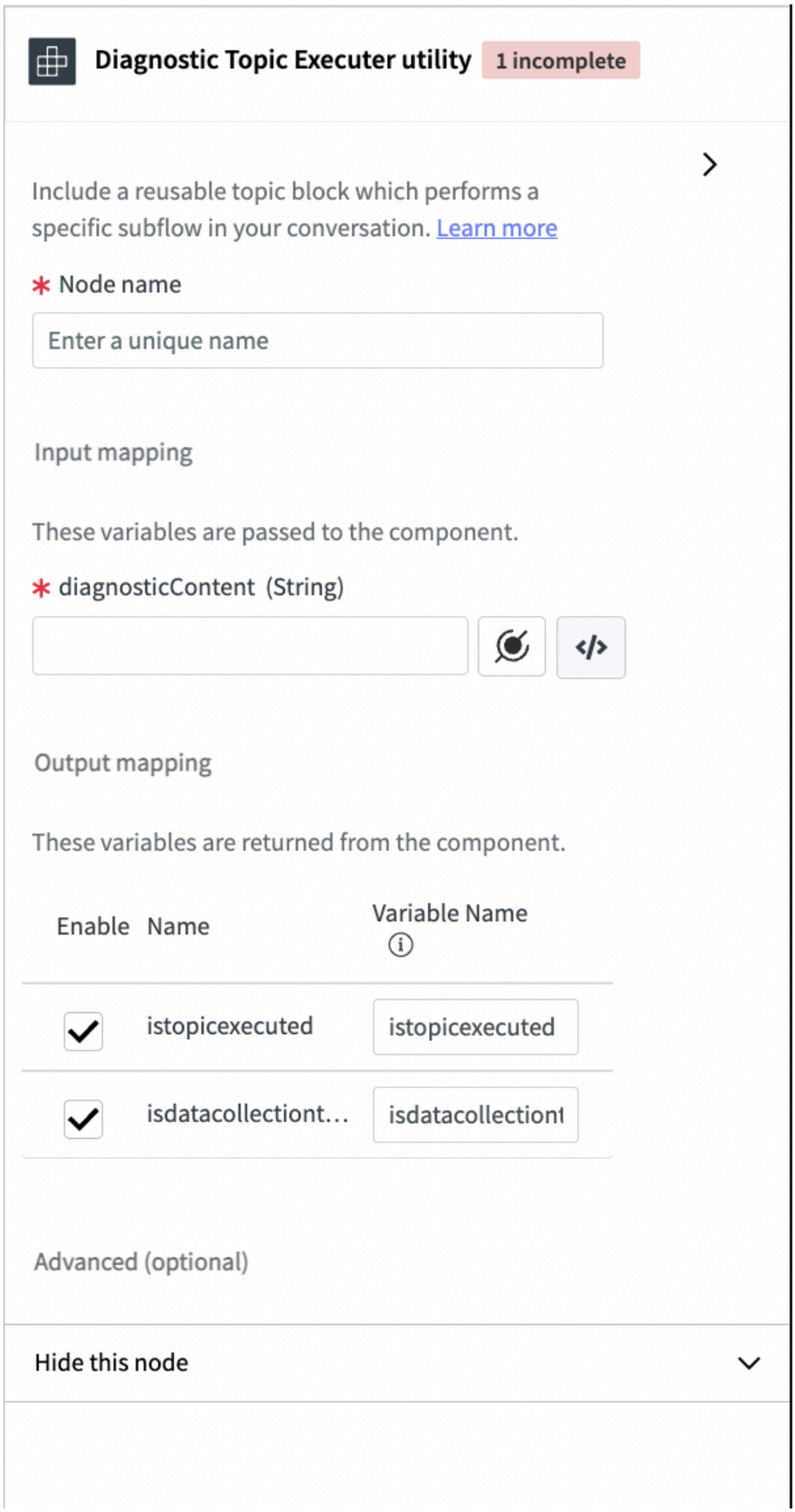
Example Diagnostic Topic Executor utility



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Geolocation utility

Use the Geolocation utility to gather map coordinates from a user, to personalize topics to a user's location, provide data for navigation or on-site tasks, and other services.

Geolocation utility properties

Specify the flow action properties for the node that you want to create.

Property	Description
Node name	Name of the Geolocation node.
Input mapping	
Permission prompt	String for the custom prompt requesting geolocation from a user.
Output mapping	
Latitude	User's latitude returned after the Permission prompt. **Note:** All Output Mappings are customizable. Select **Enable** to activate each one, and input a custom variable name to store the value under if desired.
Longitude	User's longitude returned after the Permission prompt.
Error message	Message returned if the geolocation attempt encounters an error.
Error type	Type of error returned based on the error message.
Status	Status of the geolocation data.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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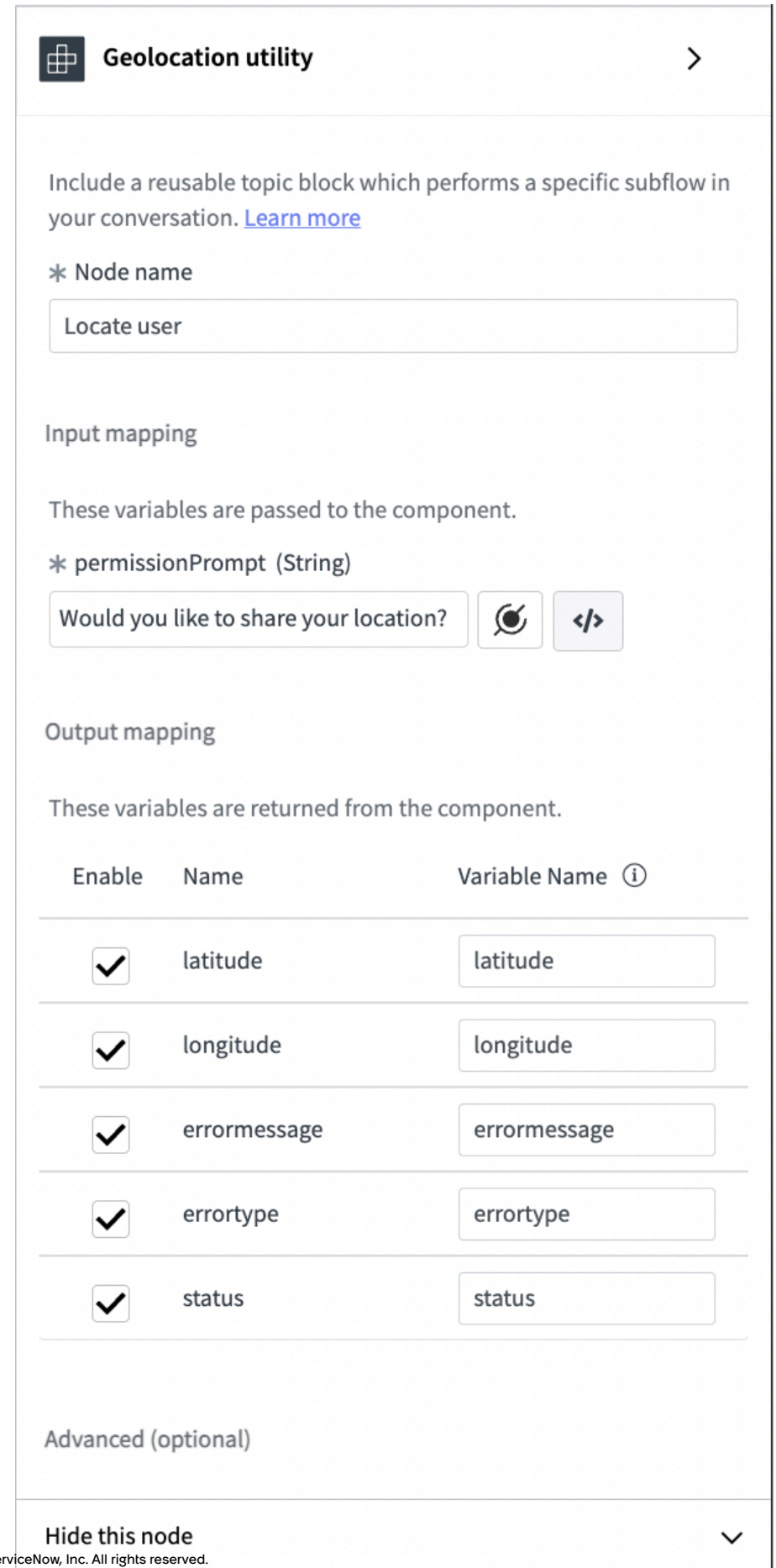
Example Geolocation utility



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Multi File Upload utility

Use the Multi File Upload utility to upload more than one file at a time in a Virtual Agent conversation.

Multi File Upload utility properties

Specify the flow action properties for the node that you want to create.

Note:
The Multi File Upload utility is supported in Microsoft Teams, Slack, and Virtual Agent API only.

Property	Description
Node name	Name of the Multi File Upload node.
Input mapping	
Prompt	Text string prompting the user to upload files.
Allow user to skip	Option to skip uploading files if a user has none.
Max file count	Maximum number of files that can be uploaded.
Max file size	Maximum size of individual files uploaded, measured in megabytes.
Try Again message	Message sent to a user if the file upload fails.
User confirmation message	Message sent to a user confirming that files uploaded.
Allow all file types	Option to allow uploading all file types.
Output mapping	
Files	The message sent to the user that lists files uploaded. Select **Enable** to activate this output, and input a custom variable name to store the value under if desired.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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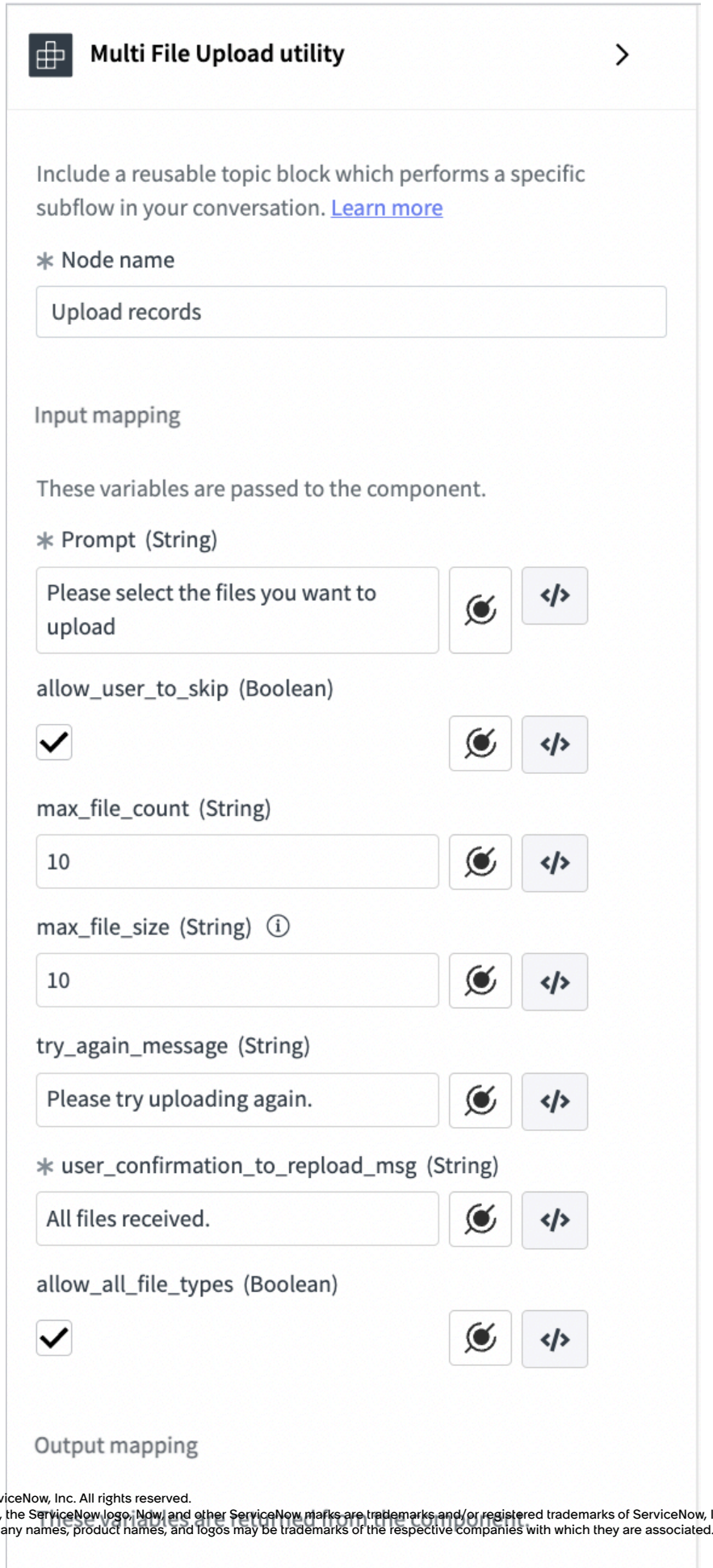
Example Multi File Upload utility



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Pause utility

Use the Pause utility to create a temporary halt in your Virtual Agent conversations.

Pause utility properties

Specify the flow action properties for the node that you want to create.

Property	Description
Node name	Name of the Pause node.
Input mapping	
Seconds	Duration of pause. **Note:** Any duration value greater than the maximum defined in the system reverts to the maximum, or 60 seconds if not defined.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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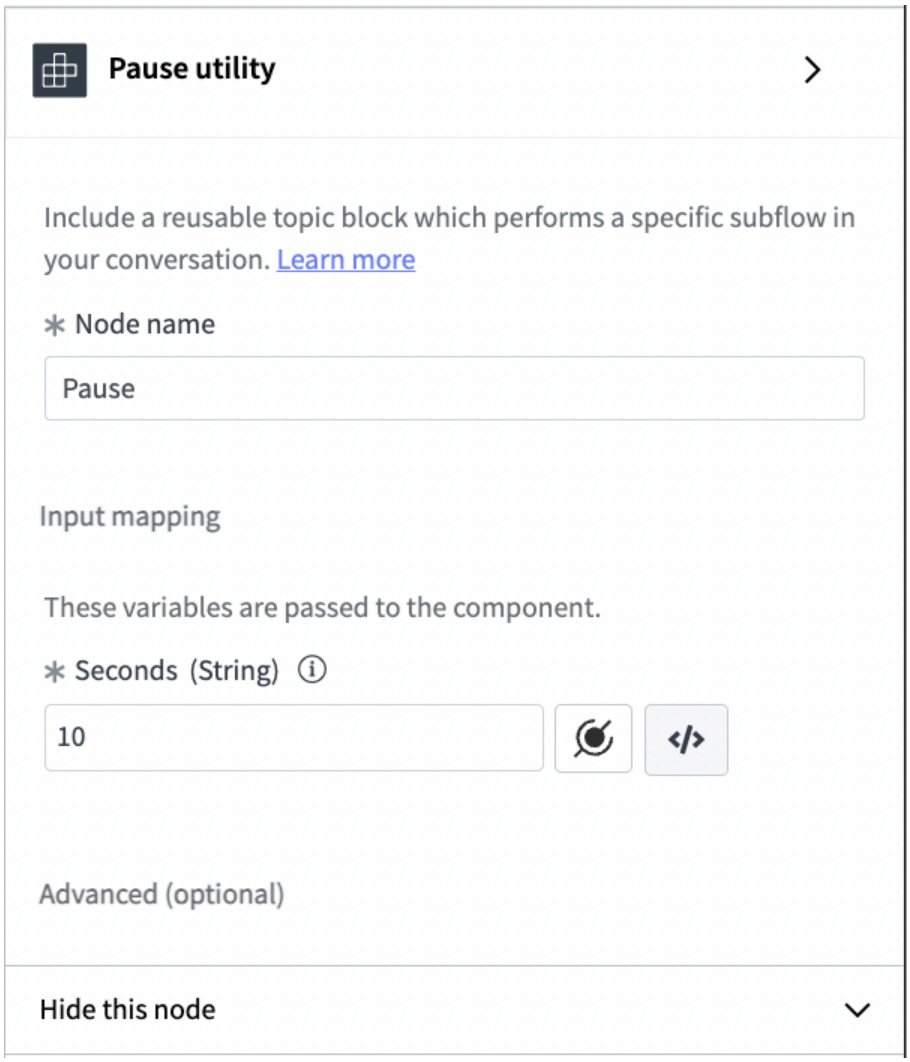
Example Pause utility



[store-future: BEGIN review]

Virtual Agent Designer capabilities

Add in-depth functions to Virtual Agent conversations with Virtual Agent Designer capabilities. Available from the Vancouver release onward, these controls provide special filters and abilities to your Virtual Agent topics.

The ServiceNow platform offers various products (such as Dynamic Translation) that can be used in Virtual Agent Designer along with other areas of the ServiceNow AI Platform. For Virtual Agent, these capabilities function as no-code topic blocks, performing complex functions in a conversation.

Unlike the User Inputs, Bot Responses, and Utilities, capabilities are features that are part of the ServiceNow AI Platform, which have been mapped to nodes in Virtual Agent Designer. The nodes are available for use in the Conversation Builder when you Use Generative AI Controller with Virtual Agent Designer.

The following capabilities are available for use within a Virtual Agent topic.

[End]
[store-future: BEGIN review]

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Dynamic Translation capability

Use the Dynamic Translation capability to perform on-demand translation of languages in your Virtual Agent conversations.

Dynamic Translation capability properties

Specify the flow action properties for the node that you want to create.

Property	Description
Node name	Name of the Dynamic Translation node.
Input mapping	
Wait for response?	Toggle to wait for a response from the action before continuing the conversation.
Text to translate	String of text to be handled by Dynamic Translation.
Source language	Input language of the text to translate.
Target language	Output language of the text to translate.
Output mapping	
Error message	Error message returned if the translation fails or other error occurs. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Detected language	Language detected by Dynamic Translation. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Translated text	String of text in target language. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Error code	Type of error returned if the translation fails or another error occurs. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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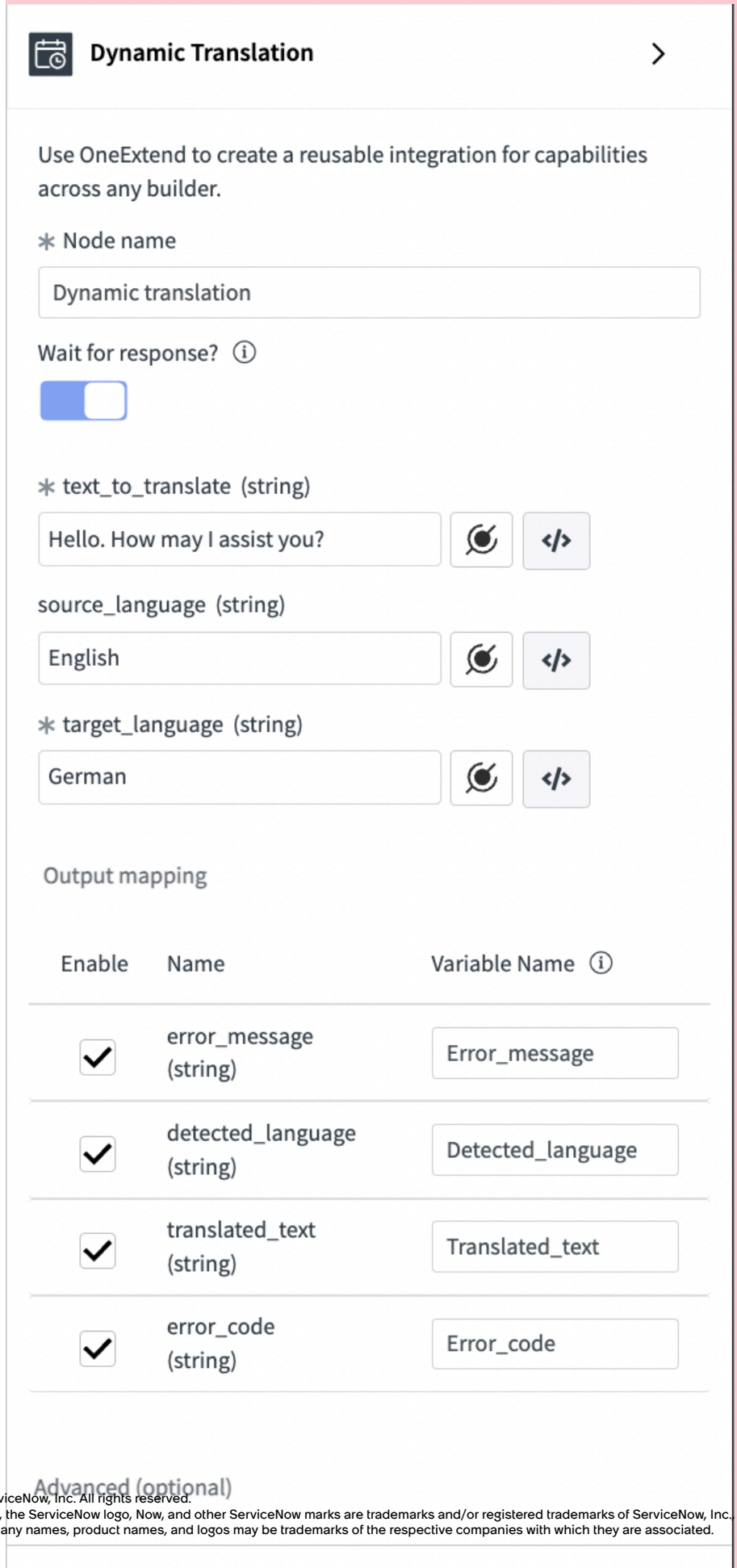
Example Dynamic Translation capability



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[store-future: BEGIN review]

Sensitive Data Masking capability

Use the Sensitive Data Masking capability node to conceal protected information and avoid sensitive information leakage.

Sensitive Data Masking capability properties

Specify the flow action properties for the node that you want to create.

Property	Description
Node name	Name of the Sensitive Data Masking node.
Input mapping	
Wait for response?	Toggle to wait for a response from the action before continuing the conversation.
PI categories	Protected Information categories.
Language	Language in which sensitive data is delivered.
Utterance	Recorded utterance.
Output mapping	
Is sensitive	Boolean denoting whether the data is sensitive information. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Anonymized text	Protected information text in anonymized form. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Status	Status of the protected information. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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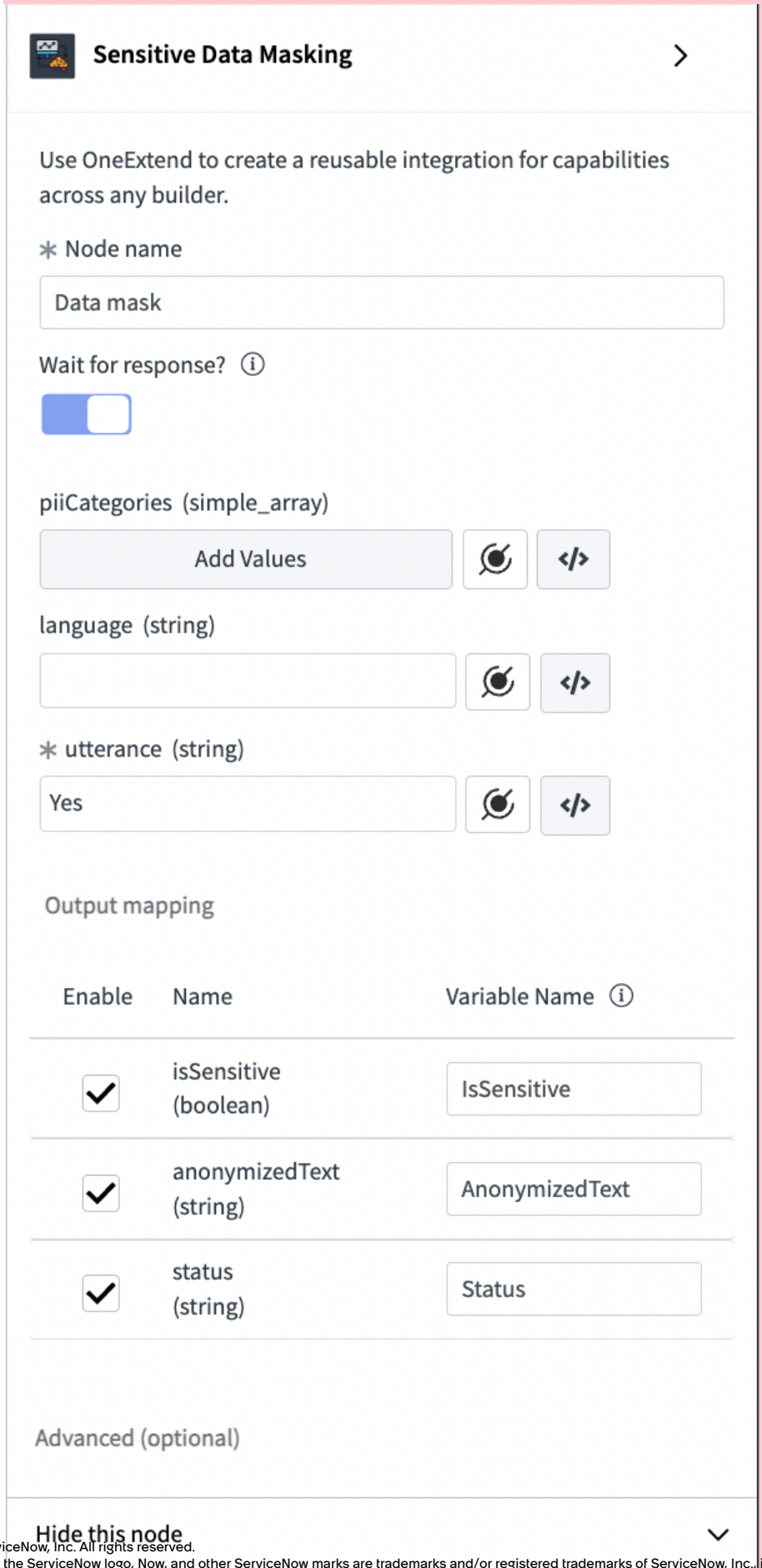
Example Sensitive Data Masking capability



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[End]

[store-future: BEGIN review]

Natural Language Query Parser capability

Use the Natural Language Query (NLQ) Parser capability to ask questions in naturally expressed language in your Virtual Agent conversations.

Natural Language Query Parser capability properties

Specify the flow action properties for the node that you want to create.

Property	Description
Node name	Name of the parser node.
Input mapping	
Wait for response?	Toggle to wait for a response from the action before continuing the conversation.
Table name	Name of the Natural Language Query table used.
Utterance	Utterance recorded by the Natural Language Query Parser.
Output mapping	
Encoded query	
Message	Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Status	Status of the query. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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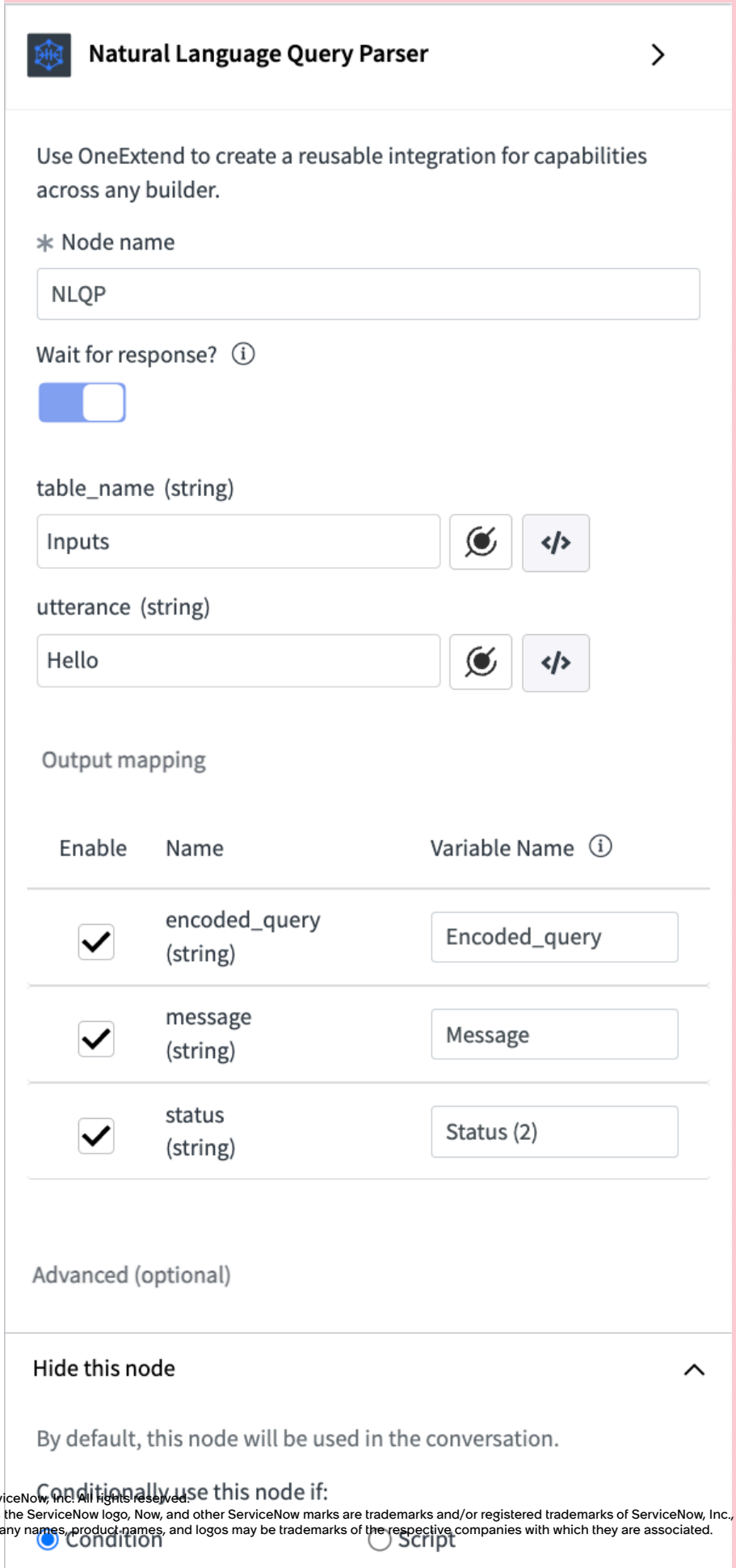
Example Natural Language Query Parser capability



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[End]

[store-future: BEGIN review]

Profanity Filtering capability

Use the Profanity Filtering capability in Virtual Agent Designer to keep unwanted language out of your Virtual Agent conversations.

Profanity Filtering capability properties

Specify the flow action properties for the node that you want to create.

Property	Description
Node name	Name of the Profanity Filtering node.
Input mapping	
Wait for response?	Toggle to wait for a response from the action before continuing the conversation.
Message text	Text message potentially containing profanity.
Source language	Language in which the message is delivered.
Sender userID	ID of the user who is sending the message.
Output mapping	
Profanity detected	Boolean denoting whether the Virtual Agent has detected profane language. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Status	Status of the filtered unwanted language. Select **Enable** to activate, and input a custom variable name to store the value under if desired.
Advanced	
Hide this node	
Conditionally show this node if	No-code condition statement or low-code script that specifies a condition for presenting this node in the conversation. The condition must evaluate to true.

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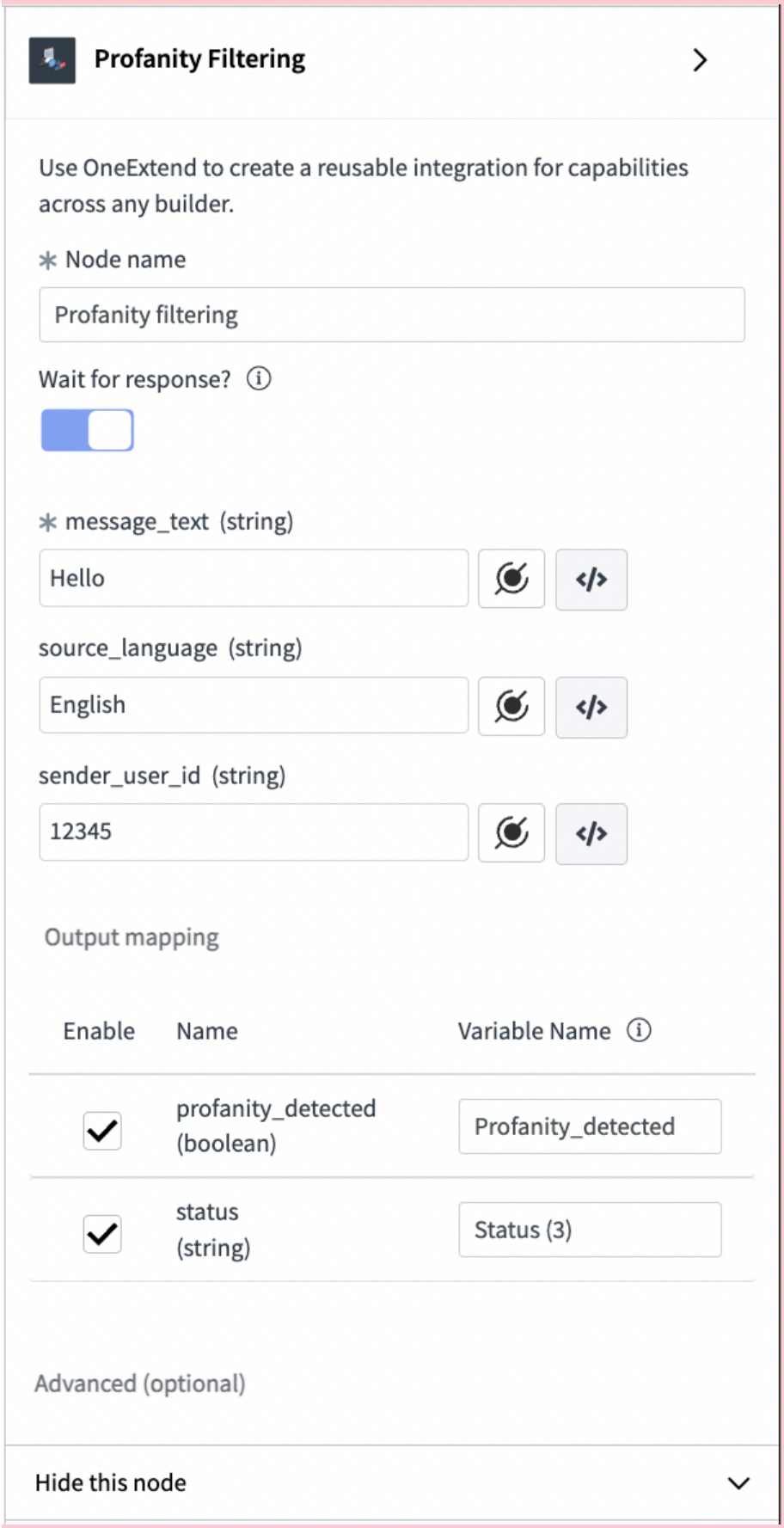
Example Profanity Filtering capability



[End]

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Virtual Agent technical reference

Use these topics to learn more about scripting methods, NLU system entities, and the Virtual Agent Interactions table.

Virtual Agent utilizes a queuing system to process incoming messages coming from asynchronous channels. Dedicated worker threads pull from this queue and process the messages in their own transactions. This enables Virtual Agent to scale to meet traffic volume. Virtual Agent transactions run as non-interactive (the scriptable method `gs.isInteractive()` will return false).

Various roles and tables are available when you activate Virtual Agent. For more information, see Installed with Virtual Agent. Virtual Agent also has a data retention policy to manage table size. For more information, see Data management in Conversational Interfaces

The following technical reference topics are available.

Domain separation and Virtual Agent

Domain separation is supported in the Virtual Agent application. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation .

Overview

Domain separation allows you to partition your organization's data and administrative control into separate domains. This lets you isolate the data and control access to it, which is particularly important in environments where multiple tenants share a common platform.

Domain separation in Virtual Agent works by creating separate Virtual Agent views that are isolated from each other. The chat configuration, branding, NLU settings, and topics and components can be assigned to a given domain within Virtual Agent. Users within a domain can only access the Virtual Agent conversations that are associated with their domain. This means that users in one domain cannot access data or functionality that belongs to another domain, including Virtual Agent conversations. Additionally, administrators who are assigned to a domain cannot see or manage Virtual Agent conversations in other domains, ensuring complete separation and security.

Domain separation is best for customers with any of the following requirements:

- You need to enforce absolute data segregation between business entities (data separation).
- Customize business process definitions and user interfaces for each domain (delegated administration).

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- Maintain some global processes and global reporting in a single instance.
- Separate data between customers or sub-organizations.
- The session scope is set upon session establishment to the domain listed in the user's user record. Users can manually change their session domain scope with the domain picker.
- The record scope uses the domain of the record and is active when viewing the form of any record.

  By default, the record scope takes precedence over the session scope so that users in higher-level domains adhere to each record's data and process constraints. However, these users can choose to expand or collapse the domain scope to show or hide data from other domains. For example, a user in the service provider (SP) global domain also has visibility into child domains such as the ACME domain. When looking at an incident record from the ACME domain, the user can choose to expand the domain scope to show values from the MSP domain or collapse the domain scope to show only record values that match the record's ACME domain.

  Note:
  Users always have access to data from domains that have been explicitly granted to them by domain visibility.

When domain separation is used, guest users are restricted to the domain used in the session. For custom chat channels, the domain of the provider application is used. For the web client, you can associate a domain ID with the chat portal. For details, see Associate a domain ID with a chat portal.

For more information, see Domain scope.

Requirements

All domain support features require the Domain Support - Domain Extensions Installer [com.glide.domain.msp_extensions.installer] plugin. For details, see Request domain separation.

Configuring Virtual Agent with domain separation

Branding

Service providers can create a chat branding configuration per domain.

Chat experiences

Chat experiences, including the default experience and any custom experiences, allow for domain separation. Each chat experience profile belongs to a domain. Each child customization, such as a setup topic change, belongs to a domain. Each child customization implements system overrides so that sub-domains can override parent-domain customizations.

NLU settings

Only one NLU service provider can be set per domain-separated instance for all Virtual Agent clients. The managed service provider (MSP) logs in as a global user for the domain to configure NLU. For details, see Configure Natural Language Understanding in Virtual Agent.

Creating topics in subdomains in Virtual Agent Designer

Roles required: admin or virtual_agent_admin

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The service provider either logs in to one of the subdomains and creates and publishes topics or allows subdomain admin users to create and publish their own topics.

Topic names within a domain must be unique, but Virtual Agent does allow you to create topics with the same name in other domains. For example, each domain might have a topic called **Greeting**.

Only service provider admins can do the following:

- Activate Virtual Agent conversation plugins or store apps for other ServiceNow business applications, such as ITSM, CSM, or HRSD, to enable pre-built topics for the subdomain.
- Assign roles on a particular subdomain to control which topics can be run by users.

Admin users assigned to the subdomain can do the following:

- Create topics in the instance.
- Be logged into the global domain and impersonate a user in the subdomain.
- Publish all available topics in the subdomain to web clients and messaging applications.

Domain separation in the web client channel

The web client does not support domain separation. However, you can provide a domain-separated chat experience in the web client channel by using separate, domain-separated portals. For example, you can create two separate support portals that are restricted to separate domains. Use the *domain_id* in the portal script to designate the domain. This gets passed as the *sysparm_domain_id* parameter in the portal URL.

To configure the portal, see Associate a domain ID with a chat portal.

For information about URL parameters, see Virtual Agent URL parameters.

Domain separation and Virtual Agent messaging app integrations

Roles required: admin or virtual_agent_admin

The domain-separated instance has one setup record for Slack, Microsoft Teams, Workplace, or Facebook Messenger.

Customers on the subdomain license either Slack, Microsoft Teams, or Workplace independently of the ServiceNow instance.

The admin of the subdomain installs the integrations within the subdomain and configures the appropriate credentials to access Virtual Agent from the third-party client. For details, see Virtual Agent integration with messaging apps.

For Facebook Messenger, the admin manually configures the integration. For details, see Conversational Integration with Facebook Messenger.

Related topics

Domain separation for service providers

Associate a domain ID with a chat portal

The Service Portal platform is not domain-separated, but you can create different versions of a portal and restrict each version's use to a single domain for chat purposes. For example, you could create two employee service portals and define a different domain for each.

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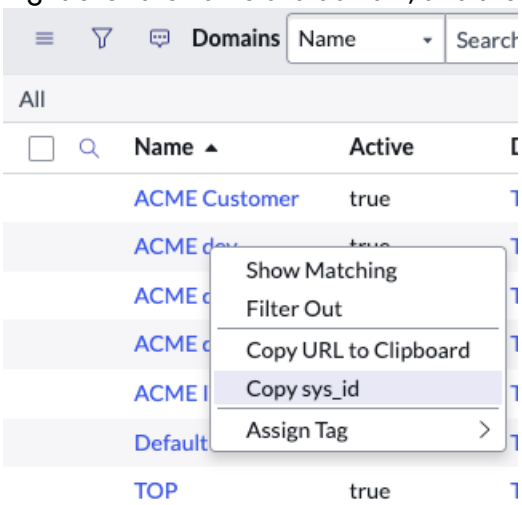
Before you begin
Role required: admin

About this task
Elements of the Service Portal platform such as settings, portals, pages and widgets are not domain-separated. However, the data within widgets does display when based on the appropriate domain. To provide different experiences, admins should create separate service portals, each with unique URLs, that they can redirect users to. For a domain-separated chat experience in the web client channel, create a portal and use the *sysparm_domain_id* parameter in the URL to designate the domain. For more information, see Virtual Agent URL parameters.

Procedure
1. **Optional:** Create a new domain and assign roles to the domain as needed.
2. Copy the domain's sys ID.
   a. Navigate to **All** > **Domain Admin** > **Domains**.
   b. Right-click the name of a domain, and then select **Copy sys_id**.



   c. Paste the ID in a text editor and save it for later.
3. Navigate to **All** > **Service Portal** > **Agent Chat**.
4. Select the name of the portal that you want to restrict to a domain, or create a new one. If prompted, open the record for editing.
5. In the **Server script** area, add the *domain_id* parameter and the domain's sys ID that you copied earlier.

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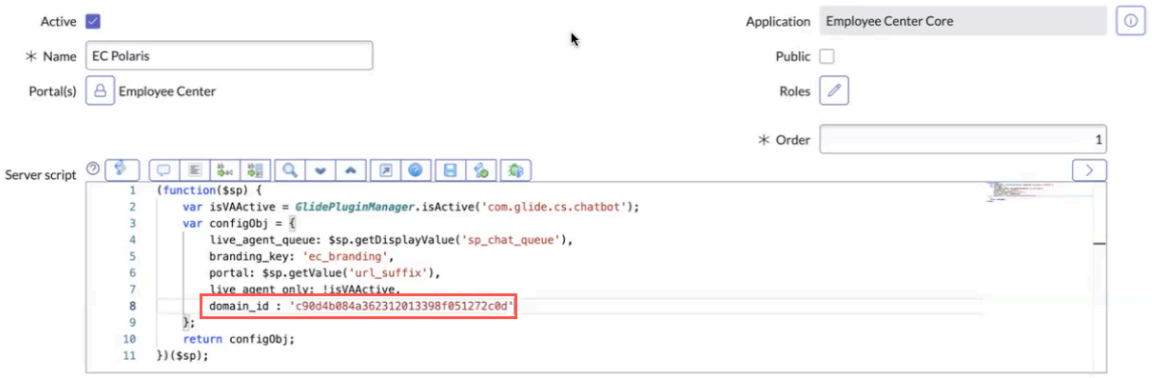

6. Select **Update** or **Submit** to save your changes.

Result

The *sysparm_domain_id* parameter gets passed in the portal URL.

Virtual Agent interaction records

Each time a Virtual Agent conversation occurs, an interaction record captures the entire conversation in the Interactions [interaction] table. The record includes all topic elements used in the conversation, as well as live agent transfers.

Interactions [interaction] table

Each conversation in an instance generates an interaction record in the Interactions [interactions] table, which logs the conversation between a requester and Virtual Agent. The interaction records include conversations that occur across the supported chat channels: web client, native mobile app, and messaging integrations.

Note:
The Interactions table is part of the Interaction Management plugin (com.glide.interaction). Virtual Agent, Agent Chat, and Connect Support use this plugin.

These interaction records provide administrators, Virtual Agent administrators, support agents, and support managers with a convenient way to review what happened during a conversation. The records also provide a quick way to see the type of conversations that occur: Virtual Agent, live agent transfers to Agent Chat, and live agent transfers to Connect Support.

Interactions [interaction] table

Interactions | Number | Search | Actions on selected rows... | New

All

Number	Opened	Opened for	State	Type	Agent chat	Virtual agent	Assigned to	Application
IMS0000002	2022-03-29 10:02:51	(empty)	Closed Complete	Chat	false	true	Virtual Agent	Global
IMS0000002	2018-02-20 11:05:47	Guest	Closed Complete	Walk-up	false	false	(empty)	Global
IMS0000003	2018-02-20 11:05:47	Guest	Closed Complete	Walk-up	false	false	(empty)	Global
IMS0000003	2022-03-29 10:09:29	(empty)	Closed Complete	Chat	false	true	Virtual Agent	Global

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Note:
Conversation transcripts are available only for Virtual Agent records that have Virtual Agent conversations and live agent transfers to Agent Chat.

- When a conversation transcript for live chat exceeds 4000 characters, the transcript is handled as an attachment to the interaction record.
- File attachments that the user uploads are recorded in the Attachments [sys_attachment] table, which corresponds to the interaction record. Attachments are automatically displayed in the activity stream.
- For Virtual Agent conversations that have live agent transfers to Connect Support, only the Virtual Agent conversation is included in the interaction transcript. Live agent conversations in Connect Support are recorded in the activity stream.

Key fields in the Interactions table

To view the Interactions table, navigate to **All**, and then enter `interaction.list` in the navigation filter. You can configure the fields displayed in the table using the list collector (slushbucket).

Field	Description

Agent average response time	Average time based on how long the agent takes to respond to each message sent by a requester. For example:
	`00:00 Requester: I have a question.`
	`00:01 Agent: What is it?`
	`00:04 Requester: How do I reset my password?`
	`00:05 Requester: I forgot it and can't access my account.`
	`00:07 Agent: Here is the answer.`
	Pair #1 00:01-00:00 = 00:01
	Pair #2 00:07-00:04 = 00:03
	(00:01 + 00:03) / 2 = 00:02 average

Agent chat	Flag that indicates the conversation was transferred to a live agent in Agent Chat: true or false.
Application	Scope of the application. Scope determines the accessible files and data available to other applications.
Assigned to	Name of the fulfiller: Live agent name or Virtual Agent
Domain	The domain the conversation took place in. For more information, see Domain separation and Virtual Agent.
Number	Number of the interaction record.
Opened	Date and time that the conversation started.
Opened for	Name of the requester. Anonymous users are identified as Guests.
Sentiment	Shows the sentiment level of the interaction, if sentiment analysis is enabled on the instance. This value can be shown to agents in the Agent Chat interface.

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Field	Description
	Business rules can be created based on this value at handoff (Virtual Agent to live agent, live agent to live agent, or live agent to queue). Valid values are as follows: • Positive • Neutral • Negative • null (no value assessed) This value is also entered in the Interaction Insights table.
State	Conversation states: • In Progress: Conversation between requester and virtual agent is in progress. • Closed Complete: Virtual agent ends the conversation. • Closed Abandoned: Requester ends the conversation before completing the conversation with the virtual agent. **Note:** There are different State Reasons for the Closed Complete and Closed Abandoned states, depending on whether you're using Virtual Agent only, Virtual Agent with Live Agent, or Live Agent only. For details on the State Reasons, see Reasons for Closed Complete and Closed Abandoned states.
State Reason	Detailed explanations (reasons) for the conversation states Closed Complete and Closed Abandoned. To learn more, see Reasons for Closed Complete and Closed Abandoned states.
Transcript	Log of the conversation between the requester and agents (virtual or live).
Type	Type of interaction record. Virtual Agent conversations are record type Chat.
Updated	Date and time that the conversation record was last updated.
Virtual agent	Flag that indicates whether the conversation is for Virtual Agent: true or false. A Virtual Agent conversation is flagged when a requester selects a conversation topic or when the topic discovery process starts the appropriate conversation.

Reasons for Closed Complete and Closed Abandoned states

Virtual Agent closes completed and abandoned conversations for various reasons, depending on whether the conversation is for Virtual Agent (VA) only, Virtual Agent with Live Agent (VA-LA), or Live Agent (LA).

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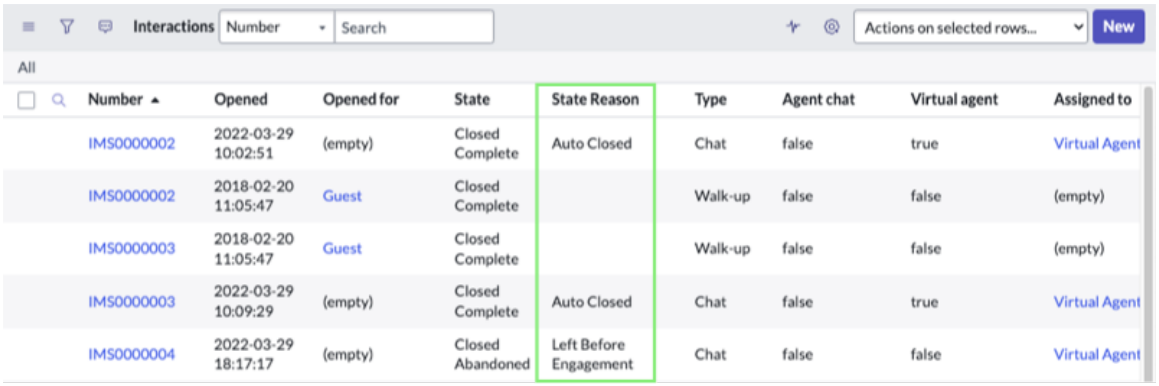
Interactions table with State Reason column



Number	Opened	Opened for	State	State Reason	Type	Agent chat	Virtual agent	Assigned to
IMS0000002	2022-03-29 10:02:51	(empty)	Closed Complete	Auto Closed	Chat	false	true	Virtual Agent
IMS0000002	2018-02-20 11:05:47	Guest	Closed Complete		Walk-up	false	false	(empty)
IMS0000003	2018-02-20 11:05:47	Guest	Closed Complete		Walk-up	false	false	(empty)
IMS0000003	2022-03-29 10:09:29	(empty)	Closed Complete	Auto Closed	Chat	false	true	Virtual Agent
IMS0000004	2022-03-29 18:17:17	(empty)	Closed Abandoned	Left Before Engagement	Chat	false	false	Virtual Agent

The **State Reason** field provides details on the different ways in which a conversation ends. The following table describes the reasons and also the related message displayed for dashboard analytics. For details about how Virtual Agent and Agent Chat handle idle conversations and the corresponding default timeout periods, see Closing Virtual Agent and Agent Chat conversations.

State	State Reason	Virtual Agent	Virtual Agent & Live Agent or Live Agent only
Closed Abandoned	Left Before Engagement	Not applicable	Requester chose to be routed to a live agent, but closed the conversation (selecting **+ End**) before an agent was assigned. Dashboard message: `User closed LA - before Agent engagement`
Closed Abandoned	No Activity	Requester opened a conversation, but didn't engage with the bot (for example, closed the browser) and didn't initiate topic discovery. The system closed the Virtual Agent idle conversation after the default timeout. • Virtual Agent idle chat timeout: Two hours (default) • Dashboard message: `System closed VA - user never engaged`	Requester chose to be routed to a live agent (not through pre-chat setup) but didn't engage with the agent. If the conversation timed out and the *`Time Out Abandoned VA Conversations`* scheduled job ran, the interaction state is Closed Abandoned with No Activity. Dashboard message: `System closed LA - before Agent engagement`
Closed Complete	User Ended	After engaging with the bot (requester entered at least one utterance during a conversation or completed a conversation), requester closed the conversation session by selecting **End**.	Requester started to chat with live agent but closed the chat client by selecting **End**. Dashboard message: `User closed LA - Clicked End/X`

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State	State Reason	Virtual Agent	Virtual Agent & Live Agent or Live Agent only
		Dashboard message: `User closed VA - Clicked End/X`	
Closed Complete	Auto Closed	Requester interacts with VA topic and completes the conversation. No live agent interaction. Dashboard message: `System closed VA - Auto Closed`	Not applicable.
Closed Complete	No User Response	Requester engaged with the bot (entered at least one utterance), but left without actively closing the conversation. The system closes the idle conversation after two hours (default). • Virtual Agent idle chat closed: Two hours • Dashboard message: `System closed VA - User no response`	Requester engaged with live agent but stopped and left the agent hanging (idle live chat). The system closes the idle live chat after six minutes (default). • Idle live chat closed: Six minutes • Dashboard message: `System closed LA - User no response`
Closed Complete	Topic Complete	Requester engaged with the bot in a topic but didn't respond to the Anything Else setup topic, or chose Yes to continue but didn't respond. The *`Time Out Abandoned VA Conversations`* job closes the interaction after the default timeout. • Virtual Agent idle chat closed: Two hours • Dashboard message: `System closed VA - Topic complete`	Not applicable.
Closed Complete	Left for search	Requester engaged with the bot (entered at least one utterance), but selected Search in the middle of the conversation and didn't return to the conversation. The system closes the conversation because of inactivity.	Not applicable.

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State	State Reason	Virtual Agent	Virtual Agent & Live Agent or Live Agent only
		Dashboard message: `System closed VA-Left with AI search`	
Closed Complete	Agent Ended	Not applicable	After requester started a chat with a live agent, the agent actively closed the conversation by selecting **End Chat**. Dashboard message: `Agent closed LA - Clicked End/x`
Faulted	Error	A runtime exception occurred while processing a message.	Requester's conversation was closed due to a runtime error.

Detailed view of a Virtual Agent interaction record

From the Interactions table, you can open a specific record to see additional details about the Virtual Agent interaction: a transcript of the conversation, related tasks, and interaction logs.

Note:
If a field is not visible, you can add it to the form view. For more information, see Configuring the form layout.

Conversation transcript

The transcript shows the dialog exchange between the agent (virtual or live) and requester, as well as the time stamp for each dialog turn.

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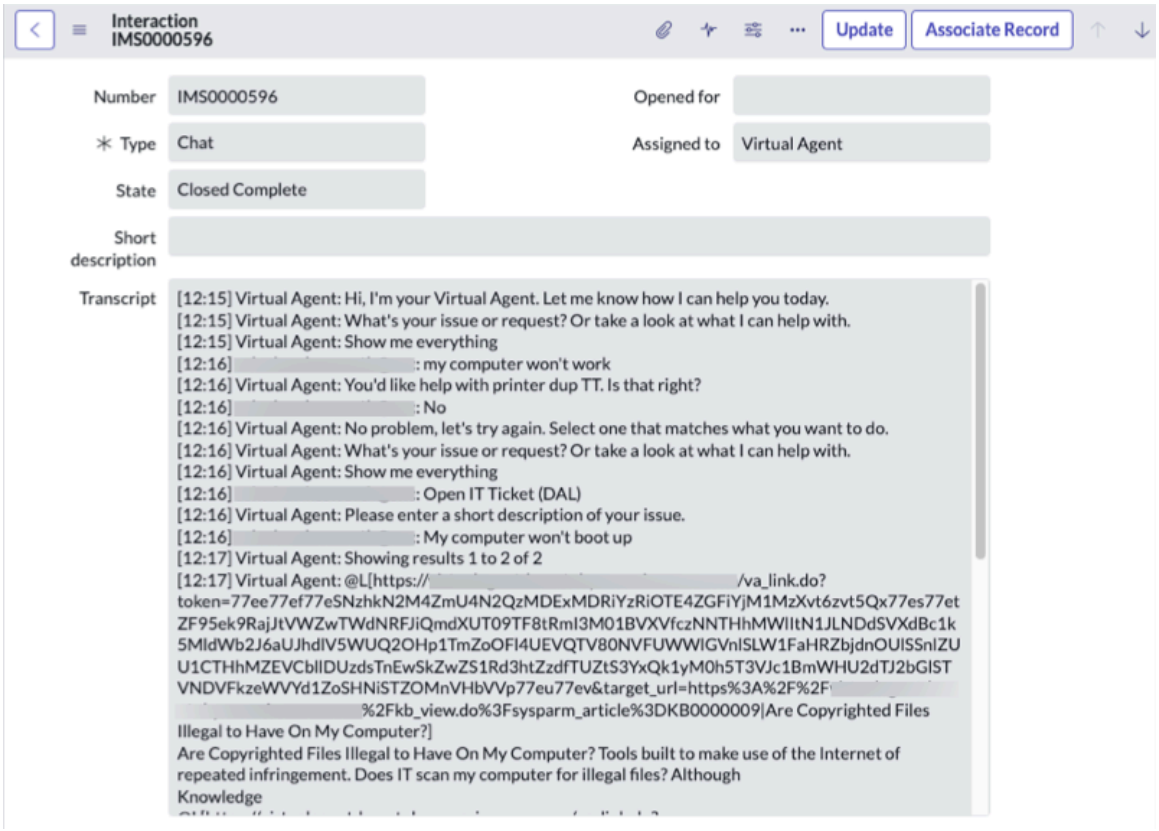
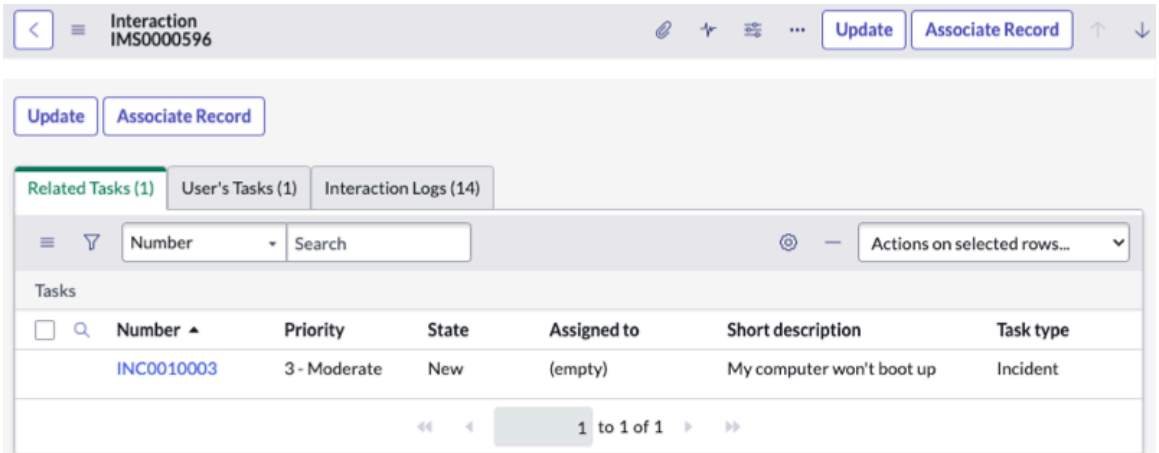


Related Tasks

Any cases, incidents, or requests created or updated during the conversation are automatically attached to the interaction record as a Related Task. To ensure that these tasks are included with the interaction record, design your conversation topics using certain Virtual Agent Designer utilities and the system method `vaSystem.attachRecordToConversation`. For details, see Topic design considerations below.



Interaction Logs

The **Interaction Logs** tab lists all the topics that run in a conversation, including the setup topics and the topics executed by topic discovery or by user selection. Each topic element is assigned a number that indicates the sequential order in which the topics run.

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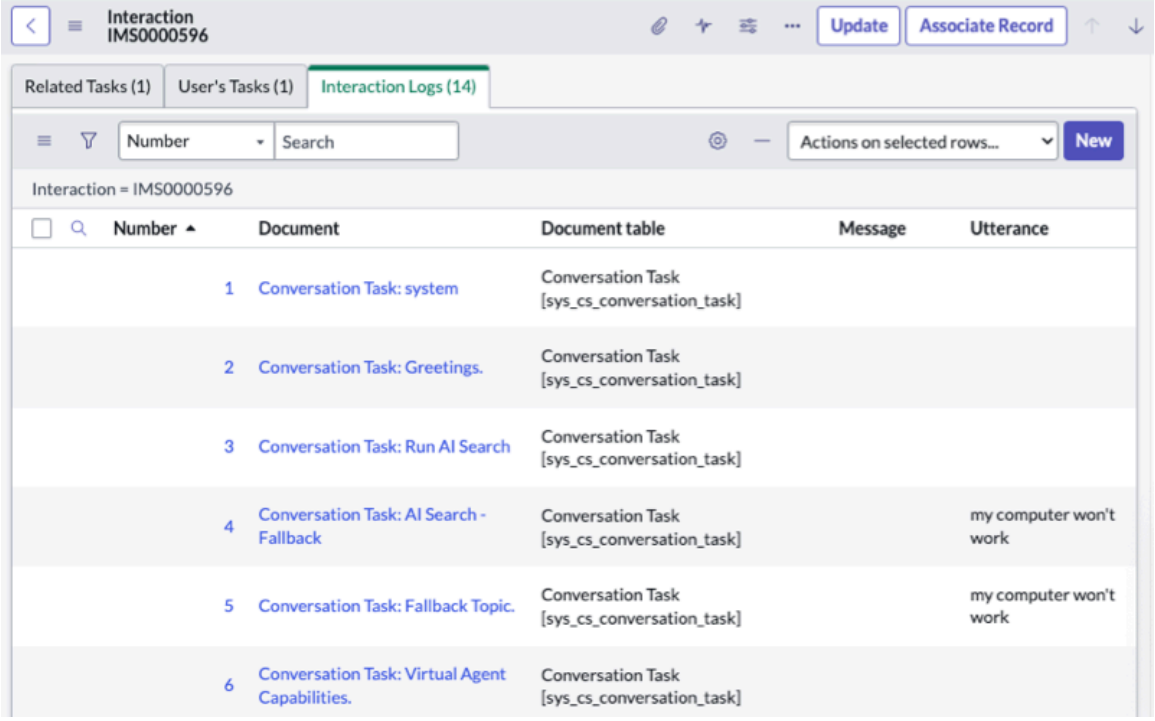

Security considerations

Information in conversation transcripts is viewable to all users. If you need to control access to records containing sensitive information, you can use scoped access control lists (ACLs) and lock scripted access to those records by using the Restricted Caller Access (RCA) feature. For details, see Set application scope, application resource, and event access and Manage Restricted Caller Access.

Topic design considerations

If your Virtual Agent conversations create or update incidents, cases, or requests, consider designing your topics with the following Virtual Agent Designer utilities and system method:

- Action utility to create or update incidents or cases
- Lookup utility to view information
- System method `vaSystem.attachRecordToConversation(String tableName, String sysId)` to attach the task to the interaction record

Use these utilities and system method so that incidents, cases, or requests created during a Virtual Agent conversation are included in the **Related Tasks** list of the interaction record.

Note:
Records created or updated using the Script Action utility are not captured as related tasks in the interaction record.

Virtual Agent scripts

Use ServiceNow® Virtual Agent script methods and variables to write chat scripts, such as response, trigger, and flow scripts. Variables can also provide context for your live support topics and conversations.

Virtual Agent scripts can provide context for topics, such as retaining information about a user or a user's input. You can use this information to personalize a conversation, such as to present a scripted greeting or confirmation. Scripts can also specify certain actions to be performed on

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information that was obtained during a conversation. These actions can be used for creating or updating ServiceNow records.

Scripts run on the server in the scope in which a topic is defined. All scope protections apply. If you're developing a conversation for a scoped application, you must use the scoped API. You can use most APIs that run in server scripts.

User input and ServiceNow record variables

In Virtual Agent, the following variables are available for use in scripts that you create for a topic.

User input variables

When you add an input control to a topic, the system automatically creates a variable to store the user input (a string, Boolean value, and so on.). The syntax is `vaInputs.myvar` where `myvar` is the name that you assigned to the input node.

For example, a text input prompt with the name `First prompt` has a system-defined variable called `vaInputs.first_prompt`. Spaces in the name are replaced with an underscore character, and uppercase characters are changed to lowercase.

ServiceNow record variables

If you create a script for a topic that queries a ServiceNow table, then the record object (GlideRecord) returned is automatically available for use in the topic. The variable syntax is `vaInputs.myvar` where `myvar` is the record object. For details on querying ServiceNow tables to return a record object, see Querying tables in script.

Use dot-walking in variables that contain a ServiceNow record to specify a particular field in the table. The syntax is `vaInputs.myvar.field`. For details on dot-walking within a script, see Dot-walking examples.

Accessing user input and ServiceNow record variables

Use *`vaInputs`* objects to access ServiceNow record variables in scripts. For example, the `vaInputs.myvar == "expected value"`. To access values from user inputs that are not records, use `vaInputs.myvar.getValue()`.

The following methods are available.

vaInputs methods

Method	Description
`vaInputs.myvar == "expected value"`	Evaluates whether `myvar` matches an expec **Note:** Values for user input variables are assigr user input controls. These values can't b your scripts.

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vaInputs methods (continued)

Method	Description
	• The Washington DC release supports addi types. For more information, see Input data Virtual Agent topics. • By default, the user variable is available an reference to the sys_user record for the use
`vaInputs.myvar.getValue();`	Returns the value.
`vaInputs.myvar.getDisplayValue();`	Returns the display value if the stored value i ServiceNow record. For variables that contain records, this method returns the display value by the display field for that table. The following example shows the label and c for a user input. In this case, `myVar.getVa` would return a value of 10, 20, or 30, while `myVar.getDisplayValue()` would retu Orange, or Pear. **Example choice list** Choice List Setting Label ⓘ Value ⓘ Apple 10 Orange 20 Pear 30
`vaInputs.myvar.getDefaultValue();`	Returns the default value in a confirmation m
`vaInputs.myvar.getDefaultDisplayValue();`	Returns the display value for the default value confirmation message.
`vaInputs.myvar.unbindEntity();`	Removes the value of input variables that the prediction service slot-filled with extracted en (unbinds it from the initial input value). For example, if the user decides to change th a confirmation prompt, you can unbind the en from the input variable. The user will then be again when they loop back to the correspond node. **Note:** NLU must be enabled on the topic. In the Agent Designer, select the **Properties** ta NLU. For information about defining NLU Entities.

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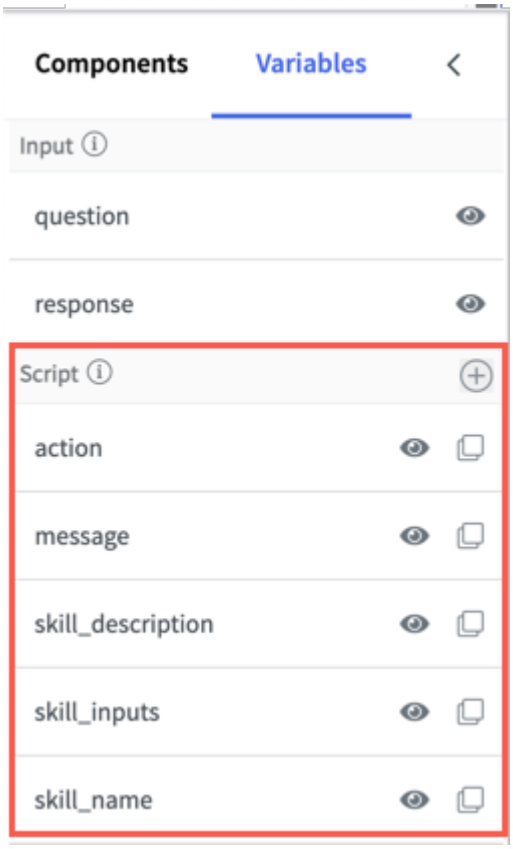
Script variables

You can define script variables for information that is not stored in ServiceNow tables but that can be used to share that information elsewhere in a topic. Script variables are similar to workflow scratchpad variables that store primitives such as integers, Boolean values, or strings. A string value can be either a static or dynamic scripted value. Use the Variables sidebar to define script variables for a topic in Virtual Agent Designer.

Variables sidebar



Note:
Script variables are intended for use by topic authors with advanced scripting skills.

The variable syntax is `vaVars.myvar`, where `myvar` is the name that you assign to the variable. For example, you can assign a value to the variable using `vaVars.myvar = value;`. Unlike user input variables, script variables can be assigned values in a script.

For information about defining a script variable in a topic, see Define script variables for a topic.

Context variables

Context variables work in a global scope whereas system variables work within the scope of the topic. You can use context variables in system parameters within the web client URL. These variables can be used anywhere in the conversation using the `vaContext` object. Use these options to create links to Virtual Agent with predefined variables.

The following example link contains a parameter, `sysparm_city=milan`. In addition to opening a Virtual Agent conversation, using this link creates a variable called `city` with a value of `milan`. This variable can be accessed in a script using `vaContext.city`.

```
https://<instance>.service-now.com/$sn-va-web-client-app.do?sysparm_city=milan
```

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A number of Live Agent variables are available for use in topic scripts. These variables include the following:

- *application*
- *language*
- *portal*
- *search_text*
- *short_description*

The variable syntax is `vaContext.LiveAgent_myvar`, where `myvar` is one of the available live agent context variables. Access the variable using `vaContext.LiveAgent_myvar = value;`.

To use Live Agent variables in topic scripts, open the topic in Virtual Agent Designer. On the **Properties** tab, select the pencil icon next to **Live Agent Variables** to add them to the topic.

For information about live agent context variables that are included with Virtual Agent, see Live agent chat context variables.

vaVars methods

Method	Description
vaVars.global_utterance	Updates when skill picker renders and an utterance is typed in.

vaSystem methods

You can use methods in the vaSystem object to do various tasks. Some of these tasks include the following:

- Attach images to records.
- Access the search string that was used to find the current topic.
- Verify that a live agent is available to receive a conversation.
- Connect the user to a live agent.

Note:
The use of undocumented system methods is not recommended, as they are unsupported and may be discontinued or altered at any time without prior notice.

Methods used in Virtual Agent topic scripts

Method	Description
vaSystem.applyLinkTemplate(String sysId, String tableName, String actionName)	Creates an external link that is specific to a porta
vaSystem.attachRecordToConversation(String tableName, String sysId)	Attach ServiceNow records to the Related Tasks list in a Virtual Agent interaction record. These records are updated or created during a Virtual Agent conversation.

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Methods used in Virtual Agent topic scripts (continued)

Method	Description
`vaSystem.attachToRecord(String mediaId, String tableName, String sysId)`	Attach an uploaded image to a ServiceNow reco The method uses the following parameters: • `mediaId`: The path for the image to be attached. To use an image entered by the customer, use `getValue()` on an image input variable. For example, `vaInputs.image_input.getValue()`. • `tableName`: A string that contains the name the table. • `sysId`: The sys_id of the record.
`vaSystem.connectToAgent()`	Connects the customer to a live agent. For more information on this method, see Transferring Virt Agent conversations to a live agent.
`vaSystem.didConnectToLiveAgent()`	Returns a Boolean (true or false) value whether t current conversation was connected to a live age
`vaSystem.getClosingMessage()`	Returns a closing message for a conversation from system property: `com.glide.cs.general.closing_mess` (The message is different for third-party messagi apps such as Microsoft Teams and Slack).
`vaSystem.getConversationId()`	Returns the conversation ID of the current conversation.
`vaSystem.getGreetingMessage()`	Returns a greeting message from UI Message wi the key "Hi, I'm your Virtual Agent. Let me know h can help you today."
`vaSystem.getInteractionSysId()`	Returns the interaction ID of the current conversation.
`vaSystem.getSearchText()`	Returns the last utterance typed by the user.
`vaSystem.getTopicSelectionMessage()`	Returns a UI message with the key "What's your issue or request? Or take a look at what I can hel with." (The message is different for third party messaging apps such as Microsoft Teams and Slack). This method is returned from the system property `com.glide.cs.topic_picker_m`
`vaSystem.getTranscript()`	Gets the conversation transcript.
`vaSystem.isLiveAgentAvailable()`	Checks whether a live agent is available to receive a conversation that is transferred from the bot. To transfer a conversation to a live agent, call this method before using `vaSystem.connectToAgent()`.
`vaSystem.isLiveAgentConfigured()`	Returns whether live chat is enabled.
`vaSystem.resetAllEntities()`	Resets all entities logged in the conversation.
`vaSystem.sendBatchedMessages()`	Immediately sends queued messages.

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Methods used in Virtual Agent topic scripts (continued)

Method	Description
`vaSystem.sendSeparatorMessage()`	Sends a separator message line and returns the closing message from `getClosingMessage(`
`vaSystem.sendSystemMessage(String message, Boolean showAvatar)`	Sends a system message and returns greetings message from `getGreetingMessage()`.
`vaSystem.sendTopicPickerControl(String topicSelectionMessage, String topicPickerButtonLabel)`	Sends a topic picker control with associated valu for the message and "Show me everything" butto label.
`vaSystem.switchTopicByName()`	Enables the user to jump from the current conversation topic to the specified topic name. The **X** button is available, so that the user can en the conversation. After the topic ends, the user resumes the global topic. When the conversation ends, the user can select **Click here to start a ne conversation** at the bottom of the chat window t restart the topic. The optional `resumeBehavior` parameter specifies how the conversation flow resumes, as follows: • If `resumeBehavior=resume`, Virtual Agent resumes the calling topic. • If `resumeBehavior=skip`, Virtual Agent sk the calling topic. If `resumeBehavior` is not specified, the defau behavior for the instance is used.
`vaSystem.switchTopicById(sysid)`	This method is the sysid of `sys_cb_topic`, and enables the user to jump from the current conversation topic to the specified topic ID. The **X** button is available, so that the user can end the conversation. After the topic ends, the user resumes the global topic. When the conversation ends, the user can select **Click here to start a ne conversation** at the bottom of the chat window t restart the topic. The optional `resumeBehavior` parameter specifies how the conversation flow resumes, as follows: • If `resumeBehavior=resume`, Virtual Agent resumes the calling topic. • If `resumeBehavior=skip`, Virtual Agent sk the calling topic. If `resumeBehavior` is not specified, the defau behavior for the instance is used.

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Methods used in Virtual Agent topic scripts (continued)

Method	Description
`vaSystem.topicDiscovery(String searchTextOverride, Boolean keywordImpl)`	Performs topic discovery based on term in the `searchTextOverride` parameter. The metho uses the following parameters: • `searchTextOverride`: A string on which t run topic discovery. • `keywordImpl`: A Boolean that determines whether to use keywords.

Method that can be used outside Virtual Agent topics

Method	Description
`sn_cs.VASystemObject.getTranscriptById(<conversation sysId>)`	Gets the transcript for the current Virtual Agent conversation.

Input data types in Virtual Agent topics

You can define inputs of commonly used Glide Virtual Agent (com.glide.cs.chatbot) data types in Virtual Agent Designer without writing a script. Define the input data type on the Start node of a custom control or topic block.

Data types in Virtual Agent Designer

The data type designation allows Virtual Agent to perform secondary validation on NLU predicted values. For example, if your choice list has red, white, and blue, but the NLU prediction service returns green, the input won't be slot-filled because that wasn't a valid choice.

When you specify an input with a data type on a calling topic, you can use the data pill picker to specify information collected from the user or previously looked up in a custom control or topic block.

Data type	Description
String	Alphanumeric text. The value uses JavaScript data conventions.
Boolean	Boolean value of true or false (yes or no).
Reference	Table record by sys_id. Select a ServiceNow table in the **Table** field. You can define conditions for the returned record.
Date/Time	Date and time values.
Array.String	Sequence of alphanumeric text values. To limit the number of strings that authors can specify, use the **Max Number of Rows** field.
Array.Datetime	Sequence of date and time values.

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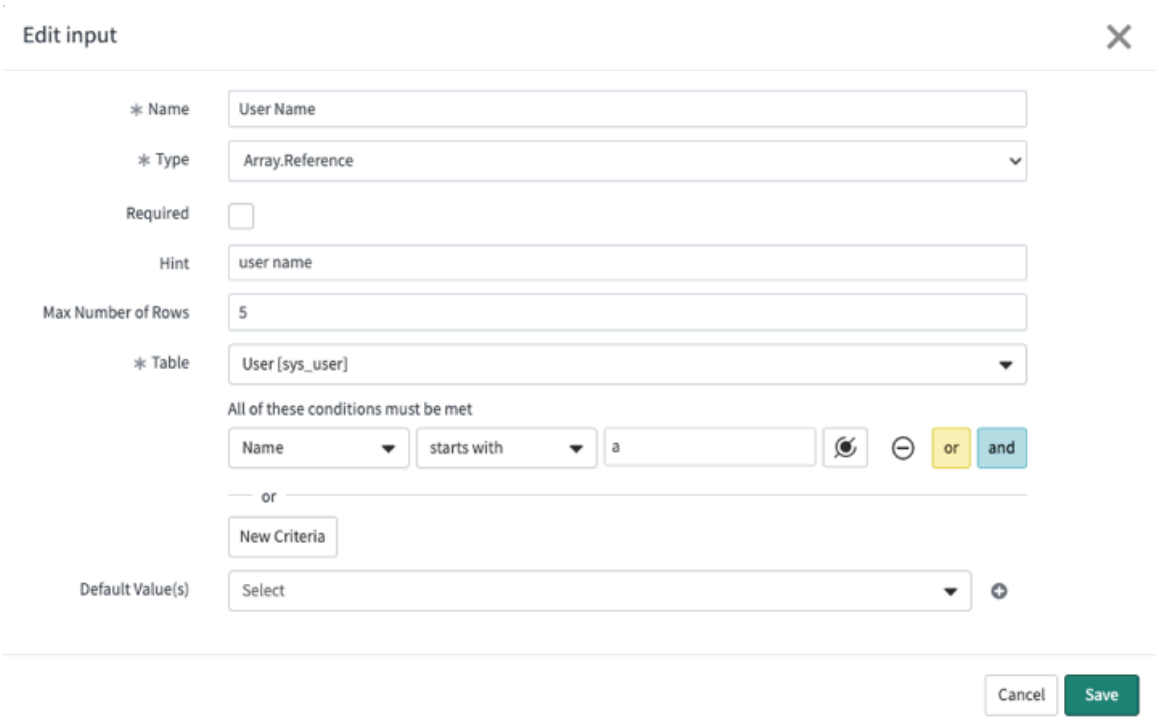
Data type	Description
	To limit the number of dates that authors can specify, use the **Max Number of Rows** field. Click **+** to specify more than one default value.
Array.Reference	Sequence of table records by sys_id. Select a ServiceNow table in the **Table** field. You can define conditions for the returned record. To limit the number of records that authors can specify, use the **Max Number of Rows** field. **Note:** The *`Array.Reference`* input data type in Virtual Agent Designer corresponds to the *`List.[Table]`* input data type in Flow Designer. For more information, see Action input and output data types.
Array.Choice	Sequence of choice list values for a specific choice field. For example, `printer`, `computer`, and `monitor`.

Note:
Duplicate default values are not allowed with array data types.

Example data type definition

This User Name Array.Reference input variable limits the number of records to 5. It references the sys_user table with the condition that all names must start with **a**.



NLU system entities

Use globally defined NLU entities to identify system information that Virtual Agent can extract from the conversation. You can define entities as "nodeless" input variables for a topic. These

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variables can be slot-filled from NLU service provider predictions or provided outside of the scope of the topic.

System entities are enabled in NLU models by default. You can view them on the model **Entities** tab in NLU Workbench.

GLOBAL.DATE system entity

The DAY SubType returns a date string that is accurate to a specific date.

GLOBAL.DATE SubType = DAY usage

Usage	Example
Format	YYYY-MM-DD
Regular expression	\\d\\d\\d\\d-\\d\\d-\\d\\d
Input example	Mr. Smith left Friday, February 4, 2019.
Normalized value	2019-02-04

Code example	<pre>{
	"name": "DATE",
	"value": "...",
	"score": 1.0,
	"normalization": "2019-02-04"
	}</pre>

The WEEK SubType returns a date string of a specific week of a year.

GLOBAL.DATE SubType = WEEK usage

Usage	Example
Format	YYYY'W'WW
Regular expression	\\d\\d\\d\\d\\dW\\d\\d
Input example	Mr. Smith left the third week of 1999.
Normalized value	1999W3

Code example	<pre>{
	"name": "entity:GLOBAL.DATE",
	"value": "...",
	"score": 1.0,
	"normalization": {"type": "GLOBAL.DATE", "subType":
	"WEEK", "value":"1999W3"}
	}</pre>

The MONTH SubType returns a date string of a specific month of a year.

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GLOBAL.DATE SubType = MONTH usage

Usage	Example
Format	YYYY'M'MM
Regular expression	\\d\\d\\d\\dM\\d\\d
Input example	Mr. Smith left in February of 1999.
Normalized value	1999M02

Code example	{
	"name": "entity:GLOBAL.DATE",
	"value": "...",
	"score": 1.0,
	"normalization": {"type": "GLOBAL.DATE", "subType":
	"MONTH", "value": "1999M02"}
	}

The YEAR SubType returns a date string of a specific year.

GLOBAL.DATE SubType = YEAR usage

Usage	Example
Format	YYYY
Regular expression	\\d\\d\\d\\d
Input example	Mr. Smith left in 1999.
Normalized value	1999

Code example	{
	"name": "entity:GLOBAL.DATE",
	"value": "...",
	"score": 1.0,
	"normalization": {"type": "GLOBAL.DATE", "subType":
	"YEAR", "value": "1999"}
	}

The SEASON SubType returns a date string of a specific season of the year.

GLOBAL.DATE SubType = SEASON usage

Usage	Example
Format	One of the following: • **Winter**: YYYYWI • **Spring**: YYYYSP

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GLOBAL.DATE SubType = SEASON usage (continued)

Usage	Example
	• **Summer**: YYYYSU • **Fall**: YYYYFA
Regular expression	One of the following: • **Winter**: \\d\\d\\d\\dWI • **Spring**: \\d\\d\\d\\dSP • **Summer**: \\d\\d\\d\\dSU • **Fall**: \\d\\d\\d\\dFA
Input example	Mr. Smith left in the fall of 1999.
Normalized value	1999FA
Code example	`{ "name": "entity:GLOBAL.DATE", "value": "...", "score": 1.0, "normalization": {"type": "GLOBAL.DATE", "subType": "SEASON", "value": "1999FA"} }`

GLOBAL.TIME system entity

The TIME SubType returns a time string that is accurate to an hour and a minute.

GLOBAL.TIME SubType = TIME usage

Usage	Example
Format	'T'HH:mm
Regular expression	T\\d\\d:\\d\\d
Input example	Mr. Smith left at ten minutes to three.
Normalized value	T02:50
Code example	`{ "name": "entity:GLOBAL.TIME", "value": "...", "score": 1.0, "normalization": {"type": "GLOBAL.TIME","subType": "TIME", "value": "T02:50"} }`

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The PARTSOFDAY SubType returns a time string that specifies parts of the day.

GLOBAL.TIME SubType = PARTSOFDAY usage

Usage	Example
Format	One of the following: • **Morning**: TMO • **Afternoon**: TAF • **Evening**: TEV • **Night**: TNI
Regular expression	One of the following: • **Morning**: TMO • **Afternoon**: TAF • **Evening**: TEV • **Night**: TNI
Input example	Mr. Smith left in the morning.
Normalized value	TMO

Code example	{
	"name": "entity:GLOBAL.TIME",
	"value": "...",
	"score": 1.0,
	"normalization": {"type": "GLOBAL.TIME", "subType":
	"PARTSOFDAY", "value": "TMO"}
	}

GLOBAL.DATE_TIME system entity

The DATE_TIME SubType returns a date string that is accurate to a specific date and time string that is accurate to an hour and a minute.

GLOBAL.DATE_TIME SubType = DATETIME usage

Usage	Example
Format	YYYY-MM-DD'T'HH:mm
Regular expression	\\d\\d\\d\\d-\\d\\d-\\d\\dT\\d\\d:\\d\\d
Input example	Mr. Smith leaves on October 31st at 5:00 p.m.
Normalized value	2022-10-31T17:00
Code example	{ "name": "DATE_TIME",

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GLOBAL.DATE_TIME SubType = DATETIME usage (continued)

Usage	Example
	"value": "October 31st at 5:00 p.m", "normalization": "2022-10-31T17:00","confidence": "1" }

GLOBAL.DURATION system entity

This entity returns a duration string that specifies the duration of the activity.

GLOBAL.DURATION usage

Usage	Example
Format	One of the following: • **Second**: 's'ss • **Minute**: 'm'mm • **Hour**: 'h'hh • **Day**: 'D'DD • **Week**: 'W'WW • **Month**: 'M'MM • **Year**: 'Y'YY
Regular expression	One of the following: • **Second**: s\\d\\d • **Minute**: m\\d\\d • **Hour**: h\\d\\d • **Day**: D\\d\\d • **Week**: W\\d\\d • **Month**: M\\d\\d • **Year**: Y\\d\\d
Input example	Mr. Smith stayed in Boston for 48 hours.
Normalized value	h48

Code example	{
	"name": "entity:GLOBAL.DURATION",
	"value": "...",
	"score": 1.0,
	"normalization": {"type": "GLOBAL.DURATION",
	"value": "h48"}
	}

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GLOBAL.LOCATION system entity

This entity returns a location string.

GLOBAL.LOCATION usage

Usage	Example
Format	String value. Example: `Santa Clara`
Regular expression	Not applicable.
Input example	Mr. Smith works in Santa Clara.
Normalized value	Santa Clara
Code example	`{ "name": "entity:GLOBAL.LOCATION", "value": "...", "score": 1.0, "normalization": {"type": "GLOBAL.LOCATION", "value":"Santa Clara"} }`

GLOBAL.PERSON system entity

This entity returns a name string.

Usage	Example
Format	String value. Example: `Joe Smith`
Regular expression	Not applicable.
Input example	Joe Smith works in Santa Clara.
Normalized value	Joe Smith
Code example	`{ "name": "entity:GLOBAL.PERSON", "value": "...", "score": 1.0, "normalization": {"type": "GLOBAL.PERSON", "value":"Joe Smith"} }`

GLOBAL.MONEY system entity

This entity returns a currency string.

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GLOBAL.MONEY usage

Usage	Example
Format	String value. Example: USD 2000
Regular expression	Not applicable.
Input example	Show me laptops for less than $2000.
Normalized value	USD 2000 **Note:** The normalized value uses the three-letter ISO 3166 country code of the source currency.
Code example	`{ "name": "entity:GLOBAL.MONEY", "value": "...", "score": 1.0, "normalization": {"type": "GLOBAL.MONEY", "value":"2000", “currency”:”USD”} }`

GLOBAL.NUMBER system entity

This entity returns a number.

Usage	Example
Format	String value. Example: 5 . 0
Regular expression	Not applicable.
Input example	I want to see the previous 5 transactions from my account.
Normalized value	5.0
Code example	`{ "name": "entity:GLOBAL.NUMBER", "value": "...", "score": 1.0, "normalization": {"numericValue":"5", “normalizedValue”: “5”} }`

GLOBAL.SOFTWARE

Returns a software string.

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Usage	Example
Format	String value. Example: `Java`
Regular expression	Not applicable.
Input example	How do I install Java?
Normalized value	Java

Code example	{
	"name": "entity:GLOBAL.SOFTWARE",
	"value": "Java",
	"score": 0.99930537,
	"normalization":
	{"type":"entity:GLOBAL.SOFTWARE",
	"subType":"SOFTWARE",
	"value":"Java"}
	}

GLOBAL.HARDWARE

Returns a hardware string.

Usage	Example
Format	String value. Example: `printer`
Regular expression	Not applicable.
Input example	How do I order a printer?
Normalized value	printer

Code example	{
	"name": "entity:GLOBAL.HARDWARE",
	"value": "printer",
	"score": 1.0,
	"normalization":
	{"type":"entity:GLOBAL.HARDWARE",
	"subType":"HARDWARE",
	"value":"printer"}
	}

Example NLU prediction result using Software system entity

{"status":"success",
"response":{
"utterance":"How do I install Java?",
"intents":[
{
"intentName":"test intent",

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```
 "nluModelName":"ml_x_snc_global_global_268a97a9dbd23c107906265d
1396191a",
            "score":0.90401393,
            "intents":[

            ],
            "entities":[
               {
                  "name":"entity:GLOBAL.SOFTWARE",
                  "value":"Java",
                  "score":0.99930537,
                  "normalization":{
                     "type":"entity:GLOBAL.SOFTWARE",
                     "subType":"SOFTWARE",
                     "value":"Java"
                  },
                  "startingPosition":-1
               }
            ]
         }
      ],
      "properties":{

 "all:ml_x_snc_global_global_268a97a9dbd23c107906265d1396191a":"
0.55",
         "entity:all":"0.01",
         "inference.sspace.time":"4",
         "inference.time":"33",
         "intent:all":"0.01",
         "nluPlatformLanguage":"en",
         "nluPlatformVersion":"rome.0"
      }
   }
}
```


Example NLU prediction result using DATE system entity


```
{
    "utterance": "We should meet next Sunday at Starbucks.",
    "intents": [
        {
            "intentName": "intent:Desire.Desire",
            "score": 0.83452,
            "entities": []
        },
        {
            "intentName": "intent:Meeting.MeetRequest",
            "score": 0.8919042,
            "entities": [
                {
                    "entityName":
 "entity:Meeting.MeetRequest.Where",
                    "value": "Starbucks",
                    "score": 1
                },
    {
```


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```
                    "entityName": "entity:GLOBAL.DATE",
                    "value": "Sunday",
                    "normalization": { "type": "DATE",
                        "subType": "DAY",
                        "value": "1999-10-01"
                     },
                    "score": 0.87
                }
            ]
        }
    ]
}
```

Virtual Agent URL parameters

Virtual Agent provides various system parameters that admins can add to an instance URL to control how page content is rendered.

Virtual Agent URL structure

You can control the page rendered for an instance by adding URL parameters to the instance URL, which is `https://<instancename>.service-now.com`.

System parameters for Virtual Agent web client

The Virtual Agent web client is supported for use in portals or embedded in third-party pages. The following system parameters control the conversation content rendered in the Virtual Agent web client.

Parameter	Description	Example
sysparm_branding_key	Applies a chat branding configuration to the web chat client. Value: branding key for the configuration	• Apply the branding configuration to a destination page: `https://<instancename.service-now.com/$sn-va-web-client-app.do?sysparm_branding_key=acme` • Apply the branding configuration to an embedded web client: `https://<instancename.service-now.com/$sn-va-web-client-app._embed.do?sysparm_branding_key=acme`
sysparm_default_topic	Sets the default topic on launch via topic `sys_ID`.	`https://<instancename>.service-now.com/$sn-va-web-client-app.do?sysparm_default_topic=1f5ac6dfc3`

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Parameter	Description	Example
sysparm_domain_id	Restricts the chat to the specified sys ID for a domain.	`https://<instancename>.service-now.com/$sn-va-web-client-app.do?sysparm_domain_id=c90d4b084a3623`
sysparm_live_agent_only	Takes user directly to a live agent, if available.	`https://<instancename.service-now.com/$sn-va-web-client-app._embed.do?sysparm_live_agent_only=true`
sysparm_load_active_only	Loads the current active conversation. Values: • true: Loads only the active conversation • false: Doesn't load active conversations • **Note:** If the sysparm_skip_load_history and sysparm_load_active_only parameters are both set to true, the existing sysparm_skip_load_history parameter takes precedence.	`https://<instancename.service-now.com>$sn-va-web-client-app.do?sysparm_load_active_only=true`
sysparm_nowassist	Loads the Now Assist in Virtual Agent client.	`https://<instancename>.service-now.com/$sn-va-web-client-app._embed.do?sysparm_nowassist=true`
sysparm_search_text	Sets the search text for the conversation.	`https://<instancename>.service-now.com/$sn-va-web-client-app.do?sysparm_search_text=request&lapt`
sysparm_skip_load_history	Skips the previous message history and starts a new conversation. Values:	`https://<instancename.service-now.com>$sn-va-web-client-app.do?sysparm_skip_load_history=true`

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Parameter	Description	Example
	• true: Doesn't load message history • false: Loads message history **Note:** If the sysparm_skip_load_history parameter is set to false and the sysparm_load_active_only is set to true, the sysparm_load_active_only loads the current active conversation.	
sysparm_ preview_mode	Displays the conversation in test mode.	`//https://<instancename.service-now.com>$sn-va-web-client-app.do?sysparm_preview_mode=true`
sysparm_requester_session_language	Specifies the requester's language for the conversation session when Dynamic Translation for Virtual Agent is installed and configured.	`https://<instancename.service-now.com>$sn-va-web-client-app.do?sysparm_requester_session_language=<two letter language code>`

Latency feedback in Virtual Agent

The *com.glide.cs.message.processing.enabled* system property notifies requesters whenever the generative AI large language model (LLM) is processing their request in the Virtual Agent web client and Now Assist panel.

Latency feedback messages

The *com.glide.cs.message.processing.enabled* property is off by default, but can be turned on in the System Properties [sys_properties] table. After turning on this system property, users receive a temporary response to indicate that the LLM call is running and that their request is being processed. One of the following messages appears to users:

- `Looking into your request...`
- `Reviewing key details...`
- `Gathering the needed info...`

The latency feedback messages can't be customized and disappears after the LLM generates a response.

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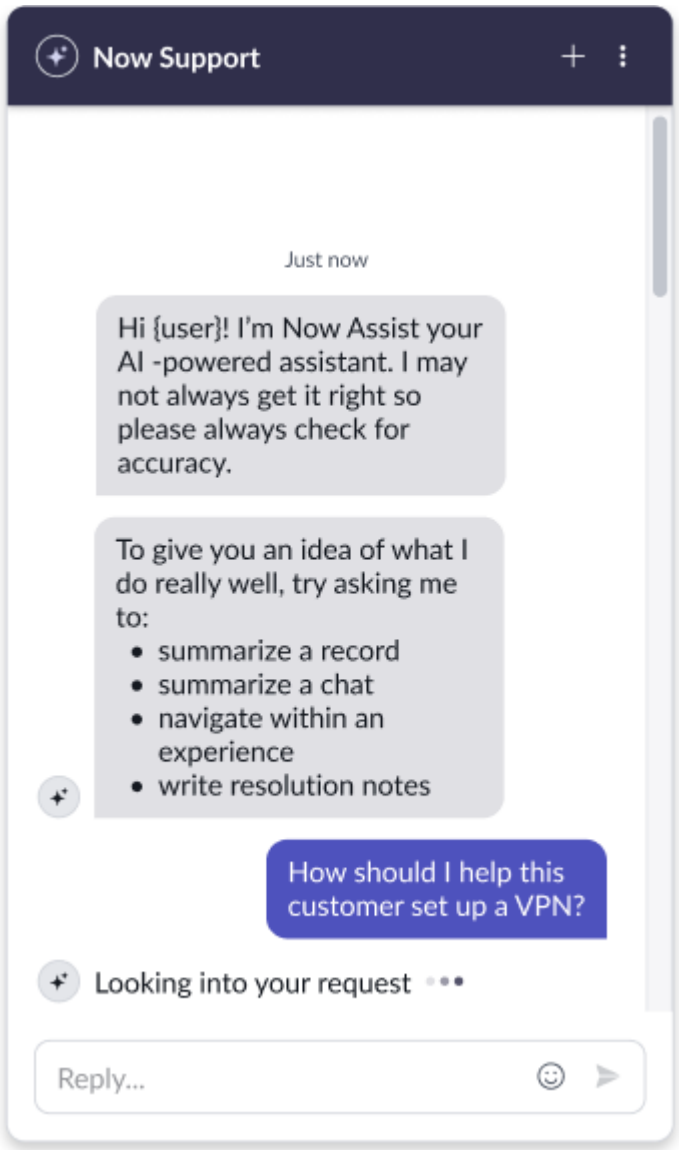
Example of a latency feedback message



Now Assist in Virtual Agent

Use generative AI skills in your conversational experiences. Now Assist in Virtual Agent uses large language models (LLMs) to create a natural-language conversational experience that can improve the success of your self-service workflows.

Get started

For an introduction to building a Virtual Agent with Now Assist, watch this video.

https://player.vimeo.com/video/995581833?h=177e4bc9f8&badge=0&autopause=0&player_id=0&app_id=58479

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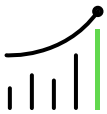
Explore	Configure	Use
		
Learn about the generative AI skills available in Now Assist in Virtual Agent.	Activate Now Assist in Virtual Agent and configure generative AI skills.	Learn about the requester conversational experience.
Analyze	**Reference**	
		
Monitor the performance of Now Assist in Virtual Agent.	Get details about user input and bot responses supported by Now Assist in Virtual Agent.	

Important:
Some Now Assist products/features are currently unavailable for customers in the FedRAMP, NSC DOD IL5, or Australia IRAP-Protected data centers, self-hosted customers, or in other restricted environments. For more information, see the KB0743854 article in the Now Support Knowledge Base. Please check for availability updates in future releases.

Troubleshoot and get help

- Virtual Agent community forum
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Further, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

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Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

For more information, see the Now Assist documentation.

Exploring Now Assist in Virtual Agent

Now Assist in Virtual Agent uses large language models (LLMs) and generative AI skills to improve deflection rates and reduce the amount of time-consuming work that Natural Language Understanding (NLU) topic discovery requires.

Now Assist capabilities bring generative AI to Virtual Agent. Using LLMs for topic discovery simplifies the amount of setup and configuration required for Virtual Agent. Topics that use keyword and Natural Language Understanding (NLU) discovery often require months of development and the involvement of dedicated subject matter experts. Unusual issues or questions may lead a user to contact a live agent instead.

Use the guided setup to configure Now Assist in Virtual Agent in a few minutes. No expertise is necessary to launch the experience. For more information, see Configuring Now Assist in Virtual Agent.

Now Assist in Virtual Agent is available through portals on the web client, the mobile app, and Microsoft Teams.

Now Assist skills in Virtual Agent

Now Assist skills in Virtual Agent enhance the user experience by combining AI Search with chat. These skills can increase issue resolution in Virtual Agent and reduce deflections to a live agent.

The following figure shows how the requester uses natural language rather than keywords in the chat. Now LLM Service determines the most likely option based on the requester's input and sends a synthesized response with possible action items. Queries can apply to both information searches and service catalog requests.

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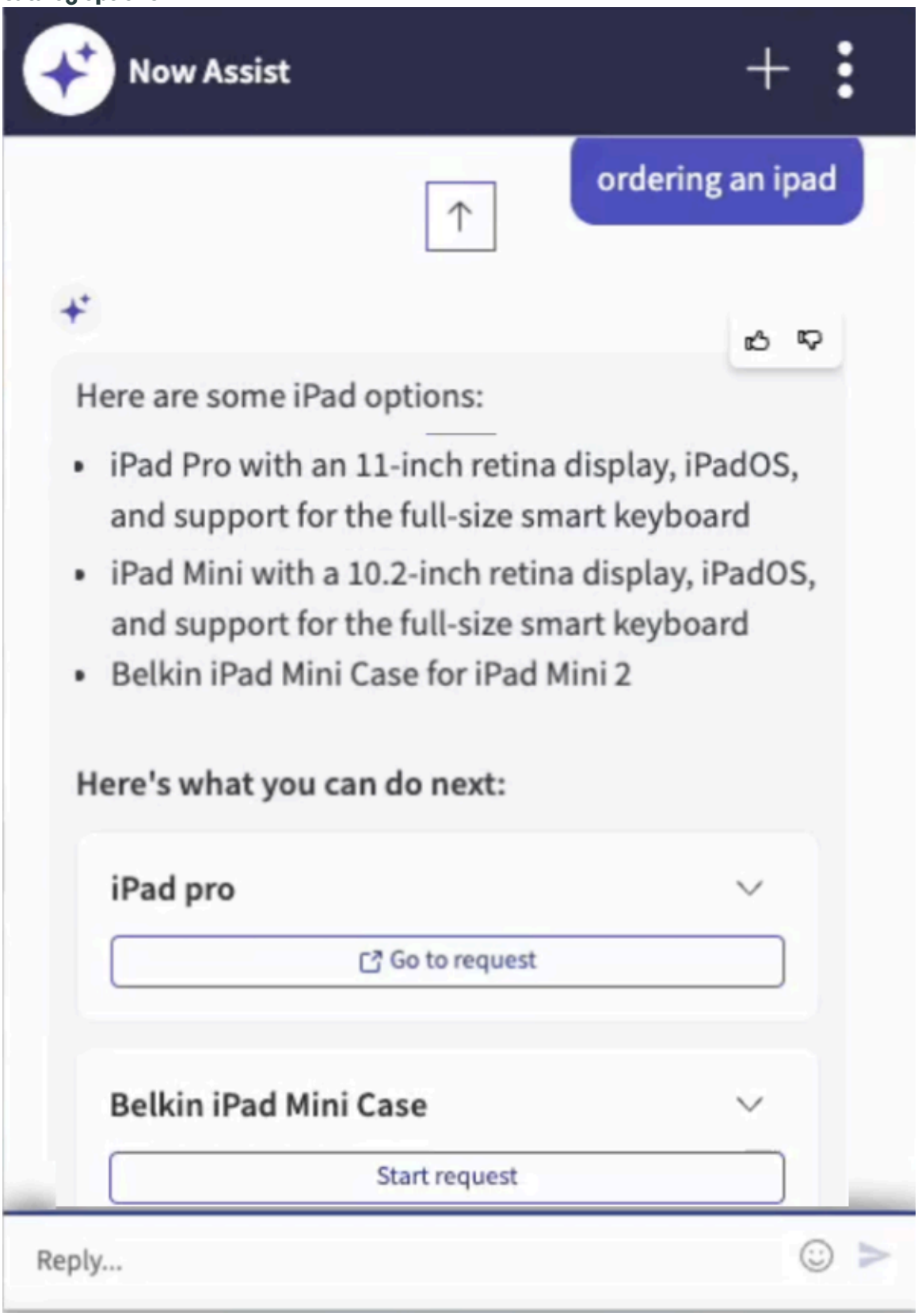
A synthesized response example with conversational and non-conversational catalog options



The Now Assist Q&A Genius Results skill shows users the best possible answer to a query, in the form of actionable options displayed along with the results. The bot may generate answers based on what it found, or return actionable options or links. Users have the option to see more results as needed.

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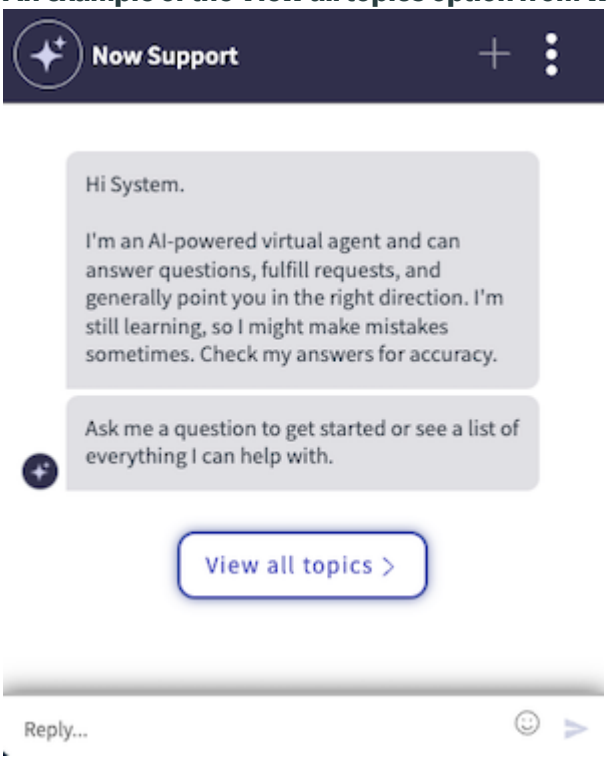
The Now Assist Multi-Turn Catalog Ordering skill gives users access to available options in the Service Catalog. Users can request an item, such as a mobile phone. The user can then provide more information to refine the search. For example, they may refine their request to a blue 256-GB iPhone. They can even request a new item instead, all in the same conversation, and the generative AI creates its responses using natural language.

The Now Assist Topics skill enables admins to create LLM topics for Now Assist in Virtual Agent. For more information, see LLM assistants. Activate the Now Assist Topics skill in the Now Assist guided setup. For more information, see Configuring Now Assist in Virtual Agent.

For more examples of having a conversation with Now Assist in Virtual Agent, see Using Now Assist in Virtual Agent.

An example of the View all topics option from within the chat widget



Now Assist in Virtual Agent skills are available in the Now Assist Admin console. For full catalog functionality in the chat window, enable the generative AI experience for catalog item request submissions. For more information, see Configure Now Assist in Conversational Catalog Request.

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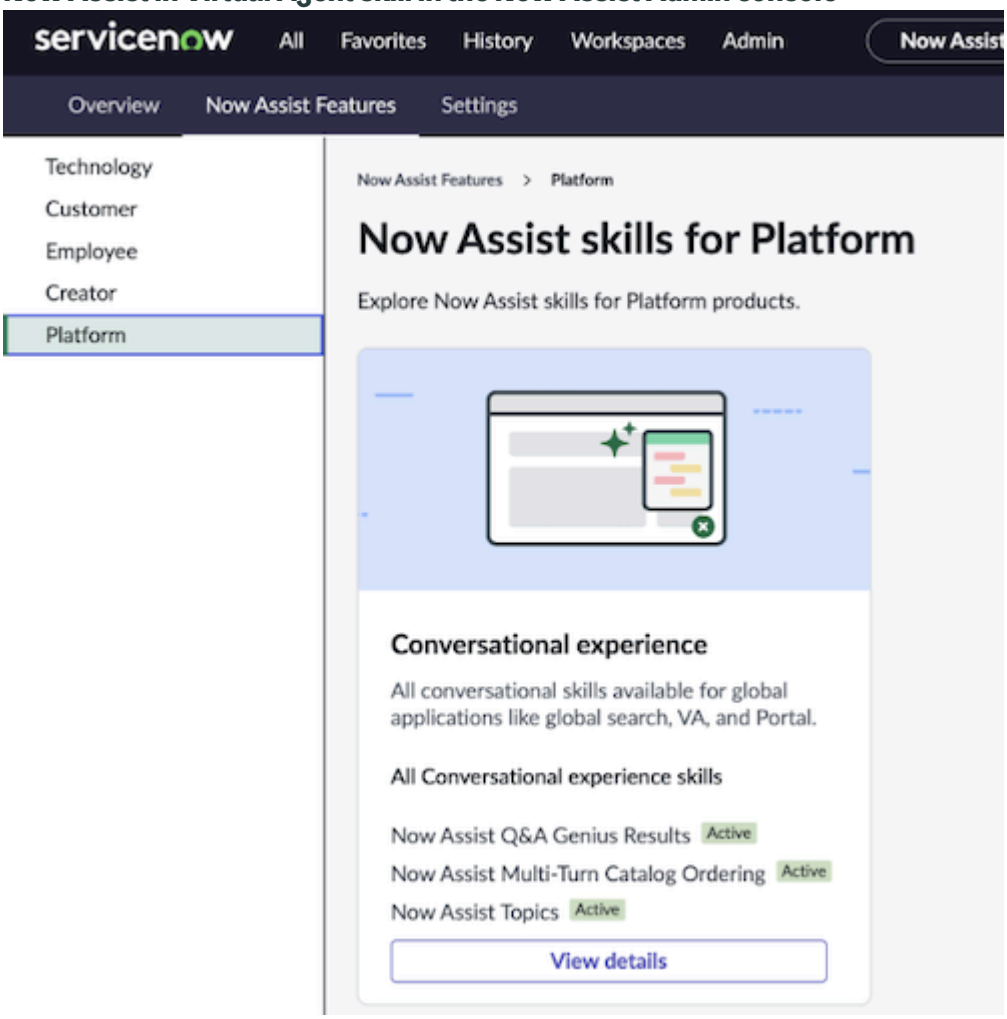
Now Assist in Virtual Agent skill in the Now Assist Admin console



Benefits

Now Assist in Virtual Agent provides the following benefits.

Benefit	Feature	User
Configure Now Assist in Virtual Agent in a few minutes, from either the Conversational Interfaces console or the Now Assist Admin console.	Guided setup experience	virtual_agent_admin or admin
Now Assist skills can be turned on within the guided setup.	Activate a Now Assist skill	virtual_agent_admin or admin
Deploy Now Assist in Virtual Agent on multiple portals using the web client, the mobile app, and Microsoft Teams.	Configuring Now Assist in Virtual Agent	virtual_agent_admin or admin
Generative AI enhances the user search experience with the ability to generate answers and enabling the user to select the **Show more results** option for a new search.	Now Assist Q&A Genius Results skill	requesters
Give users in-chat access to available options in the Service Catalog.	Now Assist Multi-Turn Catalog Ordering skill	requesters

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Benefit	Feature	User
Now Assist lets Virtual Agent switch easily between requests, using plain language when new queries are made in the same conversation.	Mid-topic switching during Now Assist in Virtual Agent conversations	requesters
Monitor performance metrics for Now Assist in Virtual Agent from the Conversational Interfaces console.	Conversational Interfaces console	virtual_agent_admin or admin
Monitor value metrics (Now Assist usage versus Now Assist in Virtual Agent) from the Now Assist Admin console.	Now Assist Admin console	virtual_agent_admin or admin

LLM assistants

LLM assistants help with large language model (LLM) topic discovery. The Now Assist in Virtual Agent assistant is the default LLM assistant created during the Conversational Interfaces Assistants guided setup.

After Now Assist in Virtual Agent or other custom assistants are active, you can associate any object type to the LLM assistants. Completing the Now Assist in Virtual Agent guided setup, as detailed in Configuring Now Assist in Virtual Agent, creates the Now Assist in Virtual Agent LLM assistant and enables you to create additional custom LLM assistants. Associating topics to an assistant makes that topic discoverable with that assistant. For topic discovery results, associate LLM topics with an assistant. Associate LLM topics to at least one assistant when creating new topics or editing topics on the topic's **Properties** tab. For more information about selecting LLM assistants when creating a topic, see Create a Virtual Agent topic.

If LLM topics aren't associated with an LLM assistant, they aren't discoverable and can't be tested from the Topics page via **Test active topics** or the **Test active topics** > **Test LLM assistant topics** drop-down list. The **Test active topics** option only appears if you have an assistant selected in the Topics page **LLM Assistant** filter. The **Test active topics** > **Test LLM assistant topics** drop-down list appears if you don't specify the **LLM Assistant** in the Topics page **LLM Assistant** filter. When using the **LLM Assistant** filter, topic blocks or custom controls that aren’t associated with an LLM assistant, but are called by a topic that's associated with an LLM assistant, appear in this filtered **LLM Assistant** Topics page view. Nested topic blocks or custom controls don’t appear in the filtered Topics page view unless they’re directly associated with an LLM assistant. For more information about testing LLM topics, see LLM topic testing. When a topic is associated with the only active LLM assistant, the Assistant drop-down list defaults to that assistant name. If you have multiple assistants, select which assistant you want to work with using the Assistant drop-down list. For more information about creating multiple LLM assistants, see Manage LLM virtual agents on the Assistants screen.

Tip:
On the Virtual Agent Designer Topics page, there is either a **Settings** or **Manage** option next to the **LLM Assistant** filter. **Settings** appears if there is a specific LLM assistant selected in the **LLM Assistant** filter and **Manage** appears if no assistant is selected in the filter. Use this option to quickly navigate to the Conversational Interfaces guided setup area to review or update your LLM assistants. For more information on the guided setup, see Configuring Now Assist in Virtual Agent.

If you want your LLM setup topic to be discoverable in an LLM assistant, you must flag the active setup topic as discoverable. For example, if you create an LLM setup topic by duplicating the Now Assist Live Agent setup topic and want to associate the setup topic with an LLM assistant, you must flag the duplicated topic as discoverable. Flag the topic as discoverable by going to the duplicated topic’s **Flow** tab, and then select **Active** > **Included in topic discovery**. After enabling the **Included in topic discovery** toggle, the topic is now discoverable.

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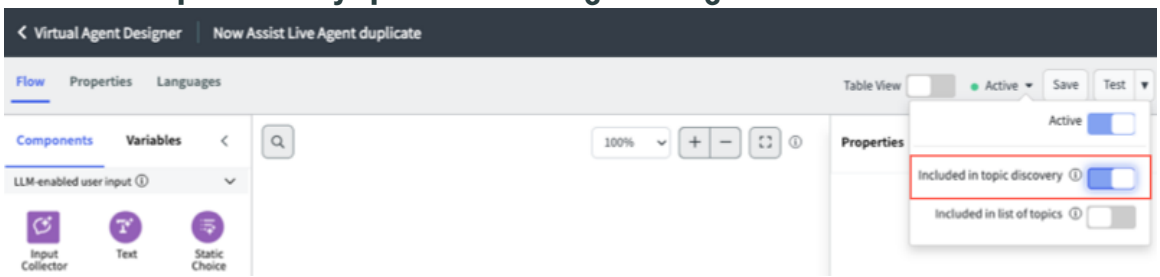
Included in topic discovery option in Virtual Agent Designer



Now Assist in Virtual Agent Domain Separation

Domain separation is supported for Now Assist in Virtual Agent. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

Overview

The goal of Now Assist in Virtual Agent is to enable Now Assist conversations in Virtual Agent. Only the data and business logic level separation is done.

Related topics

Domain separation for service providers

Configuring Now Assist in Virtual Agent

Use Now Assist in Virtual Agent to provide a content-driven generative AI experience for users.

Before you begin

There are two entry points used to set up Now Assist in Virtual Agent: You can set it up from within the Conversational Interfaces console (see step 1), or from the Now Assist admin console. If you're already within the Now Assist Admin console, select **Set up Now Assist in Virtual Agent**.

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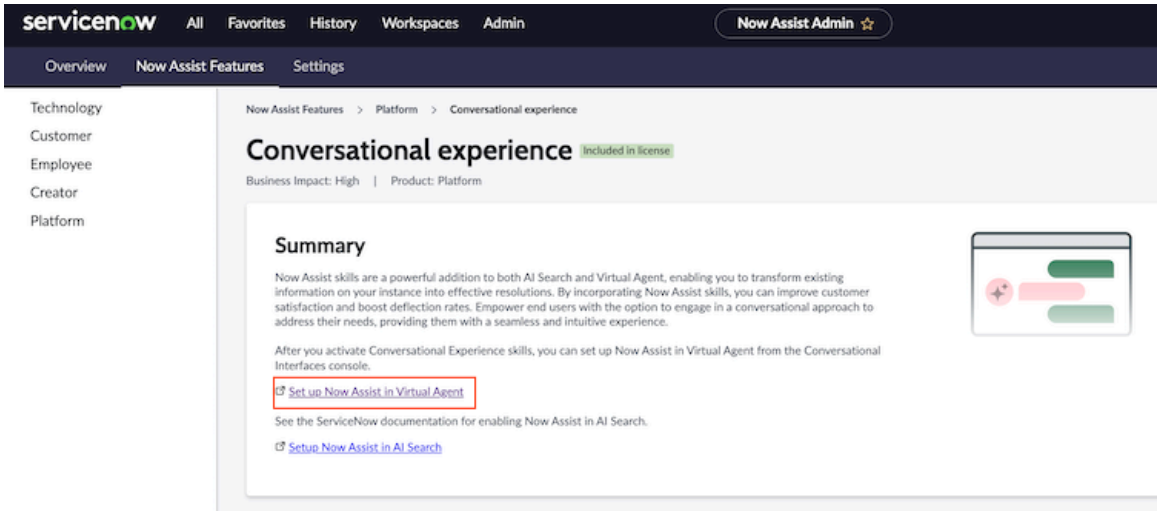


The **Assistants** tab as seen in the image of step 1 appears.

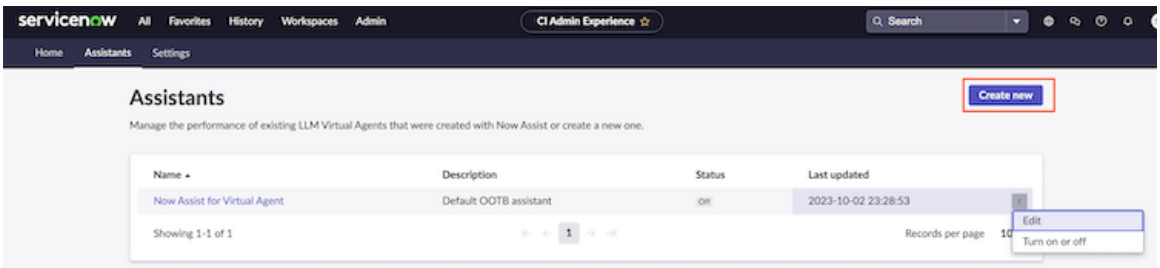
Role required: virtual_agent_admin or admin

About this task

Virtual Agent admins and admins can easily configure more than one Now Assist in Virtual Agent with this guided setup.

Procedure

1. Navigate to **All**>**Conversational Interfaces**>**Assistants**.
   By default, a Now Assist in Virtual Agent is listed.



2. Select **Turn on or off** the Now Assist in Virtual Agent or create a Virtual Agent.
   If you create a Virtual Agent, the Get started page is displayed.

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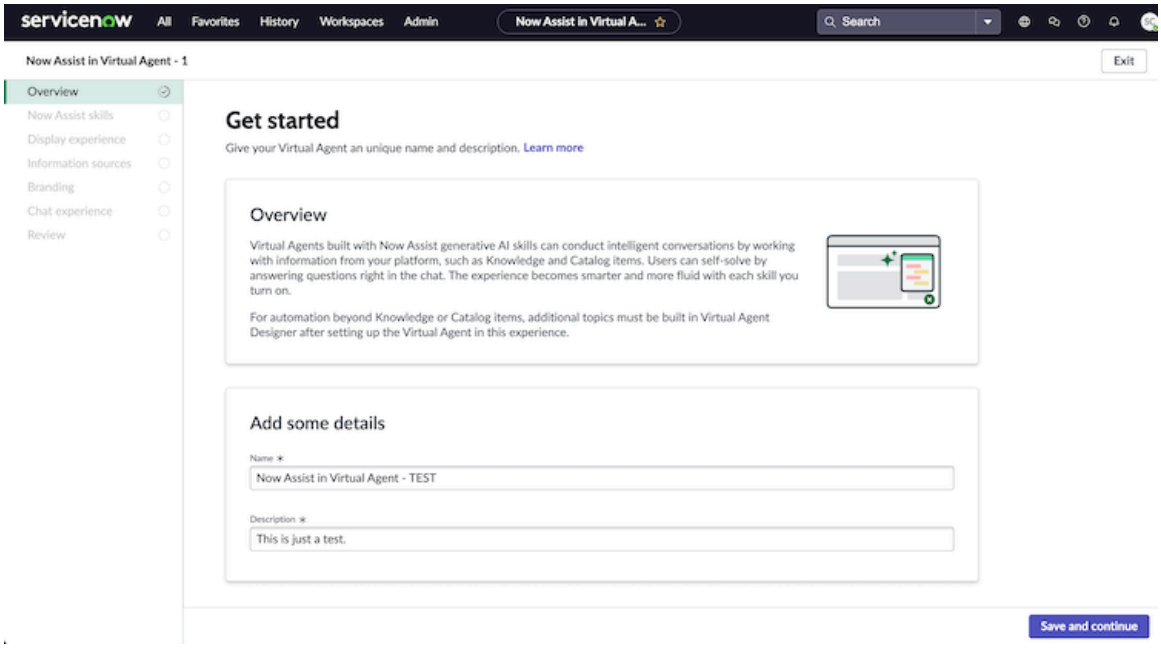
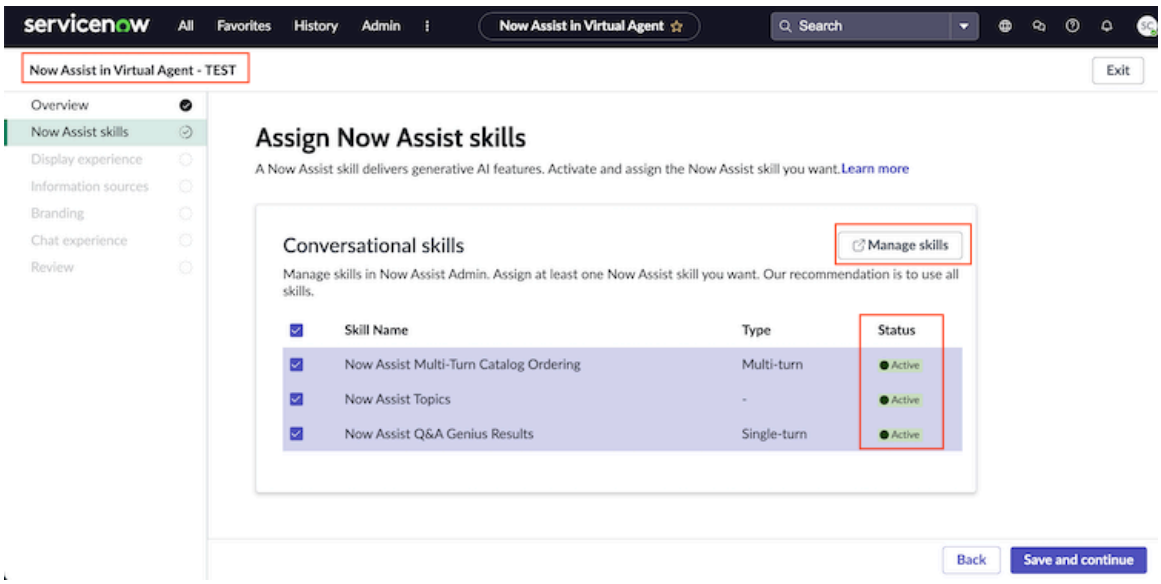


3. In the Add some details section, provide a name and description for your Virtual Agent then select **Save and continue**.
   The Assign Now Assist skills page is displayed.



   At the top of the page, the name of your Virtual Agent appears. In this example, it's Now Assist in Virtual Agent - TEST.

   By default, all Now Assist skills are turned on and shown in this list as active. You can deselect a skill if needed, and it will be unassigned for this Virtual Agent. However, if you want to deactivate a skill across the entire instance, select **Manage skills**.

   Note:
   At least one skill must be active.

4. Select **Save and continue**.
   The Choose where to display page appears.

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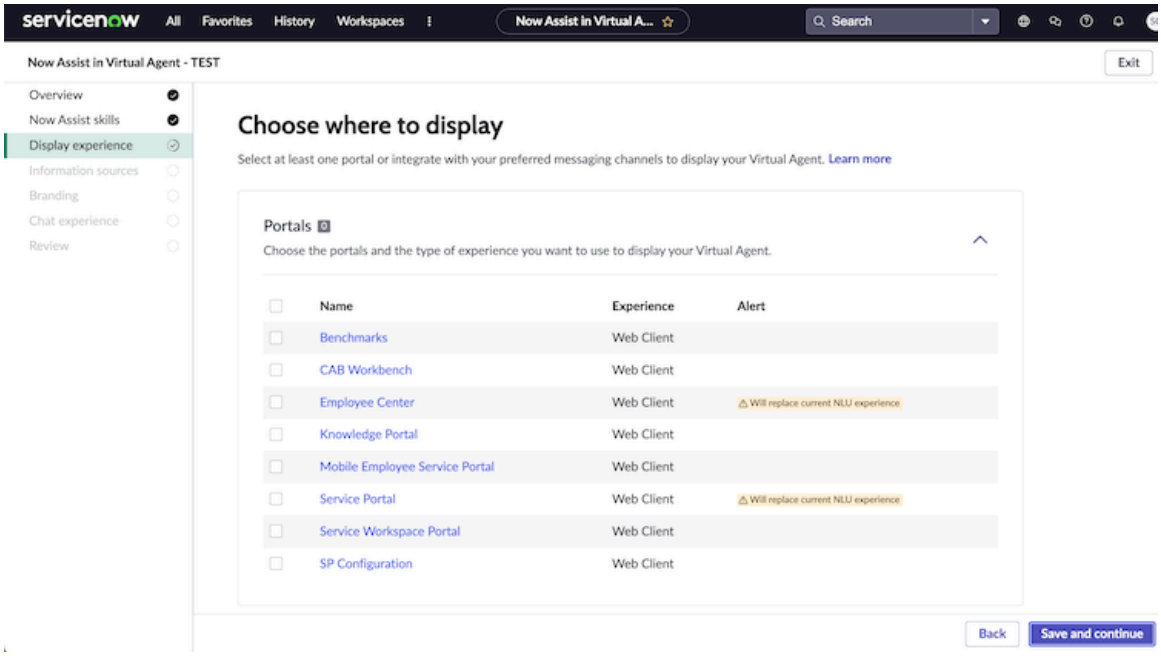
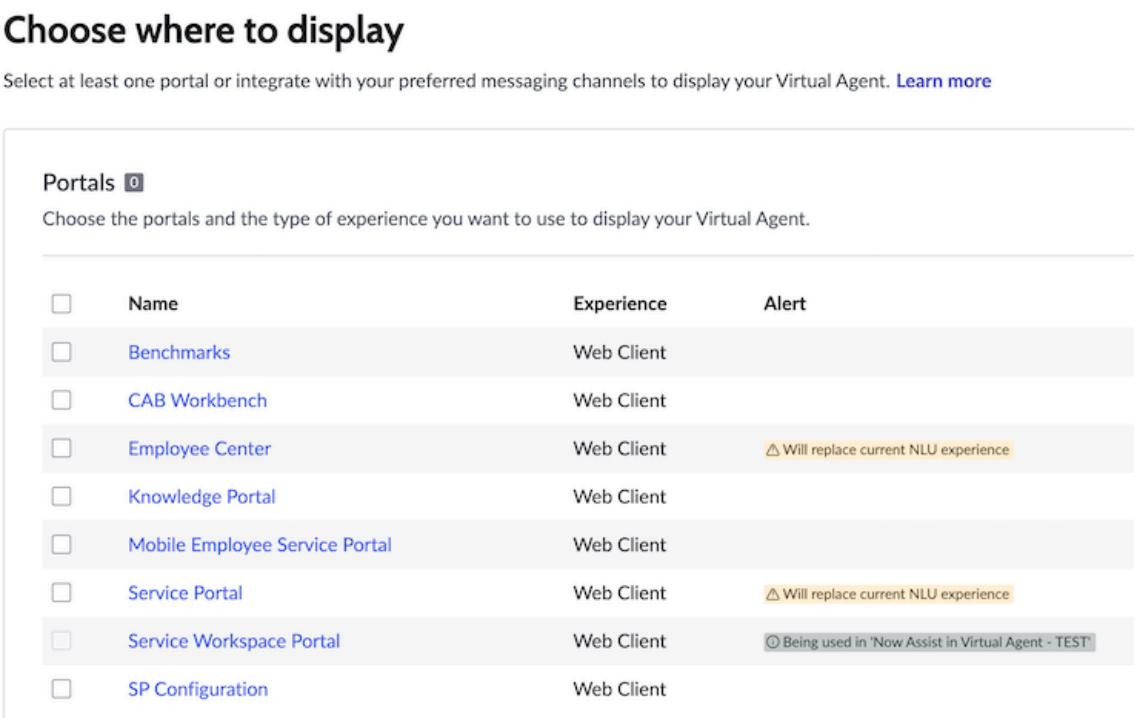


If a portal was previously selected for a different assistant, an informational message is displayed in the Alert column.



5. Select one or more portals or integrate with a messaging channel to display your Virtual Agent.

   NLU-based Virtual Agent doesn't co-exist with Now Assist in Virtual Agent. They can co-exist in the same instance, but not within the same portal.

   For Microsoft Teams, if it's not installed, go to **Conversational Interface**> **Settings**> **Channels** to install the Conversational integration with Microsoft Teams. Getting the plugin redirects you to the ServiceNow store. After the store app is installed, select the Teams channels to enable Now Assist in Virtual Agent.

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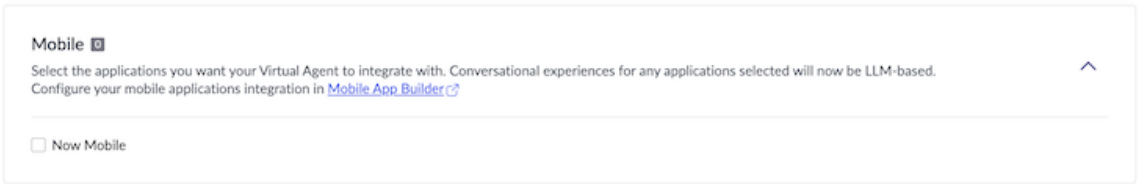
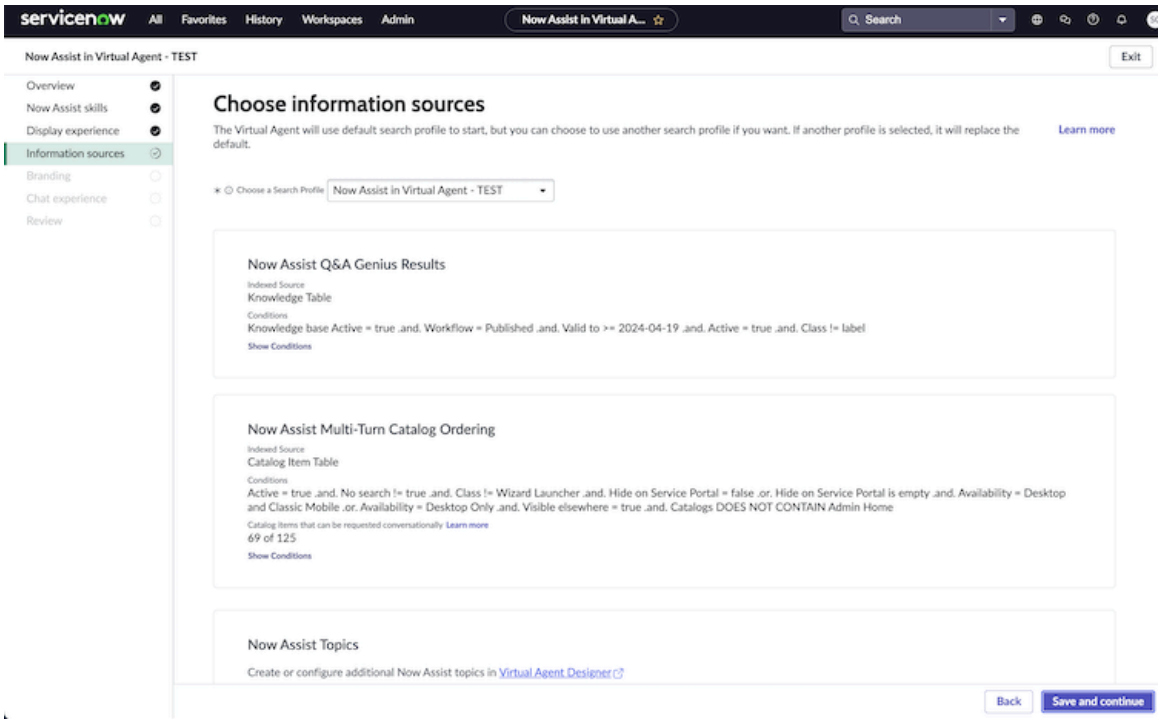
If the application for mobile in the Now Assist Admin console is turned on, it enables Now Assist large language model (LLM) in Virtual Agent for those applications on mobile.



6. Select **Save and continue**.
   The Choose information sources page is displayed.



7. From the drop-down menu, choose a search profile to be used by the Virtual Agent.
   If a search profile is selected, change the settings based on the link provided. The selected profile is copied over so that the Now Assist in Virtual Agent search profile is the same as the selected profile. Search sources, dictionaries, and result improvement rules are mirrored from the selected search profile to the default search profile that's associated with the assistant.

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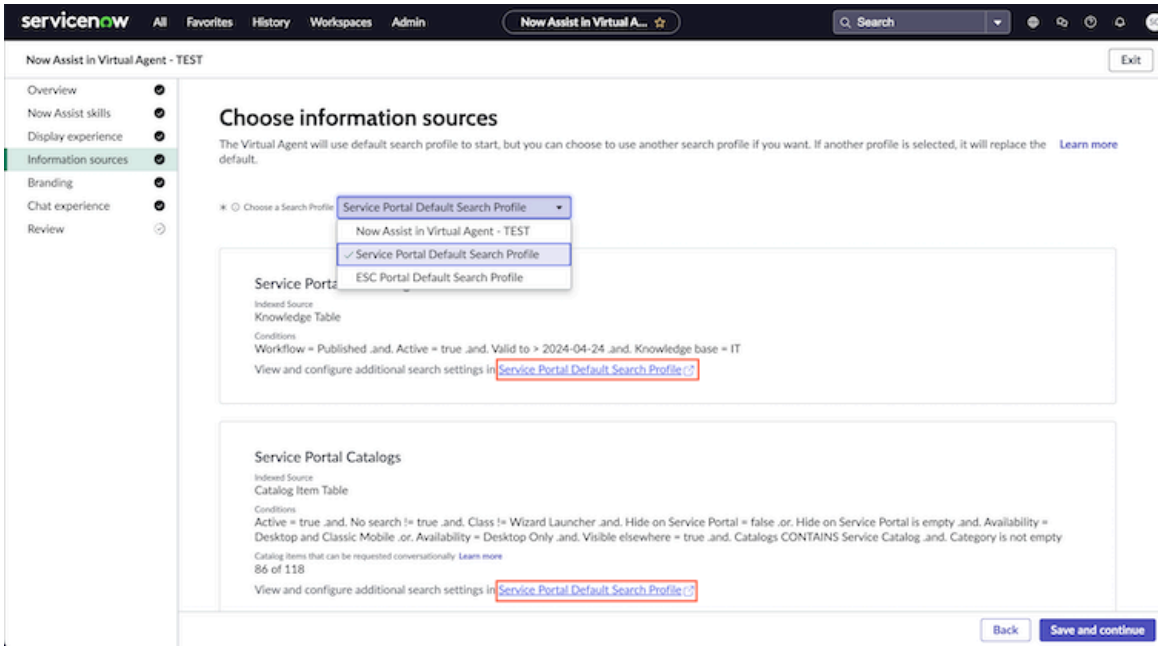

8. Select **Show conditions** to show the current conditions, make modifications, or add a new condition set.

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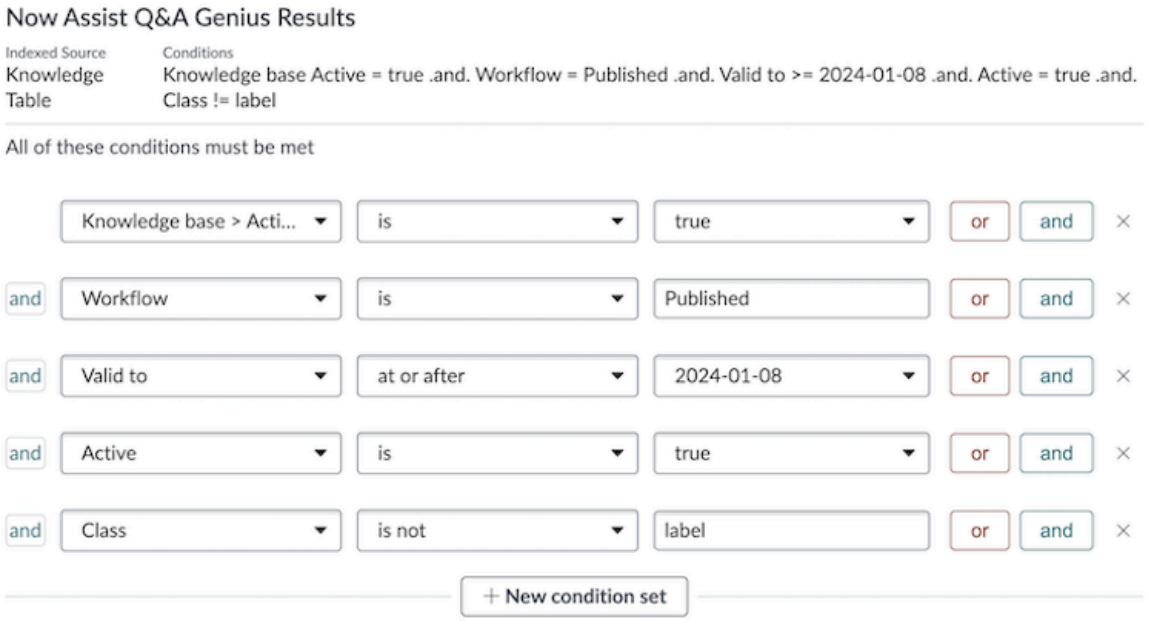
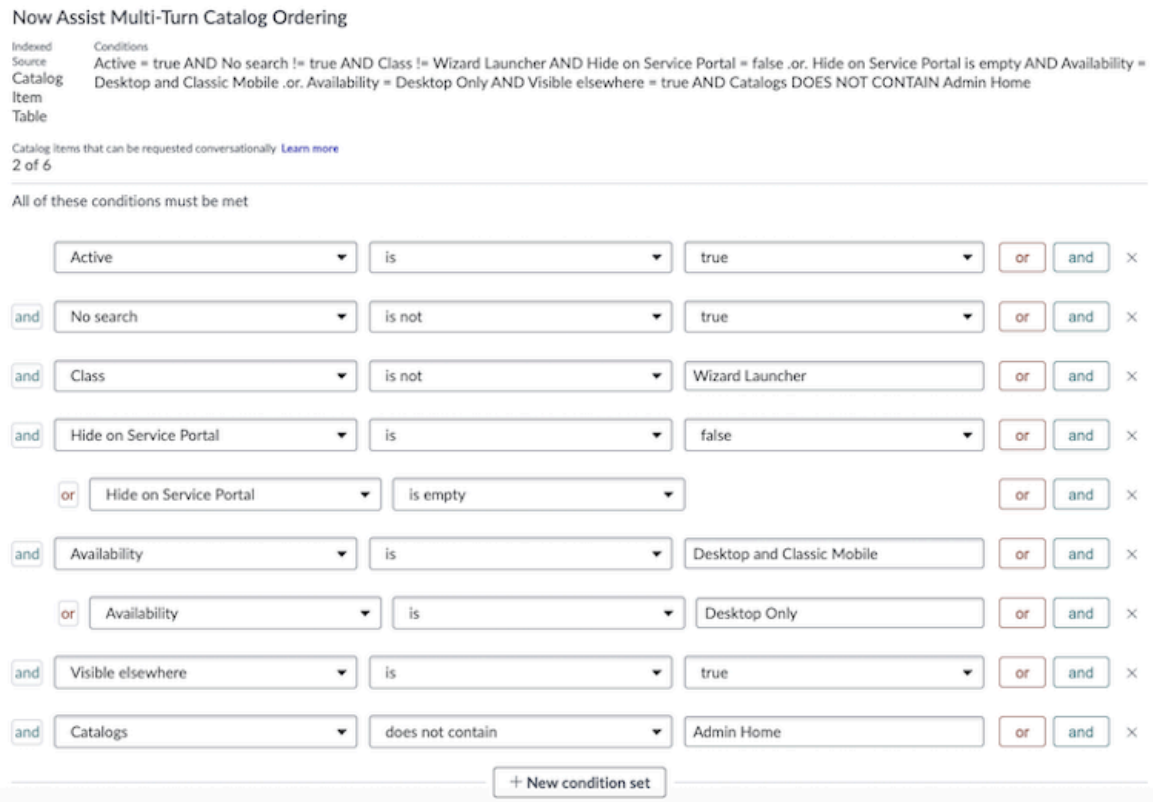
Note:
You can also quickly see the number of catalog items that are supported conversationally in Virtual Agent.

a. If you have a Now Assist Q&A Genius Results section, determine the content that is searched by configuring this information source.



b. If you have a Now Assist Multi-Turn Catalog Ordering section, the following conditions appear. To design a topic conversation in Virtual Agent, see Create a Virtual Agent topic.



c. If you have a Now Assist topics section, see Create a Virtual Agent topic to create or configure more topics.

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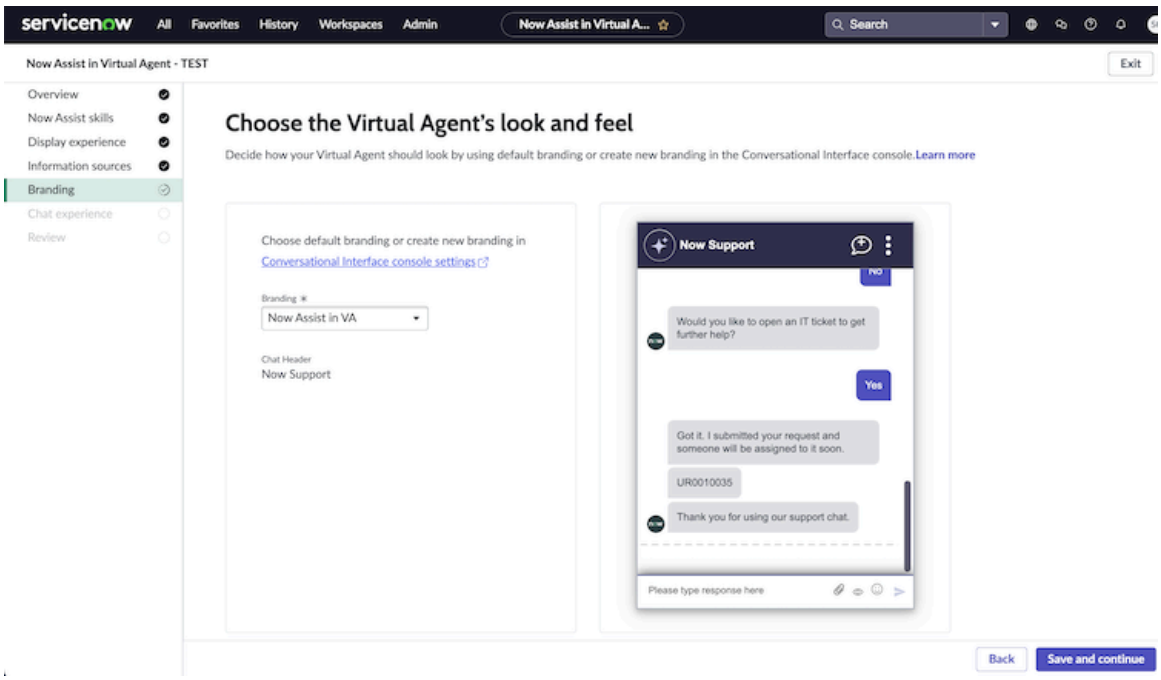
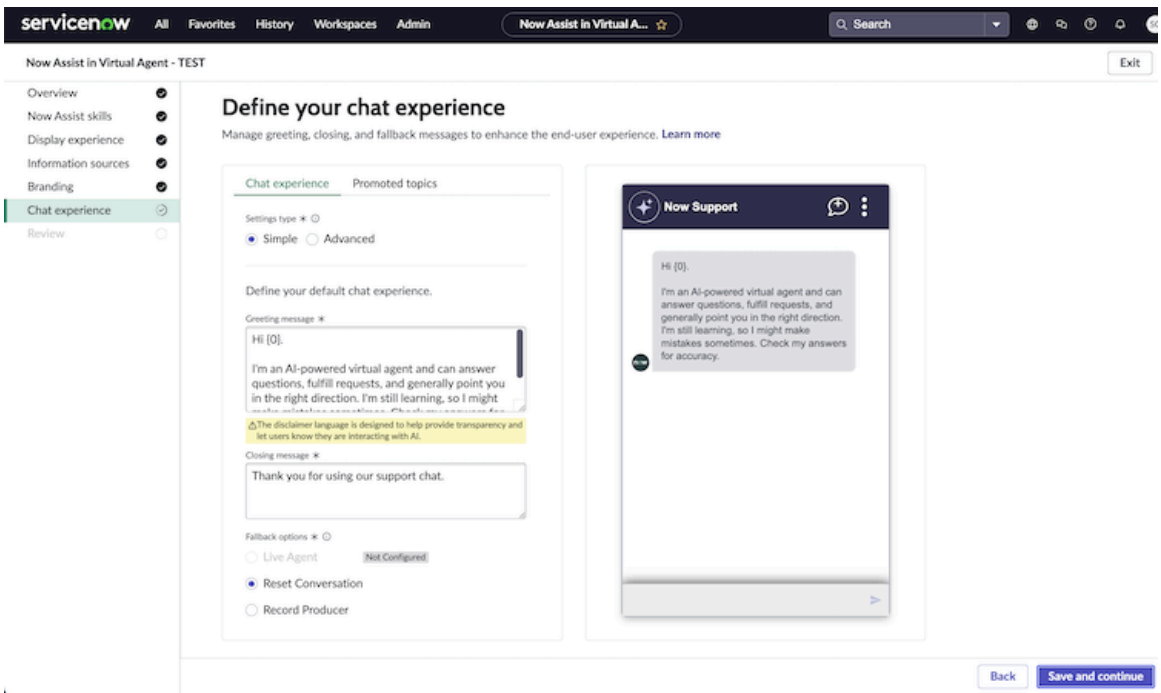
9. Select **Save and continue**.

   The Virtual Agent branding page appears where you can select a default branding or an existing customized branding. To create a branding, see the Conversational Interface console settings.



10. Select **Save and continue**.
    The Define your chat experience page appears where you manage your greeting, closing, and fallback messages. The fallback options are Live Agent, Reset Conversation, and Record Producer.



   Use the simple settings type to define the default chat experience.

   For fallback options,

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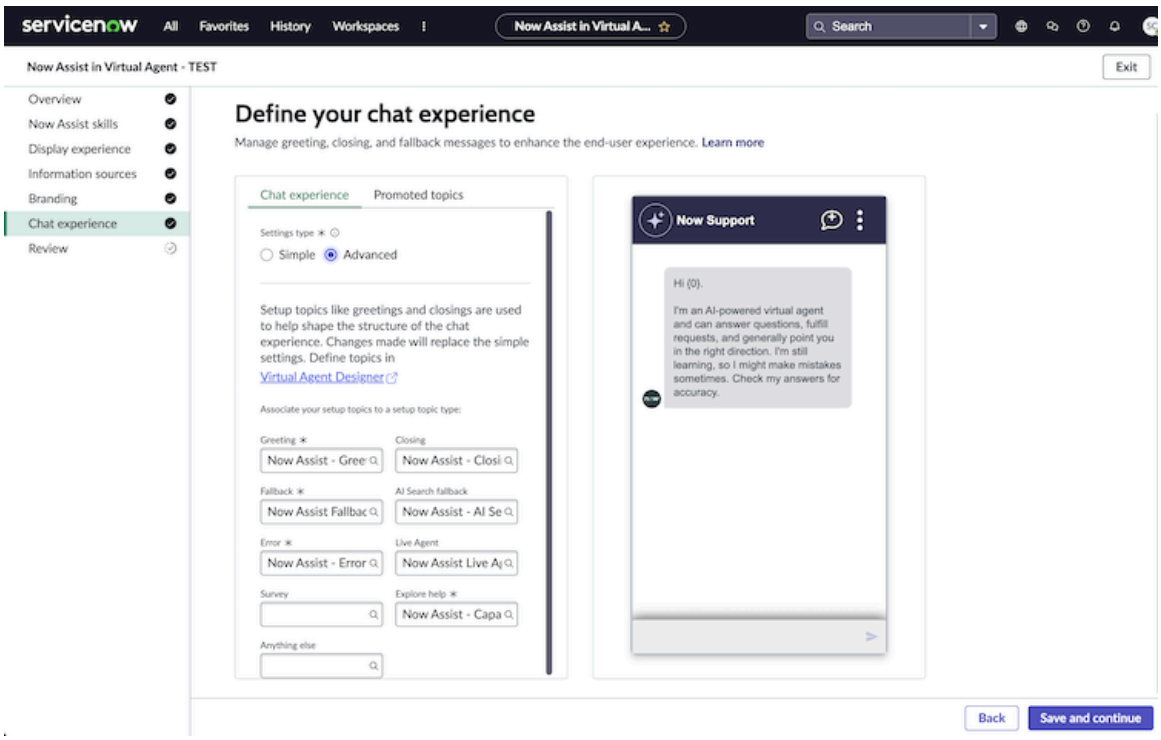
a. Live agent support routes you to an available agent if configured.

b. Reset conversation restarts the conversation to the beginning to ask another question.

c. A record producer directs the user to a catalog record producer to create an incident or a case.

> **Note:**
> For this fallback option to work for guest users, create a public record producer. For more information, see Create a record producer. If the public record producer is set to active, it automatically appears in the Now Assist in Virtual Agent Fallback options > Record producer drop-down menu.

More configurations are available in Advanced settings, replacing the default. You can select from a pre-filtered list to override setup topics defined in Virtual Agent Designer. If you change one of your setup topics, and you return to the simple setting, that topic is unavailable.



On the **Promoted topics** tab, you can navigate to Virtual Agent Designer (VAD) to define promoted topics for this assistant. Once you have defined the topics in VAD, you can then use the up or down arrows to reorder the topics.

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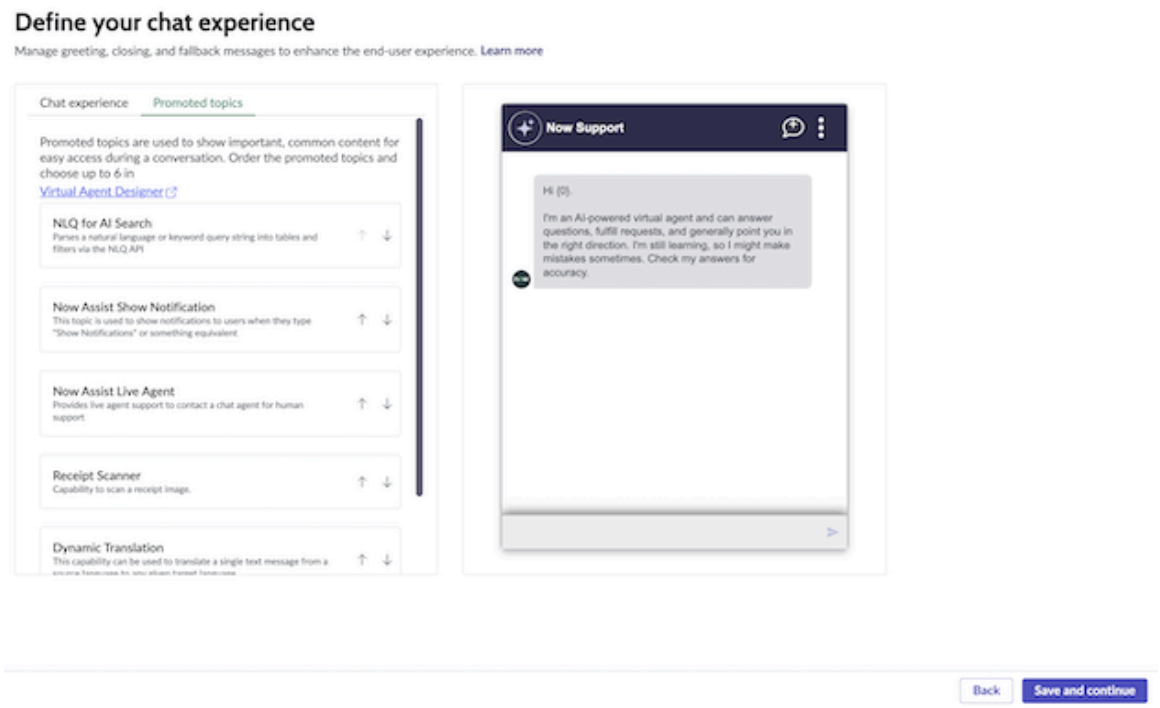
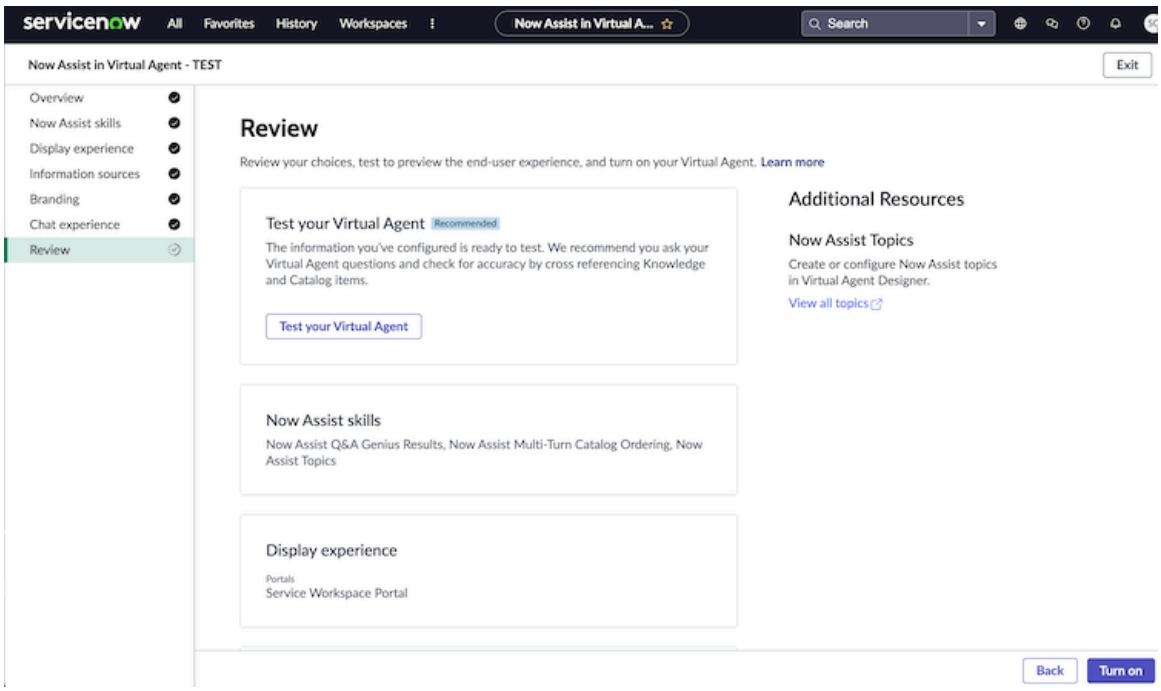


11. Select **Save and continue**.

The Review page is displayed where you can review all your settings and test your Virtual Agent. It's important to test your Virtual Agent to judge the quality of results for common use cases before moving your experience into a production environment. Validate the user interface experience, use case results, and fallback options.



a. Now Assist skills shows the active skills.

b. Display experience shows which portals have Virtual Agent.

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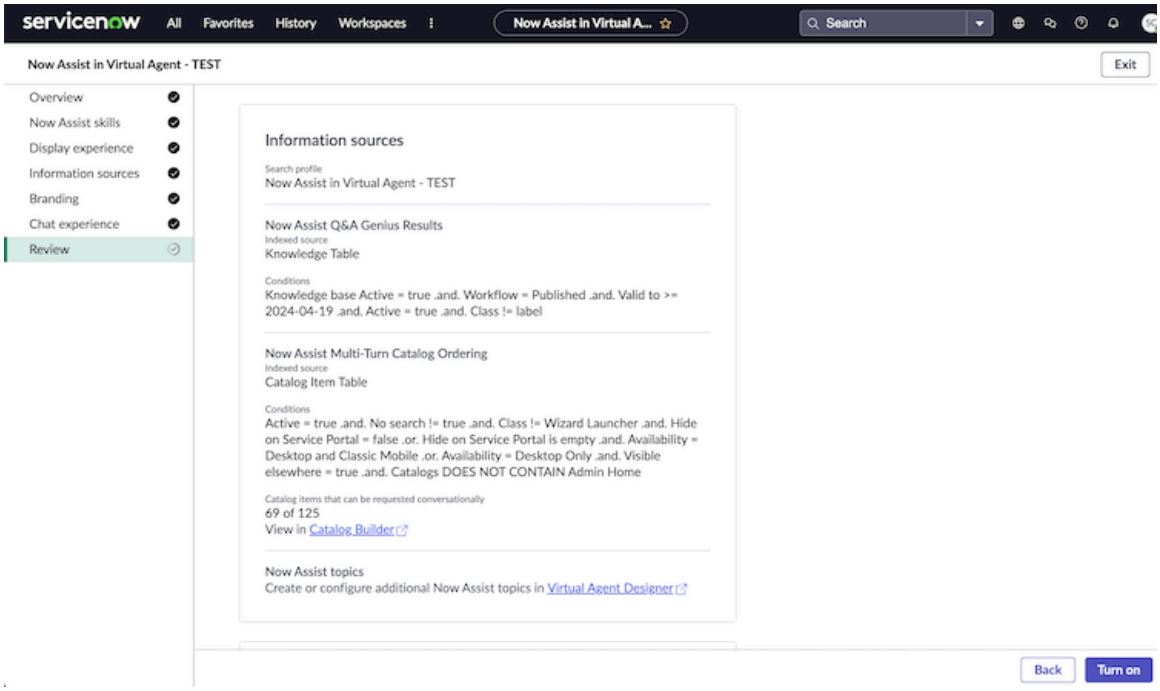
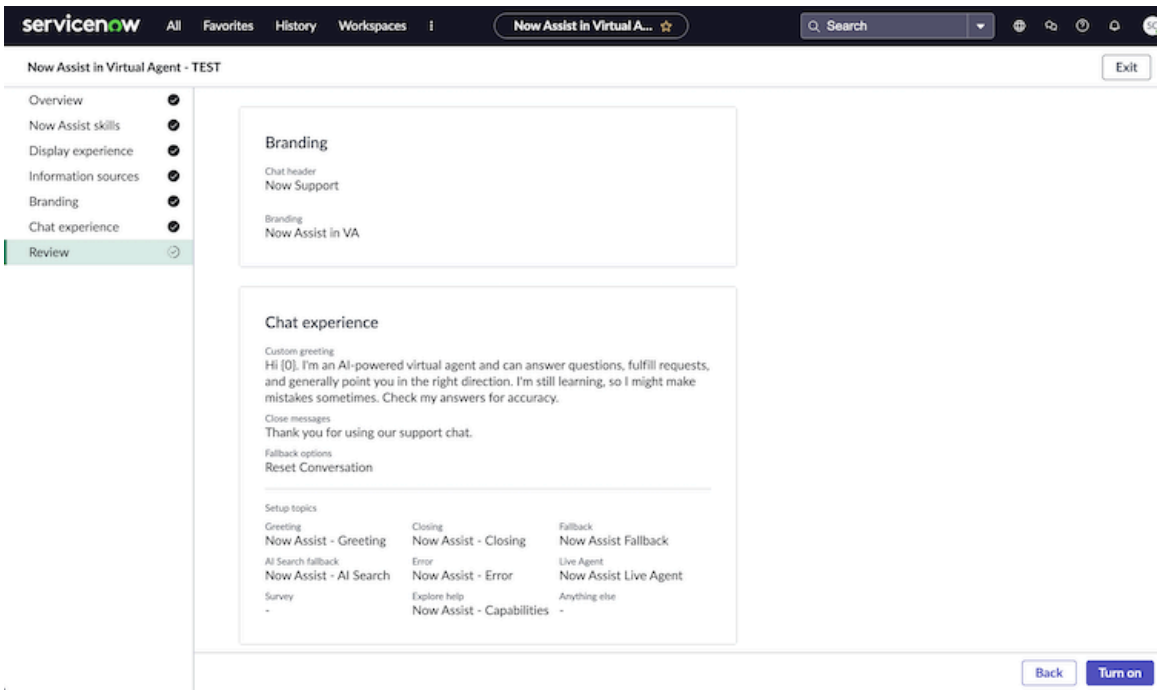


c. Information sources shows the conditions for each source.



d. Branding shows the type of branding that you have selected.

e. Chat experience shows your greeting, closing messages, and fallback options.

In the **Additional Resources** section, the following appears depending on your setup.

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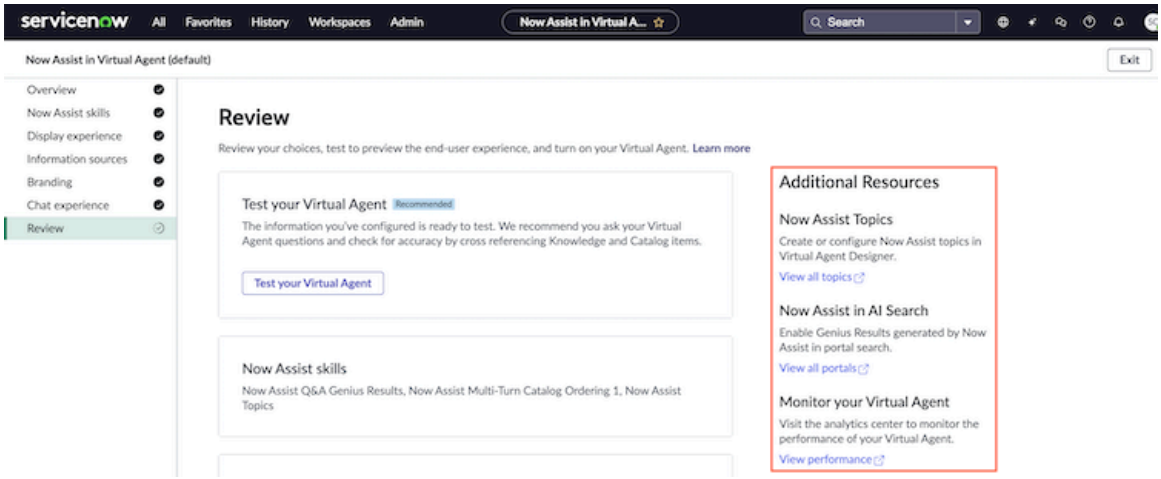

a. Now Assist Topics is visible if the Now Assist Topics skill is enabled for your assistant. The View all topics link brings you to Virtual Agent Designer.

b. Now Assist in AI Search always remains visible. The View all portals links brings you to the Set up Now Assist in AI Search console to enable Genius Results generated by Now Assist in portal search.

c. Monitor your Virtual Agent is visible once you turn on at least one assistant for the first time. The View performance link brings you to Now Assist in Virtual Agent Analytics.

12. Select **Turn on** after you have tested your Virtual Agent to confirm that everything is working fine.
    A message appears showing that Now Assist in Virtual Agent is successfully turned on.
13. Select **Got it**.

Result

Now Assist in Virtual Agent is active and topics can be associated with the Now Assist in Virtual Agent LLM assistants.

Configure Now Assist in Conversational Catalog Request

Speed up and provide a conversational and streamlined experience based on generative AI while submitting a catalog item request in Virtual Agent. Your organization can increase self-service and reduce operating costs.

Before you begin

Role required: admin or catalog_admin, and flow_designer (to edit the subflow)

About this task

Generative AI capabilities are leveraged to provide a human-like and efficient catalog request experience over the Virtual Agent conversational interface. It reduces the turnaround time for the request submission.

When the generative AI experience is configured for catalog item request submission, the following experience is available for a requester:

- Contextual question prompts that enable a more human-like conversation based on answers to previous questions.
- Slot filling that recognizes answers to 1 or more questions on the requester's input. For example, if the search keyword is `I'd like to request for a Windows Virtual Machine with 1TB disk space` and if the catalog item has questions about operating system and hard disk space, then the requester doesn't have to answer these questions again.

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- Ability to answer multiple catalog item questions at the same time.
- Multi-turn catalog ordering where requesters can change answers at any point. For example, while answering a question about a phone's memory size, the requester can mention about changing the phone model selected in the previous question.
- Validation of questions' answers.
- Ability to exit the request submission process at any point.

Note:

- Read-only questions, questions with pre-filled answers, and questions that are already answered in the requester's search keyword are skipped.
- Though the following catalog item question types are supported in the conversation mode, natural language responses aren't supported for them:
  - Reference
  - Lookup select box
  - Lookup multiple choice
  - Requested For
  - Attachment
  - Multiple choice question with more than 10 choices

Procedure

1. To configure the Now Assist for Virtual Agent application that installs the Now Assist in Conversational Catalog Request application, see Configuring Now Assist in Virtual Agent. With this configuration, the *sn_now_assist_cr.llm.conversational.request.question.limit* system property value is set to 500 by default if that property wasn't edited earlier.
2. Enable the generative AI experience for a catalog item request submission in Virtual Agent.

   a. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.

   b. Select a catalog item that must be requested in the conversation mode.
   For information about catalog items that are supported in the conversation mode, see Service Catalog topic blocks in Virtual Agent powered by LLM.

   c. On the catalog item form, confirm that the **Make the item non-conversational in VA** check box isn't selected.

   d. On the catalog item form, confirm that the **Turn off Now Assist conversation for this item** check box isn't selected.
   If you select this check box, LLM isn't used and the data isn't sent to LLM. The item might become non-conversational.

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Note:

- If you want the catalog item non-conversational, then select the **Make the item non-conversational in VA** check box. But if the catalog item contains some sensitive information that you don't want to send to LLM, then select the **Turn off Now Assist conversation for this item** check box.
- If you clear the **Make the item non-conversational in VA** check box, the item will become conversational only if all the conditions are met for making an item conversational. For more information about such conditions, see Service Catalog topic blocks in Virtual Agent powered by LLM.

e. Select **Update**.

3. Confirm that the fallback record producer is configured in the **Fetch generic ticket producer for conversational catalog request** subflow.

In a few cases, when a requester is searching for a catalog item, AI Search might not be able to return any results. For example, when the catalog item isn't available or when the requester has no access to view the catalog item. In such cases, the fallback mechanism is activated for the Virtual Agent conversation. Virtual Agent tries to connect the requester to a live agent. If a live agent isn't available, then the **Create a generic ticket** record producer, which creates an incident to resolve the issue, is triggered.

- The **Now Assist Fallback** topic controls the fallback mechanism. This topic triggers the record producer returned by the **Fetch generic ticket producer for conversational catalog request** subflow.
- This subflow returns the value of the *sn_nowassist_va.now.assist.generic.ticket.fallback.record.producer* property. By default, this property's value is the sys_id of the **Create a generic ticket** record producer.

Note:
Both the *sn_nowassist_va.now.assist.generic.ticket.fallback.record.producer* property and the **Create a generic ticket** record producer are available in an instance when the Now Assist for Virtual Agent application is installed.

Additionally, you can customize the fallback process by configuring your own record producer or by building additional logic in a new subflow.

4. Optional: Configure URL navigation settings to specify where the generated ticket link in the Virtual Agent chat opens, see Configure URL navigation for chat links.

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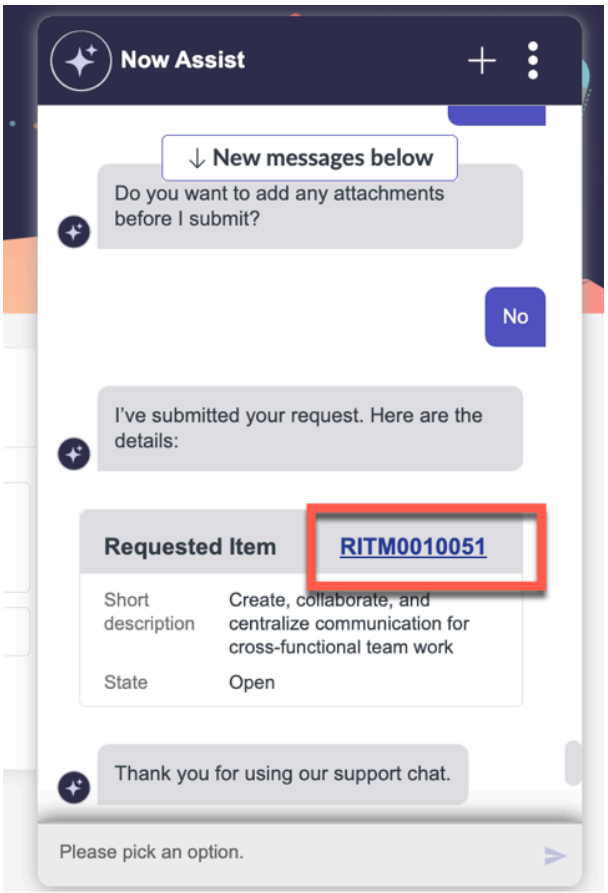
(Optional) For information about URL navigation in Virtual Agent, see URL navigation in Conversational Interfaces. For information about Virtual Agent scripts, see Virtual Agent scripts.



Related topics

- Service Catalog topic blocks in Virtual Agent powered by NLU
- Service Catalog topic blocks in Virtual Agent powered by LLM

Using Now Assist in Virtual Agent

Now Assist in Virtual Agent enhances the user experience by combining AI Search with generative AI chat skills. These skills can speed up issue resolution and reduce deflection to a live agent.

Now Assist in Virtual Agent provides your users with an interactive generative AI experience. A friendly, natural language conversation is easier to understand and helps make requesters more comfortable with talking to a bot.

The following examples highlight how a conversation powered by generative AI might look in Virtual Agent.

Starting the conversation

The following figure shows an example of the beginning of a new conversation.

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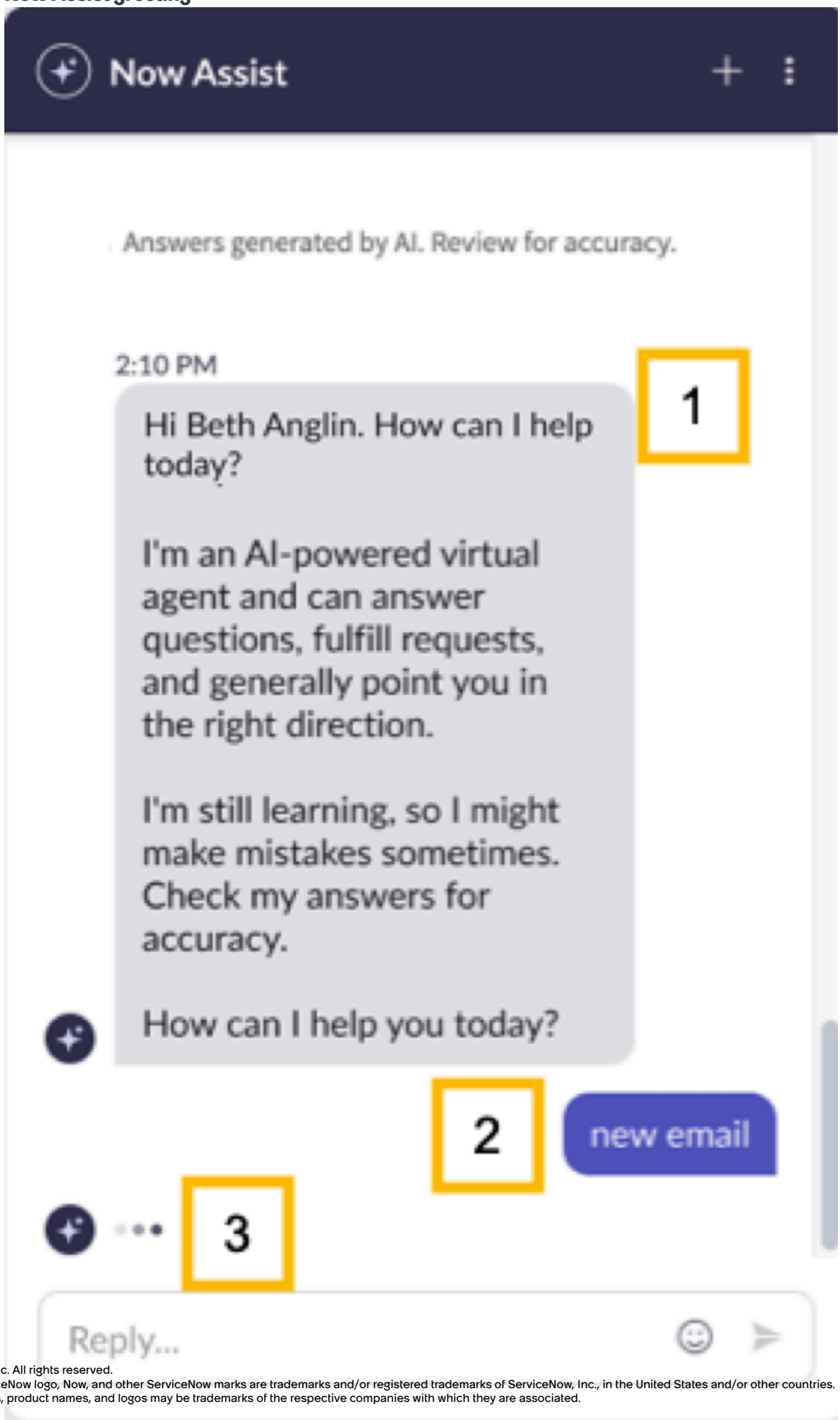
Now Assist greeting



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Now Assist greeting elements

Element	Description
1: Bot greeting	**Note:** The `Answers generated by AI. Review for accuracy.` message prior to the greeting can't be edited or turned off. After greeting the user, the bot provides an explanation of what the user can expect. Because the large language model (LLM) is still learning, the bot indicates that it may make mistakes, and that the user should check answers for accuracy.
2: User request	The user can enter any utterance.
3: Response indicator	While the LLM processes the utterance, animated dots in the chat window let the user know that the bot is working.

Conversing with the Virtual Agent

After the user enters an utterance and a search result is found, a synthesized response may appear. A synthesized response includes a brief summary of the requested information and search results along with Genius Results. For more information on how these search results are found, see Now Assist Actions Genius Results and Now Assist Q&A Genius Results.

If multiple results are found, they are presented to users, and users can view the Sources section at the bottom of the synthesized response. The Sources section also includes any relevant Knowledge Base article's attachments. Users can view Knowledge Base articles, Virtual Agent topics, subflows or actions, and complete catalog request items. Virtual Agent can only return available catalog items that match a user's request when the Now Assist Multi-Turn Catalog Ordering skill is enabled. Users can follow up on a synthesized response and receive an answer that considers the previous context. For example, if you previously were chatting about the company's travel policy and then enter `International`, the system recognizes that you are wanting additional information on the company's international travel policy.

Note:
For full catalog functionality in the chat window, enable the generative AI experience for catalog item request submissions. For more information, see Configure Now Assist in Conversational Catalog Request.

Whenever a single Virtual Agent topic is found within a synthesized response, users are brought directly into that action's flow. You may consider bypassing the synthesized response and options by automatically launching catalog items, too. For more information on automatically launching single search result actions, search for the *sn_nowassist_va.synthesized_autostart_items* system property in Available system properties.

The following options may appear depending on what search results are returned:

- Conversational catalog: The **Start request** option appears and if selected, the requester can launch the catalog request flow within the Virtual Agent.
- Non-conversational catalog: The **Go to request** option appears with an external link that if selected, either redirects the requester to a new browser or pop-up window for them to order the catalog item.

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- Topic, subflows, or action: The **[Asset's name]** option appears and if selected, the requester is launched into that flow within the Virtual Agent.
- Q&A Knowledge Base: The answer is generated by Now Assist with the option to view your sources through the numbered citations icon (). After selecting the numbered citations icon to display the sources, you can select each Now Assist link to review the source in depth.
- Need something else: The **View other options** option appears and if selected, a list of standard search results in list formatting appears along with one fallback topic. If there are no standard search results, only the fallback topic appears.

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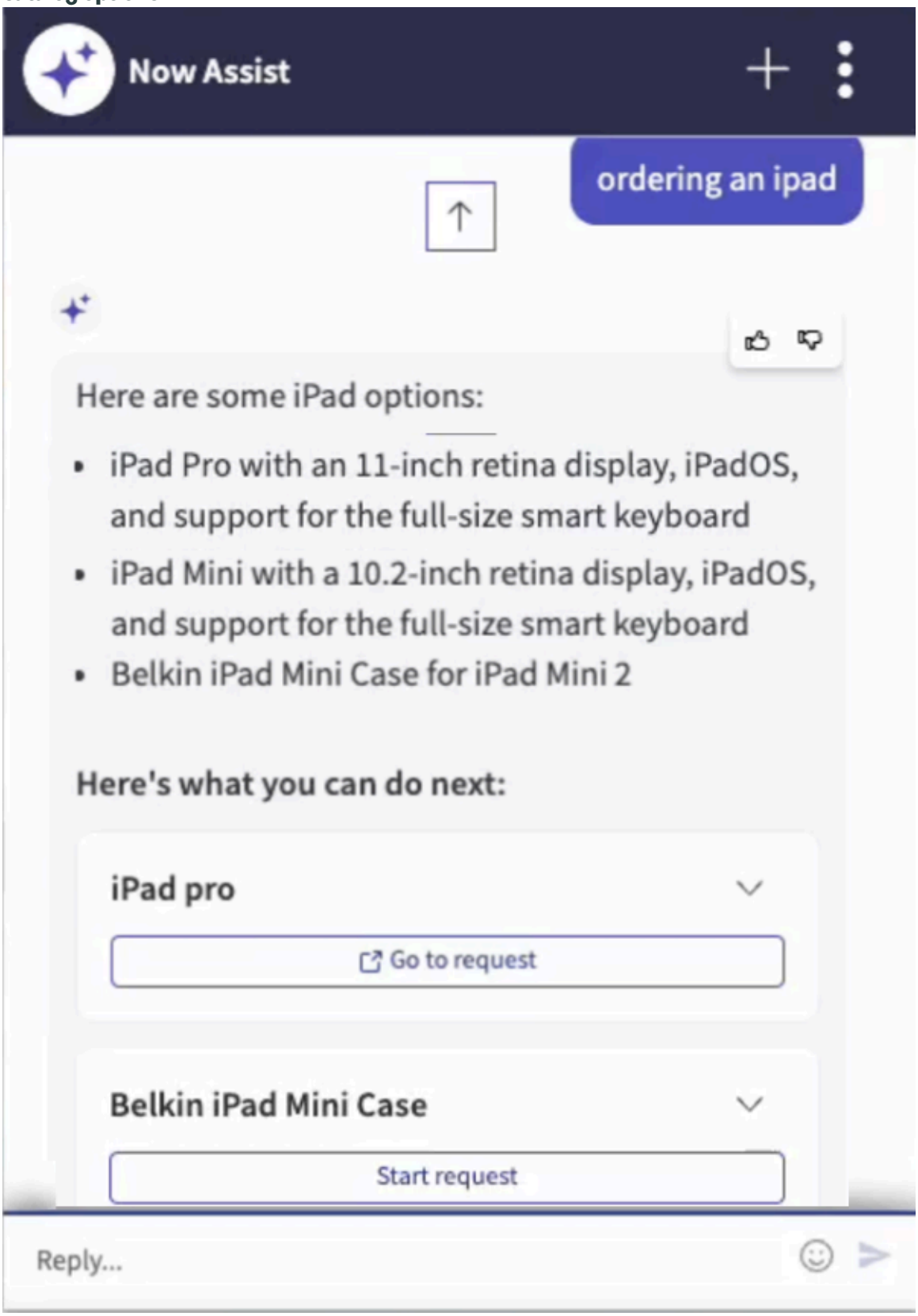
A synthesized response example with conversational and non-conversational catalog options



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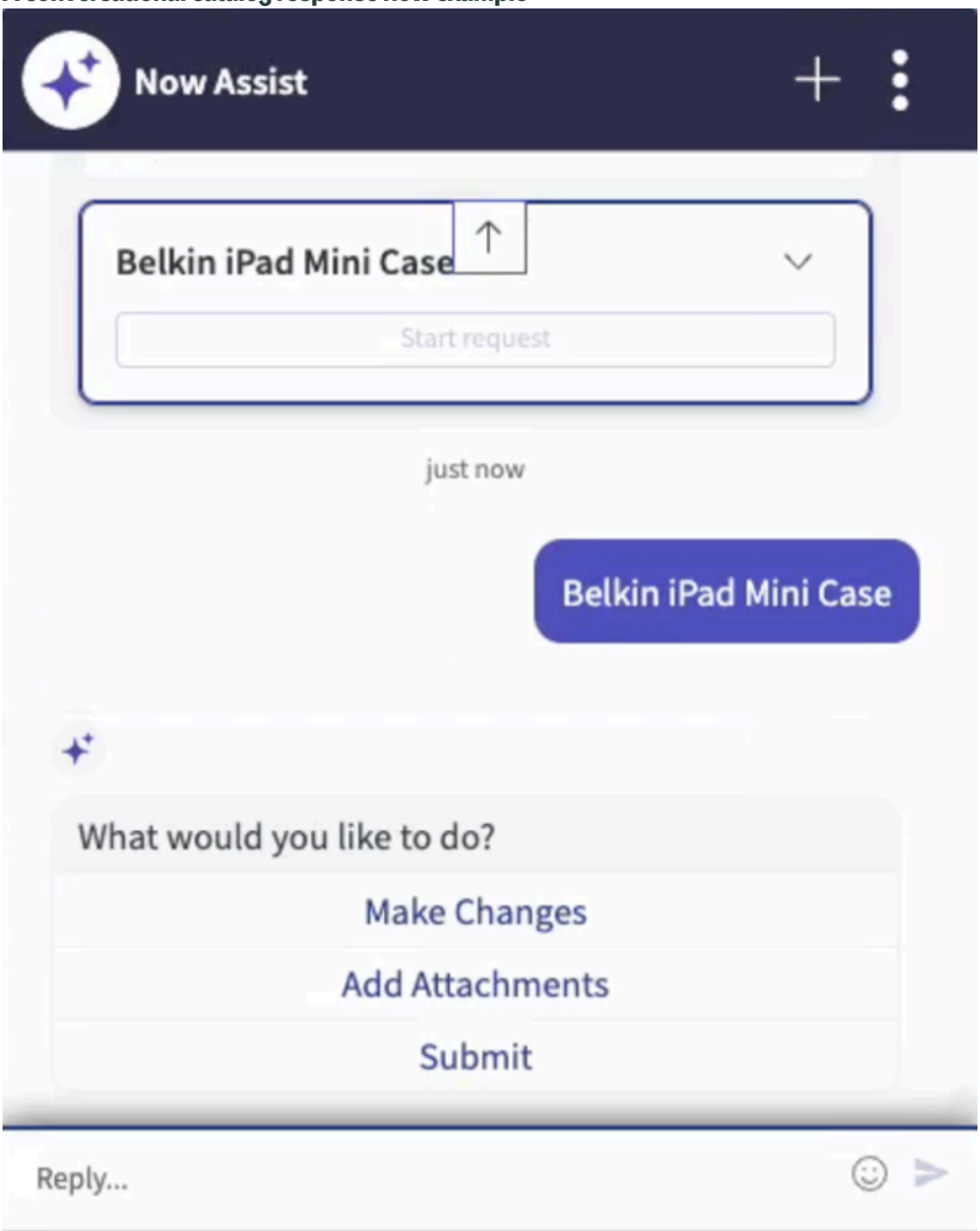
A conversational catalog response flow example



Each Virtual Agent response includes feedback icons. The user can indicate if the response was helpful by selecting the like thumbs up icon ( ). If the response wasn't helpful, the user can select the dislike thumbs down icon ( ). This feedback is used to train the LLM model and improve responses over time.

When the catalog order is complete, Virtual Agent displays a card for the order.

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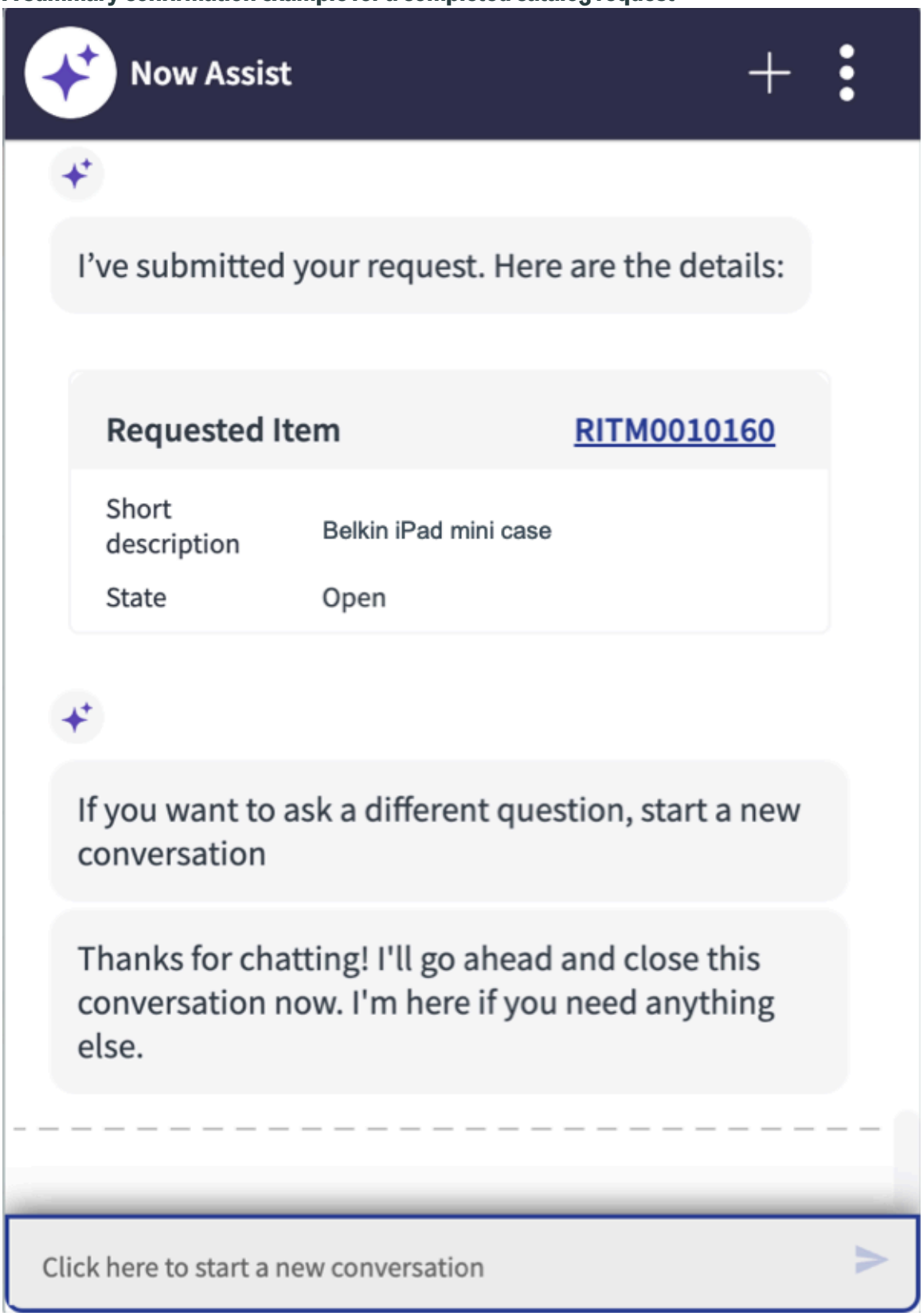
A summary confirmation example for a completed catalog request



If the user needs more help, Now Assist in Virtual Agent directs the user to either a live agent, resets the conversation, or creates an incident. The option is determined by the admin in the Now Assist in Virtual Agent guided setup. For more information, see Configuring Now Assist in Virtual Agent.

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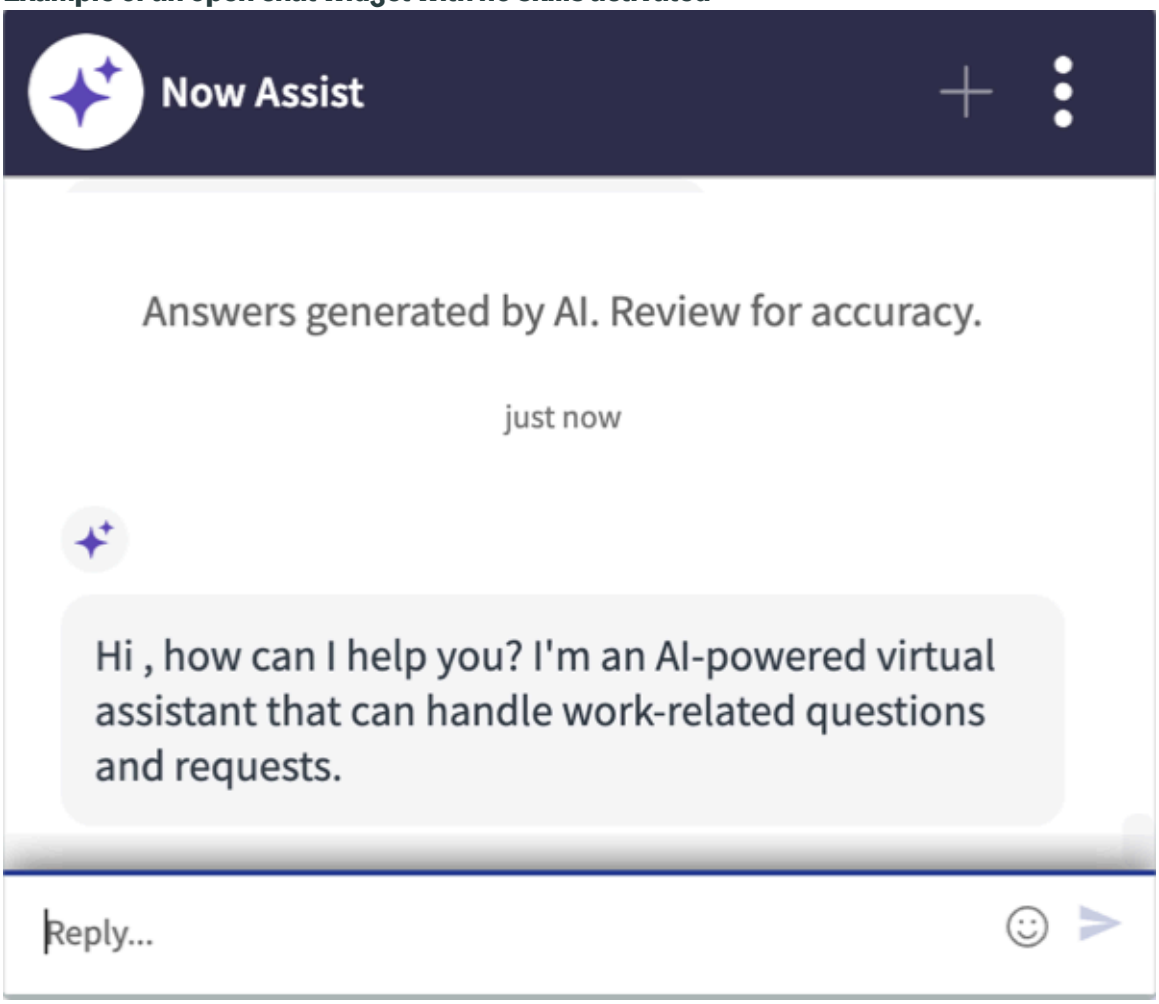
1. Live agent support routes the user to an available agent when configured.
2. Reset the conversation restarts the conversation to the beginning to ask another question.
3. Record producer directs the user to a catalog record producer to create an incident or case.

If a user doesn't have any skills configured for them by the administrator, no available skills are shown. However, the chat bar remains available for the user to enter an utterance. This triggers AI Search for a Knowledge Base article or catalog item.

Example of an open chat widget with no skills activated



For information about configuring a Now Assist skill, see Activate a Now Assist skill.

Engaging with small talk

Small talk topics and small talk utterances from the Semantic Filter Framework are recognized. Small talk is supported by your primary and fallback languages. The semantic filtering recognizes these types of small talk:

- Greetings: For example, `Hi, how are you today?`
- Gratitude: For example, `Thanks, this was helpful!`
- Complaint: For example, `This answer doesn't help me.`

  Chat conversations with complaints may prompt you to request a live agent or another fallback topic, for example, a create a support request topic.

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- Closure: For example, `That's all I needed. Bye.`

  The conversation ends when closure small talk is recognized.

More information

Want to learn more? Visit these resources.

- For more information on topic switching during a conversation, see Mid-topic switching during Now Assist in Virtual Agent conversations.
- For more information on Now Assist, see Now Assist.
- For more information on Now Assist in AI Search, see Now Assist in AI Search.
- For more information on Now Assist in Virtual Agent analytics, see Analyzing Now Assist in Virtual Agent.

Mid-topic switching during Now Assist in Virtual Agent conversations

Mid-topic switching easily lets you switch between requests, using plain language whenever new queries are made in the same Now Assist in Virtual Agent conversation.

During a Now Assist in Virtual Agent conversation, you can switch the conversation request without having to restart the conversation. For example, you are in the middle of a conversational catalog item and ordering an iPad when you remember open enrollment is coming up at your company. You can ask Virtual Agent about when open enrollment is without having to exit out of your existing conversation. The Virtual Agent provides a synthesized response which includes a summary about open enrollment, but also informs you that you can either continue with the existing conversation (ordering an iPad) or switch the conversation to focus on your new request (open enrollment).

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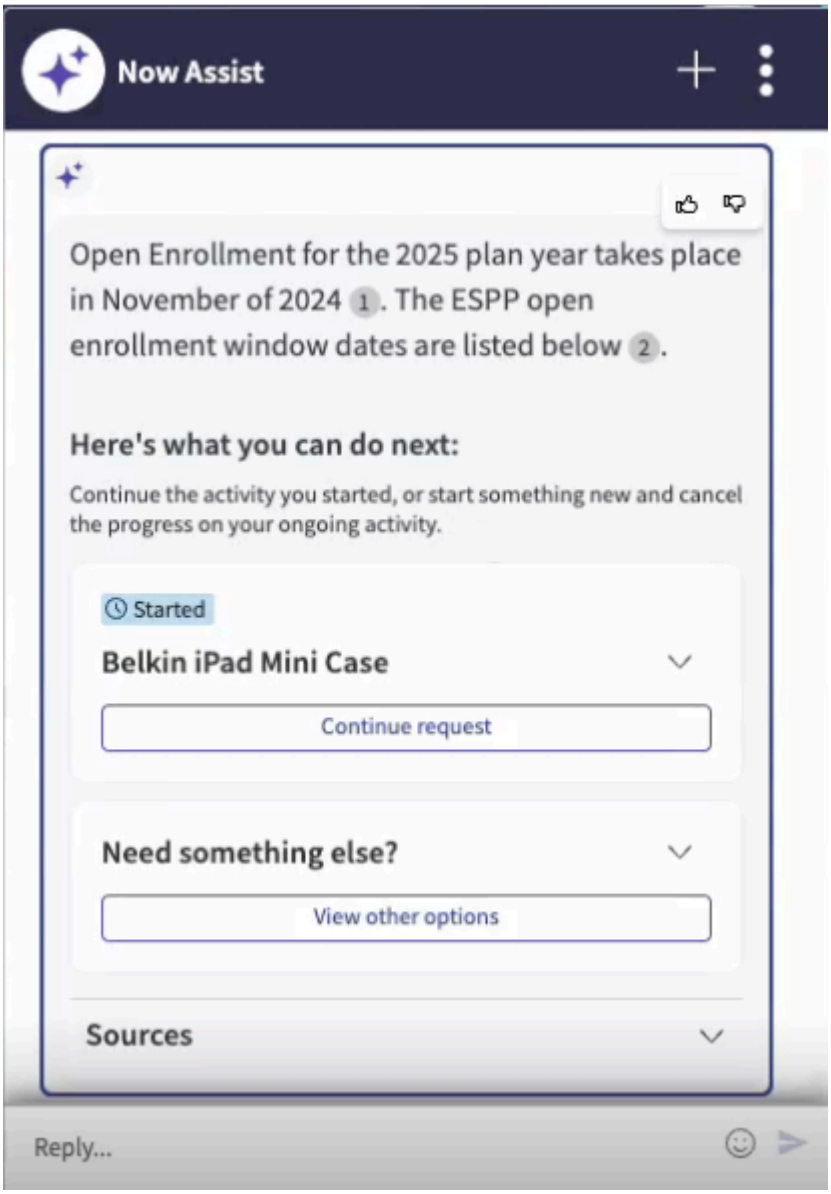
Example of topic switching



If you decide to continue with your original request, you return to the conversational node that you were previously on. If you decide to switch the conversational focus to something else, you can view additional information about your new request.

Integrating Now Assist in Virtual Agent with Microsoft Teams

Now Assist in Virtual Agent uses large language models (LLMs) and generative AI to improve the deflection rates and reduce the amount of time-consuming work that Natural Language Understanding (NLU) topic discovery once required.

Now Assist in Virtual Agent is available through portals on the web client, the mobile app, and Microsoft Teams. To integrate Now Assist in Virtual Agent with Microsoft Teams, see Configuring Now Assist in Virtual Agent. In step 12 of the procedure to Configuring Now Assist in Virtual Agent, there's the option to choose where to display Virtual Agent. Select Microsoft Teams.

Now Assist in Virtual Agent with Microsoft Teams relies on AI Search fallback topics. Within AI Search fallback topics, two types of results can appear:

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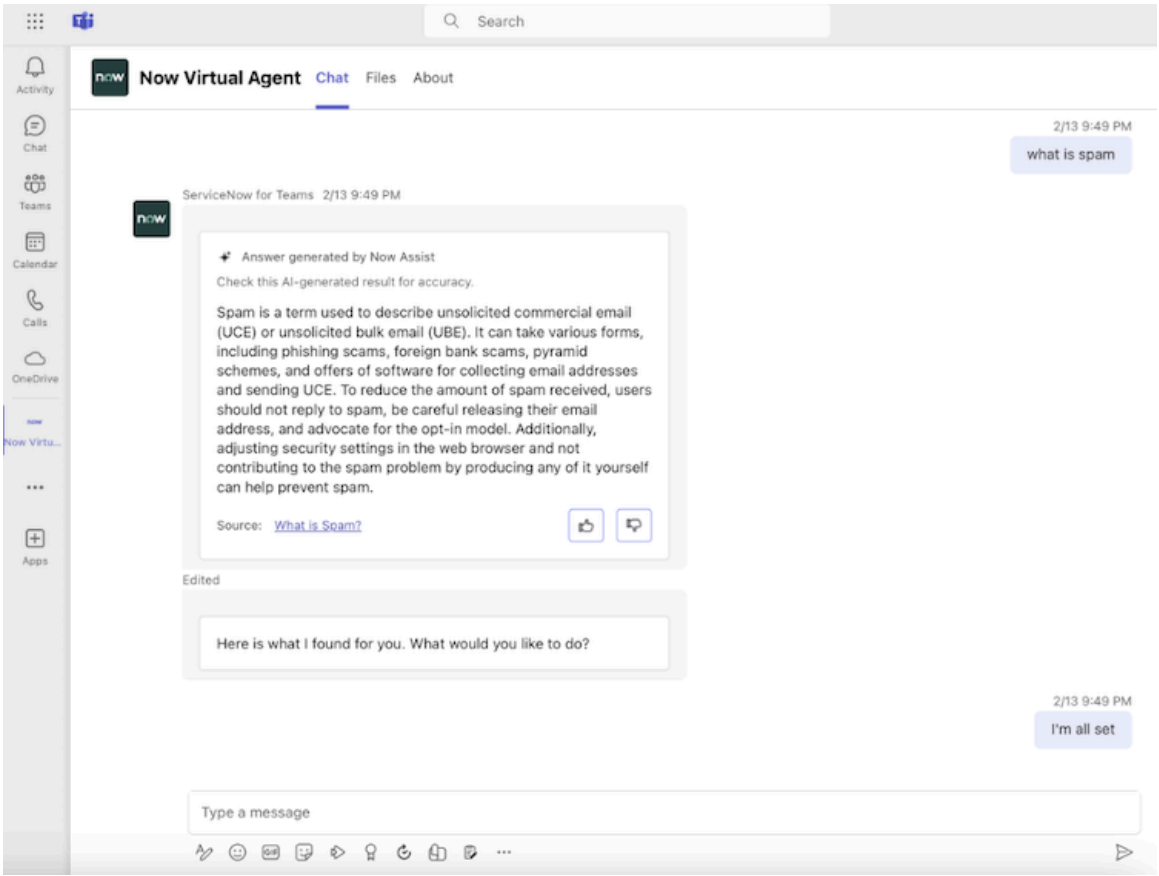
1. Genius Results: Catalog items (conversational and non-conversational) and knowledge base articles (single-turn and multi-turn Q&A).



2. Regular search results (multi-link outputs in conversations).

For more information, see Exploring Now Assist in Virtual Agent and Virtual Agent feature support in Microsoft Teams conversations.

Analyzing Now Assist in Virtual Agent

Use the Now Assist in Virtual Agent Analytics dashboard to monitor the performance of Now Assist in Virtual Agent.

Now Assist in Virtual Agent Analytics

The Now Assist in Virtual Agent Analytics dashboard provides indicators that track the performance of AI Search in Now Assist in Virtual Agent. The indicators, for example, can reveal the following:

- Percentage of user queries that Now Assist in Virtual Agent responded to given the total number of queries
- Resolution status of user queries based on the feedback provided by the user
- Deflection rate in a given period

Use the Dates filter to select the date range for which you want to view the performance indicators. Use the Assistant filter to select the LLM assistants for which you want to view the indicators and breakdowns for analysis.

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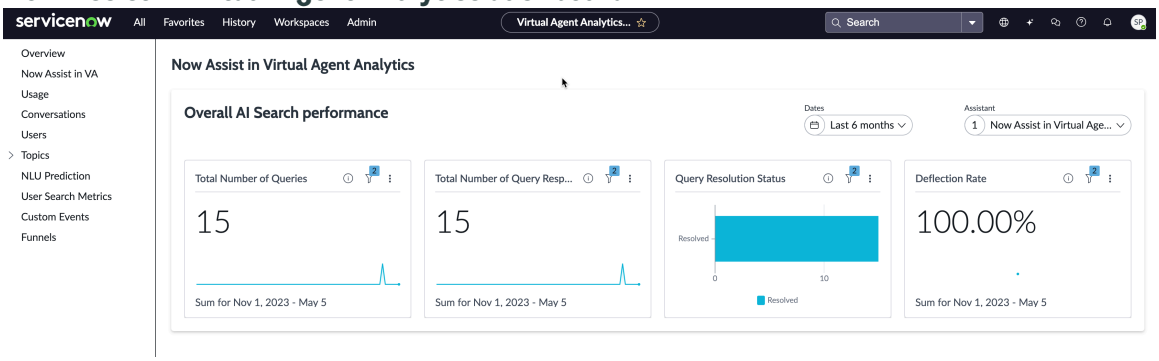
You can view the dashboard at **All** > **Conversational Interfaces** > **Conversational Analytics** > **Dashboard** > **Now Assist in VA**

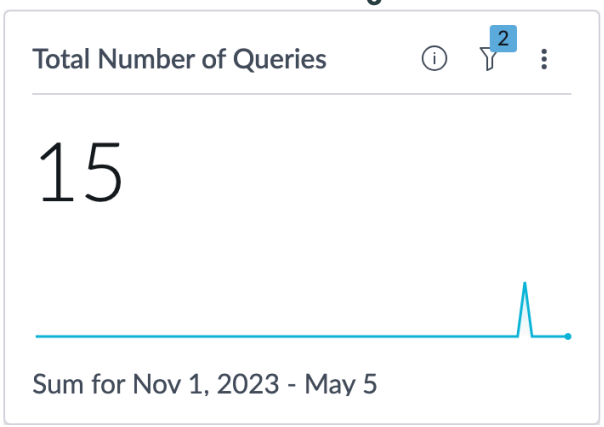
Now Assist in Virtual Agent Analytics dashboard



The following indicators show the performance of AI Search in Now Assist in Virtual Agent.

- This area of the dashboard shows the total number of user queries received by Now Assist in Virtual Agent. In a conversation, when the user selects other list items such as **Show next answer** and **Show more results**, the user input is considered as part of the same query. When Now Assist detects an intent switch, for example, if the user types a different query or selects **Start a new conversation**, it's counted as a new query.

  Total Number of Queries widget

- This area of the dashboard shows the total number of responses where Now Assist in Virtual Agent presented content for the users to review. If no content is presented in the response, the query is marked as No Response Provided.

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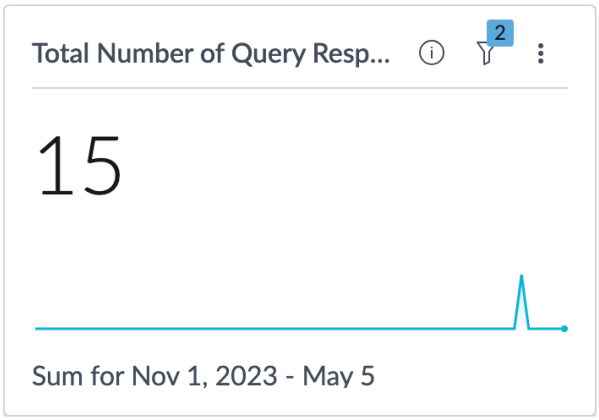
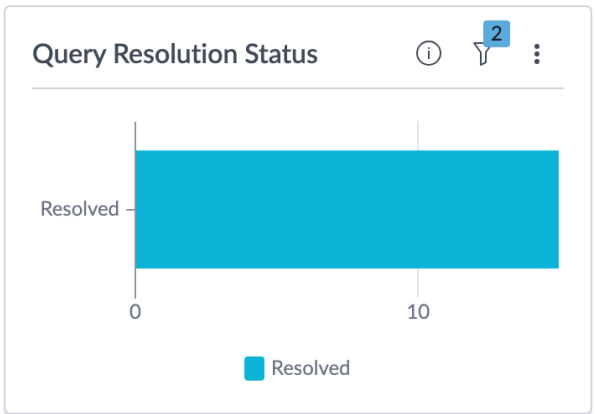
Total Number of Query Responses widget



- This area of the dashboard shows the resolution status of user queries that is determined based on the feedback provided by users on the query response.
  - Resolved: Indicates that the user found the response to be useful and effective or the user didn't provide any feedback.
  - Not Resolved: Indicates that the user didn't find the response presented by Now Assist to be useful and indicated this response through negative feedback.
  - No Response Provided: Indicates that no response was presented to the user query.

Query Resolution Status widget



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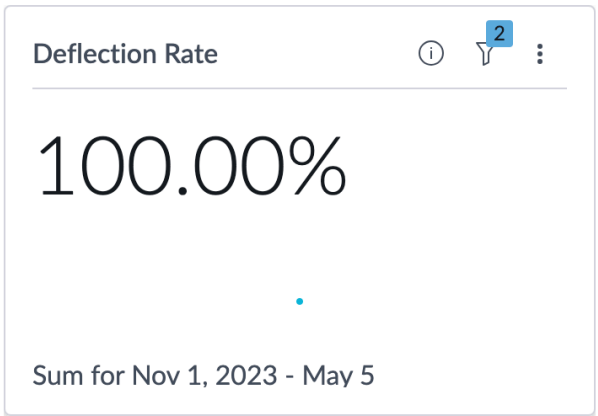
- This area of the dashboard shows the percentage of user queries resolved by Now Assist in Virtual Agent. The deflection percentage is calculated using the following formula: (Number of resolved queries/Total number of query responses) x 100.

Deflection Rate widget



You can drill down for a detailed analysis by clicking anywhere on the indicators. See Examining indicators with KPI Details for more information on exploring the indicators.

Understanding conversation deflection rate

Now Assist in Virtual Agent Analytics calculates the conversation deflection rate based on the resolution status associated with Now Assist query responses.

Sample conversation scenario

Conversation flow	Query	Resolution status
The user enters "New laptop"	Query 1	None
Now Assist returns a choice list	Query 1	None
The user selects **Show next answer**	Query 1	None
Now Assist presents a non-conversational item "New phone"	Query 1	None
The user selects **Show more results"**	Query 1	None
The user selects one of the SRs	Query 1	None
The user selects the thumbs up icon on one of the SR cards.	Query 1	Resolved
The user enters "parental leave policy"	Query 2	None
Now Assist presents a QA card for parental leave policy for US	Query 2	None
The user enters "parental leave policy for Canada"	Query 2	None
The user selects **Something else**	Query 3	Resolved
The user enters "iPhone broken"	Query 3	None
Now Assist presents a choice list of items	Query 3	None
The user selects one of the list items	Query 3	Resolved
The user enters "outage"	Query 4	None
Now Assist presents a list of SRs	Query 4	None

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Conversation flow	Query	Resolution status
The user selects **Get more help**	Query 4	Not resolved

In the sample conversation scenario, the deflection rate is calculated as (Number of resolved queries/Total number of query responses) x 100, which is, (3/4) x 100 = 75%.

Now Assist in Virtual Agent reference

Virtual Agent topic developers can create topics for use in the Now Assist panel channel. The following Virtual Agent Designer controls are currently supported.

For more information about the Now Assist panel channel, see Channels in Conversational Interfaces.

Supported controls for the Now Assist panel channel

Control type	Supported controls
User input controls	• Input Collector • Text • Static choice • Dynamic choice • Boolean • Date Time • Carousel For more information, see Virtual Agent Designer user input controls.
Bot response controls	• Text • Link • HTML • Card (record card and record card with action only) For more information, see Virtual Agent Designer bot responses.

Agent Chat

Agent Chat provides features that streamline the agent and requester chat experience and enables managers to monitor and assist agents.

Provide your agents with a workspace that has built-in productivity features for engaging with customers. Your agents can do the following:

- Use shortcuts, known as quick actions, for common activities, such as transferring a chat to another queue or displaying contextual info related to the chat.
- Reuse common responses, such as greetings or answers to frequent questions, with response templates.
- Get possible solutions for issues, derived from searches of related issues in Knowledge articles, Q&A, and previous incidents or cases with Agent assist.
- Interact with customers in their native language using Dynamic Translation for Agent Chat.

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- Manage work assignments delivered to agents' inboxes, enabling them to set their availability and accept, reject, or transfer chats.
- Trigger a Virtual Agent self-service topic that walks end users through a task with Conversation Autopilot.
- Provide agents with the option to add work notes or updates after they finish a support session with Interaction wrap up.

Get started

Explore  Learn about Agent Chat concepts and features.	**Configure**  Install and configure Agent Chat and activate relevant plugins.
Use  Use Agent Chat to help agents have discussions with others to solve issues faster.	**Reference**  Get Agent Chat details for domain separation, building reports, and interaction related records.

Exploring Agent Chat

Agent Chat enables live agents to interact directly with end users through chat. Your end users can chat with a live agent to ask questions and receive information.

Agent Chat overview

The chat system starts with virtual chat, which is an autonomous chat powered by artificial intelligence. The requester can then ask to chat with a live agent using Agent Chat. Using Agent Chat, agents can communicate with requesters, create incident or case records, or transfer chats to another agent or queue.

Agent Chat uses a persistent widget for chat conversations on any portal page of the portal that you're using. You can establish assignment rules to enable chat conversations to reach the best agent available who has the capacity and skills to handle the job or the agent can transfer the chat to another agent. Agents can use response templates to enable reusable, consistent messages to requesters.

Virtual chat conducts a survey before and after the Agent Chat. The pre-survey gets preliminary information about the requester to aid in the chat session. The post-chat survey gets feedback on the requester's satisfaction with the agent who helped.

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Agent Chat benefits

Benefit	Feature	Users
Agents and chat managers have a conversation without the requester knowing.	Agent Whisper	Agents, chat managers
Gather important information from end users through conversational questionnaires.	Chat surveys	Agents
Download a transcript of the conversation between the agent and the requester.	Chat transcript downloads for requesters	Requester
Carry out a conversation in another language.	Dynamic Translation for Agent Chat overview	Agent, requester
Initiate conversations with requesters on a messaging app of the requester's choice.	Agent-Initiated Messaging Interface	Agent, requester
Read a summarization of the chat (this is available only if you have Now Assist installed).	Chat summarization	Agent

Routing chats

Requesters start chats with virtual chat. When they request to chat with a live agent on Agent Chat, their request goes into a queue controlled by Advanced Work Assignment (AWA), which routes chats to different agents based on availability, queue length, and expertise.

Unfurling links

If an agent or requester enters a link during an Agent Chat conversation, the links are "unfurled" or displayed with a preview of the website's content. Links in Agent Chat conversations are unfurled in the same manner as Virtual Agent. For more information, see Using link unfurling in Virtual Agent.

Cross-channel conversation history and cross-channel message-level sentiment

Agents can see cross-channel conversation history and cross-channel message-level sentiment in real time when an agent is having a live conversation with a requester in the chat panel in Agent Chat. For more information, see Getting work from chats.

Agent Whisper

Agent Whisper lets agents and chat managers have a conversation without the requester knowing.

During a chat between a requester and an agent, the agent may want to privately ask a chat manager for assistance or a chat manager and an agent may want to converse without the requester knowing. Using Agent Whisper, the agent can request help and the chat manager and agent can send messages to each other without the requester knowing.

For example, if an agent is newly hired, still in training, or unsure about how to proceed with a requester's request, the agent can ask a chat manager to join the conversation to help walk the agent through the steps of the procedure privately.

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Another scenario is if an agent needs to escalate a customer conversation to a chat manager. Agents can request help and chat managers can join the chat conversations publicly to communicate directly with the customer to help deescalate the situation.

You activate Agent Whisper in Agent Chat settings. For details, see Setting up Agent Chat.

Using the Help quick action

Agents can ask chat managers to join chat conversations with requesters by raising the help flag. Agents can open the Quick Action menu or enter `/help` to request for help. When using the help quick action, agents can also type a brief private message explaining what they need help with. This way, when a chat manager enters the conversation, they already know what the agent needs.

Chat managers can view the conversations with help requested from different views: interactions list view, manager dashboard, and lists.

- Interactions list view: Agents can navigate to the interactions list view and add in the help requested column to see which conversations agents have requested help in. From here, managers can click directly into the interaction record and join the conversation with the agent and requester.
- Manager dashboard: With the Workforce Optimization for Customer Service (com.snc.wfo.csm) plugin installed, managers can see that the Help requested tile on the manager dashboard homepage.

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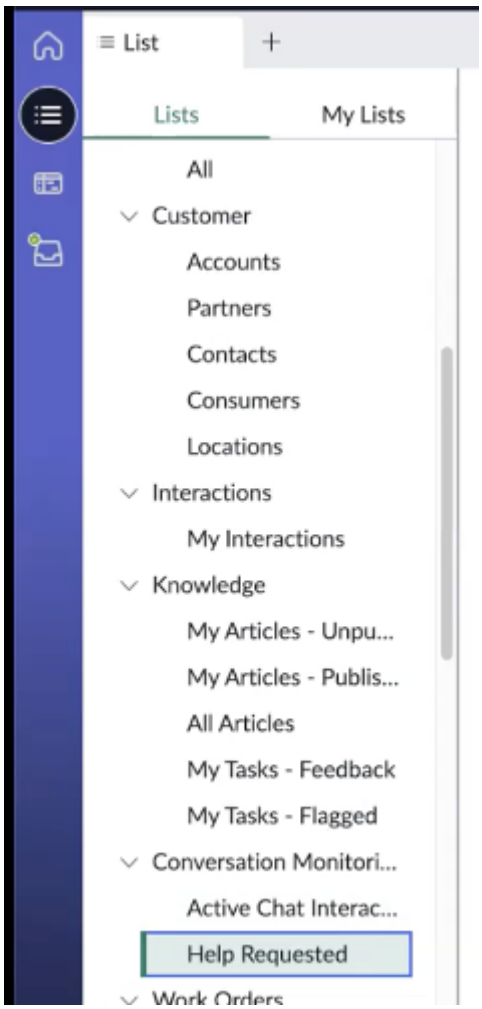
- Lists: From Conversation Monitoring > Help Requested, managers can view a list of chat interactions in which agents have requested help.



To learn more about Workforce Optimization for CSM, see Workforce Optimization for Customer Service.

Sending and receiving messages in Private Chat

The agent and chat manager can converse without the requester knowing that they are having a conversation. Messages that only seen by the agent and chat manager are private messages. The requester does not see private messages. The agent and chat manager can toggle between the public and private messages using the Public Chat and Private Chat tabs. The Private Chat tab has a yellow background with "Message only visible internally" and private messages appear on the yellow background. When someone types in the Private Chat tab, the typing event indicator does not display. For example, when the chat manager types in the Private Chat tab, the agent's and requester's screen do not display the typing event indicator.

The tab that the agent types on and sends the message from determines whether a message is posted privately or publicly. If an agent starts typing a message on the Public Chat tab and then switches to the Private Chat tab, the Private Chat tab does not display the message. If the agent then goes back to the Public Chat tab, the message is still there. However, agents can see private messages regardless of whether they are on the Private Chat tab or the Public Chat tab.

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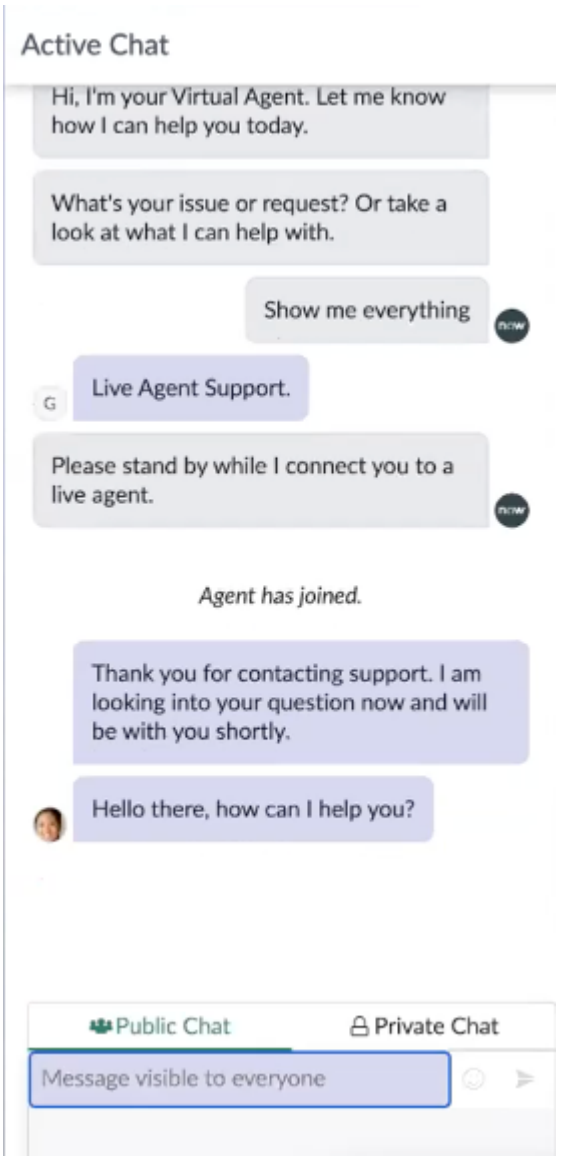
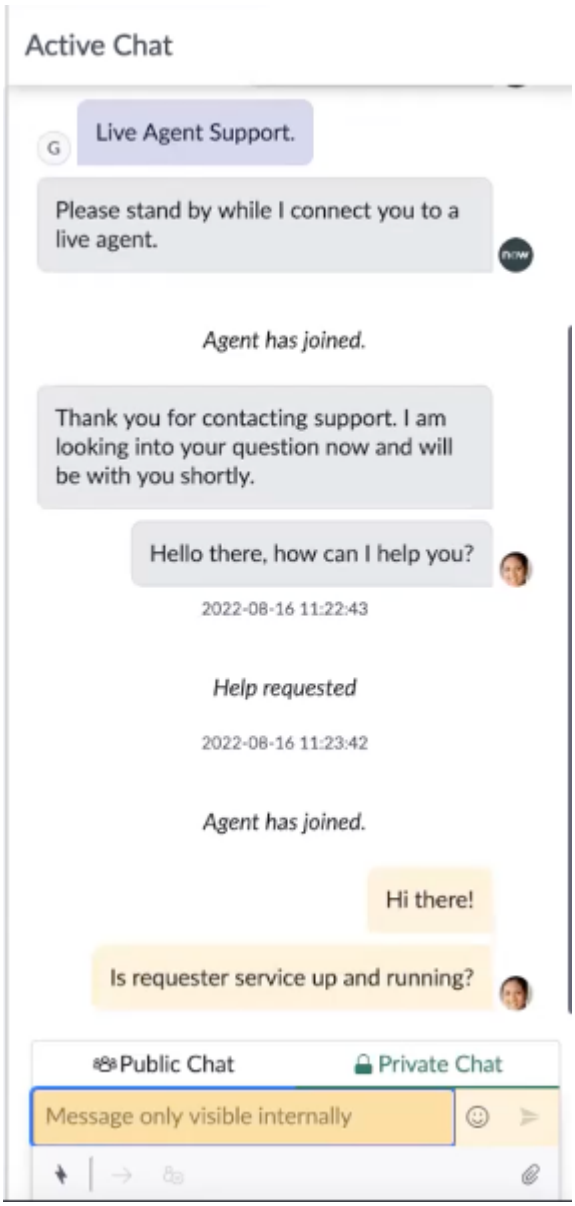
Public versus Private chat

Example of Public Chat	Example of Private Chat
	

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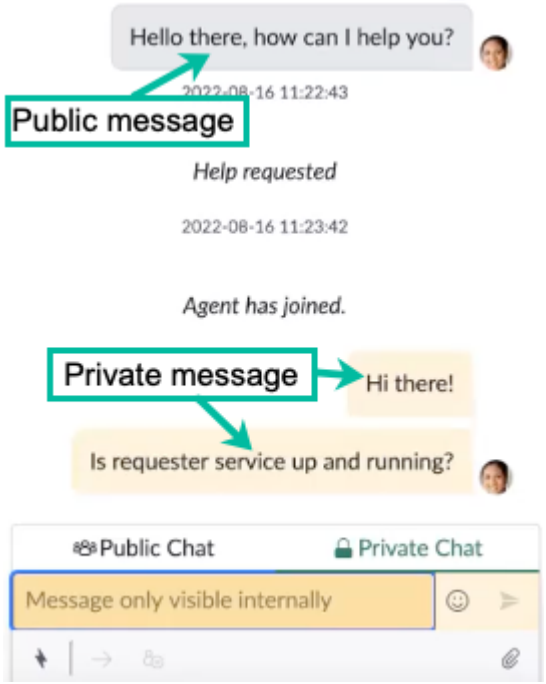
Example of public and private messages



Joining a chat conversation in Private Chat

The first time a chat manager switches from a private conversation (on the Private Chat tab) to a public conversation (on the Public Chat tab), a dialog box displays. The dialog box informs the chat manager that they are about to join the public conversation and the requester will be notified that the chat manager is joining the conversation. The chat manager can select **Yes, I'm sure** to join the public conversation or select **Cancel** to remain in the private conversation.

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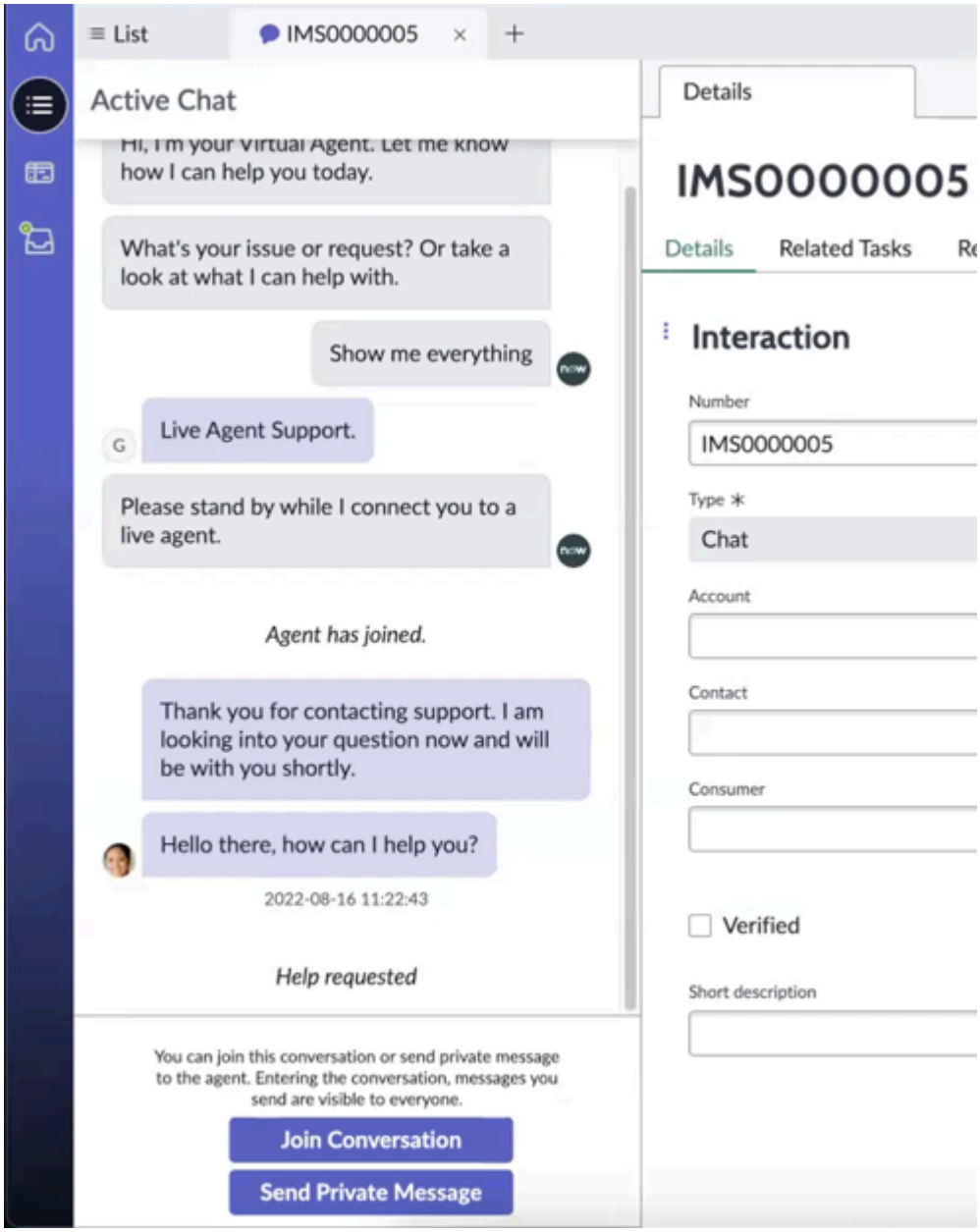

Sharing attachments in Private Chat

If agents send an attachment while on the Private Chat tab, the attachment is sent only to the agent and chat manager. Message Sent confirmation messages do not display for private message conversations.

Private messages stored in internal chat transcripts

Once the conversation ends, one external transcript and one internal chat transcript are generated.

The public chat transcript does not include private messages and is accessible for the requester to download if the Download Transcript capability has been enabled.

The private chat transcript is shown on the interaction record by default and does include private messages exchanged between agents and managers. Private messages are prefixed with the word [PRIVATE] to clearly indicate when a message came through the Private Chat.

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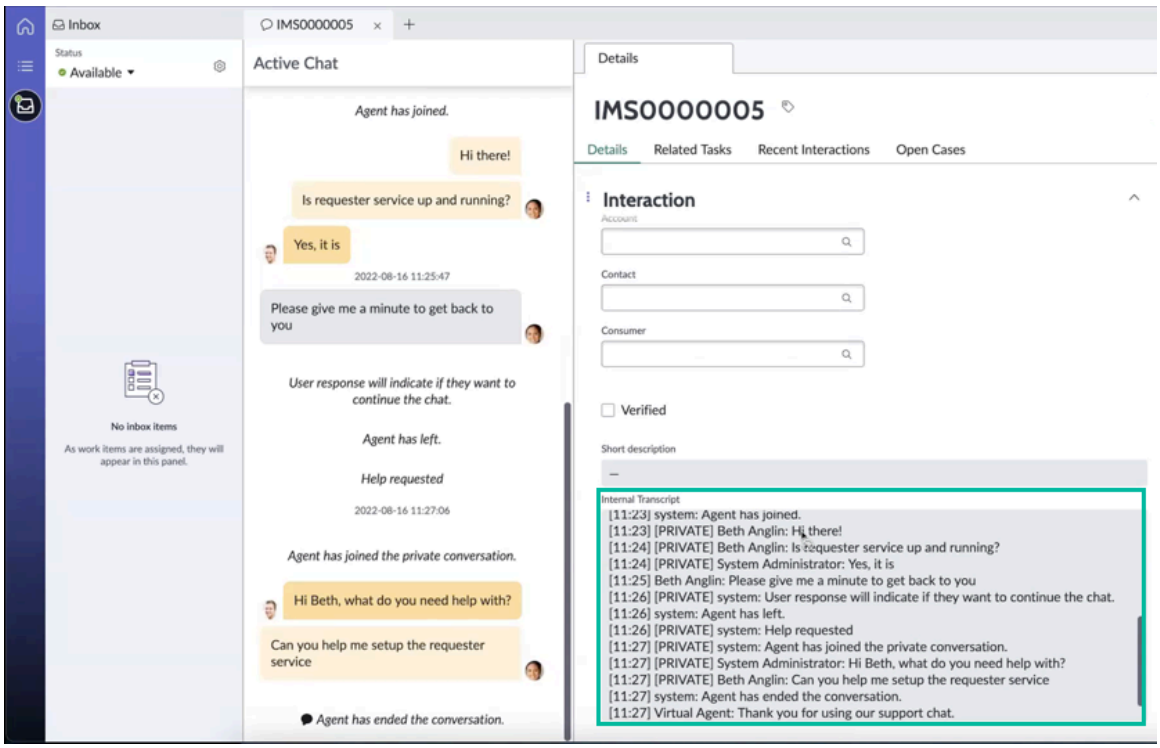
To learn more about downloading the chat transcript, see Chat transcript downloads for requesters.



Custom report

Admins can build a custom report to track the number of help requests, see Build a report to track the number of help requests for instructions.

Chat surveys

Display conversational questionnaires to your end users to gather important information from them, before and after they chat with a live or virtual agent.

How chat surveys work

Instead of using forms to collect information from your requesters, you can create different questionnaires that run in the chat client to capture preliminary user information or post-chat feedback. The questions in the following pre-chat survey example ask users to identify their service issue and to provide additional details.

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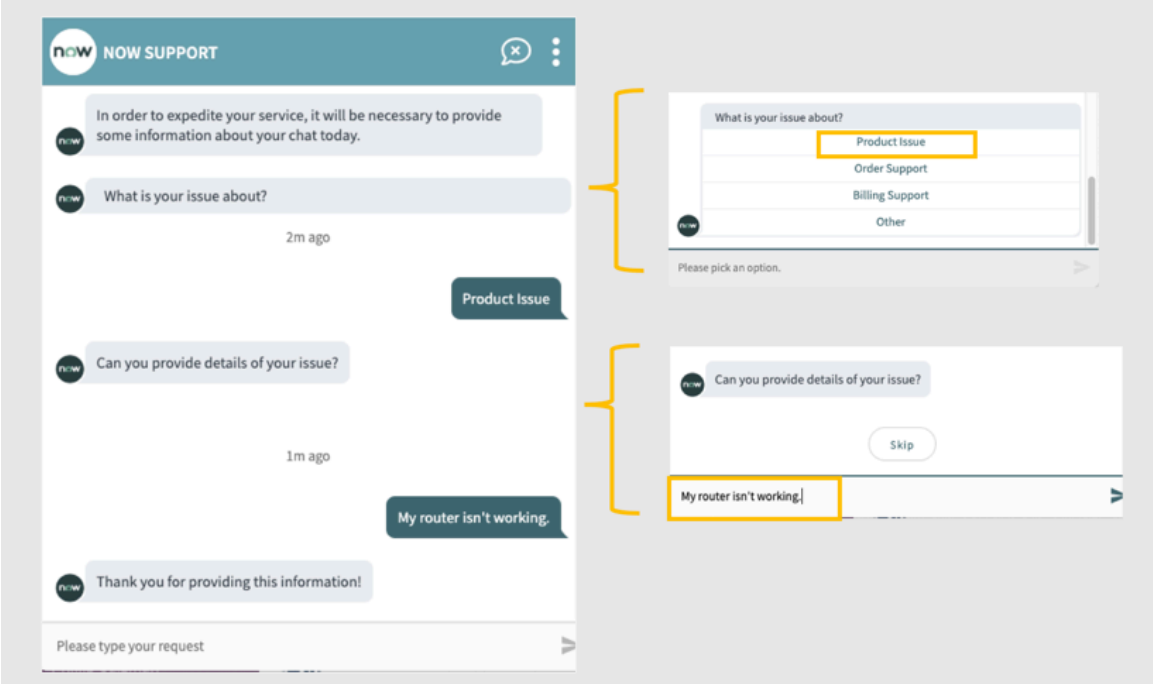
Example pre-chat survey conversation



Survey administrators and administrators use Survey Designer to:

- Build survey content: Survey Designer provides various controls for defining survey questions. The example above shows the choice list control, which displays a list of items that your users can choose from. Each survey question has corresponding properties that you can set to manage survey behavior. For instance, you can make a survey response mandatory. If you make a survey response optional, users can skip the question in the survey. You can also configure your survey so that an introductory note starts the survey and an end note displays after users finish the survey.
- (Optional) Save certain survey responses as chat context: When defining your survey, you can map a particular survey question to a chat context variable so that survey responses are stored in the context variable. You can then use these variables to route chats to live agents in certain queues, by specifying the chat context variables in routing conditions or to the virtual agent.

After creating the surveys, administrators configure the surveys to run as conversations in the chat client. The chat client renders the chat survey as a live chat conversation.

What to do next

Setting up chat surveys involves these main steps:

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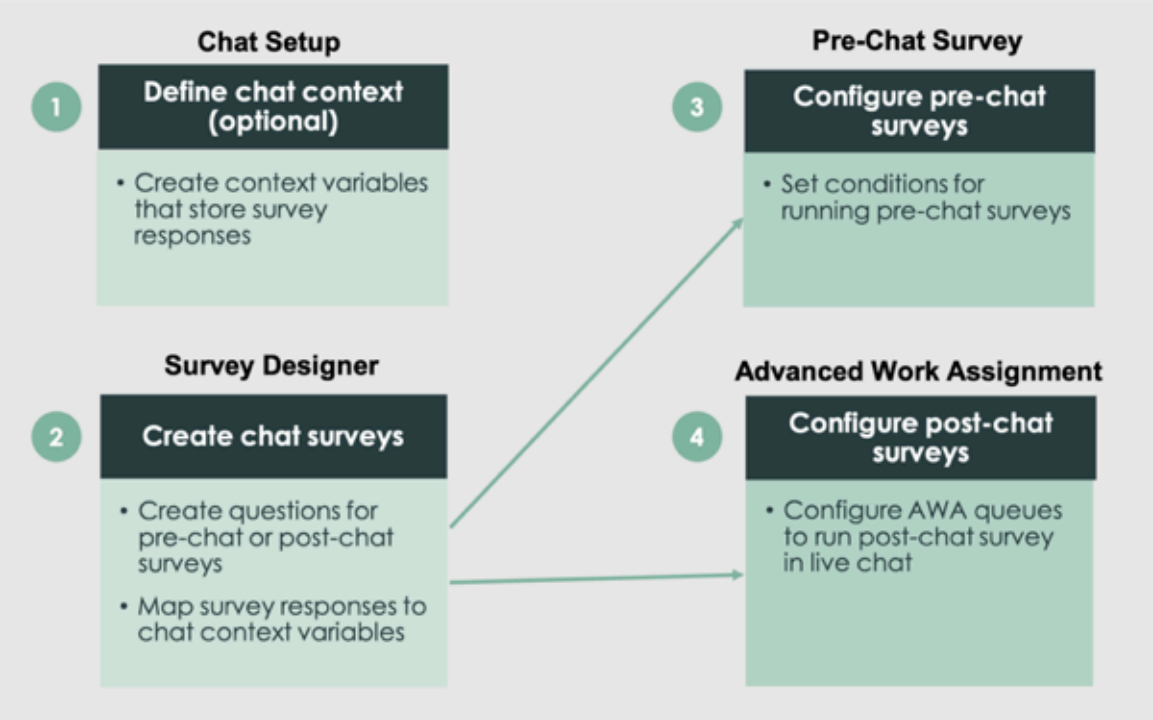

1. (Optional) Define chat context.

Configure the chat context variables for storing survey responses using **Context Variables** in Chat Settings.

2. Create chat surveys

In Survey Designer, build your conversational questionnaires for gathering pre-chat information and post-chat feedback from your requesters. If you defined chat context variables to store certain survey responses, you can map the appropriate survey question to the corresponding chat context variable.

3. Define pre-chat survey configurations.

Determine the pre-chat questionnaire to be presented to your requesters based on conditions that you apply.

4. Define post-chat survey configurations.

Control the post-chat questionnaire displayed to your requesters to gather feedback on their experience with live agents.

5. If using Virtual Agent, define context topic intent configurations.

Use pre-chat survey information to determine the appropriate Virtual Agent conversation topic automatically displayed to your requesters, rather than prompting them to choose from a list of conversation topics.

The Interaction Related Records list stores the post-survey chat results and creates a related record that links the assessment to the live agent (fulfiller).

Chat transcript downloads for requesters

Once a conversation between a requester and a live agent ends, the requester can download a transcript of the conversation.

After a conversation between a requester and a live agent ends, the requester's chat window displays a **Download** button that enables the requester to download a chat transcript. If the requester clicks the **Download** button, a .txt file is automatically downloaded from the window of the requester's current web browser. The chat transcript contains only the written text from the conversation; attachments and images from the conversation appear as URLs. Even after

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the requester starts a new chat session, the **Download** button from the previous session is still available if the requester scrolls up. The chat transcript files are generated at the end of each chat session and multiple chat sessions are not combined into one file.

The requester must be configured for chat transcript downloads for the **Download** button to appear. For information about configuring the download of chat transcripts, see Setting up Agent Chat.

Two types of chat transcripts are generated from the conversation: internal and external.

Internal chat transcripts:

- Are available only to the agent and chat supervisor.
- Include any conversations between the requester and virtual agent.
- Include any conversations between the agent and chat supervisor that occurred through Agent Whisper.
- Include customer sentiments (if Agent Chat is configured to display customer sentiments).

The internal transcript field in the interaction table contains all private and public messages and is populated as soon as the chat is close completed.

External chat transcripts:

- Are available to the requester.
- Include only conversations between the requester and the live agent.
- Do not include pre- or post-chat survey information.

Profanity Filter for Agent Chat overview

The Profanity Filter for Agent Chat prevents agents from sending messages to requesters that include profane language (also known as forbidden keywords). If an agent is upset and tries to send a message with offensive language, the Profanity Filter prevents the requester from seeing the message.

If an agent tries to send a message with profane language, the Profanity Filter blocks the message and flags the forbidden keywords. The Profanity Filter warns the agent that the message contains forbidden keywords and alerts the chat manager to the agent's use of profane language.

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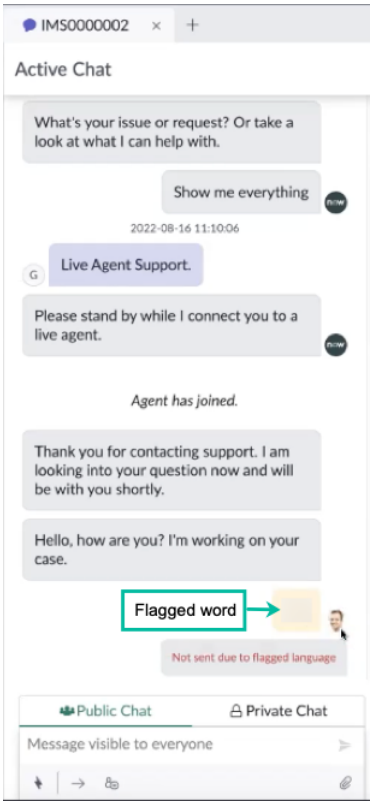

When the Profanity Filter detects forbidden keywords in a message entered by the agent:

- the message containing the forbidden keywords is highlighted in the agent's chat window.
- the agent receives a notification that they have used a forbidden keyword.
- the message with the forbidden keyword is not sent to the requester.
- if the agent has exceeded the number of forbidden keywords in a specified amount of time, a message is sent to the chat manager.
- the forbidden keyword is marked in the transcript of the chat conversation.

Notifying the chat manager

You can configure the Profanity Filter to notify the chat manager if an agent tries to use more than the specified number of forbidden keywords over the specified time. The Profanity Filter considers all conversations owned by the agent when determining the number of forbidden keywords used. If the agent tries to send a message with a forbidden keyword, the chat manager receives a notification. If the Manager Workspace or Agent Workspace is the active window, a real-time notification displays. If the Manager Workspace or Agent Workspace isn't the active window, a notification displays on the summary view in the Workspace notification menu. In the incident entry, the chat manager can review the incident and the chat log and privately message the agent.

Machine learning-based or keyword-based

The Profanity Filter uses a machine learning-based model or a keyword-based model to determine whether a message includes forbidden keywords. The machine learning-based model analyzes keywords and phrases in the context of the agent's entire message before determining whether any forbidden keywords in the message should be considered profane. For example, the statement "I made a silly mistake" would be considered not profane while "You sound so silly" would be considered profane. The machine learning-model is not on each instance individually – you cannot change the model directly to account for customized keywords and phrases.

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The keyword-based model compares a message against a list of forbidden keywords to determine whether something should be considered profane. You can allow certain keywords or phrases even if those keywords are considered profane in a generic sense. Common examples are book or movie titles that might contain forbidden keywords and but should still be allowed in a conversation. Conversely you can configure the Profanity Filter to block certain keywords or phrases even if the words may not always seem profane. The Profanity Filter analyzes each message against the list of allowed and forbidden keywords before running it through the model-based mode.

Example of machine learning-based model

Allowed keyword	Forbidden keyword	Message to be analyzed	System behavior
		You are a dummy.	Message is blocked.
UNIX for Dummies		The reference book "UNIX for Dummies" might be useful.	Message is allowed.
UNIX for dummies	stupid	"UNIX for Dummies" is a stupid book.	Message is blocked.
	foolish	I feel so foolish for not knowing the answer to your question.	Message is blocked.
		I feel so foolish for not knowing the answer to your question.	Message is allowed.

Example of keyword-based model

Allowed keyword	Forbidden keyword	Message to be analyzed	System behavior
	dummy	You are a dummy.	Message is blocked.
		You are a dummy.	Message is allowed.

Domain separation

The Profanity Filter works with domain separation. If the domain is set to Global, then the keywords apply to both the agent and requester domains. For the agent and requester to see each other's domain, the administrator must do one of the following:

- Include the domain where the regular expression should be visible as a child domain to the corresponding parent domain.
- Grant necessary access to the appropriate domain if it's a sister domain.
- Set the keywords under a global domain.

Sensitive Data Handler

During an Agent Chat or Virtual Agent conversation, the agent or requester may accidentally enter sensitive data. The Sensitive Data Handler detects and masks the sensitive data so it is not viewed by the agent or requester. The Sensitive Data Handler can also collect sensitive data as part of a business process, such as user authentication.

Possible situations when the Sensitive Data Handler might detect and mask sensitive data include:

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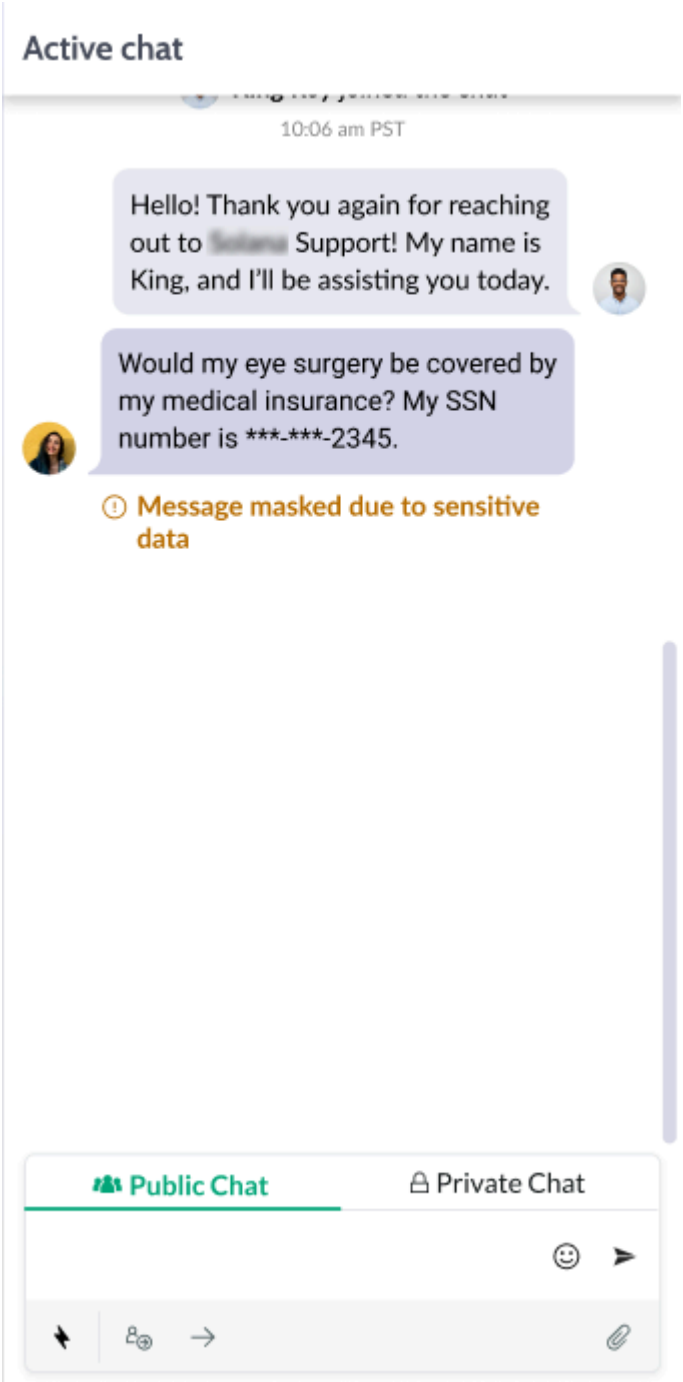
- A requester enters sensitive data, such as a social security number, during a conversation with a live agent or virtual agent.
- An agent enters company information, such as a manager's confidential email address, that the requester should not have access to.
- A requester enters sensitive data in a pre-chat or post-chat survey.

The Sensitive Data Handler detects and masks sensitive data when the requester is conversing through the web client, mobile (iOS/Android), or any of the supported adapter channels (SMS/Slack/Teams/Workplace).



You can configure the following:

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- Regular expressions for each type of sensitive data (for example, social security number or credit card number).
- Whether sensitive data handling works only for inbound (from requester) messages, outbound (from live agent) messages, or both.
- Messages that displays to the requester or agent informing them that sensitive data has been masked.

If the requester sends a message containing sensitive data to an agent, a system message is sent to the requester and agent notifying both that the message contained sensitive data. The sensitive data is masked on the transcript and marked as sensitive on the internal transcript.

If an agent tries to send a message containing sensitive data to a requester, the message is not sent to the requester. Instead, an error is displayed to the agent and the message is tagged as sensitive in the internal transcript.

The Sensitive Data Handler can be configured to pass user authentication information to another entity. The requester might provide sensitive data during a conversation to prove their identity (for example, social security number, date or birth, email address).

The Sensitive Data Handler plugin [com.glide.sensitive_data_handling] can be installed by itself, without a Glide Virtual Agent or Agent Chat plugin. Regular expressions can be added, edited, and deleted from the Sensitive Data Handling module.

Regular Expressions

The base system of the Sensitive Data Handler comes with pre-defined regular expressions for credit/debit card numbers, social security numbers, and email addresses. When the Sensitive Data Handler detects a regular expression, it uses the defined masking pattern to mask sensitive data. To define your own regular expressions and patterns to mask other sensitive data, see Configuring Sensitive Data Handler. If a regular expression is not properly configured, the system may get stuck while attempting to match the regular expression with the message. To prevent the system from getting stuck, the system times out after one second.

Pre-defined Regular Expressions

Name	Regular expression	Details
Credit Card - Visa	\b4[0-9]{12}(?:[0-9]{3})?\b	• Card number starts with 4. • New card number has 16 digits, old card number has 13 digits.
Credit Card - American Express	\b3[47][0-9]{13}\b	• Card number starts with 34 or 37. • Card number has 15 digits.
Credit Card - Mastercard	\b(?:5[1-5][0-9]{2}|222[1-9]|22[3-9][0-9]|2[3-6][0-9]{2}|27[01][0-9]|2720)[0-9]{12}\b	• Card number starts with a number between 51-55 or 2221-2720. • Card number has 16 digits.

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Pre-defined Regular Expressions (continued)

Name	Regular expression	Details
Credit Card - Diners Club	\b3(?:0[0-5]|[68][0-9])[0-9]{11}\b	• Card number starts with 36, 38, or 300-305. • Card number has 14 digits. • Cards that start with 5 and have 16 digits should be processed like a MasterCard.
Credit Card - Discover	\b6(?:011|5[0-9]{2})[0-9]{12}\b	• Card number starts with 65 or 6011. • Card number has 16 digits.
Social security number	\b(?!666|000|9\d{2})\d{3}-(?!00)\d{2}-(?!0{4})\d{4}\b	• First 3 digits cannot be 000, 666, or 900-999. • Hyphen (-) • Middle 2 digits should be 01-99 and cannot be 00. • Hyphen (-) • Last 4 digits should be 0001-9999 and cannot be 0000.
Email	\b[\w!#$%&'*+/=?`{\|}~^-]+(?:\.[\w!#$%&'*+/=?`{|}~^-]+)*@(?:[a-zA-Z0-9-]+\.)+[a-zA-Z]{2,6}\b	• Word • Period (.) • Word • @ symbol • String of alphanumeric characters at least one character long. • Period (.) • Alphabetical string 2-6 characters long.

Dynamic Translation for Agent Chat overview

Dynamic Translation for Agent Chat (DTAC) translates chat conversations from one language to another. This translating enables agents and requesters to have chat conversations with each other without the need of a shared language.

Dynamic translation for Agent Chat overview video

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For example, a requester who speaks only French starts a chat conversation with a live agent who speaks only English. From the requester's view, the entire conversation is conducted in French, while from the agent's view, the entire conversation is conducted in English.

DTAC enables cross-locale support teams and merger and acquisition projects to save time and money by handling larger volumes of chat conversations from other regions.

Note:

- DTAC is supported on Agent Workspace, not on Connect Support.
- DTAC is currently not supported when autopilot is in progress. When the requester responds to prompts from autopilot topics, these responses are not translated for the agent, even if DTAC is turned on for that conversation. See Conversation Autopilot for more information.

How DTAC works

DTAC uses Dynamic translation and a translation service provider to translate chat conversations in real time. Available translation service providers include:

- Set up Google cloud translator service spoke
- IBM Translator Service
- Microsoft Azure Translator Service spoke

Mobile clients

DTAC is available for requesters on Agent Chat in mobile for iOS and Android.

Language limitations

Even though the corresponding I18N plugins are activated, DTAC does not support the following language translations:

- Brazilian Portuguese
- Canadian French

Translation support limited to one language

DTAC can only support translation from one language to another therefore additional agents or managers joining chat sessions should speak the same language as the primary agent.

- Agent chat transfers – Agents transferring a chat conversation should both speak the same language.
- Managers joining chat conversation – Managers joining chat conversation to monitor or assist agents should speak the same language as the primary agent.

Agent presence states

DTAC does not translate agent presence states.

Attachments within DTAC

When inserting an attachment into a chat, DTAC does not translate the file name or the contents of the attachment.

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Agent-Initiated Messaging Interface

Enable agents to initiate conversations with customers on a messaging app of customers' choice by using the ServiceNow® Agent-Initiated Messaging Interface application.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Overview

The Agent-Initiated Messaging Interface application supports agent-initiated conversations for any type of messaging channels such as SMS.

Note:
The messaging channels are available based on the application associated with the service channel you install. For more information, see Service channels.

By default, the application is configured for the Conversational SMS service channel in the CSM Configurable Workspace. For more information, see Conversational SMS service channel and Initiate messaging conversations from the CSM Configurable Workspace.

Configuring Agent Chat

Configure Agent Chat to enable customers to ask questions and receive information by chatting with a live agent.

Review these sections on configuring Agent Chat features.

Setting up Agent Chat

Configure Agent Chat to enable live agents to chat with customers and manage various conversation features for agents and end users. Through Agent Chat, agents interact with end users, create incident or case records, or transfer chats to another agent or queue.

Before you begin

Configure the following before starting this task:

- Install the Agent Chat plugin (com.glide.interaction.awa).
- If you want to use the Profanity Filter, activate the Profanity Filter plugin (sn_va_profanity).
- In Advanced Work Assignment:
  - Configure service channels.
  - Define work item queues.
  - Set up work assignments.
- Update your Live Feed profile to display agent names and avatars in the chat client.
- Configure Agent Chat in Service Portal

Role required: workspace_admin

Note:
You must be in the global view to edit the settings.

About this task

Use Agent Chat settings to do the following:

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- Activate or deactivate:
  - Agent Chat (enabled by default).
  - Display of agent names and avatars the chat window.
  - Display of the agent name in the header.
  - Chat transcript downloads.
  - Display of estimated wait time for live chat support (transfer from the virtual agent to a live agent).
  - Agent Whisper, which enables supervisors to message agents privately when agents are interacting with an end user. For new instances, Agent Whisper is enabled by default.
  - Emojis.
  - Conversation history.
  - Conversational autopilot client system messages.
- Set the system messages that are displayed when a live agent transfer occurs.
- Manage Quick Action controls.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Home**.
2. Select the **Agent Chat** tile.
   The Agent Chat settings screen titled "Customize how your users chat with live agents" appears.

   Note:
   Agent Chat is automatically activated when the Agent Chat plugin is installed. If you're not using Agent Chat, slide the toggle switch to deactivate it and select **Save**.

3. Activate Agent Chat by enabling the **Activate** option.
4. Configure the options.

User chat settings

Field	Description
Agent names and avatars	Slide the toggle switch to activate or deactivate the display of the agent names and avatars in the Agent Chat client when a live agent enters, transfers, or exits a chat. Agents set their names and pictures in their Live Feed profiles. ○ If activated, the **Agent name in header** is automatically activated and displays the agent name at the top of the chat client. ○ If deactivated, agent identities remain anonymous. No names or avatars are displayed in the chat window.
Agent name in header	Slide the toggle switch to activate or deactivate the display of the agent name in the header of the chat window. This option is active by default.

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Field	Description
	This field appears if **Agent names and avatars** is active.
Transcripts	Slide the toggle switch to activate or deactivate the ability for requesters to download a transcript of the conversation they had with an agent.

Chat statuses and messages

Field	Description
Live chat wait status	Select whether to display the estimated wait time for live agent support in the chat menu for web clients. If you're using the Conversational Integration with Microsoft Teams, the wait time displays in a card that shows the approximate wait time to chat with an agent. ○ The wait time is the estimated time, in minutes, for the transfer from the virtual agent to a live agent. ○ The wait time updates once per minute. Wait time is based on the Queue Average Wait Time minus the waiting time.
Agent Transfer Message	Enter the message that users see when they are transferred to a live agent or another queue. For example: "Please stand by while I connect you to a live agent." **Note:** You can define only one transfer message and it is displayed for all queues in your instance. The Agent Transfer message does not support HTML, only plain text.
"No agent available" message	Enter the message that users see when a live agent is not available. For example: "No agents are available at the moment. Please try again later." **Note:** You can define only one agent availability message and it is displayed for all queues in your instance.

Agent chat features

Field	Description
Agent Whisper	Slide the toggle switch to activate or deactivate Agent Whisper, which enables supervisors to message agents privately when agents are interacting with a requester. **Note:** If you deactivate Agent Whisper, you must manually deactivate the /help quick action.

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Field	Description
Emojis	Slide the toggle switch to activate or deactivate emojis.
Conversation Autopilot	Slide the toggle switch to activate or deactivate notifications related to Conversation Autopilot, which enables agents to use autopilot quick actions to invoke Virtual Agent topics.
Dynamic language translation	Slide the toggle switch to activate or deactivate the dynamic translation of end user's messages.
Profanity detection	Select **View all** to display the Profanity Filter settings screen. This option only displays if the Profanity Filter plugin has been installed. For more information, see Configuring the Profanity Filter settings.
Conversation History	Select **View all** to display the Conversation History screen. Set maximum number of past conversation to display in the conversation window and apply filters to only show what is most relevant to agents based on channel type, assignment group, and more. For details on configuring the Conversation History options, see Setting up conversation history.

Quick action configurations

Field	Description
Quick action configurations	Select **View all** to display the Quick Action Toolbar Controls screen. For details on configuring the toolbar controls, see Setting up quick action toolbar controls.

5. Select **Save**.

Configuring Agent-Initiated Messaging Interface

Set up the Agent-Initiated Messaging Interface application to enable agents to send messages to customers through different messaging channels.

Agent-Initiated Messaging Interface configuration tasks

Task	Description
1. Install agent-initiated messaging interface.	Install the Agent-Initiated Messaging Interface application to integrate a messaging channel with your ServiceNow instance.

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Agent-Initiated Messaging Interface configuration tasks (continued)

Task	Description
2. Set up agent-initiated message interface for a messaging channel.	Set up the Agent-Initiated Messaging Interface application to send messages from a messaging channel.
3. (Optional) Associate user profiles with agent-initiated messages.	Use scripted extension points to call custom scripts for associating user profiles with agent-initiated messages.
4. (Optional) Validate recipient IDs for agent-initiated messagesValidate recipient IDs for agent-initiated messages .	Use scripted extension points to call custom scripts for validating the format of a recipient ID associated with a messaging channel.
5. (Optional) Determine whether messaging channels are available for agent-initiated messages.	Use scripted extension points to call custom scripts for determining whether a messaging channel is applicable to a user profile in an agent-initiated message.

Install Agent-Initiated Messaging Interface

You can install the Agent-Initiated Messaging Interface application (sn_agent_initiated) if you have the admin role. The application installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application .

Role required: admin

About this task

The following items are installed with Agent-Initiated Messaging Interface:

- Plugins
- Store applications
- Tables

For more information, see Components installed with Agent-initiated messaging interface.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Agent-Initiated Messaging Interface application (sn_agent_initiated) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

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Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install Agent-Initiated Messaging Interface.

4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.

5. Select **Install**.

Set up Agent-Initiated Messaging Interface for a messaging channel

Set up the Agent-Initiated Messaging Interface application to send messages from a messaging channel.

Before you begin

- Install agent-initiated messaging interface.
- Review the list of messaging channels available for the Agent-Initiated Messaging Interface application.
- Set the application scope to the application associated with the messaging channel using the application picker. For more information, see Application picker.

  For example, for using the SMS messaging channel, set the application scope to the Conversational SMS service channel application.

Role required: admin

About this task

A messaging channel is available when you install the application associated with a service channel.
For example, use the SMS messaging channel to send an SMS message to a customer. The SMS messaging channel is available when you have installed the Conversational SMS service channel application.

Procedure

1. In the navigation filter, enter `sn_agent_initiated_msg_config.list`.
2. In the Agent initiated messaging configurations list, modify an existing configuration or create another configuration for a messaging channel.
   - To modify an existing configuration, in the **Active** column, click the value link corresponding to the messaging channel displayed in the **Channel** column.

     For example, to send messages by using the SMS messaging channel, click the link in the **Active** column corresponding to the **SMS** channel.
   - To create another configuration for a messaging channel, click **New** in the Agent initiated messaging configurations list.
3. On the form, fill in the fields.

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Agent initiated messaging configuration form

Field	Description
Channel	Messaging channel using which agents can initiate messages to connect with requesters.
Check if active recipient profile exists	Option to ensure that an active channel user profile exists when sending messages to the user from the channel. If there are no active channel user profiles, the associated channel is not available for agent-initiated messages. In this case, the channel does not appear in the **Channel** field of the Compose Message form. For information on the Compose Message form available in CSM Configurable Workspace, see Initiate messaging conversations from CSM Configurable Workspace.
Show option to enter recipient ID manually	Option to display the field to manually enter recipient ID. For example, select this check box to enable agents to enter a phone number manually for sending an SMS message to a consumer.
Application	Scope of the application that contains the channel. This field is automatically set based on the application scope selected in the application picker.
Active	Option to activate the use of the channel for agent-initiated messages.
Order	Order number for each channel in which they appear for agent on the Compose Message form when composing messages. The channel that has the lowest order number is displayed first. For information on the Compose Message form available in CSM Configurable Workspace, see Initiate messaging conversations from CSM Configurable Workspace.

4. Save the configuration setting.
   - If you created a new configuration setting, click **Submit**.
   - If you modified an existing configuration setting, click **Update**.

Associate user profiles with agent-initiated messages

Use scripted extension points to call custom scripts for associating user profiles with agent-initiated messages.

Before you begin

Install the Agent-Initiated Messaging Interface application. For more information, see Install agent-initiated messaging interface.

Role required: admin

About this task

An agent can compose messages from an interaction of type other than Message in the CSM Configurable Workspace. By default, the `AgentMessagingInteractionUserDocument` script include is available for retrieving user profiles associated with consumers and customer contacts in an interaction record.

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By using extension points, you can easily integrate customizations without having to alter the base code. You can extend standard base functionality using customized scripts. For more information, see Using extension points to extend application functionality.

Procedure

1. Navigate to **All** > **System Extension Points** > **Scripted Extension Points**.
2. In the **API Name** column, search for and select **sn_agent_initiated.AgentInitiatedMessagingUserDocument**.
3. On the Extension Point form, either modify a script include to use the `sn_agent_initiated.AgentInitiatedMessagingUserDocument` extension point or create and register a custom script include.
   - Create and register a custom script include.
   - Modify the existing script include by going to the Implementations related list and selecting a script include in the **Class** column.

   Note:
   By default, the `AgentMessagingInteractionUserDocument` script include that use the `sn_agent_initiated.AgentInitiatedMessagingUserDocument` extension point is available for the Agent-Initiated Messaging Interface application. This script include is configured to retrieve user profiles associated with consumers and customer contacts from the Interaction [interaction] table record.

4. Associate user profiles for an agent-initiated messages by adding the `sn_agent_initiated.AgentInitiatedMessagingUserDocument` extension point to the script include.
   You can create multiple implementations for an extension point and provide an order number for each implementation. The implementation that has the lowest order number is executed first.

Customization	Implementation
Associate a table record from which the message was initiated	Include the `isValidForTableRecord` method in the `sn_agent_initiated.AgentInitiatedMessagingUserDocument` extension point.
Retrieve the user details associated with the table record from which the message was initiated	Include the `getUserDocument` method in the `sn_agent_initiated.AgentInitiatedMessagingUserDocument` extension point.

Note:
Based on the table record set in the `isValidForTableRecord` method, the user details are retrieved for sending agent-initiated messages in the `getUserDocument` method.

5. On the Extension Point form, click **Update**.

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Validate recipient IDs for agent-initiated messages

Use scripted extension points to call custom scripts for validating the format of a recipient ID associated with a messaging channel.

Before you begin

Install the Agent-Initiated Messaging Interface application. For more information, see Install agent-initiated messaging interface.

Role required: admin

About this task

By using extension points, you can easily integrate customizations without having to alter the base code. You can extend standard base functionality using customized scripts. For more information, see Using extension points to extend application functionality.

Procedure

1. Navigate to **All** > **System Extension Points** > **Scripted Extension Points**.
2. In the **API Name** column, search for and select **global.ChannelSendToValidation**.
3. On the Extension Point form, either modify a script include to use the *global.ChannelSendToValidation* extension point or create and register a custom script include.
   - Create and register a custom script include.
   - Modify the existing script include by going to the Implementations related list and selecting a script include in the **Class** column.

   Note:
   The *PhoneNumberValidationExtPointImpl* script include that use the *global.ChannelSendToValidation* extension point is available for validating recipient IDs profiles associated with the Conversational SMS service channel application.

4. Associate user profiles for an agent-initiated messages by adding the *global.ChannelSendToValidation* extension point to the script include.
   You can create multiple implementations for an extension point and provide an order number for each implementation. The implementation that has the lowest order number is executed first.

Customization	Implementation
Associate a channel ID for which the message was initiated	Include the *isValid* method in the *global.ChannelSendToValidation* extension point.
Retrieve the recipient ID associated with the channel for which the message was initiated	Include the *channelSendToValidation* method in the *sn_agent_initiated.AgentInitiatedMessagingUserDocument* extension point.

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Note:
Based on the channel ID set in the `isValid` method, the recipient details are retrieved for validating a recipient ID in the `channelSendToValidation` method.

5. On the Extension Point form, click **Update**.

Determine whether messaging channels are available for agent-initiated messages

Use scripted extension points to call custom scripts for determining whether a messaging channel is applicable to a user profile in an agent-initiated message.

Before you begin

Install the Agent-Initiated Messaging Interface application. For more information, see Install agent-initiated messaging interface.

Role required: admin

About this task

By using extension points, you can easily integrate customizations without having to alter the base code. You can extend standard base functionality using customized scripts. For more information, see Using extension points to extend application functionality.

Procedure

1. Navigate to **All** > **System Extension Points** > **Scripted Extension Points**.
2. In the **API Name** column, search for and select **sn_agent_initiated.ChannelsQualifyingFoAgentMessaging**.
3. On the Extension Point form, create and register a custom script include.
4. Determine whether a messaging channel is applicable to a user profile in an agent-initiated message by adding the `sn_agent_initiated.ChannelsQualifyingForAgentMessaging` extension point to the script include.
   You can create multiple implementations for an extension point and provide an order number for each implementation. The implementation that has the lowest order number is executed first.

Customization	Implementation
Associate a messaging channel ID for agent-initiated messages with the custom script	Include the `isValidForChannel` method in the `sn_agent_initiated.ChannelsQualifyingForAgentMessaging` extension point.
Check whether a user qualifies for the messaging channel for agent-	Include the `isChannelValidForAgentInitiatedMessaging` method in the `sn_agent_initiated.ChannelsQualifyingForAgentMessaging` extension point.

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Customization	Implementation
initiated messages	

Note:
Based on the messaging channel ID set in the `isValidForChannel` method, the users are evaluated for sending agent-initiated messages in the `isChannelValidForAgentInitiatedMessaging` method.

5. On the Extension Point form, click **Update**.

Components installed with Agent-Initiated Messaging Interface

Several types of components are installed with installation of the Agent-Initiated Messaging Interface application, including tables, plugins, and ServiceNow Store applications.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Tables installed

Table	Description
Agent initiated messaging configuration [sn_agent_initiated_msg_config]	Extends the application file. Base table for all service channel configurations for composing agent-initiated messages.

Plugins installed

Plugin	Description
Conversational Messaging (com.glide.messaging.awa	Enables messaging actions that are performed when an event occurs.

ServiceNow Store applications installed

Application	Description
Agent Messaging Component	Contains UI components for composing agent-initiated messages.

Messaging channels for Agent-Initiated Messaging Interface

Install and configure applications to enable a messaging channel for use with the Agent-Initiated Messaging Interface application.

The following table describes the messaging channels available for use with the Agent-Initiated Messaging Interface application and applications required for using those messaging channels.

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Messaging channels for Agent-Initiated Messaging Interface

Channel	Required applications
SMS	• Conversational SMS service channel • Twilio spoke • Conversational SMS Integration with Twilio **Note:** The Conversational SMS Integration with Twilio application installs the Conversational SMS service channel and Twilio spoke applications, if not already installed.

Associating user profiles on messaging interactions

Use extension points to call custom scripts.

Before you begin

Role required: admin

About this task

When a requester sends a message, the system checks if there is an existing user profile that has a matching identifier (such as a phone number) and channel details. If there is a matching user, then the system will populate the interaction record with the identifier, channel details, and the user profile in the Opened for field. If there is no user profile that matches the identifier and channel, then the system creates a channel user profile.

Procedure

1. Navigate to **All** > **System Extension Points** > **Scripted Extension Points**.
2. Click the desired extension point to view the record details.
   You can create multiple implementations for each extension point and assign an order number for each implementation. The implementation that has the lowest ordered applicable implementation is executed first.

Extension point	Description
global.ChannelUserProfileExtPoint	Use channel_user_id to find record to channel_user_profile user_table/ user_document
global.InteractionChannelUserProfileExtPoint	Defines how users are synchronized between the interaction and channel_user_profile tables
global.AgentInitiatedConversationUtil	Get From and To options to show in UI for agent initiated conversations

Controlling idle live chat sessions

Configure how active chat sessions are handled by the system when live chats become idle.

By default, the system automatically checks live chat sessions every two minutes through the Idle Chat Timer Task scheduled job to ensure that chat sessions are still active. If the requester does not respond within 180 seconds (three minutes) during an active chat session, the session

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becomes idle. The user receives a reminder message that the conversation is timing out and asks if they are still there. If they don't respond, the system automatically cancels (times out) the chat session 360 seconds (six minutes) after the requester's last response.

You can change the idle chat reminder message and the default time after which the system displays the reminder message and closes an idle chat.

Important:

Idle live chats are not available for Connect Support. Starting with the Paris release, Connect Support no longer receives enhancements or non-priority bug fixes. Consider moving to ServiceNow® Advanced Work Assignment and Agent Chat in workspace to automatically assign chat requests and other work items to agents. For details, see Move from Connect Support to Advanced Work Assignment and Agent Chat.

Change the idle chat reminder message

The default idle chat reminder message displayed to requesters is: `The conversation is timing out, are you still there?` Agents receive the message: `User response will indicate if they want to continue the chat.`

You can modify the default message sent to requesters by updating the *`com.glide.cs.idle_chat_reminder_message`* property.

1. As admin, navigate to **All**, and then enter `sys_properties.list` in the filter.
2. Open the *`com.glide.cs.idle_chat_reminder_message`* property.
3. In the **Value** field, enter the new reminder message to be displayed.
4. Select **Update**.

Change the idle chat timeout values

Add the *`com.glide.cs.idle_chat_reminder_timeout`* and the *`com.glide.cs.idle_chat_cancel_timeout`* properties to the System Property [sys_properties] table to set the chat reminder message timeout and the idle chat cancel timeout values. Create both properties at the same time.

1. As admin, navigate to **All**, and then enter `sys_properties.list` in the filter.
2. Select **New** to add the *`com.glide.cs.idle_chat_reminder_timeout`* property.
   a. On the form, fill in the fields.

Field	Value
Name	System property name. Enter: `com.glide.cs.idle_chat_reminder_timeout`
Description	Explanation for this property. For example: `Idle chat reminder timeout (in seconds)`
Type	Data type. Select `integer`.
Value	Enter the number of seconds before the idle chat reminder message is displayed, after the requester's last response. This value must be equal to or greater than 120 seconds, since the Idle Chat Timer Task job runs every 120 seconds to check active chat sessions.

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Field	Value
	For example, if the idle chat reminder message is to be displayed 5 minutes after the requester's last response, enter 300 seconds. **Note:** If you want to set an idle chat message reminder timeout that is under 120 seconds, you must also change the time at which the Idle Chat Timer Task job runs. The job must check for idle chats within a shorter time frame. For example, if the reminder message timeout is 60 seconds after the requester's last response, set the Idle Chat Timer Task job to run every 60 seconds. For more information on base system scheduled jobs, see System scheduler.

b. Select **Submit**.

3. In the System Properties table, select **New** to add the *com.glide.cs.idle_chat_cancel_timeout* property.

a. On the form, fill in the fields.

Field	Value
Name	System property name. Enter: `com.glide.cs.idle_chat_cancel_timeout`
Description	Explanation for this property. For example: `Idle chat cancel timeout (in seconds)`
Type	Data type. Select `integer`.
Value	Number of seconds before an idle chat is canceled (times out). This value must be larger than *com.glide.cs.idle_chat_reminder_timeout*, where the difference between this value and *com.glide.cs.idle_chat_reminder_timeout* is larger than or equal to 120 seconds (2 minutes, which is when the Idle Chat Timer Task job runs). For example, if the reminder message timeout value is 300 seconds (5 minutes), the idle chat cancel timeout value must be 420 seconds or greater. **Note:** If you changed the Idle Chat Timer Task job, the difference between the chat cancel timeout value and the idle chat reminder timeout must be larger or equal to the Idle Chat Timer Task job time. For example, if the reminder timeout is 60 seconds and the Idle Chat Timer Task job is also 60 seconds, the idle chat cancel timeout value must be 120 seconds or greater.

b. Select **Submit**.

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Set the inactivity timeout behavior

The *com.glide.cs.start_idle_timeout_after_agent_response* property determines the timeout behavior when inactivity is triggered. When this property is `true`, the inactivity timer does not start until the agent sends a non-automated response to the requester.

1. As admin, navigate to **All**, and then enter `sys_properties.list` in the filter.
2. Select **New** to add the *com.glide.cs.start_idle_timeout_after_agent_response* property.
   a. On the form, fill in the fields.

Field	Value
Name	System property name. Enter: `com.glide.cs.start_idle_timeout_after_agent_response`
Description	Explanation for this property. For example: `Timeout behavior when inactivity should be triggered.`
Type	Data type. Select `true/false`.
Value	Either `true` or `false`.

   b. Select **Submit**.

Set the server disconnect timeout for guest conversations

The *com.glide.cs.chat_disconnect_timeout* property determines how long the system will wait to reconnect a disconnected conversation before it ends the chat. If communication is reestablished during that timeframe, the conversation resumes.

1. As admin, navigate to **All**, and then enter `sys_properties.list` in the filter.
2. Select **New** to add the *com.glide.cs.chat_disconnect_timeout* property.
   a. On the form, fill in the fields.

Field	Value
Name	System property name. Enter: `com.glide.cs.chat_disconnect_timeout`
Description	Explanation for this property. For example: `Timeout behavior for disconnected guest conversations.`
Type	Data type. Select `integer`.
Value	Number of seconds before a disconnected guest chat is canceled (times out). The client will try to reconnect during that time.

   b. Select **Submit**.

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Examples

These examples show how the *com.glide.cs.start_idle_timeout_after_agent_response* system setting may affect how the system handles idle chats. In the following examples, the inactivity timeout is set to 60 seconds and the inactivity reminder is set to 30 seconds.

Example 1: In this example, *com.glide.cs.start_idle_timeout_after_agent_response* does not affect how the system handles an idle chat.

1. Agent enters the chat.
2. System sends automated message `Thank you for contacting support. I am looking into your question now and will be with you shortly.`
3. Agent sends the message `What can I help you with today?`
4. If the requester does not respond after 30 seconds, then the system sends the message `The conversation is timing out, are you still there?`
5. If the requester does not respond within 60 seconds after the agent's message, then the system sends the message `It seems you have left the conversation` and ends the chat.

Example 2: In this example, *com.glide.cs.start_idle_timeout_after_agent_response* affects how the system handles an idle chat.

1. Agent enters the chat.
2. System sends automated message `Thank you for contacting support. I am looking into your question now and will be with you shortly.`
3. If the agent does NOT send a message, one of the following occurs:
   - If *com.glide.cs.start_idle_timeout_after_agent_response* is not set or is set to false, then
     a. The system starts the inactivity timer.
     b. If the requester does not respond after 30 seconds, then the system sends the message `The conversation is timing out, are you still there?`
     c. If the requester does not respond within 60 seconds after the automated message, then the system sends the message `It seems you have left the conversation` and ends the chat.
   - If *com.glide.cs.start_idle_timeout_after_agent_response* is set to true, the system does not start the inactivity timer and the chat will not time out.

Controlling the browser experience for chat guest sessions

Anonymous users (unauthenticated guests) can chat with support agents in the web chat client, without logging in to a service portal. Admins can control certain aspects of the conversational experience for unauthenticated guest users, such as enabling resumable chat sessions after a browser refresh.

When guest users refresh the browser window while chatting with an agent, the refresh automatically starts a new conversation and chat session. By default, the ongoing conversation and chat session history are not retained.

You can change the default guest session behavior to let your guest users resume an ongoing conversation and see the chat session history after a browser refresh. You can also set the

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duration of the guest chat session user cookie, to let guest users resume chat sessions after they close and reopen their browser.

Enable resumable guest sessions

As admin, use the *com.glide.cs.guest_session_resumable* system property to the change the default chat guest session behavior for guest users.

1. Navigate to **All**, and in the Filter enter `sys_properties.list`.
2. Open the *com.glide.cs.guest_session_resumable* property.
3. In the **Value** field, enter `true` to enable resumable guest chat sessions and retain the chat session history.
4. Select **Update**.

After a browser refresh, your guest users can continue their conversations with agents and see the chat session history in the chat panel.

Change the guest chat session cookie time

The guest chat session cookie time is the length of time (duration), in seconds, of the guest session user cookie. Use the *com.glide.cs.guest_session_cookie_max_age* property to change the guest session cookie time, in case your guest users want to resume a chat after closing and reopening their browser.

For security reasons, the default property value is -1, which means the guest session cookie is immediately deleted when the browser is closed. But you can specify a maximum time length that sets the duration of the guest session cookie, for example 900 seconds (15 minutes).

1. As admin, navigate to **All**, and in the Filter enter `sys_properties.list`.
2. Open the *com.glide.cs.guest_session_cookie_max_age* property.
3. In the **Value** field, enter the maximum length of time (seconds) for the guest session cookie.

   For example, the value `900` is the duration of the guest session cookie in seconds (15 minutes), to give your guest users time to resume a chat session after closing and reopening the browser.
4. Select **Update**.

Configuring quick actions

Quick actions are shortcuts that perform Agent Chat tasks. Agents can work more efficiently with customers by using quick actions because they don't have to enter as many characters to perform a task.

Activate quick actions

To enable your agents to use quick actions, you must activate the and related plugins for Advanced Work Assignment, which is required for chat in Workspace.

Default quick actions

The following quick actions are available by default with Workspace chat:

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Command name	Toolbar button	Action	Default parameter
autopilot		Starts a Virtual Agent topic (Conversation Autopilot).	Available topics
help		Indicates to the chat supervisor that an agent needs help with a conversation. To use this quick action, new customers must enable Agent Chat and Agent Whisper and update customers must enable Agent Whisper on chat setup.	
r		Uses Response templates to insert as text in a conversation. **Note:** Only response templates that have a condition of *[Type] [is] [Chat]* are available in Agent Chat.	Available response templates
search-kb		Starts a KB article search. The agent is prompted to search for the relevant KB article. Based on the search term the agent enters, the agent is able to view the KB articles that match the search term. The agent can then select the KB article.	
ta		Transfers the conversation to another agent.	Available agents
tq		Transfers the conversation to another queue.	Available queues

Creating a quick action

Create a quick action so that agents can use shortcuts for performing actions in Agent Chat.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Quick Actions** > **Actions**, and then select **New**.
2. On the form, fill in the fields.

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Field	Description
Name	Name of the quick action.
Active	Option for activating the quick action.
Description	Description of the quick action.
Command Name	Text that triggers the quick action when entered after the forward slash (/) in a conversation.
Applies to	Work item that the quick action is available for. Filter the table that you select in the **Table** field to qualify a certain kind of work item. For example, to make the quick action available only for conversations that are assigned to Beth Anglin, you would first select the Interaction [interaction] table in the **Table**. Then, in the **Applies to** field, you would create the following filter: **[Assigned to] [is] [Beth Anglin]**.
Table	Work item table that the quick action is available for. **Note:** Quick actions are supported only in the Interaction [interaction] table.
Apply to all groups	Option for making the quick action available to all user groups.
Apply to groups	List of which groups can use the quick action. This field appears only if you clear the **Apply to all groups** option.
Script	JavaScript code to control what the quick action does. In this script, you have access to: ○ The *record* variable, which for Agent Chat is the Interaction [interaction] record ○ The *params* array, if you defined quick action parameters If provided, all free-form text entered after all the other parameters are captured as the last item in the *params* array. Set the value of *answer* as follows: `answer = { success: <Boolean>, message: <success_or_error_message> };` **Note:** If you do not script a message, the agent receives a default message instead.
Application	Application scope of the quick action.
Accepts string parameter	Option to indicate that the script accepts text input after any defined parameters.

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Field	Description
Parameter label	Parameter name that displays next to the quick action.
Parameter hint text	Text that displays as a hint when the agent enters a quick action.

3. Select **Submit**.

What to do next

If your quick action requires a secondary menu, define a quick action parameter so that agents can further control the quick action. For more information, see Define a quick action parameter.

Optionally, you can make the quick action available in Agent Chat as a button. For more information, see Configuring a quick action button.

Defining a quick action parameter

Define a quick action parameter to allow agents to further control a quick action in Workspace chat.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Quick Actions** > **Parameters**, and then click **New**.
2. On the form, fill in the fields.

Field	Description
Name	Name of the parameter.
Action	Quick action that uses the parameter.
No Matching Results Message	Message to agents if no records match the record query. If you do not create a **No Matching Results Message**, a default message is provided.
Display value field	Field from the parameter record that appears in Workspace chat. This field appears when you select **Basic** in the **Query mode** field.
Query mode	Type of query. You can select **Scripted** or **Basic**. To query records with a script, select **Scripted**. To query records by whichever table that you specify in the **Table name** field, select **Basic**.
Table name	Table to query for parameters. This field appears when you select **Basic** in the **Query mode** field.
No Results Message	Message to agents if there are no available records to query. If you do not create a **No Results Message**, a default message is provided.
Value field	Field from the parameter record that agents can enter in Workspace chat to invoke the parameter item. For example, to transfer a conversation to Beth Anglin, an agent would enter `/ta`

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Field	Description
	`"beth.anglin"`. In this case, the **User ID** field in the User [sys_user] record is the **Value field**. This field appears when you select **Basic** in the **Query mode** field.
Query Script	JavaScript code to determine which records qualify for your parameter. You are given a *query* variable that represents the search query that the agent provided. Set the value of the *answer* variable as follows: `answer = { items: [ { value: <value>, displayValue: <displayValue>} ] };` The array of items should contain objects with a *value* and a *displayValue*. **Note:** This field shows only if you select **Scripted** in the **Query mode** field.
Application	Application scope of the parameter.
Order	Order that the parameter is available for the quick action.

3. Click **Submit**.

Configuring a quick action button

Configure a quick action button so that agents can perform actions in Agent Chat with a single click.

Before you begin

Role required: admin

About this task

The toolbar of the Workspace chat window contains three buttons. Selecting the left button () attaches a file in a conversation, selecting the center button () initiates a queue transfer, and selecting the right button () initiates an agent transfer. You can't configure the left button, but you can assign different quick actions to the center and right buttons.

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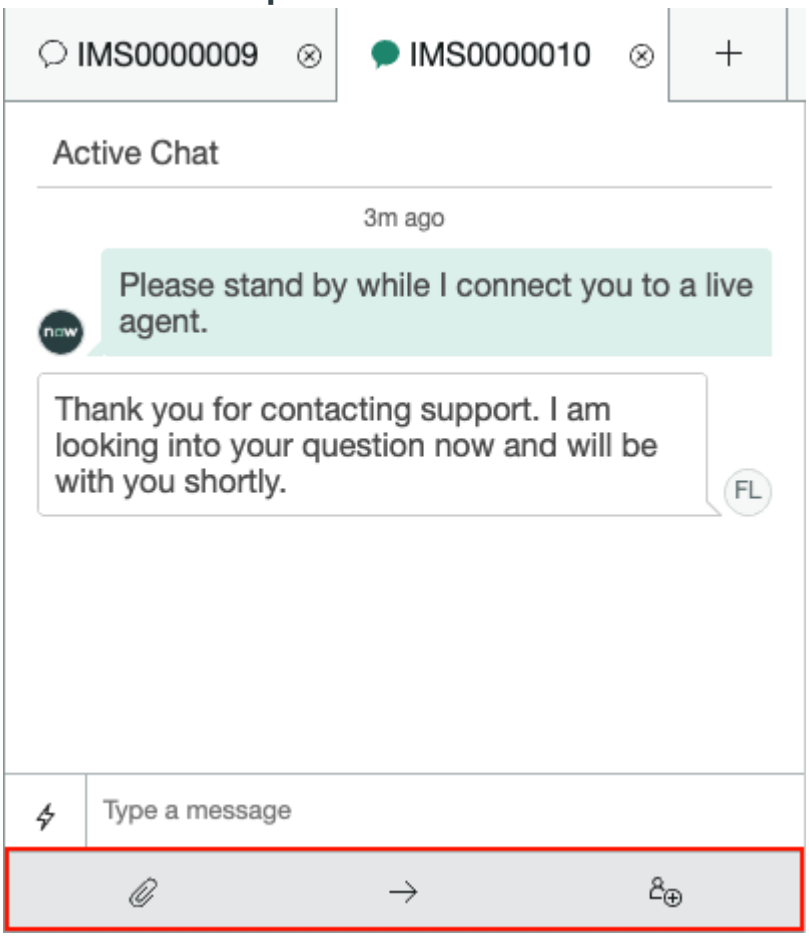
Toolbar in the Workspace chat window



Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Chat Settings** > **Agent Chat**.
2. In the Agent Experience section, select **View all** next to Quick actions.
   - To configure the arrow button (→), select **Transfer to Queue**.
   - To configure the add user button (), select **Transfer to Agent**.
   - To create a new button, select **New**.
3. On the form, fill in the fields.

Field	Description
Quick Action	Action that is performed when the button is selected.
Name	Name of the quick action
Use custom icon	Select this if you want to specify what image should be used for the icon
Icon	Button icon that appears on the toolbar of the Workspace chat window.
Active	Select if you want this quick action to be active.
Application	Name of the application for which the icon display on the toolbar.
Order	Position of the button on the toolbar. If the value is 100, the button appears at the center of the toolbar. If the value is 101, the button

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Field	Description
	appears at the right side of the toolbar. You can't change the button order.
Available on private chat tab	Select this to have the icon display on the Agent Chat toolbar.
Parameter value(s)	
Auto-submit	
Apply to all groups	

4. Save your changes.
   - To update an existing record, select **Update**.
   - To create a new record, select **Save**.

Setting up quick action toolbar controls

Customize the quick actions that appear on the chat toolbar.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select **Agent Chat** and then on the Agent Experience card, select **View All** next to Quick actions.
3. Do one of the following:
   - To create a quick action workspace action, select **New**.
   - To modify a quick action workspace action, select the quick action workspace action record you want to update.
4. On the screen, fill in the fields.

Configurable Toolbar Control

Field	Definition
Quick Action	Quick action performed.
Name	Name of the quick actions workspace action.
Use custom icon	Option to display a custom, downloaded icon in the toolbar.
Icon	Image to display on the toolbar when **Use custom icon** is selected. Select **Click to add...** and on the Choose an image screen, select an image file. **Note:** Use an image with a square aspect ratio.
Active	Indicates whether this configurable toolbar control is active.

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Field	Definition
Application	Application scope of the quick action.
Order	Value of this quick action. Quick actions are executed from lowest order to highest order, so a quick action with an order of 100 is considered before a quick action of 200.
Available on private chat tab	Option that defines whether the quick action is available on the private chat tab.
Applies to	Condition that determines when the quick action is available. ○ Add Filter Condition- Filter the table that you select in the **Table** field to qualify a certain type of work item. ○ Add "OR" Clause- Add an "or" clause to the condition. For example, to make the quick action available only for conversations assigned to Beth Anglin, you select the Interaction [interaction] table in the **Table**. Then, in the **Applies to** field, you create the following filter: **[Assigned to] [is] [Beth Anglin]**.
Parameter value(s)	Parameters needed for the quick action.
Auto-submit	Option for the agent to select a button and have the quick action and parameter post to the chat.
Apply to all groups	Option for making the quick action available to all user groups.

5. Select **Submit** or **Update**.

Activating chat context quick actions

Activate context quick actions to enable agents to view context relevant to a chat interaction. When launched in a chat, display cards show: sysparm_portal, sysparm_page, table, sys_id, or sysparm_language.

Before you begin
Role required: admin

About this task
Context quick actions are a default quick action, but require activation.

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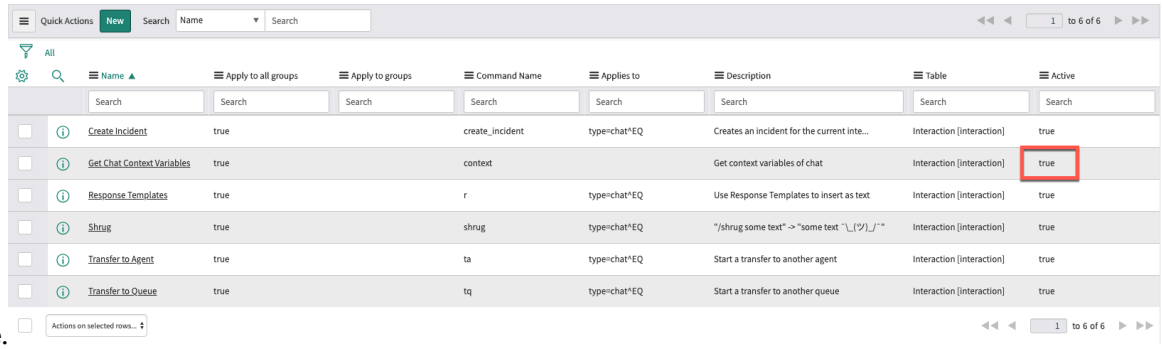
Procedure

1. Navigate to **All** > **Quick Actions** > **Actions**.
2. In the **Get Chat Context Variables** record, use the list editor to set the **Active** value to true.



Sending missed chat activity emails

Send email to users with summaries of chat messages sent to them while they were offline.

Before you begin
Role required: virtual_agent_admin

About this task
You can send email summaries to an authenticated user or users who are verified by a live agent.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select the General tab.
3. In the **Missed activity emails** card, select **View Settings**.
4. Enable the Missed activity emails feature by toggling **Activate** option.
5. In the Offline threshold drop-down, set the time duration that the user is inactive before sending email notification.
   - 15 minutes (default)
   - 2 hours
   - 8 hours
   - Custom (enter a custom duration of minutes or hours)
6. Select **Save**.

Result
Email notifications of missed chat messages are automatically sent at the specified time interval.

Configuring Sensitive Data Handler

Detect and mask sensitive information that is shared in Agent Chat or Virtual Agent conversations.

Before you begin
Activate the Sensitive Data Handler plugin (com.glide.sensitive_data_handling).

Role required: admin, virtual_agent_admin

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Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Under **Sensitive data detection**, select **View all**.
3. Slide the **Active** toggle switch to enable sensitive data detection.
4. Select the appropriate conversation flow:
   a. Requester to agent - detect and mask sensitive data entered by the requester in an Agent Chat conversation.
   b. Agent to requester - detect and mask sensitive data entered by the agent in an Agent Chat conversation.
   c. Requester to Virtual Agent - detect and mask sensitive data entered by the requester during a Virtual Agent conversation.

   Note:
   You must select at least one conversation flow.

5. The Regular Expressions tab displays the existing expressions:

Regular Expressions

Field	Description
Name	Name of the regular expression.
Regular Expression	Pattern that defines the expression.
Number of characters to mask	Number of characters in the regular expression that are masked.
Start masking from	Direction the regular expression is masked: left to right or right to left.
Status	○ Active - this expression is masked. ○ Inactive - this expression isn't masked.
Order	Order in which the active regular expressions are analyzed against a message to determine if there are any matches.

6. Either select an existing expression to modify or create a new regular expression by selecting **New** and filling in the fields.

Sensitive Data Regex form

Field	Description
Name	Name of the regular expression.
Number of characters to mask	Number of characters in the regular expression that are masked.
Masking symbol	Symbol used in place of the sensitive data.
Status	○ Active - this expression is masked. ○ Inactive - this expression isn't masked.

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Field	Description
Domain	Name of the domain that this regular expression affects. If you select **Global**, then the regular expression applies to both the agent and requester domains. For the agent and requester to see each other's domain, the administrator must do one of the following: ○ Include the domain where the regular expression should be visible as a child domain to the corresponding parent domain. ○ Grant necessary access to the appropriate domain if it's a sister domain. ○ Set the regular expression under a global domain.
Regular Expression	Pattern that defines the expression. Check your regular expression on a regex validation site such as https://regex101.com/
Order	Order in which the active regular expressions are analyzed against a message to determine if there are any matches.
Start masking from	Indicates whether the regular expression is processed from left to right or right to left.

7. On the Agent system messages tab, enter information for the message that the agent sees if they enter sensitive data:

Agent system messages

Field	Description
Description	Description of the system message.
Value	Exact wording of the system message that displays to the agent.
Updated	Date and time the message was most recently updated.
Updated by	Name of the user who most recently updated the message.

8. On the Requester system messages tab, enter information for the message that the requester sees if they enter sensitive data:

Requester system messages

Field	Description
Description	Description of the system message.
Value	Exact wording of the system message that displays to the requester.
Updated	Date and time the message was most recently updated.

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Field	Description
Updated by	Name of the user who most recently updated the message.

9. Select **Save**.

Configuring Profanity Filter

Configure the Profanity Filter for Agent Chat to detect flagged words in the manner that best suits your company's needs.

Before you begin

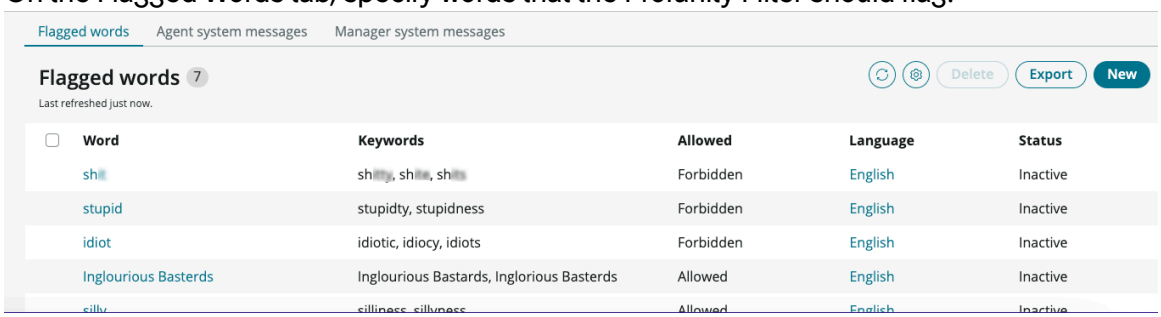
Role required: admin, virtual_agent_admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **Chat Settings** > **Agent Chat**.
2. On the Chat settings card, select **View settings** next to Profanity detection.
3. On the Profanity detection page, slide the **Active** toggle switch to activate the profanity filter.
4. In the Choose how to detect flagged words card, configure the settings:

Option	Description
Use Machine Learning model to detect flagged words	Use model-based mode to determine which words should be marked as flagged words.
Use list of flagged words if no matches are found	Use a keyword-based approach to determine which words should be marked as flagged words. The list of flagged words can be configured on the Flagged Words tab.
Number of messages before notifying manager	If the number of messages with flagged words that an agent has sent is equal to or exceeds this number within the time threshold, the Profanity Filter sends a message to the manager.
Time threshold (in hours)	Number of hours during which the number of messages with flagged words is tracked.

5. On the Flagged Words tab, specify words that the Profanity Filter should flag:



Flagged words

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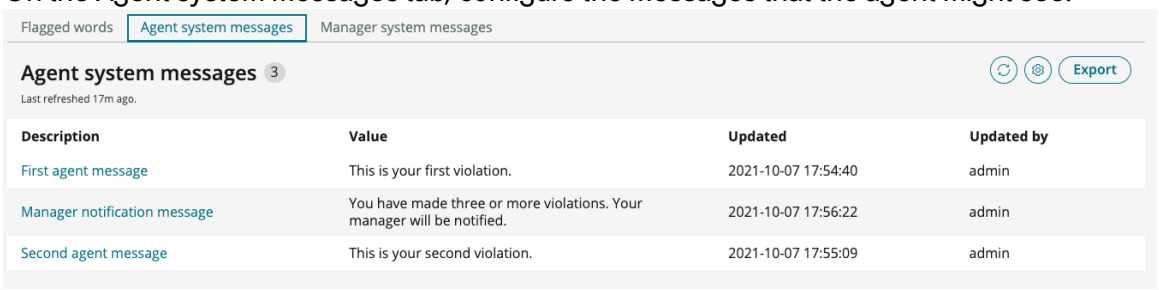
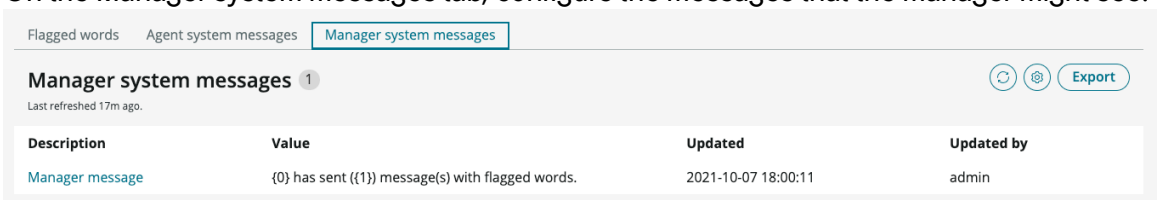
Word	Word that the Profanity Filter should flag.
Keywords	Similar words that the Profanity Filter should also flag.
Allowed	○ **Forbidden** - the word is considered profane and will be flagged. ○ **Allowed** - the word is not considered profane and will not be flagged.
Language	Language that the Profanity Filter applies to.
Status	○ **Active** - if the Profanity Filter detects this word, it will determine whether it is forbidden or allowed. ○ **Inactive** - if the Profanity Filter detects this word, it will not do anything.

6. On the Agent system messages tab, configure the messages that the agent might see:



Agent system messages	
Description	Description of the system message.
Value	Exact wording of the system message that displays to the agent.
Updated	Date and time the message was most recently updated.
Updated by	Name of the user who most recently updated the message.

7. On the Manager system messages tab, configure the messages that the manager might see:



Manager system messages	
Description	Description of the system message.

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Value	Exact wording of the system message that displays to the manager.
Updated	Date and time the message was most recently updated.
Updated by	Name of the user who most recently updated the message.

Configuring Dynamic Translation for Agent Chat

Activate Dynamic Translation for Agent Chat (DTAC) so chat conversations can be translated from one language to another.

Dynamic Translation for Agent Chat Watch this video for more information on global support with Dynamic Translation for Agent Chat.

Prerequisite steps

These tasks must be completed prior to activating DTAC:

- Integrate with a translation service provider
- Migrate to version v3 of a translator configuration
- Translate a knowledge article

Activating DTAC

DTAC translates chat conversations from one language to another. The preferred languages for the agent and requester are based on their user profiles and a translation service translates the messages into the defined language of the other participant. Translation service providers support language detection for requesters who are not logged in to ServiceNow®, also referred to as guest users.

DTAC is inactive by default. Before activating DTAC, the following requirements must be completed:

- Dynamic translation
- Set up Agent Chat
- Activate a language

Activate the Dynamic Translation for Agent Chat plugin (com.glide.cs.dynamic.translation.agent.chat).

This also activates these plugins:

- Dynamic Translation (com.glide.dynamic_translation)
- Conversational Dynamic Translation (com.glide.dynamic_translation.va_async)

and these system properties:

- true - sync
- false - async
- absence of this property - async

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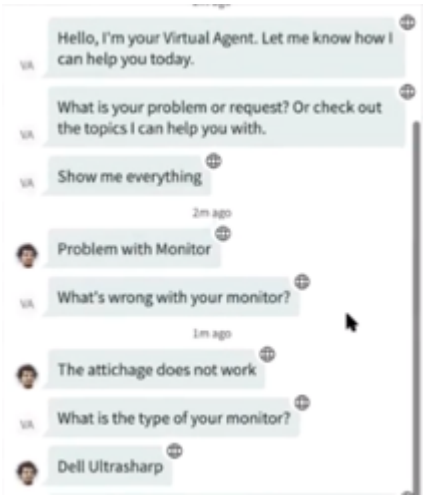
Transferring from Virtual Agent to a live agent

Once an agent accepts a chat, they can see the chat history between the Virtual Agent and requester in their preferred language for more context.

Virtual Agent topics must be set up in the desired languages prior to using DTAC. To learn more about how to set up topics, see Virtual Agent Designer.



Translation support in chat conversations

When DTAC is enabled, these items are translated in chat conversations:

- Users' messages
- System messages
- Virtual Agent chat history
- Record card field values
- Rich controls

Type	Rich Control
User input	String
User input	Static choice list
User input	Reference choice
User input	Boolean
User input	Date time
User input	File picker
User input	Carousel
Bot response	Text
Bot response	Single link
Bot response	Multiple links
Bot response	Multi-flow output

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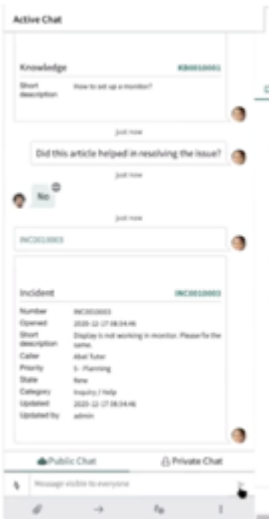
Type	Rich Control
Bot response	Script output
Bot response	Record card

DTAC does not support record card labels. For this functionality to operate, system localization properties must be configured. Navigate to **System Properties** > **System Localization**. For more information, see ServiceNow® product documentation on Localization settings.



Analytical reports for DTAC

You can generate a report that counts the number of DTAC chats, to assess how many conversations use the DTAC option.

Monitor the number of true values in the Translated column in the Interaction table. For more information, see the ServiceNow® product documentation on Interaction records in Workspace Interaction records in Agent Workspace.

Setting up conversation history

Enable and customize the conversation history options that are available on the conversation history screen.

Before you begin

Conversation history provides the capability to easily access historical conversations on the same channel. The agent can be more efficient by reviewing those conversations without opening multiple tabs and reviewing the transcripts. This page provides options to enable conversation history and to configure how many to display and optional filtered view for the agents.

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select **Agent Chat** and then on the Agent Experience card, select **View Settings** next to Conversation History.
3. To turn on conversation history, toggle on the Activate switch.
4. In the Number of conversations to display field, enter the number of previous conversations that should display on the screen.

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The maximum number of conversations that can display is 25.

5. To create a conversation history filter, select **New**.
6. On the Create New Conversation History Filter screen, fill in the fields.

Field	Definition
Name	Name of the conversation history filter.
Active	Select the check box if this filter should be applied.
Description	Description of the conversation history filter.
Order	Order in which the filters should be prioritized. The filter with the lowest order matching the agent's groups is used to filter the interactions.
Apply to all groups	Option for making the conversation history filter available to all user groups.

7. Select **Set conditions** to display the Condition dialog.
8. On the Condition dialog, build a filter for the conversation history.
   For more information, see Condition builder.
9. Select **Set**.
10. On the Create New Conversation History Filter screen, select **Submit** or **Update**.

Using Agent Chat

Agent Chat enables live agents to have conversations with requesters and for managers to help agents and monitor them.

Workspace displays a chat inbox icon () that agents use to enter chats. Agents set their status to **Available** or **Away** to open or close their inbox for chat requests. The icon displays numbers when chats are waiting to be answered.

The chat interface is integrated into the workspace so agents can chat while working onscreen with all of the other features provided by the workspace.

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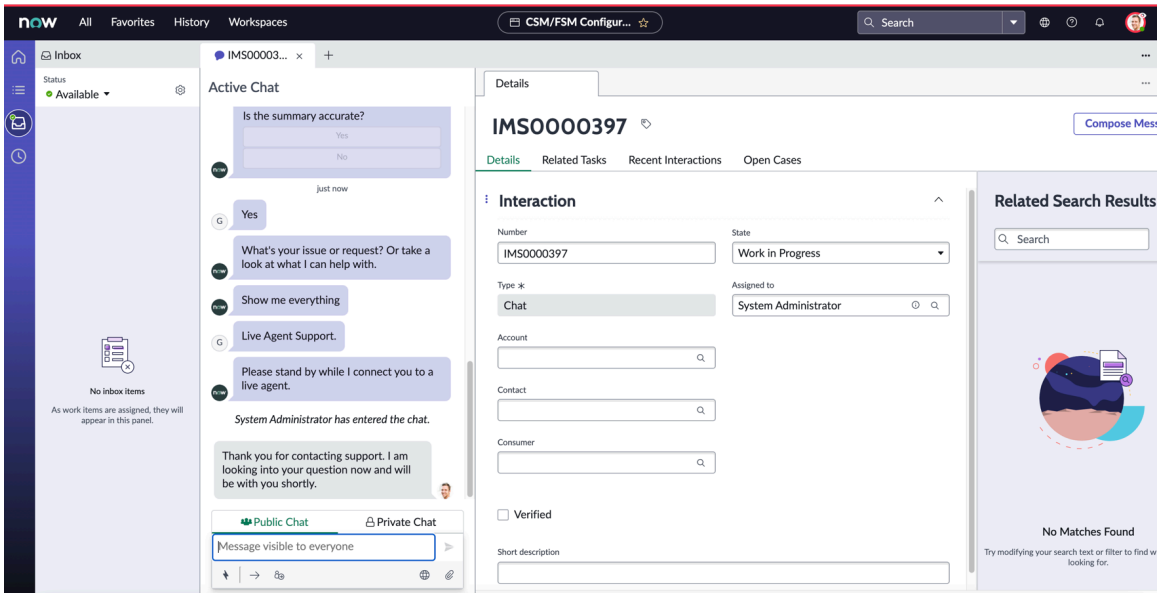

The following sections explain how to use Agent Chat.

Using quick actions

Use shortcuts, known as quick actions, for common activities that are performed frequently.

In Agent Chat, an agent can insert a quick action in any of the following ways:

- Enter a command after the forward slash (/).
- Select the lightning bolt icon (⚡) and select a quick action from the menu.
- If available, select the quick action button on the toolbar.

For example, an agent can transfer a conversation to another queue by entering `/tq` in the message input field.

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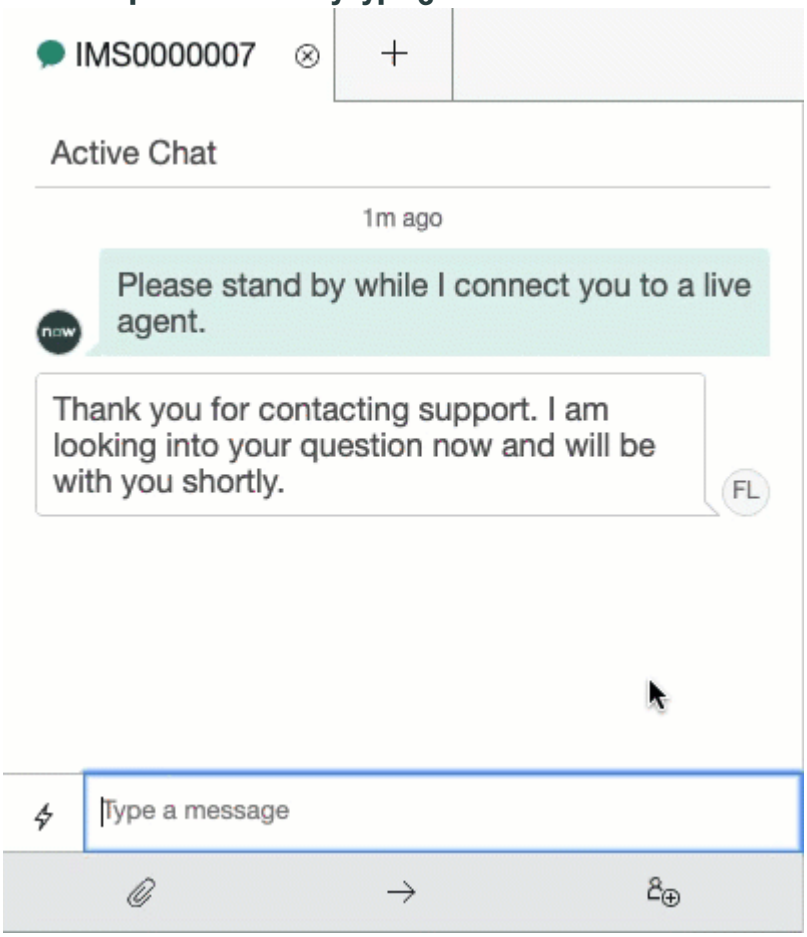
Initiate a queue transfer by typing



An agent can also initiate a queue transfer by selecting the lightning bolt icon and then selecting **/tq** from the menu.

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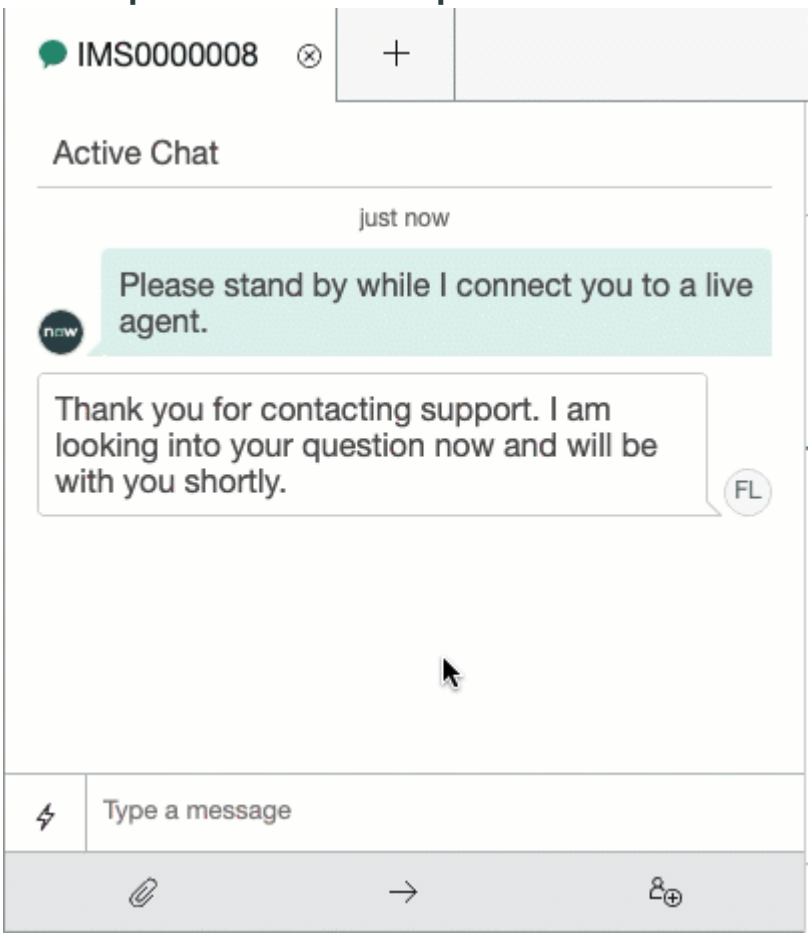
Initiate a queue transfer from the quick action menu



Alternatively, an agent can transfer to another queue by selecting the arrow button (→) on the toolbar.

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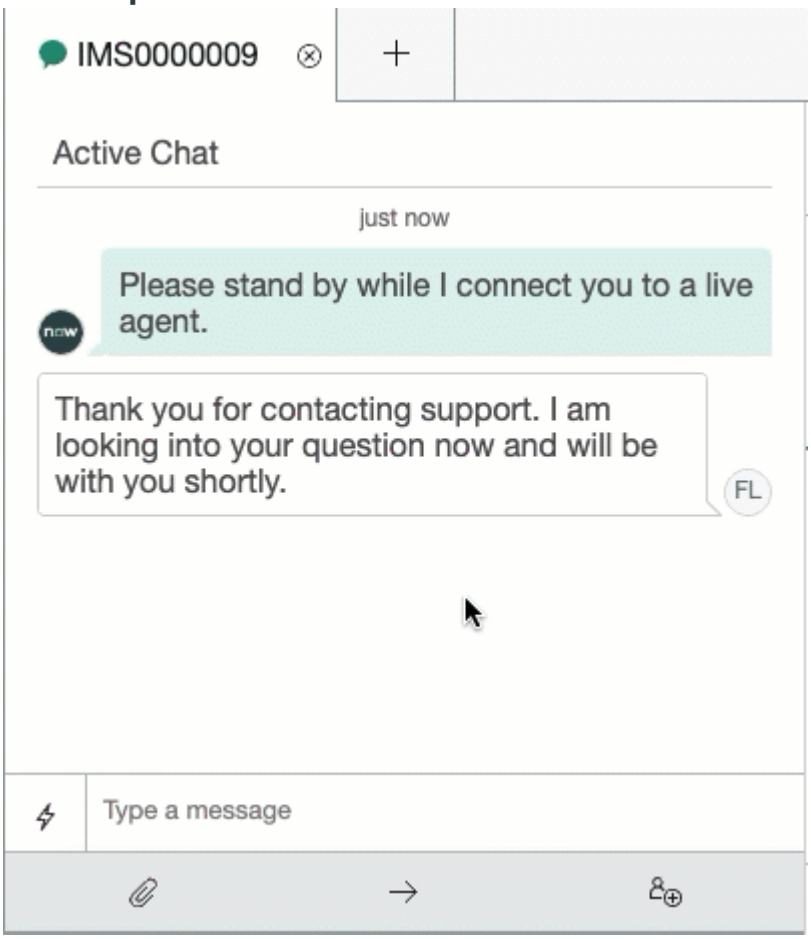
Initiate a queue transfer from the toolbar



Note:
Agents must have the quickactions_user role to use quick actions.

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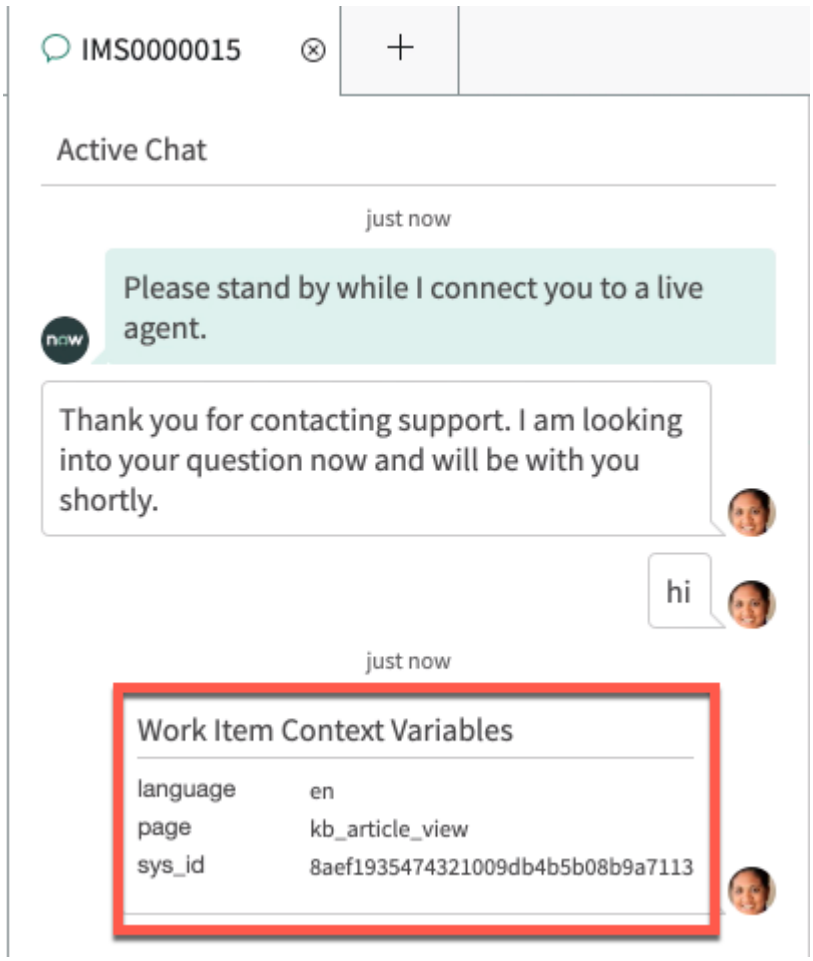
Display chat context details

An agent can view context relevant to a chat interaction. An agent can use a context quick action to show a card with context variables: sysparm_portal, sysparm_page, table, sys_id, and sysparm_language. The agent can initiate this quick action by typing `/context` in the message input field.



Parameters

Some quick actions require a secondary menu so that agents can further control the quick action. For example, after an agent initiates a queue transfer, the agent must select which queue to transfer to. The items that appear on the secondary menu are called parameters.

The following figure shows that, after an agent inserts a quick action to transfer to another queue, the agent sees a list of available queues. The default parameters for the quick action are queues that are available to agents.

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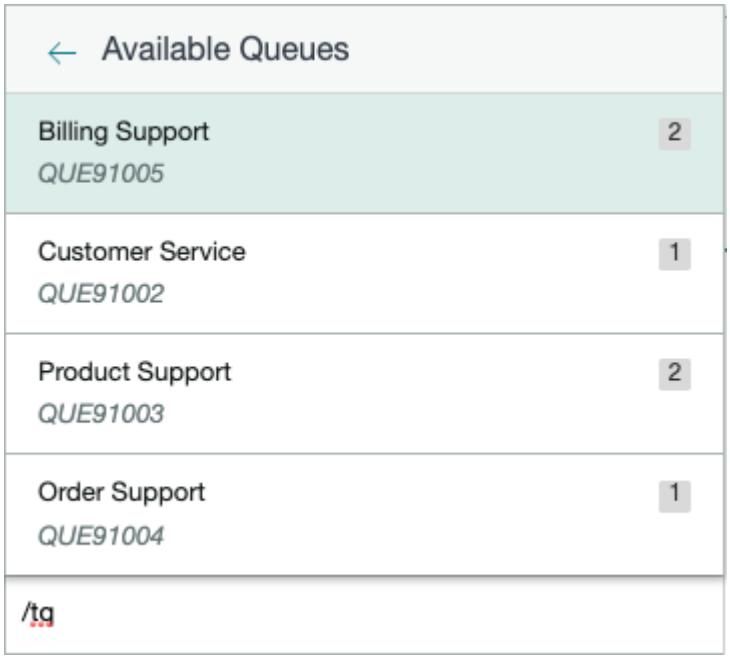

To create a quick action that requires a secondary menu, you must define parameters for the quick action. For more information, see Define a quick action parameter.

Automatically displaying topics with Conversation Autopilot

Agents can use Conversation Autopilot to display Virtual Agent topics during Agent Chat conversations. While the requester interacts with the Virtual Agent topics, agents can multitask and work on other items. Conversation Autopilot is not available for HR Service Delivery (HRSD).

While talking to a requester in an Agent Chat conversation, agents can start Conversation Autopilot by using autopilot quick actions to invoke Virtual Agent topics. Depending on the information entered by the requester, agents can search for a specific Virtual Agent topic and display it with parameters. The requester views the topic and responds as needed and Virtual Agent captures the requester's input.

Note:
For the best experience, enable the Agent Chat setting that turns on system messages during autopilot. For details, see Setting up Agent Chat.

Configuring Autopilot

You must have the Glide Virtual Agent plugin and the Agent Chat plugin installed to view and access the quick action for Autopilot. Admins can setup which Virtual Agent topics are available to agents in Agent Chat.

Note:
Admins must be able to configure a quick action based on their organization's business need and set it up for agents to use as required.

For information on using quick actions in Agent Chat, see Using quick actions.

Using Autopilot

The agent is able to use quick actions to search for and invoke an Autopilot topic of their choice during their conversation with a requester. The agent can only select Autopilot topics that are relevant to the channel. For example, only topics optimized for SMS are selectable when conversing with a requester who is using SMS.

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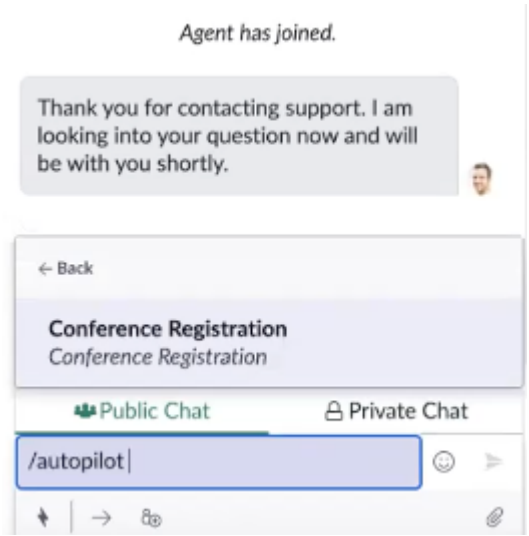
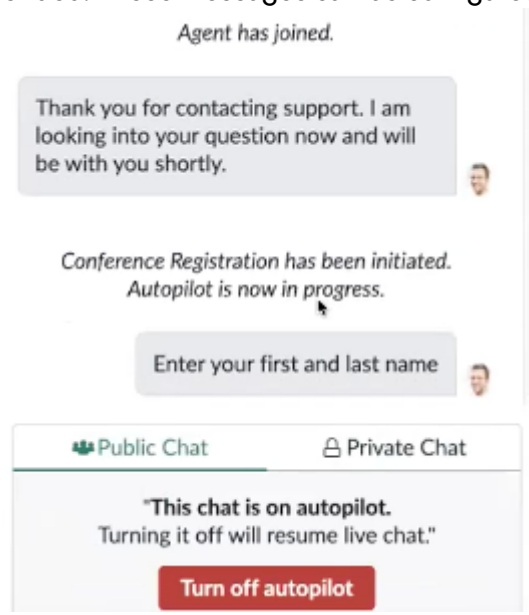


The agent is informed by system messages when an Autopilot topic has been initiated and ended. These messages can be configured by admins.



While Autopilot is on

While Autopilot is on, the requester can use the rich controls for text but agents see a read-only version of the rich controls rendered to the requester.

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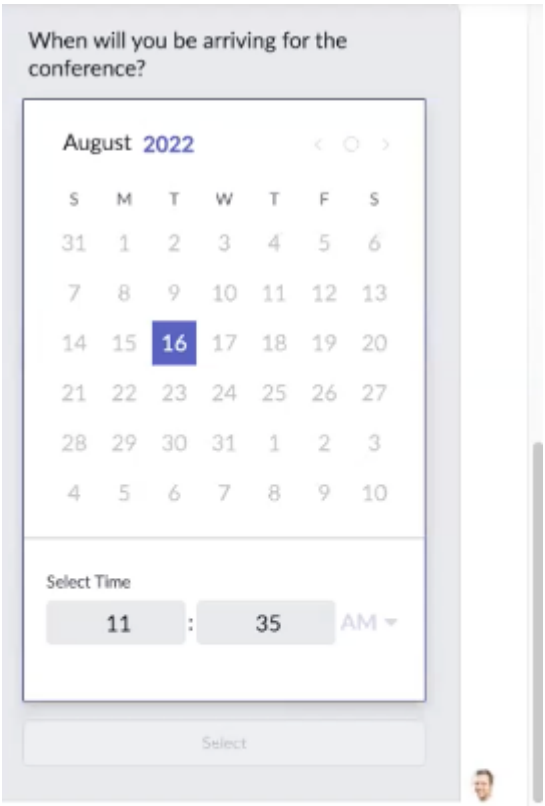
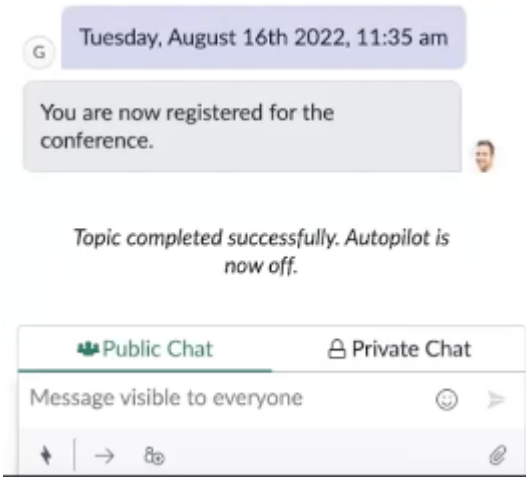


When Autopilot is in use, public chat with the requester is disabled, but agents can contact other agents and supervisors for help. If Agent Whisper is on, the Private Chat tab in Agent Whisper functions normally during Autopilot. While Autopilot is in use, the agent's capacity is not freed up and messaging actions configured by customers are disabled.

When Autopilot is ended

The agent receives a desktop notification in the Notifications tab in Workspace stating that the Virtual Agent topic has ended or been completed by the requester. At this point, the agent resumes control of the conversation.



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Conveying emotions using emojis

Use emojis in Agent Chat conversations to convey emotions to requesters. This helps requesters feel like they're having a conversation with a friend and builds customer brand loyalty.

Before you begin

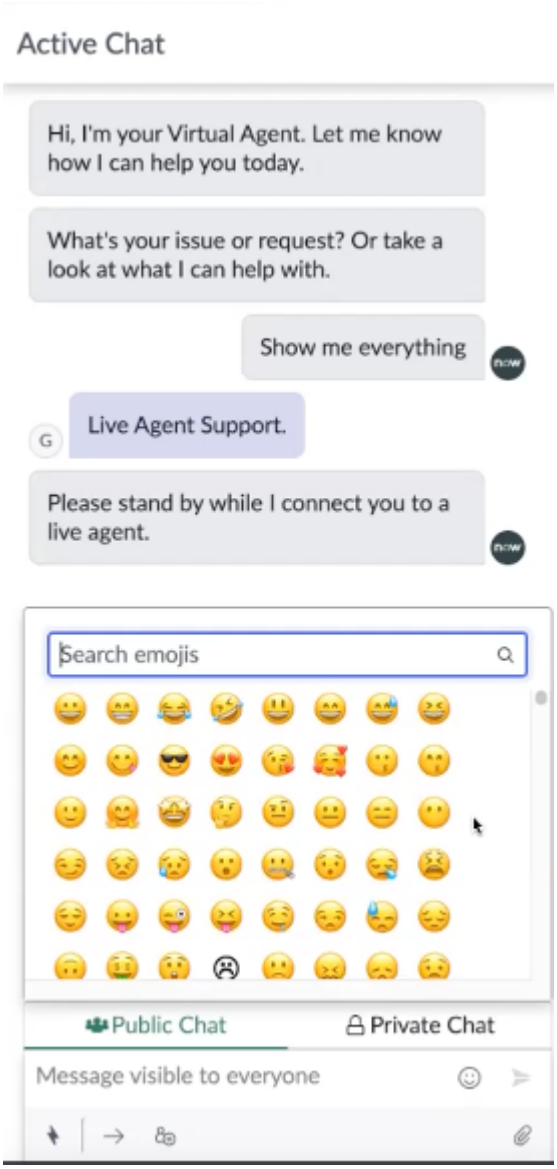
Emojis must be enabled before agents can use them in Agent Chat. See Setting up Agent Chat for instructions on enabling emojis.

Role required: admin

Procedure

1. While in an active chat, there are several ways to include an emoji:

- Select the Insert emoji icon to display the emoji palette. Then select an emoji from the palette or search for an emoji by entering a name in the search bar of the emoji palette.



- Enter a colon followed by the first few characters of the emoji name. When the pop-up menu of emojis displays, select one.

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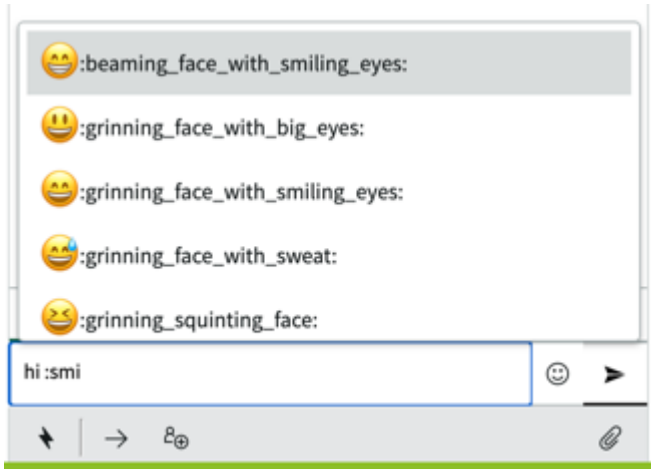
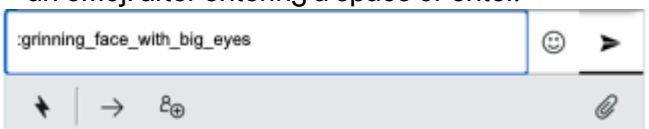
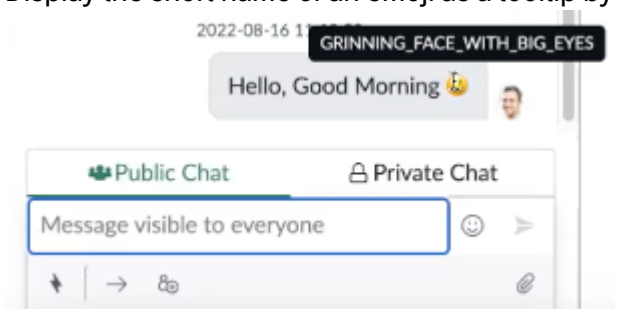


- Enter a special character combination or short name which is automatically converted into an emoji after entering a space or enter.



2. Display the short name of an emoji as a tooltip by positioning the cursor over the emoji.

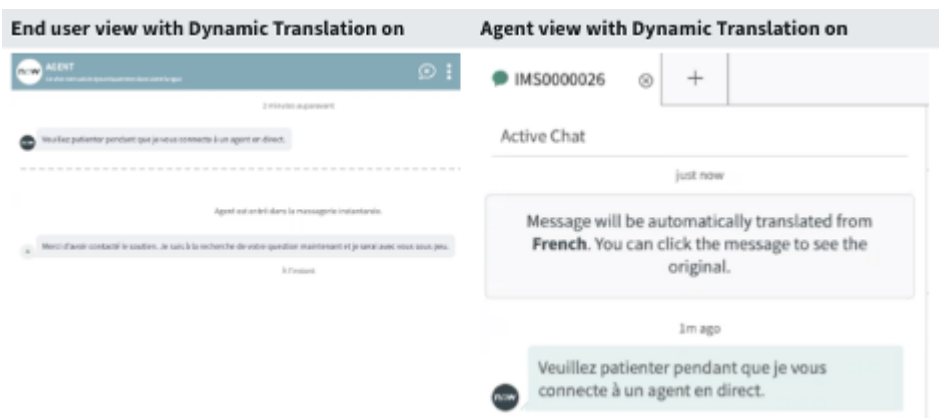


Conversing in a different language with Dynamic Translation for Agent Chat

Use Dynamic Translation for Agent Chat (DTAC) to have a chat conversation with a requester who uses a different language.

Translation indicators

When DTAC is enabled, both the agent and the requester will see a banner at the top of the chat conversation that indicates the conversation is being translated. Bilingual agents can determine if they're fluent enough in the requester's language to temporarily turn off DTAC for individual chat sessions as needed.



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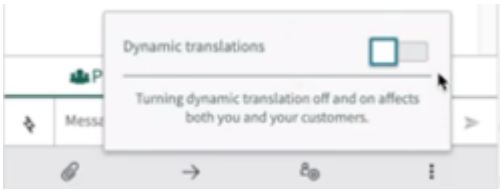
Dynamic translations control for bilingual agents

When a bilingual agent accepts a chat conversation to which they're fluent in the requester's language, DTAC is not necessary. With the Dynamic translations chat session control, agents can turn of DTAC for individual chat sessions.

Agents can select the ellipsis (⋮) at the bottom of the chat window then select the **Dynamic translations control** to the off position.

When DTAC is switched off, a notification displays at the top of the agent's and the requester's chat windows, highlighting the change in status, for this chat session.

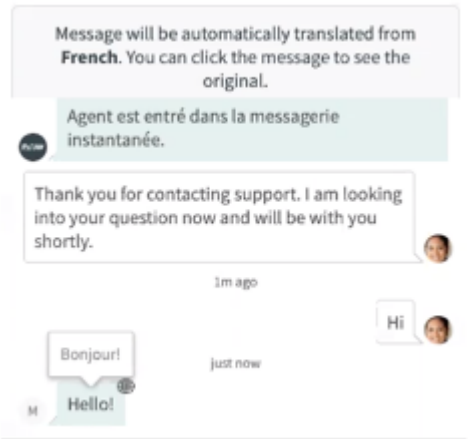
The translation capability is switched off for both the requester and the agent, for this specific chat session. The selection in one chat session does not affect the selection in other chat sessions and the agent can turn DTAC off and back on within one chat session.



Troubleshoot translated messages

Translation services do not understand idioms or jargon and it is possible that some user messages are lost in translation. You can use the translation-indicator icon to view the requester's original message and look up its meaning as needed.

You can navigate to the individual chat message and select the translation-indicator icon (🌐) to see the requester's original, untranslated message.



Translated chat transcripts

Two chat transcripts are generated at the end of each DTAC chat session. One for the requester to download and save in the requester's language. The other is the agent's transcript which contains the text as seen in the agent's chat window. If an agent used DTAC in part of the chat, the transcript contains both the translated and non-translated text. For more information, see Chat transcript downloads for requesters.

Chat transferred from Virtual Agent

Once you accept a chat from a requester, you can see the chat history between the Virtual Agent and requester in their preferred language for more context.

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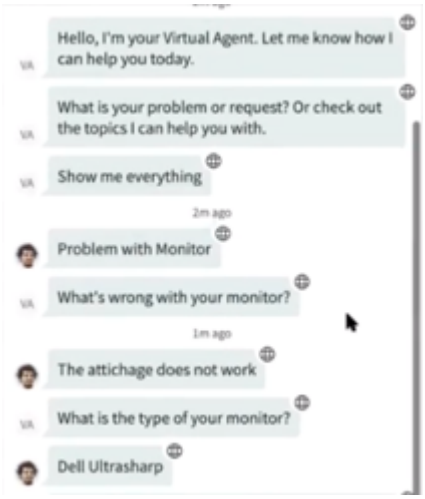

Attachments within DTAC

When inserting an attachment into a chat, DTAC does not translate the file name or the contents of the attachment.

Sending an agent-initiated message during an async chat

Send a message to a requester even when the requester isn't online while working on issues in Workspace. A long-running conversation between an an agent and a requester who are not online concurrently is called an asynchronous, or async, chat.

Before you begin
Role required: admin

Procedure

1. On the Interaction record, select **Compose Message**.
   The Compose message form displays for interactions that aren't Chat or Messaging.
2. On the form, fill in the fields.

Compose Message form

Field	Value
Channel	Messaging channel with which agents can initiate messages to connect with requesters. For async chat, select **mweb**.
From	ID of the agent who is sending the message.
To	ID of the requester who will receive the message.
Message	Enter the message you want to send to the requester.
Attachment	Select **Attach File** to specify a file to attach to the message.

3. Select **Send**.

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Related topics

Asynchronous chat

Configure asynchronous chat for the web channel

Agent Chat reference

Reference topics provide descriptions about Agent Chat.

Domain separation and Agent Chat

Domain separation is supported in the Agent Chat application. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Requirements

All domain support features require the Domain Support - Domain Extensions Installer [com.glide.domain.msp_extensions.installer] plugin. For details, see Request domain separation.

Configuring Agent Chat with domain separation

Domain separation allows organizations to segment their data and processes based on specific criteria such as business unit, geography, or other factors.

A service provider (SP) has one chat setting (Agent Chat) record in the global domain when the instance is provisioned.

The admin of a subdomain can specify Agent Chat settings for that subdomain, such as work queues and assignment groups. For details, see Setting up Agent Chat.

When a user logs into a subdomain, a seeded Agent Chat settings record is created.

When using domain separation in Agent Chat, keep the following points in mind:

- Domain Separation applies to both the agent side and the customer side of the chat. This means that agents will only be able to access chat records and data that are in their domain, and customers will only be able to see chat records that are associated with their domain.
- Agent Chat records are automatically tagged with the domain of the agent who handled the chat. This ensures that the chat record is associated with the correct domain, and that agents can only view chat records that are associated with their domain.

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- When an agent is assigned to a chat, the chat is automatically assigned to the domain of the agent. This ensures that the chat record is associated with the correct domain from the start.
- If an agent needs to transfer a chat to another agent or escalate the chat to a higher level of support, the chat is transferred to an agent who is in the same domain as the original agent. This ensures that the chat record stays within the correct domain.

Building a report to track the number of help requests

Create a report that tracks the number of help requests.

Before you begin

Role required: admin

Procedure

1. Activate the Interaction Events business rule.
   a. Navigate to **Interaction** > **All**.
   b. Right-click the **Number** heading.
   c. Click **Configure** > **Business Rules**.
   d. On the Business Rules screen under the **Name** column, click **Interaction Events**.
   e. On the Business Rules - Interaction Events screen, select the **Active** check box if it is not already selected.
   f. Click **Update**.
2. Create a new metric definition for Interaction "help requested" on the Metric Definition - New record screen by entering `Interaction` in the **Table** field and selecting **Help Requested** from the **Field** list.
   For detailed steps on creating metric definitions, see Define a metric.
3. Create a new chat as a requester.
4. Accept the same chat as an agent.
5. While still logged in as that agent, enter the quick action `/help`.
6. Navigate to **Metrics** > **Instances** and record the ID of the single instance record created for help_requested=true.
7. Navigate to the Admin window and open the interaction from the previous step.
8. Join the conversation (either privately or publicly).
9. Navigate to **Metrics** > **Instances** and observe that one instance record was created for help_requested=true.
   For more information about using the Metric Instance Table, see Metric instance.

Agent Chat Interaction related records

The Interaction related record [interaction_related_record] table tracks tasks and Knowledge Base (KB) articles that are created, updated, or viewed in the context of a particular interaction. The Interaction related record table references the interaction, related document, whether the relationship is to a task or KB article, and what type of operation on the related document formed the basis for the relationship.

Interaction related record table overview

The Interaction related record table tracks task and KB article records that were created, updated, or viewed in a particular interaction. The Interaction related record table records

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- the interaction
- the related document
- whether the relationship is to a KB article or a task
- what type of operation on the related document formed the basis of the relationship

Creating Interaction related records

Interaction related records can be created manually or automatically.

- Manually - records are manually created via an Interaction related record form. The form is opened on a workspace through an Associated record UI action. When this form is used to create the relationship, the operation field is not set to any value.
- Automatically created via business rules
- Automatically created via client calls from a workspace

Configuring automatic creation of interaction related records

You can update or create entries in the Interaction relationship policy [interaction_relationship_policy] table to manage which types of operations result in the auto-creation of interaction related records. These determine whether interaction related records may be created for each of the following actions:

- Insert - record created from workspace in the context of the interaction.
- Update - record updated from workspace in the context of the interaction.
- Mention - record number mentioned in a chat, resulting in the rendering of a record card.
- Open - record opened in workspace in the context of the interaction.
- Unknown - interaction related record created by automated logic other than via agent actions from workspace.

Two policies that are included with the base system govern behavior for relationships to the task and kb_knowledge table. To override behavior for a particular task type, you can add an additional entry for the appropriate Document

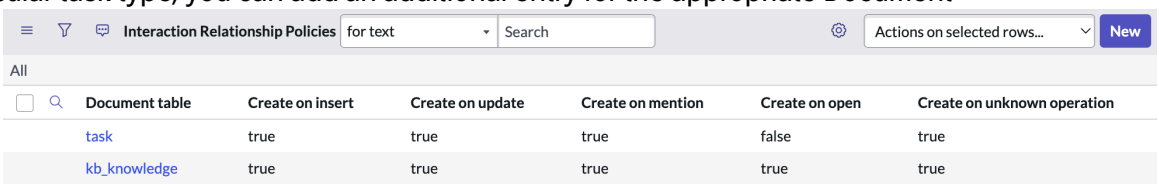

table.

The com.glide.interaction.autocreate_relationships property is set to true by default. If it is set to false, only relationships created via the interaction_related_record form are created. All others are blocked by the "Block relationship autocreation" business rule.

Sidebar

Sidebar enables agents to collaborate with others when working on a task-based or interaction-based Workspace record.

Getting started with Sidebar

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Get started

Explore



Learn about Sidebar concepts and features.

Configure



Install and configure Sidebar and activate relevant plugins.

Use



Use Sidebar to help agents have discussions with others to solve issues faster.

Reference



Get Sidebar details for domain separation.

Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring Sidebar

Using Sidebar, agents can have real-time collaboration with others based around a Workspace task-based or interaction-based record. These Sidebar discussions facilitate the exchange of information and knowledge to help resolve issues faster and with higher-quality outcomes.

Sidebar overview

An agent can initiate a group discussion from a task-based record or interaction-based record. The agent enters preliminary information and context for the discussion and adds subject matter experts to help. The agent can create multiple discussions for one record.

Sidebar workspaces

Sidebar is supported in these workspaces:

- Customer Service Management (CSM) Configurable Workspace
- CSM Manager Workspace
- Human Resources (HR) Agent Workspace
- IT Service Management (ITSM) Manager Workspace
- Vendor Management Workspace

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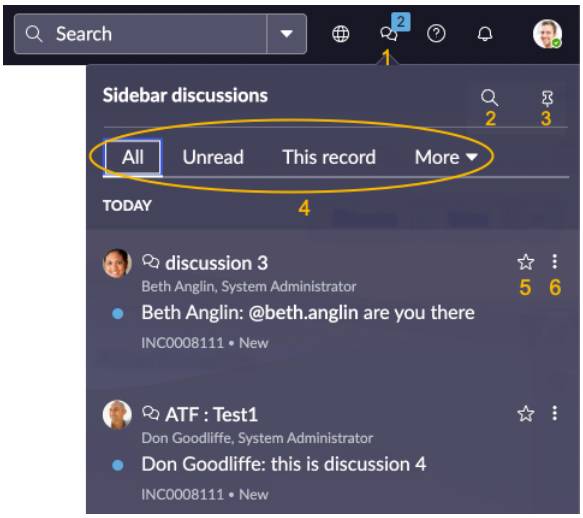
For information on adding the **Discuss** button to one of the supported workspaces above, see Adding the Discuss button.

For information on adding the **Discuss** button to any workspace not listed (such as the Service Operation Workspace), see KB article KB1213249 .

Sidebar components

Sidebar discussion panel

When you select the Sidebar discussion icon , the Sidebar discussion panel appears:



The Sidebar discussion panel includes:

Icon	Description
1 -	Display Sidebar discussions dialog. If a number in a blue square appears, the number indicates the number of Sidebar discussions that are currently active.
2-	Search within the Sidebar discussions. When you select the Search icon, the **Search** field appears and you can enter the text you want to locate. The search results display below the search field and are grouped by user message then file name. Select **Cancel** to clear the search field and return to the Sidebar discussion. You can have all search results display or filter by discussions, messages, and attachments. You can sort search results by most relevant, old to new, or new to old. To use the Search KB quick action, enable AI Search. For more information,

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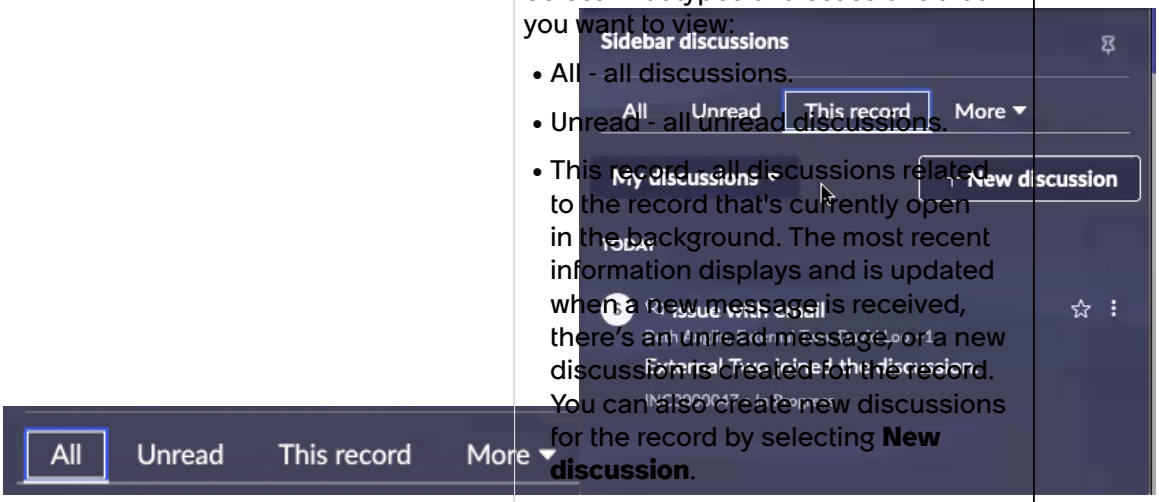
Icon	Description
	see AI Search and AI Search Availability [KB0867751].
3 -	Permanently pin the menu to the side of the screen.
4 - 	Select what types of discussions that you want to view: • All - all discussions. • Unread - all unread discussions. • This record - all discussions related to the record that's currently open in the background. The most recent information displays and is updated when a new message is received, there's an unread message, or a new discussion is created for the record. You can also create new discussions for the record by selecting **New discussion**. • Mentions - discussions that mention you with @yourusername. • Favorites - discussions that you marked as favorites.
5 -	Marks the Sidebar discussion as a favorite. Discussions that have been marked as favorites display under the Favorites tab. You can undo a discussion as a favorite by selecting the star icon again.
6 -	Displays options for the discussion: • Dismiss discussion - close the discussion dialog (but don't exit the discussion). • Leave discussion - exit the discussion.

Docked chat windows

You can access multiple Sidebar discussions at the same time using the docked windows feature. Docked chat windows include these features:

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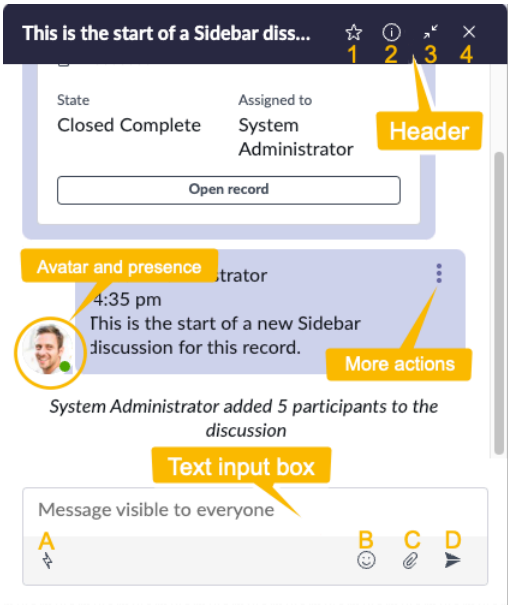

Header icons

Icon	Description
1 - ☆	Marks the Sidebar discussion as a favorite. Discussions that have been marked as favorites display under the Favorites tab. You can undo a discussion as a favorite by selecting the star icon again.
2 - ⓘ	Opens the Discussion info panel that includes the About submenu, Participants submenu, and **Leave discussion** button. On the About submenu, you can view information about the discussion. On the Participants submenu, you can add and remove participants. If you want to exist the discussion, select **Leave discussion**.
3 - ↙	Collapses the discussion so it displays only as a tab at the bottom of the screen.
4 - ✕	Closes the window.

User avatar and presence

User avatar and presence	Description
	Displays the user's avatar and presence (online status). The dot indicates the user's presence depending on whether they're logged in to the platform:

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User avatar and presence (continued)

User avatar and presence	Description
	• Green dot - user is logged in. • No dot - user isn't logged in. • Orange dot - user recently logged out. If Sidebar and Microsoft Teams are integrated, Microsoft Teams users are differentiated from Sidebar users with a Microsoft Teams  icon.

More actions icon

Icon	Description
	Display additional actions for this message including: • Post to activity stream • Remove from activity stream • Edit message • Delete message

Text input box icons

Icon	Description
A - 	Access base system or custom quick actions. The agent can start a KB article search by selecting the quick actions icon and then entering `search - kb`. The agent is prompted to search for the relevant KB article. Based on the search and the term that the agent enters, the agent is able to view the KB articles that match the search term. The agent can then select the KB article and include it in the discussion. The KB article is displayed as a record card in the Sidebar discussion. The KB article search is available with the base system.
B - 	Display the emoji menu so you can add emojis to the discussion.
C - 	Add attachments to the current discussion so they can be shared with others in the discussion. You can drag

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Text input box icons (continued)

Icon	Description
	and drop files and select the send arrow icon or you can use the attachment icon.
D - 	Send the message.

If you minimize a docked window, it appears as a tab in the overflow menu at the bottom of the screen. If you hover over a minimized docked window, the record number and chat title appear to help you identify the content. You can select any of the tabs to access that discussion again. The maximum number of docked windows you can have in the overflow menu is 25 and this amount can be configured. If there are too many docked windows to display as tabs in the overflow menu, a tab with a number displays indicating how many extra docked windows aren't displayed.

Activity stream and Sidebar

You must integrate Sidebar with activity stream if you want agents to be able to post Sidebar discussions to the activity stream. For instructions on integrating Sidebar with the activity stream, see Integrating Sidebar and activity stream. For information on using Sidebar with the activity stream, see Activity stream in Sidebar.

Sidebar installing and configuring

The Sidebar configuration settings are available via the Sidebar tab under **Conversational Interfaces** > **Settings**. See Installing Sidebar for instructions. After Sidebar is installed, you must configure the admin settings. See Configuring Sidebar for instructions.

Using Sidebar

For information on how to use Sidebar, see Using Sidebar for more information.

Key features include:

- Creating custom discussion buttons
- Viewing Core UI forms with Sidebar
- Sidebar panel
- Sidebar unread conversation badge count
- Docked chat window
- Favoriting discussions
- Discussion information panel
- Discussion participant suggestions
- Quick actions
- Integrating with activity stream
- Integrating with AI search
- Drag-and-drop file sharing
- Using emojis
- Mentioning a user with @

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Using Sidebar and Microsoft Teams

After Sidebar and Microsoft Teams are integrated, users of both applications can collaborate with each other. For more information on integrating Sidebar with Microsoft Teams, see Sidebar and Microsoft Teams.

Core UI

You can create Sidebar discussions on interaction records from Next Experience Core UI.

Domain Separation

For information about domain separation in Sidebar, see Domain separation and Sidebar.

More information

To learn more, see the Now learning course on Sidebar.

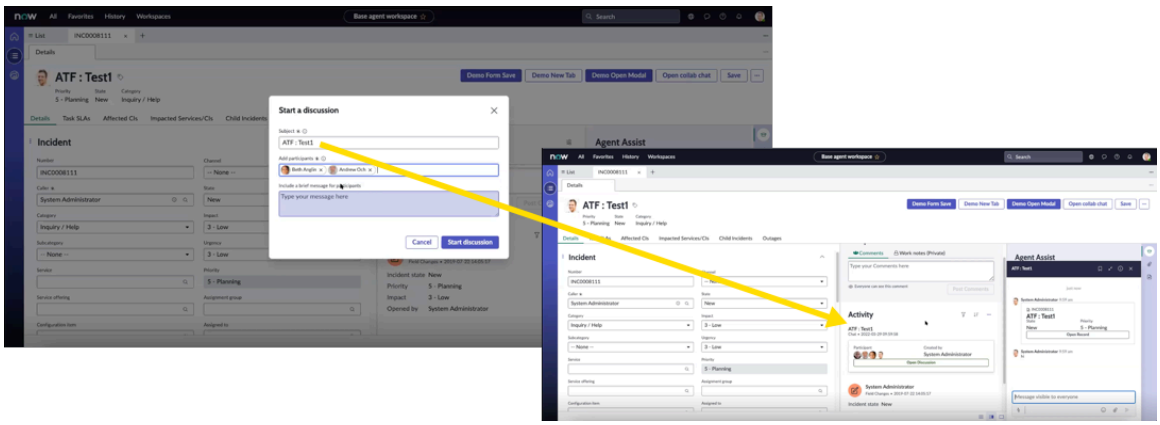
Activity stream in Sidebar

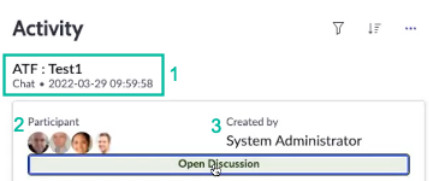
If Sidebar is integrated with the activity stream, you can create links to discussions and post discussion messages directly to the related record as an activity stream record.

Note:
Sidebar and discussion tiles are available only with Next Experience and not in Core UI.

When a Sidebar discussion is created, a corresponding Sidebar discussion tile is automatically added to the activity stream. Users who have access to the task-based record can also access the discussion from the activity stream. Sidebar users can post messages from discussions into the activity stream as Sidebar posted messages. These messages can be posted to the activity stream as editable entries that can be added and removed as necessary. For generalized information about activity streams, see Activity streams.

When you start a Sidebar discussion, a tile corresponding to the discussion is automatically added to the activity stream.





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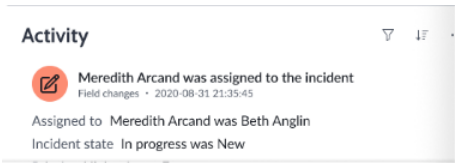
Sidebar tile

1	Sidebar discussion name, type of conversation, date/time discussion started.
2	Profile pictures of the participants (if there are more than 5 participants, then a badge displays the number of additional participants whose profile photos can't be seen.)
3	Name of user who created the Sidebar discussion.

The primary record card appears as part of the activity stream and displays the following:

- Record ID
- Short description
- Type
- State
- Assigned to
- Link that opens the record
- Priority (for task-based record cards)



Starting a discussion

If you select **Open Discussion**, then the Sidebar panel opens and displays the Sidebar discussions. Customers and non-fulfiller roles don't have access to the record don't have access to the conversation tile, similar to work notes.

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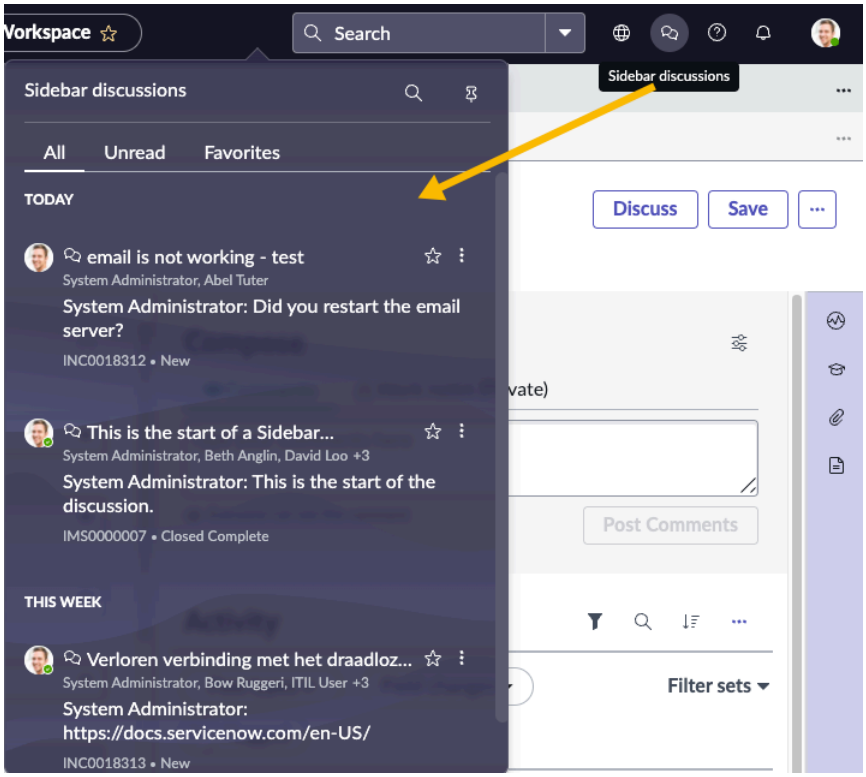
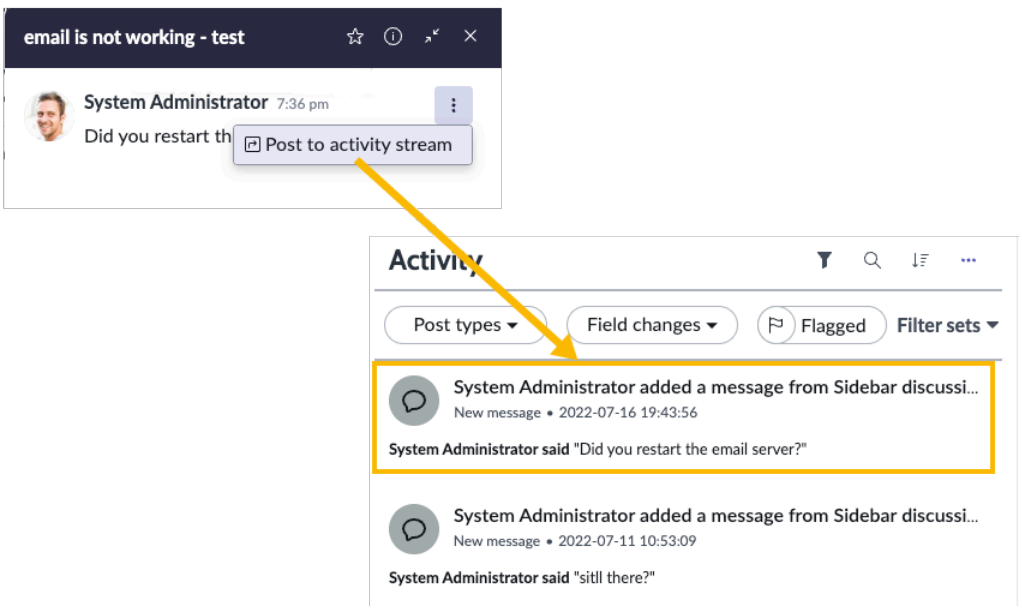


Posting a message

You can select any message in the Sidebar discussion panel and post it to the activity stream. When you post a message from the Sidebar discussion to the primary records activity stream, the most important information is tied directly to the record. This enables you to access collaborative conversations from a record so that you can add yourself to the discussion and view the conversation history.



If Sidebar messages posted to the activity stream aren't appearing, ensure **Sidebar discussion** and **Sidebar posted message** are selected in the activity stream filter.

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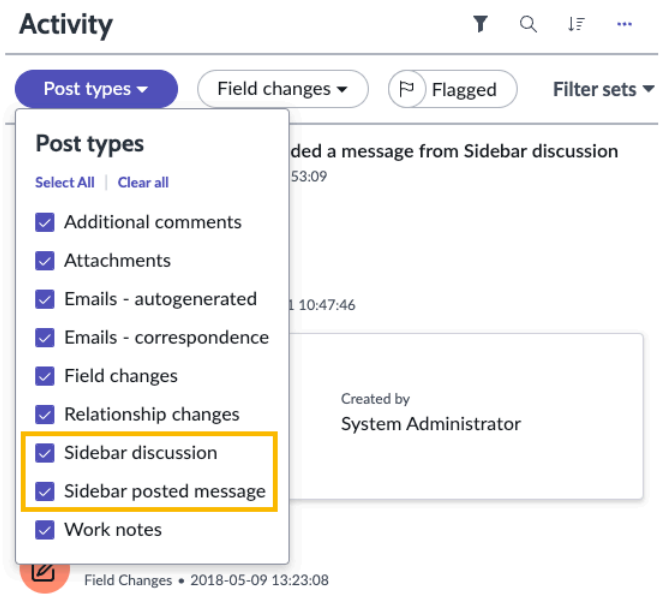
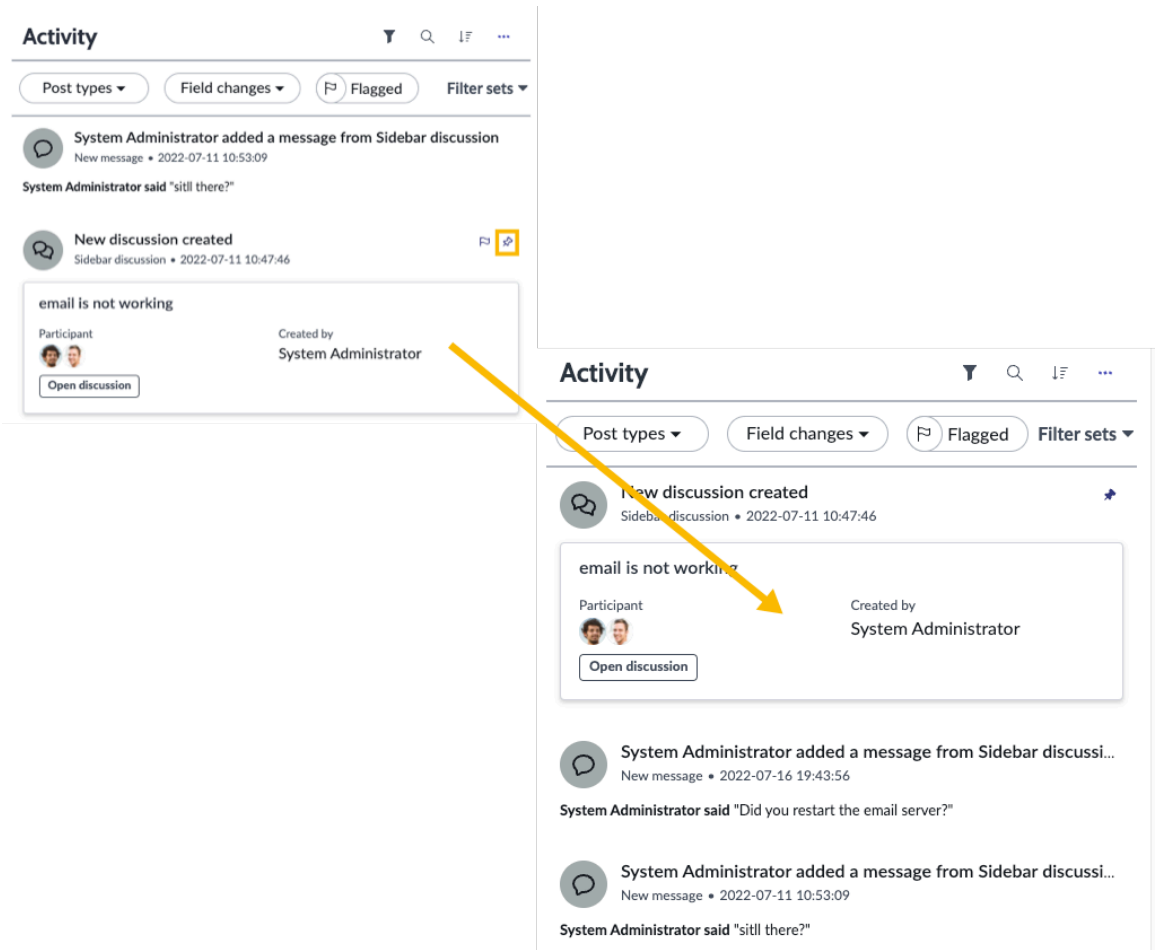


Pinning a discussion tile

To pin a discussion tile in the activity stream, select the pushpin icon to pin a discussion tile to the activity stream. Pinning a discussion tile ensures that the discussion always stays at the top of the activity stream.



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Editing or Deleting a message in Sidebar

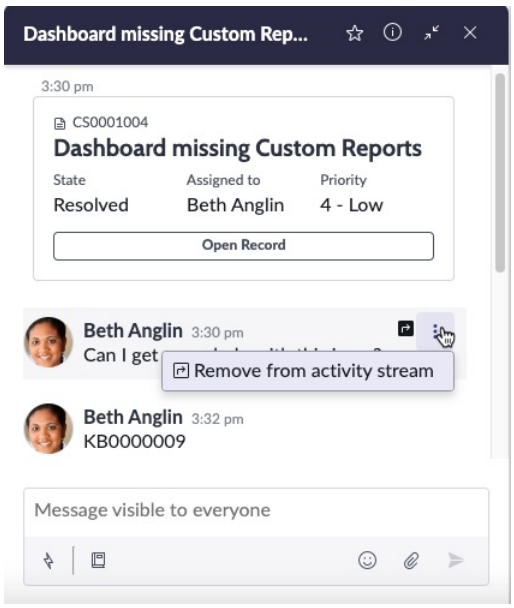
If you edit a message in a Sidebar discussion that was already posted to the activity stream, then any changes that you made to the message are reflected in the activity stream.

If you posted a message with an attachment in a Sidebar discussion and the message was already posted to the activity stream, any changes made to the attachment will be reflected in the activity stream. For example, if you post a message with an attachment in a Sidebar discussion and it's posted to the activity stream and you later delete the attachment and replace it with a different one, the activity stream displays the new attachment.

If you delete a message in a Sidebar discussion after the original message was already posted to the activity stream, then the message is removed from the activity stream.

Deleting a message from the activity stream

To remove a message from the activity stream, select the **More Actions** menu for each chat bubble within a Sidebar discussion and then select **Remove from activity stream**.



Participant suggestions in Sidebar

Activate Participant suggestions to display a list of users who may be helpful additions to a Sidebar discussion.

When you add participants to a Sidebar discussion, a drop-down list displays a list of users who can be added. If Participant suggestions is activated, a list of "top suggestions" displays at the top of the list. The participant suggestions are users who may be helpful because they may have expertise related to the record and also have access to the record.

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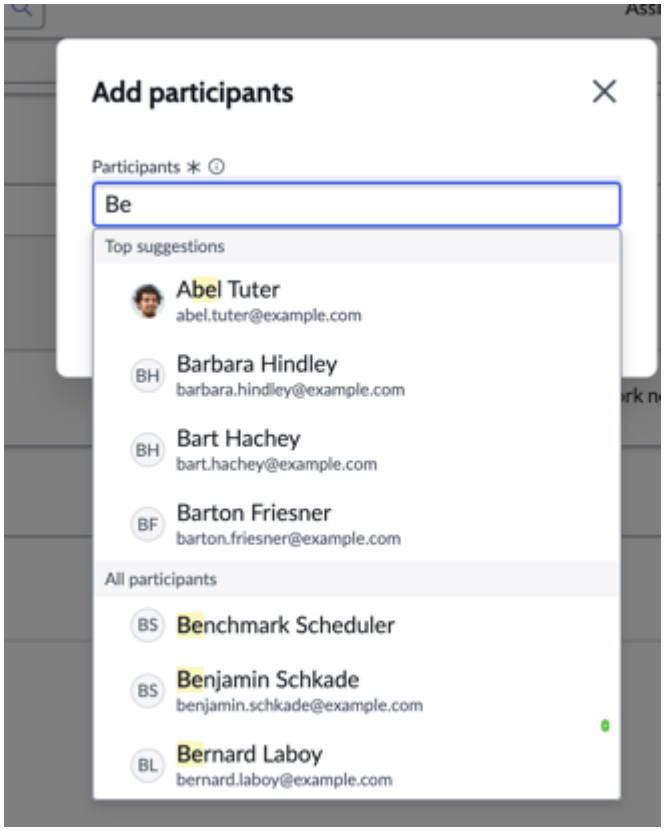

Requirements

Participant suggestions has the following requirements:

- Plugin requirements: In order to access the base Participant suggestions service, you need to download the Participant suggestions plugin (com.glide.sn_participant_suggestions). Participant suggestions are optimized only for interactions, tasks, and the task's child tables. If you want to receive participant suggestions for any other table, you have to customize the Participant suggestions service. The Participant suggestions plugin works in conjunction with the Sidebar/Omni-Experience Standard Feature Set plugin. Both the Participant suggestions plugin and the Sidebar plugin must be installed before you can view the list of suggested users.
- Lookup table: The lookup table (suggestion_service_lookup) for participant suggestions applies only to the base Participant suggestion service and not to any third-party participant suggesting services.

Configuring Sidebar

Install and configure Sidebar so agents can have real-time collaboration with others.

Configuration overview

Configuring Sidebar involves installing Sidebar, adding the Discuss button, configuring the Sidebar member query, and configuring participant finder. There are also additional steps if you want to integrate Sidebar with Microsoft Teams.

1. Install Sidebar.

   You can install Sidebar, which is part of the Omni-Experience Standard Feature Set, if you have the admin role.

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2. Set up Sidebar.

   Activate and configure options.

3. Add the Discuss button.

   Add the Discuss button to objects that do not have it installed and to custom workspaces where you need to enable Sidebar on an object.

4. Configure the Sidebar member query.

   Configuring the Sidebar member query causes the participants list on the Start a Sidebar discussion screen to be pre-populated.

5. Enable Sidebar and Microsoft Teams users to communicate with each other by integrating the applications:

   a. Sidebar and Teams integration overview.

   b. Integrate Sidebar and Microsoft Teams.

   c. Enable or configure the Microsoft Teams integration.

Installing Sidebar

You can install Sidebar, which is part of the Omni-Experience Standard Feature Set, if you have the admin role.

Before you begin

Ensure that the application and all of its associated ServiceNow® Store applications have valid ServiceNow® entitlements. For more information, see Get entitlement for a ServiceNow product or application.

Role required: admin

About this task

The following items are installed with Sidebar:

- Plugins
- Roles
- Tables

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. To find the Sidebar application, enter `omni-experience standard feature set` in the filter criteria.

   If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install Sidebar feature.

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4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.

5. Select **Install**.
6. If you want to use the Search KB quick action, enable AI Search.
   For more information, see AI Search and AI Search Availability [KB0867751].

Setting up Sidebar

Activating the participant suggestions causes Sidebar to display a list of knowledgeable users who may be able to help address an issue. After you activate participant suggestions, you can configure who Sidebar decides is knowledgeable user and which groups have access. After installing Sidebar, activate and configure Sidebar so agents can collaborate with others to resolve issues.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Home**.
2. Select the **Sidebar** tile.
   The Sidebar setting screen titled "Adjust how live agents collaborate to support your users" appears.
3. Activate Sidebar by enabling the **Activate** option and selecting **Save**.
   The screen with the Sidebar configuration options appears.

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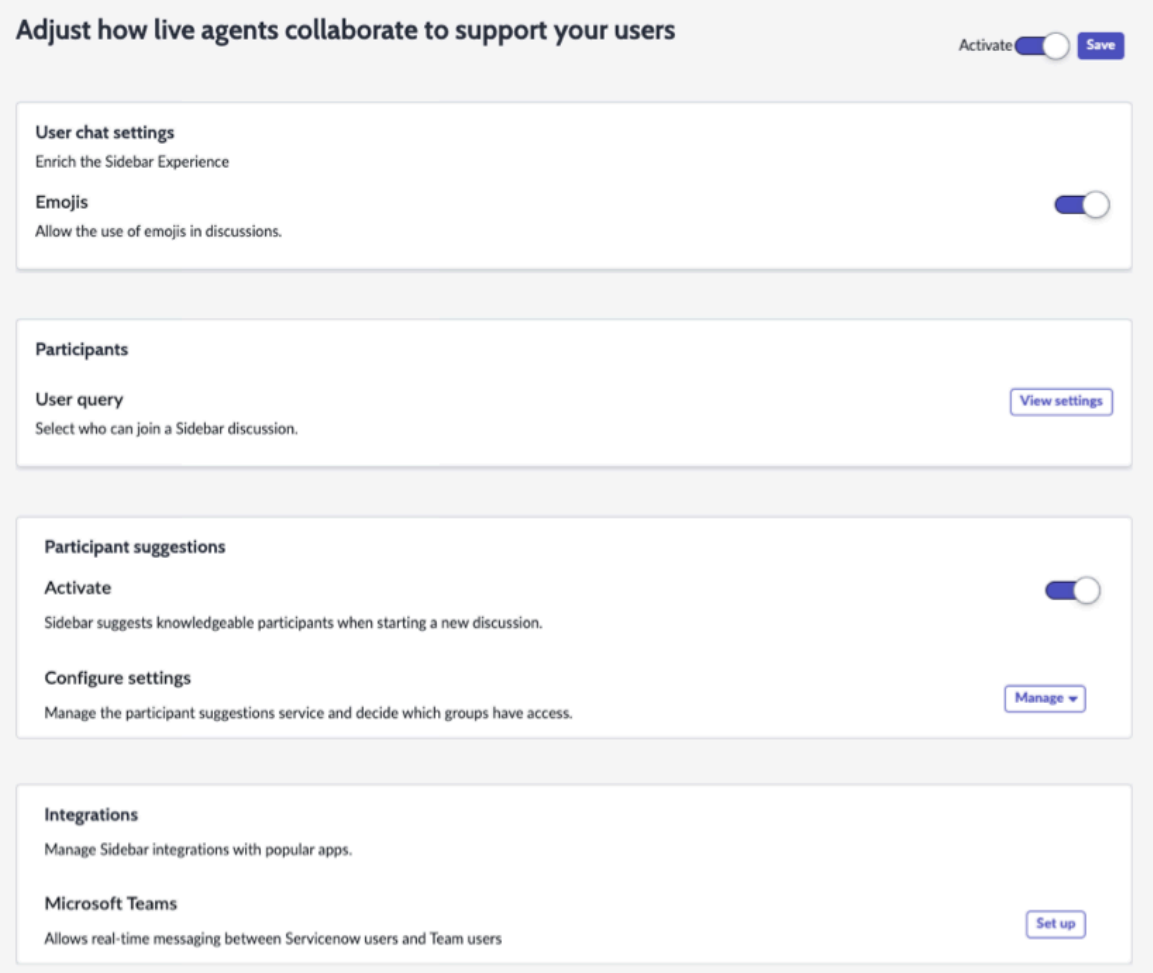

4. Configure the options.

User chat settings

Field	Description
Emojis	Slide the toggle switch to activate or deactivate emojis.

Participants

Field	Description
User query	If you select **View settings** one of the following lists displays: ○ Users that are automatically pre-filled for the agent to add to a discussion ○ Users that display when the agent searches for participants to add to a discussion For more details, see Configuring Sidebar member query.

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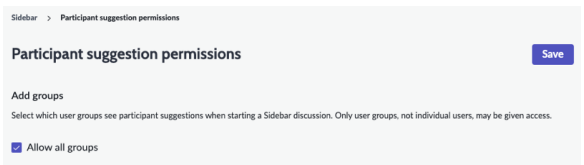
Participant suggestions

Field	Description
Activate	Slide the toggle switch to activate or deactivate participant suggestions. Use the participant suggestions to display a list of users who may be helpful in the Sidebar discussion. For detailed information on participant suggestions, see Participant suggestions in Sidebar.
Configure settings	If you activate participant suggestions, the Manage drop-down list appears. Select a configuration option: ○ View Configuration - displays the Participant suggestions table and related lists. ○ View Permissions - displays the Participant suggestions permissions page where you configure whether participant suggestions should display for specific groups or all groups. To enable all groups to view participant suggestions, select **Allow all groups** and then **Save**. Since permissions can't be configured at an individual user level, ensure that any users you want to be included belong to a relevant group.  For detailed information on participant suggestions configuration settings, see Participant suggestions in Sidebar.

Integrations

Field	Description
Microsoft Teams	If Sidebar isn't already integrated with Microsoft Teams, select **Set up** to configure the options for the first time. See Enable or configure the Microsoft Teams integration for more information. If Sidebar has already been integrated with Microsoft Teams, the Manage drop-down list appears. Select a configuration option: ○ View configuration (for more information, see Enable or configure the Microsoft Teams integration). ○ View permissions (for more information, see Manage Microsoft Teams permissions)

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Field	Description
	○ Remove integration - if you select this option, a warning message displays that the integration between Sidebar and Microsoft Teams will be removed. Select Cancel if you do not want to remove the integration or select remove if you want to remove the integration.

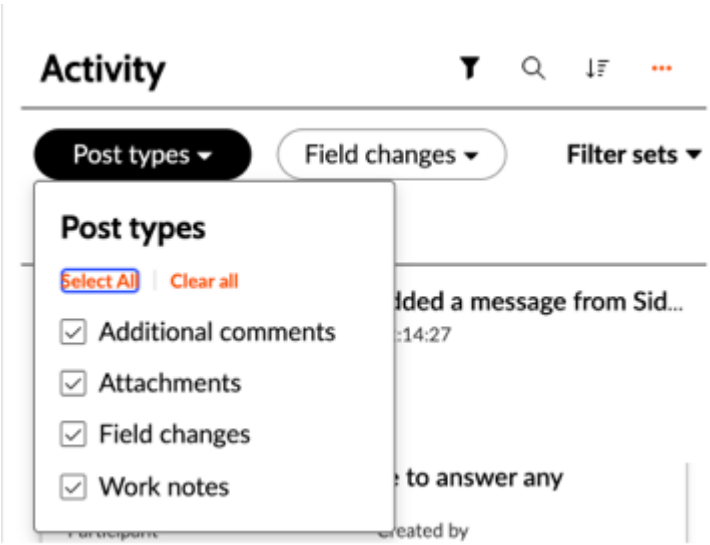
5. Select **Save**.

Integrating Sidebar and activity stream

For agents to post Sidebar discussions in the activity stream, Sidebar must be integrated with the activity stream and Sidebar options must display in the post filters. If the Sidebar options don't display in the post filters, you must add them.

Before you begin
Role required: admin

Note:
List of post types without Sidebar options:



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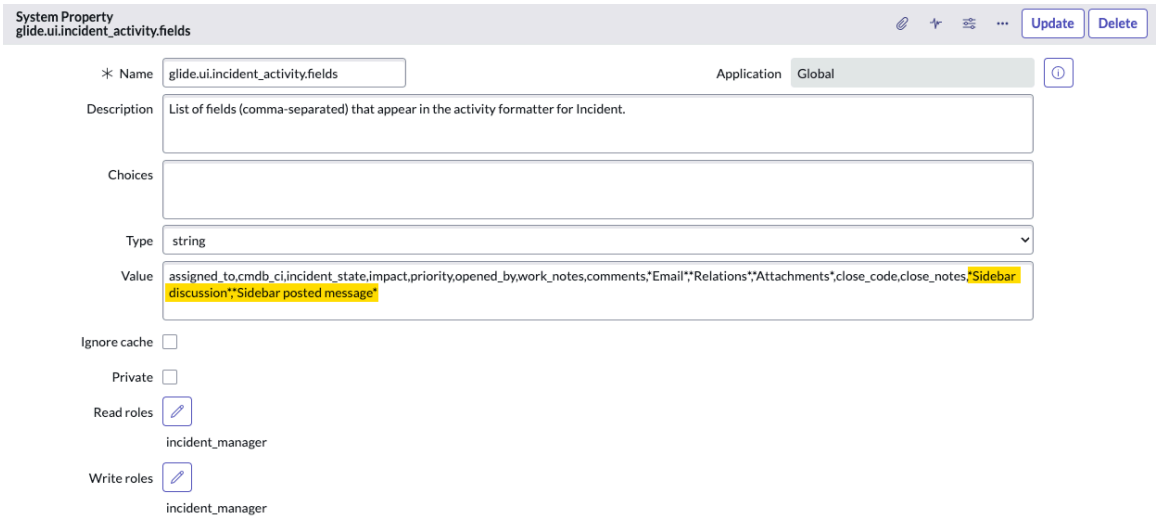
Procedure

1. If Sidebar was automatically installed in the workspace:
   a. Check the `sys_properties` file for the record glide.ui.{table_name}_activity.fields where {table_name} is the parent record table name.
   b. If the `sys_properties` file record exists for the record table, check whether it includes **Sidebar discussion** and **Sidebar posted message**. If it doesn't, add **Sidebar discussion** and **Sidebar posted message** at the end of the existing value.



2. If Sidebar was manually added for a record in a workspace:
   a. Check the `sys_properties` file for glide.ui.{table_name}_activity.fields where {table_name} is the parent record table name.
   b. If the `sys_properties` file record exists for the record table, check whether it includes **Sidebar discussion** and **Sidebar posted message**. If it doesn't, add **Sidebar discussion** and **Sidebar posted message** at the end of the existing value.

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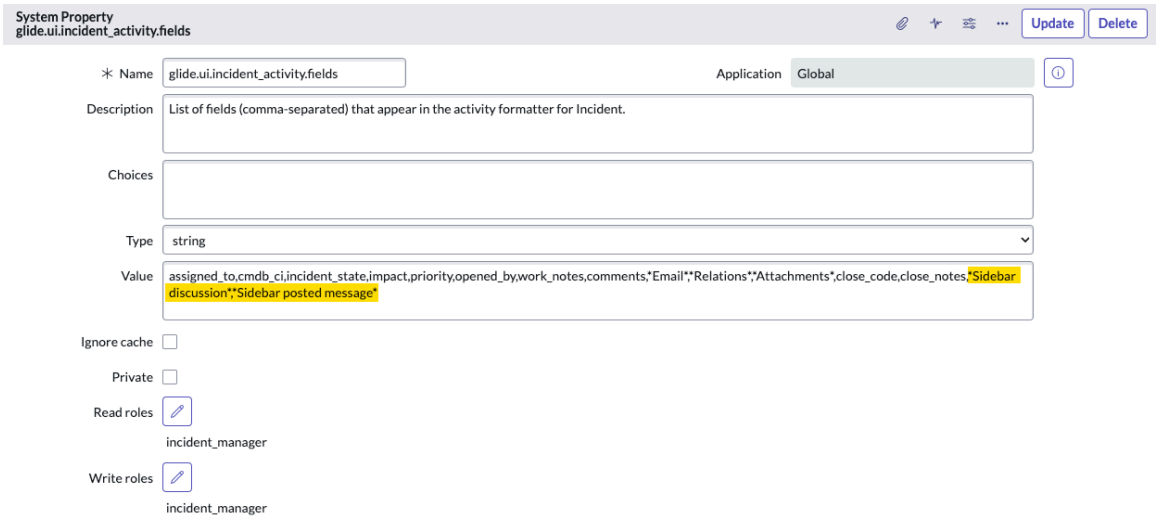
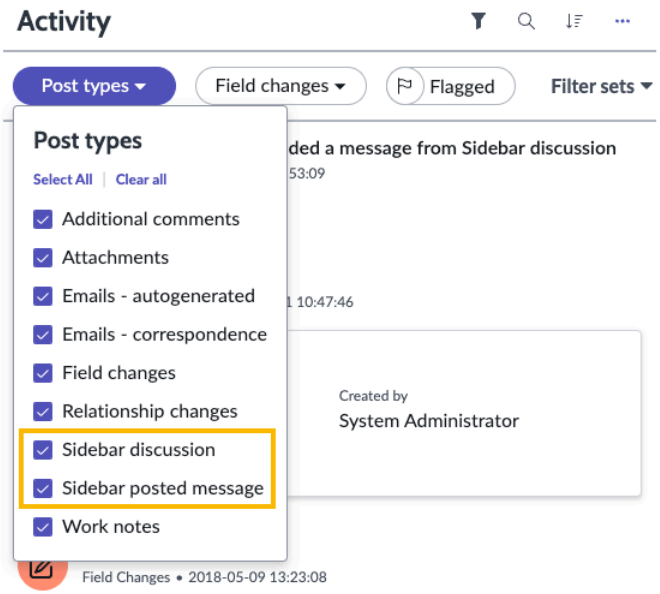


c. If the `sys_properties` file record doesn't exist for the record table, it loads the default filters which contain Sidebar filters.

Note:
List of post types with Sidebar options:



Adding the Discuss button

To use Sidebar, you must add the **Discuss** button to objects that do not have it automatically installed and to custom workspaces where you need to enable Sidebar on an object. After you add the **Discuss** button, you can create Sidebar discussions.

Before you begin

Role required: admin

About this task

You do not need to add the **Discuss** button to these workspaces because it is automatically installed:

- Customer Service Management (CSM) Configurable Workspace
- CSM Manager Workspace

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- Human Resources (HR) Agent Workspace (Configurable only)
- IT Service Management (ITSM) Manager Workspace
- Vendor Management Workspace

Note:
After you add the **Discuss** button, you must configure the activity stream. For more information, see Activity stream in Sidebar.

Procedure

1. Navigate to **All** and in the filter field, enter `ux form actions configs`.
2. On the UX Actions Configurations screen, select the workspace where you want to create the **Discuss** button.
3. On the UX Actions Configuration - Workspace Action Config screen, select the **UX Form Actions Layouts** tab.
4. On the UX Form Actions Layouts tab, select **Task Actions**.
5. On the Task Actions screen, select the **UX Form Action Layout Items** tab.
6. On the UX Form Action Layout Items tab, select **Edit**.
7. On the Edit Members screen, enter `discuss` in the Collection field.
   Discuss appears in both the Collection and the Task Actions columns.
8. Select the Collection column.
9. Select **Save**.
   The UX Form Actions Layout - Task Actions screen redisplays.
10. On the UX Form - Action Layout Items tab, select **Discuss** from the UX Form Action Layout Item column.
11. On the UX Form Actions Layout Item - Discuss screen, check the value in the Table field:
    - If the Table field displays Task, then the Discuss button has been added.
    - If the Table field displays Interaction, then select the back arrow. Perform steps 6 through 10 again, but select the Task Actions column.
12. Select **Save**.

Configuring Sidebar member query

Configuring the Sidebar member query pre-populates the participants list on the Start a Sidebar discussion screen.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. From the left-side menu on the CI Admin Experience page, select Sidebar.
   The Sidebar settings screen with the heading "Adjust how live agents collaborate to support your users" displays.
3. From the Participants section on the Sidebar settings screen, select **View Settings**.
   The Sidebar Member Query screen displays.
4. Do one of the following:

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- To edit an existing query, select the name of the query.
- To create a new query, select **New**.

5. Fill in the fields:

Field	Description
Name	Name of the member query.
Active	Indicates whether the query is activated.
Type	From the drop-down list, select **Pre-fill** or **Search**. ○ Pre-fill: automatically select all members of the assignment group. ○ Search: add members of the assignment group and no one else.
Order	Order in which the routing condition for this queue is considered, in comparison to other queues.
Application	Type of scoped application.
Condition Mode	Type of condition for routing work items in the query. From the drop-down list, select **Advanced** or **Simple**. ○ Simple: specify a routing condition using the condition builder. ○ Advanced: specify a JavaScript scripted condition.
Condition table	This field displays if you selected **Simple** for the Condition Mode. From the drop-down list, select the table.
Condition	This field displays if you selected **Simple** for the Condition Mode. Use the **Add Filter Condition** and **Add "OR" Clause** buttons to create the condition for the query.
Condition Script	This field displays if you selected **Advanced** for the Condition Mode. Enter a JavaScript script to build the query.
User Query Mode	From the drop-down list, select **Advanced** or **Simple**. ○ Simple: Specify a routing condition using the condition builder. ○ Advanced: Specify a JavaScript scripted condition.
User Query Condition	This displays if you select **Simple** for the User Query Mode. Use the **Add Filter Condition** and **Add "OR" Clause** buttons to create the condition for the query.

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Field	Description
User Query Script	This displays if you select **Advanced** for the User Query Mode. You can specify a JavaScript script to build the query.

6. Select **Submit**.

Sidebar and Microsoft Teams

Sidebar's integration with Microsoft Teams enables Sidebar users and Microsoft Teams users to communicate with each other from their respective platforms.

Monetization by Microsoft

The Sidebar-Microsoft Teams integration is available as a standard ServiceNow feature, however Microsoft intends to monetize any use of their Microsoft Teams API based on a rate charge per message:

- The rate charge applies each time the Microsoft Teams API is called. Charges apply for messages sent from your ServiceNow instance to Microsoft Teams and vice versa.
- The rate charge doesn't apply to "means to an end" actions such as searching for or adding users to a Microsoft Teams group chat, user presence, or reactions.

Microsoft bills ServiceNow customers directly via their Microsoft Azure account. For more information, see Licensing and payment requirements for the Microsoft Teams API.

Authenticating Sidebar users in Microsoft Teams

A Sidebar user must already have a Microsoft Teams account to communicate with a Microsoft Teams user. Microsoft Teams authenticates each Sidebar user to confirm that they have a Microsoft Teams account. This authentication ensures that Microsoft Teams can create a group chat that includes the Sidebar user's Microsoft Teams account. If the Sidebar user has a Microsoft Teams account but isn't signed in, they're prompted to sign in.

Differentiating between Sidebar and Microsoft Teams users

To differentiate Sidebar users from the Microsoft Teams users, a Microsoft Teams icon displays next to the Microsoft Teams user name. The Microsoft Teams icon displays next to Microsoft Teams user names in discussion windows and search results, but not in the activity stream.

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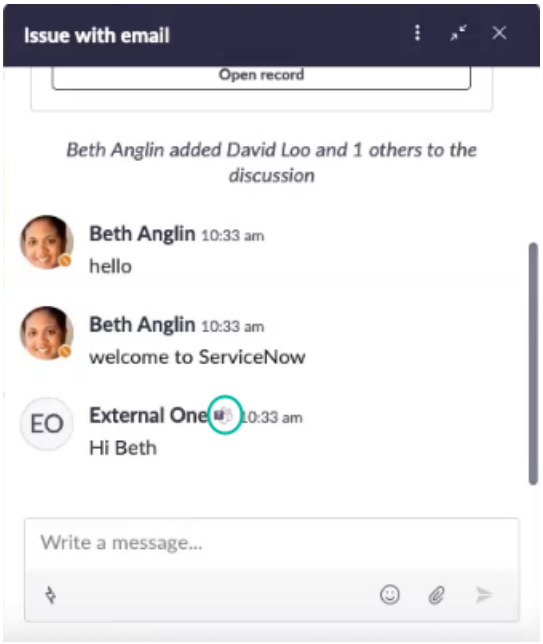
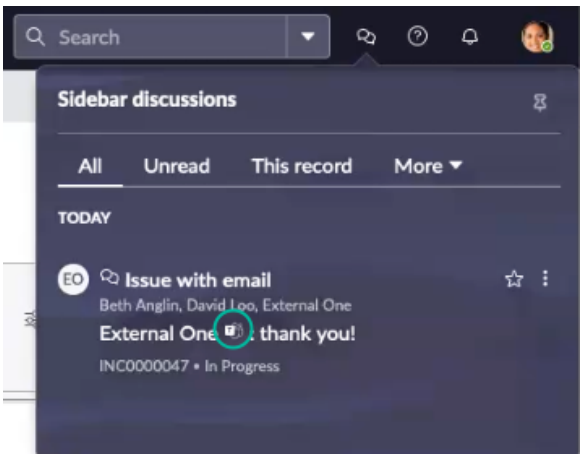
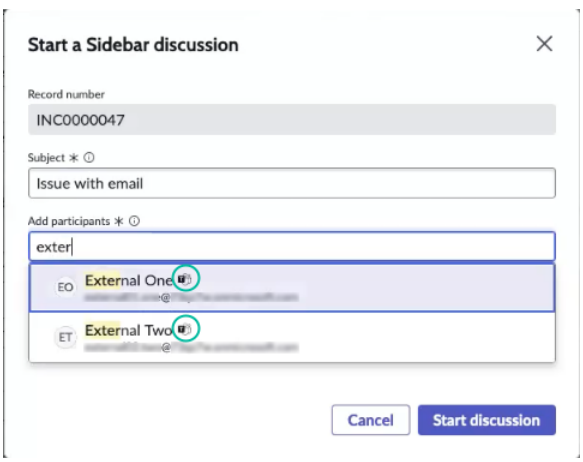
Examples with Microsoft Teams icon

Discussion window with Microsoft Teams icon	
All tab on the Discussion window with Microsoft Teams icon	
Discussion window with Microsoft Teams icon next to search results	

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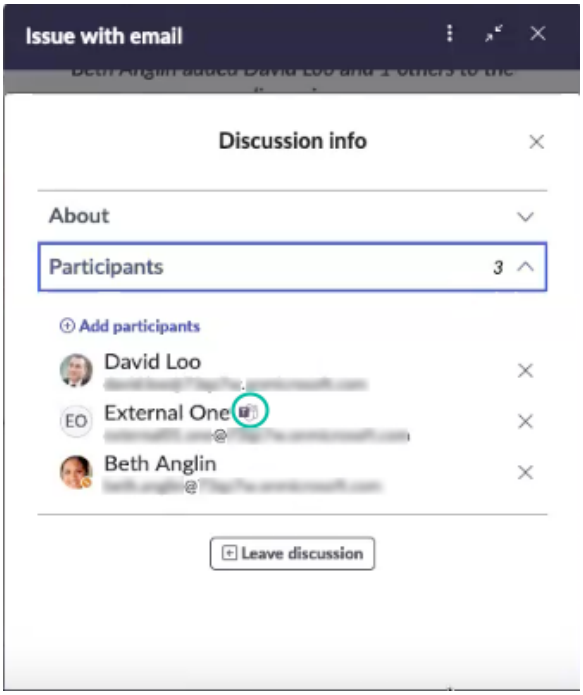
Examples with Microsoft Teams icon (continued)

Discussion info window with Microsoft Teams icon	

Adding users to a discussion

Sidebar users can enter the partial or full name of a user that they want to add to the discussion. If the user exists in the system, the user's name appears and can be selected to be added to the discussion. Users who have access to Microsoft Teams but not ServiceNow can be identified by the Microsoft Teams logo in their avatar image. Microsoft Teams users can add participants to the discussion by adding them to the group chat on Microsoft Teams. Doing this automatically adds those users to the discussion in Sidebar.

Sending messages between Sidebar and Microsoft Teams

After Sidebar and Microsoft Teams are integrated, you can send these types of messages between the two applications:

- Messages with plain text
- Messages with emojis
- Messages with URLs
- Messages with attachments

Actions performed in the Sidebar discussion are reflected in Microsoft Teams and actions performed in Microsoft Teams are reflected in Sidebar. If you reply to a message in a Microsoft Teams group chat, the message displays in Sidebar however, it doesn't display as a reply to the original message.

Errors messages appear in these situations:

- If Sidebar is unable to deliver a message to a Microsoft Teams user, the message "Not delivered in Teams" displays. Depending on how error message notifications in Sidebar are configured, the message displays to just the Sidebar user who sent the message or to all Sidebar users in the discussion.

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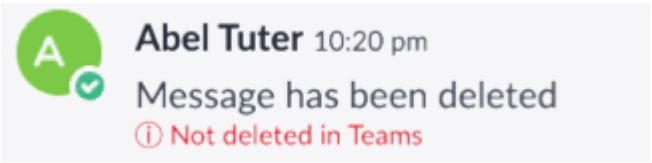
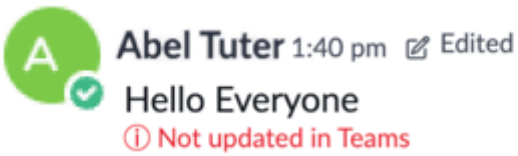
- If you delete a message that you previously sent from Sidebar to Microsoft Teams but Microsoft Teams is unable to delete the message, then the message "Not deleted in Teams" displays.



- If you edit a message that you previously sent from Sidebar to Microsoft Teams but Microsoft Teams is unable to update the message, then the message "Not updated in Teams" displays.



Removing users from a discussion

Sidebar users can remove a Microsoft Teams user from a Sidebar discussion. When a Microsoft Teams user is removed from a discussion, Sidebar and Microsoft Teams users see a message that the user has been removed from the discussion. After a Microsoft Teams user is removed from the discussion, that user can still access the group chat on Microsoft Teams and view older messages, but they can no longer participate in the discussion. If a Microsoft Teams user leaves a discussion on their own, both Sidebar and Microsoft Teams users see a message that the Microsoft Teams user has left the discussion.

Message history

If the admin enables Microsoft Teams group chats for a user, the message history of any Sidebar discussions that the user is already participating in aren't preloaded in the Microsoft Teams group chat. In the Microsoft Teams group chat, the user will only receive messages that are sent after the admin enables them to receive Microsoft Teams group chats.

ServiceNow's access to Microsoft Teams messages

ServiceNow's access to Microsoft Teams group chats and messages is restricted to the ones generated as part of the Sidebar and Microsoft Teams integration.

Synchronizing of participants

The discussion participants aren’t synchronized if the integration between Sidebar and Microsoft Teams is changed multiple times.

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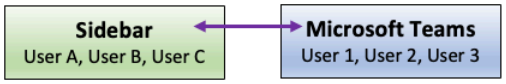
Synchronizing example

Initial configuration



1. Admin activates the Sidebar-Teams integration.



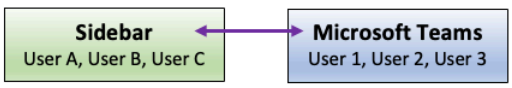
2. Admin deactivates the Sidebar-Teams integration.
3. Sidebar User A is removed from the discussion on Sidebar.
4. Teams User 3 is removed from the Teams group chat and User 4 is added to the Teams group chat.



5. Admin reactivates the Sidebar-Teams integration.

Result

Discussion groups are NOT updated and remain as they were before the Sidebar-Teams integration was deactivated (User A, User B, User C on Sidebar and User 1, User 2, and User 3 on Teams).



Domain separation with Sidebar-Microsoft Teams integration

If Sidebar is integrated with Microsoft Teams, you can't have domain separation on the Microsoft Teams instance. For example, if you've configured two domains on ServiceNow but use only one Microsoft Teams instance, you can't partition the Microsoft Teams instance to have part of it point to one domain and the other part to another domain.

Integrate Sidebar and Microsoft Teams

Enable conversations between Sidebar and Microsoft Teams users by integrating Sidebar with Microsoft Teams.

Follow these steps to integrate Sidebar and Microsoft Teams.

> **Note:**
> Some resources below require you to log in to sites like ServiceNow University, Now Create, or the ServiceNow Community. If the expected resource does not load, please log in and try to access the resource again.

1. Install the store app on the Washington DC instance.
2. Create the Microsoft Teams developer account and Azure app. See KB article KB1225842 for more information.
3. Create the Microsoft Teams app. See KB article KB1225842 for more information.
4. Enable the Microsoft Teams integration using the information in Enable the Microsoft teams integration.

Enable or configure the Microsoft Teams integration

Enable or configure the Microsoft Teams integration as part of integrating Sidebar with Microsoft Teams.

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Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select Sidebar.
3. On the Integrations card:
   - If Sidebar and Microsoft Teams are not already integrated, select **Set up**.
   - If Sidebar and Microsoft Teams are already integrated, select **View configuration** from the Manage drop-down list.
4. On the Microsoft Teams Integration screen, slide the activate toggle to allow or prevent Microsoft Teams users from participating in Sidebar discussions.
   - When this is switched on, Microsoft Teams users that previously had access to Sidebar will regain access and any Microsoft Teams users that are newly included will gain access to Sidebar.
   - When this is switched off:
     - Microsoft Teams users that previously had access to Sidebar will no longer have access to Sidebar.
     - Any Microsoft Teams users that are newly included will not gain access to Sidebar.
     - Existing discussions will become inactive in Microsoft Teams. Microsoft Teams users will still be able to access older messages in a Microsoft Teams group chat, but any messages sent in those group chats will not be sent to Sidebar.
     - Existing discussions will remain active for Sidebar users.
5. Enter **Client Secret**, **Callback URL**, and **Redirect URL**.

Note:
For more information about the Microsoft Azure Portal fields needed, see Use the portal to create an Azure AD application.

Field	Description
Application (client) ID	ID associated with the app created in the portal.
Directory (tenant) ID	ID associated with the Microsoft Teams organization that will be linked to Sidebar discussions.
App ID	ID used to subscribe to Sidebar conversations from Microsoft Teams.
Client Secret	Auto-assigned credentials used to authenticate the Microsoft Azure app with Microsoft. If this field is changed, then a new integration setup will be triggered.
Callback URL	Web location Microsoft Teams uses to send a response to Sidebar. For your own instance, add the value like https://your-instance.service-now.com/api/now/

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Field	Description
	collaboration_chat_event_processor/chats. If this field is changed, then a new integration setup will be triggered.
Redirect URL	Web page that appears after you successfully log in to Microsoft Teams. If this field is changed, then a new integration setup will be triggered.

6. Select **Save**.

Manage Microsoft Teams permissions

Configure which groups or users can access Sidebar discussions in Microsoft Teams.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings**.
2. Select Sidebar.
3. From the **Manage** drop-down list on the Integrations card, select **View permissions**.
   The Microsoft Teams permissions page appears.
4. Select the Groups tab or the Users tab.

Groups tab

Field	Description
Filter by	Use the filter fields to limit which users display in the Available users list.
Apply Filter button	Select **Apply Filter** to limit the groups in the Available Groups list using the filter fields.
Available groups	Select the groups that can access the Sidebar discussions in Microsoft Teams.
Selected groups	List of the groups that can access Sidebar discussions in Microsoft Teams. To remove access, select X next to the group name. **Note:** All of the users in the selected group will have access to the discussions.

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Users tab

Field	Description
Filter by	Use the filter fields to limit which groups display in the Available groups list.
Apply Filter button	Select **Apply Filter** to limit the users in the Available users list using the filter fields.
Available users	Select the users that can access the Sidebar discussions in Microsoft Teams.
Selected users	List of the users that can access Sidebar discussions in Microsoft Teams. To remove access, select X next to the user name.

5. Select **Save**.

Using Sidebar

You can create a Sidebar discussion for a task-based or interaction record from either a configurable workspace or a Next Experience Core UI record page.

Before you begin

Role required: users with access to the record associated with the Sidebar discussion

Procedure

1. Navigate to the workspace in which you want to start a Sidebar discussion.
   If you want to initiate a Sidebar discussion in a Customer Service Management (CSM) workspace, the CSM plugin for that workspace must be activated.
2. Select the list icon  .
3. From Lists, navigate to and select the case, interaction, or incident for which you would like to start a Sidebar discussion.
4. On the Details screen, you can start a new discussion or join an existing discussion by selecting **Discuss**.
   - If the Sidebar discussion exists, the corresponding discussion dialog appears.
   - If a Sidebar discussion doesn't exist, the Start a Sidebar discussion dialog appears. Fill out the fields and then select **Start discussion**:

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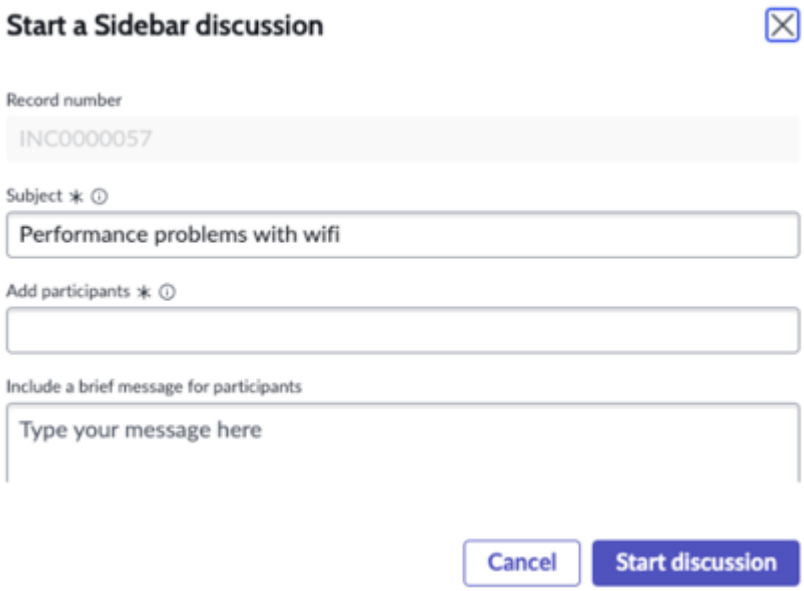

- Record number - the task or incident number associated with the Sidebar discussion.
- Subject - this field is pre-populated with the record's short description. If the Subject starts with a number in parentheses, the number indicates what number this discussion is for the record. For example, if the subject line has "(2) Email issue," the "2" indicates this is the second discussion for the email issue record. You can edit or add to the Subject field.
- Add participants - if an assignment group was entered for this case/interaction/incident, this field is pre-populated with the members of the assignment group. You can also manually enter the participants you would like to include in the discussion. Only users who have access to the record can be added as participants. For more information, see Configuring Sidebar member query.
- Include a brief message for participants - enter a short message for the participants of the Sidebar discussion.

5. To return to a previous Sidebar discussion, you can select the Discussion icon or select one of the tabs in the overflow menu.
6. After a discussion has been started, you can edit and delete messages.

7. To call out a user, enter `@user` (where `user` is the name of the user).
   - If you don't know the user's name, enter `@` to display a list of users and select someone from that list.
   - Only users who have access to the underlying record display in the list.
   - The list is divided into users who are currently participating in the discussion (participants) and users who aren't (non-participants).
   - The user is notified that they were mentioned in a Sidebar discussion message. The Sidebar discussions chat icon displays a number indicating unread messages or mentions.

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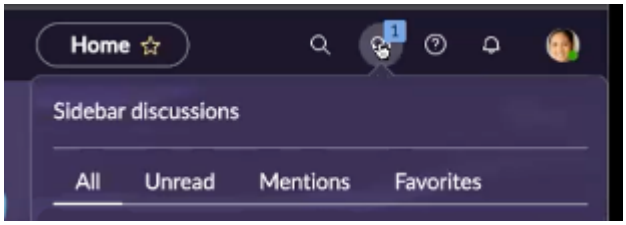
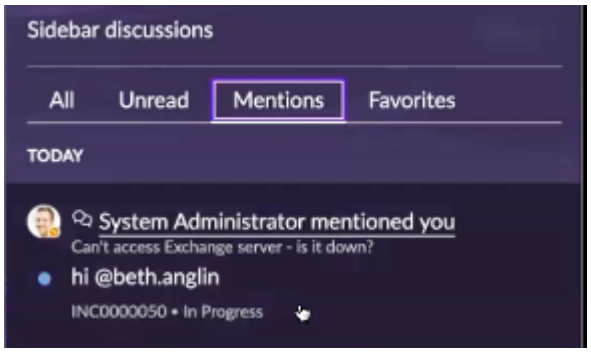


- If the user selects the Mentions tab, the messages in which the user was mentioned using @user display.



- If the user selects the message preview card, the corresponding message displays with the exact message containing the @mention highlighted.
- If Sidebar and Microsoft Teams are integrated, Microsoft Teams users are differentiated from Sidebar users with a Microsoft Teams icon.

8. When you're finished, close or exit the discussion.
   - To close the discussion dialog (but not exit the discussion), select .
   - To exit the discussion, select **Leave discussion**.

Sidebar reference

Read information about how Sidebar works with domain separation.

Domain separation and Sidebar

Domain separation and Sidebar

Domain separation is supported for Sidebar . Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

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Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Overview

To set up domain separation for Sidebar, enable domain separation for your instance. If your instance has multiple domains, you can turn Sidebar on or off for each domain. No special configuration is needed to configure a domain-separated environment with Sidebar. Domain separation for Sidebar is supported only when domains are set up using a parent-child domain hierarchy.

Sidebar discussions are domain separated according to the base record (task or interaction record). You can see and create sidebar discussions only if you have access to the task or interaction record.

For example, say INC00001 belongs to the record created in the ACME domain and the Cisco domain doesn't have access to INC00001. Users that belong to the Cisco domain can't interact with Sidebar discussions based on INC00001.

Sidebar versions for domain separation

To fully utilize domain separation, you must be on both the Vancouver version and August version of the Sidebar store app (Omni Experience Standard Feature Set).

If you are a first time Sidebar user in Vancouver (you did not use Sidebar earlier and are not trued up to the Vancouver store app) and want to leverage domain separation, Sidebar is inactive by default. Navigate to the Conversational Interfaces settings page for each domain and activate Sidebar manually. Alternatively, you can access the sys_cs_collab_settings table and manually insert a new record for each domain.

There is a known issue with emojis not working as expected when used with domain separation. A workaround for this issue is to go to the Enable Emojis ACE Content block and update the record field with the sys_cs_collab_settings record's sys_id for the given domain.

Domain separation with the Sidebar and Microsoft Teams integration

If Sidebar and Microsoft Teams are integrated and configured, activating Sidebar prompts a message stating that the Microsoft Teams integration must be manually turned on and deactivating Sidebar prompts a message stating that the integration with Microsoft Teams will also be turned off.

Domain separation will not work with Microsoft Teams if multiple domains are configured. Pairing a unique Microsoft Teams with each domain is not supported.

Related topics

Domain separation for service providers

Conversational Interfaces Diagnostic Tool

Use the Conversational Interfaces Diagnostic Tool to identify, troubleshoot, and find solutions for issues with conversational interfaces, before reaching out to Now Support.

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Get started

Explore	Use
	
Learn about the features of the diagnostic tool.	Use the tool to resolve errors and solve configuration issues with Microsoft Teams and Advanced Work Assignment.

Troubleshoot and get help

- Virtual Agent and Natural Language Understanding (NLU) community forum
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring Conversational Interfaces Diagnostic Tool

The Conversational Interfaces Diagnostic Tool lets admins search for, identify, and resolve issues with conversational interfaces.

Overview

The Conversational Interfaces Diagnostic Tool lets admins search for, identify, and resolve issues with conversational interfaces.

Technical support engineers set up the Conversational Interfaces Diagnostic Tool on the server. Technical support engineers create and manage the Conversational Interfaces diagnostic category records and content that the Conversational Interfaces Diagnostic Tool uses.

After the technical support engineers create the diagnostic categories and content, admins can start using the Conversational Interfaces Diagnostic Tool on the web client. Admins must have the admin or virtual_agent_admin role.

The Conversational Interfaces Diagnostic Tool is available for both Virtual Agent and Virtual Agent Lite.

Note:
Before using the Conversational Interfaces Diagnostic Tool, admins must activate the Conversational Interfaces - Diagnostics plugin (sn_ci_diagnostics) available on the ServiceNow® Store store.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Conversational Interfaces Diagnostic Tool workflow

After you've described the issue you want to solve, the Conversational Interfaces Diagnostic Tool workflow begins using the relevant diagnostic topics and topic blocks. These topics and topic blocks are used for identifying, diagnosing, solving, and collecting data for the issue described.

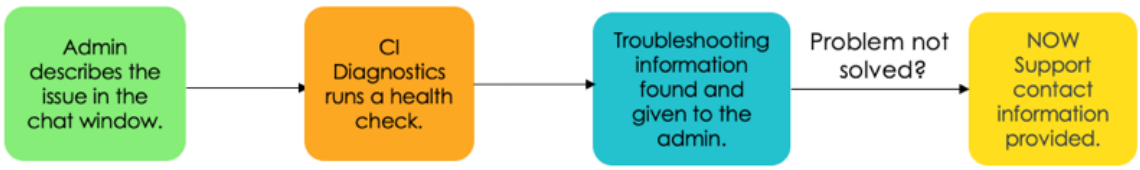
For example, the diagnostic workflow does the following:

- Prompts you for the required data, based on the issue you want to solve.
- Includes a list of Knowledge Base (KB) articles where you can find more information, as applicable. If you aren't finding the information you need, you can also search for additional KB articles.
- Gives you the option of downloading diagnostic support information.
- Lets you select another issue to solve.

The diagnostic workflow and the options and prompts you see correspond to the issue you are trying to diagnose and solve. The diagnostic workflow uses an AI Search filter as part of the diagnosis. For more information about AI Search and how to configure it, see Configuring AI Search.

The diagnostic topic block workflow also includes solutions for messaging integrations, such as Microsoft Teams. It also helps with Advanced Work Assignment configuration issues.

Conversational Interfaces Diagnostic Tool workflow



In the workflow, the admin describes the issue. The tool runs a health check and returns available troubleshooting information, as well as contact information for Now Support if the problem was not solved.

Conversational Interfaces Diagnostic Tool benefits

Benefit	Feature	Users
Diagnose general errors, such as error messages and system property issues.	Diagnose Conversational Interfaces errors	Admins
Identify and solve Microsoft Teams configuration issues.	Diagnose Microsoft Teams configuration issues	Admins
Identify and resolve common Advanced Work Assignment (AWA) configuration issues.	Diagnose Advanced Work Assignment configuration issues	Admins

Using the Conversational Interfaces Diagnostic Tool

Use the tool to diagnose general Conversational Interfaces errors and system property settings, as well as issues with Microsoft Teams and Advanced Work Assignment configuration.

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Diagnose Conversational Interfaces errors

Use the Conversational Interfaces Diagnostic Tool to resolve issues related to conversational interfaces such as error messages and system property issues before reaching out to Now Support.

Before you begin

Role required: virtual_agent_admin or admin

About this task

Use this task to resolve errors and find and change system property values.

Procedure

1. Start a conversation with the Virtual Agent chatbot.
2. At the greeting message, type `diagnostic pre chat`.
3. Describe the issue that you want to solve.

   If it is an error message issue, you can copy-and-paste or type the error message into the chatbot conversation.

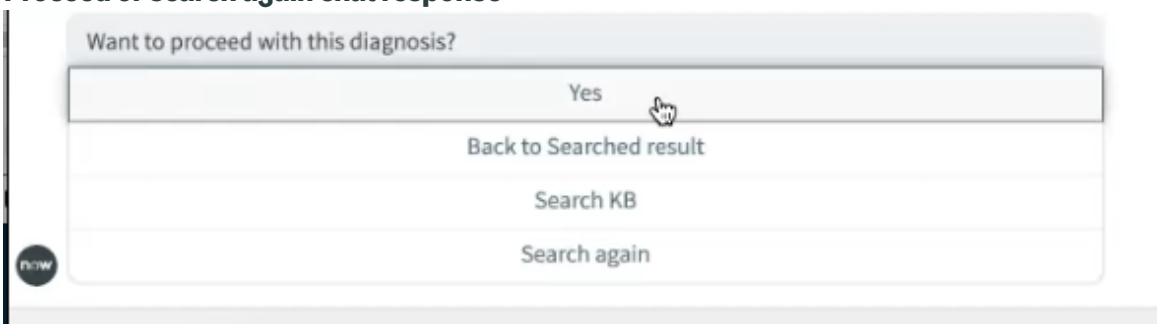
   For system properties, you don't need to know the exact name of the system property. Type a feature name related to the property to see a list of matching system properties.

   When your input matches an existing system property, but that property isn't in your instance, you see the system property name followed by two dash lines. For example: `some.property.name--`

   Find or create the system property on your instance and make changes, as applicable.

   The tool displays a list of solutions.
4. Select the solution that you want to use.
   The Diagnostic Tool asks if you want to proceed with the diagnosis.

   Proceed or search again chat response

5. Select **Yes** to continue.
   The tool initiates the workflow and leads you through the relevant prompts. The prompts you see depend on the issue you want to diagnose and solve.
6. Answer the prompts.
   When the diagnosis is complete, the Diagnostic Tool displays a recommended solution.

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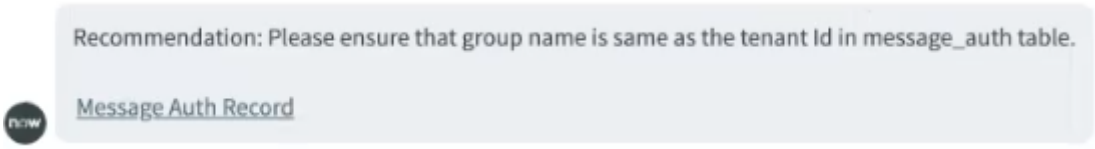
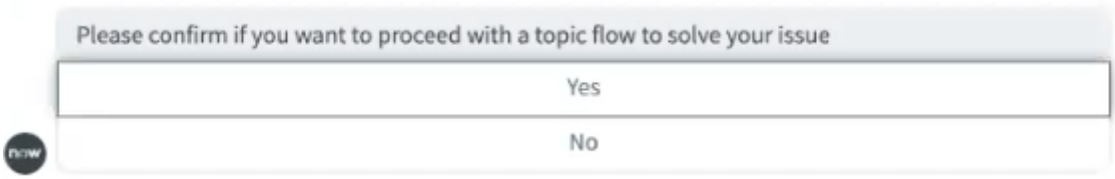
Issue recommendation



Issue confirmation

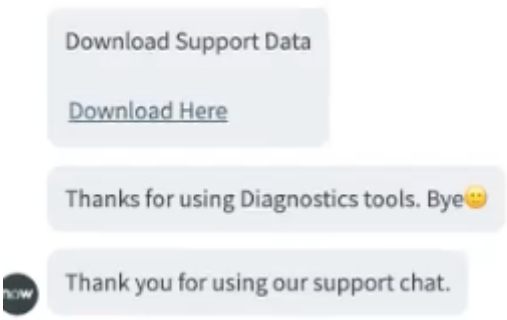


7. Select **Yes** to confirm, or select **No** to end the workflow.
   The Diagnostic Tool guides you through the relevant workflow. The options and prompts you see depend on the issue you want to solve. Reply to the prompts, as applicable. You may also see a link to the relevant Knowledge Base (KB) article where you can find more information.
8. Provide feedback.
   When asked whether the solution was helpful, select one of the following:
   - Select **Yes**, if the solution wasn't helpful.

     You are asked to provide additional information that helps fine-tune the solution.

     The prompts you see vary by the issue that you want to solve.
   - Select **No** to confirm that the solution was helpful and to exit the workflow.
   - You may see a link that you can use to download support data.

     Prompt to download support data

9. **Optional:** Click the link to download support data.

Diagnose Microsoft Teams configuration issues

Use the Conversational Interfaces Diagnostic Tool to identify and help solve Microsoft Teams configuration issues before reaching out to Now Support.

Before you begin

Role required: virtual_agent_admin or admin

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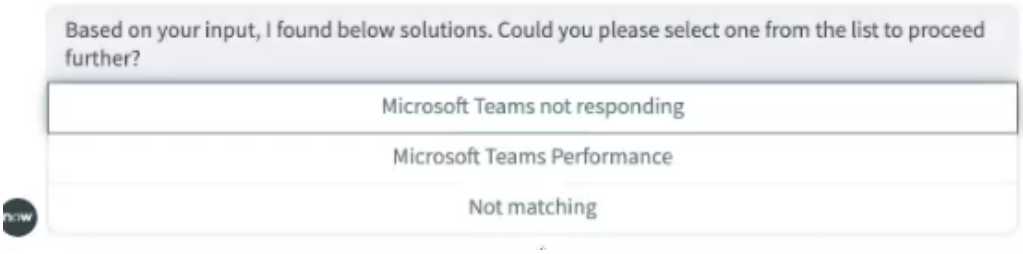
Procedure

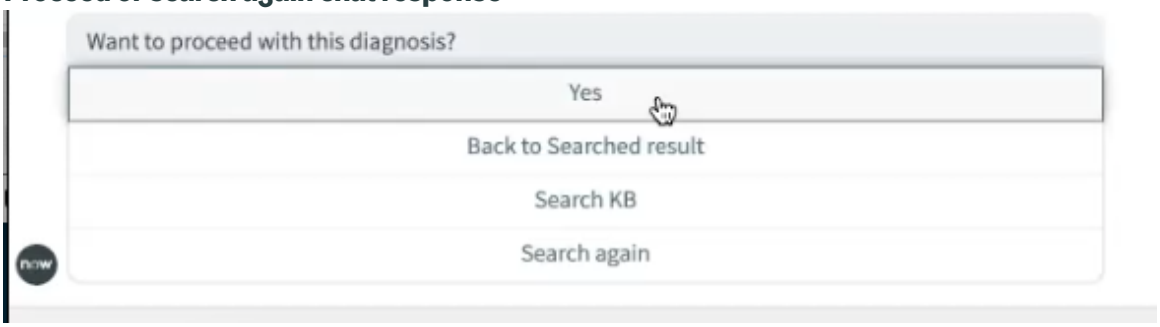
1. Start a conversation with the Virtual Agent chatbot.
2. At the greeting message, type `diagnostic pre chat`.
3. Describe the issue that you want to solve.
   For example, if the Microsoft Teams application isn't responding, you can type `no response`.
   The tool displays a list of solutions.

   Example solutions for "no response"



4. Select the solution that you want to use.
   The Diagnostic Tool asks if you want to proceed with the diagnosis.

   Proceed or search again chat response



5. Select **Yes** to continue.
   Lists of Health Check Parameters and MS Teams Tenant Configurations display.

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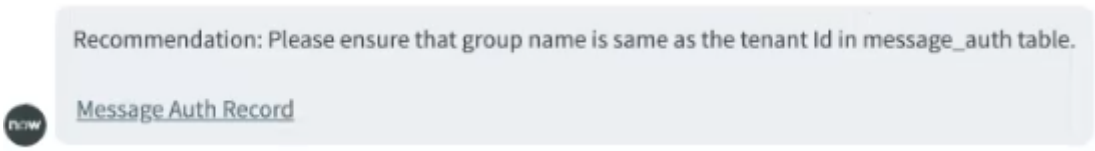
Health check parameters and tenant configuration status

Health Check Parameter	Value
Are all Nodes Online?	true
Does user have the admin role?	true
Is the Conversational Integration with Microsoft Teams plugin installed?	true
Are the dependent plugins installed?	true
Are the dependent store apps installed?	true
Are notifications enabled?	false

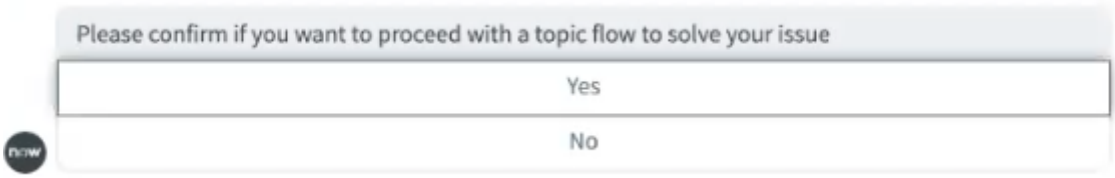
MS Teams Tenant Configurations	Value
Tenant ID	aadda82c-7cd1-4d94-a60a-1b1578428a0b
Has a record been created in the sys_cs_provider_application table?	true
Is a valid message_auth linked to the Provider Application?	true
Is the message_auth group name same as tenant_id?	false

6. Review the values for any parameters that are set incorrectly.
   For example, if a value is set to **False** when it should be set to **True**.
   When the diagnosis is complete, the Diagnostic Tool displays a recommended solution.

Issue recommendation



Issue confirmation



7. Select **Yes** to confirm, or select **No** to end the workflow.
   The Diagnostic Tool guides you through the relevant workflow. The options and prompts you see depend on the issue you want to solve. Reply to the prompts, as applicable. You may also see a link to the relevant Knowledge Base (KB) article where you can find more information.
   For example, you may see a link to the Master KB article for common and known issues with Microsoft Teams.
8. Provide feedback.
   When asked whether the solution was helpful, select one of the following:

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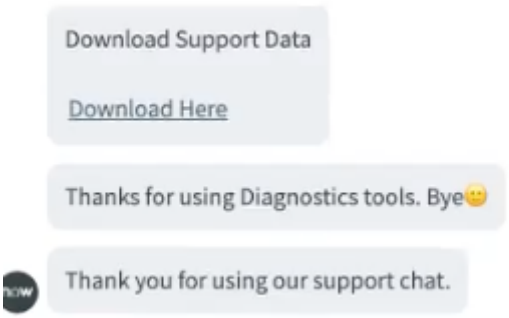
- Select **Yes**, if the solution wasn't helpful.

  You are asked to provide additional information that helps fine-tune the solution. For example, you may be asked to provide the MS Teams Bot tenant ID, or asked if the instance has been cloned from another instance.

  The prompts you see vary by the issue that you want to solve.

- Select **No** to confirm that the solution was helpful and to exit the workflow.
- You may see a link that you can use to download support data.

Prompt to download support data



9. **Optional:** Click the link to download support data.

Diagnose Advanced Work Assignment configuration issues

Use the Conversational Interfaces Diagnostic Tool to identify and resolve common Advanced Work Assignment (AWA) configuration issues before reaching out to Now Support.

Before you begin

Role required: virtual_agent_admin or admin

About this task

Solve issues with your AWA configuration. For example, you can solve issues such as **No Agents Available** messages.

Procedure

1. Start a conversation with the Virtual Agent chatbot.
2. At the greeting message, type `diagnostic pre chat`.
3. Describe the issue that you want to solve.
   You can type or paste the error message into the chatbot conversation. For example, you can type `No Agents Available`.
   The tool displays a list of solutions.
4. Select the solution that you want to use.
   The solutions correspond to the issue that you want to solve.
   The Diagnostic Tool asks if you want to proceed with the diagnosis.

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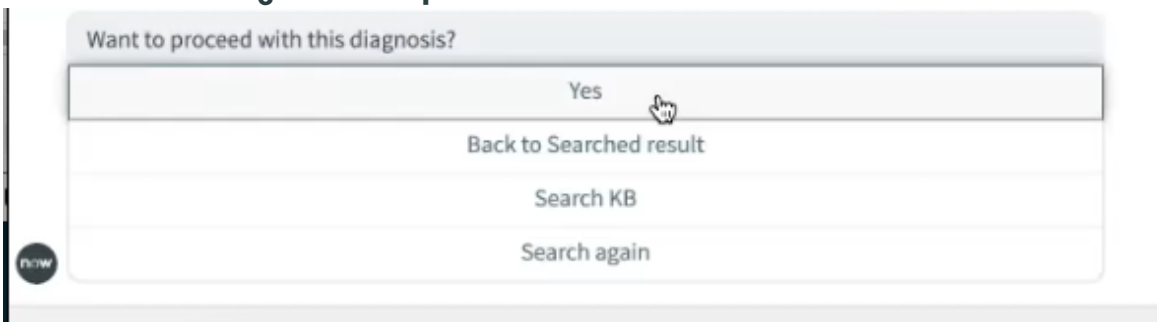
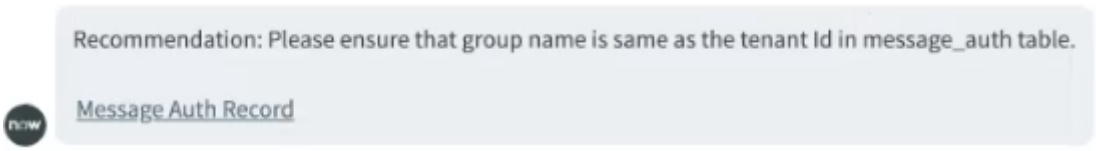
Proceed or search again chat response

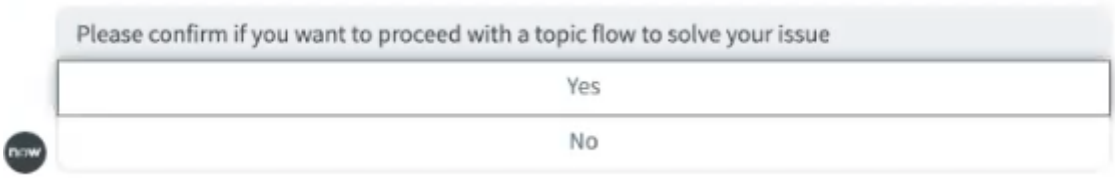


5. Select **Yes** to continue.
   The tool initiates the workflow and leads you through the relevant prompts. The prompts you see depend on the issue you want to diagnose and solve.
6. Answer the prompts.
   When the diagnosis is complete, the Diagnostic Tool displays a recommended solution.

Issue recommendation



Issue confirmation



7. Select **Yes** to confirm, or select **No** to end the workflow.
   The Diagnostic Tool guides you through the relevant workflow. The options and prompts you see depend on the issue you want to solve. Reply to the prompts, as applicable. You may also see a link to the relevant Knowledge Base (KB) article where you can find more information.
8. Provide feedback.
   When asked whether the solution was helpful, select one of the following:
   - Select **Yes**, if the solution wasn't helpful.

     You are asked to provide additional information that helps fine-tune the solution.

     The prompts you see vary by the issue that you want to solve.
   - Select **No** to confirm that the solution was helpful and to exit the workflow.
   - You may see a link that you can use to download support data.

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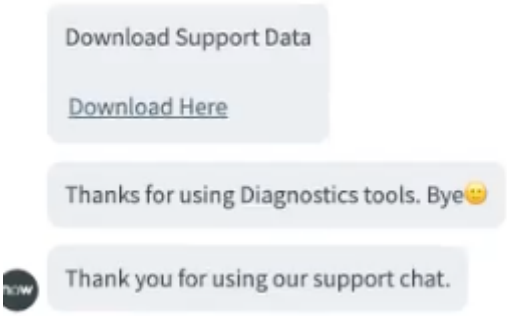
Prompt to download support data



9. Optional: Click the link to download support data.

Additional resources for Conversational Interfaces

If you're looking for Conversational Interfaces (CI) best practices, troubleshooting, or other implementation guidelines, select a feature or resource type to discover ServiceNow® resources on other relevant websites.

Resource links

CI features	Resource type	Resources
Agent Chat	Release notes	Agent Chat release notes
Agent Chat	Getting Started	Agent Chat quick start guide (ServiceNow Community)
Agent Chat	FAQs	Agent Chat FAQ
Now Assist in Virtual Agent	Tips and examples	When to consider Now Assist in Virtual Agent How to request catalog items in Now Assist in Virtual Agent Now Assist in Virtual Agent conversational catalog ordering
Sidebar	Release notes	Sidebar release notes
Sidebar	Getting Started	Sidebar - Product Briefing
Sidebar	Tips and examples	Enable Sidebar users to collaborate with Microsoft Teams users
Sidebar	FAQs	Sidebar FAQ
Virtual Agent	Release notes	Virtual Agent release notes

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Resource links (continued)

CI features	Resource type	Resources
Virtual Agent	Getting Started	Virtual Agent Fundamentals (ServiceNow University) Virtual Agent Implementation (ServiceNow University) Virtual Agent Integrations (ServiceNow University) Virtual Agent and NLU Quick Start Guide Virtual Agent - Deployment Guide
Virtual Agent	Best practices	The 7 habits for a highly effective chatbot
Virtual Agent	Tips and examples	Virtual Agent - Tips for Implementation Success Virtual Agent implementation checklist - a deeper dive
Virtual Agent	FAQs	Virtual Agent FAQs Virtual Agent NLU FAQs

Manage instance data sources

Data management is critical to success in all aspects of your business. Platform tools give you full control over your data, whether in instances, databases, or third-party applications.

Instance Data Replication IDR



Synchronize data between instances in one-to-one or one-to-many database relationships.

MetricBase



Simplify working with large amounts of data and create time-based analyses.

MID Server



Communicate and transmit data between ServiceNow instances and external applications.

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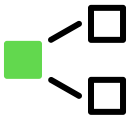
Financial Services Remote Tables	Entity View Action Mapper (EVAM)	
		
Connect your instance on the ServiceNow AI Platform to third-party sources.	Standardize and chart out all data from multiple sources.	

Instance Data Replication (IDR)

Keep your records consistent across any instances or organizations in your business. Instance Data Replication lets you transfer data from one producer instance to one or more consumer instances. Bidirectional (consumer-to-producer) replication is available with IDR, along with specific data table selection, localization or translation, and other options.

MetricBase

Make large data easier to handle with MetricBase. This app summarizes information from larger data sources, and provides time-based records, analytics, and timed or event-based actions. Create graphs of data over time with Reporting to analyze system trends or incidents, or use Workflow Studio to trigger automated data flows.

MID Server

Communicate and share data with external servers, databases, and applications. The Java-based Management, Instrumentation, and Discovery (MID) Server handles various communications from your instance to third-party systems. Maintain optimum performance with automated upgrades, active server monitoring, and a full troubleshooting knowledge base—all included in the MID Server package.

Financial Services Remote Tables

Bring external data into your instance and process it to your specifications with Financial Services Remote Tables. Retrieve data from third-party servers or other ServiceNow AI Platform instances, with options for caching in local memory. View external data without storage, or use script definitions to set up instance cache parameters.

Entity View Action Mapper (EVAM)

Get a standard view of all the data that you work with, using Entity View Action Mapping. The EVAM application enables you to bring multiple data sources together into one view, create templates to map data to UX components, write scripts for triggers based on user interaction, and more.

Entity View Action Mapper

Entity View Action Mapper (EVAM) is an application that standardizes how different data sources display in cards and lists.

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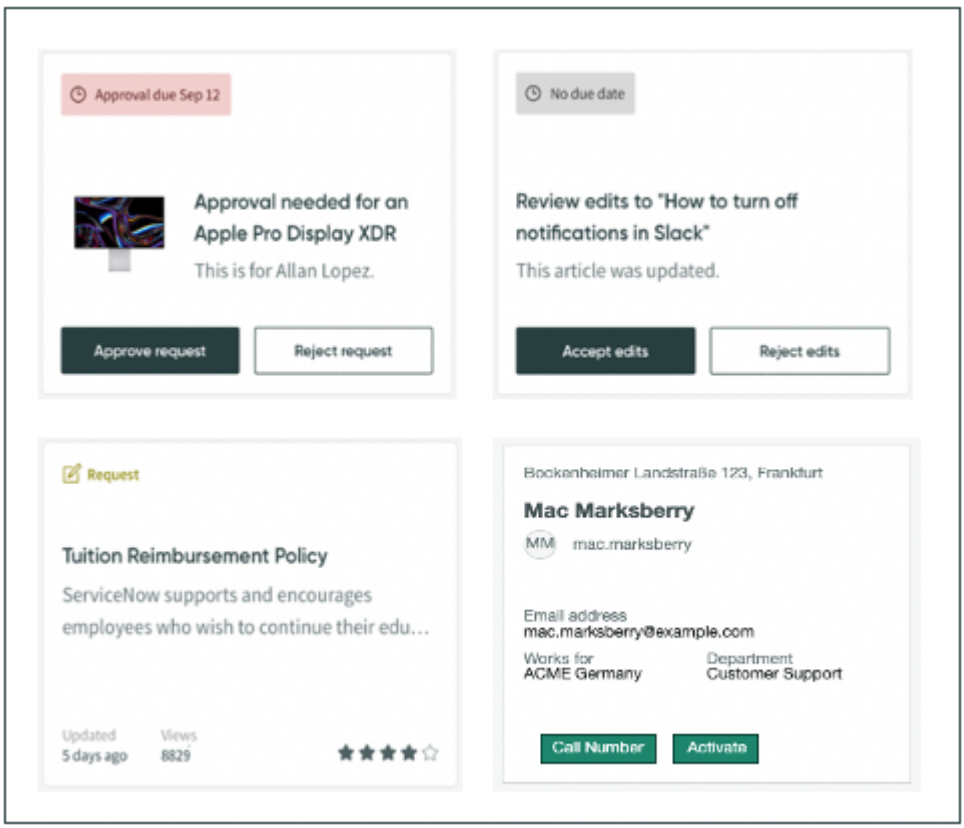
EVAM enables you to show information as a card grid view or as a list of information in a list view. Users can page through large data sets of search results and see different views based on filtering.

Prior to EVAM, lists were restricted to a single type of data source. If there were more data sources, you would have to write a custom implementation. EVAM enables you ingest multiple lists from different data sources, and then configure specific views without the need for customization.



EVAM flow

EVAM consists of the following:

- Entity (datasource) - The entity that has associated data that you intend to display. For example, a community post or a user.
- Map – The mapping process maps the datasource data to component properties that display on the card. You can also associate actions that trigger from the card view.
- View – A view is how a card displays data and actions.
- Actions – An entity can have an action that performs on the card. For example, you can activate a user into your system.

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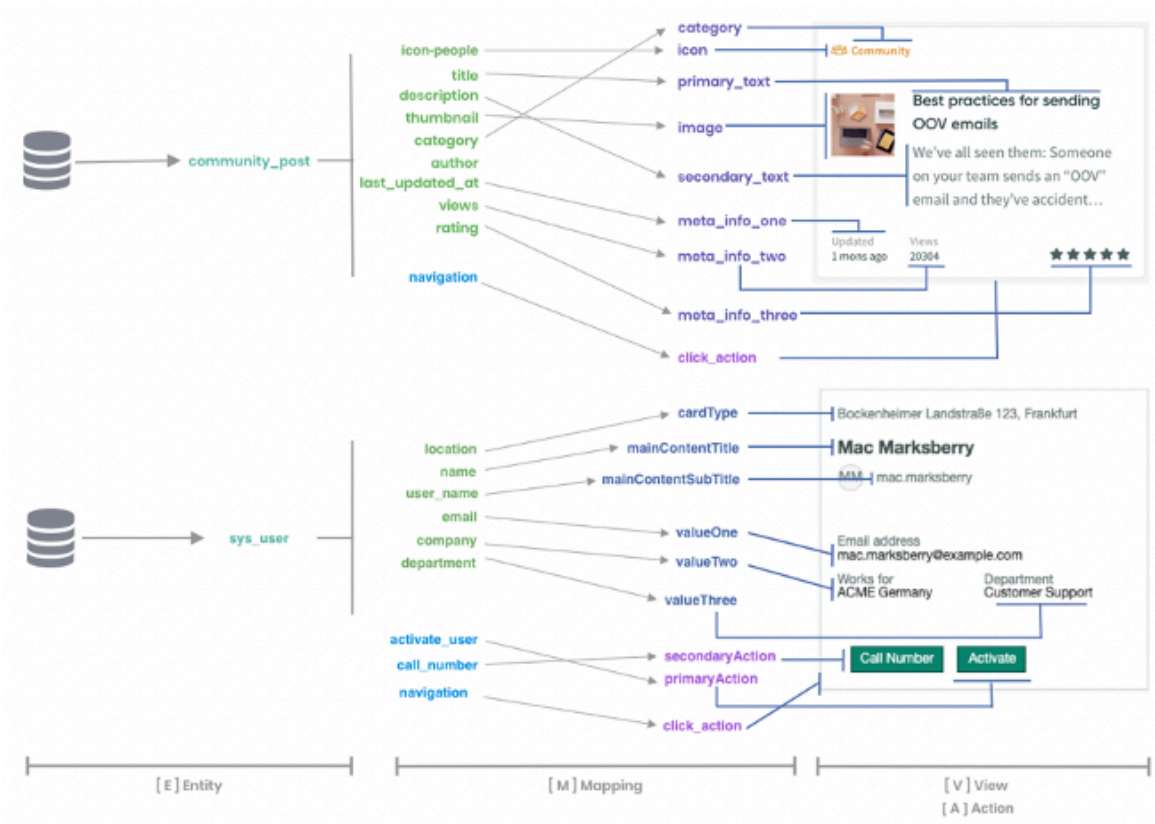

Features of EVAM

Use multiple datasources for a single list view

EVAM can accept multiple disparate datasources and configure the data through sorting and filtering to return the data as a single list.

Define view templates

Map the datasource output to a UX component view by using view templates. You can configure multiple view templates per datasource based on a condition to customize how data displays for users.

Create view configurations to combine conditions, database fields, and declarative actions

Create a view configuration to combine conditions, database fields, and declarative actions with an associated view template. You can also group view configurations together to create configuration bundles.

Enable user interactions to trigger actions

EVAM enables user interactions to trigger a server script or UXF client action.

What to do

- Define a datasource
- Create an EVAM definition
- Associate a view configuration, view template, and action.

Activation information

EVAM is a ServiceNow AI Platform application that is active by default.

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Create a multi-data source list display in Entity View Action Mapper

Use EVAM to take in different datasources, configure views, and show them in a card display view.

Before you begin

Role required: admin or evam_admin

About this task

A typical scenario is showing user requests and incidents in a single display view. A user might want to see requests that can be made from a catalog, such as a computer order. They also might want to see open or closed incidents. These items come from different datasources, but need to display through a consistent standard that can be easily configured.

This tutorial runs through creating an EVAM definition with two datasources, a configuration bundle for each datasource which contains two view configurations, and associated actions and view templates. Many tasks are repeated, instead of repeating each step, the following table lists the unique configurations and definitions:

EVAM Definition	Datasource [Table]	Configuration Bundle	Action	Configuration View	View Template
User Requests	Catalog Requests [Requested Item]	Catalog Request Bundle	Navigation	Open Requests	Open Request Template
				Closed Requests	Closed Request Template
	Incidents Submitted [Incidents]	Incidents Submitted Bundle		Open Incidents	Open Incidents Template
				Closed Incidents	Closed Incidents Template

Procedure

1. Create an EVAM definition for user requests.
   An EVAM definition houses datasources, configuration bundles with associated view configurations, data filters, actions, and templates. After you initially submit your EVAM definition, you will see the related lists to add datasources, configuration bundles, and data filters.

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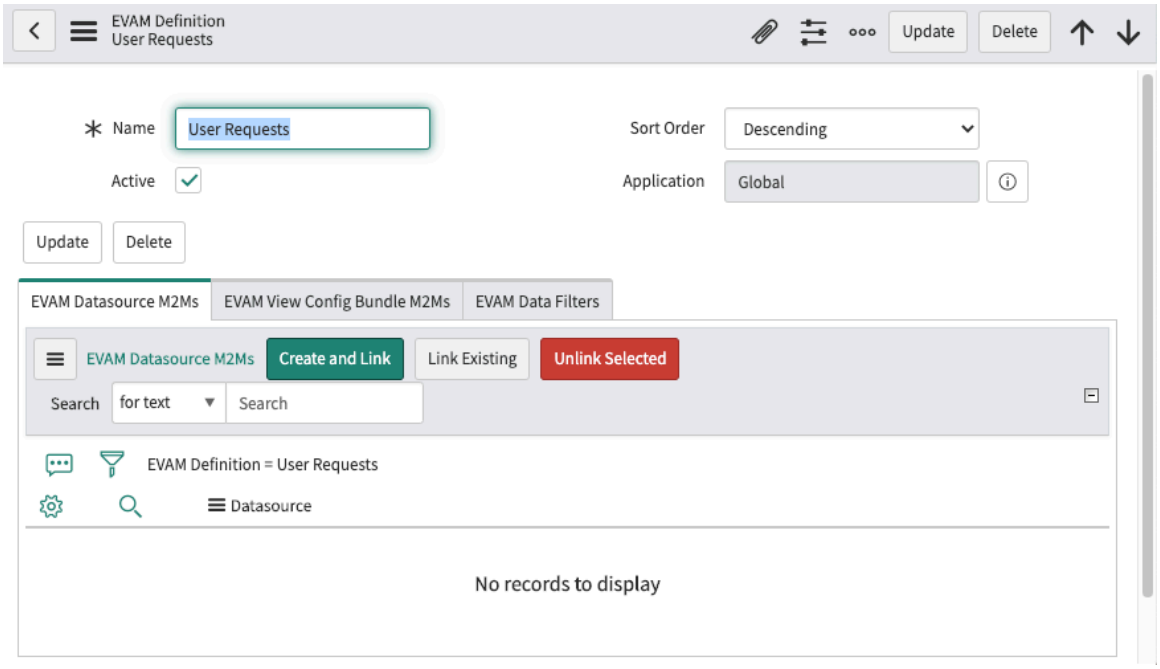
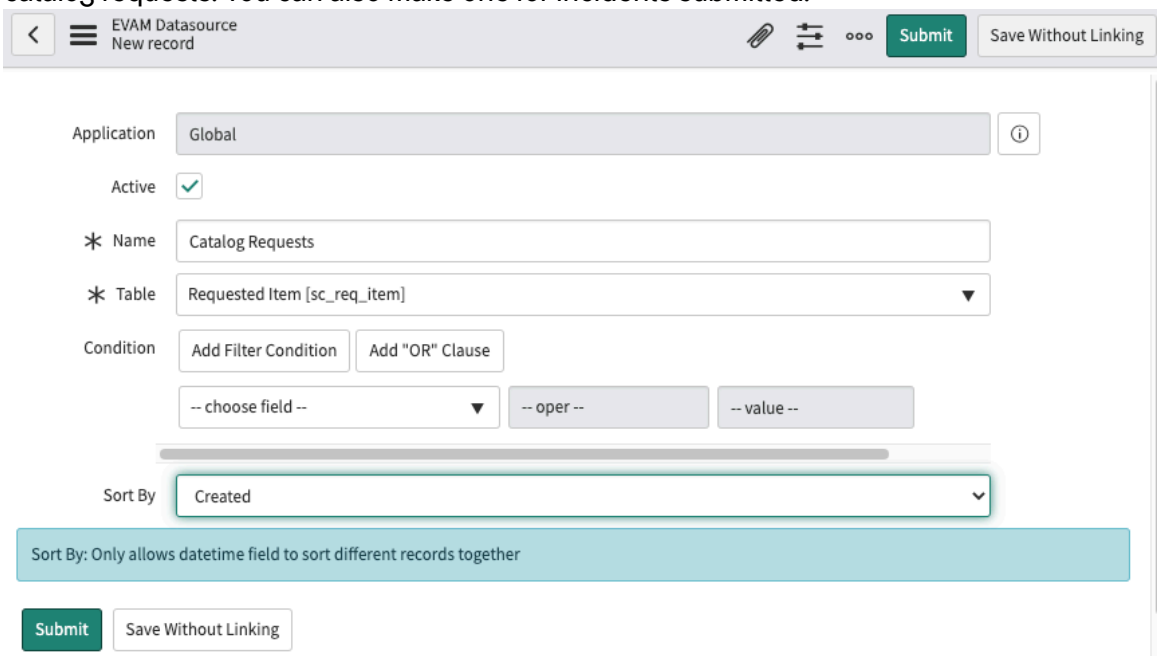


2. Define datasources for your EVAM definition.
   Create and link each datasource to the User Request definition. The initial datasource is for catalog requests. You can also make one for incidents submitted.



3. Create and link a view configuration bundle.
   You should create two configuration bundles, a catalog request bundle and an incidents submitted bundle.

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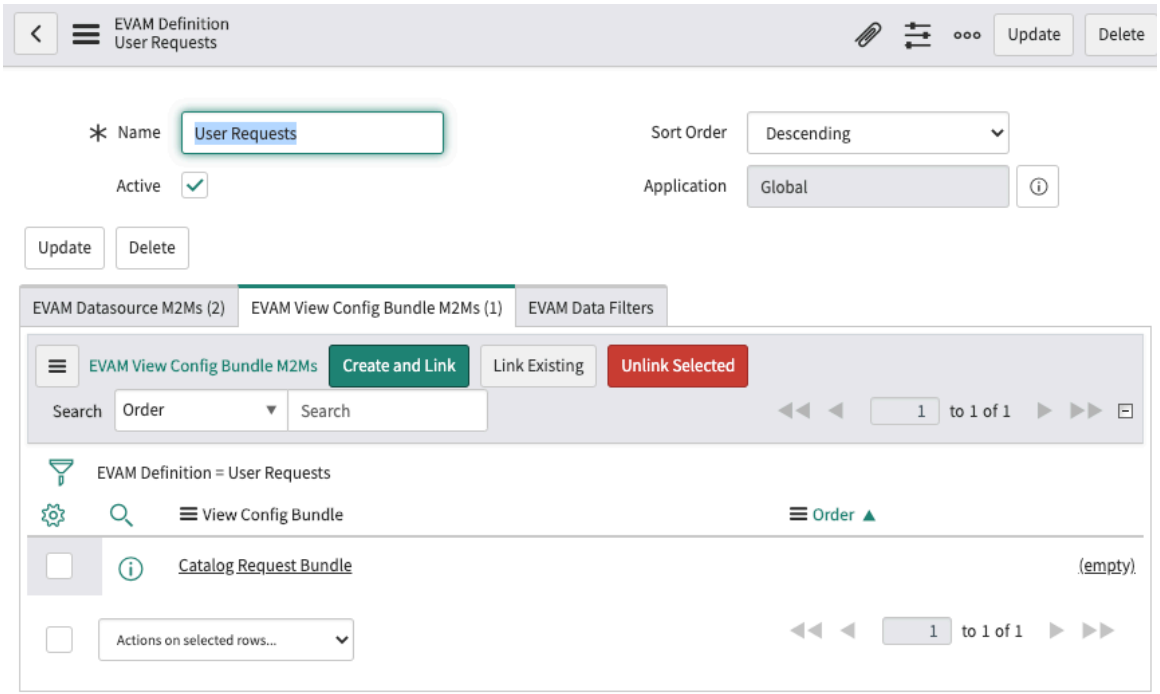
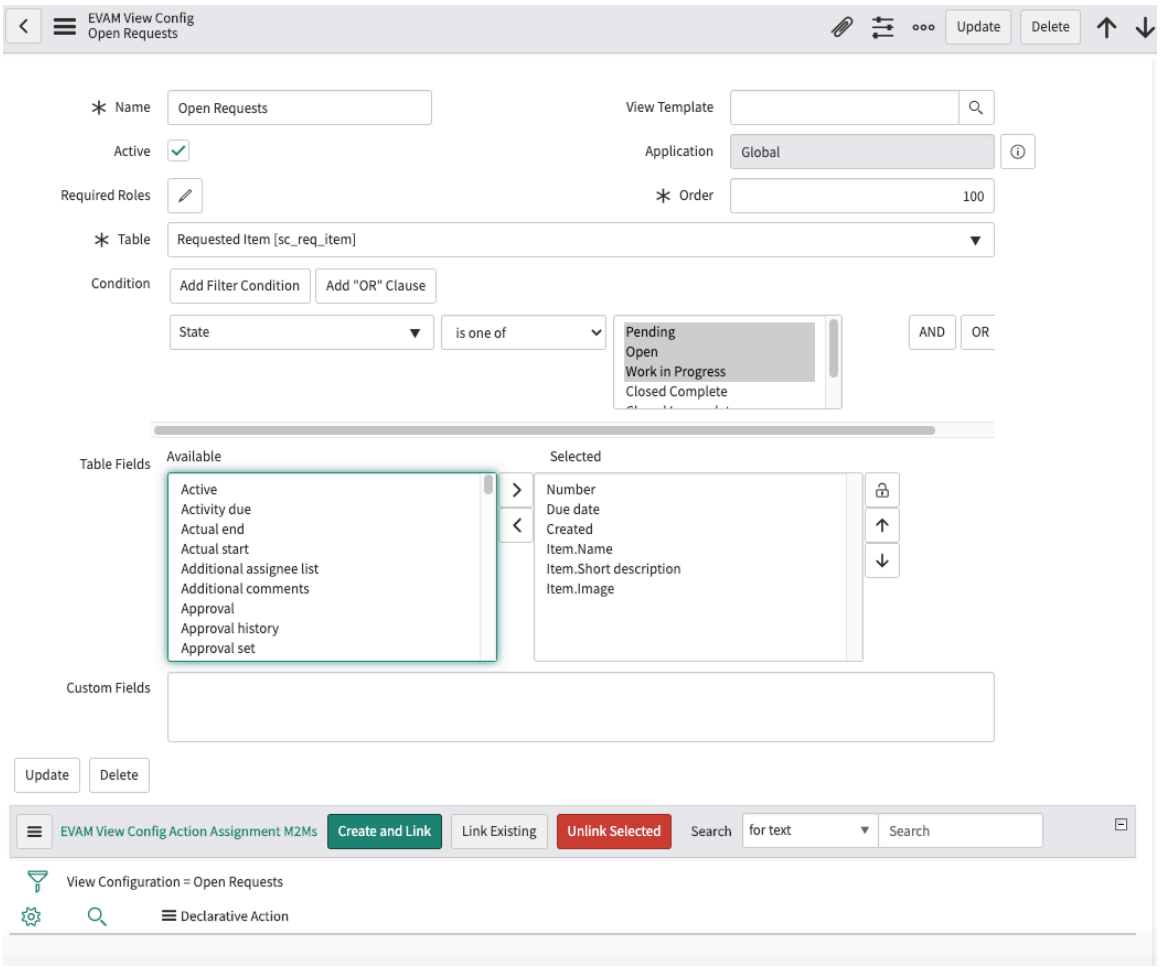


4. Use the Create and Link to add create and add view configurations.

   The first one view configuration will be for Open Requests.



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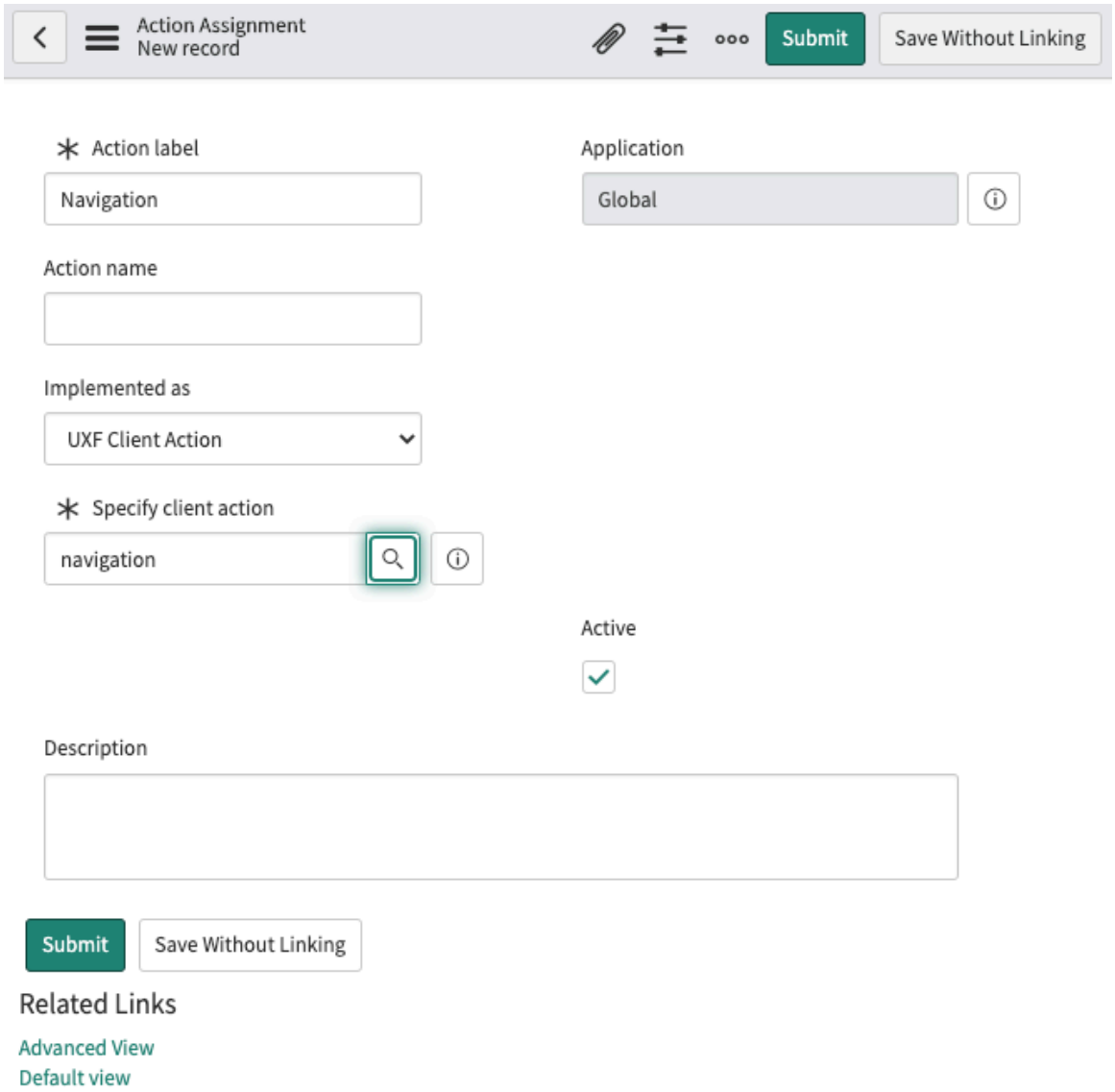
5. Create an action definition.
You can use the create and link related list.



6. Create view templates for requested items and associate with the view configuration.
Here is the template info for the Requested Items Template:

```
{
 "component": "now-card-evam-record",
 "staticValues": {
  "highlightedHeaderIcon": {
   "key": "clock-outline"
  },
  "highlightedHeaderBkgColor": {
   "key": "positive"
  },
  "imageType": {
   "key": "image"
        },
  "detailLabelOne": {
   "translatable": true,
   "key": "created"
  },
```

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```
  "detailLabelTwo": {
   "translatable": true,
   "key": "number"
        }
 },
 "mappings": {
  "highlightedHeaderLabel": "state",
  "titleLabel": "cat_item.name",
  "imageURL": "cat_item.picture",
  "subtitle": "cat_item.short_description",
  "detailValueOne": "sys_created_on",
  "detailValueTwo": "number"
 },
 "actionMappings": {
  "clickAction": "navigation"
 }
}
```

7. Repeat steps 3-5 to add another view configuration for closed requests.
   You created a configuration bundle with one view configuration. Add another configuration called Closed requests. This view configuration references the same datasource [requested item], but uses different conditions to show ().
8. Associate view templates to view configurations, click **Update**.
9. View your finished product.



Create an EVAM definition

Define the list of data sources to render. The EVAM definition is the main record for an EVAM configuration.

Before you begin

Role required: admin or evam_admin

Procedure

1. Navigate to **All** > **Entity View Action Mapper (EVAM)** > **EVAM Definitions**, and then click **New**.
2. On the form, fill in the fields.

Field	Description
Name	Name of the EVAM configuration.
Active	Option to activate the EVAM definition.
Sort Order	Order the data is ordered on the EVAM definition. You can select **Ascending** or **Descending**.
Application	Application scope of the EVAM definition.

3. Click **Submit** and then select your EVAM definition.

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4. In the *EVAM Datasource M2Ms* related list, add a datasource.

Option	Description
Create and Link	You can define a new data source and then link this datasource to your EVAM definition.
Link Existing	You can add a pre-defined datasource to your EVAM definition.
Unlink Selected	You can remove the selected datasource from your EVAM definition.

5. Click **Submit**.
6. In the *EVAM View Config Bundle M2Ms* related list, add a configuration bundle.

Option	Description
Create and Link	You can define a new configuration bundle and then link this bundle to your EVAM defini tion.
Link Existing	You can add a pre-defined configuration bun dle to your EVAM definition.
Unlink Selected	You can remove the selected configuration bundle from your EVAM definition.

After you link the configuration bundles, you can define an order to prioritize the bundles, with the lowest number receiving the higher precedence.

7. In the *EVAM Data Filters* related list, click **New** and fill in the form to add data filters:

Field	Description
Label	Label name of the EVAM data filter.
Active	Option to activate the EVAM data filter.
Order	Priority that the EVAM view configuration takes over other view configurations. To give higher priority to a view configuration, enter a lower number.
Application	Application scope of the EVAM view configuration.
EVAM Definition	Associate an EVAM definition with the data filter.

8. Click **Submit**.

Define a datasource

The datasource is an entity that has associated data that you intend to display. For example, a community post or a user.

Before you begin

Role required: admin or evam_admin

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Procedure

1. Navigate to **All** > **Entity View Action Mapper (EVAM)** > **Datasources**, and then click **New**.
2. On the form, fill in the fields.

Field	Description
Application	Application scope of the datasource.
Active	Option to activate the datasource.
Name	Name of the datasource.
Table	Choose a table to use for the datasource.
Condition	Condition to define how to filter the data from the selected table.
Sort By	Table column to use for sorting the table data. For example, you can select to sort knowledge articles by the creation date. **Note:** You can only use *Sort By* for datetime fields when sorting different records.

3. Click **Submit**.

View configurations, view templates, and configuration bundles for EVAM

A view configuration combines conditions, database fields, and declarative actions with an associated view template. You can also group view configurations together to create configuration bundles.

EVAM has pre-defined view configurations, view templates, and configuration bundles to make it easier to use the feature. The OOB configuration bundles include:

- Service Portal Search Bundle
- Service Portal bundle (sp_bundle)

These bundles have view configurations attached that are anticipated to fit the business unit associated. You can also create or edit configuration bundles to meet your needs.

View configurations have an associated view template, tables and conditions, designated table field with data, and associated declarative actions. You can look at the demo_evam_dataset for examples of OOB configuration views. These view configurations are ready to use and are meant to work with many use cases. You can also create or edit view configurations to meet specific needs.

The OOB view templates match an associated view configuration. The templates contain the JSON used to give the necessary information for the card display and use. For example, the Attachment Search Template contains the following:

```
{
    "component": "sn-search-result-evam-card",
    "staticValues":  {
        "detailLabelType": {
            "translatable": false,
            "key": "inline"
        },
```

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```
        "textHeaderLabelOne": {
            "translatable": true,
            "key": "Attachment"
        },
        "detailLabelOne": {
            "translatable": true,
            "key": "From:"
        }
    },
    "mappings": {
        "imageType": "doctype_image_type",
        "icon": "doctype_image",
        "imageURL":"doctype_image",
        "textHeaderLabelTwo": "doctype",
        "title": "ai_search_teaser_title",
        "summary": "ai_search_teaser_text",
        "detailValueOne":"parent_title"
    },
    "actionMappings": {
        "clickAction": "navigation",
        "footerLinkAction": "navigation_to_parent_record"
    }
}
```

The JSON structure has the following sections:

Template	Description
component	The card component name.
staticValues	The static text mapping to component properties. These values have the following properties: • translatable – Determines whether the key text should be translated based on the users language.Can be either True or False. • key – The value the property is set to.
mappings	The mapping of the datasource field to the component properties.
actionMappings	The actions that you can associate to the card.

These view templates are ready to use and are meant to work with many use cases. You can also create or edit view templates to meet specific needs.

Define an EVAM view configuration

Create a view configuration to combine conditions, database fields, and declarative actions with an associated view template.

Before you begin
Role required: admin or evam_admin

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Procedure

1. Navigate to **All** > **Entity View Action Mapper (EVAM)** > **View Definitions** > **View Configurations**, and then click **New**.
2. On the form, fill in the fields.

Field	Description
Name	Name of the EVAM view configuration.
Active	Option to activate the EVAM view configuration.
View Template	Template to associate with the EVAM view configuration.
Application	Application scope of the EVAM view configuration.
Order	Priority that the EVAM view configuration takes over other view configurations. To give higher priority to a view configuration, enter a lower number.
Table	Table to associate with the EVAM view configuration.
Condition	Conditions for when to use the EVAM view configuration.
Table Fields	Table fields to display on the EVAM view configuration.
Custom Fields	A custom field to display on the EVAM view configuration.

3. Click **Submit**.

Define an EVAM view template

You can configure multiple view templates per datasource based on conditions to customize how data displays for users. The view template maps fields from the view configuration to component.

Before you begin
Role required: admin or evam_admin

About this task
The view template is referenced from the EVAM view configuration record. For more information, see Define an EVAM view configuration.

Procedure

1. Navigate to **All** > **Entity View Action Mapper (EVAM)** > **View Definition** > **View Templates**, and then click **New**.
2. On the form, fill in the fields.

Field	Description
Name	Name of the EVAM view template.
Application	Application scope of the EVAM view template.
Active	Option to activate the EVAM view template.
Template	A JSON template that defines the view for a mapped datasource. For example, the default search template contains the following:

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Field	Description

	<pre>{
	"component": "sn-search-result-evam-card",
	"staticValues": {
	},
	"mappings": {
	"title": "ai_search_teaser_title",
	"summary": "ai_search_teaser_text"
	},
	"actionMappings": {
	"clickAction": "navigation"
	}
	}</pre>
	Use `sn-search-result-evam-card` as the component for search result pages.

3. Click **Submit**.

Create an EVAM action definition

You can associate a declarative action with a view template. EVAM also enables user interactions to trigger a server script or UXF client action.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Entity View Action Mapper** > **Action Definition**, and then click **New**.
2. On the form, fill in the fields.

Field	Description
Action label	Display label of the EVAM action.
Action name	Database name for the EVAM action name.
Implemented as	Implementation of the EVAM action definition. Select one of the following: **Server Script** Executes a script on the server, for example, to assign a record to someone, or delete a record. **UXF Client Action** Takes action on the client side, such as opening a record or making a phone call.
Specify client action	You can choose a pre-defined action. For example, SC Content Items KB Article Navigation, to display KB articles. **Note:** This field appears only if you select to implement the action as a UXF client action.

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Field	Description
Application	Application scope of the EVAM action.
Active	Option to activate the EVAM action.
Description	Description of the EVAM action.

3. Click **Submit**.

Define an EVAM configuration bundle

Create a view configuration to combine conditions, database fields, and declarative actions with an associated view template.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Entity View Action Mapper (EVAM)** > **View Definitions** > **View Configurations**, and then click **New**.
2. On the form, fill in the fields.

Field	Description
Name	Name of the EVAM view configuration.
Active	Option to activate the EVAM view configuration.
Required Roles	Roles to define who can view the EVAM view configuration
View Template	Template to associate with the EVAM view configuration.
Application	Application scope of the EVAM view configuration.
Order	Priority that the EVAM view configuration takes over other view configurations. To give higher priority to a view configuration, enter a lower number.
Table	Table to associate with the EVAM view configuration.
Condition	Conditions for when to use the EVAM view configuration. Click **Add Filter Condition** to select which conditions should be met.
Table Fields	Table fields to display on the EVAM view configuration. You can choose from available table fields and move them to *Selected*. You can also order the order they are shown.
Custom Fields	A custom field to display on the EVAM view configuration. You must supply a comma-separated list of table fields are required for the template.

Instance Data Replication

ServiceNow® Instance Data Replication (IDR) copies data updates from one instance, called the producer instance, to one or more other instances called the consumer instances. IDR enables you to maintain consistent data across different instances. For example, you can synchronize data between different organizations in your company or even between different companies with separate instances.

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Create an Instance Data Replication

Get started

Explore  Learn about IDR features and concepts.	**Set up**  Request IDR and plan your replication strategy.	**Configure**  Configure IDR replication sets and settings.
Administer  Administer and monitor data replication in IDR.	**Reference**  Learn about excluded tables, adapters, and data privacy in IDR.	

Helpful resources

Some ServiceNow resources that can provide you with helpful information are:

ServiceNow Community

ServiceNow Community

Support

- https://support.servicenow.com/now
- Known Error Portal

Exploring Instance Data Replication

Instance Data Replication (IDR) provides a one-to-many replication, which enables one instance to propagate data across different departments and business units to keep data synchronized.

IDR also supports bidirectional replication. Bidirectional replication enables you to copy data from a producer instance to a consumer instance and from a consumer instance back to the producer instance.

Benefits

- Data is automatically replicated to one or more other instances.
- Data can be modified and mapped to any table and table column on other instances. For example, you can modify and map table columns to localize data for different locales.

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- Data that is updated on consumer instances can be replicated to the producer instance.

  Data, such as problem requests, can be copied to consumer instances for third parties to use. The third party can update the problem issue on the consumer instance. The data can then be updated on the producer instance.

- Business rules can trigger post-replication workflows, such as generating notifications or validating the replication.
- Data that is in transit during a crash is recoverable.

How Instance Data Replication works

You use the Instance Data Replication plugin (com.glide.idr) to replicate data updates on one instance, called the producer instance, to one or more other instances, called the consumer instances.

By configuring a producer replication set, you can specify the tables and table columns on the producer instance to replicate. When you configure a consumer data set, you can specify the tables and table columns on the consumer instances that receive the producer replication set data.

Next, you activate both producer and consumer replication sets to turn on the IDR functionality. The data that is updated in a producer replication set automatically updates the corresponding data in the consumer replication sets.

Syncing the producer and consumer replication sets requires that you do a one-time download (called seeding) of all the producer replication set data to the consumer instances.

You can initiate seeding requests on a consumer instance when you activate a consumer replication set. Beginning with the Rome release, you can use a filter criterion feature (called partial seeding) to restrict the number of records that are seeded. Use partial seeding to divide large jobs into smaller jobs when you have a large number of records to duplicate.

After seeding, replication involves data updates only. An audit trail contains a history of those record updates.

By default, the table data on a producer instance goes into the tables of the same name on consumer instances. Transformation is the process of replicating producer data in tables or table columns that have a different name on the consumer instances.

IDR adapters modify data before storing it on consumer instances. Adapters perform string and mathematical operations, such as converting one currency to another, or converting one time zone to another.

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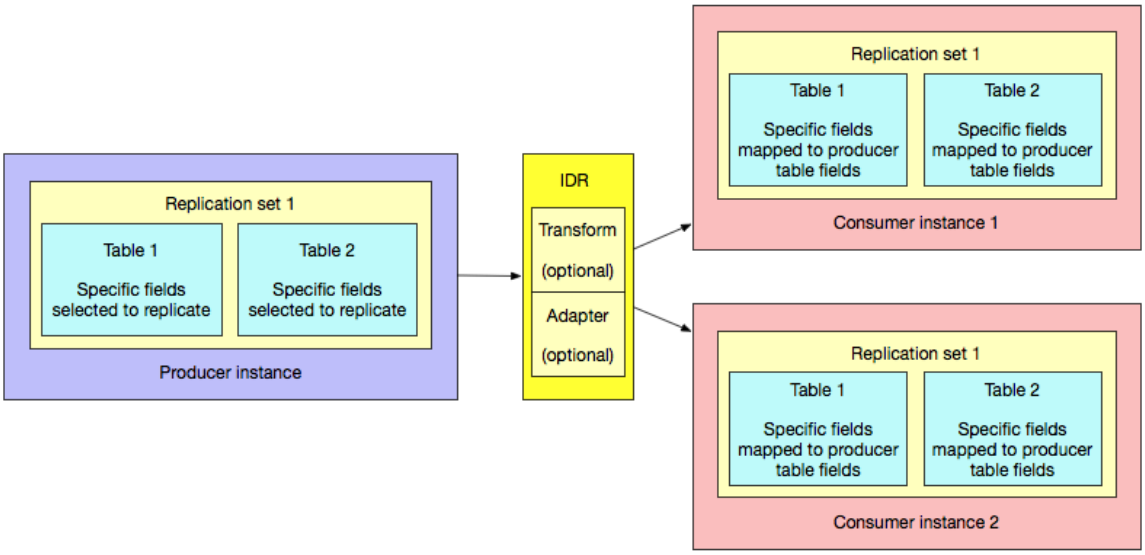
IDR overview



Warning:
IDR overwrites data on instances and can replicate sensitive data. Avoid potential data loss and data exposure, by testing your IDR implementation in a pre-production environment. See data privacy in IDR for more information.

IDR and instance upgrades

Upgrading your instance with IDR enabled is a seamless process.

- IDR doesn't consume or produce messages during an instance upgrade. IDR jobs are automatically stopped when the upgrade begins.
- The data_replication_queue tracks the timestamp of the last message sent. This ensures that replication resumes from the last change made prior to the upgrade.
- Any seeding in progress before the upgrade will be automatically paused when the upgrade starts and will resume once the upgrade is completed. To ensure that seeding completes without interruptions, avoid initiating a seeding request before an upgrade.
- Seeding requests can't be initiated during an instance upgrade.
- Replication resumes immediately after the upgrade is completed. There is no need to make any adjustments to IDR for record replication to continue.

IDR limitations and when not to use IDR

- Do not use IDR to clone instances.

  IDR does not replicate metadata tables, child metadata tables, and most user and system tables. IDR is designed to replicate data, not to clone instances. For example, the Application File [sys_metadata] table and tables that extend [sys_metadata] (including the Business Rules [sys_script], Catalog [sc_catalog], and Workflow [wf_workflow] tables) are excluded and can't be replicated. For details on cloning, see System clone.

- Avoid using IDR to replicate a series of large attachments on a regular basis. If you need to include attachments that are larger than 10 MB regularly, monitor IDR to ensure that the lag time doesn't exceed expectations.
- Avoid continuous replication of CMDB tables. Replicating CMDB data as changes occur can create performance issues or unforeseen consequences with replication due to the number of records involved. If you must replicate CMDB tables, consider scheduling replication or use

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conditions to constrain the count of replicated records and ensure all required columns are included in the replication set.

- You cannot replicate Edge Encrypted, Column Level Encryption, and Password (2-Way Encrypted) fields.
- Additional replication limitations:
  - Maximum record size is 10 MB.
  - IDR supports replicating approximately 1 million records per day.
- Limitations for seeding records:
  - Replication seeding must not take longer than seven days to complete.
  - Initial seeding of the tables must not exceed 3 million records per replication set.

Note:
To overcome these limitations, reduce the number of tables in the seeding request, reduce the size of the records, or use partial seeding.

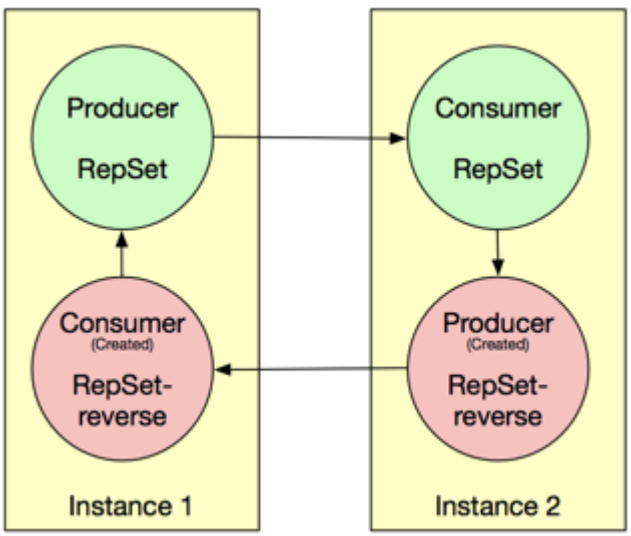
Bidirectional replication for Instance Data Replication

Bidirectional replication in Instance Data Replication (IDR) enables data to flow from a producer instance to a consumer instance and accept data from a consumer instance to flow back to the producer instance.

All inserts and changes to records on either instance are sent to the other instance to keep the tables identical on both instances. For example, you can enable bidirectional replication for the Incidents table to keep incident records synchronized between two instances.

To make data flow bi-directionally, the system creates a producer replication set on the consumer instance and a consumer replication set on the producer instance.

Bi-directional replication



If you look at the replication sets on the original producer instance, you see the replication set name and the automatically generated consumer instance. It has the same name appended with the suffix, `-<long-number>-reverse`, where `<long-number>` is a randomly generated number. For example, if Test is the producer replication set name, `Test-2034802-reverse` might be the name of the consumer replication set that is automatically created on the same instance. On the original consumer instance, you see the same names. Replication sets with the `reverse` suffix are read-only.

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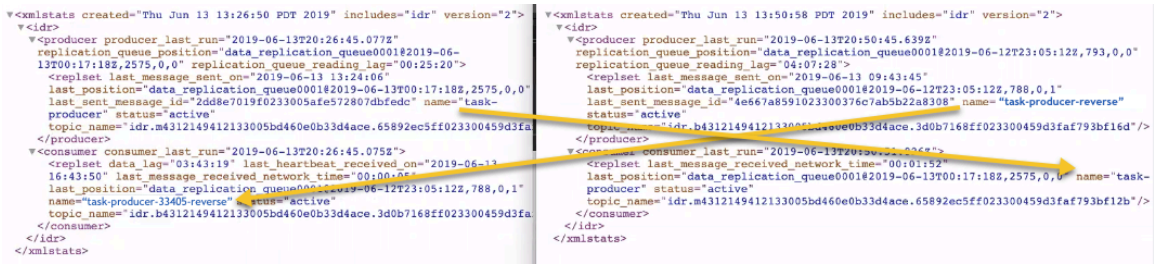
You can verify a consumer on a producer instance and a producer on a consumer instance by running `https://<producer-instance-name>/xmlstats.do?include=idr` and `https://<consumer-instance-name>/xmlstats.do?include=idr` on the producer and consumer instances. In the following image, the original producer instance is on the left and the original consumer instance is on the right.



Bidirectional replication has the following limitations:

- Auto-conflict resolution is unsupported.
- Merge conflicts happen if producer and consumer instances modify the same record at the same time.

  The most recent update wins, which means that the data on the consumer and producer tables might be different.

- Bidirectional replication supports the Number adapter but none of the other adapters.
- Bidirectional replication keeps data in sync between producer and consumer instances. However, in some scenarios, avoid using bidirectional replication and use one-way replication instead.
  - If you plan to use adapters to differentiate data replicated between two instances, use two one-way replication sets to replicate data back and forth instead of using bidirectional sets.
  - If you need to seed data from one instance to another and vice versa, use two one-way replication sets.
- With bidirectional replication, records created on the producer instance are replicated to a consumer instance and vice versa. When the record is inserted on the consumer instance and it triggers a business rule that updates the record, that update is not replicated back to the producer instance.

If you must understand the implications of bi-direction and data transfer between instances, see data privacy in IDR for more information.

Discrete mapping in producer replication sets for Instance Data Replication

Adding discrete mapping to producer replication sets in Instance Data Replication (IDR) enables different consumer replications to be distinguishable.

Every producer replication set has a unique relationship with each consumer subscription. One way of distinguishing this relationship is by mapping discrete field values for producer replication sets.

Once you enable discrete mapping, you can define for each outbound entry of a replication set a discrete value field. An administrator of the producer replication set can define the mapping of each consumer subscription by the setting this discrete value.

For example, you might have an ACME corporation as the producer instance, and have consumer subscribers of ACME US and ACME Europe. You could set a discrete value of **region** on the outbound replication entries for the incident table. While both of these entries reference

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the same company table, a rule set for the discrete value can display US for ACME US, and Europe for ACME Europe.

If you have bi-direction enabled with discrete mappings, different consumer subscriptions:

- Should never receive records sent from other consumer subscribers
- Should never receive records from a producer intended for other consumers subscribers

With bidirectional replication, records created on a consumer instance are replicated to the producer instance and vice versa. When the consumer replicates a record to the producer, the consumer's discrete field value that you defined in the producer replication set overrides the discrete field value in the consumer record if it's different. For example, say you define a discrete mapping using separate regions for each consumer instance as follows:

Discrete mapping using the Region field

Consumer instance	Region
Consumer instance A	Asia
Consumer instance B	Europe
Consumer instance C	USA

When a record is manually added to consumer instance B with the Region field set to Asia, bi-directional replication sends the record from the consumer to the producer to be inserted, but the region field is overwritten and the value is changed to Europe. The discrete value that is defined in the producer replication set is used instead.

For details on the implications with discrete mappings and data transfer between instances, see data privacy in IDR.

Coalesce columns in Instance Data Replication

The coalesce columns feature is used to identify records when you perform data inserts, updates, and deletions across instances using Instance Data Replication (IDR).

By default, the **sys_id** field is used to coalesce records in IDR. Beginning with the San Diego release, you can choose to use a different field.

Use the coalesce columns feature when records on the consumer instance have a different sys_id than the same record on the producer instance. For example, when the record is created by Discovery and loaded into multiple instances. You select the **Coalesce** field in the Replication Entry form on the producer.

When you select the **Coalesce** field, you must verify the following:

- The field that you selected is in the Included Fields on the Replication Entry form on the producer instance.
- The field exists with the same name, length, and type on the consumer instance.

> **Note:**
> The **Coalesce** field can be different on the consumer instance if you create a valid transform for the field.

- The **Unique** column value for the field that you selected is set to *true* in the Dictionary Entry [sys_dictionary] table.

Don't change the value of the field after it's set as the **Coalesce** field.

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To change the **Coalesce** field after it has been set, you must delete the Replication Entry on the producer instance and create a new Replication Entry.

If the **Coalesce** field doesn't exist on the consumer instance, the following error is displayed on the Consumer Replication Set form. `The consumer instance does not recognize the <column_name> coalesce field as a valid member of the <table_name> table. Create this field or enable a transformation with this table to receive updates from the producer table to the consumer instance.`

Transforms

If transform is enabled on the producer instance, the **Coalesce** field on the target table must have the same name, type, and length. If any of those parameters don't match, an error is displayed.

If transform is enabled on the producer instance, the mapping is invalid for the **Coalesce** field, and the consumer syncs entries, the system displays an error on the Consumer Replication Set form.

If transform is enabled for a replication entry with a valid mapping of the **Coalesce** field and then the table schema for the target table is updated so that the mapping is no longer valid, the system displays an error on the Replication Entry form.

If a replication entry attempts to enable transform and a valid mapping for the **Coalesce** field doesn't exist from the source table to the target table, the system displays an error on the Replication Entry form.

Instance Data Replication set up

Request Instance Data Replication (IDR) and prepare for IDR by analysing your data and planning your strategy.

Request an Instance Data Replication subscription

The Instance Data Replication (IDR) plugin requires a separate subscription and must be activated by ServiceNow personnel.

Before you begin

Role required: admin

About this task

Beginning with the New York release, IDR is supported. The IDR plugin ID is com.glide.idr. When purchasing an IDR subscription, ServiceNow, Inc. personnel also activate the following plugins that IDR depends upon:

- com.snc.db.data_replicate
- com.glide.transform
- com.glide.kmf

IDR runs in ServiceNow data centers only, which means there is no support for using IDR with on-premise instances.

To purchase a subscription, contact your ServiceNow account manager. The account manager can arrange to have the plugin activated on your organization's production and subproduction instances, generally within a few days.

If you don't have an account manager, decide to delay activation after purchase, or want to evaluate the product on a subproduction instance without charge, follow these steps.

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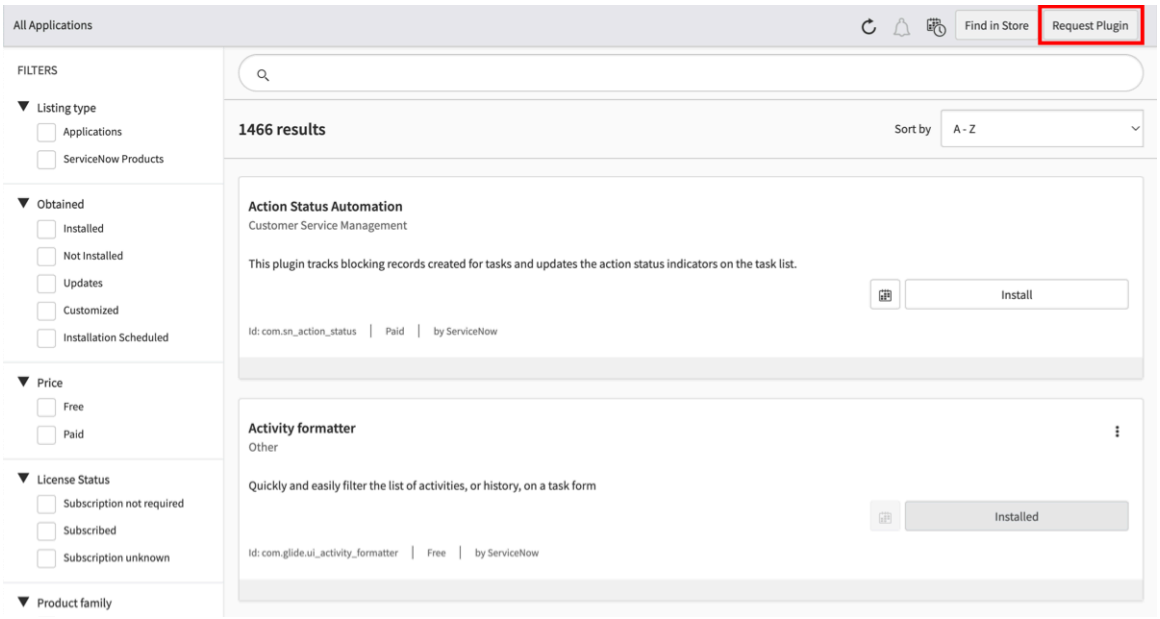
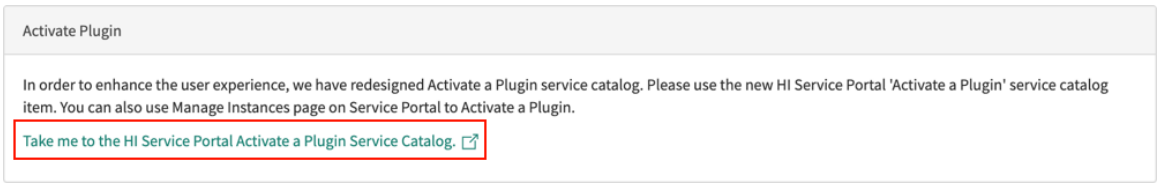
Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the **Activate Plugin** form on Now Support.



3. On Now Support, select the link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Instance on which to activate the plugin.
Which plugin would you like to activate	Name of the plugin to activate. **Note:** If the system does not list the plugin you want or if you are activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.

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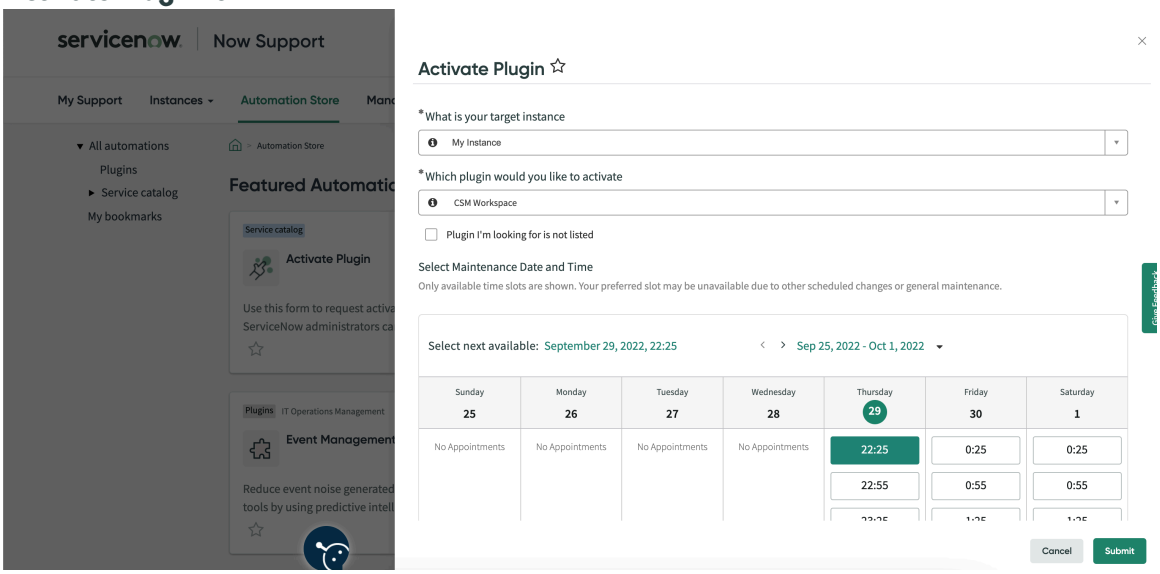
Field	Description
Select Maintenance Date and Time	The date and time to activate the plugin. **Note:** Plugins are activated in two batches, once in the morning and once in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.

Example

For example, see the following form to activate the CSM Workspace plugin on an instance named My Instance.

Activate Plugin form



7. Select **Submit**.
   For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

What to do next

Create and activate a producer replication set.

Related topics

List of plugins (Washington DC)

Preparing for Instance Data Replication

Before you set up Instance Data Replication (IDR), analyze the tables and columns in the producer and consumer instances to replicate data successfully.

Deciding which tables to replicate

Before you create a producer replication set, decide which tables to replicate. Avoid replicating system tables (tables with a sys_ prefix). If you replicate system tables (like sys_user,

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sys_user_group, or sys_user_grmember) that have existing data in the consumer instance, insert and update failures can occur during replication. If you decide to replicate these tables, you may have additional work afterwards to clean these tables.

Avoid replicating CMDB tables. Replicating CMDB tables can create performance issues or unforeseen consequences with replication due to the number of records involved. If you determine the CMDB tables must be replicated, use conditions to constrain the count of replicated records and ensure all required columns are included in the replication set.

For a list of tables you should avoid replicating, see Excluded tables in Instance Data Replication.

Analyzing table hierarchies

For each table you want to replicate, determine if the table is a parent or child table. If the table belongs to a parent-child hierarchy, decide if you want to preserve the hierarchy and what strategy you want to use to move the hierarchy from the producer to the consumer.

Important:
To maintain data integrity and ensure that reference fields are populated on the consumer as you'd expect, you must replicate all of the parent and child tables in the table hierarchy.

See Preserving table hierarchy in Instance Data Replication.

Analyzing table relationships

For each table you want to replicate, determine if the table has reference fields that point to other tables. If you are replicating a table with a reference field that points to another table, but you don’t include that table in your replication set, the reference field will be empty in the record on the consumer instance. Replicating table relationships maintains data integrity and ensures that reference fields are populated on the consumer as you'd expect.

Organizing replication sets

As part of the planning phase, determine how you want to organize your replication sets and the tables they contain.

- Create a single replication set for each table. This option requires more setup, configuration, and time management, but allows you to pause replication for a single table without impacting other tables.
  - Replication is performed in parallel using multiple jobs.
  - Throughput metrics are easier to track with separate replication sets.
  - When an error occurs, replication for a single table is affected instead of all multiple tables.
- Create a replication set for a group of related tables. This option is easier to set up and manage, but oversight and potential issues impact all tables in the group.

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- If you need find information about replication status, the logical name you use for this replication set might be easier to find and understand compared to using distinct replication sets for each table.
- If you want to pause replication, you can do so for the entire group of tables by pausing replication from one replication set.
- If a replication issue occurs on one table and replication stops, this stops replication for all tables in the replication set.

If you decide to group tables in a single replication set, try to limit it to five or fewer tables. If you have more than five tables to replicate, use multiple replication sets with five or fewer tables in each set.

Deciding which columns to replicate

For each table you want to replicate, decide which columns to include. Avoid including every column in your replication set by default. Instead, decide which columns are necessary, and exclude any sys_ columns or other columns that are updated by scripts automatically.

For example, if you include a column updated by the system automatically on a frequent basis, IDR may replicate data more often than necessary. When the system replicates this data, it can negatively impact the capacity subscription. Periodically check the **IDR License and Usage Details** dashboard to monitor the message count that is generated from the producer.

Preparing target tables on the consumer instance

By default, IDR uses a record's sys_id field as the lookup value to keep data synchronized between the producer and consumer instance. If the target table contains existing data or records from prior data imports, the sys_id values in the consumer don't match the sys_ids from the producer instance.

Always consider the producer instance as the source of truth. For optimal replication results, follow these guidelines:

- Make the producer instance the exclusive data source for the consumer instance.
- Prior to replication, ensure that the target table in the consumer instance is empty. Ideally, the initial records in the target instance are created from data sent exclusively from the producer via a replication set or a clone.
- Ensure that there are no other ongoing data imports or updates to target tables on the consumer instance after replication starts.

For example, if users from LDAP are imported to the consumer instance using a different data source, the sys_ids for those records don't match the sys_id values in the producer instance. In this scenario, existing user records in the target table on the consumer aren't updated and duplicate records are created.

In situations where this cannot be avoided, clean the tables on the consumer instance prior to replication. You must delete the records in the target table or ensure the sys_id values in producer and consumer are the same.

Alternatively, you can use a custom **Coalesce** field to identify unique records (instead of the default sys_id column) for replication. Use a custom **Coalesce** column when records on the consumer instance have a different sys_id for the same records on the producer instance. For more information on using a custom **Coalesce**, see Coalesce columns in Instance Data Replication.

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Reviewing business rules

You can use business rules to trigger workflows after replication, such as sending a notification or validating the replicated data. Review any business rules on the consumer instance that might prevent the idr.system user from inserting, updating, or deleting records in the target table.

If failures related to business rules occur, they appear in the **Instance Data Replication** > **Replication Payload Error** table on the consumer instance. View the **Error Message** field for details on the script that is causing the failure.

With bidirectional replication, records created on the producer instance are replicated to a consumer instance and vice versa. When the record is inserted on the consumer instance and it triggers a business rule that updates the record, that update is not replicated back to the producer instance.

Reviewing ACLs

Review the ACLs in place on the target table in the consumer instance to ensure that IDR can replicate data successfully. Confirm that the idr.system user has the appropriate roles for the target table.

If failures related to ACLs occur, they appear in the **Instance Data Replication** > **Replication Payload Error** table on the consumer instance. View the **Error Message** field for details on the ACL that is causing the failure.

Reviewing data policies

Review any data policies in place on the target table in the consumer instance to ensure that IDR can replicate data successfully. Confirm that the data you are replicating satisfies the data policy.

If failures related to data policies occur, they appear in the **Instance Data Replication** > **Replication Payload Error** table on the consumer instance. View the **Error Message** field for details on the data policy that is causing the failure.

Preserving table hierarchy in Instance Data Replication

Decide if you want to replicate a parent-child table hierarchy and what strategy to use for replicating the data in Instance Data Replication (IDR).

Before you create a replication set, determine if the table that you want to replicate is part of a parent-child table hierarchy. If it is, decide if you want to preserve the hierarchy and whether to replicate the data from the parent perspective (retaining only columns belonging to the parent table) or from the child perspective (retaining all columns that belong to the child tables). Review the following available strategies.

Strategy 1: Preserve the entire hierarchy and replicate child columns

You can preserve the entire hierarchy, including all of the child table columns, by creating an outbound entry for each child table, and specifying a sys_class_name filter for each child table.

For example, to replicate the Task table and ensure that all of the columns from all of the child tables are included, specify the following:

Outbound entries

Table	Filter
Task	sys_class_name=task

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Outbound entries (continued)

Table	Filter
Incident	sys_class_name=incident
Problem	sys_class_name=problem
Change Request	sys_class_name=change

And so forth, for all of the child tables, including filters with each table for the sys_class_name.

With this strategy, records are inserted into each child table on the consumer, including data from the columns that belong to each child table on the producer.

Strategy 2: Preserve the hierarchy, but don't replicate child columns

To preserve the hierarchy but only replicate columns from the parent table, replicate the parent table and include the Class Name [sys_class_name] field in the **Included Fields** list. Including the Class Name field maintains the distinction between parent and child records on the consumer instance.

For example, if you want to replicate the Task table and its children (Incident, Problem, Change Request), but only replicate the columns that belong to the Task table, specify the following:

Outbound entry

Table	Included Fields
Task	Class Name

In this strategy, the sys_class_name column on the consumer Task table receives entries for the parent table (task) and child tables (incident, problem, and change), and records are inserted into the respective child tables on the consumer. However, without the sys_class_name filter, the columns that are unique to each child table are not replicated.

Strategy 3: Ignore the hierarchy, and only replicate parent table data

To ignore the hierarchy and only replicate parent records, replicate the parent table and exclude the Class Name [sys_class_name] field from the **Included Fields** list. Excluding the Class Name field removes the distinction between parent and child records on the consumer instance. All replicated records on the consumer will be parent table records.

For example, if you want to replicate records from the Task table and simply consider all records as tasks for reporting or auditing purposes, specify the following:

Outbound entry

Table	Included Fields
Task	Any fields except for Class Name

In this strategy, when you replicate the Task table, all replicated records have a value of task in the sys_class_name column, and no columns belonging to the child tables are replicated.

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Upgrading legacy replication sets to V2 in Instance Data Replication

Improve message processing and replication performance by upgrading your legacy replication sets in IDR to V2.

Legacy and V2 replication sets

Important:
Legacy replication sets are planned for deprecation by the Zurich release. To continue replicating data, you must upgrade all legacy replication sets to V2.

- Legacy replication sets use a ServiceNow Kafka message transport and delivery implementation that was created prior to the Utah release. All replication sets created prior to the Utah release are considered legacy replication sets.

  Beginning with the Washington DC release, you can no longer create legacy replication sets.

- V2 replication sets use the ServiceNow Hermes Messaging Service for Kafka message transport and delivery, which replicates data faster, at scale, and with high reliability. The Hermes Messaging Service is a ServiceNow AI Platform capability that's automatically enabled when the IDR plugin (com.glide.idr) is activated. All replication sets created after the Washington DC release are V2 replication sets.

Note:
Data sent from a V2 producer replication set is retained in the message queue for 24 hours.

Upgrading legacy replication sets

Upgrade your eligible legacy replication sets to V2 to take advantage of the benefits provided by Hermes. Upgrading replication sets from legacy to V2 is a seamless process. Active data replication from the producer to consumer continues throughout the upgrade, which means you don't need to pause replication before you begin. Replication continues using the V2 replication sets after the upgrade is finished.

You can either create new V2 replication sets or upgrade existing legacy replication sets to V2. See Upgrade legacy replication sets in Instance Data Replication.

Upgrade eligibility

Legacy replication sets are eligible for upgrade to V2 when both the producer and consumer instance are on Utah or higher. Note that some Utah legacy replication sets aren't eligible for upgrade to V2, depending on their configuration (for example, the replication set can't be bidirectional or discrete).

You can confirm upgrade eligibility by viewing the producer replication set and checking the **Upgrade Eligibility** column in the Consumer Subscriptions related list.

- If the value for each subscribed consumer is **Eligible**, you can begin the upgrade process by following the steps in Upgrade legacy replication sets in Instance Data Replication.
- If the value for a subscribed consumer is **Not eligible**, this means that either the consumer instance isn't on Utah or higher, or the consumer replication set is on Utah, but isn't eligible for upgrade to V2 because of its configuration.

For details on which types of legacy replication sets are eligible for upgrade in Utah, refer to the "Upgrading legacy replication sets to V2" topic in the Utah version of the IDR documentation.

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Compatibility

V2 producer replication sets are compatible only with V2 consumer replication sets.

If you upgrade a producer replication set to V2, you must upgrade the subscribed consumer replication sets to V2 as well to take advantage of the V2 processing improvements.

Upgrade legacy replication sets in Instance Data Replication

Replicate high volumes of data faster and more reliably by upgrading your Instance Data Replication (IDR) legacy producer and consumer replication sets to V2.

Before you begin

Role required: admin

About this task

Important:
Legacy replication sets are planned for deprecation by the Zurich release. To continue replicating data, you must upgrade all legacy replication sets to V2.

Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.
2. Select a producer replication set that you want to upgrade.
3. Verify that the producer replication set is eligible for upgrade by checking the **Upgrade Eligibility** column on the Consumer Subscriptions related list.
   - If the value for each consumer is **Eligible**, you can upgrade the replication set.
   - If the value for any consumer **Not eligible**, this means that either the consumer instance isn't on Utah or higher, or the consumer replication set is on Utah, but isn't eligible for upgrade to V2 because of its configuration. See Upgrade eligibility for more information.
4. Create a V2 producer replication set.

   a. On the Producer Replication Set form, select **Upgrade**.

   b. In the dialog box, either accept the default name or enter a unique replication set name. By default, the system appends -V2 to the legacy replication set name, but you can use any valid set name to differentiate the V2 version from the legacy version.

   c. Select **OK**.

   The legacy producer replication set is copied to create a V2 producer replication set. The producer instance sends metadata to the consumer instance, which enables you to upgrade the legacy consumer replication set.
5. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
6. Select the legacy consumer replication set that's subscribed to the producer replication set you upgraded.
7. Upgrade the legacy consumer replication set.
   If the **Begin upgrade** button doesn't appear on the Consumer Replication Set form, resend the metadata from the producer replication set:

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a. Select **Begin upgrade**.

b. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

c. Select the new V2 producer replication set.

d. Select the check box next to the consumer subscription in the Consumer Subscriptions related list.

e. Select the **Actions on selected rows** list.

f. Select **Resend Metadata**.

The V2 consumer replication set is created, and the producer instance sends metadata replication entries to the consumer instance. After all the entries are received, the **Start dry run** button appears on the Consumer Replication Set form.

8. Confirm that the consumer instance can connect to the Hermes Messaging Service and that replication succeeds by selecting **Start dry run**.
   Data is consumed from the Kafka topic by the consumer instance but not persisted in the database yet.
9. Complete the upgrade by activating the V2 consumer replication set with or without data integrity checks.
   - Ensure that the legacy and V2 topics are in sync by selecting **Finish upgrade**.

     This option ensures that IDR performs all necessary data integrity checks before activating the V2 consumer replication set. If any data integrity checks fail, the upgrade is automatically rolled back to prioritize data consistency.

   - Complete the upgrade without data integrity checks by selecting **Finish upgrade without sync**.

     This option allows you to complete the upgrade for replication sets where the consumer replication is lagging or no records have been replicated to the V2 topic. However, it may skip replicated records or attempt to duplicate replication. If you have concerns over missing or mismatched records, you can create a data comparison request to reseed those records.

   Note:
   If the **Finish upgrade** button doesn't appear on the Consumer Replication Set form, contact Customer Service and Support.

   The V2 consumer replication set is activated and the legacy consumer replication set is automatically deactivated.
10. After all subscribed consumers are upgraded to V2, deactivate the legacy producer replication set.

    Note:
    Legacy consumer replication sets stop consuming when you deactivate the legacy producer, so you must ensure all subscribed consumers are upgraded to V2 before you deactivate it.

    a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

    b. Select the legacy producer replication set that you upgraded.

    c. Select **Deactivate**.

    d. Confirm deactivation by selecting **OK**.

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Result
The legacy producer and consumer replication sets are upgraded to V2 and the upgrade status changes to Up to date. Data replication continues based on the last message ID that was processed by the legacy replication set.

Rolling back an upgrade in Instance Data Replication

If a problem occurs during an upgrade to V2, the upgrade is rolled back in Instance Data Replication (IDR).

Important:
Legacy replication sets are planned for deprecation by the Zurich release. To continue replicating data, you must upgrade all legacy replication sets to V2.

If you upgrade a legacy replication set to V2 and a problem occurs with the upgrade, the upgrade is automatically rolled back to ensure data consistency. If a processing delay caused the issue, you can try the upgrade again.

For example, when the consumer instance identifies the most recent message in the legacy topic, but can't find that same message in the Hermes topic, the upgrade is rolled back. If you attempt the upgrade again and the consumer instance successfully finds the most recent message in the Hermes topic, the upgrade continues, and processing begins only from the Hermes topic.

- If the legacy consumer job is still processing records that were replicated prior to when the upgrade started replicating to both the legacy and the Hermes topics, the upgrade is rolled back. In this scenario, allow time for the consumer to process the replication backlog and then try the upgrade to V2 again. For example, if the lag persists after 30 minutes, wait another 2 hours and try again, or wait 24 hours and try again.
- If no records are being replicated from the producer to the Hermes topic after the upgrade starts, wait and retry the upgrade after allowing at least one record to replicate from the producer to the consumer. Alternatively, you can manually trigger replication by making a change to at least one record.
- If you want to complete the upgrade without data integrity checks, you can use the **Finish upgrade without sync** option after performing the dry run.

  This option allows you to complete the upgrade for replication sets where the consumer replication is lagging or no records have been replicated to the V2 topic. However, it may skip replicated records or attempt to duplicate replication. If you have concerns over missing or mismatched records, you can create a data comparison request to reseed those records.

Configuring Instance Data Replication

Configure producer and consumer replication sets, and then modify records or mappings as necessary in Instance Data Replication (IDR).

Create a producer replication set in Instance Data Replication

Specify the tables and columns on the producer instance that you want to replicate in Instance Data Replication (IDR).

Before you begin
Verify that the producer and consumer instances belong to the same customer.

Plan your data replication strategy by reviewing the important considerations described in Preparing for Instance Data Replication.

Role required: idr_admin or admin

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About this task

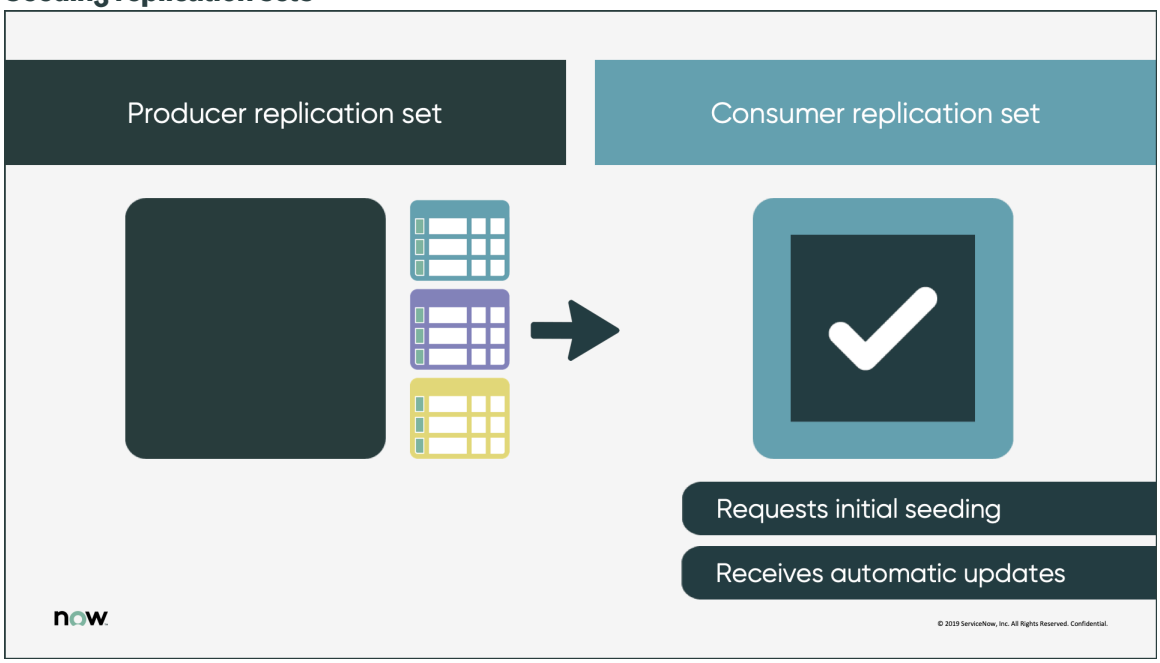
Creating the producer replication set is the first step of setting up Instance Data Replication. Seeding is the initial download of all the records in the producer replication set to the tables in the consumer replication set. After seeding, Instance Data Replication (IDR) only replicates data updates. The seeding limitations are:

- The maximum record size is 10 MB.
- The maximum seeding size is 3 million records.

> **Note:**
> If your replication set contains more than 3 million records, seeding cannot start. To fix this situation, break the replication set into multiple replication sets with fewer records in each or use partial seeding.

- The maximum seeding time is 7 days.

Seeding replication sets



Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets** and click **New**.
2. On the form, fill in the fields.

Producer Replication Set form

Field	Description
Name	Names can only contain alphanumeric characters and hyphens.

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Field	Description
	Note: The consumer replication set must have the same name as the producer replication set, so the name should not be producer-specific.
Bi-Directional	Option to enable bi-directional replication on consumer instances. Bi-directional replication enables changes to records made on the consumer instance to propagate to the producer instance. If you want to set up a producer replication set with bi-direction for consumer instances, see Bidirectional replication.
Discrete	Option to enable discrete mapping from a producer replication set. This mapping distinguishes different consumer instances. For more information, see create discrete mappings for a producer replication set.
Description	Description of the replication set.
Entry Set	Set of outbound entries. If you imported an update set from another instance or you created one earlier on your instance, you can choose an existing entry set.

After you submit the Producer Replication Set form, the system auto-generates the producer ID. The **Producer ID** field identifies the producer instance in the system.



3. To add outbound entries to your producer replication set, click the **Outbound Entries** tab and click **New**.
4. On the form, fill in the fields.
   For each outbound entry, you must select a source table from the producer instance to replicate data records. You can also select associated table columns, include attachments to records, and set filter conditions for each source table.

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Replication entry form

Field	Description
Source Table Name	Name of one of the tables on the producer instance to replicate. For example, SAN Disk [cmdb_ci_san_disk].
Filter	Filter criteria to control the records in the table that the system is replicating. ○ Use the filter to limit the number of records in your replication set. For example, if the table has an **Active** field, add a filter condition like **[Active] [is] [True]** to replicate only active records. ○ If you want to replicate and preserve a parent and child table hierarchy, add a filter for the sys_class_name column to each outbound entry. This ensures that all of the child table columns are replicated, and not just the parent the columns. For example, to replicate both the Task [task] parent table and the Incident [incident] child table, you must add **[Task type] [is] [Task]** as a filter in the parent table entry and **[Task type] [is] [Incident]** as a filter in the child table entry. In this example, Task type is the label for the sys_class_name column on each table. For details, see Preserving table hierarchy in Instance Data Replication.
Include Attachments	Option to replicate the files associated with the records that you are replicating.
Included Fields	Fields to include. Move table fields into the Selected column to replicate them or into the Available column to prevent replicating them. **Note:** The system must replicate some fields, such as **sys_id (Mandatory)**. The system cannot replicate some fields, such as **Edge Encrypted** and **Password1**. They do not appear in either column.
Enable Custom Coalesce	Option to enable you to choose a field other than the default **sys_id** field to coalesce IDR.
Coalesce Field	Choose a field to use to coalesce IDR. Only unique fields are available. See Coalesce columns in Instance Data Replication. This field only displays if you select **Enable Custom Coalesce**.

5. Select **Submit**.

   Note:
   If the table that you add to the replication set has child tables, add the child tables to the replication set to maintain data integrity.

6. Repeat step 3 for each table that you want to include in the replication set.
   After you submit, the **Activate** button is added to the form.
7. Select **Activate**.

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Replication can't happen until you link the producer replication set to one or more consumer replication sets. Activating the producer replication set makes the producer data available for replication to consumers.

8. Select the **Notification Configuration** related link and choose a tab to configure notification details.

Option	Description
When to send	Specify the conditions for sending a notification. ○ **Record inserted or updated**— You can send notifications when records are updated or inserted. ○ **Event is fired**—Specify the event type that sends the notification. ○ **Triggered**—A notification is sent when triggered by a ServiceNow® Flow Designer flow. For more information, see Flow Design
Who will receive	Send notifications to users, groups, or user groups in the fields on the ServiceNow record that generates the notification.
What it will contain	You can choose an email template to populate the Subject and Message HTML. You can also override the template and customize the text as appropriate.
What Digest will contain	If you select **Allow Digest**, you can configure an email digest interval through the Digest Interval module in System Notification.

9. Select **Update**.
10. To see a preview of the notification, select **Preview Notification**.
11. To discard the Producer Replication Set, select **Delete**.

Result

The producer is ready to send the data that is specified in the replication set to one or more consumer instances.

What to do next

- For information about creating and activating the consumer replication set, see Create and activate a consumer replication set.
- For information about granting access to the replication data, see Grant access to replication data.

  After creating a consumer replication set, you must ask for permission to receive the producer replication data. See Grant access to replication data to learn how to grant or deny access.

- If you believe that a consumer set should no longer receive replication data, you can revoke the consumer set access.

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Create a consumer replication set for Instance Data Replication

Create a consumer replication set to specify the tables and columns on a consumer instance that receive the producer data in Instance Data Replication (IDR).

Before you begin

- Create and activate a producer replication set.
- Reduce latency by ensuring that the producer and consumer instances are in the same geographic region and belong to the same customer. You can replicate data between instances across different geographic regions. However, replication latency can occur when instances are located in data centers in separate regions.
- Role required: idr_admin or admin

About this task

Create a consumer replication set and link it to a producer replication set. IDR replicates data from the producer to the tables and table columns of the same name on the consumer instance. The administrator of the producer replication set must grant the consumer instance access to the replication data.

If the producer replication set administrator generates a new encryption key, the encryption key value that is stored in the consumer replication set might not automatically update. If it does not update, replication stops. To restore access, see Restore access to replication data.

Procedure

1. On a consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
2. Select **New**.
3. On the form, fill in the fields.

Consumer Replication Set form

Field	Description
Producer Instance URL	URL of the producer instance. For example, https://<producer_instance>.servicenow.com.
Producer Replication Set Name	Name of the consumer replication set. The name on the consumer must match the name on the producer. Obtain the name from the producer administrator.
Description	Description of the purpose of the replication.

4. Select **Submit**.
   The list of all consumer replication sets appears. The system sends a request to the producer replication set administrator to approve or deny your request for a shared encryption key.

> **Warning:**
> Do not change any of the values.

5. In the list of all consumer replications sets, select the replication set.
   The Consumer Replication Set displays the replication set information.

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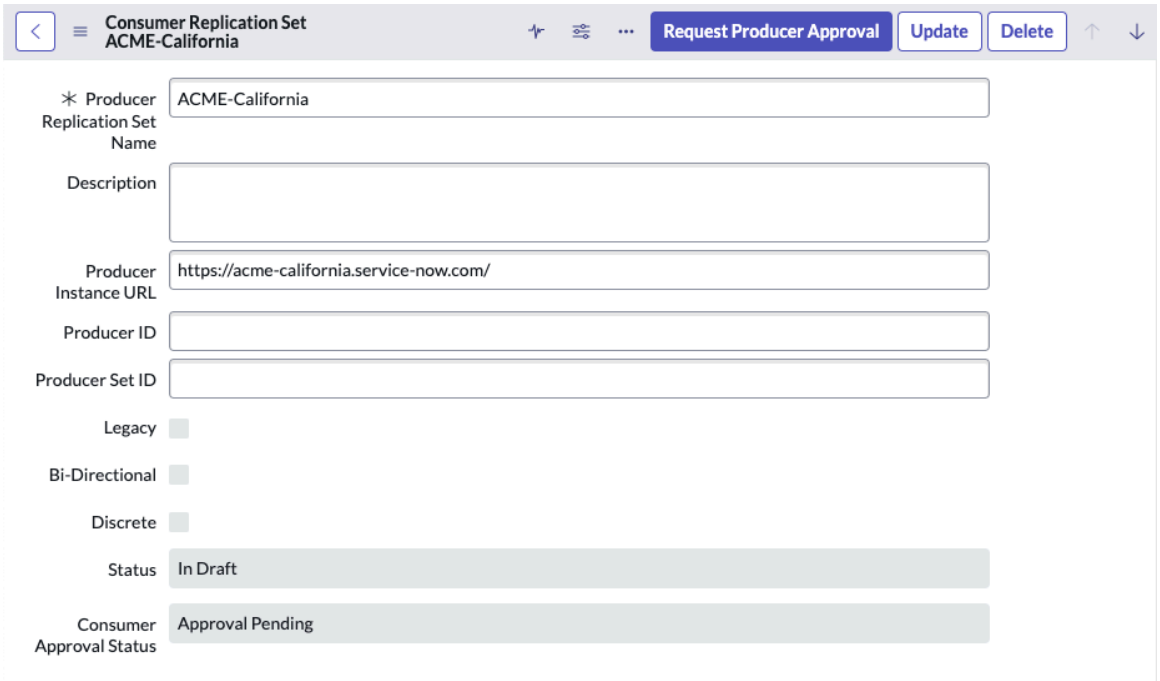

The Consumer Approval Status shows Approval Pending. The producer administrator must approve your request to be a consumer.

Note:
If you receive an error saying that your encryption key does not work, contact Customer Service and Support.

6. Wait until the producer administrator approves the request.
   The Consumer Approval Status changes to Approved. For more information, see Grant access to replication data.
7. Refresh the browser page.
   The system replaces the **Request Producer Approval** button with the **Activate** button.
8. To update the Consumer Replication Entries configuration on the consumer to match the configuration on the producer after you receive confirmation, click the **Synchronize Replication Entries** related link.
   If you do not see this option, refresh the page.
   A dialog box confirms the synchronization. The tables that you select for replication in the producer replication set are replicated in the consumer replication set and appear on the **Inbound Entries** tab. The initial seeding of all the table data may take some time. After initial seeding, only data updates are replicated to consumer replication sets. For more information about seeding, see Seed a consumer instance.
9. To configure who receives replication notifications, click the **Notification Configuration** related link.
10. On the form, fill in the fields.

Replication Set Error Notification form

Field	Description
When to send	Trigger for sending a notification.
Who will receive	Person who receives the notifications.

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Field	Description
What it will contain	Notification content.

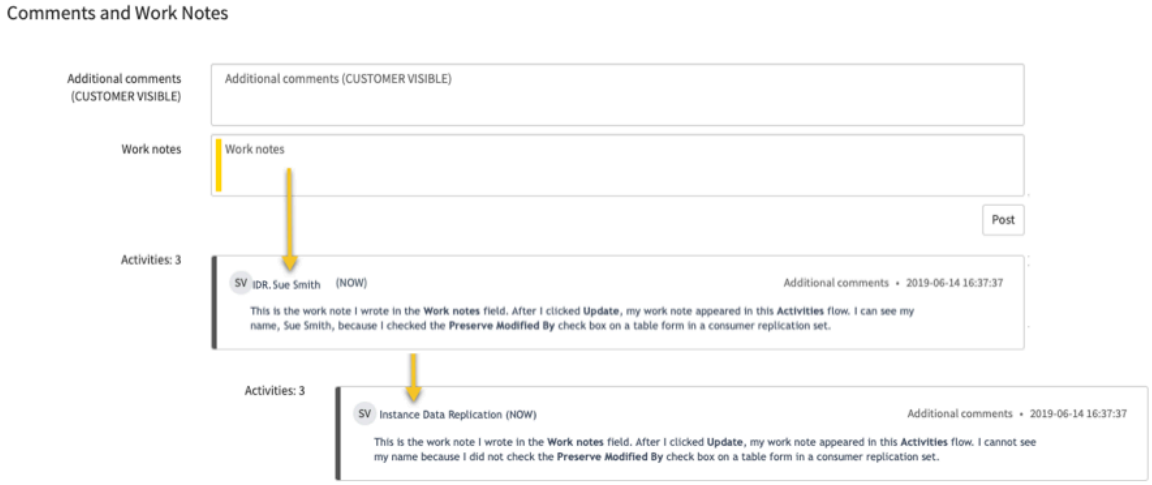
11. Select **Update**.
12. Activate the consumer replication set.
    a. Select the consumer replication set that you want to activate.
    b. Open the **Inbound Entries** tab.
    c. Select **Activate**.

    After some time, the Status is Active Replication, and the **Partial Seeding** and **Full Seeding** buttons are displayed. With both seeding options, IDR generates audit trails of all record updates. If you encounter an error during seeding, see Fix seeding errors. For more information about seeding, see Seed a consumer instance.
13. **Optional:** To discard your seeding request before clicking **Activate**:
    a. On the **Seeding Requests** tab, click a seeding request.
    b. On the Seeding Request form, click **Cancel**.
14. **Optional:** To modify the behavior of the consumer, click a source table name on the **Inbound Entries** tab.

    a. To preserve the user name in an Activities entry, select the **Preserve Modified By** option on the Inbound Entry form.

    (Optional) For example, the **Work Notes** field is an Activity type in change request records. When a user updates a change request, the work note moves into the Activities stream.

    - If you do not select **Preserve Modified By**, Instance Data Replication appears in place of the user name in the consumer records.
    - If you select **Preserve Modified By**, the user who updated the change request is identified in the entry and the system prepends IDR to their name.



When replicating changes, **Preserve modified by** affects values for the **Updated by**, **Updated**, **Created**, and **Created by** system fields:

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- When **Preserve modified by** is enabled and you include system fields in the producer replication entry, producer system field values are replicated to the consumer records. If you do not include system fields in the producer replication entry, default system values from the consumer instance are used instead.
- When **Preserve modified by** is disabled, default system field values from the consumer instance are used, which means they may not match the system field values in records on the producer.

When seeding data, the **Preserve modified by** setting has no effect:

- If you include system fields in the producer replication entry, producer system field values appear in the seeded records.
- If you do not include system fields in the producer replication entry, null values appear in the system fields for seeded records.

b. To run business workflows after a replication, select the **Run Business Rule** option.

(Optional) A business rule is a server-side script that is associated with a table. Use business rules to trigger workflows that are associated with replications, such as sending a notification or validating the replicated data. For more information, see Trigger workflows after replication.

c. To replicate the data from the producer tables into tables with different names on the consumer instance, click **Enable Transform**.
For more information, see Transform replication data.

d. Click **Update**.

What to do next

The consumer instances contain, at a minimum, the current data in the producer replication set tables. The consumer instances are now ready to accept replicated data updates. By default, the data in the producer tables is replicated into tables and table columns of the same name on the consumer instances. For more information about how to map the data into different tables and table columns and how to modify the data as it is replicated, see Transform replicated data.

- Map the replication data to different tables on the consumer instance.
- Modify the values during replication.
- Set up business rules to trigger post-replication workflows.

Seed a consumer instance for Instance Data Replication

Seed all or some of the tables in your Instance Data Replication (IDR) replication sets depending on the needs of your consumer instance.

Before you begin

Role required: idr_admin or admin

About this task

Seeding replicates existing records from the producer instance to the consumer instance. You can initiate seeding requests on a consumer instance while you are activating a consumer replication set. Seeding options are not available in bi-directional or discrete replication sets by design.

You can select either full seeding or partial seeding.

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- Full seeding replicates all existing records from a table in the producer instance. Perform a full seeding when you want to replicate all existing records.
- Partial seeding enables you to filter and replicate specific records from the producer. Perform a partial seeding when you want to replicate only some of the records from the producer.

The producer instance handles one seeding request at a time. When the producer instance is busy with a seeding request, subsequent seeding requests are queued and initiated in the order that they are received.

- Records that exist on the producer instance and not on the consumer instance are copied to the consumer instance.
- If the sys_id on the producer matches an existing record on the consumer instance, the entire record on the consumer instance is updated to match the producer.
- The sys_id of the record identifies the record on both instances. If you use the custom coalesce option, the field you select is used to coalesce records in both instances.
- If a replication set changes and no longer includes a table, IDR does not alter the records in the corresponding table on the consumer instances.

If you encounter an error during seeding, see Fix seeding errors.

- Seeding continues even if errors occur on some consumer tables. You can restart seeding specifically on the tables that have errors or on all tables in a replication set.
- The maximum for a retry reseeding request is 10,000 errors. If you have more errors, perform a full seeding.

Do not retry full seeding if the data set exceeds any of the following limitations:

- Record size exceeds 32 MB
- Seeding request exceeds 3 million records
- Replication takes longer than seven days to complete

Note:
Seeding is not a replacement for cloning. Do not use IDR to clone instances.

Procedure

1. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets** and click a consumer replication set.
2. On the **Inbound Entries** tab, select the entry or entries that you want to initiate seeding for.
3. To initiate a full seeding, click **Full Seeding**.
   A dialog box opens stating that the system is requesting all matching records.
4. To configure a partial seeding, click **Partial Seeding**.
   a. If you selected more than one entry, select the Replication entry that you want to configure and select **Configure Seeding**.
   b. Configure one or more Custom Filter conditions, operators, and values.
   c. To download the current field values and to replicate the files that are associated with the records, select **Include Attachments**.
   d. To download the current field values and the history of all field updates, select **Include History**.

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e. In the Included Fields columns, use the arrows to move table fields into the Selected column to replicate them or into the Available column to prevent replicating them.

f. Click **Save Configuration**.

g. Configure other Replication entries as needed.

h. When you are ready to initiate seeding, click **Request Partial Seeding**.

Note:
The Custom Filter determines which records to include in the partial seeding request.

The system must replicate some fields, such as **Sys ID**. The system cannot replicate some fields, such as **Edge Encrypted** and **Password**. They do not appear in either column.

5. To discard your seeding request before you click **Request Partial Seeding**, click **Cancel**.

Result
In a successful seeding, all selected data on a producer instance is replicated on a consumer instance. After seeding, the consumer instance maintains a history of all field updates.

Trigger a workflow after replication using Instance Data Replication

Use platform business rules to trigger workflows after replication using Instance Data Replication (IDR).

Before you begin
Role required: idr_admin or admin

About this task
Inserts and updates that are replicated to a consumer instance can trigger business rules configured on the target table. A business rule is a server-side script that is associated with a table. Use business rules to trigger workflows that are associated with replications, such as sending a notification or validating the replicated data.
Business rules are part of the ServiceNow AI Platform. For more information, see Business rules.

Procedure

1. On a consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets** and click a consumer replication set.
2. On the **Inbound Entries** tab, click a replication set table.
3. Select the **Run Business Rule** option.
4. Repeat this procedure for the other tables in the replication set.
5. Click **Update**.
   IDR invokes the business rules that are associated with the specified table after replicating the data to the table.

Reconfigure a replication set in Instance Data Replication

If you must change or update your original replication set, reconfigure Instance Data Replication (IDR) replication sets on the producer instance.

Before you begin
Role required: idr_admin or admin

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About this task

After activating a revised producer replication set, update the producer replication set name, shared key, producer ID, and producer set ID on each consumer instance.
Note the following important information:

- Make sure that a seeding request is not in progress before you reconfigure a producer instance. Check the consumer replication sets seeding requests status.
- If you make a change to the producer replication set, you must re-synchronize the consumer replication set. On the consumer instance, click **Synchronize Replication Entries**, and then click **Activate**.

Procedure

1. Reconfigure a producer instance:

   a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

   b. Select a producer replication set and make one or more of the following changes to the set:

   - To add a table to the set, on the **Replication Entries** tab, click **New**.
   - On the **Replication Entries** tab, click a replication set. In the Replication Entry form, modify the columns that are included in the replication set, and click **Update**.
   - To remove the table from the replication set, on the **Replication Entries** tab, click a replication set and click **Delete**.
   - To change the shared encryption key, click **Generate New Shared Key**.

     Only generate new shared keys when you discover that they are compromised or if you want to stop sending data to a consumer. After changing the encryption key on the producer instance, consumers that have the Consumer Approved Status of Denied must reapply for access to the producer replication set. For more information, see Grant access to replication data.

   These changes stop replication and produce this status message on the consumer instance: `Producer Replication Set configuration has been modified`.

2. Navigate to **Instance Data Replication** > **Consumer Replication Sets** and click the consumer replication set and each consumer instance that you want to update with the changes made on the producer.
   The status of the replication set is Replication Error. The following table lists the action to take according to the status message.

3. **Optional:** Discard the entire IDR configuration and start over, delete the replication set on the producer and the consumer.
   - To delete a producer replication set from the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**. Click the producer replication set that you want to delete, and click **Delete**.
   - To delete a consumer replication set on a consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**. Click the consumer replication set that you want to delete, and click **Delete**.

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Grant access to the replicated data for Instance Data Replication

Approve or deny a request to grant access to the replication data in Instance Data Replication (IDR).

Before you begin
Role required: admin, idr_admin

About this task
You can review consumer access requests for all of your producer replication sets or for a specific producer replication set. The administrators of consumer sets must apply for access before they can receive the replication data.

Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Consumers Pending Approval**.
2. Select the option for each consumer replication set that you want to approve.
3. On the Actions on selected rows list, select **Approve**.
   The approved consumer sets start receiving the replicated data.

   Note:
   You can change the Consumer Approval Status to Denied to prevent the consumer from receiving the replicated data.

4. Approve a consumer access request for a specific producer replication set.

   a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

   b. Select the producer replication set where you want to approve consumer access.

   c. Under Related Links, on the **Consumer Subscriptions** tab, select the option for the consumer replication set that you want to approve.

   d. On the Actions on selected rows list, select **Approve**.
      The approved consumer set starts receiving replicated data.

      Note:
      You can change the Consumer Approval Status to Denied to prevent the consumer from receiving the replicated data.

Revoke access to replicated data for Instance Data Replication

Revoke a consumer's access to replicated data if you believe that consumer instance should no longer receive data in Instance Data Replication (IDR).

Before you begin
Role required: admin, idr_admin

About this task
When you generate a new, shared encryption key, approved consumer sets automatically receive the new key and data replication is not interrupted. Any consumer set with a status of Denied or Pending Approval does not receive the new encryption key, and replication ceases.

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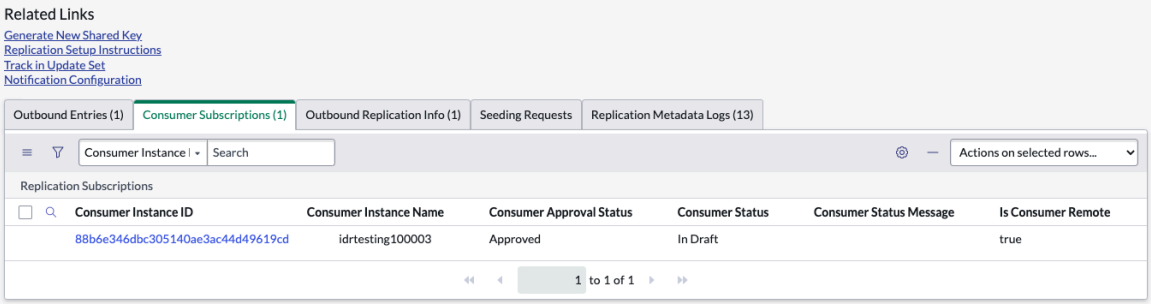
Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.
2. Select the producer replication set that has consumers whose access needs to be revoked.
   The instance identifies the consumers under the **Consumer Subscriptions** tab.



3. On the **Consumer Subscriptions** tab, select the option for the consumer instance whose permissions you want to revoke.
4. In the Actions on selected rows list, select **Revoke**.
   Instance Data Replication generates a new encryption key and shares it with all approved consumer sets. All other consumer sets stop receiving replication data. Admins of those consumer replication sets must reapply to restore access to the replication data.

Restore access to replication data for Instance Data Replication

Restore Instance Data Replication (IDR) access to replicated data by sending a request to the producer replication set admin.

Before you begin
Role required: admin

About this task
When the producer replication set administrator generates a new encryption key, consumer sets with a status of Approved automatically receive the new key and data replication is uninterrupted. Consumer sets with a status of Denied or Pending Approval do not receive the new encryption key and replication stops.

Procedure

1. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
2. Select the consumer replication set to restore access to.
3. Click the **Request Shared Key** related link.
   The system sends a request to the producer replication set administrator. If you are granted access, the consumer Approval Status changes to Approved.
4. If the producer replication set has changed, click the **Synchronize Replication Entries** related link.
5. To get the latest data in the producer replication set, on the **Inbound Entries** tab, select all the tables and click **Activate**.

Transform replication data for Instance Data Replication

Transform producer instance data for tables or table columns that are named differently on consumer instances in Instance Data Replication (IDR).

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Before you begin

- Create and activate a producer replication set.
- Create, activate, and seed one or more consumer replication sets.
- Role required: idr_admin or admin

About this task

The replicated data from producer tables and table columns goes into tables and table columns of the same name on consumer instances. You can map the producer data into any table or table column on consumer instances. If existing tables or table columns have different names, you can replicate the data to a different table or table column. Adapters modify the data before storing it on consumer instances. For example, adapters can localize data from the producer instance before it is consumed by the consumer instance.

You can also use adapters to modify the producer data during replication. For example, you can localize the data or populate the data that has been labeled differently in consumer tables.

Transformations have the following limitations:

- sys_created, sys_created_by, sys_domain, sys_updated_by, sys_id, sys_mod_count, and other systems are automatically mapped to the consumer and can't be remapped.

  No other sys_ fields can be replicated.

- Adapters can't operate on the sys_journal field type such as Comments or Worknotes columns in a Task table.
- Calculated fields won't be transformed.

  A calculated field, such as the name field from sys_user, will replicate but cannot be transformed. Allowing a transformation breaks the calculation for the resulting field.

> **Note:**
> Calculated fields will not show as an option to transform.

Procedure

1. Choose a producer or consumer instance and navigate to the replication set.

Option	Description
Consumer Instance	Navigate to **Instance Data Replication** > **Consumer Replication Sets** and click a consumer replication set.
Producer instance	Navigate to **Instance Data Replication** > **Producer Replication Sets** and click a producer replication set.

2. Choose an inbound or outbound entry.

Option	Description
Consumer Instance	On the **Inbound Entries** tab, click an inbound entry.
Producer instance	On the **Outbound Entries** tab, click an outbound entry.

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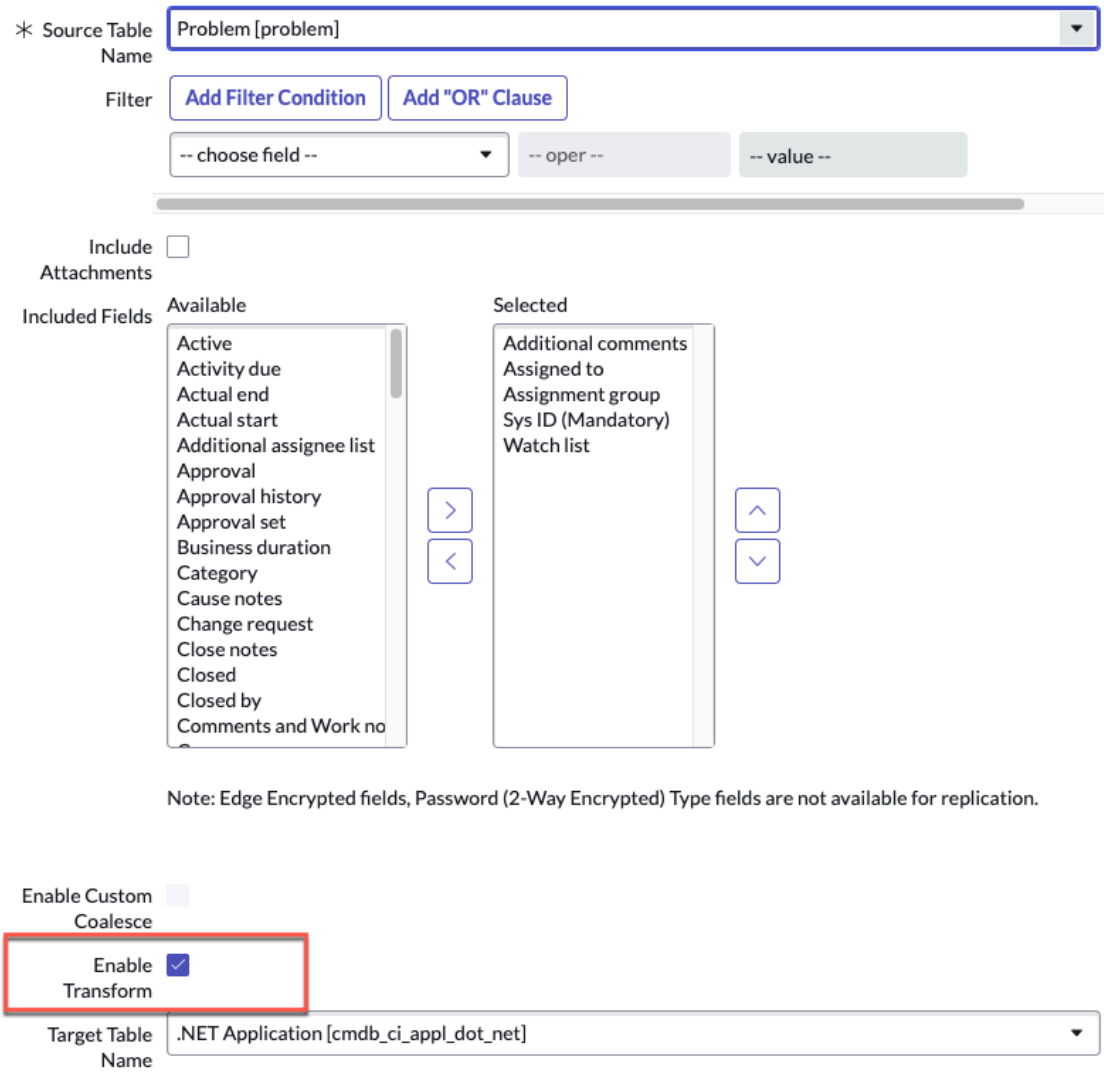
An entry appears.



3. Select the **Enable Transform** option.
4. In the Target Table Name list, select the table into which you want to replicate the source table data and click **Update**.
5. On the **Inbound Entries** or the **Outbound Entries** tab, click the same entry.
6. Click the lock icon next to **Transform Map** to unlock it.
   The image shows a Transform Map, with the field names from the source table appearing in the left column. The middle column shows matching field names in the target table. All fields that do not have the same names in both tables appear in the – choose source field – or – choose target field – lists.

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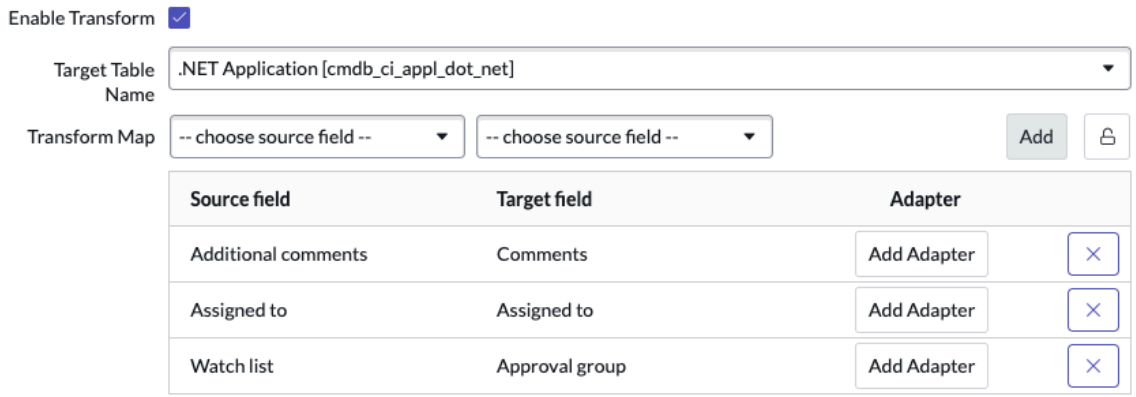
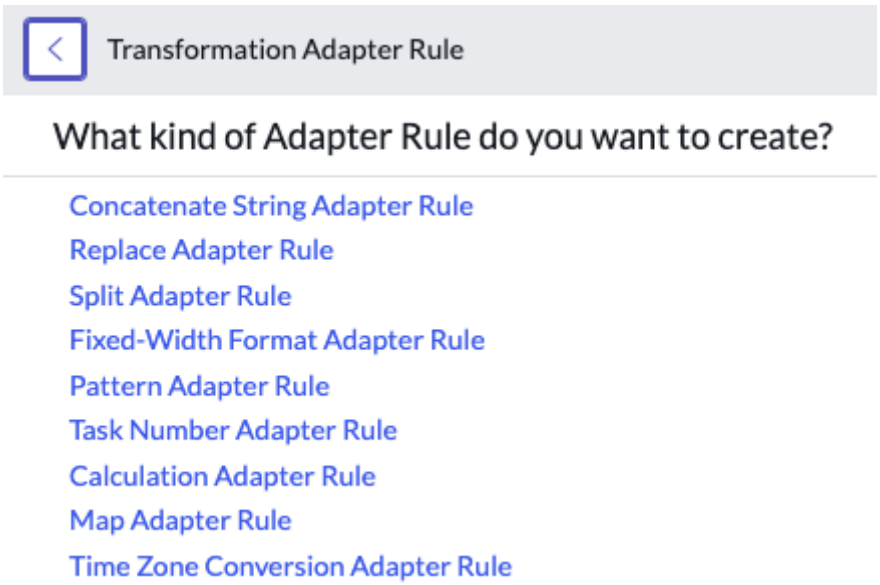


Note:
If a table in a producer replication set is not on a consumer instance, the consumer instance will fill the first column with the producer schema definition sent during synchronization.

7. Map a producer column to a consumer column that has a different name:
   a. Click **– choose source field –** and select the source field that you want to map.
   b. Click **– choose target field –**, select the target field into which you want to map the data, and then click **Add**.
   c. If you want to remove a field from replicating the producer instance to the consumer instance, click the **X** at the end of the row to delete the field.
8. To modify the producer data before replicating it in the consumer instance, click **Add Adapter**. The image shows the type of Adapter rules that you can create.



9. Click the adapter that you want to use and then configure it.
   For more information about configuring adapters, see Adapter descriptions.

Note:
Adapters do not modify the data on the producer instance.

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Warning and error messages for schema validation in Instance Data Replication

Understand error and warning messages relating to schema definitions. You can then troubleshoot or fix Instance Data Replication (IDR) replication issues.

Warning and Error Messages

Message	Type	Action
`The consumer instance does not recognize the [specified] table from the associated IDR schema.`	Error	The replication entry cannot process any messages. Please enable a transformation with this table to receive updates from this table to the consumer instance.
`The consumer instance does not recognize the [specified] column from the associated IDR schema.`	Warning	The replication entry cannot process any of the specified columns. Please enable a transformation with this table in order to receive updates from this column to the consumer instance.
`The consumer instance does not recognize the column type or length from the associated IDR schema for these columns: [specified columns].`	Warning	The consumer instance might lose data for those columns. Please enable a transformation with this table in order to receive updates from these table columns.

Set up bidirectional replication in Instance Data Replication

Replicate updated data on a consumer instance to the producer instance using bidirectional replication in Instance Data Replication (IDR).

Before you begin

Role required: idr_admin or admin

Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**:
   - Click **New** for a new replication set
   - Click on a producer replication set.
2. Check the **Bi-Directional** checkbox to enable bi-direction for your producer replication set. Bi-directional replication enables changes to records that are made on the consumer instance to propagate to the producer instance.

> **Note:**
> Bi-directional replication works for records that originate on the producer or consumer.

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3. On a consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets** and click a consumer replication set that is connected to the producer replication set.
4. On the Consumer Replication Set pane, click the **Synchronize Replication Entries** related link to update the Consumer Replication Entries configuration on the consumer to match the configuration on the producer.

Result
Data that is updated on this consumer instance automatically replicates on the producer instance, which then replicates the updates to its other consumer instances.

Create a discrete producer replication set for Instance Data Replication

Distinguish consumers for a producer replication set in Instance Data Replication (IDR).

Before you begin
Role required: admin

Procedure
1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**:
   - Click **New** for a new replication set
   - Click on a producer replication set.
2. Check **Discrete** to enable discrete mappings for your producer replication set.
   Once you enable discrete mapping, each outbound entry for a replication set has a discrete value column. You can define the mapping of each consumer subscription by setting a discrete value.
3. Navigate to **Outbound Entries** tab and click **New**.

Options	Description
Source Table Name	Select one of the tables on the producer instance to replicate. For example, .NET Application [cmdb_ci_dot_net]
Discrete Field	Choose a reference field that defines the mapping for each consumer subscription. For example, if you choose the **Assigned To** field in the Incident source table, you can distinguish user assignments for specific consumers.
[Optional] Filter	Within the **Filter** section, you can use the **Add Filter Condition** to select filter criteria to control the records in the table that are being replicated. For example, you might want to replicate only active records. In that case, select **Active** in the **– choose field –** list, **Is** in the **– oper –** list, and **True** in the **– value –** list. If you do not use a filter, all the fields in the producer replication set table appear in the Available column. **Note:** The Available column contains the fields in the Source Table that you specified. That table may not contain the **Active** field.
[Optional] Include Attachments	Select this option to replicate files that are associated with the records that are being replicated.

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Options	Description
[Optional] Included Fields	In the Included Fields columns, use the arrows to move table fields into the Selected column to replicate them or into the Available column to prevent replicating them. **Note:** Some fields, such as **SYS ID (Mandatory)**, must be replicated. Other fields, such as **Edge Encrypted** and **Password1**, can't be replicated and do not appear in either column.

4. Navigate to **Discrete Mappings** tab, click **New**, and fill in the form fields.

Field	Description
Discrete Value	This field sets a rule for what displays for the selected consumer instance within the producer replication set. For example, an **Assigned To** discrete value gives choices from a designated table of a specific user to show assignments.
Outbound Replication Entry	Select an outbound replication entry that you configured with a source table for this producer replication set.
Replication Subscription	Choose the consumer instance that displays the discrete value assignment.

Note:
For each consumer that subscribes to a producer replication set with discrete mapping enabled, they must have a discrete value set.

Administering Instance Data Replication

Monitor data replication activities and troubleshoot potential issues in Instance Data Replication (IDR).

Comparing replicated data between instances in Instance Data Replication

You can find missing or mismatched records by comparing replication data between instances in Instance Data Replication (IDR).

IDR synchronizes data between a producer instance and one or more consumer instances. After you activate a producer replication set and subscribe at least one consumer, you can send existing records from the producer to the consumer by seeding records. After seeding is finished, IDR maintains data synchronization between the instances by replicating new and changed records from the producer to the consumer.

If an insert fails on the consumer or when producer and consumer records don’t match after replication, you can use the data comparison feature in IDR to find these records and reseed them from the producer to the consumer.

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Key benefits

- Identify records missing from the consumer instance after seeding.
- Identify mismatched records and view their differences.
- Keep data synchronized between instances by reseeding records.

Comparing transformed data

When comparing transformed data, note the following details:

- The data comparison can return mixed results if records are added to a table on the producer and then a transformation replicates to a different table on the consumer instance.
- Mapped fields with different field definitions are skipped. For example, if a field on the producer has a different column type or column length than the mapped field on the consumer, the field is skipped.
- All fields that are modified by an adapter are skipped except for modifications made by the Task number adapter. For example, if a string is appended using the Concatenate String adapter, the data comparison can't undo the concatenation and compare the data using the original string, so the field is skipped.

Compatibility

Beginning in the Washington DC release, you can compare replicated data in bidirectional replication sets, discrete replication sets, and replication sets with transformations configured on either the producer or the consumer.

When comparing data on different family releases, note the following compatibility options.

Producer to consumer compatibility

Data comparison	Producer	Consumer	Supported replication sets
Producer to consumer	Washington DC or later	Utah and earlier	None
Producer to consumer	Washington DC or later	Vancouver	Supports unidirectional replication sets, but not the following: • bidirectional replication sets • discrete replication sets • replication sets configured with transformations
Producer to consumer	Washington DC or later	Washington DC or later	All replication sets

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Consumer to producer compatibility

Data comparison	Consumer	Producer	Supported replication sets
Consumer to producer	Washington DC or later	Utah and earlier	None
Consumer to producer	Washington DC or later	Vancouver	Supports bidirectional replication sets, but not the following: • unidirectional replication sets • discrete replication sets • replication sets configured with transformations
Consumer to producer	Washington DC or later	Washington DC or later	All replication sets, but not unidirectional replication sets

Limitations

- Journal fields are excluded from the comparison due to the potential size of their content.
- Attachments are not included in data comparisons.
- Sys Audit [sys_audit] table records are excluded from the comparison.

Find missing or mismatched records in Instance Data Replication

Find records missing from the consumer instance or mismatched records after data has been replicated by creating a data comparison request in Instance Data Replication (IDR).

Before you begin

Make sure the following conditions are met:

- The producer replication set is active.
- Seeding isn't in progress.
- No other data comparison requests are running.

Role required: admin

About this task

Note the following:

- Data comparison requests are purged after three months.
- A data comparison request can have a maximum of 500,000 records.
- There are limitations when comparing transformed data. See Comparing replicated data between instances in Instance Data Replication.

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Procedure

1. On the producer instance, navigate to **All** > **Instance Data Replication** > **Producer Replication Sets**.
2. Select an active producer replication set with replicated data that you want to compare.
3. Create a data comparison request.

   a. Navigate to the IDR Data Comparison Requests related list.

   b. Select **New**.

   c. On the form, fill in the fields.

   IDR Data Comparison Request form

Field	Description
Replication Set	Name of the producer replication set.
Target Instance Name	Name of the consumer instance.
Target Instance URL	URL of the consumer instance.
Table Name	Name of the table in the outbound entry of the producer replication set.
Start Time	Start date and time for comparing data. Records with a sys_updated_on value after the date you select are included in the comparison.
End Time	End date and time for comparing data. Records with a sys_updated_on value before the date you select are included in the comparison.

   d. Select **Submit**.

4. View a summary of the data comparison in the IDR Data Comparison Results form.
   - Determine the percentage of missing or mismatched by viewing the pie chart.
   - View the total number of missing and mismatched records in the **Mismatched Records Count** field.
5. **Optional:** Identify records that are missing from the consumer instance after seeding through the pie chart or list.
   - View the missing records by selecting the missing records portion of the pie chart.
   - View records that have a **Missing** value in the **Record Type** column in the IDR Instance Comparison Results related list.

   Tip:
   Save copies of the missing record IDs in case you need to provide them to Customer Service and Support.

6. **Optional:** View the differences between mismatched records after data replication.

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a. Navigate to the IDR Instance Comparison Results related list.

b. Select the check box next to any record with a **Mismatched** value in the **Record Type** column.

c. Select the **Actions on selected rows** list.

d. Select **Compare records**.

e. View the highlighted differences between the records in the **Compare Record Payloads** dialog box.

> **Note:**
> Journal fields are excluded from the comparison due to the potential size of their content.

Save a copy of the payload difference in case you need to provide it to Customer Service and Support.

What to do next

Reseed missing or mismatched records in Instance Data Replication.

Reseed missing or mismatched records in Instance Data Replication

Synchronize data between instances by reseeding records missing from the consumer instance or mismatched records between the producer and consumer instance in Instance Data Replication (IDR).

Before you begin

Role required: admin

About this task

Note the following:

- Data comparison results and logs are purged after five days.
- A reseeding request can have a maximum of 100,000 records.

Procedure

1. On the producer instance, navigate to **All** > **Instance Data Replication** > **Producer Replication Sets**.
2. Select a producer replication set with data that you want to reseed to the consumer.
3. View the data comparison results.
   a. Navigate to the IDR Data Comparison Requests related list.
   b. Select a data comparison.
4. Synchronize the data between the producer and the consumer instance by reseeding.
   - Reseed all records by selecting **All** in the **Reseed mismatched records** field.
   - Reseed only the mismatched or missing records by selecting **Mismatched** in the **Reseed mismatched records** field.
5. Select **Reseed**.

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Result
Records are reseeded from the producer to the consumer and the results are displayed when the job is finished.

What to do next
If records are still missing or mismatched, contact Customer Service and Support for assistance.

Deploying a replication configuration from one instance to another in Instance Data Replication

You can copy a replication configuration from one instance to another through an update set in Instance Data Replication (IDR).

In IDR, you can capture a snapshot of a replication configuration, including selected fields, filters, or data transformations using the **Track in Update Set** option, and then copy it to another instance using an update set.

Important:
The **Track in Update Set** option in IDR is the only supported method for capturing a replication configuration that you want to copy to another instance.

Key benefits

- Save time by defining a replication configuration once and using it as a template for new replication sets on other instances.
- Minimize potential impact to your production instance by developing a replication configuration in your sub-prod instance first.
- Verify a replication configuration in a sub-prod instance before rolling it out to a production instance.

Configuration entities

The following configuration entities are captured in an active update set when you select the **Track in Update Set** option.

Entry set

An entry set is a bundle of replication entries (like a replication set), that doesn't contain any instance-specific metadata like the Producer ID. A new Producer ID is used in the target instance when you create a producer replication set based on an entry set.

Replication options that are tracked in an entry set and their status (active or inactive) include:

- Bi-directional replication
- Discrete value mapping

Replication entries

A replication entry contains configuration settings for each table that you want to replicate. Replication entries are either outbound or inbound.

- Outbound entries from a producer instance contain the source table, filter, fields you want to replicate, and data transformation settings.
- Inbound entries from a consumer instance include the target table, the option to run business rules after replication, and data transformation settings.

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Viewing an entry set and replication entries

When you create a replication set, a new record is added to the Entry Sets [idr_entry_set] table. New records are added to the Replication Entries [idr_replication_entry] table for each outbound entry that you add to the replication set.

After selecting **Track in Update Set**, you can view the entry set and its replication entries in the current update set by navigating to **All** > **System Update Sets** > **Local Update Sets**, selecting the update set, and then viewing the **Customer Updates** tab.

Deploy a replication configuration through an update set in Instance Data Replication

Export a replication configuration from one instance and import it on another instance through an update set in Instance Data Replication (IDR).

Before you begin

Role required: idr_admin or admin

About this task

You can copy a replication configuration from one instance to another using an update set. For details on using update sets, see Get started with update sets.

Procedure

1. On the source instance, create an update set.
   a. Navigate to **All** > **System Update Sets** > **Local Update Sets**.
   b. Select **New**.
   c. Enter a name for the update set.
   d. Select **Submit and Make Current**.
   An update set is created and selected as the current update set on the source instance.
2. Capture a producer or consumer replication configuration in the update set.

   Note:
   You can capture the following types of configurations on a producer instance:
   - Producer replication (one-way)
   - Producer replication with bi-directional replication
   - Producer replication with discrete replication

   - The replication set configuration is added to the Entry Sets [idr_entry_set] table.
   - The replication entries in the replication set are added to the Replication Entries [idr_replication_entry] table.
   - The entry set and its replication entries are captured in the current update set.
3. **Optional:** Continue modifying the replication configuration as needed.
   Additional changes that you make aren't captured until you select **Track in Update Set** again.
   a. Modify the producer replication set and select **Update**.
   b. Capture the latest changes by selecting **Track in Update Set**.
   The latest changes are captured in the update set.
4. Export the update set to XML.
   a. Navigate to **All** > **System Update Sets** > **Local Update Sets**.
   b. Select the current update set.

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c. In the **State** drop-down list, select **Complete**.

d. Select **Update**.

e. In the Update Sets list, select the update set that you marked as complete.

f. Select the **Export to XML** related link.
The update set is exported to an XML file on your local machine.

5. On the target instance, import the update set.

a. Navigate to **All** > **System Update Sets** > **Update Sets to Commit**.

b. Select the **Import Update Set from XML** related link.

c. Select **Choose File** and browse to the XML file that you exported.

d. Select **Upload**.

e. In the Retrieved Update Sets list, select the update set that you imported.

f. Select **Preview Update Set**.

Note:
If you receive sys_record_transform errors during the preview, select all the error records that are listed in the **Update Set Preview Problems** tab, and then select **Accept Remote Update**. Repeat this action for any additional sys_record_transform errors that appear.

g. Exit the preview by selecting **Close**.

h. On the update set form, select **Commit Update Set**.

The update set is imported on the target instance, including the entry set and replication entries that you captured from the source instance. If you exported the configuration for a uni-directional producer replication set, a new producer replication set is automatically created on the target instance.

6. On the target instance, perform the following steps based on the type of replication set that you want to set up.

Result

The replication configuration that you exported from the source instance is imported to the target instance. A new replication set based on the exported configuration is created on the target instance.

What to do next

- If you're setting up a producer replication set, create and subscribe one or more consumers.
- If you're setting up a consumer replication set, approve the consumer's request on the producer instance, and then activate the consumer replication set on the consumer instance.
- If you're setting up a bi-directional replication set, synchronize the consumer by selecting the **Synchronize Replication Entries** related link in the connected consumer replication set.
- If you're setting up a discrete replication set, create and subscribe one or more consumers.

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Cloning with Instance Data Replication

Ensure that certain tables are preserved or excluded to clone your database from one instance to another successfully with Instance Data Replication (IDR).

There are multiple methods for copying an IDR configuration from one instance to another.

Capture the configuration in an update set

An update set captures a group of configuration changes that you can move from one instance to another but doesn't include data that a producer replicates to a consumer. You can capture a snapshot of an IDR replication configuration, including selected fields, filters, or data transformations using the **Track in Update Set** option, and then copy it to another instance using an update set. See Deploying a replication configuration from one instance to another in Instance Data Replication.

Copy the configuration using a clone profile

Cloning your instance copies everything in the database from one instance to another, including the data and the IDR replication configuration.

Before you clone your instance, you must determine whether to exclude or include your IDR replication configuration.

For details on cloning, see System clone.

IDR cloning use cases

You must preserve and exclude different sets of IDR tables in your cloning profile depending on your cloning use case.

Recurring clone

In this use case, you clone your source instance regularly without affecting the existing IDR configuration on the target instance.

For example, you configure IDR to replicate data from instance A to instance B. You determine that you must clone the database from instance A to another instance called instance C. Instance A and instance C both have IDR configured with different replication configurations. When you clone the database from instance A to instance C, you don't want to clone any of the IDR replication configuration from A to C.

Note:
If you regularly clone data from your source instance to your target instance, and find that you need to copy the IDR replication configuration from the source instance to the target instance, use the **Track in update set** feature to copy the IDR to the target instance.

To clone your database from one instance to another without affecting the IDR configuration on the target instance, you must update the preserve and exclude lists in your cloning profile according to the Recurring Clone use case described in KB0965218.

True clone

In this use case, you clone your source instance to your target instance and include the complete IDR replication configuration. The target instance inherits everything from the source. After the clone is finished, you must resubscribe all consumer instances to the target instance.

For example, you decide to provision a new production instance from a non-production instance that already has IDR configured. When you clone the non-

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production instance, the new production instance inherits everything from the non-production instance. To ensure that data replicates from the production instance and not the non-production instance, you resubscribe all consumer instances to the new production instance.

To clone your database and copy the current IDR configuration to the target instance, you must update the preserve and exclude lists in your cloning profile according to the True Clone use case described in KB0965218.

Migration clone

In this use case, you clone your source instance to the target instance, including the complete IDR replication configuration from the source instance, while preserving the target instance's replication configuration.

The migration clone involves performing a true clone, but with additional steps.

1. On the target instance, you create an update set and use the **Track in update set** feature to upload the existing replication sets on the target instance into the update set.
2. Perform a true clone.
3. After performing the true clone, you import the update set to the target instances, and you set up replication sets using entry sets to preserve the configuration.

Comparing IDR cloning use cases

Use case	Description	Prerequisites	Post requisites
Recurring clone	Clone your source instance to your target instance regularly but exclude your IDR replication configuration. When complete,replication sets on the target instance should not be changed.	Verify that IDR is configured correctly, and that replication is successful on both the source and target instances.	After performing a recurring clone, you can copy the IDR replication configuration from the source instance to the target instance using the **Track in update set** feature.
True clone	Clone your source instance to your target instance and copy your IDR configuration to the target instance. When complete, entry sets from the source instance should be cloned to the target instance.	Verify that IDR is configured correctly, and that replication is successful on the source instance.	After performing a true clone, you must perform the following actions on the target instance: 1. Re-create the replication sets using the cloned entry sets from the source instance. 2. Resubscribe each consumer to the newly-provisioned producer.

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Comparing IDR cloning use cases (continued)

Use case	Description	Prerequisites	Post requisites
Migration clone	Clone your source instance to your target instance and copy your IDR configuration to the target instance, while preserving the target instance's replication configuration. When complete, entry sets from the source instance should be cloned to the target instance.	1. Capture the existing replication sets on the target instance in an update set using the **Track in update set** feature. 2. Perform a true clone.	After performing the true clone, you must perform the following actions on the target instance: 1. Import the update set. 2. Re-create the target replication sets using the entry sets captured in the update set. 3. Re-create the source replication sets using the cloned entry sets from the source instance.

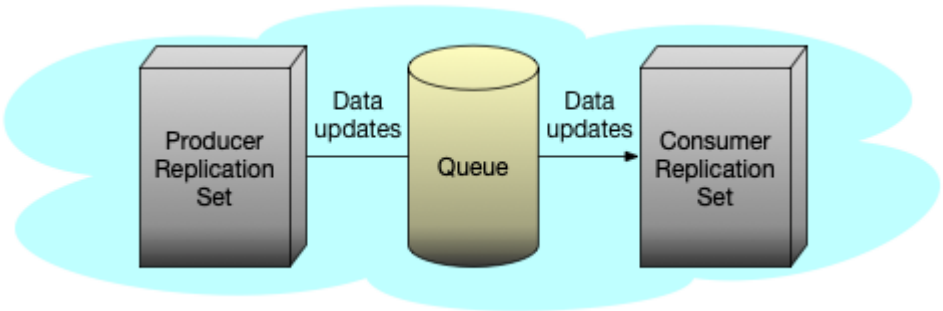
Delays in replicating data with Instance Data Replication

Delays in replicating data from the producer instance to the consumer instance can occur with Instance Data Replication (IDR).

After IDR has been set up on the producer instance, the *IDRProducerJob* job runs on producer instances to detect data updates. When there are updates to replicate, the producer instance sends the updates to consumer instances.

The IDRConsumerJob job runs on the consumer instances to detect the data updates from a producer. When the IDRConsumerJob job detects updates, it updates the data in consumer tables.

IDR data updates flow



It takes some time for the data updates in a producer replication set to appear in consumer replication sets. You can look on the monitoring dashboard to see how long data updates take from a producer replication set to consumer replication sets. Look at the queue dashboard to see the replication record queue, message queue, and messages processed for all replications sets.

If you have significant data delays, contact Customer Service and Support.

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Monitoring Instance Data Replication

You can monitor the status of active producer and consumer replication sets, scheduled jobs, seeding requests, and license or usage details through the Instance Data Replication (IDR) Monitoring Dashboard.

Accessing the IDR Monitoring dashboard

Users with the admin or idr_admin role can access the dashboard.

Access the IDR Monitoring dashboard in the following way:

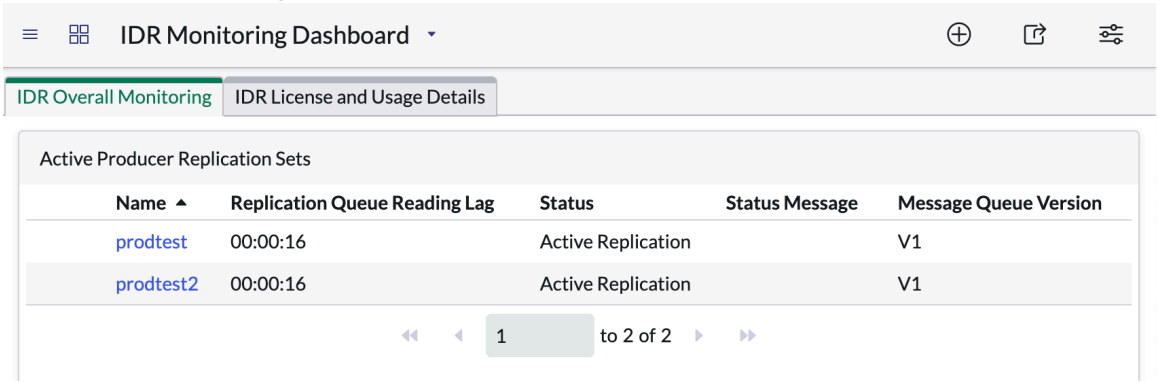
- Navigate to **Instance Data Replication** > **Monitoring Dashboard**.
- Choose either: **IDR Overall Monitoring** or **IDR License and Usage Details** dashboard.

IDR Overall Monitoring dashboard

The IDR Overall Monitoring dashboard monitors the following:

- Active Producer Replication Sets
- Active Consumer Replications Sets
- Suite of IDR Scheduled Jobs
- Producer Seeding Requests Within Last 7 Days
- Consumer Seeding Requests Within Last 7 Days

IDR overall monitoring dashboard



Active Producer Replication Sets

The Active Producer Replication Sets monitors your producer replication set status and reports the data lag time between your instance and the replication queue.

Field	Description
Name	Name of the producer replication set
Replication Queue Reading Lag	Time between a record change on the producer instance and the moment that it's sent over the outbound replication queue
Status	Status of a replication set, either active or in error
Status Message	Message that describes the error status

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Field	Description
Message Queue Version	Version of the Message Queue. Either V1 (Legacy) or V2 (Hermes)

Active Consumer Replication Sets

Active Consumer Replication Sets monitors your consumer replication set status, reports the network lag time, and reports the data lag time between the producer instance and consumer instance.

Field	Description
Name	Name of the consumer replication set.
Data Lag	Time between a record change on the producer instance and the moment that it's recorded in the consumer instance.
Network Lag	Time between a record change log in the outbound replication queue and the moment that it's recorded in the consumer instance.
Status	Status of a replication set, either active or in error.
Status Message	Message that describes the error status.
Message Queue Version	Version of the Message Queue. Either V1 (Legacy) or V2 (Hermes)

Suite of IDR Scheduled Jobs

The suite of IDR scheduled jobs poll for data changes, requests, and check the health of your producer and consumer instances. You can monitor the following jobs:

Jobs	Description
Hermes Metrics Collection	Collects metrics related to the Hermes Messaging Service.
Hermes Periodic Purge	Cleans obsolete cached data in the Hermes API.
Hermes Topics Util	Synchronizes topics across Hermes clusters. Initially, topics are created in a single Hermes cluster. This job detects new topics and creates the same topics in the remaining Hermes clusters.
IDRConsumerJob	Polls for record changes and seeding requests on the consumer instance in 15-second intervals.
IDRDeltaConsumerJob	Beginning in the San Diego release, when a consumer instance subscribes to a producer instance that is outside the local datacenter, the IDRDeltaConsumerJob job is created

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Jobs	Description
	on the producer instance. The function is the same as the IDRConsumerJob. The three-letter code denotes the datacenter location.
IDRHermesDeltaConsumer	Polls for consumer record changes from the Hermes delta topic in 15-second intervals.
IDRHeartBeatJob	Updates information about the health of every active producer or consumer set.
IDRMetadataConsumerJob	Polls for metadata record changes on the consumer instance in 15-second intervals.
IDRProducerJob	Polls for new, updated, or deleted records in the data replication queue for a producer instance in 15-second intervals.
IDRSeedingProducerJob	Checks for new seeding requests coming from consumer instances.

Note:
You can set when your IDR scheduled jobs run and configure a periodic trigger that specifies how often the job runs.

IDR Scheduled Jobs field types

Field	Description
Name	Scheduled job name.
Next Action	Date and time when the job next runs.
Trigger type	Job that you can configure to run daily, weekly, monthly, periodically, once, on-demand, or business calendar start or end date. The trigger can repeat daily, hourly, by minute, or by second.
Job ID	ID of the scheduled job.
State	State of the job, for example, ready.

Producer Seeding Request Within Last 7 Days

You can monitor the status of a producer seeding request within the last seven days.

Field	Description
Replication Set	Producer set and the consumer set.
Status	Status of the seeding request. The status can be completed, in progress, or failed.

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Field	Description
Start Time	Time that the seeding begins.
End Time	Time that the seeding ends.
Percent Complete	Percentage of the seeding request job that is complete.

Consumer Seeding Request Within Last 7 Days

You can monitor the status of a consumer seeding request within the last seven days.

Field	Description
Replication Set	Corresponding consumer set.
Status	Status of the seeding request. The status can be completed, in progress, or failed.
Start Time	Time that the seeding begins.
End Time	Time that the seeding ends.
Percent Complete	Percentage of the seeding request job that is complete.

IDR dashboard properties

You can access the IDR dashboard properties by navigating to **Instance Data Replication** > **Properties**.

You can change the following properties on your dashboard:

Property field	Description
Minutes of lag before the Data Lag field are highlighted in red on the IDR Monitoring Dashboard	**Data Lag** field that is part of the Active Consumer Replication set. If the actual lag time is greater than the time threshold that you set, the system highlights the field. The default is 15 minutes.
Minutes of lag before the Network Lag field is highlighted in red on the IDR Monitoring Dashboard	**Network Lag** field that is part of the Active Consumer Replication set. If the actual lag time is greater than the time threshold that you set, the system highlights the field. The default is 15 minutes.
Minutes of lag before the system highlights the Replication Queue Reading Lag field in red on the IDR Monitoring Dashboard	**Replication Queue Reading Lag** field that is part of the Active Consumer Replication set. If the actual lag time is greater than the time threshold that you set, the system highlights the field. The default is 15 minutes.

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Note:
You can set the colors on the fields through the personalize list columns (v_idr_dashboard_list.do).

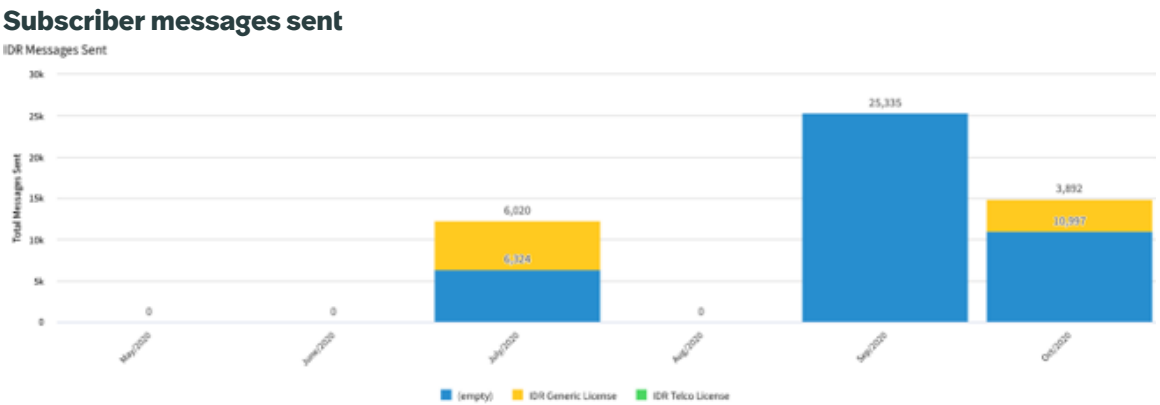
IDR License and Usage Details dashboard

The IDR License and Usage Details dashboard monitors the following:

- Subscriber Sent Messages
- Subscriber Received Messages
- IDR License Details
- IDR Messages Sent
- IDR Messages Received

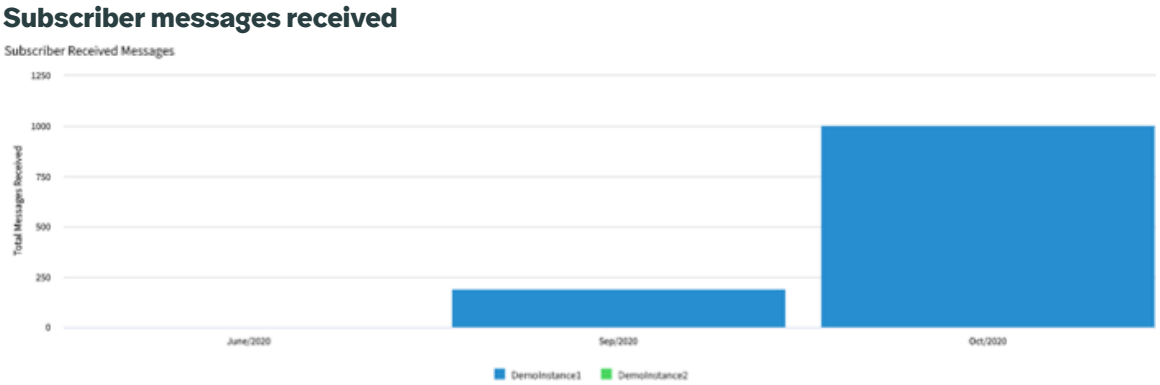
Subscriber Sent Messages

The number of messages each subscriber instance sent, by month.



Subscriber Received Messages

The number of messages each subscriber instance received, by month.



IDR License Details

You can monitor the status of a consumer seeding request within the last seven days.

Field	Description
Name	Name of the IDR license.

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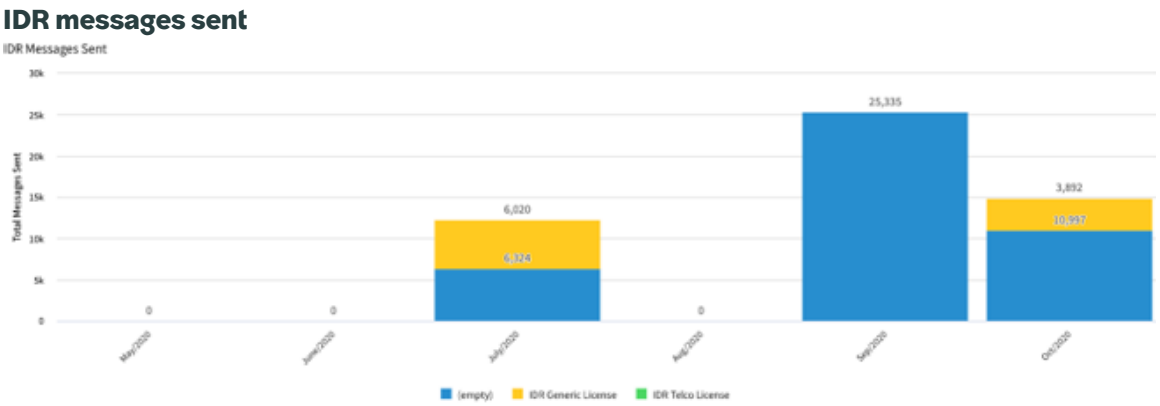
Field	Description
Type	Type of subscription: **Per-User** for user subscriptions, **Capacity** for data driven subscriptions, or **Unrestricted User** for subscriptions capped by the maximum user count.
Category	License category: ServiceNow license or Store App license.
Start date	Start of the licensing period.
End date	End of the licensing period.
Display only	Does not support resource allocation or monitoring.
Purchased	Number of purchased licenses.
Allocated	Number of allocated licenses.

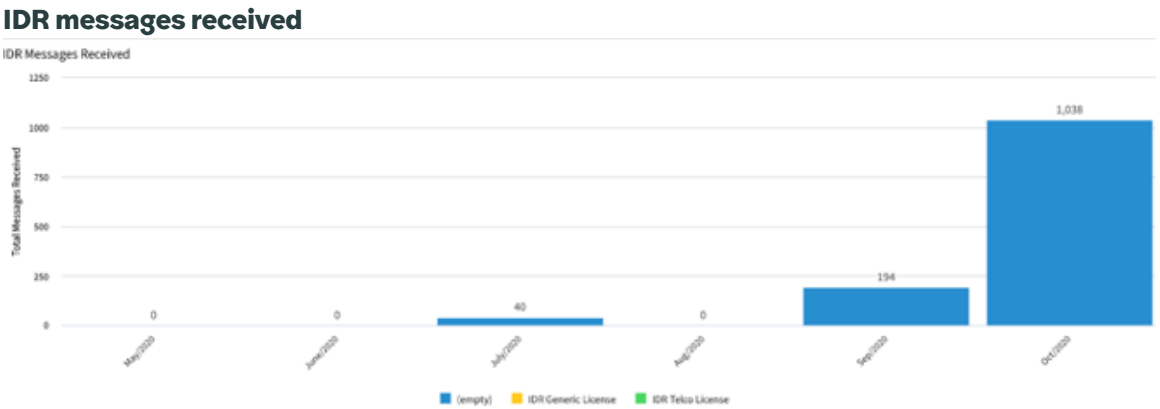
IDR Messages Sent

The number of messages sent, per license, monthly.



IDR Messages Received

The number of messages received, per license, monthly.



Monitoring queues in Instance Data Replication

You can monitor the replication record queue, message produced queue, message consumed queue, and the messages processed for all replications sets through the Instance Data Replication (IDR) Queue Dashboard.

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Accessing the IDR Queue Dashboard

Users with the admin or idr_admin role can access the dashboard.

Access the IDR Queue Dashboard by navigating to **Instance Data Replication** > **Queue Dashboard**.

IDR Queue Dashboard

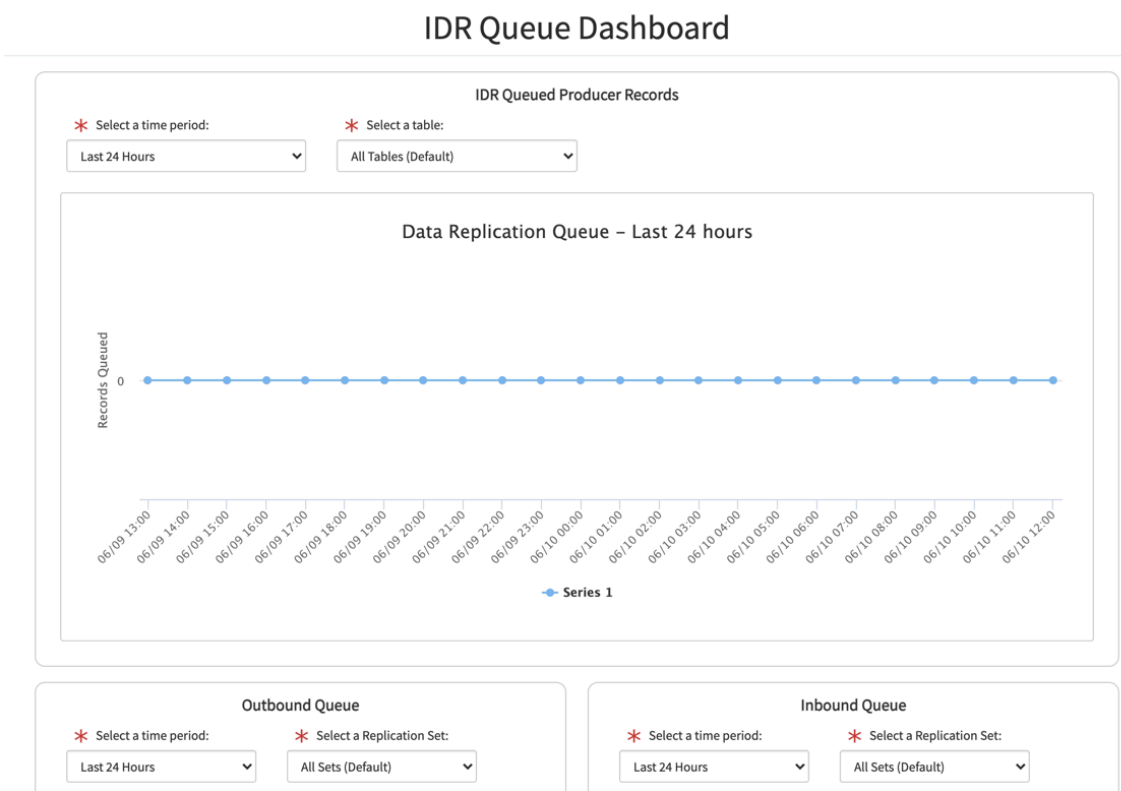
The IDR Queue Dashboard enables you to monitor the following:

- IDR Queued Producer Records which are hourly records queued for all tables over a 24-hour time period.
- Outbound Messages Remaining which are messages remaining in the replication queue that are not yet sent to the message queue.
- Outbound Messages Processed which are messages produced from this instance to the message queue.
- Inbound Messages Remaining which are messages remaining in the message queue, that have not yet been processed.
- Inbound Messages Processed which are messages consumed on this instance.

In any chart, select **Last 24 Hours** or **Last 5 Days** as the time period. For the 24-hour period, the number of messages is per hour. For the 5-day period, the number of messages is per day.

Select the legend link under the chart to exclude that data source.

IDR Queue Dashboard



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IDR Queued Producer Records

With the IDR Queued Producer Records chart, you can see the number of records queued for each table over an hourly or daily period. It shows which tables account for the highest amount of traffic within IDR over time. Use this chart to identify activity spikes that cause predictable performance lags on the consumer instance.

For example, if you see that a large spike of activity occurs every day at 3:00 a.m. due to a business rule on a table, you should expect a performance lag to occur on the consumer around that time.

Select **All Tables** or a specific table. Position your cursor over a point in the chart to see the queue count and tables for that point.

Outbound Messages Remaining

With the Outbound Messages Remaining chart, you can determine whether a producer instance is catching up to real-time replication after a large spike in activity.

When replication is working correctly, the messages remaining count should be very low. If there is a spike in activity, you can expect a large value. For example, when a business rule is changing tens of thousands of records within a minute.

You can also expect messages remaining to decrease over time as the jobs process the messages.

If the messages remaining count continues to grow without resolution, it might indicate:

- An issue processing the messages. For example, the *IDRProducerJob* is not running, or cannot send messages to the message queue.
- The instance is recording changes faster than IDR can produce them.

Select **All Sets** or a specific set. Position your cursor over a point in the chart to see the message count and replication set name for that point.

Outbound Messages Processed

With the Outbound Messages Processed chart, you can see the flow of records from a producer instance to the message queue over time.

Trends for messages processed and the messages remaining over time indicates if replication is recovering from a lag or if there are issues sending data to the message queue.

Along with the Data Replication Queued Producer records chart, you can see if the instance is sending data. If your instance has queued records that are not being sent, it might indicate:

- The instance is not able to run the producer job. For example, due to other resource-intensive processes running on the instance and all worker threads being busy.
- There is an issue connecting to the message queue.

To see the message count and replication set name for a graph point, select **All Sets** or a specific set and position your cursor over a point in the chart.

Inbound Messages Remaining

With the Inbound Messages Remaining chart, you can determine whether a consumer instance is catching up to real-time replication after a large spike in activity.

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You can expect a temporary large value when there is a spike in activity. The value normally decreases as the messages are processed.

If this value continues to grow without resolution, it might indicate:

- An issue processing the messages. For example, the *IDRConsumerJob* is not running, or cannot read messages from the message queue.
- The instance is recording changes faster than IDR can consume them.

Select **All Sets** or a specific set. Position your cursor over a point in the chart to see the message count and replication set name for that point.

Inbound Messages Processed

With the Inbound Messages Processed chart, you can see the flow of records for each consumer set over time.

Use the inbound messages chart to determine which replication sets have the most traffic and see trends for messages processed and the messages remaining.

If the producer is sending records to the message queue and the consumer is not processing them, it might indicate issues with the producer or the consumer instance.

Position your cursor over a point in the chart to see the message count and replication set name for that point.

Preventing insert and update errors in Instance Data Replication

You can prevent insert and update failures in Instance Data Replication (IDR) by specifying a class name filter in the producer replication set.

Important:
This topic only applies to producer replication sets created prior to the Utah release.

When you replicate a parent table and one or more child tables, you must add a sys_class_name filter to the parent table in the outbound entry of your producer replication set. If the sys_class_name filter is missing, insert and update failures appear in **Instance Data Replication** > **Replication Payload Error** in the following scenarios:

- A failed insert occurs when a record in the child table is replicated because the system attempts two inserts with the same sys_id to the parent table. Adding the sys_class_name filter to the parent prevents the unique key violation during the INSERT into the parent table.
- A new record is added to a replicated child table on the producer instance. Instance Data Replication (IDR) initially creates the record in the parent table on the consumer, but not the child table. If the child record is changed on the producer instance, during replication a failed update occurs on the child table in the consumer instance because the record only exists in the parent table.

If the table is a parent, decide if you want to replicate any of its child tables.

- If you want to replicate one or more child tables, you must identify the sys_class_name value for the parent table, and then add a corresponding sys_class_name filter to the parent table.

  For example, **Task Type** is the label for sys_class_name on the Task [task] table. To start replicating the incidents in addition to tasks, you must add **[Task Type] [is] [Task]** to the outbound entry for the Task [task] table.

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- If you only want to replicate the parent table, the filter is optional.
- If the parent table is already being replicated, you must edit the parent and add the sys_class_name filter.

If the table is a child, decide if you want to replicate its parent.

- If you want to replicate the parent table as well, you must identify the sys_class_name value for the parent table, and then add a corresponding sys_class_name filter to the parent table.

  For example, **Task Type** is the label for sys_class_name on the Task [task] table. To start replicating tasks in addition to incidents, you must add **[Task Type] [is] [Task]** to the outbound entry for the Task [task] table.

- If you only want to replicate the child table, the filter is optional.
- If one or more child tables are already being replicated, you must add the sys_class_name filter to the parent.

Resolving data replication errors in Instance Data Replication

Resolve errors and monitor the status of Instance Data Replication (IDR) replication sets.

Monitoring and diagnostic checklist

When you notice that the system is not replicating data, you can use the diagnostics checks to investigate the problem. To monitor the overall health of all replication sets, see IDR Monitoring dashboard.

IDR diagnostics checks

Check	Description
Monitor	
Check connectivity	Test your IDR instance connectivity to determine the connectivity of your instance to the message queue.
Check IDR monitoring dashboard to see if replication jobs are active	For the dashboard to properly display replication set information, these IDR scheduled jobs must be available and running on your instance: • Hermes Metrics Collection • Hermes Periodic Purge • Hermes Topics Util • IDRConsumerJob • IDRDeltaConsumerJob-<instanceid> • IDRHeartbeatJob • IDRMetadataConsumerJob • IDRProducerJob • IDRSeedingProducerJob If any of these jobs are missing or not running, contact Customer Service and Support.

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IDR diagnostics checks (continued)

Check	Description
	Note: The system only creates the IDRDeltaConsumerJob-<instanceid> when a consumer instance subscribes to a producer instance that is outside the local datacenter.
Producer replication set	
Check activation of the producer replication set	If the status of your producer replication set is In Draft, click **Activate**.
Check consumer subscription approval	Review the consumer access requests for your producer replication sets. A consumer replication set must request access before it can receive replication data.
Check producer replication log errors	Identify IDR errors by viewing the metadata for messages between producer and consumer instances, payload error logs, and message logs.
Consumer replication set	
Check the activation status of a consumer replication set	If the status of your consumer replication set is In Draft, click **Activate**.
Check if you need to synchronize replication sets	A synchronization issue occurs when a producer instance doesn't send data or a consumer instance doesn't receive data. Synchronization errors appear in the **Status** field on the consumer instance as **Replication Error**.
Check your consumer replication set status	Review the status of your consumer replication set and what that means for your replication.
Error and status messages	
Check replication or replication metadata log errors	Identify IDR errors by viewing the metadata for messages between producer and consumer instances, payload error logs, and message logs.
Check status messages	Review these status messages with recovery information.

Run Instance Data Replication diagnostics

Verify the status of services and the connection between your instance and the Instance Data Replication (IDR) message queue.

Before you begin

Role required: admin or idr_admin

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Procedure

1. Navigate to **All** > **Instance Data Replication** > **Diagnostics**.
   The dashboard loads and the IDR diagnostic tests run automatically.
2. View the following diagnostic tests.

Option	Description
Key Management Service	Checks the status and setup of the key man agement service. **Note:** IDR requires a key management service to be up and running.
Certificate Management Service	Checks the status and setup of your certifi cate management service. **Note:** IDR requires a certificate management service to be up and running.
EJBCA Service Status	Checks the status and setup of the EJBCA service as part of the Key Management Frame work (KMF) health.
VAULT Service Status	Checks the status and setup of the VAULT ser vice as part of Key Management Framework (KMF) health.

3. Test the connection to the message queue and confirm the replicator is working by running the Message Queue Connection Test.

Option	Description
Test the connection to the Legacy message queue	**a.** Select **Legacy**. **b.** In the Legacy Message Queue Test Con figuration section, select **Local** or **Remote** to run diagnostics on a local or remote in stance. For a remote instance, enter the URL of the remote instance, and a user name and password for any of the following roles: ▪ idr_rest ▪ idr_read ▪ idr_admin **Note:** The local datacenter to your producer instance regional proximity is the de fault. **c.** Select **Run Legacy Message Queue Test**.

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Option	Description
Test the connection to the V2 message queue	**a.** Select **V2**. **b.** Confirm that Hermes is enabled and that the Hermes cluster configuration is operational. **c.** Select **Run Message Queue Connection Test**.

Result
The resulting messages validate enabled services or the connection to the message queue.

Review synchronization errors in Instance Data Replication

Review the status field to check if synchronization is working correctly on the Instance Data Replication (IDR) consumer instance.

Before you begin
Before identifying synchronization errors, complete the tasks in check for common issues.

Role required: idr_admin or admin

About this task
Synchronization errors occur when a producer instance doesn't send data or a consumer instance doesn't receive data. Synchronization errors appear in the **Status** field on the consumer instance as **Replication Error**.

Procedure
1. Determine if the consumer successfully sent the synchronize request to the producer:
   a. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
   b. Select a consumer replication set.
   c. Click the **Replication Metadata Logs** related link.
   d. Sort the logs in a descending order in the Log Sequence column.
   e. Find the most recent payload with the REPL_SET_DETAIL_REQUEST type and open it.
   If you do not see this payload type, refresh the log until you see a payload with the REPL_SET_DETAIL_REQUEST type.
   f. Verify that you see the correct producer instance ID in the To column.
   If the producer instance ID is incorrect, update the ID and click **Activate**.
   g. Verify that you see Sent in the Status column.
   If you don't see Sent in the Status column, the producer didn't send any updates.
2. Determine if the producer received the synchronize request from the consumer:

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a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

b. Select a producer replication set.

c. Click the **Replication Metadata Logs** related link.

d. Sort the logs in a descending order in the Log Sequence column.

e. Find the most recent payload with the REPL_SET_DETAIL_REQUEST type and open it.
If you don't see this payload type, refresh the log until you see the REPL_SET_DETAIL_REQUEST type.

f. Verify that you see the correct consumer instance ID in the From column.
If the consumer instance ID is incorrect, update the ID.

g. Verify that you see Received in the Status column.

Discover replication delays in Instance Data Replication

Monitor possible data replication issues by using the Instance Data Replication (IDR) Monitoring Dashboard.

Before you begin

Role required: admin

About this task

Procedure

1. To view the time lag on a producer instance, navigate to **Instance Data Replication** > **Monitoring Dashboard**, and check the Active Producer Replication Sets for the following details.

Option	Description
Name	Name of the producer replication set.
Replication Queue Reading Lag	Time between a record change on the producer instance and the moment it is sent over the outbound replication queue.
Status	Status of a replication set, either active or in error.
Status Message	Message that describes the error status.
Message Queue Version	Version of the Message Queue. Either V1 (Legacy) or V2 (Hermes)

To get additional information, view the producer instance xmlstats at `https://<producer-instance-name>/xmlstats.do?include=idr`.

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The xmlstats shows:

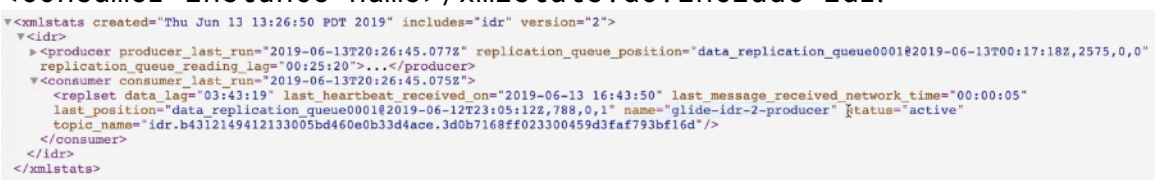
- The *producer_last_run* indicates the last time that the replication job ran on the producer instance.
- The *last_message_sent_on* indicates the last time that the producer sent updated data to consumers.

> **Note:**
> The timestamps are GMT.

2. To view the time lag on a consumer instance, navigate to **Instance Data Replication** > **Monitoring Dashboard** and check the Active Consumer Replication Sets for the following details.

Option	Description
Name	Name of the consumer replication set.
Data Lag	Time between a record change on the produc er instance and the moment it is recorded in the consumer instance.
Network Lag	Time between a record change logs in the out bound replication queue and the moment it is recorded in the consumer instance.
Status	Status of a replication set, either active or in error.
Status Message	Message that describes the error status.
Message Queue Version	Version of the Message Queue. Either V1 (Legacy) or V2 (Hermes)

To get additional information, view the consumer instance xmlstats at `https://<consumer-instance-name>/xmlstats.do?include=idr`.



The xmlstats shows:

- The *consumer_last_run* indicates the last time that the consumer job ran and received changes from the producer.
- The *last_heartbeat_received_on* shows the timestamp when the consumer last received a heartbeat from the producer instance.

> **Note:**
> The timestamps are GMT.

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Fix seeding errors in Instance Data Replication

Retry Instance Data Replication (IDR) seeding on tables with seeding errors, which occur from network problems and failed inserts, so that you don't have to do a full seeding.

Before you begin

Role required: idr_admin or admin

About this task

The maximum for a retry reseeding request is 10,000 errors. If you have more errors, perform a full seeding.

Note:
Seeding is not a replacement for cloning. Do not use IDR to clone instances.

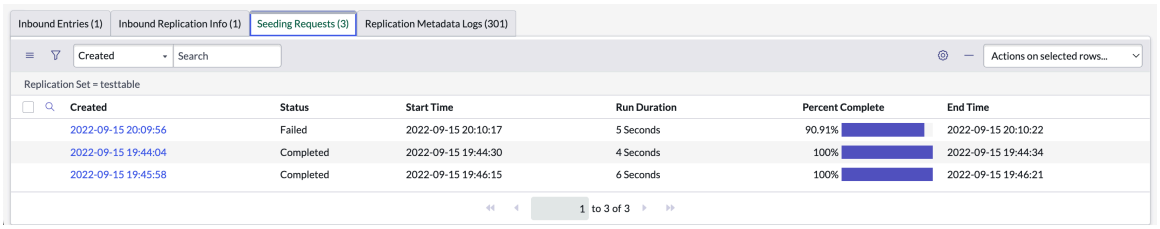
Do not retry full seeding if you exceed any of the following limitations:

- Record size exceeds 10 MB
- Seeding request exceeds 3 million records
- Replication takes longer than seven days to complete

Note:
To avoid these limitations, reduce the number of tables in the seeding request, reduce the size of the records, or use partial seeding.

Procedure

1. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
2. On the **Seeding Requests** tab of the Consumer Replication Set pane, click a seeding request that failed.



3. On the Seeding Request pane, click the **Payload Errors** tab and examine the values in the Message column.
4. Click **Retry All Errors** or select specific errors, and then click **Retry Selected Errors**.

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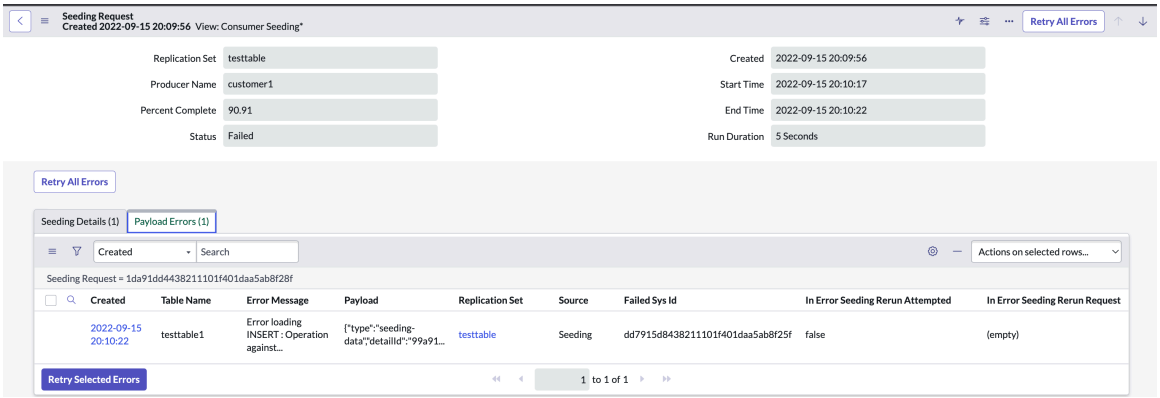
The image shows areas where you can retry errors.



Find Instance Data Replication errors

Identify Instance Data Replication (IDR) errors by viewing the metadata for messages between producer and consumer instances, payload error logs, and message logs.

Before you begin

Role required: idr_admin or admin

Procedure

1. View the producer or consumer metadata logs.

Option	Description
Producer	Navigate to **Instance Data Replication** > **Producer Replication Sets**, select a producer replication set and click the **Replication Metadata Logs** related link.
Consumer	Navigate to **Instance Data Replication** > **Consumer Replication Sets**, select a consumer replication set and click the **Replication Metadata Logs** related link.

2. On either the producer instance or the consumer instance, to view transformation errors and replications that failed to load:

   a. Navigate to **Instance Data Replication** > **Replication Payload Error**.
   If the **Source** value is **Seeding**, the error occurred during seeding. If the source value is different, the error occurred during a replication set update. If any column breaks during transformation, transformation for the entire table breaks and data is not replicated in the table.

   b. Select an error in the Created column.
   The **Error Message** field on the Payload Error pane describes the payload error.

3. View the replication log on either the producer instance or the consumer instance:

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a. Navigate to **Instance Data Replication** > **Replication Log**.

b. Select an entry.
The Instance Data Replication Log form shows the message and message level.

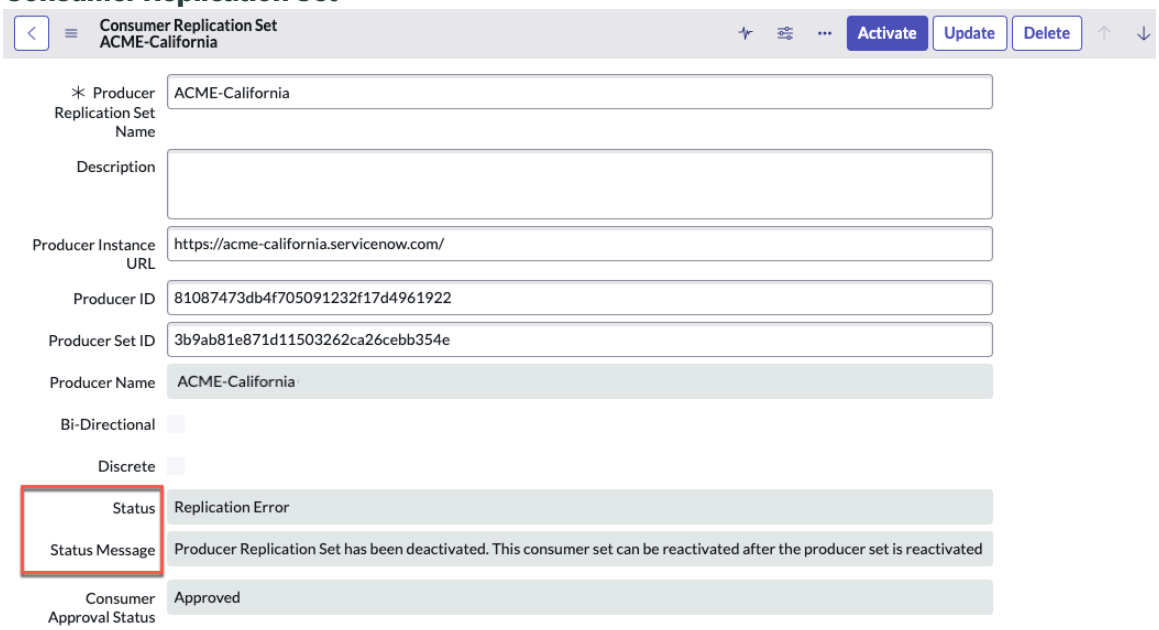
Status messages and status errors for a consumer replication set in Instance Data Replication

Review the status of your consumer replication set and research error messages to identify or fix Instance Data Replication (IDR) replication issues.

Consumer replication set status and status message

Navigate to **Instance Data Replication** > **Consumer Replication Sets** to access a consumer replication set, and view the status and status messages.

Consumer Replication Set



Status

Status	Description
In Draft	To use your consumer replication set, click **Activate**.
Activation Requested	After you initiate an activation, you must wait for the producer instance to respond to your request. If the wait time is excessive, then check the replication log for errors.
Seeding	The seeding job must complete before replication can resume.
Seeding Paused	The seeding job must resume before the seeding can continue.
Active	Normal status.

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Status (continued)

Status	Description
Replication Stopped	Check the Status Messages in the following table for a specific message and associated fix.
Replication Paused	The replication process must resume before the replication can continue.
Replication Error	Check the Status Messages in the following table for a specific message and associated fix.
Replication Deactivated	Activate the producer and consumer instances.
Subscription Requested	Approve the request for a consumer subscription on the producer instance.

Status Messages

Message	Action
`All Producer Replication Sets have been deactivated due to fatal replication error`	All consumer replication sets are moved to the error state. Contact Customer Service and Support.
`Consumer replication set received out of order messages`	Contact Customer Service and Support.
`Error while seeding data. Please refer to the Replication Payload Error table for details`	On the consumer instance, more than one record failed to seed. To recover, go to the Replication Payload Error table to find and fix the error, and then activate the replication set.
`Error while seeding data. Please retry seeding this table`	To recover, reseed the table.
`Producer has encountered an error while seeding`	To recover, contact the administrator of the producer instance to determine the cause of the problem.
`Producer Replication Set configuration has been modified`	On the consumer instance, click **Synchronize Replication Entries** and then click **Activate**.
`Producer Replication Set has been deactivated due to replication error`	Contact Customer Service and Support.
`Producer Replication Set has been deactivated`	To recover, activate the producer replication set, and then activate the consumer replication.
`Producer Replication Set has been deleted`	To recover, delete the consumer replication set.
`Producer Replication Set is inactive`	To recover, activate the producer replication set, and then synchronize and activate the consumer replication set.

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Status Messages (continued)

Message	Action
`Producer Replication Set not found`	To recover, delete the consumer replication set.
`Replication Set Paused`	To recover, click **Resume** or **Activate**.
`Replication set was in pause/error/seeding pause state for more than 7 days`	The consumer replication set has been in the pause state, error state, or seeding pause state for more than the timeout period. The replication set is put into the disabled state. To recover, check for seeding errors and activate the replication with seeding.
`Seeding has been terminated due to timeout`	To recover, retry the seeding request or contact Customer Service and Support.
`Seeding request for a Producer Replication Set containing more than X number of records is not supported`	To recover, change the filter criteria to reduce the number of records to be seeded or use partial seeding. The default limit is 10 million records. Contact Customer Service and Support to change the default limit.
`Seeding was cancelled by a consumer admin`	To recover, activate the replication set.
`Seeding was cancelled by a producer admin`	To recover, activate the consumer replication set. Only seeding requests in the queued, paused, or started states can be canceled. In this case, the consumer replication state is Replication Error.
`Shared key not matching`	The producer and consumer replication sets have different shared keys. To recover, copy the shared encryption key on the producer replication set, paste it into the consumer replication set, and activate the replication set.

Instance Data Replication XML stats

Extract Instance Data Replication (IDR)-related data from your instance to monitor replication status.

IDR XML Stats

You can view key metrics from your IDR producer and consumer instances to monitor performance and the status of IDR processing.

In a browser where the instance is running, append the following text to the instance URL: `xmlstats.do?include=idr`. The following output is an example of the IDR XML stats.

```
<idr status="enabled">
<producer producer_last_run="2020-11-06 13:45:30"
replication_queue_position="data_replication_queue0001@2020-11-0
5T22:58:32Z,2732,0,1"
replication_queue_reading_lag="00:01:00">
<replset last_message_sent_on="2020-11-06 13:44:31"
last_position="data_replication_queue0001@2020-11-05T22:58:32Z
 2731,0,1"
```

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```
last_sent_message_id="f339a84ac818201050bec7cf110d4135" name="N-
2NormalStickyReplicaiton"
status="active" topic_name="d59f4226db6680504d2bac44d49619a0.570
532d91b582010ef39fcc4cc4bcba1">
<subscriber name="persistencetestingora9" remote="false"/>
</replset>
<replset last_message_sent_on="2020-11-06 13:44:31"
last_position="data_replication_queue0001@2020-11-05T22:58:32Z,2
732,0,1"
last_sent_message_id="7f39a84ae5182010fad1a90f50fcd335"
name="N-1NormalTransformerReplication"
status="active"
topic_name="d59f4226db6680504d2bac44d49619a0.6f0572d91b582010ef3
9fcc4cc4bcb01"/>
</producer>
<consumer consumer_last_run="2020-11-11 14:22:36">
<replset data_lag="00:00:22"
 last_heartbeat_received_on="2020-11-11 14:22:36"
 last_message_received_network_time="00:00:05"
last_position="data_replication_queue0002@2020-11-11T18:50:47Z,2
12,0,1" name="N-2NormalTransformerReplication"
producer_name="byungidrorlandonightlyconsumer6" remote="false"
 status="active"
 topic_name="07f85510db93005407072f17d496196a.21247ddddb182010ed
02e3e2ca9619c9"/>
<replset data_lag="00:00:22"
 last_heartbeat_received_on="2020-11-11 14:22:36"
 last_message_received_network_time="00:00:06"
last_position="data_replication_queue0000@2020-11-10T23:28:58Z,1
374,0,1" name="N-1NormalStickyReplication"
producer_name="byungidrparis1" remote="false" status="active"
 topic_name="559cd6d2db6ad458a667cac505961973.bdc33951db9020107c
fe200c0b9619ea"/>
</consumer>
</idr>
```

IDR Metrics

Metric	Description
idr status	Shows whether IDR is enabled for your instance.
Producer instance	
producer producer_last_run	The last time that the *IDRProducerJob* scheduled job ran (GMT).
producer replication_queue_position	Position of the cursor in the replication queue.
replication_queue_reading_lag	The time between when a change is made, and when the *IDRProducerJob* scheduled job sends that change to the network.
replset last_message_sent_on	The last time data was sent to the network from this replication set.

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IDR Metrics (continued)

Metric	Description
replset last_position	The cursor position in the data_replication_queue when the last message was sent for this replication set.
last_sent_message_id	The message ID of the last sent message from the data_replication_queue.
name	The name of the replication set.
status	The replication set status.
topic_name	The topic name in the message queue for this replication set.
Consumer instance	
consumer_last_run	The last time the *IDRConsumerJob* scheduled job (local) or *IDRDeltaConsumerJob - <instanceid>* scheduled job (remote) ran (GMT).
replset data_lag	Time since the last heartbeat was received. Heartbeats should occur every minute for a replication set.
last_heartbeat_received_on	Time of the last heartbeat for this replication set.
last_message_received_network_time	For the last received message, the time difference between when it was sent to the message queue and when it was picked up by the consumer instance.
replset last_position	The cursor position in the data_replication_queue, at which the last message was sent for this replication set.
name	The name of the replication set.
status	The replication set status.
topic_name	The topic name in the message queue for this replication set.

Instance Data Replication reference

These reference topics provide additional information about data privacy in Instance Data Replication (IDR) and domain separation.

Data privacy in Instance Data Replication

The ability of replication sets to host multiple remote consumers in Instance Data Replication (IDR) means that there are potential data privacy issues to consider.

Replications sets in IDR serve multiple instances with multiple consumers. A replication set can have a single customer or can have multiple customers. A consumer could also be located within the same geographic region as the producer or located in a different geographical region.

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Depending on how you configure your replication set, you can have data sharing internally, between offices of the same company, or externally, extending across multiple companies. You can also confine data sharing to a single location or region, or you can share data across all regions.

An active replication set occurs after the producer instance administrator approves a consumer subscription. An active replication set involves data transfer, which could include transfer of personal data, between geographical regions. The data transfer between different geographical regions could subject the data to differing personal data regulations.

During the approval process, if IDR determines that the consumer and producer instances are in different geographical regions, it alerts the producer before activation. This alert should make administrators aware of the potential for differing data transfer regulations between regions.

Once a replication set is active, a replication set with multiple consumers might have specific discrete rules which direct specific data to specific consumers. Any modification of a discrete rule on an active replication set which spans multiple consumers has the potential to expose data. This data exposure can include personal data, which might be viewable by unintended consumers that subscribe to the replication set.

If you set bi-direction between a producer and consumer instance, the consumer can originate data that shares back to the producer instance. This data can also potentially reach any other consumer that is part of the replication set.

Adapter descriptions for Instance Data Replication

Adapters modify the producer data before inserting the data on consumer instances in Instance Data Replication (IDR).

Adapter fields

Each adapter has **Name** and **Description** fields. The name appears in the Adapter column. Use the **Description** field to explain the purpose of the data conversion.

Calculation adapter

Use the calculation adapter on the producer data to specify the operation and the value that is used in the operation.

Parameter examples

Parameter and value	Source data	Adapter output
Operation: Multiply **Constant Value**: 1.08	10	10.80
Operation: Max **Constant Value**: 1000	1020	1000
Operation: Floor **Constant Value**: 0	5.5	5

Max specifies the highest and **Min** specifies the lowest possible values. Values above or below those limits are set to those limits. Value types such as **int** and **long** have maximum and minimum values. Values above or below those limits cause precision errors.

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Concatenate String adapter

Use the concatenate string adapter to append a specified string to the source data.

Parameter example

Parameter and value	Source data	Adapter output
String: _v2	Patch10236	Patch10236_v2

Fixed-width format adapter

Use the fixed-width format adapter to reformat fixed-width input data. Use `#` to represent any positive integer, `@` to represent any character, and `\` as the literal escape character.

Parameter examples

Parameter and value	Source data	Adapter output
Match: ########## **Output**: (###) ###-####	7605551212	(760) 555-1212
Match: ##### **Output**: ###.##	10000	100.00
Match: ##\,### **Output**: #####	10,000	10000

Map adapter

Use the map adapter for comma-separated pairs of literals to map source-to-target conversions. Matches must be exact. For example, PRB=TASK would not convert PRB1000 to TASK1000.

Parameter examples

Parameter and value	Source data	Adapter output
Map: PRB=TASK, done=complete	PRB	TASK
Map: PRB=TASK, done=complete	done	complete
Map: PRB=TASK, done=complete	PRB1000	(no mapping)

Pattern adapter

Use the pattern adapter for regular expressions to identify input patterns. Use parentheses in the **Regex** to identify groups. In **Output Pattern**, use `$` to specify groups. `$0` represents the entire input, `$1` represents the first group, `$2` represents the second group, and so on. You can also insert, prefix, and append literal characters, including spaces so they appear in the adapter output.

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Parameter examples

Parameter and value	Source data	Adapter output
Regex: (.*),(.*) **Output pattern**: $2 $1	Smith, John	John Smith
Regex: (ABC[a-zA-z][a-zA-z])(ABC[a-zA-z][a-zA-z]) **Output pattern**: $1 $0	ABCDEABCFG	ABCDE ABCDEABCFG
Regex: (ABC[a-zA-z][a-zA-z])(ABC[a-zA-z][a-zA-z]) **Output pattern**: $1 release $0	ABCDEABCFG	ABCDE release ABCDEABCFG

In the second example, the match is ABC followed by two letters, followed by ABC and two letters. `$1` of this input is ABCDE. `$2` of this input is ABCFG. `$0` is the entire input string. So `$1 $0` is ABCDE ABCDEABCFG.

Replace adapter

Use the replace adapter to replace a specified input string or substring with a specified string. Use `$` to replace only some of the occurrences of the string. `$1` replaces only the first occurrence; `$2` replaces only the second. Use curly braces to replace the first N occurrences. For example, `${3}` replaces the first three occurrences.

Parameter examples

Parameter and value	Source data	Adapter output
Find: London **Replace**: Madrid	The product is London. The product is London. The product is London.	The product is Madrid. The product is Madrid. The product is Madrid.
Find: $2 London **Replace**: Madrid	The product is London. The product is London. The product is London.	The product is London. The product is Madrid. The product is London.
Find: ${2} London **Replace**: Madrid	The product is London. The product is London. The product is London.	The product is Madrid. The product is Madrid. The product is London.

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Split adapter

Use the split adapter for a specified delimiter, such as a space, to break a string into two or more strings. In **Output Pattern**, use `$` to specify groups. `$0` represents the entire input, `$1` represents the first group, `$2` represents the second group, and so on. You can repeat a group in an output pattern, for example, `$2, $1, $1`. Multiple instances of a delimiter in source data create three or more groups.

Parameter examples

Parameter and value	Source data	Adapter output
Delimiter: " " **Output Pattern**: $2, $1	John Smith	Smith, John
Delimiter: " " **Output Pattern**: $2, $1, $1	John Harry Smith	Harry, John, John
Delimiter: " " **Output Pattern**: $3	John Harry Smith	Smith

Task number adapter

Use the task number adapter to add a prefix or suffix to a task number or replace the task number's prefix.

Parameter examples

Parameter and value	Source data	Adapter output
Modification: Replace **Number Prefix**: PRB **New Number Prefix**: STRY	PRB80899	STRY80899
Modification: Add Prefix **Prefix**: STRY	08099	STRY80899

Time zone conversion adapter

Use the time zone conversion adapter to convert one time zone to another.

Parameter example

Parameter and value	Source data	Adapter output
Output time zone: PDT	07:00:00 am GMT	00:00:00 am PDT

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Excluded tables in Instance Data Replication

You can't replicate certain tables in Instance Data Replication (IDR). Child tables of tables in the exclusion list are also excluded.

Excluded tables

These tables are excluded from IDR:

- Tables with the prefixes V_PREFIX, SYSX_, sys, ts_, ua_, usageanalytics_, wf_, ecc_, clone_, jrobin_, rrd_, imp_, pf_, pfd_, idr_

  sys_domain is an exception.

- Rotated tables, including syslog, sys_querystat, ecc_queue, ecc_event, cmdb_metric, sysevent
- Tables without a sys_id
- sso_federation
- saml2_update1_properties
- sso_properties
- digest_properties
- Instance

Child tables that extend these tables are also excluded from IDR and should not be included in replication sets because replication fails if they are included. For example, sc_cat_item extends sys_metadata, which is an excluded table. This makes sc_cat_item an excluded table due to inheritance.

Tables to avoid replicating:

- cmdb
- cmdb_ci

If you determine the CMDB tables must be replicated, you must use conditions to constrain the count of replicated records and ensure all required columns are included in the replication set.

Domain separation and IDR

Instance Data Replication (IDR) functions at the data level, which means it does not explicitly support domain separation.

For a typical use case, data moves from a producer instance to a consumer instance and back without regard to which domain the instance is in. You can use IDR to filter data, enabling you to segregate specific data between instances. If you must go beyond the IDR record-level filtering capability, you can use business rules to convert data from one domain to another. For more information, see Before Query business rules.

Instance Data Replication properties

These system properties control the behavior of the Instance Data Replication (IDR) application.

To set IDR system properties, navigate to the System Properties [sys_properties] table and add the property.

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IDR data comparison properties

Property	Description
The record batch size for data comparison results `idr.instance.comparison.batch.size`	If the data comparison results exceed 1 million records within the given date range, the request is divided into batches of 10,000 records. • Type: integer • Default value: 10,000
The threshold for missing or mismatched records `idr.dct.mismatched.missing.percentage.threshold`	If the number of missing or mismatched records exceeds 50% of the total records found within the given data range, the comparison stops and partial seeding is recommended for the given date range instead. • Type: integer • Default value: 50
The maximum number of records `idr.instance.comparison.max.records`	The maximum number of records allowed for processing a data comparison. • Type: integer • Default value: 500,000
The maximum runtime `idr.instance.comparison.max.runtime`	The maximum amount of time allowed for running a data comparison. • Type: integer • Default value: 15 minutes
Fields to skip `idr.dct.comparison.skip.fields`	The list of fields to skip when comparing records between instances. • Type: string • Default value: caller_id,sys_created_on,sys_created_by,sys_updated_on,sys

System properties

Property	Description
Stop replication if an out-of-order issue occurs `idr.message.gap.order_enforcement.enabled`	By default, IDR stops replication if an out-or-order issue occurs on the consumer. You can change the default behavior when an out of order issue occurs on the consumer by adding this property and setting it to `false`. This automatically re-queues and replicates missing messages using the most recent

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System properties (continued)

Property	Description
	record details from the producer without stopping replication. • Type: string • True: Stop replication • False: Don't stop replication and re-queue **Note:** Each producer and consumer instance must be on the same family version to use this property. Both instances must be on Vancouver or higher.
Set attachment size limit `idr.cdc.replication.table.reader.attachment.size`	By default, IDR doesn't restrict the size of attachments. You can change the default behavior by adding this property and entering a maximum size for attachments. • Type: integer (size in bytes) • Default value: 100,000,000

Instance Data Replication roles

Instance Data Replication (IDR) is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

IDR administrator [idr_admin]

Admin role for accessing all IDR tables.

Contains Roles

List of roles contained within the role: idr_rest.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

IDR read [idr_read]

Read role for reviewing IDR tables.

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Contains Roles

List of roles contained within the role: idr_rest.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

IDR rest [idr_rest]

Role required for making a diagnostic request.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MetricBase

The MetricBase application stores time-series data, which is data that is sampled at regular intervals. You can graph the stored data or use it with triggers to execute Flow Designer flows.

Get started

Explore	Configure	Define and collect data
		
Learn about MetricBase features and concepts	Set up MetricBase and create a time-series specification	Create a time-series definition, access MetricBase data, and detect anomalies using predictive models.

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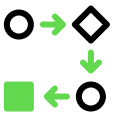
Trigger flows	Manage	Reference
		
Create triggers that execute Workflow Studio flows.	Manage the health and performance of MetricBase	Access developer resources and learn about domain separation with MetricBase

Helpful resources

Some ServiceNow resources that can provide you with helpful information are:

ServiceNow Community

ServiceNow Community

Support

- https://support.servicenow.com/now
- Known Error Portal

Exploring MetricBase

Collect, retain, analyze, and act on time-series data using MetricBase.

MetricBase overview

MetricBase helps you work with large amounts of data by using a smaller summary of that data that is stored in the MetricBase database.

- Integrate MetricBase seamlessly with ServiceNow IoT-based applications that monitor or act on large amounts of machine-generated data.
- Trigger flows in Workflow Studio based on time-series data in MetricBase.
  - Generate an email if the average CPU usage is more than 85% in the last 5 minutes.
  - Generate an email if MetricBase detects a gap in data submitted for 10 minutes or more.
  - Generate an alert if the average of the collected data is less than 10 or greater than 500 in the last 5 minutes.
  - Generate an alert if memory usage is likely to exceed 90% in the next 10 minutes.
- Visualize MetricBase data using time-series charts.
- Use the Reporting application to graph the time-series data that is stored in MetricBase.
- Detect anomalies by training a machine language model and execute a Workflow Studio trigger when an anomaly is detected.

MetricBase works with:

- An instance that stores machine-generated data
- A server that has the MetricBase application and database

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MetricBase users

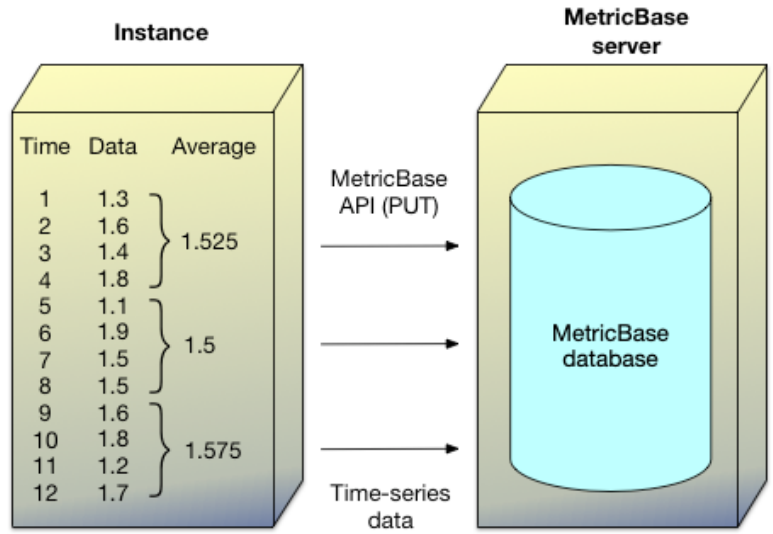
Users

User	Description
Administrator	An administrator collects, retains, analyzes, and acts on time-series data using MetricBase.

MetricBase workflow

The following figure shows that machine-generated data is sampled every 4 seconds. You send the average of the values in each sampling period to the MetricBase database, which stores the data until its expiration date.

Storing time series data



1. The administrator specifies a metric to store and how often to collect it by creating a time-series definition in MetricBase.
2. The administrator sends data from the instance to the MetricBase server using the MetricBase REST or JavaScript APIs.
3. The administrator configures trigger definitions that execute flows based on time-series data in MetricBase.
4. The administrator configures and trains predictive models in MetricBase to detect anomalies and execute flows when new data is significantly different than the trained data.
5. The administrator monitors collected data using time-series charts in MetricBase. Time-series data remains in the MetricBase database for a prescribed amount of time, after which MetricBase deletes the data.

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MetricBase benefits

MetricBase benefits

Benefit	Feature	Users
Store time series summary of a large collection of data	Create a time-series definition in MetricBase	Administrator
Insert and retrieve time-series data from the MetricBase database	Developer resources	Administrator
Access and visualize time-series data in the MetricBase database	Accessing MetricBase data	Administrator
Trigger flows when new data is significantly different than the trained data	Detecting anomalies in MetricBase data using predictive models	Administrator
Trigger flows that can log incidents, send emails, and create other alerts	Triggering flows using MetricBase data	Administrator

What to explore next

To learn more about configuring and using MetricBase, see:

- Configuring MetricBase
- Defining and collecting MetricBase data
- Triggering flows using MetricBase data
- Managing MetricBase
- MetricBase reference

Configuring MetricBase

Plan and configure your MetricBase implementation.

Requesting the MetricBase product

The MetricBase plugin [com.snc.clotho] requires a separate subscription and must be activated by ServiceNow personnel. Be sure to also request the MetricBase Demo plugin [com.snc.clotho.demo], which includes sample tables, metrics, triggers, and data.

To purchase a subscription, contact your ServiceNow account manager. The account manager can arrange to have the plugin activated on your organization's production and subproduction instances, generally within a few days.

When ServiceNow personnel install the MetricBase Demo plugin, they also connect your instance to the server that contains the MetricBase database. A MetricBase database can connect with only one other instance. For example, a clone of the original instance can't talk to the same database as the original instance.

Working with MetricBase demo data

Familiarize yourself with MetricBase by exploring the MetricBase demo.

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Overview of the MetricBase demo

With the MetricBase Demo plugin, you can experiment with MetricBase without configuring it or knowing much about it. The demo plugin is separate from the MetricBase plugin. Make sure to request both.

Use the MetricBase demo to explore MetricBase before you set it up for production purposes.

- Visualize sample time-series data.
- Access sample metrics, triggers, and a scheduled job that collects and stores data.
- Test the functionality of included triggers. The plugin includes scheduled time-series data updates, as if they had been received from an instance.
- Experiment with the MetricBase JavaScript APIs using the Data Explorer.

In the demo, a fictional fleet of drones has been outfitted with sensors that broadcast their metrics, including their speed, altitude, and battery life over time.

Getting familiar with MetricBase

After ServiceNow personnel install the MetricBase and MetricBase Demo plugins, you can use the demo to get familiar with MetricBase.

Prerequisites

- MetricBase and the MetricBase demo plugins must be installed by ServiceNow personnel.
- Role required: admin

1. Navigate to **MetricBase Demo** > **Drones** to see the name, model, length, width, altitude, and speed for all drones in the fleet.

Name ▲	Model	Camera Model	Fleet	Length (cm)	Width (cm)	Height (cm)	Altitude (m)	Speed (kph)	Remaining Battery (%)
ASF-KP-IG3-1	Kingfisher Phantom	Imesity G3	ASF	37	37	13	165.21455	71.22602	84.44444
ASF-WT7-IC2-1	Warbler T7	Imesity C2	ASF	40	45	8	120.973076	66.827896	17.777779
ASF-WT7-IC2-2	Warbler T7	Imesity C2	ASF	40	45	8	138.80995	68.61613	26.666666

2. Select **MetricBase Demo** > **Metrics** to see how the metrics are defined. In the Time Series Metrics list, the column values specify the table where the drone's time-series metrics are stored, the names of all the metrics that are stored for each drone, and the retention policy for each metric. The retention policy specifies how frequently measurements are taken, and how long MetricBase retains that data.

All > Table name = mb_demo_drone

Table name ▲	Metric field name	Retention policy	Application name
mb_demo_drone	mb_demo_mt_altitude	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_external_humidity	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_external_pressure	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_external_temperature	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_rem_battery	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_rem_disk	Coarse	MetricBase Demo
mb_demo_drone	mb_demo_mt_speed	Dense	MetricBase Demo

Now that you've seen the drone data and learned how to find it, let's see how the data was collected using a retention policy.

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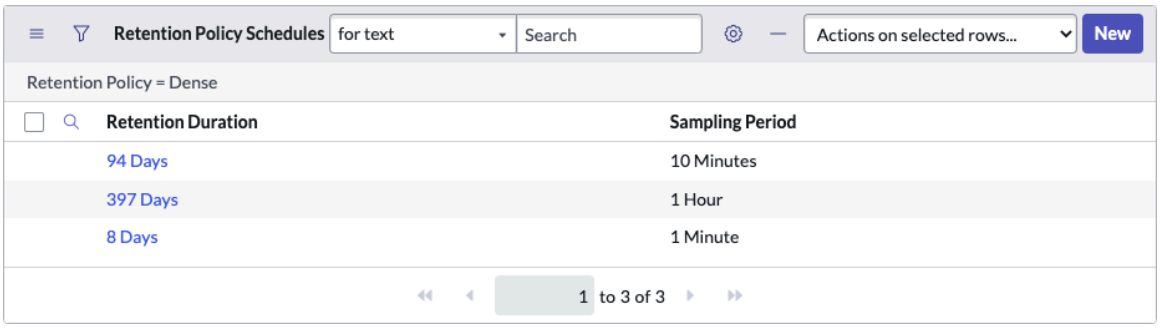
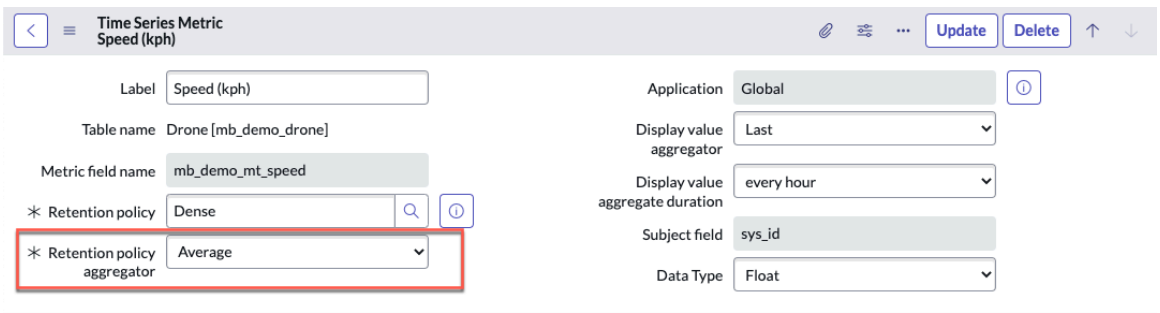
3. Select a retention policy. The Retention Policy form shows the definition for the policy. In the following example, this metric is measured once a minute for the first 8 days, then once every 10 minutes for the following 94 days, and then once an hour for the following 397 days. After that, the system discards the data.



See MetricBase retention policies.

4. To see how the data is aggregated during the Retention Durations, select the left arrow (<) at the top of the Retention Policy Schedules window to return to the Time Series Metrics list.

5. Select a table name. The Time Series Metric definition shows the **Retention policy aggregator**. This aggregator summarizes the data as, for example, the average, maximum, or minimum value in the aggregation period. In the following example, the admin clicked the table for the speed metric. The result is that MetricBase stores the speed averages during each sampling period in the MetricBase database.



Now that you understand how the data was collected using retention policies, let's see how to display the data in lists and graphs.

6. Notice the parameter fields that start with **Display**. In this example, they mean that the speed values that are displayed in the list view of drones are the last speeds recorded in every hour interval for each drone. These **Display** fields control what appears in the list view of the drones only. They have nothing to do with the retention policy.

7. Display the list view of a table by entering `<table-name>.list` in the **Field navigator** field. For example, `mb_demo_drone.list`. All drone data appears. In the example from the previous step, the speed column would contain the **Last** value of the sampling period.

8. Select **MetricBase Demo** > **Drones** and look at the speed (kph) column. From the previous step, you know that these values are the last speeds recorded for each drone up to an hour ago. The values are the same as you would get by using the *`.list`* command.

9. Select the speed value of the first drone. The following graph shows the speed of the drone that was measured hourly.

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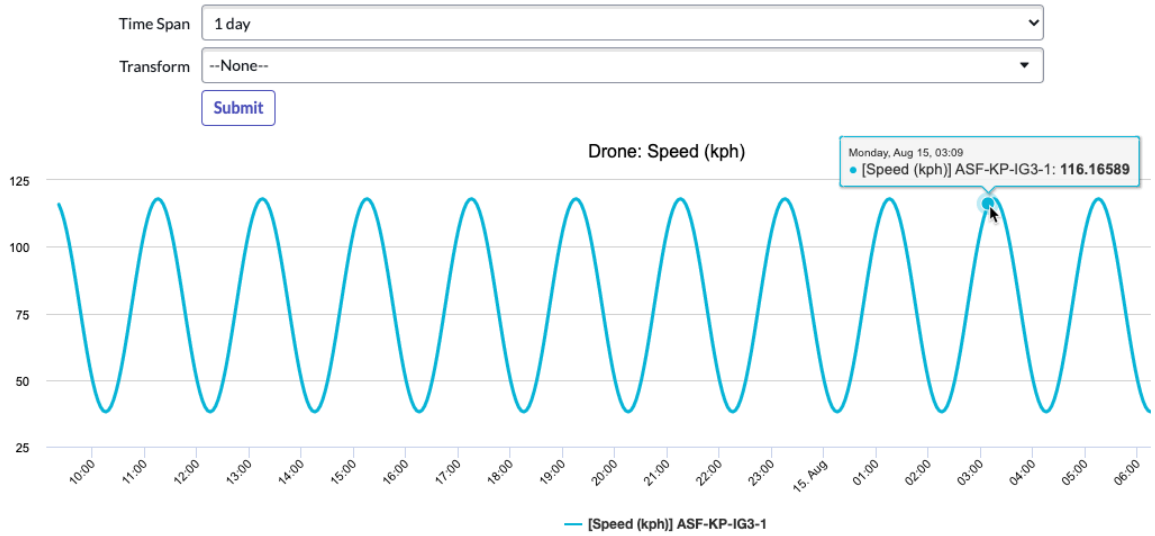
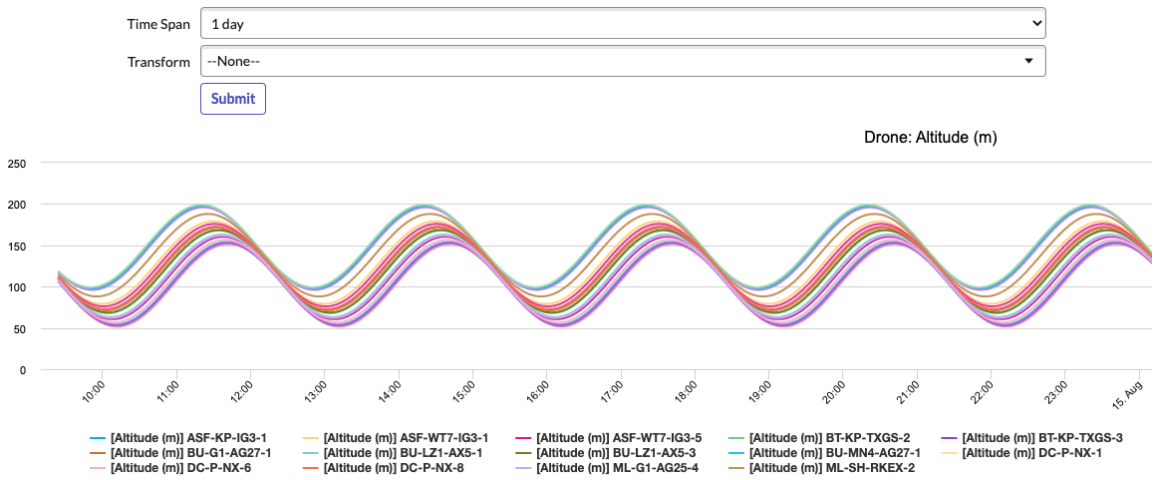


Note:
You might need to select a different **Time Span** field value to get a clearer graph. For example, try **1 Day**. The speed is a sine wave because it's artificially generated. Hover over the sine wave to see the actual measurements.

10. Select the left arrow (<) to return to the list of drone metrics, right-click on one drone type (**Model** column), and select **Show Matching**. Only the drones of the selected type appear.
11. Select the menu icon next to the Altitude column heading and select **Time Series Chart**. You see a graph that shows the altitude measurements of the Warbler-T7-type drones.



You might like to change the **Time Span** value for a clearer graph.

12. Select the left arrow (<) to return to the list of drone metrics.

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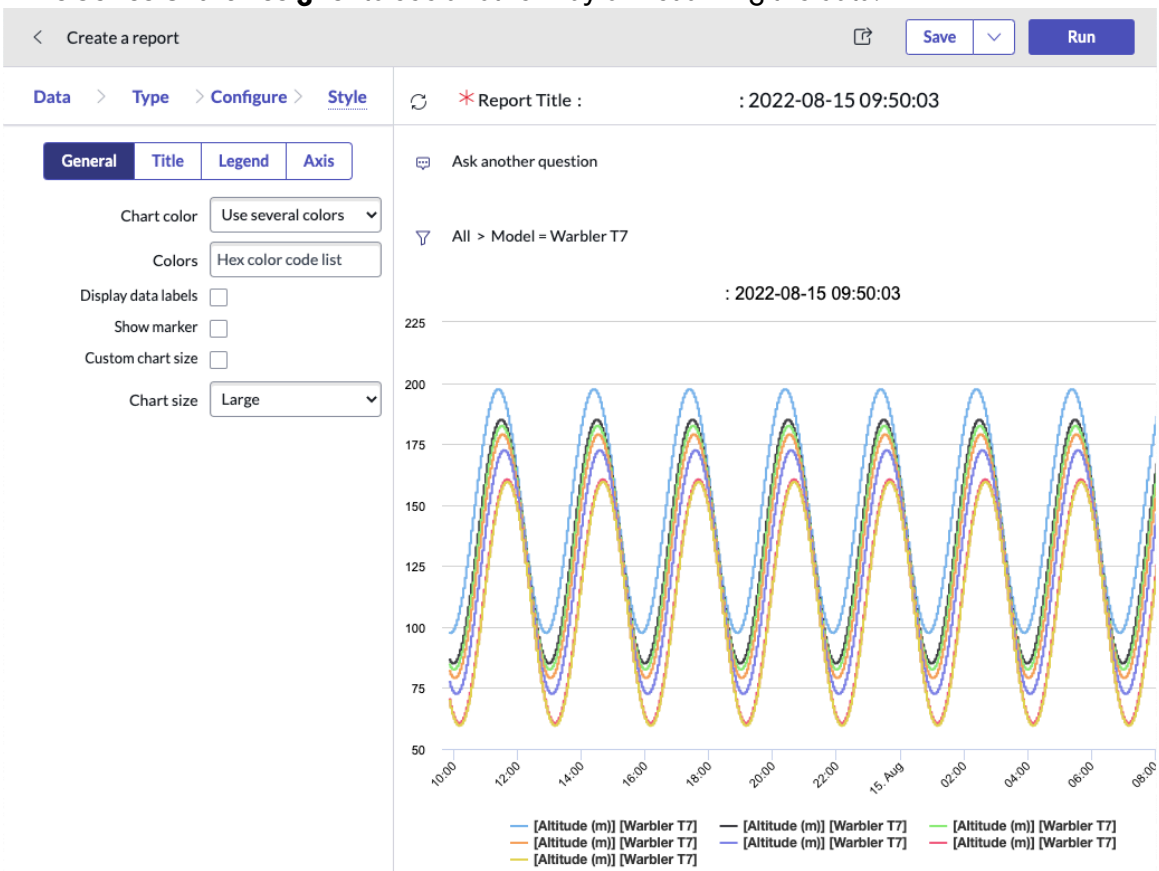
13. Click the menu icon next to the Altitude column heading and select **Time Series Chart Designer** to see another way of visualizing the data.



14. In the Create a Report page that displays in the Reporting application, vary the graph parameters.

> **Note:**
> In the following steps, to stay on the same page, select **Run**. To advance to the next page when designing the graph, select **Next**.

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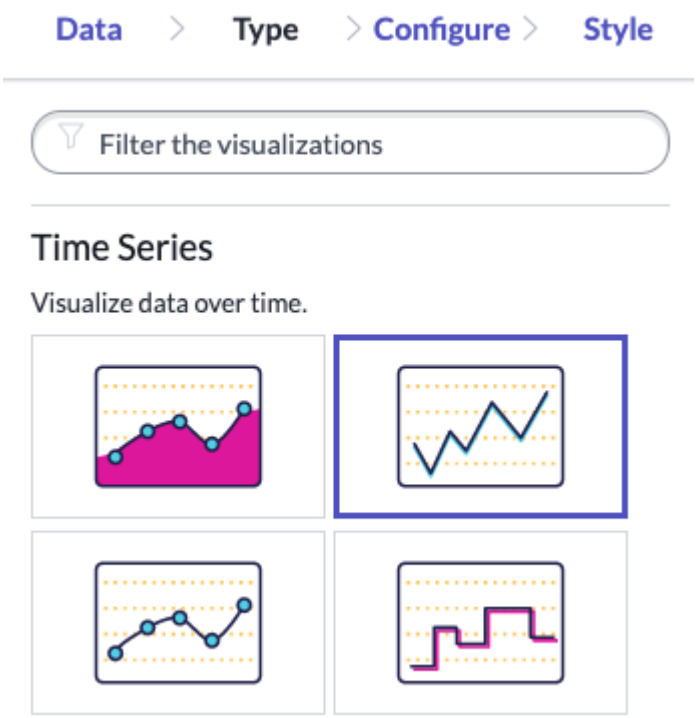
a. In the Type pane, select the kind of graph to display, and then click **Next**.



b. In the Configure pane, try changing the parameters. Click **Run** to view the results with each change.

- Change the **Report Title** to Warbler Altitude.
- Apply a condition to filter the view. For example, **[Model] [is] [Warbler T7]**.
- Change the **Last** value to **1** day.
- Select **Envelope** in the **Transform** list. You see the minimum and maximum (envelope) altitudes for the fleet of Warbler T7 drones over time.
- select the time line to display on the graph using the **Time range** list.

> **Note:**
> **Relative** uses the **Last** timespan relative to the present time. For example, if **Last** is 1 hour, the time line in the graph always spans the previous hour. You can add this report to your dashboard to show the metrics in the previous hour.

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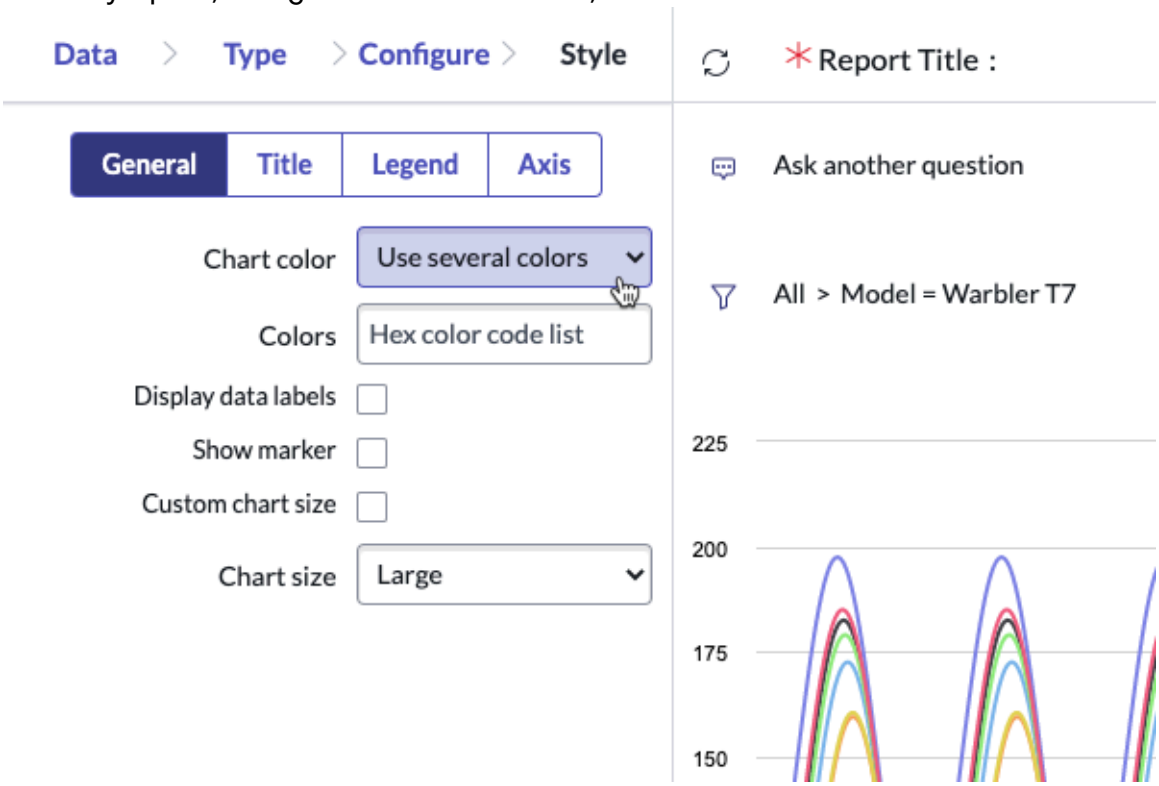
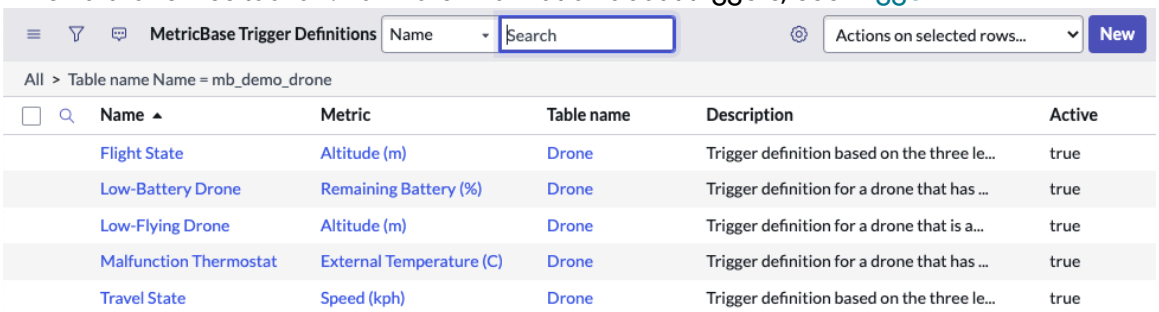
c. In the Style pane, change the **Chart color** value, and then click **Run**.



You've displayed drone data in lists and graphs. Now, let's define a trigger that executes when data that you monitor reaches a threshold value.

15. Select **MetricBase Demo** > **Trigger Definitions**. The MetricBase Trigger Definitions list shows the name (**Name**) of the trigger, the metric (**Metric**) the trigger monitors, the table (**Table name**) the metric that it is in, the trigger description, and whether the trigger is active. Triggers kick off flows when metrics meet trigger thresholds. An example is when a drone flies too low. For more information about triggers, see Trigger Workflows.



Name	Metric	Table name	Description	Active
Flight State	Altitude (m)	Drone	Trigger definition based on the three le...	true
Low-Battery Drone	Remaining Battery (%)	Drone	Trigger definition for a drone that has ...	true
Low-Flying Drone	Altitude (m)	Drone	Trigger definition for a drone that is a...	true
Malfunction Thermostat	External Temperature (C)	Drone	Trigger definition for a drone that has ...	true
Travel State	Speed (kph)	Drone	Trigger definition based on the three le...	true

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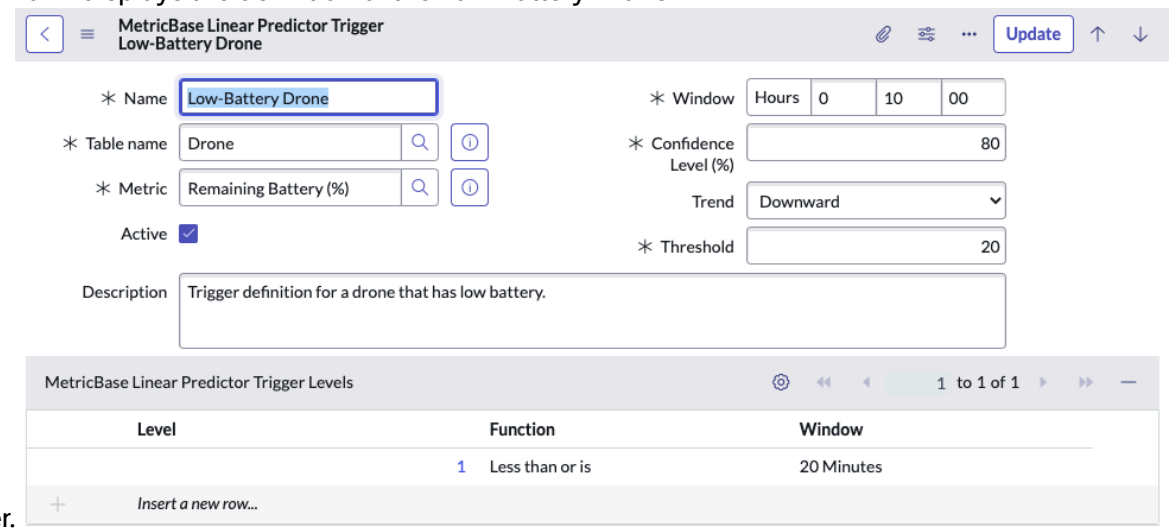
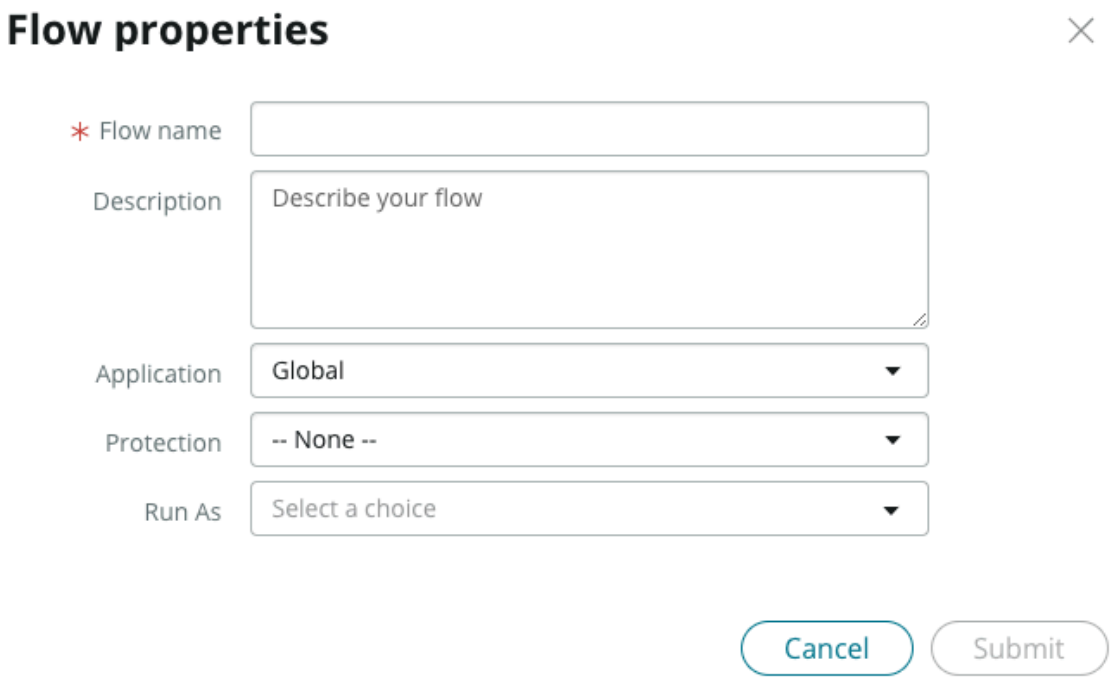
16. Select **Low-Battery Drone**. The MetricBase Linear Predictor trigger form displays the definition of the Low-Battery Drone trigger.



In this example, the trigger monitors the **Remaining Battery (%)** metric (**Metric**) in the Drone table (**Table name**) every 10 minutes (**Window**). If the battery life is trending downward (**Trend**) and is 80% likely (**Confidence Level**) to reach 20% (**Threshold**) within 20 minutes (under **Window** for **Level** 1), the trigger executes. Although it fires, nothing happens until you associate this trigger with a flow. The flow defines the actions to take.

17. Select **MetricBase** > **Trigger Flows**.
18. Select **New flow** to associate a trigger that is defined in the system to a flow.
19. In the **Flow name** field, name the flow and select **Submit**.



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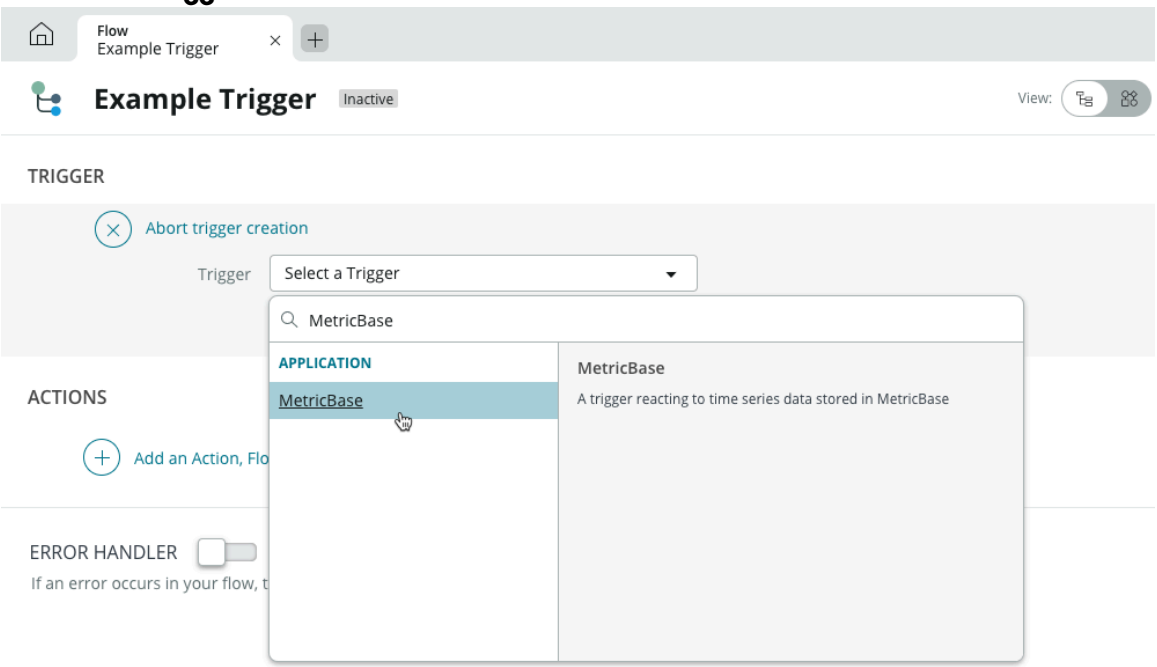
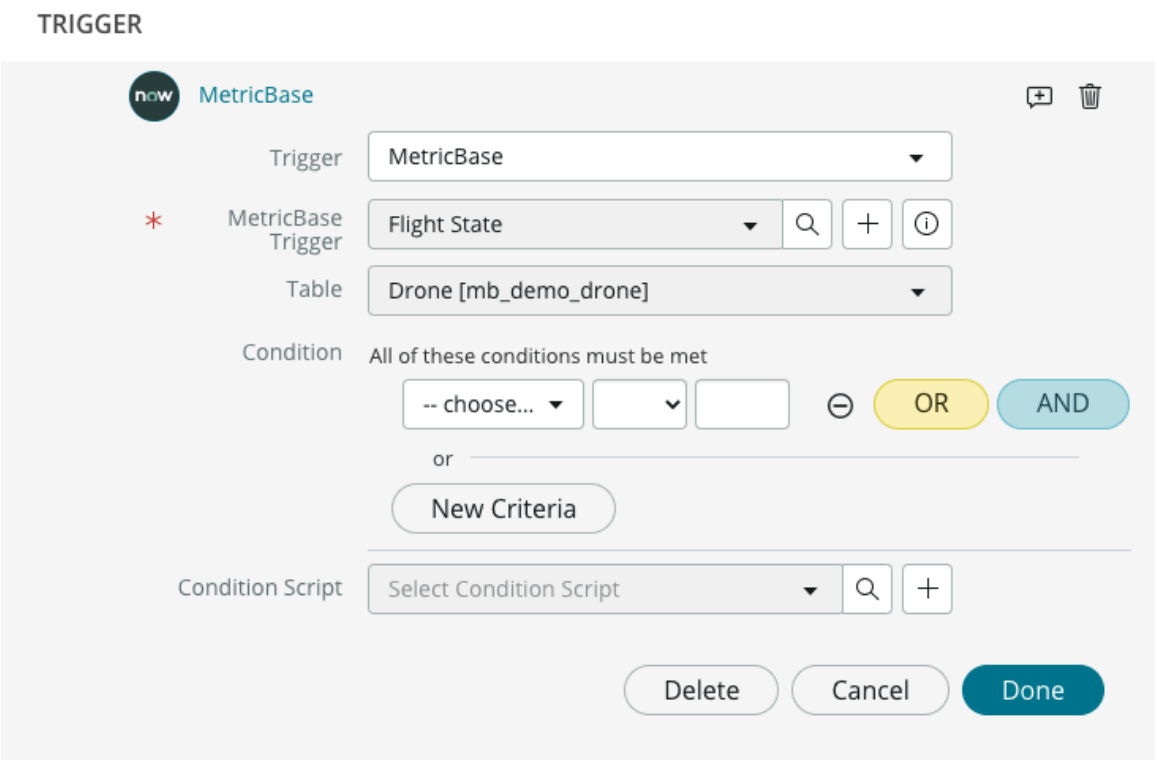
20. Click **Add a Trigger** and select **MetricBase** in the list.



21. In **MetricBase Trigger**, select a trigger that already exists and select **Done**. Alternately, select the plus sign to the right of **MetricBase Trigger** to create a new trigger.



22. Select **Add an Action, Flow Logic, or Subflow**.
23. Select **Action** to specify the actions to take when the trigger fires. The Action dialog box appears.

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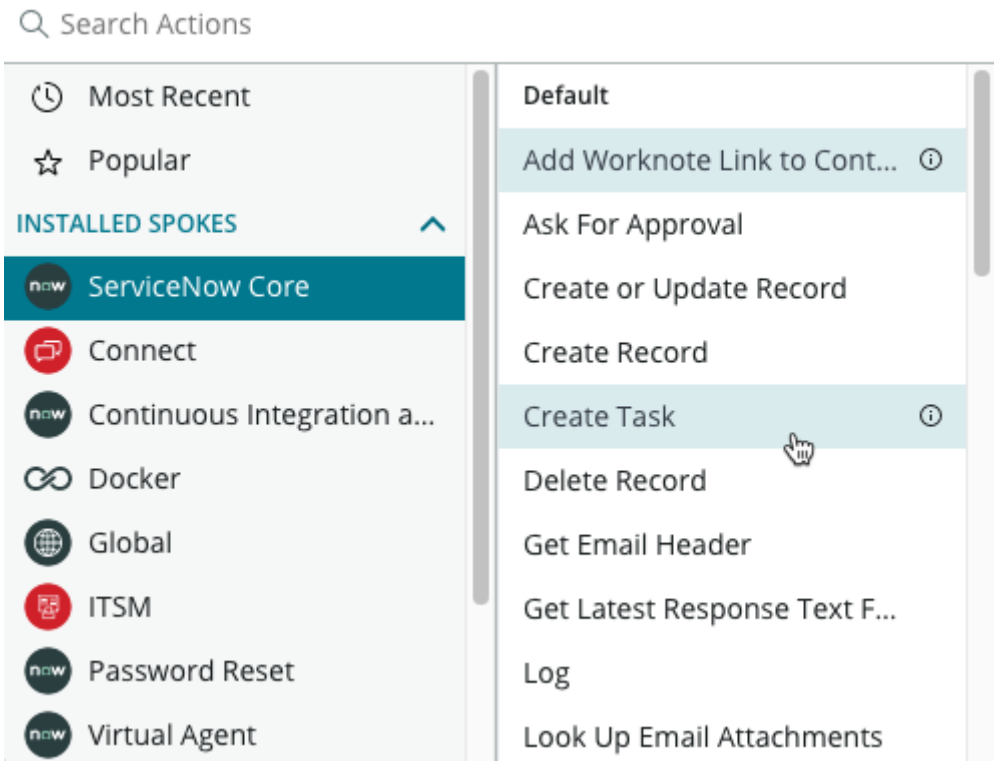

24. Select a domain of actions from the left column and the specific action to take in the right column.
25. Select **Save** and **Activate**. The flow doesn't execute unless it is activated. For more information about Workflow Studio, see Workflow Studio.

The following table summarizes the modules in the MetricBase demo.

MetricBase demo modules

Module	Description
Drones	Table that keeps metrics on drones, such as speed and altitude. Each record is a different drone. You can add records.
Fleets	Table that maintains metrics about groups of drones. Each record is a different fleet. You can add records.
Data Generators	Table that defines how data is created for the drone records. This field is provided for informational purposes. You cannot change or add records.
Metrics	List of metrics that are defined in the system. This list is the same table as **MetricBase** > **Time Series Metrics**. You can add metric fields.
Scheduled Jobs	Scheduled job that is created for the demonstration application. The job runs every five minutes to add data to the demo tables in the MetricBase database. You can change the schedule.
Trigger Definitions	List of triggers that are defined in the demo. This list is the same table as **MetricBase** > **MetricBase Triggers** > **Trigger Definitions**. You can create additional triggers.

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MetricBase demo modules (continued)

Module	Description
Anomaly Logs	List of logs that result from triggers firing. The **Low-Flying Drone** trigger creates the anomaly logs.
Data Explorer	Widget that enables you to experiment with MetricBase JavaScript APIs using the demonstration application data. See Get Familiar with MetricBase APIs for more information.

Get familiar with MetricBase APIs

Experiment with MetricBase APIs using Data Explorer that is part of the MetricBase Demo application. Data Explorer uses the data installed with the MetricBase Demo application.

Before you begin

Role required: clotho_admin

About this task

Data Explorer is a playground where you can see and edit example scripts that visualize data included with the MetricBase Demo application. The example scripts use the MetricBase JavaScript APIs. For information on the MetricBase JavaScript APIs, see Client, Data, DataBuilder, Transformer, TransformPart, TransformResult.

Note that the now/v1/clotho/transform/topic API endpoint is reserved for internal use only.

Example scripts use either:

- Transforms, which use the Transformer method.
- Machine Language, trained models that predict expected behavior. All the scripts without "Transform" in their title use Machine Language.

Procedure

1. Navigate to **All** > **MetricBase Demo** > **Data Explorer**.
   The **Data Explorer** displays.

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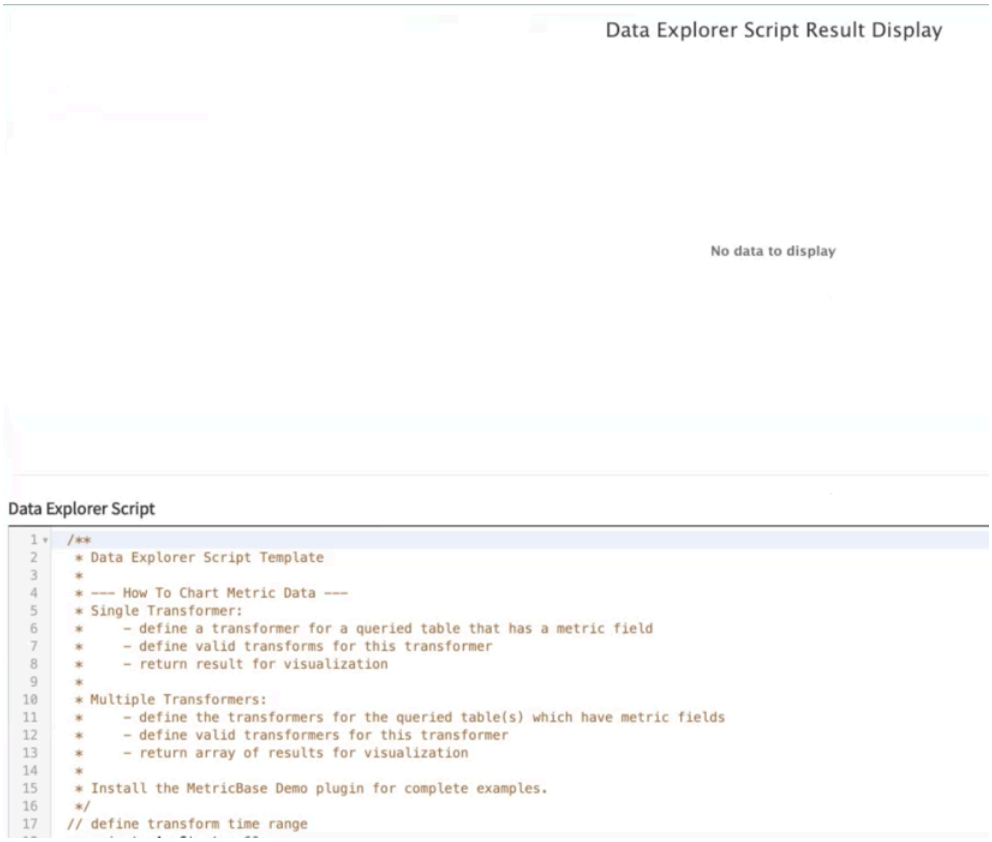

When you run a script, the data visualization appears under **Data Explorer Script Result Display**.

2. Select one of the sample scripts to run in the **Example Script** menu.



3. Click **Load Example**.
4. Click **Run**.
   The script displays the data visualization under **Data Explorer Script Result Display**.
5. **Optional:** Change the values or statements in the script or write an entirely new script and click **Run**.

   Note:
   If you want to save the changes you made in the script, click **Save**.

6. Under **Server Output**, look at the server's response that might include error information.

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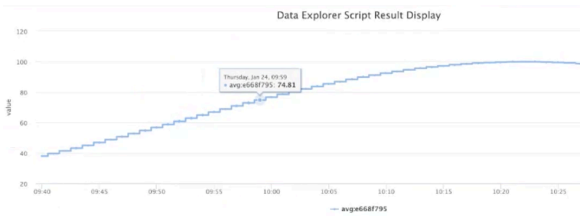
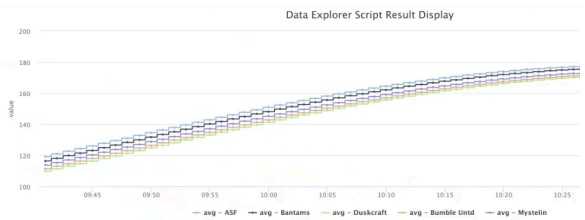
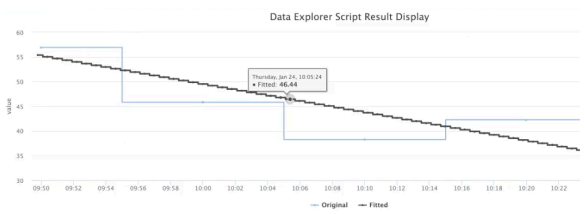
Example:

Example scripts

Example script	Definition and visualization
Simple Transform	Uses the transformer API to display a single time-series metric, the average speed of the drones: `transformer.metric('mb_demo_mt_speed').avg()`. 

Simple Transform with Grouping	Uses the transformer API to display a group of time-series metrics, the average altitude of the fleet of the drones:
	`transformer.groupBy("fleet").metric("mb_demo_mt_altitude").`
	`avg().label('avg - %g:fleet:')`
	 

Normal Model	Models normal data, which approximates a bell-shaped or Gaussian curve for distributed values.

Linear Model	Creates a line to summarize the current data and predict future values. This example, about the remaining charge in drone batteries, graphs both the trained model values and the average of the values.
	`var builder = new sn_clotho.Transformer(drones);`
	`var fit = builder.metric("mb_demo_nt_rem_battery").resample(100).`
	`fit({model:"linear"}).label("Fitted");`
	`builder.metric("nb_demp_mt_rem_battery").avg().label("Original")`
	 

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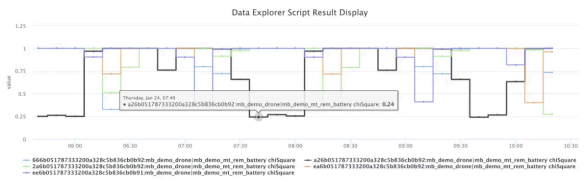
Example scripts (continued)

Example script	Definition and visualization

Seasonal Trend Decomposition Model	Uses a seasonal trend model so that data can be subtracted to reveal non-seasonal trends. This model is similar in purpose to the Holt Winters model but arrives at the result using different algorithms.
	`var builder = new sn_clotho.Transformer(drones);`
	`var metric = "nb_demo_mt_rem_battery";`
	`var fit = builder.metric(metric).fit({model:"STL", periodicity:"PT2H", innerCycles:1, outerCycles:10})`
	 

Holt Winters Model	Uses the Holt Winters, seasonal trend model so that data can be subtracted to reveal non-seasonal trends. This model is similar in purpose to the Seasonal Trend Decomposition model but arrives at the result using different algorithms.
ARIMA Model	The most general class of models for predicting time-series data that has no trend, meaning all the data has the same value or the values fluctuate sinusoidally around the mean.

Deviation Model	Uses chisquare model to show the differences between the real data and the model's prediction.
	`var metric = "nb_demo_mt_rem_battery";`
	`builder.metric(metric).deviation(model, "chiSquare");`
	 

Defining and collecting MetricBase data

Store time-series summaries of much larger data collections.

Overview of creating a time-series definition

In MetricBase, you specify the metric that you want to store and how often to collect it. You can also determine how long to store it in the MetricBase database. Then, you send the data from an instance to the MetricBase server at the rate that you define using MetricBase REST or JavaScript APIs. In this way, you can monitor a much larger data collection with MetricBase summaries of it.

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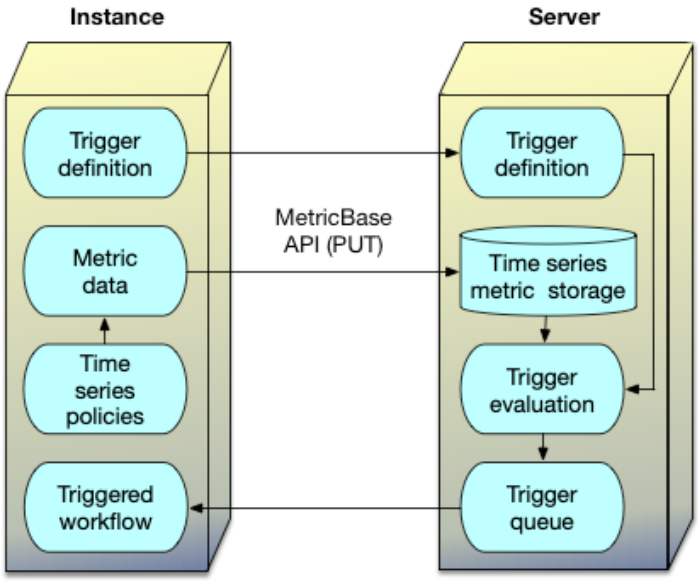
MetricBase collects the metrics of how often you send data and what the aggregation of that data is, for example, maximum, minimum, average, or last. This data is called time-series data. For example, if you collect drone speeds on an instance, you can send the average drone speed for every two minutes to the MetricBase database. You can also collect altitude and battery life. MetricBase stores each metric as a column in its database.

Sending information from an instance to a MetricBase server



Retention policy schedules

Retention policy schedules specify how long MetricBase stores the time-series data in the MetricBase database. You can create, edit, and delete retention policy schedules. To create, edit, or delete retention policy schedules, navigate to **MetricBase** > **Retention Policy Schedules**.

When creating a retention policy schedule, the following limitations apply:

- Maximum retention duration: 26 months (794 days)
- Maximum sampling period: 1 day
- Maximum data points (calculated as retention duration * sampling period): 160,000 data points

In addition, the retention duration must be a multiple of the sampling period.

Retention policies

Retention policies include multiple retention schedules with coarser granularity the longer that the data is kept. For example, the Coarse retention policy stores sampled data every:

- Hour for one week (7 Days per 1-hour period)
- Two hours for one month (31 days per 2-hour period)
- Day for 13 months (397 Days per 1-day period)

In this policy, the specified metric is measured every hour for the first 7 days. It is then measured every other hour for the next 31 days, and once a day for the next 397 days. MetricBase deletes data that is older than 435 days.

To see the list of all supported retention policies, navigate to **MetricBase** > **Retention Policies**.

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Create a time-series definition in MetricBase

Specify the metric that you want to store, how often to collect it, and how long to store it in MetricBase.

Before you begin

- Install MetricBase
- Role required: clotho_admin

Procedure

1. Navigate to **MetricBase** > **Time Series Metrics**.
2. Select **New**.
3. On the form, fill in the fields.

Time series metric form

Field	Description
Label	Intuitive name for the **Metric field name**. For example, altitude could be the label for the metric field name, mb-altitude.
Table name	Name of the table to add the metric to in the MetricBase database. For example, in the MetricBase Demo, the mb_drone table stores the drone data. Each column in the table is a different metric, for example, altitude, length, and speed.
Metric field name	Name of the time-series metric that records. For example, mb-altitude. You can think of it as the name of a column in the MetricBase database table.
Retention policy	Sampling frequency and how long MetricBase keeps the values in the database. You cannot customize the value. For a definition of the values, click the magnifying glass and then a policy. The coarser the sampling rate, the less data that stores. Use the coarsest sampling rate that works for your dataset. For example, do not collect data every minute if collecting it once an hour suffices. See MetricBase retention policies for a description of the policies you can select.
Retention policy aggregator	Operator that aggregates the data in a sampling period. For example, last, minimum, maximum, and average.
Display value aggregator	The aggregation method in use when using *<table-name>.list* where <table-name> is a table in the MetricBase database. This value is unrelated to the retention policy. For a definition of the options, see MetricBase transforms.
Display value aggregate duration	Duration that is used to calculate the aggregation only when using the list view. For example, *<table-name>.list* where <table-name> is a table in the MetricBase database. This value is unrelated to the retention policy.
Subject field	You can select a unique table column as your subject for the metric. The unique column must be designated on the table before you select it. For example, if your metric tracks temperatures in different houses, you can make the house address column the subject of your metric. The house address column on your table must be unique before you set the subject field.

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Field	Description
	Note: The sys_id column is the default unique column.
Data Type	You can specify the data type of the subject field.

4. Select **Submit**.

Result
You've created a time-series specification for a metric that you want to track.

What to do next
Sample the data according to the time-series specification and send it from an instance to the MetricBase database server.

Use the REST or JavaScript APIs to send the data to the MetricBase database at the rate that is prescribed by the time-series definition. See Developer resources.

Important:
Send the data at the rate that the time-series definition prescribes. If you send the data at a different rate or for a different duration, you receive an error. Make sure to aggregate the data according to the time-series metric definition. Also, the MetricBase database only stores values of data type float.

MetricBase retention policies

Retain data in MetricBase according to retention policies.

MetricBase Retention Policies

Policy	Description
Coarse	This policy retains data for 1 week at 1-hour period, 1 month at 2-hour period, and 13 months at 1-day period. This policy is suitable for metrics that change less often or metrics that do not require high resolution, such as disk usage.
Dense	This policy retains data for 8 days at 1-minute period, 94 days at 10-minute period, and 13 months at 1-hour period. This policy is suitable for metrics that require higher resolution for longer terms.
High	This policy retains data for 1 week at 1-minute period, 1 month at 10-minute period, and 13 months at 1-hour period. This policy is suitable for metrics that require higher resolution for longer terms.

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MetricBase Retention Policies (continued)

Policy	Description
Medium	This policy retains data for 1 week at 10-minute period, 1 month at 30-minute period, and 13 months at 2-hour period. This policy is suitable for metrics that change less often such as job processing throughput.
Medium High	This policy retains data for 13 months at 1-hour period.
Operational Intelligence	Operational Intelligence (OI) policy retains data for 8 days at 1-minute period, 94 days at 10-minute period, and 13 months at 1-hour period.
Sparse	This policy retains data for 13 months at 1-day period.
Ultra Dense	This policy retains data for 1 day at 10-second period, 3 months at 1-minute period, and 1 year at 1-hour period.

Accessing MetricBase data

Access the time-series data that you sent to the MetricBase database in the way that is convenient to you.

You can access and visualize time-series data in the MetricBase database by using:

- Reporting application

  You can generate reports and graphs from the time-series data that is stored in the MetricBase database. For more information, see Create reports from MetricBase time-series data.

- Table lists using the *.list* command

  For more information, see View MetricBase data using the list command.

- REST or JavaScript APIs

  For more information, see Retrieve MetricBase data using REST and JavaScript.

Access MetricBase data using the list command

Use the list command on a table in the MetricBase database to view time-series data. The data reveals the behavior of the entity that supplies the data.

Before you begin

Role required: admin

Procedure

1. On the MetricBase instance, in the **application navigator**, type `<table-name>.list`, and press the Enter key.
   <table-name> is the name of the table in the MetricBase database that contains the metric you want to view.

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2. Click the menu icon ( ) above the metric column, and select **Time Series Chart**.
3. Change the **Time Span** and **Transform** fields to evaluate the data.
4. **Optional:** Adjust the data:

   a. Select one of the transforms: **Add**, **Multiply**, or **Divide**.

   b. In the **Value** field, enter the number to add, multiply, or divide the metric data by and click **Submit**.

   Note:
   The adjusted data is not saved in the MetricBase database.

Retrieving MetricBase data using REST and JavaScript

Use JavaScript or REST APIs to insert and retrieve time-series data from the MetricBase database and to run transforms on the data. The transformations enable you to visualize time-series data in a variety of ways.

For more information about MetricBase time-series data transformations, see MetricBase transforms.

Using REST

For information about the MetricBase REST APIs that return time-series data from the MetricBase database, see MetricBase Time Series API.

Using JavaScript

For information about the MetricBase JavaScript APIs that return time-series data from the MetricBase database, see:

- Client — Execute transforms on the MetricBase database and receive the results.
- Data — Return the object that contains the result of a transform.
- DataBuilder — Create a series of data points for a metric.
- Transformer — Manipulate time-series data to prepare the data for evaluation and analysis.
- TransformPart — Specify details of the transform to be done.
- TransformResult — Return the object that contains the result of the transformation.

Experiment and get familiar with the JavaScript APIs by using the MetricBase Data Explorer that comes with the MetricBase Demo.

Detecting anomalies in MetricBase data using predictive models

MetricBase creates a model by training a representative sample of your time series data to determine the model parameters. The training process determines the model parameters that best fit your data, to distinguish normal data from anomalous data.

MetricBase supports the following model types:

- Probabilistic Exponentially Weighted Moving Average (PEWMA), a moving average algorithm that uses a probability factor to determine how it reacts to change in data
- Autoregressive Integrated Moving Average (ARIMA), a moving average algorithm that factors in previous errors and values

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- Seasonal Trend decomposition using Loess (STL), a seasonal algorithm for decomposing time series data into seasonal and trend components
- Holt-Winters (HW), a seasonal algorithm that decomposes the trend and seasonal components to determine the level

Note:
MetricBase selects the most appropriate model type when you select *`Find Best Fit Model`* from the model class list.

After you have a model trained from your data, you can trigger flows when new data is significantly different than the trained data.

Create and train a predictive model

Use statistical models to determine significant anomalies in real-time using MetricBase triggers. You will need to train a model using representative data that has already been stored in MetricBase.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Models**.
2. Select **New**.
3. On the form, fill in the fields.

Model New Record form

Field	Description
Model name	Name of the model. The name can be any combination of alphanumeric characters. This model name is not the same as the model class. In general, the name relates to the value in **Group by**.
Table name	Name of the table that contains the training data.
Metric	Name of the metric that you use to train the model. The metric must belong to the table.
Created	Date that you trained the model.
Filter	Filters that you use to exclude some of the data in the dataset. **Note:** When choosing data to train your model, try to select data that demonstrates an expected behavior to reduce anomalies in the training set.
Group by	You can use **Group by** as a discriminator field for your model data. For example, if you want to create a data model over a group of production servers whose performance differs by role (such as database or application server roles) then you would choose role as the **Group by** field. The training process creates one model per role in the group of records selected by the filter. You do not have to manually create a model for each role.

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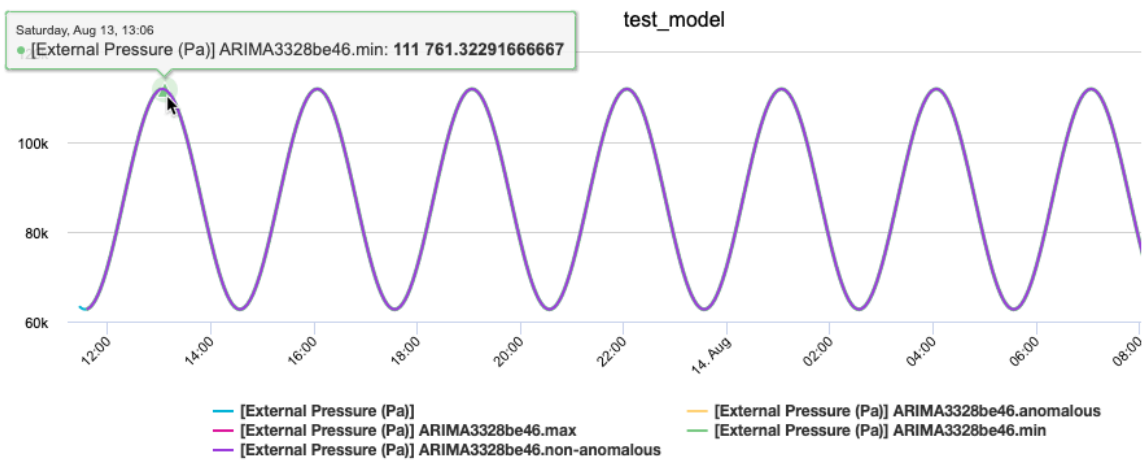
Field	Description
Model Class	The algorithm to use when training data. Select a moving average algorithm (PEWMA, ARIMA), a seasonal algorithm (STL, HW), or choose **Find Best Fit Model**. The default is **Find Best Fit Model**, which tries each algorithm and selects the one which appears to have the best fit over the training set.
Training Dataset Start Date	MetricBase time series data for the metric starting with this date.
Training Dataset End Date	MetricBase time series data for the metric ending with this date.
Valid until	Date that serves as a reminder to consider retraining the model. If the model is performing well, there's no need to retrain it. The model can continue working past this date.
Active	Option to use the trained model. Once the model is active it becomes available for use as a Workflow Studio trigger.

4. Click **Submit and Train**.
   MetricBase trains the model. When complete, the model appears on the **MetricBase Model Instances** tab.
5. Click the model name.
   The modeling data appears as does the model string with the parameters optimized by the training.



6. **Optional:** Click the model name and then click **Set Model** to change the model parameters.
   You can edit the model parameters when you want to override the settings for training your model. The graph does not update, you are saving the revised model string.

What to do next

You can create a Workflow Studio trigger for this model. For more information, see Create a model trigger.

Triggering flows using MetricBase data

Time-series data that is stored in the MetricBase database can trigger Workflow Studio flows. These triggers can log incidents, send emails, and create other alerts.

A trigger definition is a set of conditions that automatically executes a Workflow Studio flow. When you create a trigger definition in MetricBase and associate it with a flow, the trigger

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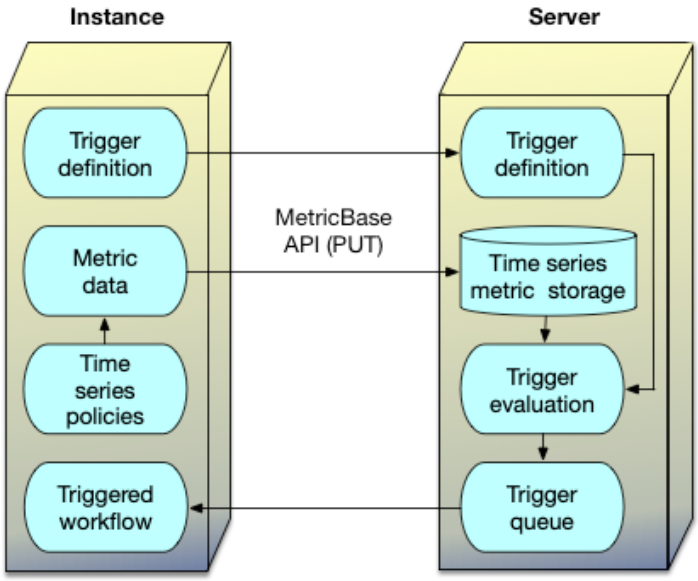
definition transfers from your instance to the MetricBase server. After you activate the trigger and flow, MetricBase monitors time-series data in the MetricBase database. When time-series data matches the initial triggering condition, and then transitions from one condition to the next, a transition trigger is generated and added to the queue. The instance polls the queue, processes the transition trigger, and then executes the Workflow Studio flow.

Trigger workflow



For more information about time-series policies, see Create a time-series definition in MetricBase.

High-level overview of implementing triggers

1. Define one or more triggers on an instance.

   Band trigger

   Triggers when a metric value falls within a range of values.

   Linear predictor trigger

   Triggers when a series of values trend toward and are expected to reach a specified value.

   Gap trigger

   Triggers when values are not received for a specified period.

   Model trigger

   Triggers when a trained model detects anomalous behavior.

2. Create a trigger condition to add additional requirements for a trigger to execute a flow.

   (Optional) For example, data often fluctuates over time. Small fluctuations can cause unwanted, duplicate triggering events. A Condition Script can prevent that erroneous duplication.

3. Associate the trigger with the flow it executes using Workflow Studio.
4. Test the trigger and workflow.
5. Activate the trigger.

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Deleting triggers

If a trigger is associated with a flow, you can't delete it in MetricBase. To delete a trigger, you must first delete the flow in Workflow Studio and then you can delete the trigger in MetricBase.

Legacy triggers

Legacy triggers are deprecated. You can't create legacy triggers; you can only carry forward legacy triggers that exist.

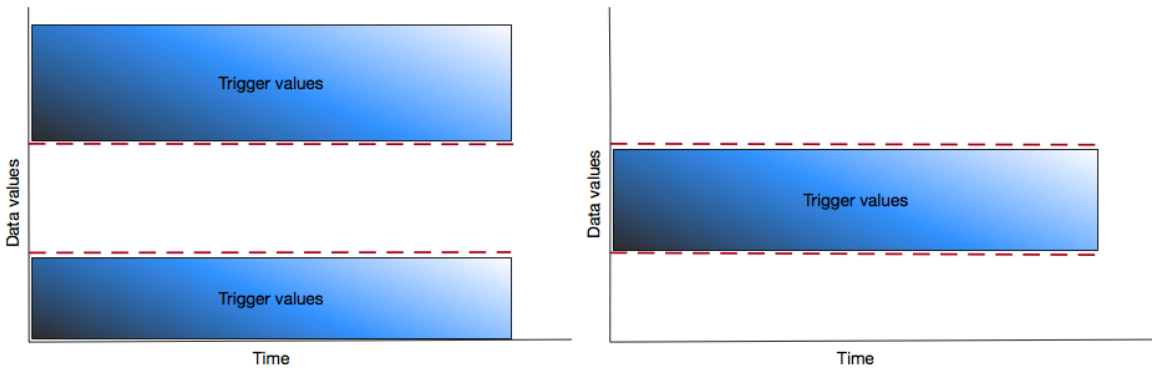
Create a MetricBase band trigger

Create a MetricBase band trigger that detects when a metric value falls within a range of values.

Before you begin
Role required: admin

About this task
Band triggers execute when metrics fall outside of or within a range of values.

Band trigger values



Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger Definitions**.
2. Select **New**.
3. On the **MetricBase** Trigger Creation form, select the **Band Trigger** option.
4. On the form, fill in the fields.
   The trigger levels are not initially visible on this form. You configure the levels later.

MetricBase Band Trigger form

Field	Description
Name	Name of the band trigger.
Table name	Table in the MetricBase database that contains the metric that you want to monitor. The only tables that appear when you click the search icon are the tables that you specified in the time-series metrics. If you select a metric before you select a table, only tables that have that metric appear in the **Table name** dialog box.

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Field	Description
Metric	Table metric that you want to monitor that is specified by the **Table name**. The only metrics that appear when you click the search icon are the metrics in that table. If you select a metric before you specify a **Table name**, the metrics in all your time-series metrics appear. After you select a metric, only the tables that contain that metric appear when you click the search icon that is next to the **Table name**.
Active	Option to activate the trigger.
Description	Description of the trigger.
Aggregator	Aggregation value that you select: **None**, **Max**, **Min**, or **Average**. **None** means that you use the last value in the collection period.
Window	Length of time used to calculate the aggregation function. For example, assume the **Window** is 1 hour and the aggregator is **Min**, and a new data point is added to the series. The system calculates the new minimum using the new data window (the last hour of data including the new data point). The new minimum is compared to the different trigger levels to determine whether to execute the trigger.

5. Select **Save**.
   A new record is created.
6. In the MetricBase Band Trigger Levels section on the record you just created, double-click each cell to add values that specify trigger parameters.

MetricBase Band Trigger Levels

Field	Description
Level	Numbers that indicate increasing severity. For example, you might define the altitude for level 1 to be less than 50 meters, but above 25 meters, and the altitude for level 2 to be less than or equal to 25. Each level should trigger a different flow. **Level** is often used in Condition Scripts. See Execute triggers conditionally.
Function	Function that makes the **Value** the maximum or minimum of the lower end of the band. Therefore, the function defines whether trigger values are inside or outside of the band. For example, if the **Function** is **Less**

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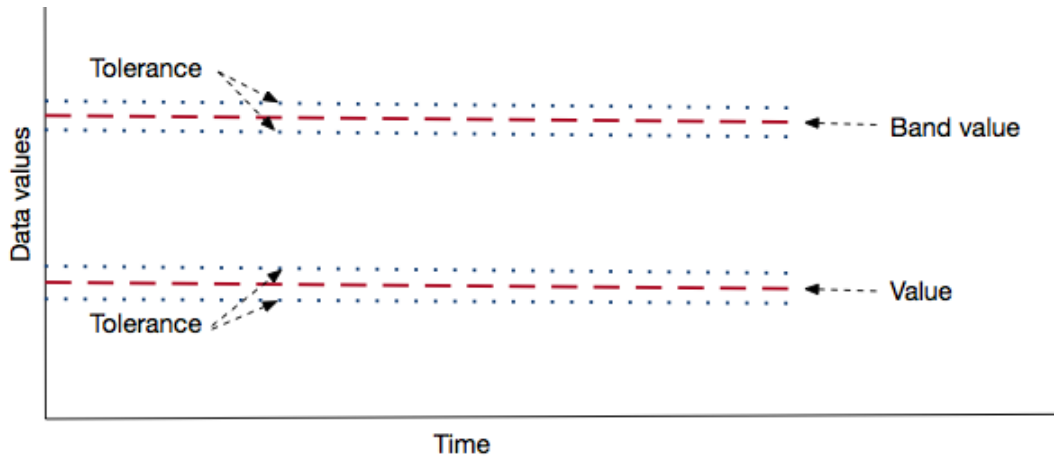
Field	Description
	than, the trigger executes when the metric goes below the band value.
Value	Lower end of the band. See the following image.
Band Function	Function that makes the **Band Value** the maximum or minimum value of the upper end of the band. Therefore, the band function defines whether trigger values are inside or outside of the band. For example, if the **Band Function** is **Greater than**, the trigger executes when the metric goes above the band value. See the following image.
Band Value	Upper end of the band. See the following image.
Tolerance	Sets tolerance margins around the **Value** and **Band Value** to prevent repeatedly executing a trigger for small fluctuations in the data. After a trigger executes, the data must exceed the tolerance to execute the trigger again. See the following image.



For example, assume the **Function** is **Greater than**, the **Value** is 25, and the **Band Value** is 50.

- If the **Tolerance** is 0, the trigger executes for all values that are less than 50 and greater than 25.
- If the **Tolerance** is 5, the ranges are 50 ± 5 (45-55) and 25 ± 5 (20-30).
- If the last two data points in order were 51 and 49, the trigger executes because 49 is below the **Band Value**.
- If the next two data points in order are 51 and 49, the trigger doesn't execute again because the values are within the tolerance range since the last trigger execution.

7. Add one or more rows to the table to create multi-layered triggering behavior.

Note:
You must define at least two levels in a band trigger so that there are levels to transition between.

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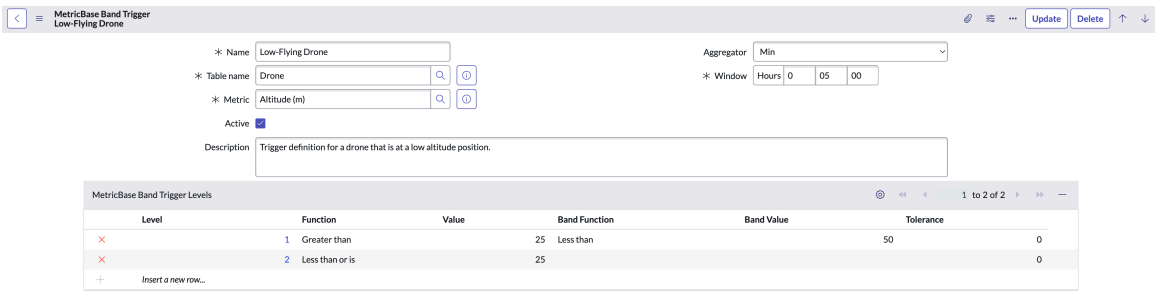
Typically, each additional row (level) indicates a more severe condition. The Flow Designer flow associated with the level should warn with increasing severity.

8. Select **Update**.
9. **Optional:** Add a triggering condition that determines whether a trigger executes a Workflow Studio flow.
   See Execute triggers conditionally.

Example: Band Trigger form



What to do next

Associate this trigger with a Workflow Studio flow. For more information, see Assign a trigger to a flow.

Create a MetricBase linear predictor trigger

Create a MetricBase linear predictor trigger to detect when a metric is likely to cross a specified threshold within a specified period of time.

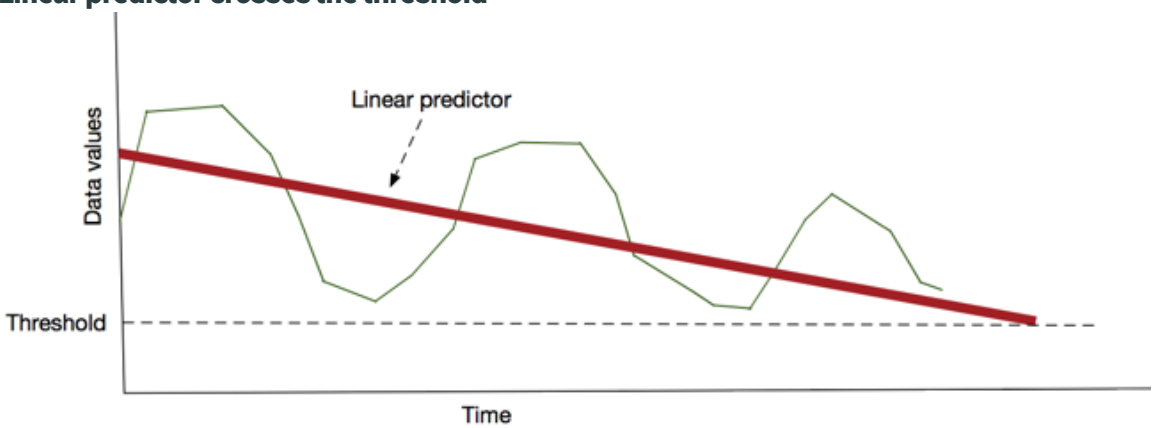
Before you begin

Role required: admin

About this task

The linear predictor trigger uses past data to generate a line that predicts future values. When MetricBase predicts that the linear value reaches a threshold, the trigger executes.

Linear predictor crosses the threshold



If the most recent data point reaches the threshold, the trigger executes regardless of the linear prediction.

Trigger parameters include how much past data to use in the calculation of the prediction, how far ahead to look, and the level of confidence that you accept.

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Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger Definitions**.
2. Select **New**.
3. On the **MetricBase** Trigger Creation form, select the **Linear Predictor Trigger** option.
4. On the form, fill in the fields.
   The trigger levels are not initially visible on this form. You configure the levels later.

MetricBase Linear Predictor Trigger form

Field	Description
Name	Name of the linear predictor trigger.
Table name	Table in the MetricBase database that contains the metric that you want to monitor. The only tables that appear when you click the search icon are the tables that you specified in the time-series metrics. If you select a metric before you select a table, only tables that have that metric appear in the **Table name** dialog box.
Metric	Table metric that you want to monitor that is specified by the **Table name**. The only metrics that appear when you click the search icon are the metrics in that table. If you select a metric before you specify a **Table name**, the metrics in all your time-series metrics appear. After you select a metric, only the tables that contain that metric appear when you click the search icon that is next to the **Table name**.
Active	Option to activate the trigger.
Window	Length of time used to calculate the line that predicts the future course of the value. For example, you might want to use the last 10 minutes of data to calculate the linear predictor. If the value is too long, the line does not reflect current trends. If the value is too short, the line might follow the raw values too closely and not accurately reflect the overall trend of the values. The value must be at least 10 times the sampling period that is defined by the sampling rate of your **Metric**. **Warning:** Do not confuse this value with the **Window** value in the trigger level. That value specifies how far into the future that you want the linear predictor to look to see if the **Metric** is likely to cross the **Threshold**.
Confidence Level (%)	A measure of how closely the real data fits the linear prediction of the data. A confidence level of 95% means that the real value must be within 5% of the predicted value to execute a trigger. If you only want to trigger when the real values are close to the predicted values, choose a high confidence percentage. If you are willing to accept real data that varies

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Field	Description
	more significantly from the predicted values as being valid, select a lower confidence level, for example, 80%.
Trend	Direction of the trend: upward or downward. For example, the value is increasing or decreasing toward the **Threshold**.
Threshold	Target value that the metric is expected to reach before the trigger executes.
Description	Description of the trigger.

5. Select **Save**.
   A new record is created.
6. In the MetricBase Linear Predictor Trigger Levels section on the record you just created, double-click each cell to add values that specify trigger parameters.

MetricBase Linear Predictor Trigger Levels

Field	Description
Level	Numbers that indicate increasing severity. Each level should trigger a different flow. For example, you might define the following: **Level 1** Battery is predicted to reach 20% in 30 minutes. **Level 2** Battery is predicted to reach 20% in 5 minutes. **Level** is often used in Condition Scripts. See Execute triggers conditionally.
Function	Comparative function to use on the threshold value. **Less than or is** is the only available option. For example, battery life **Less than or is** 30 minutes.
Window	How far into the future that you want the linear predictor to look to see if the metric is predicted to cross the threshold. **Warning:** Do not confuse this value with the **Window** value in the trigger definition form. That value specifies how much data to use (measured in time) to calculate the slope of the predictor line.

7. **Optional:** Add rows to the table to create multi-layered triggering behavior.
   Typically, each additional row (level) indicates a more severe condition. The Workflow Studio flow associated with the level should warn with increasing severity.
8. Select **Update**.
9. **Optional:** Add a triggering condition that determines whether a trigger executes a Workflow Studio flow.
   See Execute triggers conditionally.

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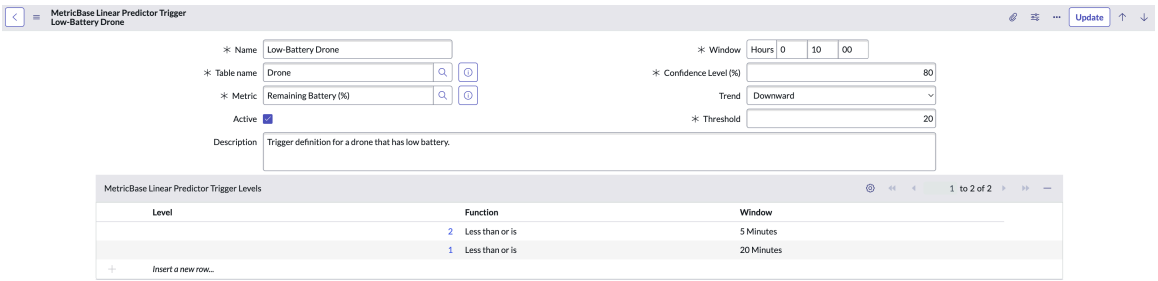
Example: Linear Predictor form



What to do next

Associate this trigger with a Workflow Studio flow. For more information, see Assign a trigger to a flow.

Create a MetricBase gap trigger

Create a MetricBase gap trigger to alert you when MetricBase stops receiving data.

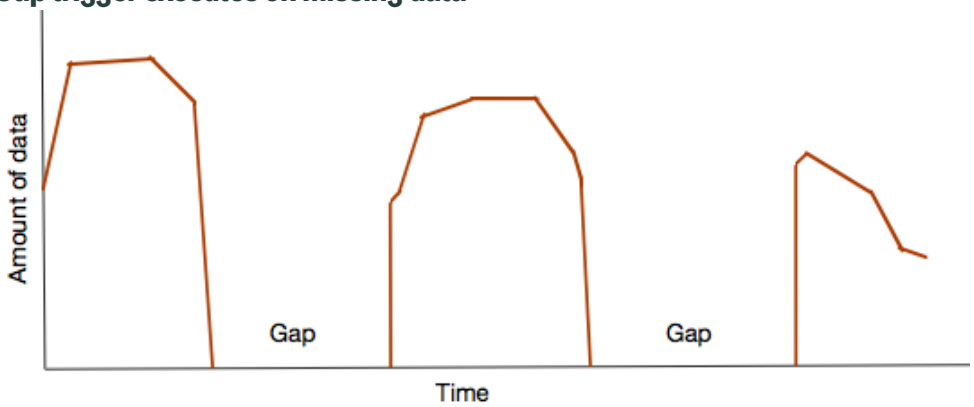
Before you begin

Role required: admin

About this task

Gap triggers execute when MetricBase stops receiving data for a specified period.

Gap trigger executes on missing data



You can define multiple trigger levels to indicate different severities. For example, you can set a gap of 10 minutes as level 1, a gap of 20 minutes as level 2, and so on. Each level should trigger a different Workflow Studio flow. The difference between gap durations on different levels must be at least 10 minutes. For example, if you set level 1 to a gap of 10 minutes, you must set level 2 to a gap of 20 minutes or more.

Note:
If you make the gap durations between levels less than 10 minutes, MetricBase displays an error message and deletes the level that you added.

Polling frequency is calculated using the difference between gap durations on different levels and dividing by 2 (rounded down). For example, given the following:

- Level 1 triggers after 5 minutes of missing data
- Level 2 triggers after 30 minutes of missing data

The polling frequency is 12 minutes, because Floor((30-5)/2) = 12 minutes.

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The maximum polling frequency is every 5 minutes, and the minimum frequency is every 30 minutes. If a trigger has only one level, the polling frequency is 30 minutes.

MetricBase searches through the data that is stored in the MetricBase database, not through incoming data. Therefore, a gap trigger might execute after the gap when data is missing. For example, if MetricBase polls every 10 minutes and the gap is 30 minutes of missing data, the trigger might execute as late as 40 minutes after the data was last received.

Procedure

1. Navigate to **All** > **MetricBase** > *Workflow Studio* > **Trigger Definitions**.
2. Select **New**.
3. On the **MetricBase** Trigger Creation form, select the **Gap Trigger** option.
4. On the form, fill in the fields.
   The trigger levels are not initially visible on this form. You configure the levels later.

MetricBase Gap Trigger form

Field	Description
Name	Name of the trigger.
Table name	Table in the MetricBase database that contains the metric that you want to monitor. The only tables that appear when you click the search icon are the tables that you specified in the time-series metrics. If you select a metric before you select a table, only tables that have that metric appear in the **Table name** dialog box.
Active	Option to activate the trigger.
Metric	Table metric that you want to monitor that is specified by the **Table name**. The only metrics that appear when you click the search icon are the metrics in that table. If you select a metric before you specify a **Table name**, the metrics in all your time-series metrics appear. After you select a metric, only the tables that contain that metric appear when you click the search icon that is next to the **Table name**.
Description	Description of the trigger.

5. Select **Save**.
   A new record is created.
6. In the MetricBase Gap Trigger Levels area on the record you just created, double-click each cell to add values that specify trigger parameters.

Field	Description
Level	Numbers that indicate increasing severity. For example, you might define level 1 to be no data for 10 minutes. Level 2 might be no data for 20 minutes. Each level should trigger a different flow. **Level** is often used in Condition Scripts. See Execute triggers conditionally.

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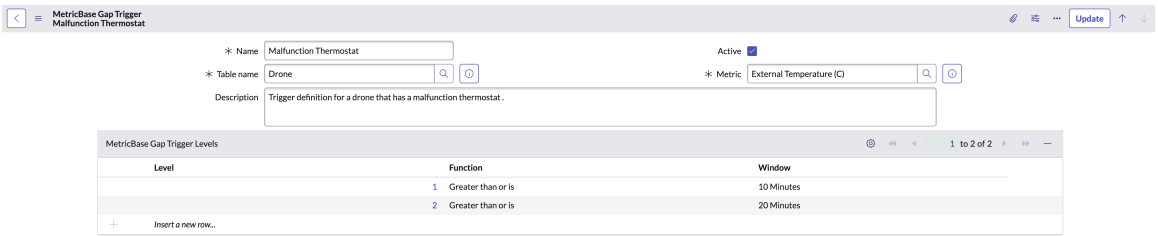
Field	Description
Function	Function, **Greater than or is**, which means that this trigger executes when the gap in received data is greater than the value that you specify in the **Window** field. There is only one option for the function, and it cannot be left empty or MetricBase displays an error message.
Window	Length of time that no data has been received that executes the trigger. The format is hours:minutes:seconds. For example, 00:20:00 means that this trigger executes after 20 minutes of missing data.

7. **Optional:** Add rows to the table to create multi-layered triggering behavior.
   Typically, each additional row (level) indicates a more severe condition. The Workflow Studio flow associated with the level should warn with increasing severity.
8. Select **Update**.
9. **Optional:** Add a triggering condition that determines whether a trigger executes a Workflow Studio flow.
   See Execute triggers conditionally.

Example: Gap Trigger form



What to do next
Associate this trigger with a Workflow Studio flow. For more information, see Assign a trigger to a flow.

Create a MetricBase model trigger

Model triggers execute when the time-series data deviates from expected values.

Before you begin
Role required: admin

About this task
There are four model types supported: autoregressive integrated moving average (ARIMA), probabilistic exponentially weighted moving average (PEWMA), Holt-Winters, and seasonal trend decomposition using Loess (STL).#MetricBase #uses the model to create a definition of expected, normal values.

Procedure
1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger Definitions**.
2. Select **New**.
3. On the **MetricBase** Trigger Creation form, select the **Model Trigger** option.
4. On the form, fill in the fields.

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The trigger levels are not initially visible on this form. You configure the levels later.

Field	Description
Name	Name the model trigger.
Model	Trained model this trigger uses. See Create and train a predictive model.
Metric	Table metric that you want to monitor. This value is set automatically based on the model, which means you cannot set it yourself.
Table name	Table in the#MetricBase #database that contains the metric that you want to monitor. This value is set automatically based on the model, which means you cannot set it yourself.
Active	Option to activate the trigger.
Description	Description of the trigger.
Spike Direction	Specify whether you want to trigger only on anomalies that occur above predicted values (upward), below predicted values (downward), or both (either).

5. Select **Save**.
   A new record is created.
6. In the MetricBase Model Trigger Levels area on the record you just created, double-click each cell to add values that specify trigger parameters.

Column	Description
Level	Numbers that indicate increasing severity. For example, you might define level 1 to be 2 standard deviations from the mean. Level 2 might be 4 standard deviations. Each level should trigger a different Workflow Studio flow. **Level** is often used in Condition Scripts. See Execute triggers conditionally.
Function	Always **Greater than or is**, meaning that in order to trigger, the time-series metric must be greater than or equal to the number of standard deviations from the mean specified in **Number of Standard Deviations**.
Number of Standard Deviation	Float value specifying the number of standard deviations the time-series metric must be away from the mean to trigger an alert at this level.

7. **Optional:** Add rows to the table to create multi-layered triggering behavior.
   Typically, each additional row (level) indicates a more severe condition. The Workflow Studio flow associated with the level should warn with increasing severity.
8. Select **Update**.
9. **Optional:** Add a triggering condition that determines whether a trigger executes a Workflow Studio flow.

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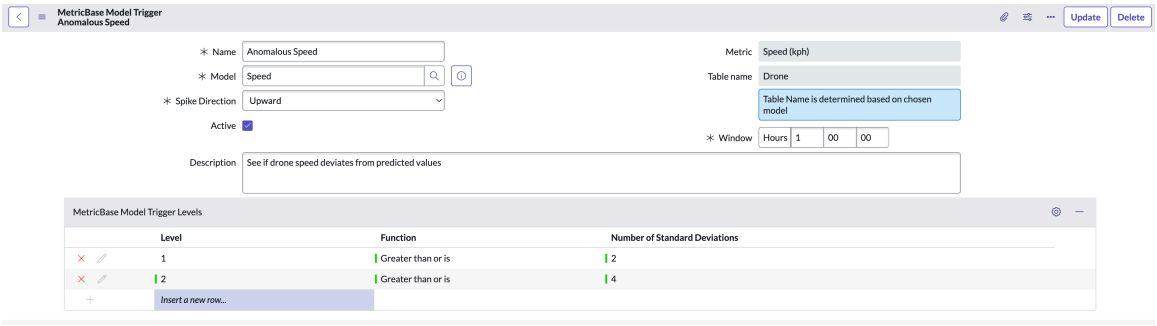
See Execute triggers conditionally.

10. Test your model and trigger on real data before deploying to production.

Example: Model Trigger form



What to do next

Associate this trigger with a Workflow Studio flow. For more information, see Assign a trigger to a flow.

Execute triggers conditionally

MetricBase triggers execute based on a single metric. Condition Scripts impose additional requirements that determine whether a trigger kicks off a flow.

Before you begin

Role required: admin

About this task

Condition Scripts execute when conditions for a trigger are met but before the trigger executes a Flow Designer flow. In that way, Condition Scripts can prevent triggers from executing flows even when trigger conditions are met. For example, data often fluctuates over time. Small fluctuations can cause unwanted, duplicate triggering events. A Condition Script can prevent that erroneous duplication.

Condition scripts are sometimes also referred to as moderator scripts.

Condition Scripts always return `true` (trigger) or `false` (do not trigger). To learn how to write these scripts, see Scripting in ServiceNow Fundamentals. To experiment with scripts, see Get familiar with MetricBase APIs.

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger Condition Script**.
2. Select **New**.
3. On the form, fill in the fields.

Field	Description
Name	Name for the Condition Script.
Application	Scope of the Condition Script. The value, **Global**, means that the action applies to all applications.
Description	Explanation of what the Condition Script does. When does it return True or False?

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Field	Description
Script	Field to enter the JavaScript. Make it returns *true* to execute a flow.

4. Write the Condition Script.

   When writing a script, think about the conditional statements (what cases it should execute for and what cases it shouldn't). If all evaluate *true*, the script returns *true* and the flow executes, otherwise it does not. The following example script triggers a flow when a drone is traveling too fast at a low altitude (defined by level 1). The example shows a typical approach to writing a condition script.

   a. Get the trigger definition, passed in as a filter function parameter.

   b. Get the record (*current*) that is causing the triggering event, passed in as a filter function parameter.

   c. Get the time from the record that the trigger conditions were satisfied, passed in as a filter function parameter.

   d. Get the trigger level, passed in as a filter function parameter.

   e. Use these parameters to return *true* if the level 1 trigger conditions are met and *travel_state* equals traveling or speeding.

```
function filter(/*GlideRecord*/
 triggerDefinition, /*GlideRecord*/
 current, /*GlideDateTime*/ start, /*int*/ level) {
 // retrieve current travel state of drone
 var travel_state = String(current.travel_state);

 // the drone is traveling at a significant speed, and the
 altitude just went below the threshold
 if (((travel_state === 'traveling') || (travel_state ===
 'speeding')) && (level === 1)){
  return true; //process this trigger
 }

 return false; // don't process this trigger
}
```

   Note:
   Condition Scripts must execute quickly.

5. Select **Submit**.

What to do next

Use Flow Designer to associate a flow with a trigger. When configuring a flow, you can select a Condition Script you created.

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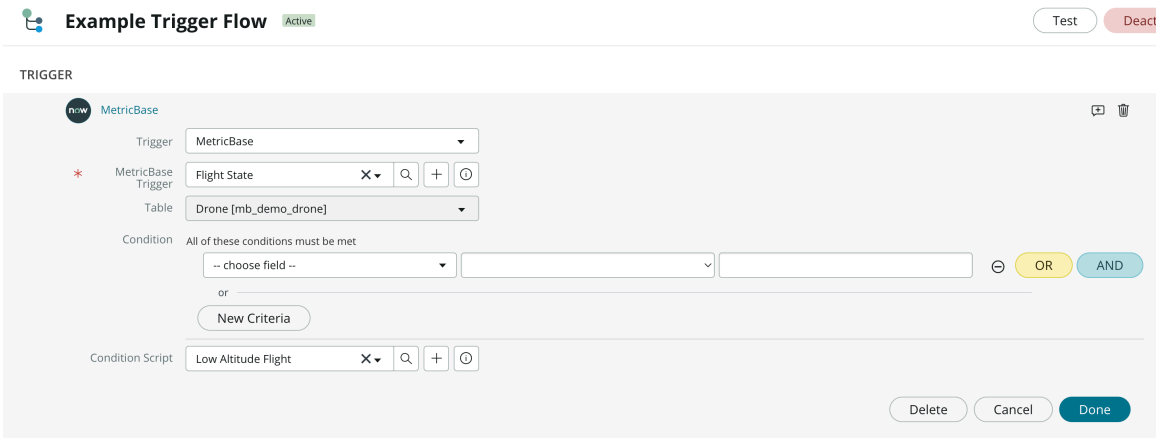
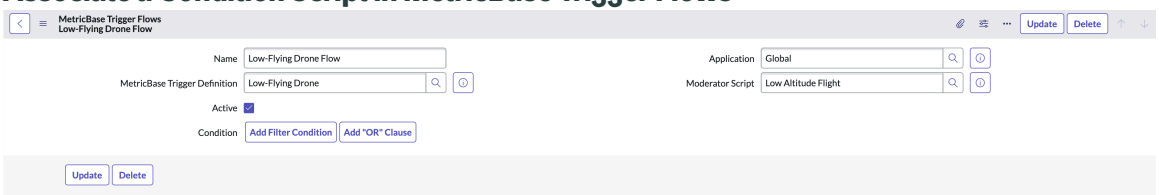
Add a Condition Script to a trigger definition in Flow Designer



You can also associate a condition script with a trigger flow in the MetricBase Trigger Flows [sys_flow_metric_trigger] table. If you associate a condition script with a trigger flow here, it won't appear in Flow Designer, but it will still execute with the trigger.

Associate a Condition Script in MetricBase Trigger Flows



Assign a trigger to a flow

Now that you created a trigger, use Workflow Studio to specify the flow a trigger executes. The flows can provide alerts for unexpected behavior.

Before you begin

Role required: admin

About this task

Triggers, by themselves, execute nothing. After defining a trigger in MetricBase, you use Workflow Studio to associate the trigger with a flow.

Procedure

1. Navigate to **All** > **MetricBase** > **Trigger Flows.**.
2. Select **New Flow**.
3. Fill in the fields.
4. Select **Submit**.
5. Select **Add a trigger** to specify the trigger that kicks off this flow.
6. In the dialog box that appears, scroll, and select MetricBase for the trigger type.
7. Under **TRIGGER**, fill in the form to define the trigger to associate with this flow.
   a. In the **MetricBase Trigger** list, select a trigger by either selecting the magnifying glass to select an existing trigger or selecting the plus sign (+) to define a new trigger.
   b. **Optional:** Add requirements for the flow to execute by adding filter conditions.

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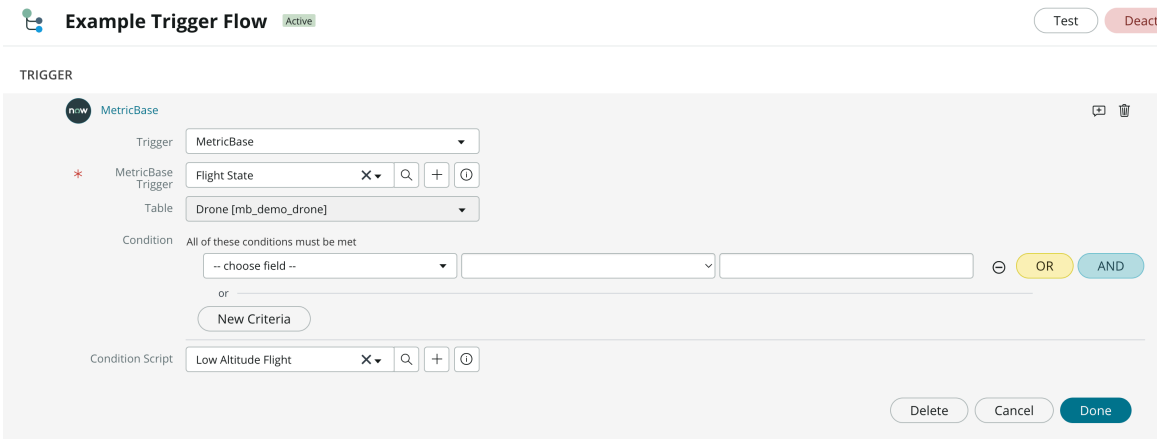
c. **Optional:** Beside **Condition Script**, select the magnifying glass to select a Condition Script or click the plus (+) to create a script.
Condition scripts add additional requirements for a trigger to execute a flow.

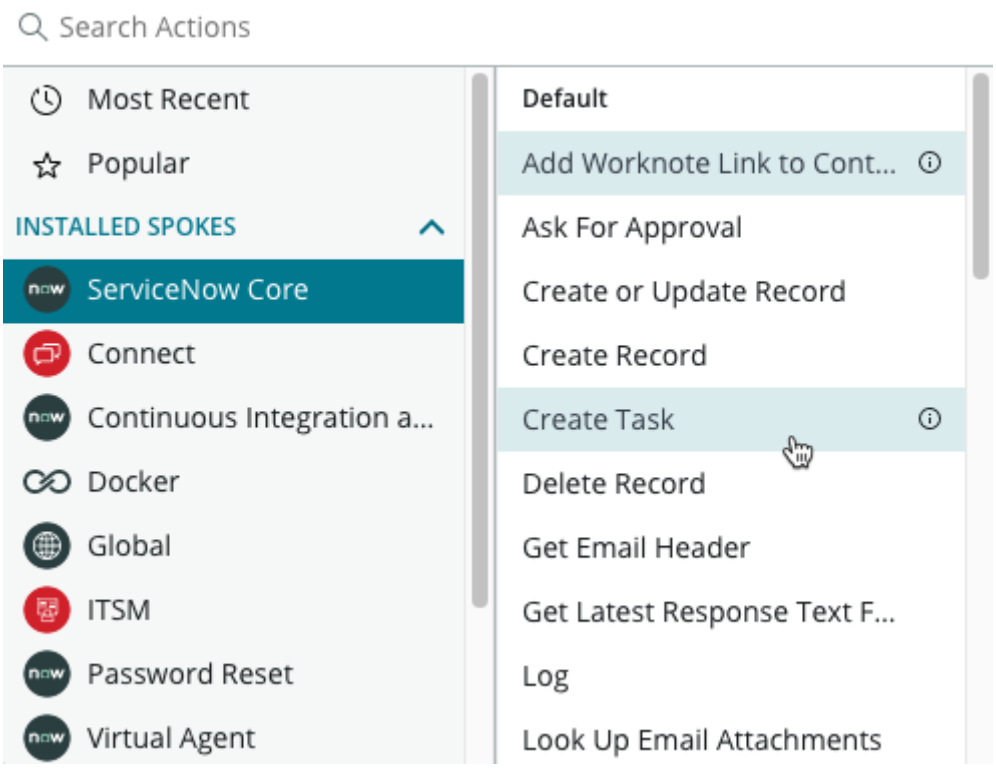


8. Under **ACTIONS**, select **Click to add an Action, Flow Logic, or Subflow**

   a. When selecting an action, select an action category in the first column of the dialog box, and a flow action in the second column.

   b. Create combinations of different actions, flow logics, and subflows to get the desired behavior.

   c. Select **Done** to complete each part of the flow action.



9. Select **Save**.

10. Test the flow.

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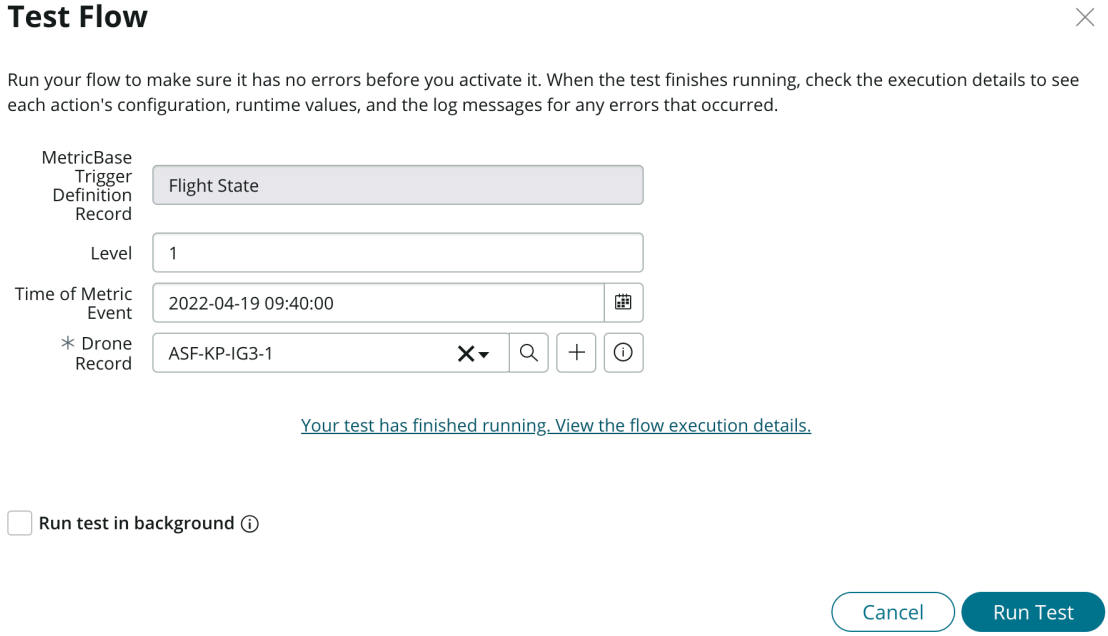
a. In the flow tab in Workflow Studio, select **Test**.

b. Select the trigger **Level** to test, provide the **time of metric event**, and what **record** is triggering.
Different triggers may execute different flows.



Note:
When you test a flow, the system does not execute the trigger, and therefore does not create a record. By selecting a record in the Test flow dialog box, the system acts as if that record was just created. For more information, see Test a flow.

c. Select **Submit**.
The test completes. Select the message to view the flow execution details. Edit the settings if necessary, save again, and then retest.

11. Select **Activate** to activate the trigger.
The flow does not execute unless you activate it.

View trigger logs

Trigger logs show different levels of trigger malfunctions.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger logs**.
2. Click one of the trigger logs.
3. Under **Related Links**, click **Show Log Entries**.
4. **Optional:** Change the default values in the **Enter parameters for log file entries to browse** form to select the log entries to view and click **Submit**.

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Managing MetricBase

View the overall health and performance of MetricBase, and debug its triggers and scripts.

View MetricBase database status

View the status and health of the connection to your MetricBase database.

Before you begin

Role required: clotho_admin

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Health Dashboard**.
2. In the list, select **Health**.
3. View the status of the database connection.
   If the database is offline, contact Customer Service and Support.
4. Monitor the lag time between your instance and the database by viewing the **MetricBase Lag Statistics** value.
   If the lag time is reported in multiple seconds, contact Customer Service and Support.
5. **Optional:** Select **Refresh** to view the latest status.

View MetricBase data usage and efficiency

Monitor the usage and efficiency of your MetricBase time series data.

Before you begin

Role required: clotho_admin

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Health Dashboard**.
2. In the list, select **Series**.
   The MetricBase Series Information page displays the Total Series Count, which is the total number of series registered in MetricBase.
3. Determine whether any series aren't being used by calculating the stale series ratio.
   This ratio is the percentage of series that haven't received a value within a specified number of days.
   a. Enter the number of days (greater than or equal to 1) in the **Staleness Time Period** field.
   b. Select the Refresh icon ( ).
   The closer the ratio is to 0%, the fewer unused series there are within the given time period. You determine your own threshold for an acceptable stale series ratio. To lower the ratio, adjust the metric's sampling schedule or remove unused metrics or series. For help with removing a stale series, contact Customer Service and Support.
4. Determine how efficiently your time series data is used by viewing the **Data Utilization Efficiency** value.
   The value is the percentage of data points per metric that have a non-null value. The closer this value is to 100%, the fewer null data points there are. To increase the efficiency, review each metric to ensure that data is being posted at a similar rate to the first schedule of its retention policy. See MetricBase retention policies for more information.

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5. Determine how often values are published to MetricBase by viewing the **Average Unutilized Data Gap** value.
   The gap value is the average number of entries between two non-null data points. To decrease the gap value, change the metric's schedule to publish data more often or update the metric's sampling period in its retention policy. See MetricBase retention policies.

View MetricBase status and statistics

You can view the status of the MetricBase database.

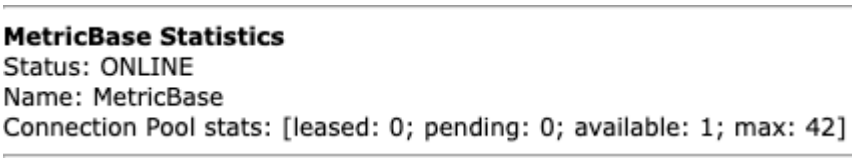
Before you begin
Role required: admin

Procedure

1. View the status of the MetricBase instance.

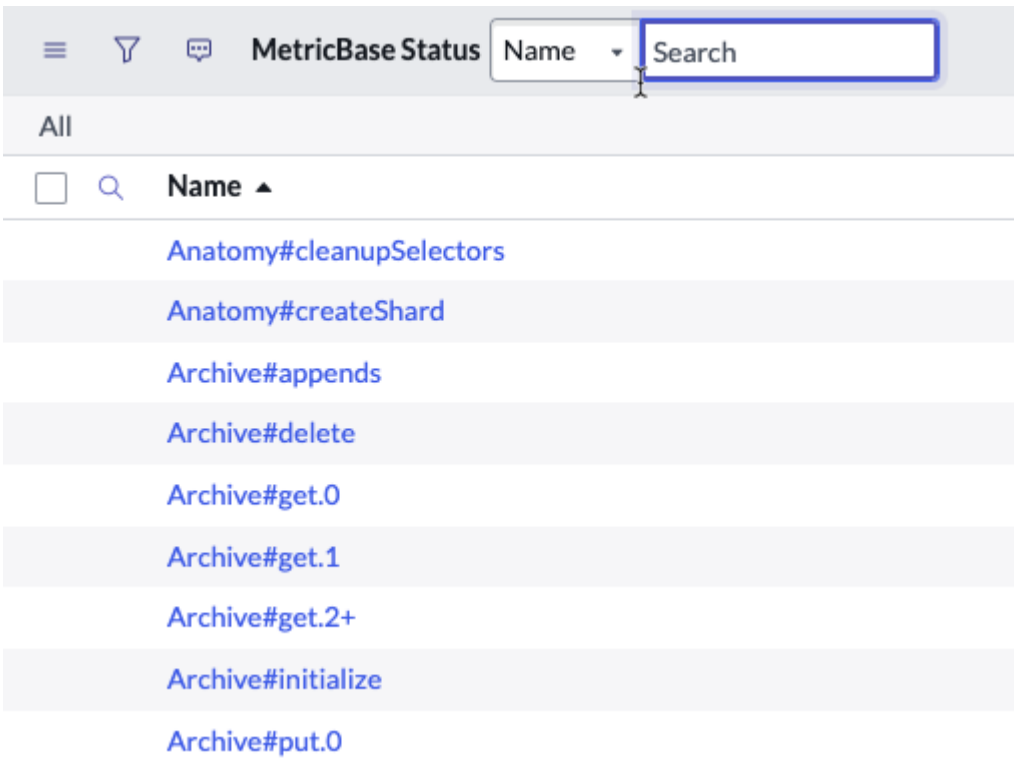
   a. Navigate to **System Diagnostics** > **Stats** > **Stats**.

   b. Scroll down to find **MetricBase Statistics**



2. View the metrics monitored by MetricBase and statistics about them.

   a. Click **MetricBase** > **MetricBase Status**
   The MetricBase Status page displays all of the metrics tracked in MB.



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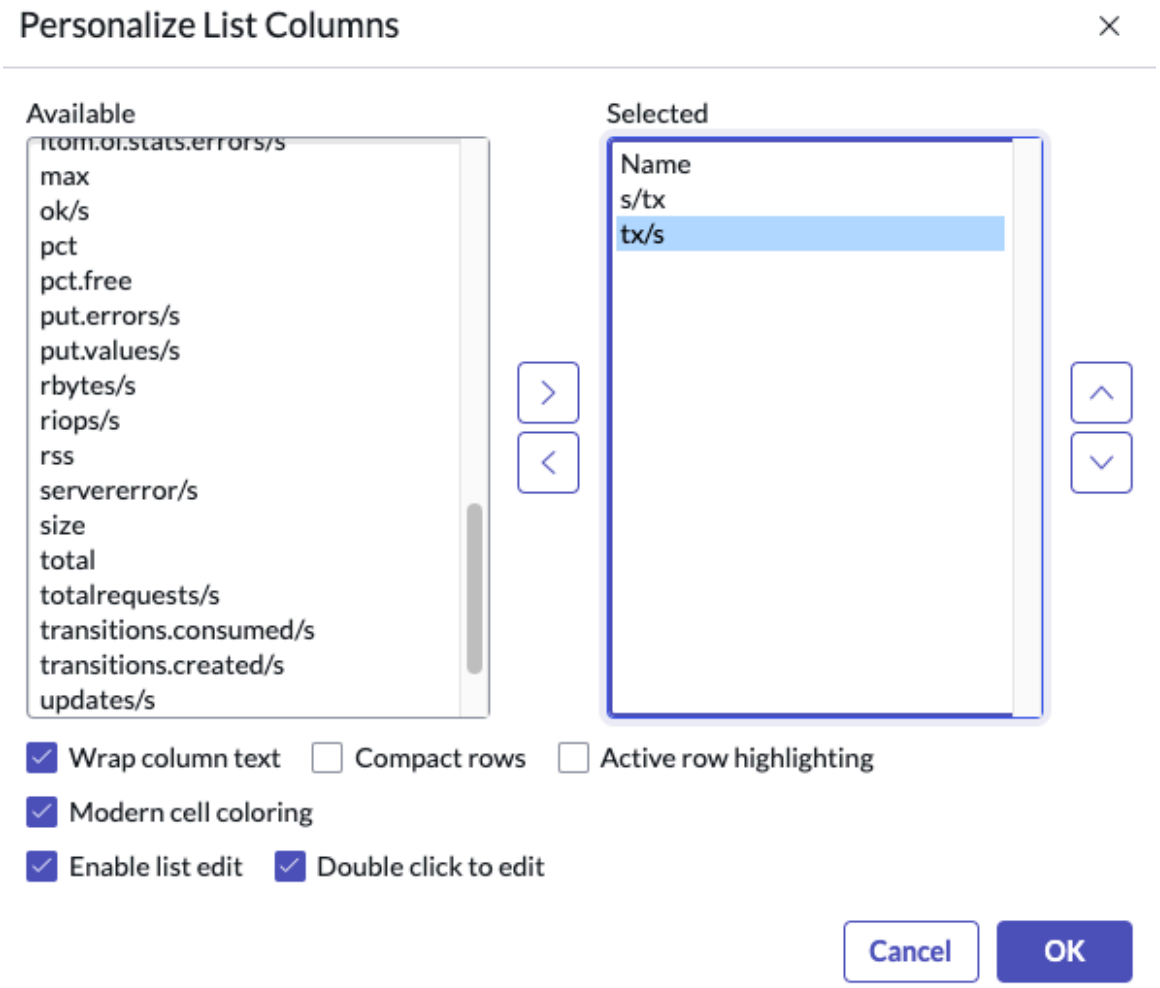
b. Click the gear icon.
The Personalize List Columns dialog box displays.



c. Select and move metrics from the **Available** column to the **Selected** column to display the metric and click **OK**.
The metrics display on the MetricBase Status page.

Name ▲	s/tx	tx/s
Anatomy#cleanupSelectors		0
Anatomy#createShard		0
Archive#appends		
Archive#delete		0
Archive#get.0	6.0E-5	0
Archive#get.1		0
Archive#get.2+		0
Archive#initialize		0

Debug MetricBase

You can display the results of debugging scripts in MetricBase.

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Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Diagnostics** > **Session Debug** > **Debug** *MetricBase*.
   When the page you are on submits queries to MetricBase, you see the transforms and how long they took on the bottom of the page. Submitting a lot of MetricBase queries may slow down the page load time significantly.
2. To view a history of the debug script's execution, click **available here**.
3. Click **Update**.
   Session debug tracking for MetricBase activities starts and the MetricBase Status page displays.

MetricBase reference

These reference topics provide additional information about MetricBase developer resources and domain separation.

Developer resources

Developers can use JavaScript or REST APIs to insert and retrieve time-series data from the MetricBase database and to run transforms on the data. The transformations enable you to visualize time-series data in a variety of ways.

REST APIs

For information about the MetricBase REST APIs that return time-series data from the MetricBase database, see MetricBase Time Series API.

JavaScript APIs

For information about the MetricBase JavaScript APIs that return time-series data from the MetricBase database, see:

- Client — Execute transforms on the MetricBase database and receive the results.
- Data — Return the object that contains the result of a transform.
- DataBuilder — Create a series of data points for a metric.
- Transformer — Manipulate time-series data to prepare the data for evaluation and analysis.
- TransformPart — Specify details of the transform to be done.
- TransformResult — Return the object that contains the result of the transformation.

Transformations

For more information about MetricBase time-series data transformations, see MetricBase transforms.

Data Explorer

Experiment and get familiar with the JavaScript APIs by using the MetricBase Data Explorer that comes with the MetricBase Demo.

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Domain separation and MetricBase

Domain separation is supported in the MetricBase application. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

Related topics

Domain separation for service providers

MetricBase roles

MetricBase is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

MetricBase administrator [clotho_admin]

Administrative role for time series-related functionality.

Contains Roles

List of roles contained within the role.

- flow_designer
- clotho_rest_accumulate
- clotho_rest_put

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

MetricBase plus reader [mbplus_reader]

Lets users query MetricBase plus data.

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Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MetricBase plus writer [mbplus_writer]

Lets user modify tables in MetricBase plus.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MetricBase REST accumulate [clotho_rest_accumulate]

MetricBase REST accumulate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MetricBase REST put [clotho_rest_put]

MetricBase REST PUT role.

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Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MID Server

The Management, Instrumentation, and Discovery (MID) Server is a Java application that runs as a Windows service or UNIX daemon on a server in your local network. The ServiceNow® MID Server enables communication and the movement of data between a ServiceNow instance and external applications, data sources, and services.

The MID Server initiates all communications with the ServiceNow® instance. This communication is recorded as records in the MID Server ECC Queue, which acts as the communication log between the instance and the MID Server. The MID Server picks up any work it has to do from the ECC Queue and returns the results of that work to the queue.

This video gives you an overview of the MID Server:

MID Server overview	

Setting up the MID server

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

This documentation provides detailed instructions for setting up a functioning MID Server for use with ITOM applications. Click the icons to go to each task's portal page. These procedures help you prepare your system, download and run the installer, and configure MID Servers to run in your environment. After you get a valid MID Server up and running, you can add security and encryption to protect your data.

At the bottom of each page is a link to the reference materials you need, such as MID Server system requirements, MID Server parameters, and instructions for monitoring your MID Server.

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Use the additional links at the bottom to move through the content within a specific category or return to the MID Server setup to access a different portal.

If you are new to the MID Server or an experienced user who wants to set up a MID Server quickly, you can use the Use MID Server guided setup. This wizard walks you through the process of installing and configuring a MID Server with default settings in just a few steps.

Upgrading the MID Server

The MID Server checks with the instance periodically to see if an upgrade is necessary. If the MID Server detects that a new version is available for upgrade, it downloads the installer from `install.service-now.com` and runs the package automatically. You can also elect to upgrade the MID Server manually. See MID Server upgrades for details.

Resolving MID Server issues

You can search the HI Knowledge Base for troubleshooting articles or monitor the MID Server status and track active issues from within the instance. Many articles on resolved MID Server issues have been collected on Servicenow MID Server Landing page [KB0960404]. For more information about common resolution procedures, see Resolving MID Server issues.

ServiceNow applications that use the MID Server

- Discovery
- Orchestration
- Service Mapping
- Event Management
- Operational Intelligence
- Cloud Management
- IntegrationHub
- Cloud Cost Management
- Agent Client Collector

External applications that use the MID Server

- Import Sets
- Microsoft SMS/SCCM
- LANDesk Maintenance Suite
- Microsoft System Center Operations Manager (SCOM)
- Microsoft MIIS

MID Server version compatibility

The version of the MID Server must be compatible with the version of the instance. Otherwise, the MID Server cannot process commands or communicate with the instance.

The instance determines which version of the MID Server is allowed. The MID Server version must at a minimum belong to the same major release, such as Madrid. If the MID Server version belongs to the same major release, it can, but does not have to, belong to the same minor

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version, such as Madrid Patch 1. In this case, communication with the instance might still be possible, but it is always suggested that you upgrade to the latest version.

During upgrades, there may be times when the instance has been upgraded, but the MID Server has not. In that situation, Integration Hub operations are not sent to the MID Server until it is upgraded to the same version. The Integration Hub operations are requeued and sent to the MID Server once it is upgraded.

Warning:
You can Pinning a MID Server to a specific version to a specific version, but you should be aware that the version might become out of date.

Configure MID Server network connectivity

Prepare the network for MID Servers to connect with the instance and access the download site. The network must be prepared before installing or configuring the MID Server. If computers or devices have additional security measures, that security may interfere with MID Servers on those systems.

Before you begin
Role required: admin



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Ensure that the MID Server can connect to elements inside and outside your network
3. Configure MID Server security
4. Configure your MID Server
5. Download and install the MID Server on a Linux or Windows host
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Make sure that the host machine meets the requirements specified in the MID Server system requirements.

About this task
The MID Server host computer must have access to the ServiceNow download site at `install.service-now.com` to upgrade automatically. If you have a self-hosted ServiceNow environment that blocks access to the download site, you must import the MID Server installer package into your MID Server hosts manually. For instructions, see KB0760123 in the Self-Hosted knowledge base.

Firewalls and proxy configurations may block calls to the OCSP Entrust and DigiCert servers, which prevents the MID Server from working. You may need to change your firewall permissions so that the OCSP traffic goes through. For more information and resolutions, see the HI Knowledge Base article [KB1216223].

The host machine must have these network privileges:

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- Firewall access: Configure any firewalls between the MID Server and the target devices to allow a connection. If your network uses a DMZ, and if your network security protocols limit port access from within the network to the DMZ, you might have to deploy a MID Server to a machine within the DMZ to probe the devices there.
- Network access: Configure target devices to allow the MID Server probe to connect. If network security prevents you from configuring new machines that can connect to the targets, install the MID Server on an existing machine with connection privileges.
- Network account: Install the MID Server with the proper account, either local or domain administrator.

Additionally, for the MID Server to access your ServiceNow instance, satisfy these prerequisites:

- Network access to the ServiceNow instance: Configure the network that the MID Server uses to allow traffic over TCP port 443.
- A MID user: Create a ServiceNow user record for the MID Server to use. This user record must have the mid_server and import_admin roles.

Note:
Verify that the baseline public page **InstanceInfo** is active for the MID Server to connect to the instance.

Procedure

1. Configure the network to allow MID Server network connectivity to the ServiceNow instance over TCP port 443.
2. Configure basic authentication for SOAP communications with the ServiceNow instance.
3. Navigate to **System Web Services** > **Scripted Web Services** > **Scripted SOAP Services**.
4. Confirm that the following web services are active:
   - GetMIDInfo
   - InstanceInfo
   - MIDAssignedPackages
   - MIDFieldForFileProvider
   - MIDFileSyncSnapshot
   - MIDServerCheck
   - MIDServerFileProvider
5. Type **sys_public.list** in the navigation search field and press **Enter**.
   The Public Pages record list appears.
6. Verify that the **InstanceInfo** public page is active, to allow the MID Server to validate its version.
7. Ensure that the MID Server host computer can access the download site at `install.service-now.com`.

What to do next

After the network is prepared, proceed to Installing the MID Server.

Prepare network connections for MID Servers

Before you install the MID Server, perform the necessary prerequisites that it needs to connect to elements inside and outside your network. This includes network privileges and security considerations.

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Security considerations

Sometimes computers or devices have additional security measures configured, and these measures may interfere with the MID Server's ability to run commands or queries on those systems.

For example, a Linux server might be configured to allow only certain IP address to connect to it via SSH. Similarly, a network router might be configured to allow only certain IP address to query SNMP on it. To allow access in such cases, use one of the following methods:

- Update the configuration of those computers or devices to allow the desired MID Server to run commands or query them. For example, a network router may be configured to only allow the network management systems to query SNMP on it. In that case, add the MID Server as though it were another network management system.
- Install a MID Server on a computer that already has access to the computers or network devices with such restrictions. For example, to use Discovery within a DMZ (where communication from outside the DMZ will be severely restricted), install a MID Server on a computer that is already in the DMZ.

Credential spray

The MID Server uses its host's Windows Server Message Block (SMB) client and configuration to connect to other Windows machines. If Windows is configured to use legacy protocols, the connection is vulnerable to man-in-the-middle attacks that can result in weak password disclosure and remote code execution.

Use the following host configuration to limit the impact of an attacker with a man-in-the-middle vantage point:

- Ensure that SMB Signing is configured to be **Required** on the client MID Server to limit potential attacks on the integrity.
- Ensure that SMB Signing is required by all SMB servers within the environment.
- Use strong passwords to limit offline dictionary attacks if the host machine must support legacy authentication protocols such as NetNTLM.
- Use a unique account for each relevant host to limit the impact of compromised credentials on the end systems.

External connectivity requirements

These requirements are specifically for the use of MID Servers with the ServiceNow® Discovery and Orchestration products.

The MID Server communicates securely on port 443 to the instance and requires no inbound connections. In some cases, it might be necessary to allow this communication through the firewall if the MID Server fails to register on the instance. To determine if the application or a network security restriction is to blame for connection failure, attempt to telnet to the instance on port 443 from the server that is hosting the MID Server application. If this connection fails, then the problem could be a web proxy (since 443 is an https connection) or a Firewall rule preventing external TCP connections from that host. Contact network security personnel for the proxy information to add to the config.xml file, or request that the firewall be configured to allow access using one of the following syntaxes:

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- `<source IP> to <any>`
- `<source IP> to <ServiceNow> any established`
- `<source IP> to <instance_name.service-now.com> 443`

Important:
The MID Server host computer must have access to the ServiceNow download site at `install.service-now.com` to upgrade automatically. If you have a self-hosted ServiceNow environment that blocks access to the download site, you must import the MID Server installer package into your MID Server hosts manually. For instructions, see KB0760123 in the Self-Hosted knowledge base.

Internal connectivity requirements

These methods are used for discovering various devices on a network and are specifically for the use of MID Servers with the Discovery and Orchestration products.

- **SSH**: For UNIX-like machines, Discovery and Orchestration use SSH protocol, version 2 to access target machines. SSH is a network protocol that allows data to be exchanged using a secure channel between two networked devices. SSH communicates on port 22 within an encrypted datastream and requires a login to access the targets using two available methods of authentication: a user name and password combination and a user name and shared private key. Specify SSH authentication information and type in the **Credentials** module. If multiple credentials are entered, the platform tries one after the other until a successful connection is established or all are ultimately denied. To provide for application relationships a limited number of SUDO commands must be available to be run. Additional details to these requirements can be found in UNIX/Linux commands requiring root privileges for Discovery and Orchestration.
- **WMI**: For Windows machines, Discovery uses the Windows Management Instrumentation (WMI) interface to query devices. Due to security restrictions for WMI, the MID Server application executing the WMI queries must run as a domain user with local (target) administrator privileges. When Discovery detects activity on port 135, it launches a WMI query. The response from the Windows device is sent over a Distributed Component Object Model (DCOM) port configured for WMI on Windows machines. This can be any port. Ensure that the MID Server application host machine has access to the targets on all ports due to the unique nature of the WMI requirements.
- **Windows PowerShell**: PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications. Orchestration uses PowerShell to run Workflow activities on Windows machines. PowerShell must be installed on any MID Server that executes these activities. MID Servers using PowerShell must be installed on a supported Windows operating system. ServiceNow supports PowerShell 3.0 to 5.1. Orchestration activities for PowerShell require a credentials **Type** of Windows.
- **SNMP - Network**: For network devices, Discovery uses an SNMP scan to get device specific MIBs and OIDs. SNMP is a common protocol used on most routers, switches, printers, load balancers and various other network enabled devices. Use a community string (password) for authentication when scanning a device via SNMP. Many devices have a default community string of **public** which Discovery uses by default when querying a target. Define additional community strings in the SNMP credentials form which are tried in succession, along with **public**, until a successful query returns. In addition to the credentials, the platform also requires the ability to make SNMP requests on port 161 from the MID Server to the target. If Access Control Lists (ACLs) are in place to control the IP addresses that can make these queries, ensure that the IP address of the MID Server is in the ACL. Discovery supports SNMP versions 1, 2c, and 3.

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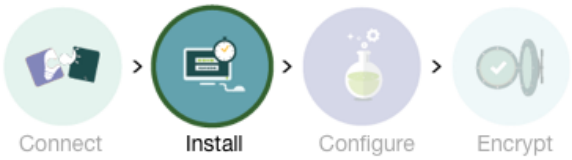
- **WBEM:** Web-Based Enterprise Management (WBEM) defines a particular implementation of the Common Information Model (CIM), including protocols for discovering and accessing each CIM implementation. WBEM requires either of two ports, 5989 or 5988 and uses the HTTP transport protocol. WBEM supports SSL encryption and uses CIM user name/password credentials. Discovery launches a WBEM port probe to detect activity on the target ports and to append gathered data to a classification probe that explores CIM Servers.

Installing the MID Server

Download and install the MID Server on the host machine, test the connection, and then validate the MID Server. Use the manual procedures or the guided setup. Set up multiple MID Servers for load balancing and domain separation. These procedures prepare it for use with any application.



1. Ensure that the MID Server can connect to elements inside and outside your network
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3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Prerequisites: Ensure the MID Server system requirements and MID Server connection prerequisites are met before you install the MID Server manually or use the guided setup utility.

MID Server manual installation

The manual process requires these setup tasks, performed in the order shown here:

1. Create the MID Server user account and grant the appropriate role to this user.
2. Download the installer file for the host machine.
3. Install the MID Server on a Linux or Windows host.
4. Validate the MID Server to ensure that it is trusted to access credentials used by the instance for automations.
5. Test connectivity between the MID Server and the instance for automatic upgrades.
6. Optionally, deploy multiple MID Servers in your network for load balancing or when domain separation is enabled.

MID Server guided setup

Alternatively, the MID Server Guided Setup streamlines the process and allows you to set up a basic MID Server quickly.

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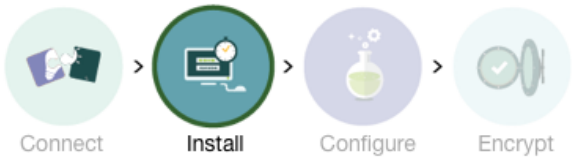
Create the MID Server user and grant the role

To communicate with the instance, MID Servers need a user ID and the appropriate role. Create the user ID for a MID Server and grant the ID the **mid_server** role. To prevent MID Server validation failure, the system runs business rules to monitor the settings selected for MID Server users.

Before you begin

Role required: admin



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7. Configure your MID Server
8. Configure MID Server security

About this task

The MID Server connects to an instance by using the SOAP web service. To allow authentication with the instance, create a separate user account for each MID Server or share the same account across multiple MID Servers. Grant each MID Server user the mid_server role, which is required for the MID Server user on any instance on which basic authentication is enabled. The mid_server role allows the MID Server to access protected tables when strict SOAP security is in place. The system adds the necessary SOAP roles automatically with this role.

Note:
The strict SOAP security feature, enabled by default for any instance that uses basic authentication, protects all tables with Access Control Lists (ACL).

If multiple MID Servers are using the same logged in user, an issue record is created when more than one is **Up** at a time. It is recommended that MID Servers use a unique logged in user. See (KB1552863) MID Server Unique Logged In User for more information and remediation steps.

Important:
Improve security by using MID Server mutual authentication instead of basic authentication. See Enable MID Server mutual authentication for more information.

Procedure

1. From the instance, navigate to **User Administration** > **Users**.
2. Click **New**.
3. Complete the fields in the form.

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Field	Description
User ID	User name for the MID Server user. This name is specified in the *mid.instance.username* parameter of the configuration file that the MID Server installer creates. For details, see MID Server parameters. **Note:** Avoid using the same MID Server logged in user across multiple MID Servers.
First name	The user's first name.
Last name	The user's last name.
Password	Password for the MID Server user. This password is specified in the *mid.instance.password* parameter of the configuration file that the MID Server installer creates.
Web service access only	Check this box if you are using basic authentication. The web_service_access_only field is used to restrict user access to the ServiceNow instance, ensuring that a user can only interact with the platform through web services (REST or SOAP APIs) rather than the user interface. When this field is set to true for a user with the mid_server role, it prevents that user from logging into the ServiceNow UI, which is crucial for security and proper MID server operations.

4. Right-click the header and select **Save**.
5. Under the **Roles** related list, click **Edit**.
6. Select the **mid_server** role for this user.
   Each MID Server account must have this role to access protected tables.
7. Click **Save**.
8. Confirm that the MID Server account was created successfully and the account has connectivity to the instance.

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a. On the host machine where you intend to install the MID Server, open a browser and navigate to the instance.

b. Use your new MID Server user credentials to log in.
If the login is successful, then any MID Servers you install on that host will be able to connect to the instance.

MID Server role validation

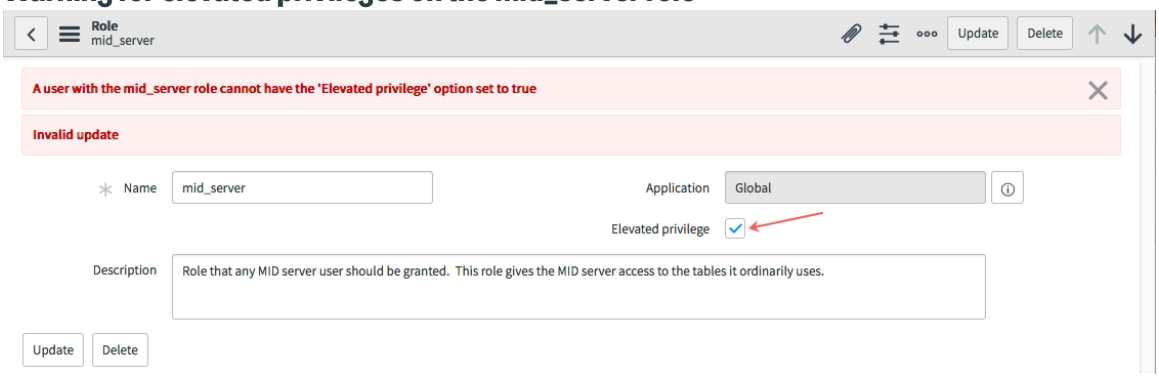
Real-time system validation of MID Server role assignments prevents incompatible settings.

To prevent MID Server validation failure and ensure that your MID Server is configured correctly, the system runs several business rules that monitor the roles and settings you select for your MID Server user. The instance displays a warning and blocks the change when you attempt to save an incompatible configuration.

Elevated privileges not permitted

The mid_server role cannot be configured for elevated privileges. The **Invalid MID Server settings** business rule runs on the Role [sys_user_role] table and prevents the **elevated_privileges** field from being set to true for the mid_server role.

Warning for elevated privileges on the mid_server role



Relationship table protection

The User Role [sys_user_has_role] table creates the relationship between the User [sys_user] and the Role [sys_user_role] tables.

- **Incompatible role**

  The mid_server and security_admin roles are incompatible and cannot be assigned to the same user. The system determines the user's current role and runs the **Security Admin incompatible with MID** business rule on the User Role [sys_user_has_role] table. This rule prevents an administrator from adding the security_admin role for a user who currently has the mid_server role.

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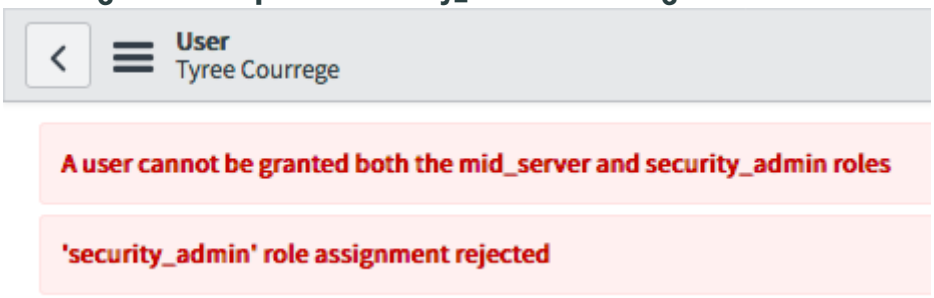
Warnings for incompatible security_admin role assignment



- **Incompatible user role and user record settings**

  The **Incompatible MID Server user role** business rule runs on the User Role [sys_user_has_role] table to protect its data from incompatible configurations. Validation for this related table ensures that an administrator cannot assign the mid_server role to a user who already holds the security_admin role.

What to do next

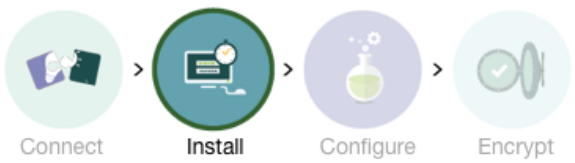
Download the MID Server files for your operating system.

Download the MID Server files

Download the MID Server installer package through the instance and make it available for installation on the host. Allow the local network to access the authorized IP addresses to ensure that you can download the installation package and receive automatic upgrades.

Before you begin

Role required: admin



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8. Configure MID Server security

About this task

The IP address of the MID Server download site (`install.service-now.com`) can change without notice. To ensure that you can download the MID Server installation package and receive automatic MID Server upgrades, allow local network access to these IP addresses:

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- 149.96.5.98
- 149.96.6.98

A maint user can change the MID Server download site URL with the MID Server system property **mid.install_server.base_uri**. The MID Server downloads the update files from the new URL instead. Users with closed environments can direct MID Servers to update through hosts in their environment. See MID Server properties and [KB1546609] Configure Custom MID server Upgrade URL for more information.

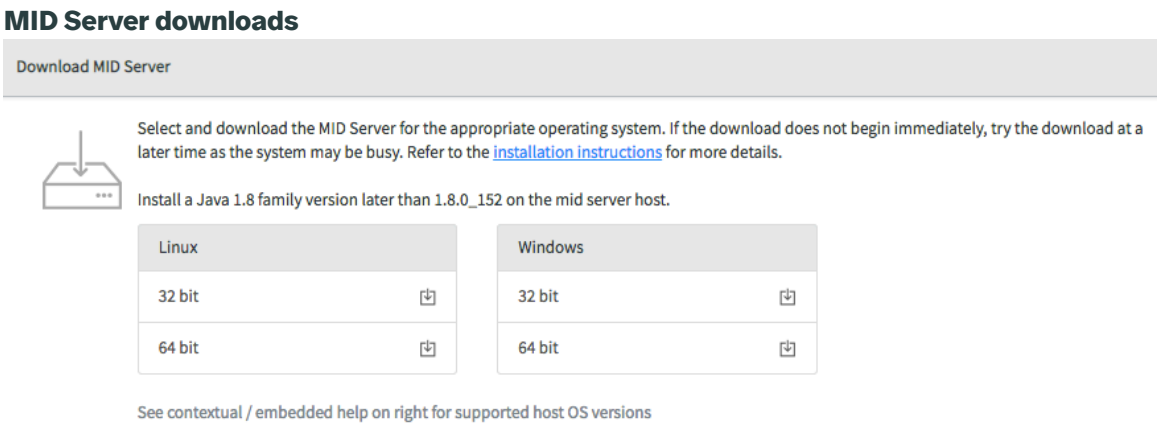
Note:
Download the MID Server first and then enable Discovery, Orchestration, or any integration that requires the use of the MID Server.

Procedure

1. On the ServiceNow instance, navigate to **Mid Server** > **Downloads**.
2. Select and download the MID Server for the appropriate operating system.
   For the best performance, install the 64-bit MID Server for your operating system.

   Note:
   ServiceNow no longer supports new installations of 32-bit MID Servers or upgrades to version Rome. New MID Server installation are blocked through RPM and MSI installer on the following operating systems:
   - CentOS 7
   - Windows server 2008
   - Windows server 2008 R2
   - Windows 8
   - Windows 10

   MID Servers can be manually installed to any operating system with the ZIP file, however Windows 10 is unsupported. Unsupported MID Servers auto-upgrading to Rome create an issue record in MID Server Issues (ecc_agent_issue). For more information, see Supported platform changes for MID Server [KB0863694].



3. Save the download file to a temporary file on the local drive.
4. Move the file into the designated MID Server folder you create for your operating system and run the installer from that location.

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What to do next

You can manually verify the signature of an installation package with the jarsigner tool to ensure its authenticity. For more information about verifying the signature, see the MID Server upgrades section on manual verification.

Install the MID Server on the host computer.

- Linux
- Windows

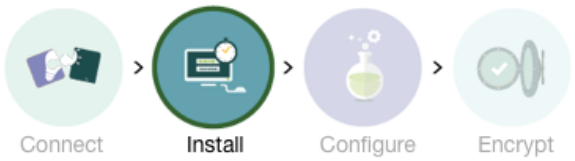
Install a MID Server on Linux

Install MID Servers with the MID Server installer and verify it is active. The package includes an installer that automatically configures JRE to run in the environment. The MID Server can use an existing JRE rather than the provided JRE. Uninstall the MID Server to redeploy it.

Before you begin

Verify that the host computer satisfies the MID Server system requirements.

Role required: admin, mid_server



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About this task

To install Linux on MID Server, the RedHat/CentOS systems require RPM while Debian (Ubuntu) systems require DEB. The default installation location is `/opt/servicenow/mid`. Installing DEB in user defined directories is not supported.

To improve security, this procedure installs and run the MID Server service as a non-root user. Root privilege is required to deploy and configure a MID Server on a Linux server. A non-root user can manage a service only if they have the required permissions. For more details, see PolicyKit issues with Linux MID Servers using non-admin accounts [KB0815542].

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Note:
ServiceNow no longer supports new installations of 32-bit MID Servers or upgrades to version Rome. New MID Server installation are blocked through RPM and MSI installer on the following operating systems:

- CentOS 7
- Windows server 2008
- Windows server 2008 R2
- Windows 8
- Windows 10

MID Servers can be manually installed to any operating system with the ZIP file, however Windows 10 is unsupported. Unsupported MID Servers auto-upgrading to Rome create an issue record in MID Server Issues (ecc_agent_issue). For more information, see Supported platform changes for MID Server [KB0863694].

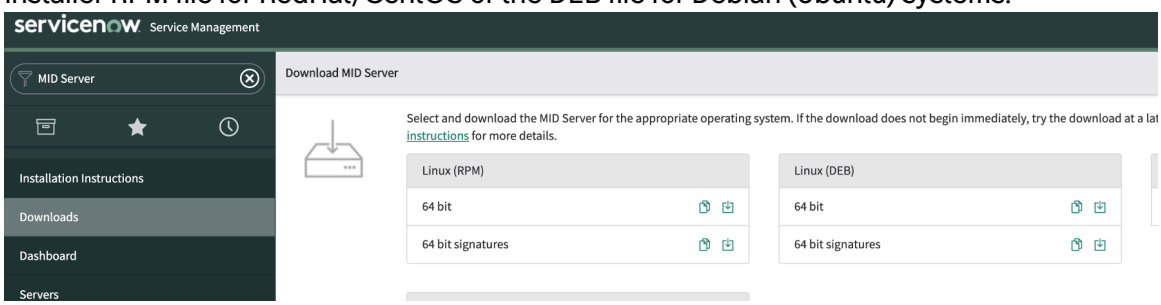
Java 11.0.17 is bundled with the MID Server installer package and is installed on the host for all new MID Servers. The installer automatically configures Java 11.0.17 to run in your environment. No additional configuration is required. This version supports both 64-bit Windows MID Servers and 64-bit Linux MID Servers. The MID Server requires a minimum JRE version 11.0.8, and recommended version 11.0.17. If you are using a lower version than 11.0.8, you may see encryption related issues.

Note:
Linux MID Servers require glibC version 2.17. The library must be updated for JRE 11. On 64-bit Linux systems, you must install the 32-bit GNU C library (glibc). The installation command for CentOS is: `yum install glibc.i686`

Testing showed that the MID Server works as expected with Oracle Java 11 version 11.0.5. If you need to upgrade the JRE to a different version, then coordinate with the appropriate account representative for support.

Procedure

1. On the instance, navigate to **MID Server** > **Downloads** and download either the MID Server installer RPM file for RedHat/CentOS or the DEB file for Debian (Ubuntu) systems.



Note:
Use the copy link button to copy the download link and use the following `wget` command to directly download the installers in Linux machines.

```
wget <copied link of the installer>
```

2. **Optional:** Manually verify the authenticity and integrity of the downloaded file.

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a. Download the signature ZIP files for RPM/DEB.

b. Run the following commands for either RPM or DEB.

(Optional) **RPM**

- Extract the public key, `ServiceNow_Digicert_DGST.pem`, and signature file from the downloaded signature zip file.
- Run the following command to verify the signature of the RPM file.

```
openssl dgst -sha256 -verify <Extracted .pem file>
 -signature <Extracted bin file path> <RPM file path>
```

DEB

- Extract the public key, `ServiceNow_Digicert_Public.gpg`, from the downloaded signature zip files.
- Import the public key and verify the signature of the DEB file with the following commands.

```
gpg --import <public key>
dpkg-sig --verify <DEB file path>
```

3. Use the following commands to install either the RPM or DEB installer:

RPM

- Install the RPM package for RedHat systems with the following command:

```
sudo rpm -ivh --nodeps package_name.rpm.
```

- Install the RPM package for RedHat systems in a user defined location with the following command:

```
sudo rpm -ivh --nodeps package_name.rmp
 --prefix=/path/to/user/directory.
```

DEB

Install the DEB package for Debian systems with the following command:

```
sudo dpkg -i package_name.deb.
```

4. To configure the MID Server service, run the following command from the agent folder as a user with root privilege and provide the required inputs.

```
./installer.sh
```

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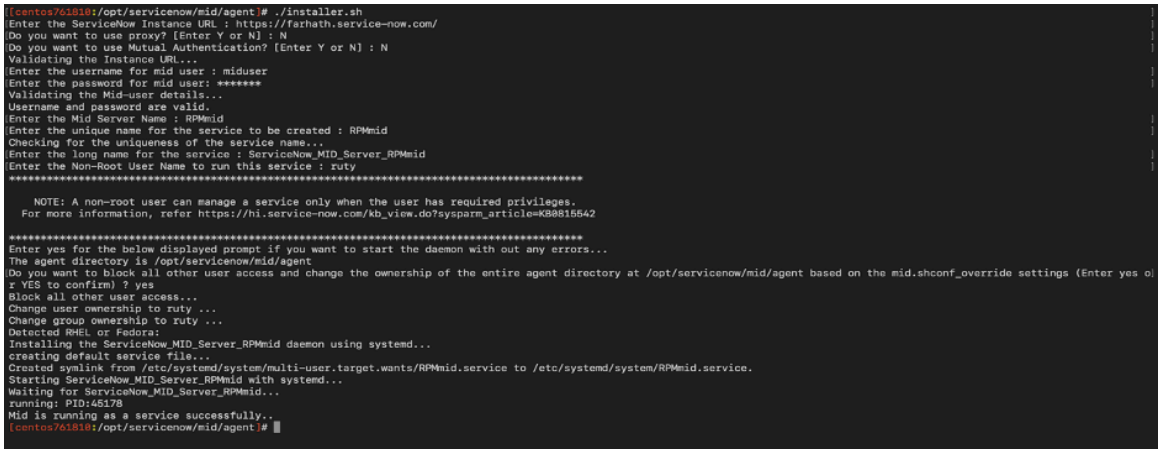

5. The **installer.sh** script takes the following inputs.

   Instance URL

   Enter the full URL of your instance, for example: `https://mycompanyinstace.service-now.com`

   MID-Server Username

   Enter the user name of the MID Server user that you already created. The MID Server user must have the mid_server role.

   MID-Server Password

   Set the password for the current MID Server user.

   MID-Server Name

   Set the name of the MID Server.

   Proxy Server Information (optional).

   mid.proxy.use_proxy

   Enables the MID Server to use a web proxy to access the ServiceNow instance.

   mid.proxy.host

   Set this parameter to define the web proxy's host.

   mid.proxy.port

   Set this parameter to define the web proxy's port.

   mid.proxy.username

   If the web proxy requires a user name, set this parameter to define that username.

   mid.proxy.password

   If the web proxy requires a password, set this parameter to define that password.

   The MID Server can bypass proxy servers whose DNS/IP address is listed in the configuration parameter **mid.cloud.discovery.proxy.exclusion.list**. See MID Server property for more information.

   To run a MID Server as a daemon service, the following properties are also required.

   app_name

   Set a unique name for the current MID Server

   app_long_name

   Set a unique long name for the MID Server.

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run_as_user

Set the username to run the service as a non-root user.

Result

Once all the inputs are entered, the MID Server automatically runs as a daemon service and starts the service.

Linux MID Server silent installation

Silently installing the MID Server uses predefined parameters and requires no user input after it is initiated. You can use silent installation on several machines at once to quickly set up a network and to ensure all MID Servers have the same installation settings.

To perform a silent installation with the Linux installer, run the following command:

```
./installer.sh -silent -INSTANCE_URL
 https://instance_name.service-now.com -MUTUAL_AUTH
 N -MID_USERNAME username -MID_PASSWORD password
 -USE_PROXY N -MID_NAME mid -APP_NAME mid -APP_LONG_NAME
 ServiceNow_MID_Server_Mid -NON_ROOT_USER nonrootuser
```

The following fields can be passed through the command line:

INSTANCE_URL

Enter the URL of your instance, for example: `https://mycompanyinstance.service-now.com`

MUTUAL_AUTH

Set this value to Y to use mutual authentication instead of basic authentication. Otherwise, set it to N.

> **Note:**
> If **MUTUAL_AUTH** = Y then provide the path to the certificate with **CERTIFICATE_PATH**.

CERTIFICATE_PATH

If mutual authentication is enabled, provide the path to the certificate.

MID_USERNAME

Enter the user name of the MID Server user that you already created. The MID Server user must have the mid_server role.

MID_PASSWORD

Enter the password for the user.

USE_PROXY

Set this value to Y if your MID Server communicates through a proxy to connect to the instance.

> **Note:**
> If **USE_PROXY** = N then skip the other proxy details.

PROXY_HOST

Enter the proxy server host name or IP address. Do not include the protocol in the host name. For example: `proxyserver.domain.com` is correct, but `https://proxyserver.domain.com` is incorrect.

PROXY_PORT

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Enter the port the proxy server uses to communicate. If this value is blank, the installer uses the proxy server's default port number.

PROXY_USERNAME

Enter the username that has administrator rights to the proxy server.

PROXY_PASSWORD

Enter the password for the username.

MID_NAME

Enter the MID Server name.

APP_NAME

Provide the service name. It must be unique for the current MID Server.

APP_LONG_NAME

Provide the service long name.

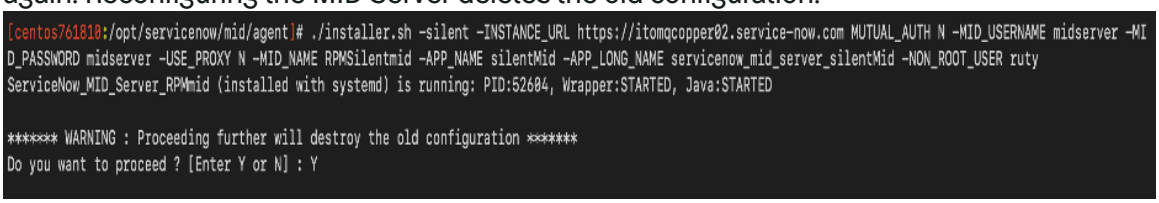
NON_ROOT_USER

Provide the username to run the service as a non-root user.

The following is an example command for a MID Server which uses a proxy and mutual authentication:

```
./installer.sh -silent -INSTANCE_URL
https://instance_name.service-now.com MUTUAL_AUTH Y
–CERTIFICATE_PATH <path-to-certificate> -USE_PROXY Y
-PROXY_HOST <ip> -PROXY_PORT <port> -PROXY_USERNAME <username>
-PROXY_PASSWORD <password> -MID_NAME proxymid -APP_NAME
proxymid -APP_LONG_NAME servicenow_proxy_mid -NON_ROOT_USER
nonrootuser
```

Note:
To reconfigure the MID Server, run the `installer.sh` command again. Reconfiguring the MID Server deletes the old configuration.



Run Linux MID Servers as non-root users

Run MID Servers as non-root user on a Linux machine to improve security. Multiple MID Server can be installed as services so they can start by themselves after system reboots.

Before you begin

Role required: root

This process is only applicable if you installed the MID Server manually using the ZIP file. If you installed the MID Server with the procedure in Install a MID Server on Linux, then the MID Server is already running as a non-root user.

Supported versions for this procedure are Linux Red Hat 6 or newer, Ubuntu 1404 or newer, and CentOS 6 or newer.

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Procedure

1. Stop any MID Server running on the host with the command **bin/mid.sh stop**.
2. Remove any MID Servers on the host with the command **bin/mid.sh remove**.
3. Edit the file `mid.shconf_override`.

```
########################################################################
# To put any changes into effect, re-install the service using the commands
# bin/mid.sh stop then bin/mid.sh remove followed by bin/mid.sh install
########################################################################

# Uncomment the lines below and set some name for the current MID server.
# This allows multiple MID Servers to run as a service on the same host.
#APP_NAME="this_mid_app_name"
#APP_LONG_NAME="this_mid_long_app_name"

# Put a username here to run the service as a non-root user.
# The specified user will be the owner of the entire agent directory.
# If left empty, the owner is unchanged.
RUN_AS_USER=

# Put a group name here that will be the group owner of the entire agent directory.
# If left empty, the group is unchanged.
GROUP_NAME=

# Set a flag to control whether the script will prompt for confirmation before
# changing the owner or group of the agent directory
PROMPT_BEFORE_OWNERSHIP_CHANGE=true
```

4. Add the MID Server's name using the lines **APP_NAME=** and **APP_LONG_NAME=** to run it as a service.
   To prevent errors, the **APP_NAME** of each MID Server must be unique.
5. **Optional:** To run multiple MID Servers as services on the same host, add an **APP_NAME** and **APP_LONG_NAME** for each instance.

```
[root@CentOS6 ~]# cat /opt/midservers/mid_centos6_1/bin/mid.shconf_override
APP_NAME="mid_centos6_1"
APP_LONG_NAME="ServiceNow MID Server MID_CENTOS6_1"

[root@CentOS6 ~]# cat /opt/midservers/mid_centos6_2/bin/mid.shconf_override
APP_NAME="mid_centos6_2"
APP_LONG_NAME="ServiceNow MID Server MID_CENTOS6_2"
```

6. Add the name of the non-root user to operate the account using the line **RUN_AS_USER=**.
7. **Optional:** Add the name of the group to own the entire agent directory using the line **GROUP_NAME=**.

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8. Set the line **PROMPT_BEFORE_OWNERSHIP_CHANGE=** to **true** to prompt the user for confirmation before any changes to file permissions are applied.
   The file permission change is applied to the entire agent folder and everything inside recursively. The changes include blocking other users' the access to the entire agent folder, changing the owner to **$RUN_AS_USER** if specified, and changing the group to **$GROUP_NAME** if specified.
9. Reinstall the MID Server with the command **bin/mid.sh install**.

Note:

To prevent errors, make sure to stop and remove any existing MID Server services before starting new ones. During the first installation, a root user is required to call **bin/mid.sh install**. Reinstalling the MID Server applies the changes in `mid.shconf_override`. Then the non-root user specified in `mid.shconf_override` is able to start/stop/restart the service without elevated privileges.

What to do next

For more information about managing the allow list and file permission enforcement, see File permission enforcement for Windows MID Servers. Running a Linux MID Server with a non-root account may result in issues with PolicyKit in some systems. See PolicyKit issues with Linux MID Servers using non-root accounts for more information.

Configure a Linux MID Server to use an existing JRE

You can choose to use an existing JRE for your MID Server rather than the OpenJDK provided with the MID Server installer.

Before you begin

Ensure that your JRE version is supported. See MID Server system requirements for details.

Role required: admin

About this task

By electing to use your own JRE, you are responsible for upgrading it as necessary. For a detailed procedure and cautions regarding changing the JRE, see KB0778272.

Procedure

1. Navigate to this file in the MID Server installation directory:
   `agent/conf/wrapper-override.conf`
2. To specify the existing Java executable that you want to use, add this line to the file:
   `wrapper.java.command=`{your_java_executable}

   For more information, see the Java service wrapper property documentation.
3. Save the file.

Uninstall a Linux MID Server

The MID Server runs as a stand-alone service. You can remove a stand-alone MID Server service to accommodate such tasks as redeploying the MID Server to another host machine or changing the unique name of a MID Server when deploying multiple MID Servers.

Before you begin

Role required: admin

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Procedure

Run the **uninstall.sh** script in the agent folder to remove the service and uninstall the RPM/DEB.

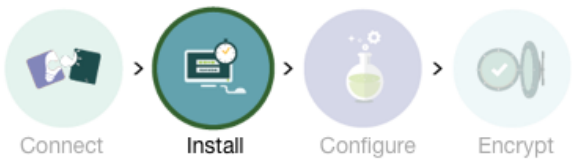
```
[centos761810:/opt/servicenow/mid/agent]# ./uninstall.sh
Uninstalling MID Server RPM package : agent-19.itomqcopper.0.268-172.el7.x86_64
Preparing packages...
Running 'mid.sh remove' to uninstall MID server
Detected RHEL or Fedora:
Stopping servicenow_mid_server_silentMid...
Waiting for servicenow_mid_server_silentMid to exit...
Stopped servicenow_mid_server_silentMid.
Removing servicenow_mid_server_silentMid daemon from systemd...
Removed symlink /etc/systemd/system/multi-user.target.wants/silentMid.service.
agent-19.itomqcopper.0.268-172.el7.x86_64
[centos761810:/opt/servicenow/mid/agent]#
```

Result
The MID Server service is uninstalled.

What to do next
Validate the MID Server to prepare it for use.

Install a MID Server on Windows

Install MID Servers with the MID Server guided Windows installation package. The package includes an installer that automatically configures OpenJDK to run in the environment. The MID Server can use an existing JRE rather than the provided OpenJDK. Uninstall the MID Server to redeploy it.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

- Verify that the host computer satisfies the MID Server system requirements.
- The MID Server requires the minimum PowerShell version 3.0 and supports versions up to PowerShell 5.1.
- Ensure that the Microsoft Application Experience Lookup Service is enabled on the MID Server host. If this service is disabled, the MID Server auto-upgrade might fail, causing the MID Server to go down. For information on managing issues with the Application Experience service, see KB0597552.

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Java 11.0.17 is bundled with the MID Server installer package and is installed on the host for all new MID Servers. The installer automatically configures Java 11.0.17 to run in your environment. No additional configuration is required. This version supports both 64-bit Windows MID Servers and 64-bit Linux MID Servers. The MID Server requires a minimum JRE version 11.0.8, and recommended version 11.0.17. If you are using a lower version than 11.0.8, you may see encryption related issues.

Note:
ServiceNow no longer supports new installations of 32-bit MID Servers or upgrades to version Rome. New MID Server installation are blocked through RPM and MSI installer on the following operating systems:

- CentOS 7
- Windows server 2008
- Windows server 2008 R2
- Windows 8
- Windows 10

MID Servers can be manually installed to any operating system with the ZIP file, however Windows 10 is unsupported. Unsupported MID Servers auto-upgrading to Rome create an issue record in MID Server Issues (ecc_agent_issue). For more information, see Supported platform changes for MID Server [KB0863694].

Testing showed that the MID Server works as expected with Oracle Java 11 version 11.0.5. If you need to upgrade the JRE to a different version, then coordinate with the appropriate account representative for support.

Upgraded MID Servers might use different Java versions depending on their operating system versions.

- MID Servers upgraded from earlier versions use the OpenJDK provided with the MID Server installer. This version of the OpenJDK was tested and certified for use with these MID Servers.
- MID Servers upgraded on any other operating system versions also automatically upgrade the JRE to the version provided with the installation package.

Install a MID Server on Windows with guided installation

Install MID Servers with the MID Server guided Windows installation package. The package includes an installer that automatically configures OpenJDK to run in the environment.

Before you begin
Role required: admin or mid_server

About this task
The MID Server guided native Windows installer will configure the MID Server with provided settings. The installer creates the MID Server Service and assigns it to the provided user. The installer sets the file permissions on the MID Server Install folder. The installer allows for the configuration of proxy settings. Optionally, the installer can start the MID Server automatically.

Procedure

1. On the instance, download the MID Server installation .msi file from **MID Server** > **Download**.
2. Log in to the Windows host machine where you want to install the MID Server.
3. Place the installer .msi on the desired MID Server host.
4. Open the installer with Administrator level privileges.

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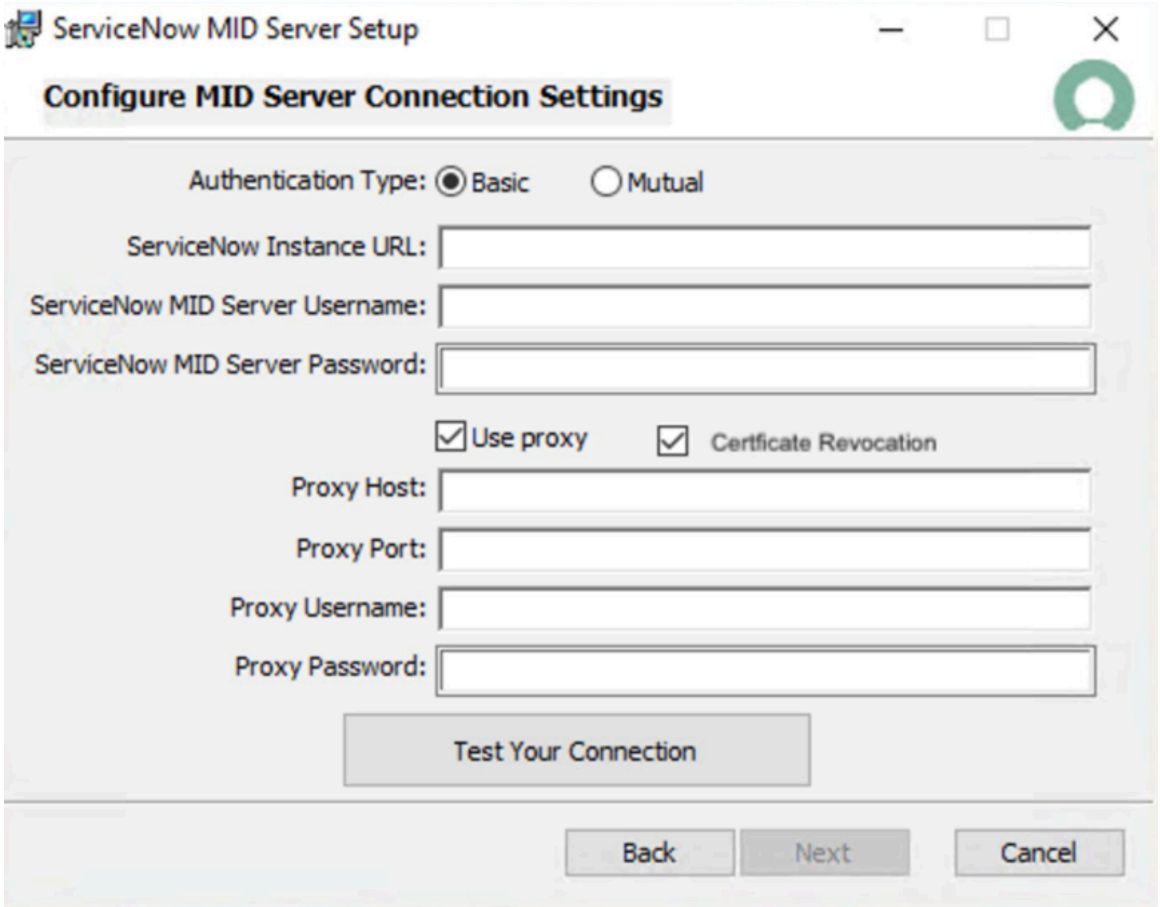
5. Use the installer to enter the following information.



Field	Description
Authentication Type	**Basic** Username and password based authentication. **Mutual** Client certificate based authentication. See MID Server unified key store for more information on mutual authentication. **Note:** Selecting mutual authentication disables the MID Server username and password fields. The disabled fields are not written to **config.xml**.
ServiceNow instance URL	Enter the full URL of your instance, for example:

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Field	Description
	`https://mycompanyinstace.service-now.com`
ServiceNow MID Server username	Enter the name of the MID Server user that you already created. The MID Server user must have the mid_server role.
ServiceNow MID Server password	Enter the password for the user in the **ServiceNow MID Server username**.
Certificate Revocation	This check box is selected by default to enable certificate revocation policies to improve security. For more information on certificate revocation, see MID Server certificate check policies. When testing a connection with certificate revocation enabled, the installer checks if OCSP port 80 is open and the entrust page is accessible. If the connection test fails due to the certificate revocation check, the error must either be corrected and re-tested or the certificate revocation check must be disabled. The certificate revocation check is not required for successful installation.
Use proxy	Select this check box if your MID Server communicates through a proxy to connect to the instance. **Note:** Your proxy server must use Basic Authentication for the MID server to connect to the instance. The MID Server can bypass proxy servers whose DNS/IP address is listed in the configuration parameter **mid.cloud.discovery.proxy.exclusion.list**. See MID Server property for more information.
Proxy host	Enter the proxy server host name or IP address. Do not include the protocol in the host name. For example, enter `proxyserver.domain.com`, not `https://proxyserver.domain.com`.
Proxy port	Enter the port through which the proxy server communicates. If you leave this field blank, it should use the proxy server's default port number.

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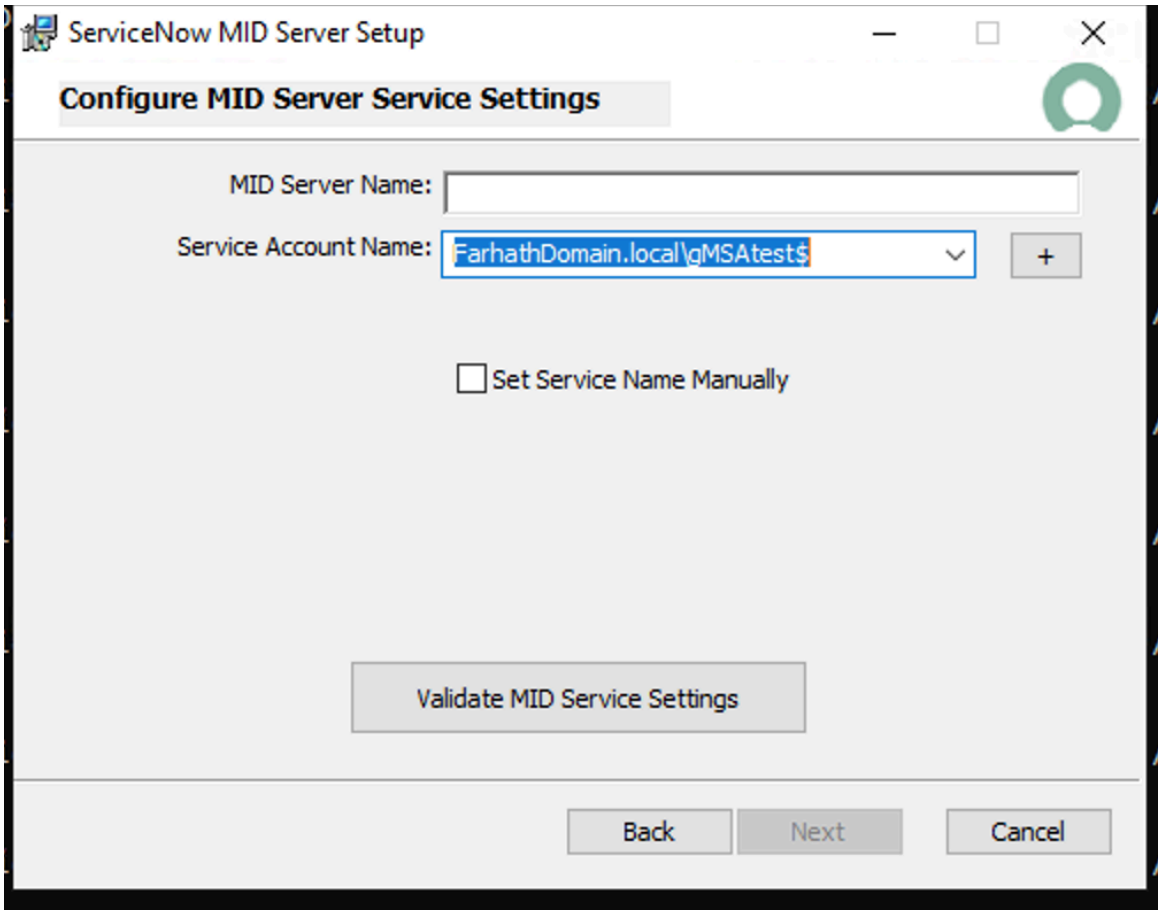
Field	Description
Proxy username	Enter the user name that has administrator rights to the proxy server.
Proxy password	Enter the password for the user name.

6. Click **Test your connection** to validate the credentials and instance information.
   If you encounter any errors, verify the information that you input.
7. Click **Next**.
8. Configure the MID Server name and Service Account parameters (see table).



Field	Description
MID Server name	Enter a MID Server name. **Warning:** MID Server names cannot begin with **mid.server**.
Service Account Name	Username of the service account that will be used to run the MID Server service. For information on creating service accounts, see Create a Windows service account with "Log on as Service" [KB0867669].

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Field	Description
	Service Account Name field is an editable drop-down menu. Either select a value from the drop-down or type a new value in the text field. Only the accounts with *`log on as service`* policy are displayed in the drop-down. Group Managed Service Accounts (gMSA) that inherit the *`log on as service`* policy from their groups are not displayed in the drop-down. However, you can install the MID Server service using those accounts by manually entering the service account name in the editable drop-down. The name can follow three formats. **a.** If the service account is local to the computer, you can give just the name. Example: My_Local_Service_Account **b.** If the service account is local to the computer, you can provide "." as the domain name for the account. Example: .\My_Local_Service_Account **c.** Any account can follow the format {domain}\{username}. Example: MY-COMPUTER-DOMAIN \My_Domain_Service_Account Add a new local service account by selecting the **+** button. This button opens the **Configure New Local User** window, which has three fields. ○ **Service Account Name:** Enter the name of the new service account. ○ **Service Account Password:** Enter the password of the new service account. ○ **Re-enter Password:** Confirm the password of the new service account. When a group Managed Service Account (gMSA) user is selected, the password field is removed because passwords for gMSA users are managed by the Active Directory.

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Field	Description
	Note: The provided service account credentials must meet the following requirements in addition to being a valid account. ○ The user cannot be a local system or an administrator level account (local admin, domain admin, etc.) ○ The service account provided has the *`log on as service`* right, which is required for an account to be used as the *`log on user`* for a service.
Service Account Password	Password of the service account that will be used to run the MID Server service.
Set Service Name Manually	Select this check box if you want to manual set the service name and display name for your MID Server. Note: Your proxy server must use Basic Authentication for the MID server to connect to the instance.
MID Service wrapper name	Modify this field if necessary. It is populated automatically by prefixing `snc_mid_` to the MID Server name. In most cases, you do not need to modify this.
MID Server wrapper display name	Modify this field if necessary. It is populated automatically by prefixing `ServiceNow MID Server_` to the MID Server name. In most cases, you do not need to modify this.

9. Click **Next** and select a destination folder for the installation.

   Users can manually enter an existing, valid file path, or use the “Change” button to open up a browsing page where they can choose the install location.

10. Click **Next** to view the summary.

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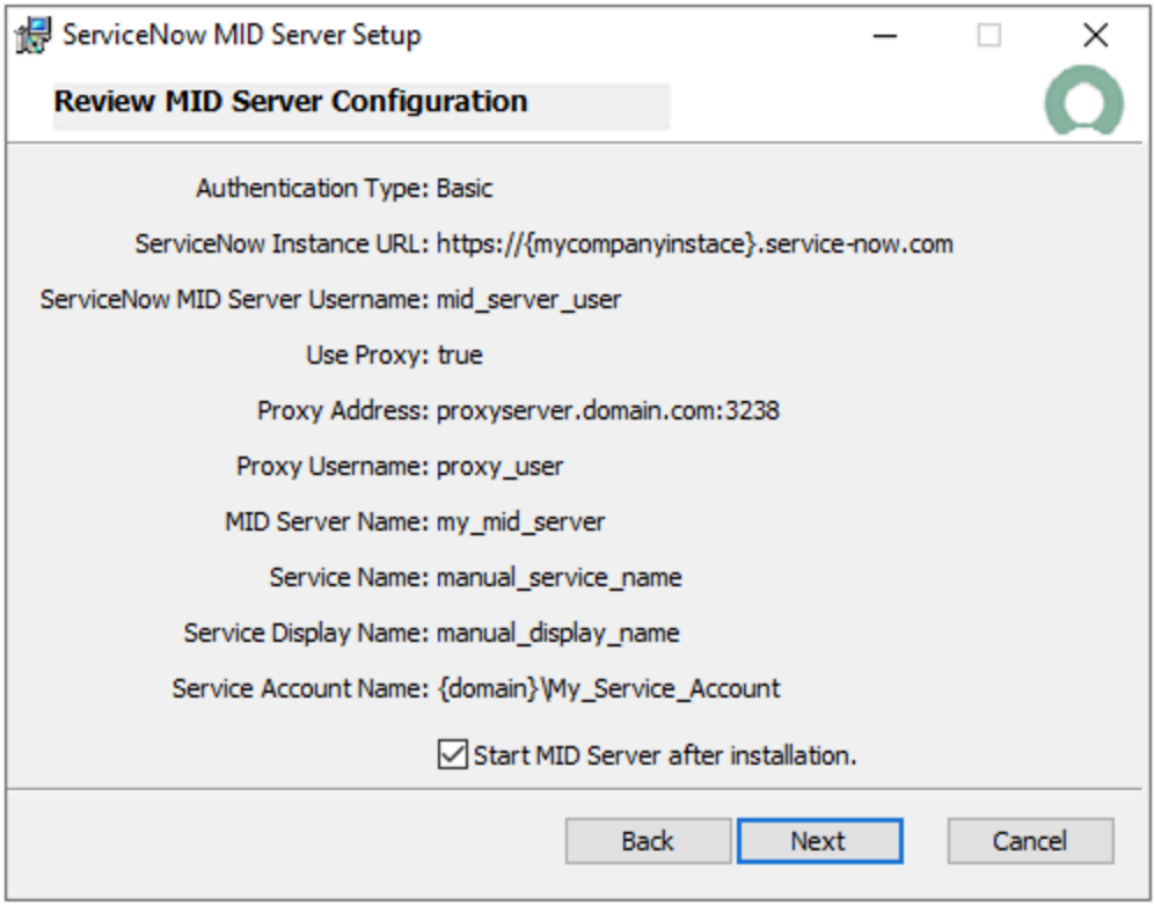

Select **Start MID Server after installation** if you want to start the MID Server immediately after installation. If you wish to make additional configuration changes, before starting the MID server, leave this box unchecked. If mutual authentication was selected, the MID Server username and password fields are removed.

Note:
If the MID Server fails to start, the cause might be a duplicate name or multiple services that point to the same executable path. This can happen when you have MID servers previously not installed through the installer. See MID Server fails to start for details.

11. Click **Mid Servers List Page**.
    The installer opens the MID Server list from your instance.
12. Select the MID Server name from the list.

Note:
It may take a few seconds for the MID Server time to establish a connection with your instance.

The system displays the MID Server record.

13. From **Related Links**, click **Validate**.
    The MID Server **Validated** changes to **Yes**.

What to do next

To upgrade the MID Server, see MID Server upgrades for procedures and requirements.

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Uninstall a Windows MID Server with the guided installer

The MID Server guided native Windows installer also supports guided uninstallation of the MID Server.

Before you begin

Role required: admin

There are three ways to uninstall a MID Server after installing it with the guided native Windows installer.

Procedure

1. On the MID Server host, navigate to the **Control Panel** > **Programs** > **Programs and Features** > **Uninstall a program**.
   a. Uninstall the program with the MID Server's name.
2. **Optional:** Alternatively, navigate to **Settings** > **Apps**
   a. Uninstall the program with the MID Server's name.
3. **Optional:** The MID Server can also be uninstalled with the silent uninstall script.
   This is useful for uninstalling multiple MID Servers. For more information, see Windows MID Server silent installation and uninstallation

Configure Windows MID Server service credentials

MID Server service credentials are required to manage the MID Server service on the host machine, including its ability to successfully auto-upgrade.

Before you begin

Role required: admin

About this task

If you installed the MID Server using the native installer, you will not need to complete this procedure. However, to change the service user after the installation for any reason, use this procedure.

Windows service credentials control the level of privilege on the device. The user should not be a local system or an administrator level account (local admin, domain admin, etc.) The service account provided should have the **log on as service** right, which is a requirement for an account to be used as the **log on user** for a service.

Note:

Windows service credentials are not the same as the MID Server user credentials, which allow communication between the MID Server and the instance. You must configure both of these credentials separately. See Create the MID Server user and grant the role for instructions on MID Server user credentials.

Procedure

1. Open the Windows Services console.
2. Double-click the `ServiceNow <MID Server name>` service for each MID Server.
3. Select the **Log On** tab.
4. Choose a non-admin user and provide the password for that user.
5. In the **General** tab, set the **Startup type**.
   The field is set to **Automatic** by default.
6. Click **OK**.

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7. Restart the ServiceNow <MID Server name> service, and make sure that ServiceNow\<MID Server name>\agent\logs\agent0.log does not have error messages.
   If the MID Server does not start, see the ServiceNow knowledge article Review the agent log for MID Server errors (article KB0535148).
8. On the instance to which this MID Server is connected, navigate to **MID Server** > **Servers**.

   If Discovery is installed, alternately navigate to **Discovery** > **MID Servers**. All MID Servers connected to this instance are listed.
9. Make sure that the Status of the MID Server that you just installed is **Up**.

Windows MID Server silent installation and uninstallation

Silently installing the MID Server uses predefined parameters and requires no user input after it is initiated. You can use silent installation on several machines at once to quickly set up a network and to ensure all MID Servers have the same installation settings.

MID Server silent installation

Note:
All silent install/uninstall commands must be run with administrator level privileges.

To silently install the MID Server on a Windows system, download the script attached to the Knowledge Base article Windows MID Server silent installation and uninstallation. Place the file on the target MID Server host machine and run the following command from the command prompt. You can also run the script directly from powershell.

```
powershell -command ".\SilentInstall.ps1 -<parameter_name1>
 '<value for parameter1>' -<parameter_name2> '<value for
 parameter2>' etc..."
```

The script checks the following mandatory parameters:

- *MSI_FILE_NAME*: the name of the MSI file used for the installation.
- *INSTALL_LOCATION* : the location to install the MID Server.
- *INSTANCE_URL*: the target ServiceNow instance the MID Server will connect to.
- *MID_USERNAME*: the instance account name.
- *MID_PASSWORD*: the instance account password.
- *MID_NAME*: the name of the MID Server.
- *SERVICE_ACCOUNT_NAME*: the name of the service account.
- *SERVICE_ACCOUNT_PASSWORD*: the password of the service account.

The following parameters are optional:

- *LOG_NAME*: enables logging and puts logs into the file named by this parameter.
- *START_MID*: sets the MID Server to start automatically after the installation finishes.
- *USE_PROXY*: enables the use of a proxy. If you choose this command, the following parameters become mandatory.
  - *PROXY_HOST*: the name of the proxy host.
  - *PROXY_PORT*: the port number of the proxy.
  - *PROXY_USERNAME*: the proxy username. If there is no username, input **''**.
  - *PROXY_PASSWORD*: the proxy password. If there is no password, input **''**.

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- *MANUAL_SERVICE_NAME*: the service name. If you choose this command, the following parameters become mandatory:
  - *SERVICE_NAME*: the service name.
  - *SERVICE_DISPLAY_NAME*: the service display name.
- *MUTUAL_AUTH*: enables mutual authentication. If this switch is enabled, *MID_USERNAME* and *MID_PASSWORD* are not required. See MID Server unified key store for more information.

Note:
The parameters *START_MID*, *USE_PROXY*, *MUTUAL_AUTH*, and *MANUAL_SERVICE_NAME* are switches. They use the format **-<switch_param_name>** and are not followed by a value.

After the script runs, verify the MID Server files, service, and entry in Programs and Features are installed. If you enabled logging, verify the log info in the file specified by the *LOG_NAME* parameter.

An example MID Server silent installation command:

```
powershell -command ".\SilentInstall.ps1 -MSI_FILE_NAME
 'MID-Installer.msi' -INSTALL_LOCATION 'C:\Users\Administrator'
 -INSTANCE_URL 'https://my-instance-name.service-now.com'
 -MID_USERNAME 'mid_server' -MID_PASSWORD 'mid_password'
 -MID_NAME 'Silent_Install_MID' -SERVICE_ACCOUNT_NAME
 'DOMAIN\My_Service_Account' -SERVICE_ACCOUNT_PASSWORD
 'Service_Account_Password' -LOG_NAME 'Silent_Install_Log.txt'"
```

An example command using the *START_MID* switch:

```
powershell -command ".\SilentInstall.ps1 -MSI_FILE_NAME
 'MID-Installer-Wix.msi' -INSTALL_LOCATION
 'C:\Users\Administrator' -INSTANCE_URL
 'https://my-instance-name.service-now.com' -MID_USERNAME
 'DOMAIN\My_Service_Account' -MID_PASSWORD 'mid_password'
 -MID_NAME 'Silent_Install_MID' -SERVICE_ACCOUNT_NAME
 'DOMAIN\My_Service_Account’ -SERVICE_ACCOUNT_PASSWORD
 'Service_Account_Password' -LOG_NAME 'Silent_Install_Log.txt'
 -START_MID"
```

MID Server silent uninstallation

To silently uninstall the MID Server on a Windows system, download the script attached to the Knowledge Base article Windows MID Server silent installation and uninstallation. Then run the script using the command prompt. It can also be run directly from powershell.

```
powershell -command “.\SilentUninstall.ps1 -MID_NAME ‘<value
 for MID_NAME>’ -LOG_NAME ‘<value for LOG_NAME>’”
```

The script requires the mandatory parameter *MID_NAME*, which is the name of the MID Server you want to uninstall.

The optional parameter *LOG_NAME* enables logging of the uninstallation and puts logs into the file named by this parameter.

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After the script runs, verify the MID Server files, service, and entry in Programs and Features are uninstalled. If you enabled logging, verify the log info in the file specified by the *LOG_NAME* parameter.

An example MID Server silent uninstall command:

```
powershell -command ".\SilentUninstall.ps1 -MID_NAME
 'silent_install_cmd' -LOG_NAME
      'uninstall.txt'"
```

Manually install a MID Server on Windows

Install MID Servers with the ZIP file installation package and verify it is active.

Before you begin

Role required: admin or mid_server

About this task

Click this link to view the installation video: Installing the MID Server on Linux

Procedure

1. Log in to the Windows host machine where you want to install the MID Server.
2. Create a folder for the MID Server on the top level of the drive such as `ServiceNow\MID Server1`.
3. Download the MID archive file into the new folder.
4. Right-click the archive and select **Extract All**.
5. Navigate to the `service-now\`<mid server name>`\agent` folder that was created when the file was extracted.
6. To configure the MID Server manually, edit the `config.xml` file with a text editor such as WordPad:

   a. Find the element *<parameter name="url" value="https://YOUR_INSTANCE.service-now.com" />* element and change the value to the URL of your instance.

   b. Enter the MID user credentials in the `mid.instance.username` and `mid.instance.password` parameters.
   By default, the MID Server, uses basic authentication for SOAP messages. The password value is also encrypted authentication.

   c. **Optional:** Find the *<parameter name="name" value="YOUR_MIDSERVER_NAME_GOES_HERE" />* element and change the value for the MID Server name.

   d. **Optional:** Enter connection information for the proxy server.
   Remove the appropriate comment tags from the proxy configuration information.

   Example
   For example, you can configure these parameters:

   - *mid.proxy.use_proxy*
   - *mid.proxy.host*
   - *mid.proxy.port*

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- *mid.proxy.username*
- *mid.proxy.password*

7. Run `start.bat` to start the MID Server.
8. On the instance, in the **Related Links**, select **Validate**.
   The MID Server **Validated** changes to **Yes**.

Run a Windows MID Server as a non-admin after manual installation

MID Servers can be configured to run using non-administrative accounts. Using non-admin accounts in conjunction with file permission enforcement can improve security by restricting access to MID Server files.

Before you begin

Role required: admin

Note:
In a future release, non-admin accounts will be mandatory for the MID Server, and support for using an administrative account will be deprecated.

This procedure is only for users who install the MID Server using the ZIP file. The Windows MID Server installer already requires the MID Server run as a non-admin user. As part of the MID Server installer's installation process, the access control lists for the MID Server folder are restricted to the following users and groups.

- System
- Administrator
- The configured service account

When installing using the ZIP file, install the MID Server on a Windows machine using an administrator account. Create a Windows user account without administrative privileges.

Running a MID Server with a non-admin account has limitations and changes the behavior of other applications. The following behavior changes can occur:

- The MID Server account needs appropriate credentials to run a Discovery schedule. If the credentials are insufficient, the MID Server falls back to the user account's privileges. A non-admin user account may not have the necessary privileges to access the Discovery target.
- Enhanced Application Dependency Mapping (ADME) and File Based Discovery (FBD) may not work by default. To correct this issue, non-admin users need to be given permission to read/write to the Admin Share folder.
- Non-admin accounts cannot initiate upgrade services in versions prior to the Orlando release.

Procedure

1. Run the MID Server service as LocalSystem or as a user with admin rights.
2. Create a file entitled `GrantStartStopPerm.ps1` with the following code.

```
Function GrantStartStopPerm
{
    Param( [string]$username, [string]$servicename )
    $user = New-Object
 System.Security.Principal.NTAccount($username)
    $sid =
 $user.Translate([System.Security.Principal.SecurityIdentifier]
).Value
```

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```
    Write-Output "Sid : $sid"

    $sd = sc.exe sdshow $servicename
    Write-Output "SD value   : $sd"

    if( !($sd -like "*$sid*") ){
        $permsToAdd = [string]::Format(")(A;;RPWPCR;;;{0})S:(",
 $sid);
        if($sd -match [regex]::Escape(")S:(")){
            $sd = $sd -replace
 [regex]::Escape(")S:("),"$permsToAdd"
            $result = sc.exe sdset $servicename $sd
            Write-Output "SD changed : $sd";
            Write-Output "Result : $result";
        }
    }else{
        Write-Output "Sid is already part of SD"
    }
}
```

3. Start the PowerShell console as an administrator.
4. Load the file by using the dot-source function from the `GrantStartStopPerm.ps1` file.
   For example: `C:\Users\mid_account\Desktop> . .\GrantStartStopPerm.ps1`
5. Run PowerShell sourced function with non-admin account and the service name as input.
   For example:

```
GrantStartStopPerm mid_account snc_mid_test
Output line expection in success :
Result : [SC] SetServiceObjectSecurity SUCCESS
```

6. Add the non-admin account name to the MID Server parameter *`mid.windows_host.file_permissions.allow_list`* in the MID Server host's `config.xml` file.
   This step adds the non-admin account to the allow list. See MID Server parameters for more information about *`mid.windows_host.file_permissions.allow_list`* as well as instructions for adding a parameter to the `config.xml` file.
7. Restart the MID Server.
   The new file permission enforcement rules take effect when the MID Server starts.
8. Switch the MID Server to the non-admin service account.
9. Restart the MID Server.

What to do next

For more information about managing the allow list and file permission enforcement, see File permission enforcement for Windows MID Servers.

Uninstall a Windows MID Server after manual installation

The MID Server runs as a stand-alone service. You can remove a stand-alone MID Server service to accommodate such tasks as redeploying the MID Server to another host machine or changing the unique name of a MID Server when deploying multiple MID Servers.

Before you begin

Role required: admin

This procedure is only for users who install the MID Server using the ZIP file.

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Procedure

1. Stop the running MID Server service, using either of these procedures:
   - **Windows command line**: From the MID Server home (`agent`) directory, run `stop.bat`.
   - **Windows Services console**: From the Windows Services console, right-click the **ServiceNow** *`MID Server name`* and then select **stop**.
2. From a command prompt, go to the `\agent\bin` directory in the MID Server installation directory and double-click the `UninstallMID-NT.bat` file.

What to do next

Validate the MID Server to prepare it for use.

Configure a MID Server on Windows to use an existing JRE

You can choose to use an existing JRE for your MID Server rather than the OpenJDK provided with the MID Server installer.

Before you begin

Ensure that your JRE version is supported. See MID Server system requirements for details.

Role required: admin

About this task

By electing to use your own JRE, you are responsible for upgrading it as necessary. For a detailed procedure and cautions regarding changing the JRE, see KB0778272.

Procedure

1. Navigate to this file in the MID Server installation directory:
   `agent/conf/wrapper-override.conf`
2. To specify the existing Java executable that you want to use, add this line to the file:
   `wrapper.java.command=`{your_java_executable}

   For more information, see the Java service wrapper property documentation.
3. Save the file.

Validate the MID Server

You must manually validate the MID Server after it is installed to enable it to execute automation tasks. You can invalidate a MID Server you suspect has been compromised to prevent it from accessing automation credentials in the instance or executing outbound ECC probes.

Before you begin

Role required: agent_admin, admin

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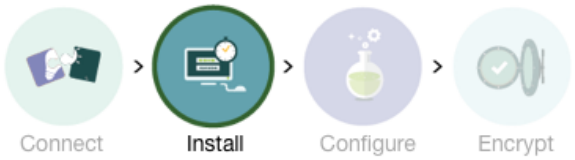

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
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Make sure that the MID Server version is compatible with the instance.

About this task

Validation restricts access to automation credentials to trusted MID servers only.

When you validate a MID Server, you specify the capabilities it can use, the applications that use it, and the IP ranges it is allowed to explore. You will be prompted to set the initial selection criteria when you validate MID Servers that do not already have capabilities, applications, or IP ranges already configured. You do not have to set the initial selection criteria to actually validate the MID Server. See MID Server selection for more information on capabilities, applications, and IP ranges.

Note:
When you upgrade, MID Servers that are already configured in your instance are automatically validated. This prevents the interruption of automation tasks that MID Servers might be performing. See MID Server upgrades for more information.

Procedure

1. Navigate to **All** > **MID Server** > **Servers**.
2. Open the new MID Server you created from the list of MID Servers.
3. Under **Related Links** click **Validate**.
   The Set Initial Selection Criteria window appears if there are no records in the Supported Applications, IP Ranges, or Capabilities related lists.
4. On the Set Initial Selection Criteria window, use the switches to enable or disable selection criteria for this MID Server:
   - **Allow ALL capabilities**: Allow all capabilities for Orchestration and Event Management to use this MID Server.

     Note:
     Service Mapping and Event Management alert aggregation and RCA, which used capabilities in previous releases, rely on the application for MID Server selection.

   - **Allow ALL applications**: Allow all applications that use MID Servers to use this MID Server.
   - **Allow ALL IP ranges**: Make all IP ranges valid for this MID Server, meaning that it can target any IP address.

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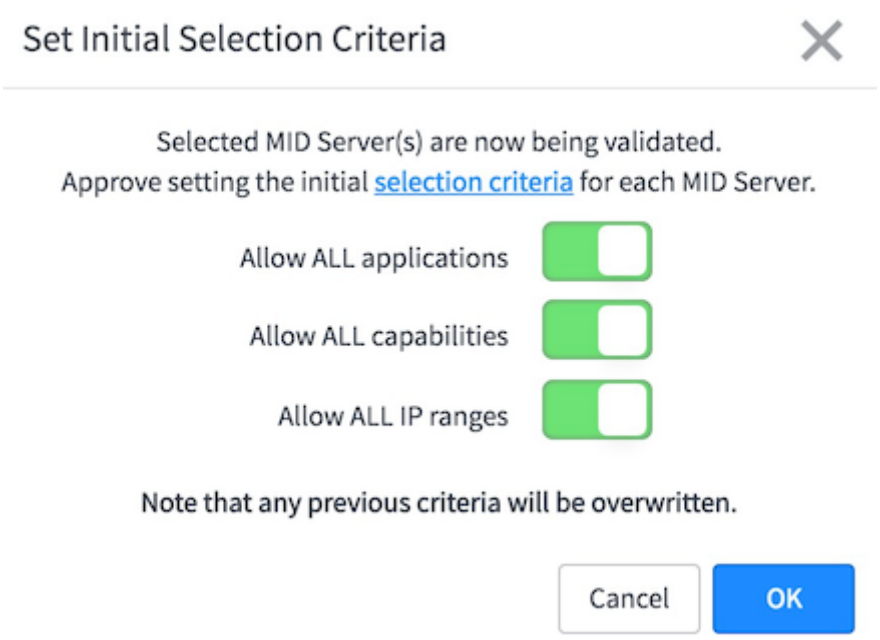
Setting initial selection criteria



If you click **Cancel**, the validation continues but none of the capabilities, applications, or IP ranges are added.

5. Click **OK**.

   The **Validated** field on the dashboard is set to **Validating**, and then set to **Yes** after the validation completes.

6. To invalidate a MID Server, open the record for the MID Server you suspect has a security issue.
7. Under **Related Links**, click **Invalidate**.
   Invalidating a MID Server forces it to clear its memory and restart. The MID Server generates a new keypair on restart.

What to do next

Test network connectivity to ensure that the MID Server can upgrade automatically.

Related topics

Rekey a MID Server

Test MID Server connectivity

Confirm that the MID Server host is able to communicate with the instance. Resolve any issues with the network connectivity such as conflicts with firewalls, access control lists, and routing errors. Successful communication is necessary for automatic upgrades.

Before you begin

Role required: admin

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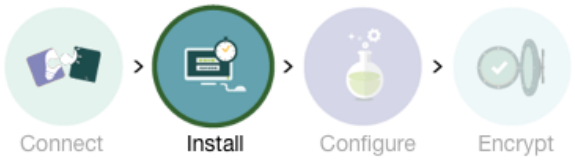

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6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

The computer that hosts the MID Server must be able to access one of these URLs to upgrade automatically:

- HTTPS: `https://install.service-now.com on the default HTTPS port (443)`
- HTTP: `http://install.service-now.com on the default HTTPS port (80)`

Procedure

1. Use PING to test connectivity with the host on the network (ping<host IP>).
2. If no ping response is returned, use TRACEROUTE to see where traffic might be stopped (traceroute<host>).
3. Use TELNET to connect to any of the TCP ports (telnet<host> <port>).
4. Use an SNMP scanning tool to determine if a potential network device is responsive.
5. Resolve the most likely issues around network connectivity:
   - *Routing:* Confirm that the MID Server host has network access to the IP ranges you are attempting to discover.
   - *Firewalls:* Confirm access to the physical firewalls that protect a large environment such as the Data Center. Confirm access to any logical firewalls that protect an individual computer. MID Server communications are initiated inside the firewall and therefore do not require any special firewall rules or VPNs.
   - *Access Control Lists (ACL):* Confirm that ACLs contain the IP addresses based list on SNMP network devices that allows communication to a particular target.
   - *Resolve all issues with your network teams to better understand your topology.* Deploy additional MID Servers if necessary to help keep your network secure. Configure access from your existing MID Server host to networking components.
6. Verify that the MID Server service is running on the host:
   - *Windows*: In the Windows Services console, locate the **ServiceNow [MID Server name]** and confirm that each MID Server has the **Started Status** value.
   - *Linux*: Ensure that the `agent0.log.0.lck` appears in the `/servicenow/ MID Server name]/agent` folder.

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7. After each MID Server restart, open the `agent0.log.0` and address all error messages.
8. From the ServiceNow instance, navigate to **MID Server** > **Servers**.
9. Review and verify that all MID Servers that are connected to the instance are listed.
10. Verify that the **Status** is **Up** for the MID Servers.

What to do next

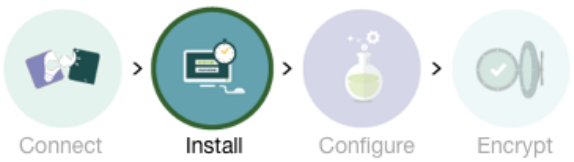
This concludes the installation of a single MID Server. If necessary, continue to deploy multiple MID Servers from a single host in your network. Otherwise, begin configuring your MID Server.

Install multiple MID Servers on a single system

Install multiple MID Servers on the same host computer. Multiple MID Servers can support each other with load balancing, as well as use domain separation. The number of MID Servers required is determined by factors like network policies, security restraints, and the reliability of the host computer.

Before you begin

Role required: admin, mid_server



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7. Configure your MID Server
8. Configure MID Server security

About this task

You can install multiple MID Servers on a Linux or Windows host or on a virtual machine. Installing multiple MID Servers may involve other setup steps depending on your network configuration.

> **Important:**
> Only one MID Server service can be a daemon on a Linux host. This is a limitation of the Tanuki wrapper service.

Procedure

1. Log in to the host system or virtual machine where you want to install multiple MID Servers.
2. Create a directory for each MID Server on the top level of the drive.

   Make sure you create a unique and descriptive name for each MID Server, such as MIDServer_SMS_Int or MIDServer_Disc1.

3. Extract the downloaded MID Server archive file into each MID Server directory.

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When the extract completes, there should be a directory path similar to the following for each MID Server: `ServiceNow<MID Server name>\agent`.

4. For each MID Server, run the installer appropriate to the host's operating system.

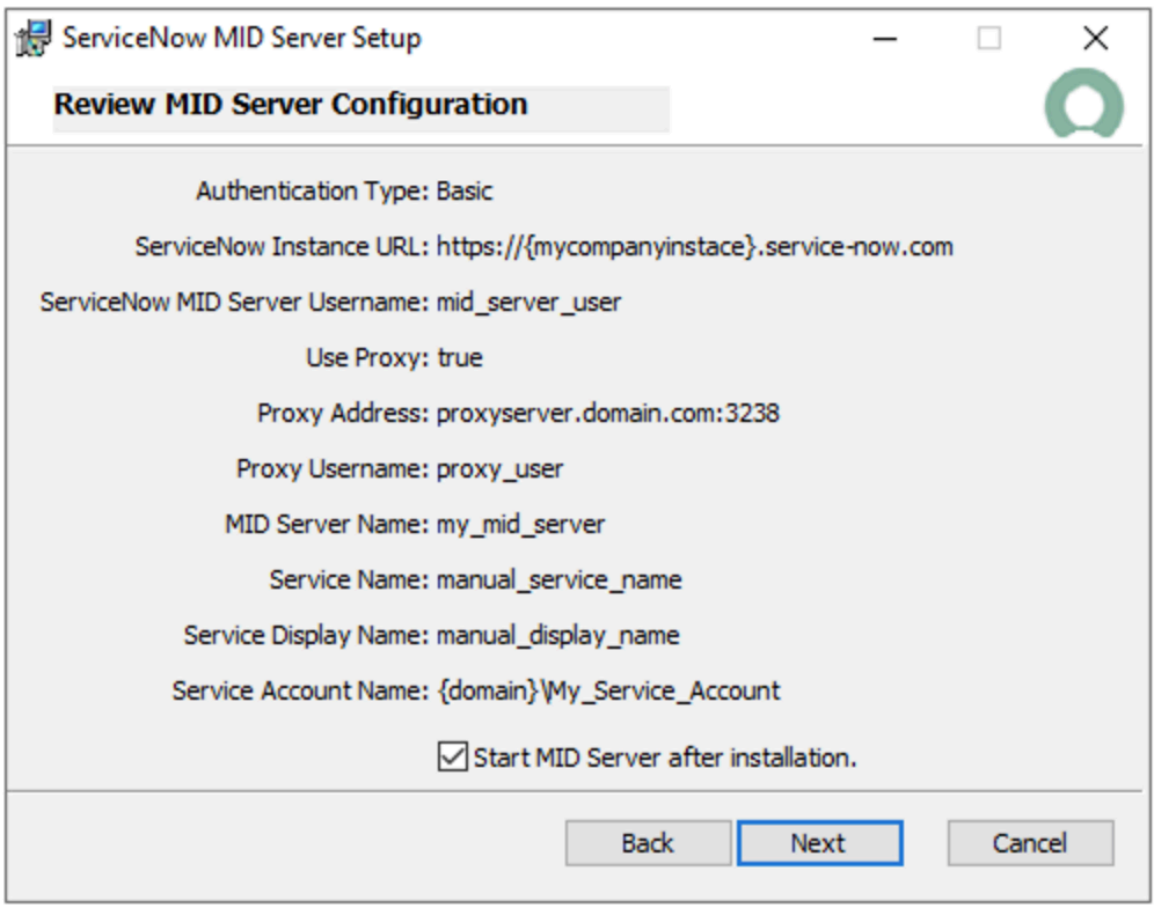
MID Server installers

Operating System	Installer path
Windows	`/agent/start.bat`
Linux	`/agent/installer.sh`

5. Use the installer to enter the following information.
   - URL to your instance
   - User credentials to run the MID Server
   - Proxy server connection details
   - MID server name
   - MID server service wrapper name and display name (Windows systems only)

Note:
The MID Server user must have the mid_server role.

6. From the installer, click **Start MID Server**.



The local host starts the MID Server.

7. Click **Mid Servers List Page**.

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The installer opens the MID Server list from your instance.

8. Select the MID Server name from the list.

   Note:
   It may take a few seconds for the MID Server time to establish a connection with your instance.

   The system displays the MID Server record.

9. From **Related Links**, click **Validate**.
   The MID Server **Validated** changes to **Yes**.

What to do next

All MID Server installation procedures are complete. Proceed to configure your MID Server.

Multiple MID Server deployments

Depending upon how you use the MID Server (for an external integration, Discovery, Service Mapping, or Orchestration) and the load placed on it, you might find it necessary to deploy multiple MID Servers in your network.

Factors determining the number of MID Servers your network will require to support external applications that integrate with ServiceNow include the following:

- The security constraints in your network.
- Your network policies.
- The amount of traffic between ServiceNow and the integrations.
- The reliability of the MID Server machines.

Network policies and security

Security policies in your network (firewalls between network segments, for example) might make direct communication impossible between your instance and an integration's data source (JDBC, LDAP, etc.). To retrieve data for the instance, you can install a MID Server that has access to both the data source and the instance.

These network policies can determine if you need to install multiple MID Servers in your environment:

- **Access control lists (ACL)**: If your security policy controls access to network devices (e.g. switches and routers) with an ACL, it might be necessary to install one or more MID Servers on a machine in the network that is already on the ACL.
- **DMZ**: Your network policy might require you to install one or more MID Servers in your DMZ to probe the devices there. This is common in networks that tightly regulate the ports that are opened on the inside firewall.
- **Probe types**: If you are conducting probes of different operating systems, your network policy might require a separate MID Server for each type of probe (e.g., one MID server for Windows WMI probes and another for SSH probes on UNIX).

Load balancing

Deploy multiple MID Servers where capacity is an issue, as when Discovery has to gather information about thousands of configuration items quickly. In a high volume environment, it might be necessary to deploy multiple MID Servers as load balancers for certain transactions. For example, JDBC data transfers can tie up the resources of a MID Server, making it unable to respond to other requests. The following operations between an integration might require separate MID Servers in a busy network:

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- File exports
- Running scripts
- JDBC data sources
- Reading files

High availability model

Avoid installing MID Servers for critical integrations on a machine that might experience any type of planned outage or an outage caused by overloaded processes. If necessary for reliability, consider deploying these types of MID Servers to dedicated machines for high reliability

Note:
Do not integrate with an external application on a MID Server provisioned for ServiceNow Discovery or Orchestration.

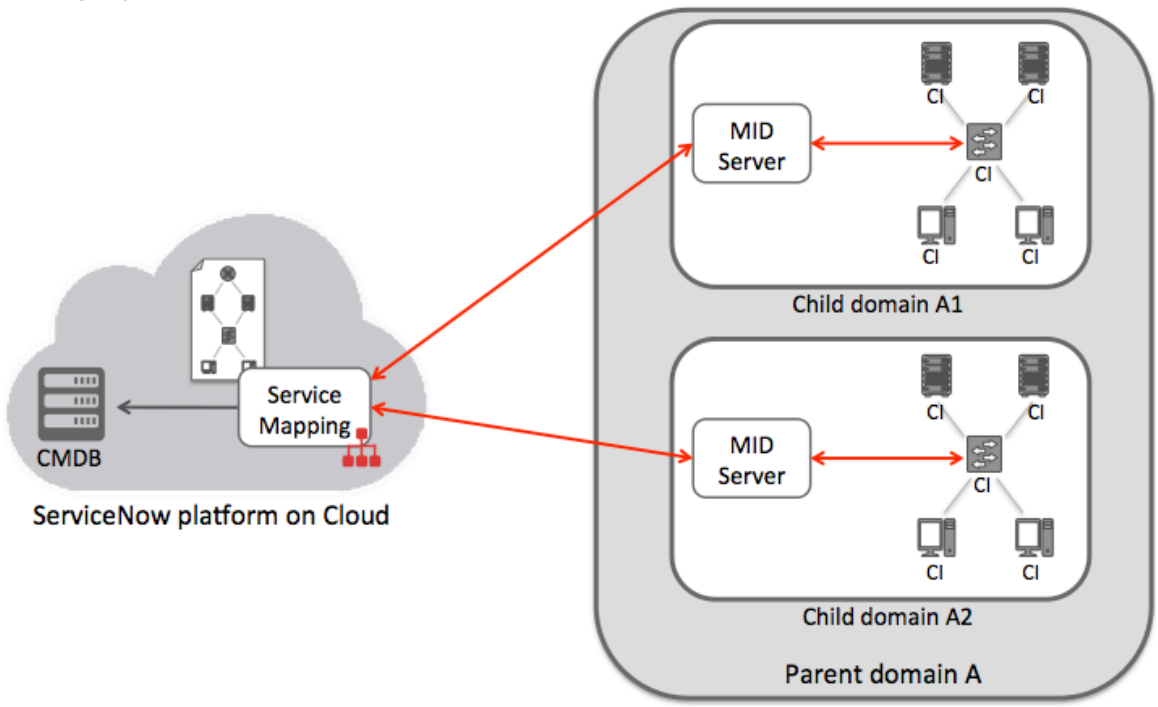
Wide area network (WAN)

When determining where to deploy MID Servers in a WAN, consider the bandwidth available between your local area networks. In most cases, install a MID Server on each LAN to probe devices locally, rather than deploying MID Servers that must probe devices across slow WAN connections. An alternative to this type of deployment is to install MID Servers that probe other LANs via VPN connections that take advantage of fast Internet connections. If the bandwidth of your WAN connections is comparable to that of your Internet connection, then there is no performance impact in running MID Server probes across WAN connections.

Domain separation

In deployments where domain separation is enabled and domains are configured to form a hierarchy, place the MID Servers at the lowest domain level.

Deploying MID Servers with domain separation



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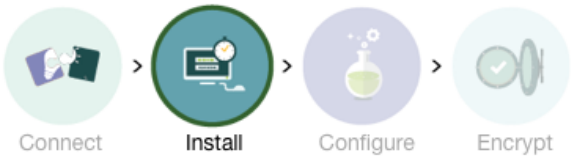
Use MID Server guided setup

MID Server guided setup provides a sequence of tasks that help you install a MID Server with the proper user account and validate the MID Server. If you are setting up a MID Server for the first time, this is a good way to get one up and running in your environment quickly.

Before you begin

Role required: admin



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About this task

You are guided through a series of configuration activities that create a fully qualified MID Server. A progress indicator on each screen allows you to monitor your progress on each task.
Each configuration activity provides the following resources to help you:

- Contextual embedded help.
- Links to comprehensive documentation on the ServiceNow product documentation site.

Important:
You must complete MID Server configuration before you can launch any other IT Operations Management guided setup.

Procedure

1. Navigate to **All** > **Guided Setup** > **ITOM Guided Setup**.
   The IT Operations Management Guided Setup welcome screen appears.
2. Take one of the following actions:
   - If none of the MID Server installation and configuration tasks are complete, click **Get Started**.
   - If you have completed any of the MID Server installation and configuration tasks, click **Continue** to return to the task list.

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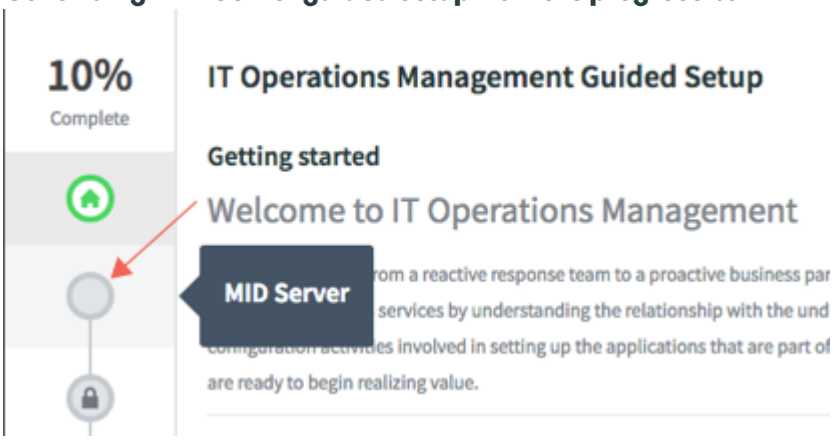
- Select the MID Server icon in the progress bar on the left side of the category screen to display the MID Server category pane at any time.

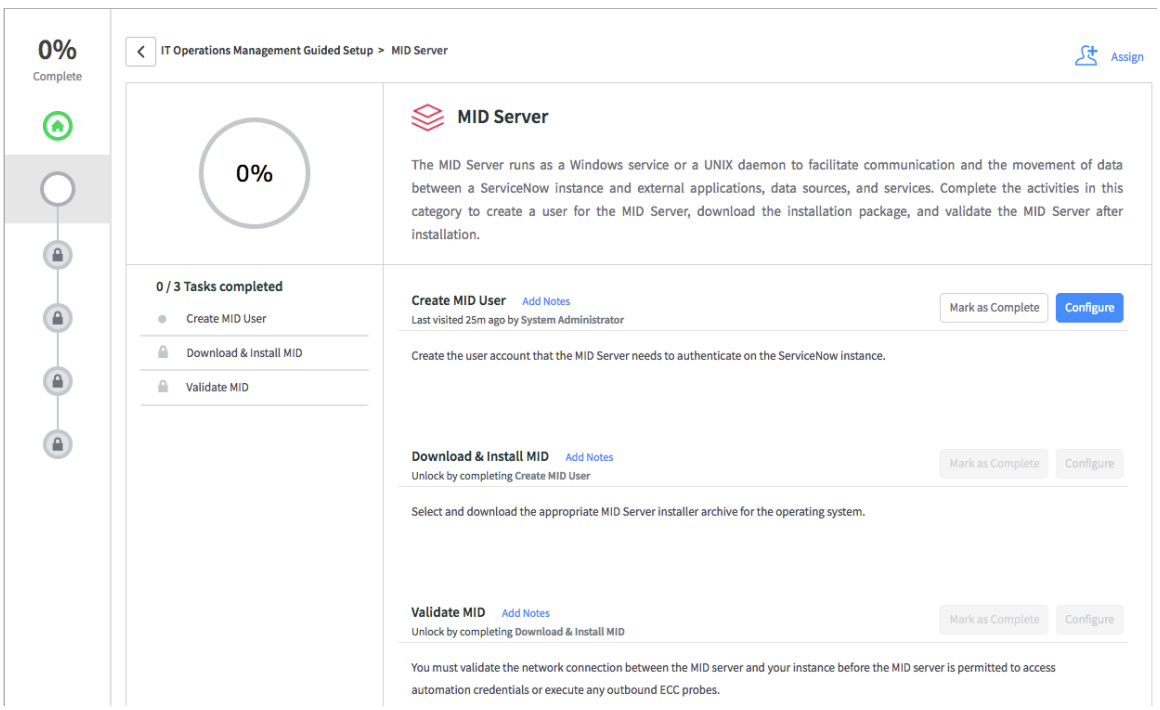
Continuing MID Server guided setup from the progress bar



3. Click **Continue**.
   The IT Operations Management Guided Setup category screen appears. The controls for starting the MID Server tasks are at the top of the list. These task must be completed before you can set up the other applications that rely on the MID Server.



4. In the MID Server pane, click **Get Started**.
   The MID Server task list appears with a description of each task.



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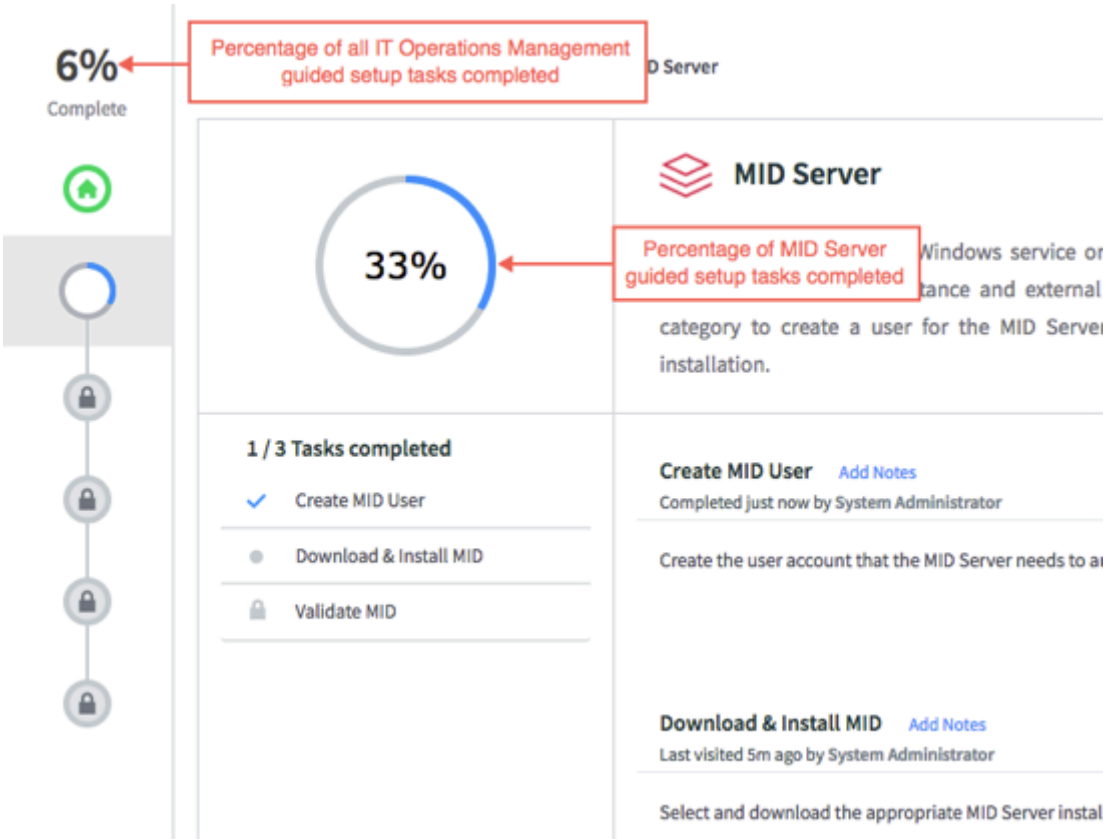
5. Click **Configure** to create the MID Server user and follow the instructions in the help pane that appears on the right side of the screen.

> **Important:**
> If you configured MID Servers manually prior to starting Guided Setup, select from that information to complete each specific task.

6. When you have provided the requested information for the MID Server user, click **Submit**, and then click **Mark as Complete** at the bottom of the help pane.
The view returns to the task list. Notice that the circular progress indicator for the category shows 33% of the MID Server configuration complete. The progress indicator on the left side of the screen shows the completion percentage for all the IT Operations Management tasks.



7. Click **Configure** for the next task, **Download & Install MID**.

   Java 11.0.17 is bundled with the MID Server installer package and is installed on the host for all new MID Servers. The installer automatically configures Java 11.0.17 to run in your environment. No additional configuration is required. This version supports both 64-bit Windows MID Servers and 64-bit Linux MID Servers. The MID Server requires a minimum JRE version 11.0.8, and recommended version 11.0.17. If you are using a lower version than 11.0.8, you may see encryption related issues.

8. Validate your new MID Server.

What to do next

If necessary, deploy multiple MID Servers from a single host in your network. Otherwise, proceed to configure your MID Server.

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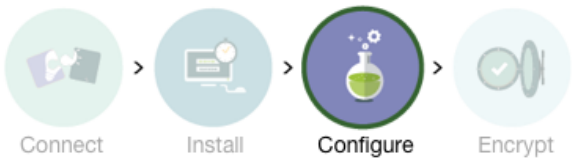
Configuring MID Servers

After installing and validating your MID Servers, ensure that they have access to sufficient system resources, probe the proper targets, and communicate with the instance as expected. Configure MID Server selection criteria, create clusters for failover protection, and set up MID Servers in different domains to protect data.



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Some of these configuration procedures rely on data found in the MID Server references home page. See that page for links to the parameters, properties, and privileged commands you need to fine tune the behavior of your MID Servers. You can apply controls to individual MID Servers or to all the MID Servers in your environment. Remember to restart the MID Server after any configuration change for those changes to take effect.

MID Server selection

MID Servers are selected for use based on three criteria: applications, IP address or range, and capabilities. You can designate specific applications for a given MID Server, such as Discovery or Orchestration. You can specify an IP address or a range that a MID Server is allowed to work within. Some applications require specific capabilities, and so are restricted to MID Servers with those capabilities.

MID Server selection

Configure the way your instance selects a MID Server, either by application, IP address ranges, network capability, or behavior.

MID Server capabilities

Create capabilities that define the specific functions of a MID Server within an IP address range.

MID Server IP range auto-assignment

Configure the system to automatically assign a qualified MID Server to a subnet by that subnet's IP address range.

Map an IP address to a DNS name

Map host server DNS names to IP addresses if your MID Server manages resources within defined IP ranges.

Configure MID Server as WinRM trusted host

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Add servers, which are part of WinRM, as trusted hosts on all MID Servers that Discovery or Service Mapping use for discovery.

File permission enforcement for Windows MID Servers

To improve security, Windows MID Servers will enforce Windows file permission restrictions. This will prevent compromised accounts from accessing unauthorized files by restricting their permissions to the minimum necessary for their role.

MID Server clusters

MID Server clusters are groups of MID Servers which provide support to each other in the forms of load balancing and fail-over protection. Work sent to a MID Server that is part of a cluster is automatically balanced between all the MID Servers in that cluster. MID Servers in a fail-over cluster each have a configured order that the platform uses to determine which MID Server to use next in case of failure.

Create a MID Server cluster

Create a MID Server cluster for load balancing and fail-over protection.

Set thread use

Set the number of threads your MID Server uses for the desired MID Server speed, based on hardware capabilities and competing applications running on the host.

Domain separation

Domain separation segregates MID Servers based on the records they can access. The credentials configured in a MID Server's config.xml file determine which records that MID Server can read, update, or create. You can specify MID Server policy records that only MID Servers from the same domain can use.

MID Server domain separation

Set up your MID Servers in different domains to restrict the records and credentials that a MID Server can access.

Synchronize a JAR file to MID Servers

Upload a JAR file to an instance and synchronize it to all MID Servers connected to that instance. Use JAR file synchronization to create policies that only a MID Server from the same domain can use.

MID Servers used for credential-less Discovery

MID Servers that are used for credential-less Discovery require special configuration to run Network Mapper (Nmap) commands on target computers.

Install and uninstall Nmap on a MID Server

You must install Nmap on each MID Server running on a Windows host. When given the proper capability, those MID Servers can discover some basic information about CIs in your network if normal authentication fails.

MID Server extensions

vCenter event collector

The vCenter event collector listens for vCenter-related events and updates the CMDB accordingly. The event collector allows the CMDB to be updated with changes to virtual machines (VMs), in addition to the updates detected by Discovery. A change to a VM is sent as an event from the vCenter server to the vCenter event collector. When an event is received, the CMDB is updated

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accordingly. Full vCenter Discovery does not need to rerun. For some events, such as powered on and powered off events, Discovery does not need to run again at all. For most events, Discovery runs only on the necessary vCenter resource.

SNMP trap collector extension

The SNMP trap collector is a MID Server extension that listens for SNMP traps from the devices on your network. Upon receiving a trap, the MID Server sends the trap to the instance for further processing by Event Management. If Event Management is not active, traps are not processed and are discarded by the instance.

MID Server selection

You can configure MID Server selection by application, IP address ranges, network capability, or behavior. Specific MID Servers can be assigned to particular tasks, or the MID Server can be selected automatically. MID Servers can use domain separation to limit the scope of discoveries and event management.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The MID Selector used by most applications has three modes to select a MID Server:

- **Auto-select MID Server**: Selects from MID Servers based on MID Server criteria, regardless of whether they are members of a cluster.
- **Use specific MID Server**: Automatic reassignment to another MID Server is not supported.
- **Use specific MID Server cluster**: Automatic reassignment to another MID Server only selects from members of the specified cluster.

For Agent Client Collector, refer to Automatic MID Server selection.

MID Server criteria

MID Servers offer these types of criteria that help an application determine which MID Server to use:

- **Application**: The application that you specify on the MID Server. You can designate these applications for a specific MID Server:
  - Discovery
  - Orchestration
  - Service Mapping

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- Event Management
- Operational Intelligence
- Cloud Management

An **ALL** application option is also available. By default, this option includes all applications. You can configure which applications are included in the **ALL** designation.

- **IP address or range**: The IP address or the IP ranges that the MID Server is allowed to work within. You can specify an IP address or IP range in the application, such as on a Discovery schedule or an Orchestration activity, and for the MID Server. If the IP configured in the application matches the IP address or falls within the allowable IP range configured on the MID Server, a match is possible, and that MID Server passes this criteria. To have the instance automatically assign IP ranges (subnets) to available MID Servers, see Using MID Server IP range auto-assignment.
- **Capabilities**: The network capability an application needs to use, such as the PowerShell Orchestration activity or the Flow Designer PowerShell step. Some applications, like Cloud Management, require a specific capability.

> **Note:**
> Discovery and Service Mapping can also use behaviors, which determine the type of port probes used during the port scan phase of Discovery. Both Discovery and Service Mapping use a behavior to discover Create a discovery behavior for Unix-based load balancers. Other applications do not use behaviors. Behaviors are not used for auto-selection, default MID Servers, or specific MID Servers as described below. See Discovery behaviors for more information.

How an application selects a MID Server

If you do not specify a specific MID Server for an application to use, the application tries to select one. Each application relies on different criteria to select an appropriate MID Server.

Application	Supported Application on the MID Server	IP address range	Capability
Discovery (Select **Auto-Select MID Server** on the Discovery schedule)	The **Discovery** or **ALL** application must be specified on the MID Server.	Discovery uses IP ranges that you configure on the Discovery Schedule form to see if they fall within the IP ranges that you configure on the MID Server, or the **ALL** IP ranges option must be selected on the MID Server.	N/A **Note:** Any configured behaviors are ignored.
Orchestration	The **Orchestration** or **ALL** application must be specified on the MID Server.	The target IP address that you configure in an Orchestration activity must fall within the IP ranges that you configure on the MID Server, or the **ALL** option must be selected on the MID Server.	The capability that is required for an Orchestration activity must match the capabilities you configure on the MID Server, or the MID Server capability must be set to **ALL**.

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Application	Supported Application on the MID Server	IP address range	Capability
Service Mapping	The **Service Mapping** or **ALL** application must be specified on the MID Server.	The endpoint IP address must fall within the IP range that you configure on the MID Server, or the **ALL** option must be selected on the MID Server.	One of the supported Service Mapping capabilities (for new installs) must be configured on the MID Server, or the MID Server capability must be set to **ALL**.
Event Management	The **Event Management** or **ALL** application must be specified on the MID Server.	The IP configured in the event connector instances, such as Configure event collection from HPOM, must fall within the IP range configured on the MID Server.	
Cloud Management	N/A	N/A	The **Cloud Management** or **ALL** capability must be added.

Mode: Auto-select MID Server

During initial work assignment to a MID Server, or when failing over existing work from a down MID Server to another MID Server, the MID selector picks a set of suitable MID from a given status level by traversing the steps below once. If at any step it finds at least one server, all remaining steps are skipped.

1. Suitable MID Servers with status = Up.
2. Default MID Server (if it was defined) with status = Up.
3. Suitable MID Servers with status = Upgrading or Paused.
4. Default MID Server (if it was defined) with status = Upgrading or Paused.
5. Suitable MID Servers with status = Upgrade Failed, Draining, Drained, Drain Failed, or Down.
6. Default Mid Server (if was defined).

All steps which are below an application's minimum status level are skipped. Many applications (such as Discovery) allow Up or Degraded MID Servers, other applications only allow Up MID Servers.

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Mode: Use specific MID Server cluster

During initial work assignment to a MID Server, or when failing over existing work from a down MID Server to another MID Server, the MID selector picks a set of suitable MID from a given status level by traversing the steps below once. If at any step it finds at least one server, all remaining steps are skipped.

1. Suitable Mid Servers with status = Up.
2. Suitable Mid Servers with status = Upgrading or Paused.
3. Suitable Mid Servers with status = Upgrade Failed, Draining, Drained, Drain Failed, or Down.

All steps which are below an application's minimum status level are skipped. Many applications (such as Discovery) allow Up or Degraded MID Servers, other applications only allow Up MID Servers.

A MID server is picked from set of MID servers at the highest status level as follows depending on cluster type:

- **Load Balance Cluster**: picks a MID Server within the status level randomly.
- **Fail-over Cluster**: picks a MID Server with best cluster records' order number (0 = best).

Mode: Use a specific MID Server

Discovery and Event Management can use a MID Server that you specifically call out.

Note:
Selecting a specific MID Server is not the same as specifying the default MID Server for an application. A specific MID Server is always used. If it is **Down** or not validated, the application does not execute commands against the MID Server. A default MID Server is fallback that is used when the auto-selection of MID Servers does not find any eligible MID Server.

Application	How you specify a specific MID Server	Criteria that the default MID Server must mee
Discovery	Choose the MID Server on the Discovery schedule. **Note:** You can also specify a cluster of MID Servers.	If you select a MID Server without the **Disc** **ALL** application, it automatically adds the I application.
Orchestration	N/A	N/A
Service Mapping	N/A	N/A
Event Management	Choose one or more MID Servers on the connector instance event collection, such as Configure event collection from HPOM.	N/A
Cloud Management	N/A	N/A

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Note:
If a MID Server manages resources within defined IP ranges for Orchestration, you must map the fully-qualified domain name (FQDN) of a server with its IP address to run certain activities, such as Exchange activities.

Domain separation

If you are using domain separation, you can configure MID Servers to be in separate domains. The domain that the MID Server is in affects how the application selects the domain:

Discovery and Service Mapping: On the Discovery schedule, the MID Servers and clusters that available for selection are limited to the same domain of the user who is configuring the schedule. This also applies to the auto-selection option: only MID Servers in the same domain as the user can be automatically selected.

MID Server selection test for Service Mapping

If Service Mapping is active, you can preview which MID Server that Service Mapping uses for a specific target device or computer. To do this, navigate to **Service Mapping** > **MID Servers** and click **MID Selection Test**. Enter the IP address and an optional application and capability, and then click **OK**. The name of the MID Server that Service Mapping will use appears in the window.

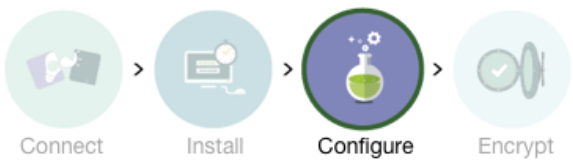
Related topics

Configure a default MID Server for each application

You can configure a default MID Server that an application can use if all other possible MID Servers are unavailable. You can narrow down the list of applications that are included in the definition of ALL.

Before you begin

Role required: agent_admin or admin



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6. Download and install the MID Server on a Linux or Windows host
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8. Configure MID Server security

About this task

Applications are only available when their respective plugins are activated.

The default MID Server is used when applications fail to find a suitable MID Server that matches configured criteria during auto-select. The default MID Server for the **ALL** application is used if the default MID Server for the specific application is not available. Some applications also offer a property to set the default MID Server.

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Important:
If you configure a MID Server for ALL IP ranges (type **Include**) and also create an IP range of type: **Exclude** for the same MID Server, the system ignores the excluded IP range for that MID Server.

The default MID Server does not need to meet any criteria (application, IP range, behavior, or capability) to be used. Specifying a default MID Server is optional, and you can use a MID Server as the default for more than one application.

Application	Additional notes
Discovery	Discovery attempts to use the default MID Server when the Discovery schedule specifies **Auto-Select MID Server** and Discovery cannot find any MID Servers with the correct application and IP range.
Orchestration	Orchestration attempts to use the default MID Server when it cannot find any MID Servers with the capabilities that you define in the Orchestration activity. You can also specify a default MID Server. The value in that property automatically synchronizes with the default MID Server you select in the Orchestration application.
Alert aggregation and RCA	Not applicable. The MID Server is selected if it has the RCA capability. Route to right MID by domain.
Service Mapping	If there are no MID Servers with matching application, capability, or IP range, Service Mapping uses the default MID Server.
Event Management	You can specify a default MID Server for Event Management using the mid.server.connector_default system property. Event Management does not use the default MID Server in the application record.
Cloud Management	N/A

Procedure

1. Navigate to **All** > **MID Server** > **Applications**.
   The list of installed applications that can use MID Servers appears.
2. Click the name of an installed application.
3. Select a MID Server from the list in the **Default MID Server** field.
4. To select additional MID Servers for this application, click **Edit** in the **MID Servers** related list and select alternate MID Servers that this application is allowed to use.
5. Click **Update**.

Select applications to include in the definition of ALL for a MID Server

You can narrow down the list of applications that are included in the definition of ALL.

Before you begin
Role required: agent_admin or admin

About this task
You can specify the ALL application for a MID Server, which means that the MID Server is allowed to work with any of the applications that require MID Servers, such as Discovery, Event Management, Service Mapping, and so on. But you might not want all applications to be included

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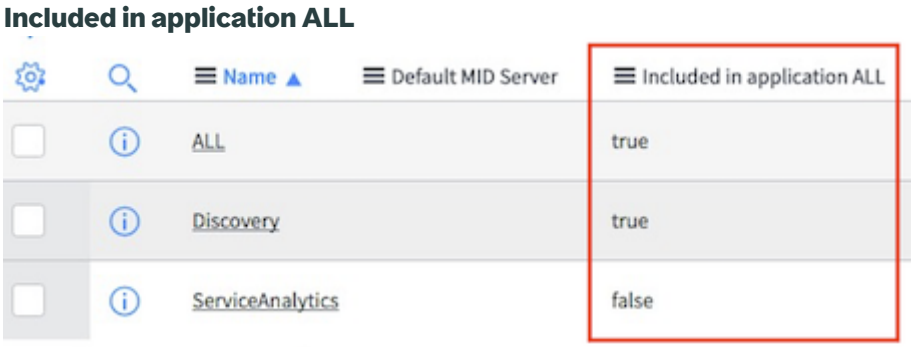
in the definition of ALL. For example, you might want to exclude Service Mapping from the ALL definition if you already have a dedicated MID Server to work with Service Mapping.

Procedure

1. Navigate to **All** > **MID Server** > **Applications**.
   The list of installed applications that can use MID Servers appear.
2. If you do not see the **Included in application ALL** column, you can personalize the list and add it.



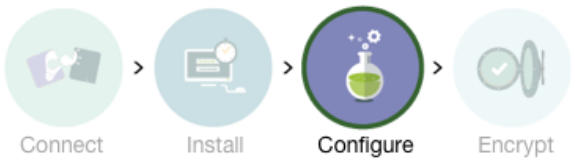
3. For each application, double-click the value in the **Included in application ALL** column.
4. Change the value to **true** (to include) or **false** (to exclude).

Configure an IP address range for the MID Server

You can manually configure an IP address range for the MID Server to explore.

Before you begin

Role required: agent_admin or admin



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3. Configure your MID Server
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6. Download and install the MID Server on a Linux or Windows host
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8. Configure MID Server security

About this task

Applications, such as Discovery and Orchestration, can specify an IP range or the specific IP address of a target. When the application looks for a MID Server to use during auto-selection, it chooses a MID Server whose IP range includes the application's range or specific IP address. Applications also use other criteria, such as the MID Server's supported application or capability. See MID Server selection for more information.

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Note:
This is a manual configuration procedure. To learn how the system can assign IP address ranges to selected MID Servers automatically, see Using MID Server IP range auto-assignment.

These applications use IP ranges as follows:

- **Orchestration**: Use the IP address of the target machine (together with the capability) to select the correct MID Server for Orchestration activities. See the procedure in this topic to configure the IP address.
- **Service Mapping**: Select the MID Server whose IP address range matches the IP in the discovery request. See MID Server configuration for Service Mapping for more information.
- **Discovery**: Can select an IP address range using the same criteria as Service Mapping. Discovery can also use a quick IP range that you specify in the Discovery schedule.

Tip:
You can also use the **ALL** IP range, which allows the MID Server to be used with any range of IP addresses that an application specifies. This only allows the MID Server to access IP ranges, it does not mean that the MID Server can actually reach all of the IP ranges. To function with an application, the MID server must have access to the IP ranges that the application needs.

Valid IP address ranges can be as follows:

An IP address in dotted decimal or hexadecimal format. The hexadecimal format can be explicitly prefixed with 0x, this is not mandatory. Here are examples:

- 10.11.144.155
- 0x0A0B909B
- 0A0B909B

An IP address range in dotted decimal or hexadecimal format. Here are examples:

- 10.11.144.150-10.11.144.160
- 0x0A0B9096-0x0A0B90A0
- 10.11.144.150-0x0A0B90A0

An IP network address with the net mask specified after a slash (/) in regular notation (0-32 inclusive) or in IP address notation. Here are examples:

- 10.11.144.0/24 10.11.144.0/255.255.255.0
- 10.11.144.0/0xFFFFFF00
- 0x0A0B9000/24
- 0x0A0B9000/0xFFFFFF00

Procedure

1. Navigate to **All** > **MID Server** > **IP Ranges**.
2. Click **New**.
3. Complete the form, using the fields in the table.

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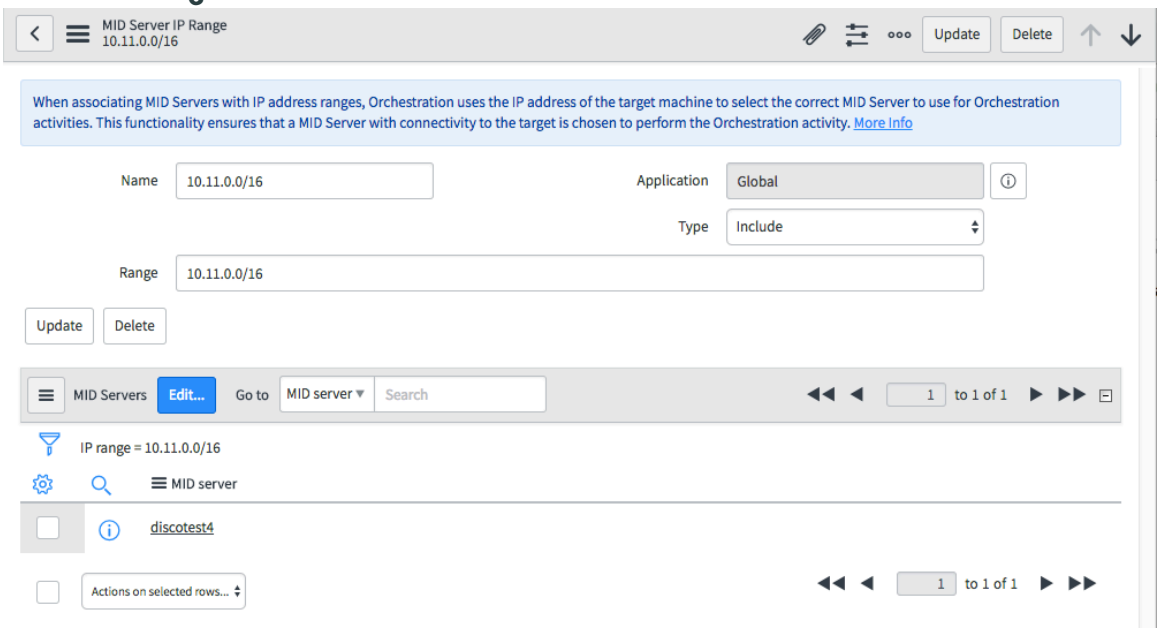
IP address ranges



Field	Description
Name	Enter a descriptive name.
Application	Application scope for this IP range. The default is **Global**.
Type	Select the type of range: ○ **Include**: Include the specified IP range. ○ **Exclude**: Exclude the IP address range. **Note:** If a MID Server is configured for **ALL** applications, any IP addresses configured for exclusion are ignored by the system. If your goal is to configure default MID Servers for separate applications in your system, see Configure a default MID Server for each application.
Range	Enter the range in a valid format.
Related list	
MID Servers	The MID Servers that can use this IP address range.

4. Click **Save**.

Important:
IP ranges assigned manually prior to using auto-assignment in the Discovery Quick Start are affected as follows:

- Individual IP ranges are retained and appended to the ranges assigned automatically by the system for the designated MID Server.
- If the MID Server was configured with the **ALL** ranges selection, the auto-assignment feature overwrites that designation with the ranges it finds.

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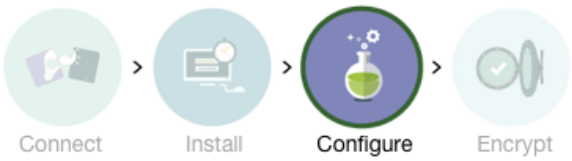
What to do next
Open the **ALL** IP range record and configure the MID Servers that you want to use with any set of IP addresses.

Override the MID Server selection filter

You can use the override feature to write your own filter condition that overrides the normal MID Server selection criteria for an application. An override has precedent over the default filter and can be defined for a specific selection condition.

Before you begin
Before attempting to create an override filter, be sure you understand the criteria the platform uses to select MID Servers. See MID Server selection for details.

Role required: admin



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8. Configure MID Server security

About this task
Note:
The override feature is intended for Cloud Management and Cloud Discovery only. The **Override by capability** filter is provided by default.

There are four MID Server selection filters included in the base ServiceNow system. These filters are applied to all MID Servers in order until the system finds a matching condition:

- Status Filter
- App Filter
- Capability Filter
- IP Filter

Important:
The override feature allows multiple filter types but only one override filter for each filter type. The **Override selector** filter type overrides all other filters and takes complete control of the MID Server selection. If this type is active, it is the only filter applied.

Procedure
1. Navigate to **All** > **MID Server** > **Mid Selector Override**.
   The list of MID Server overrides appears.

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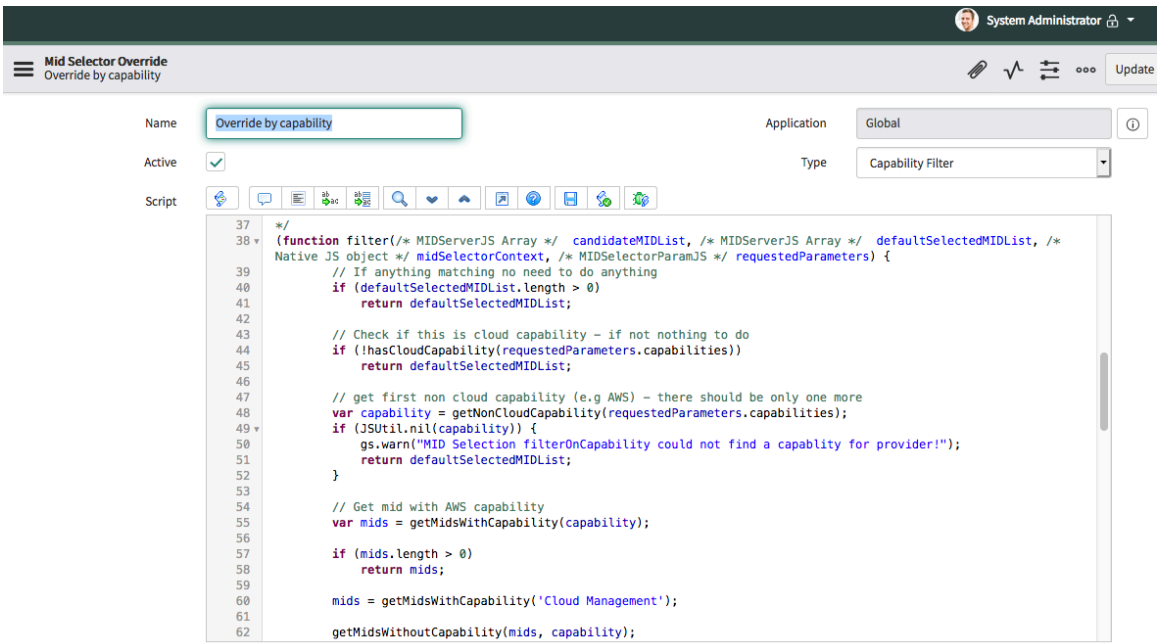
2. Click **New** to create a new filter.
3. Complete these fields:
   - **Name**: Unique name for this override. Ensure that you can identify the override type by the name.
   - **Script**: Condition for this filter. Create the MID Server selection logic for your override in this field, using the directions provided in the function template. Look at the **Override by capability** filter as an example before starting to create your filter.
   - **Type**: Type of override being configured. Select one of the four default filters to override with your condition, or select **Override selector** to create a filter that overrides all the others.
4. Click **Submit**.



Example:
The Cloud Discovery schedule selects MID Servers based on Applications and Capabilities. To select different MID Servers for different service accounts, you can customize the **MID Selector Override**. After the line `(function filter(/* MIDServerJS Array */ candidateMIDList, /* MIDServerJS Array */ defaultSelectedMIDList, /* Native JS object */ midSelectorContext, /* MIDSelectorParamJS */ requestedParameters) {` add the following code with your information:

```
var result = [];

 if (JSON.parse(midSelectorContext).service_account_id ==
 '[example-account-id]') {
  for (var mid in defaultSelectedMIDList) {
   if (defaultSelectedMIDList[mid].sysId == '[example-MID-1]' ||
 defaultSelectedMIDList[mid].sysId == '[example-MID-2]')
    result.push(defaultSelectedMIDList[mid]);
  }
  return result;
 }
```

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Using MID Server IP range auto-assignment

Discovery Quick Start can automatically assign ranges of IP addresses, called subnets, to qualified MID Servers. This subnet auto-assignment requires SNMP credentials for read-only access to routers Discovery uses. The Automation Status Set form shows summary details of subnet Discoveries and the IP range assignments for associated MID Servers.



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To be automatically assigned to a subnet, a MID Server must be:

- In a running **(Up)** state.
- Successfully validated.
- Able to access one or more subnets in your network.

The subnet assignments that the instance makes for your MID Servers are stored in the Automation Status Set [automation_status_set] table. For details about MID Server auto-assignment, see Discovery Quick Start.

Important:
You must auto-assign at least one MID Server to create a schedule automatically.

Required SNMP OIDs for MID Server IP range auto-assignment

Customers who use network service providers must request specific SNMP access to use MID Server IP range auto-assignment.

IP range auto-assignment requires SNMP credentials for read-only access to all routers that Discovery uses to identify subnets. In addition, your service provider must grant the following SNMPWALK access:

- iso.org.dod.internet.mgmt.mib-2.ip.ipRouteTable (1.3.6.1.2.1.4.21)
  - ipRouteDest (1.3.6.1.2.1.4.21.1.1)
  - ipRouteNextHop (1.3.6.1.2.1.4.21.1.7)
  - ipRouteType (1.3.6.1.2.1.4.21.1.8)
  - ipRouteMask (1.3.6.1.2.1.4.21.1.11)
- iso.org.dod.internet.mgmt.mib-2.ip.ipForward.ipCidrRouteTable (1.3.6.1.2.1.4.24.4)

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- ipCidrRouteDest (1.3.6.1.2.1.4.24.4.1.1)
- ipCidrRouteMask (1.3.6.1.2.1.4.24.4.1.2)
- ipCidrRouteNextHop (1.3.6.1.2.1.4.24.4.1.4)
- ipCidrRouteType (1.3.6.1.2.1.4.24.4.1.6)

View automation status sets and IP range assignments

The Automation Status Set form shows summary details of a subnet Discovery and the subsequent IP range assignments for MID Servers selected for automatic subnet assignment.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **MID Server** > **Automation Status Sets**.
2. Select a status record for a subnet Discovery you want to view.
   The form contains read-only status information about the selected Discovery, the subnets found, and the range assignment process for the MID Servers you selected for auto assignment.

> **Important:**
> IP ranges assigned manually prior to using auto-assignment in the Discovery Quick Start are affected as follows:
>
> - Individual IP ranges are retained and appended to the ranges assigned automatically by the system for the designated MID Server.
> - If the MID Server was configured with the **ALL** ranges selection, the auto-assignment feature overwrites that designation with the ranges it finds.

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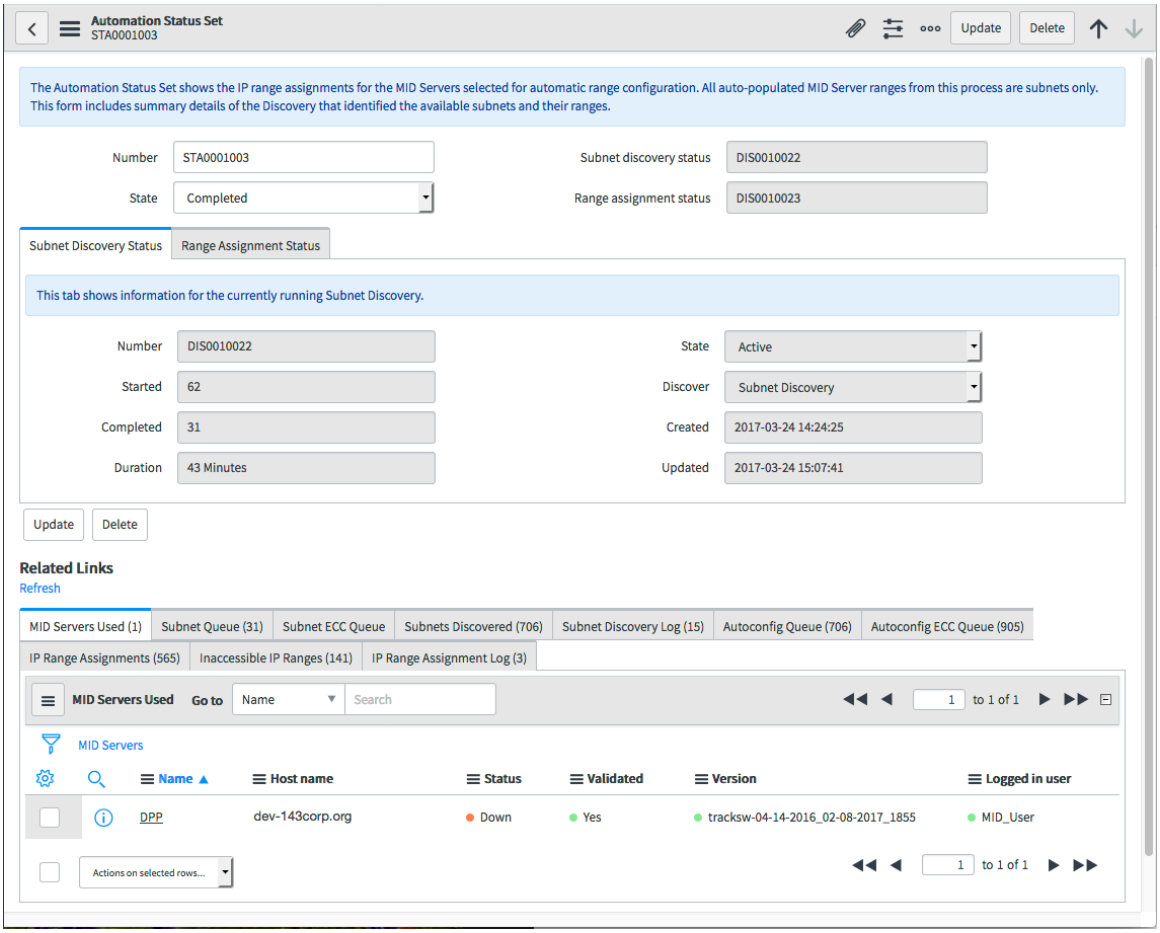
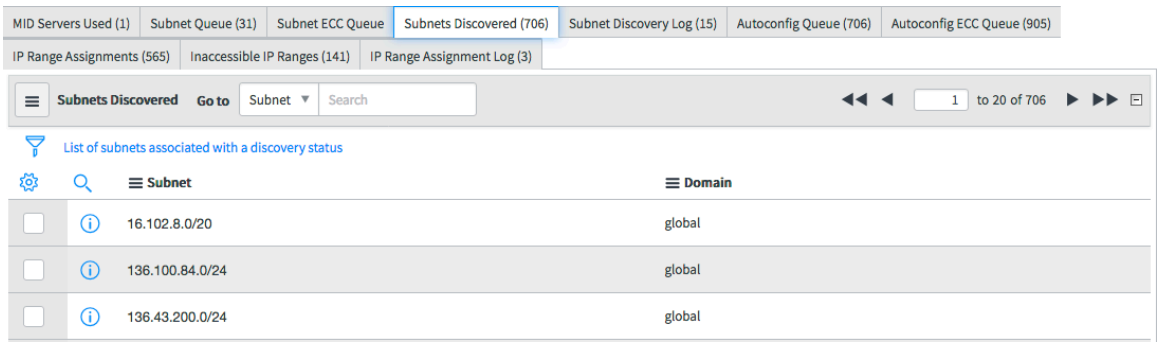
Automation Status Set form



3. Select the **Subnets Discovered** related list to view the list of subnets available for assignment.



4. Select the **IP Range Assignments** related list to view the IP ranges that were assigned to a MID Server.

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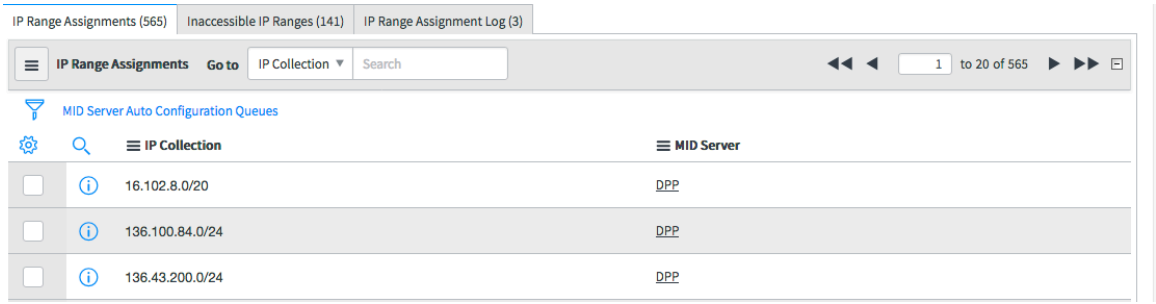
Warning:
IP ranges identified by Discovery are stored in the IP collection [ip_address_collection] table, which is only used for MID Server IP range auto-assignment in the Jakarta release. This table is intended for future development and **should not** be used in any customizations, including column additions, business rules, or scripting actions.



File permission enforcement for Windows MID Servers

To improve security, Windows MID Servers enforce Windows file permission restrictions. The enforcement limits access to the MID Server files to a restricted allow list of users and groups.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

File permission enforcement for Windows MID Servers goes into effect on the MID Server on start up in Orlando. By default the agent folder is locked to four user accounts and groups: the local admin group, the system account, creator owner, and the user account the Windows MID Server is using. The list of permitted user accounts is managed by a allow list, which is controlled by the MID Server parameter *`mid.windows_host.file_permissions.allow_list`*. This parameter takes a string of comma separated group names, user names, and security identifiers (SID). Group and user names must follow SAM account naming requirements. Domain accounts must be specified by using the SID.

Roll back file permission changes

Changes to the file permissions are recorded, and the last used settings are saved in the `/etc` folder as a backup. The file is `fileperm.aclsave`. Open a command prompt and run the command `icacls <agent_folder> /restore <agent_folder>/etc/fileperm.aclsave` where <agent_folder> is name of your agent folder.

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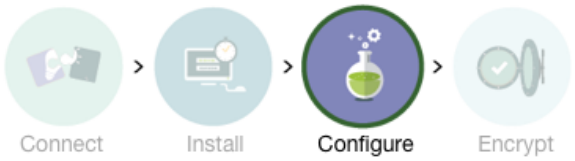
Run a MID Server as a non-admin

To run a MID Server as a non-admin user, it must first be installed using an admin account. Then add the non-admin user to allow list and restart the MID Server. Once the new enforcement rules run, the MID Server can be switched to the non-admin service account. See Run a Windows MID Server as a non-admin after manual installation for more information on setting up non-admin Windows MID Servers, or Run Linux MID Servers as non-root users for Linux MID Servers.

Map an IP address to a DNS name

Associate the IP address to a DNS name to ensure the appropriate MID Server is selected. The IP Address range configuration determines which MID Server is selected. If the MID Server manages resources within defined IP ranges, all host servers must have their DNS names mapped to an IP address.

Before you begin
Role required: admin



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7. Configure your MID Server
8. Configure MID Server security

The association of an IP address to a DNS name ensures that the appropriate MID Sever is selected based on the IP Address range configuration. If this is not done, Orchestration reverts to the default MID Server.

If Discovery cannot discover the server and resolve the DNS name to an IP address, you must create the mapping manually.

Important:
The platform does not map **localhost** to 127.0.0.1 automatically. You must create that mapping using this procedure.

Procedure

1. Enter **cmdb_ci_dns_name.list** in the navigation filter.

   A list of DNS names appears.

2. Check the list for your host server.

   If the server does not appear in the list, continue with this procedure.

3. Click **New**.

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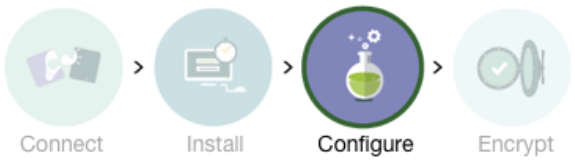
4. Enter the fully-qualified domain name (FQDN) of the host server in the **Name** field.
5. Right-click in the form header and select **Save** from the context menu.
6. In the **IP Address** related list, click **New**.
7. In the **IP Address** field, enter the IP address of your host server.
8. In the **Nic** field, select **eth0** or your preferred network interface controller.
9. Leave the **Netmask** field blank.
10. Click **Submit**.

Configure MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range, allowing an application to select the most appropriate MID Server. Configure capabilities on MID Servers for applications like Orchestration, Cloud Management, and Service Mapping.

Before you begin

Role required: admin or sm_admin



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5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

Several applications use capabilities, IP ranges, and MID Server selection to narrow the pool of MID Servers the applications need.

Note:
At least one capability is required for each MID Server used by Orchestration. See MID Servers for Orchestration for more information.

The following capabilities are available by default with Discovery:

All	IBM	Resolve DNS
Ansible	JDBC	REST
AWS	NetApp	SNMP
Azure	Nmap	SOAP
Chef	OpenStack	SSH

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Cloud Management	PowerShell	VMware
Google	RCA	WMI

Procedure

1. Navigate to **All** > **MID Server** > **Capabilities**.
2. Select an existing capability or select **ALL** to include all capabilities.

   Note:
   Ensure that each IP address range has MID Servers with the necessary capabilities to complete the Orchestration activities on that network segment.

3. Create a new capability:

   a. Select **New**.

   b. Configure the value for a custom capability.

   Example
   An example is a capability for **DOMAIN**, with a value of **service-now**.

   c. Select **Submit**.

4. Select **Edit** in the MID Servers related list to add MID Servers to the capability.
5. Select one or more MID Servers for this capability from the **Available** list.
6. Select **Save**.

   The capability defined here also appears in the primary record for this MID Server.

MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range.

Nmap capability

The **Nmap** capability is only assigned to MID Servers for which the Network Mapper (Nmap) scanner has been installed for credential-less Discovery. This capability cannot be added to or removed from any MID Server manually. For instructions on installing or uninstalling Nmap, see Install and uninstall Nmap on a MID Server

MID Server capability values

Capabilities provided in the base system do not have a defined value string. The capability value can be blank, a single value, or a * (wildcard). A MID Server configured to use a capability that has no value can locate any device using that capability's protocol. If a capability has a defined value, the MID Server using that capability finds only those devices using that protocol that match the value string exactly. The exception to this is the Resolve DNS capability, which is configured to resolve any DNS name into an IP address using a partial string match. The * (wildcard) will match a request capability specifying any non-blank value.

Starting with the Madrid release, the **[capability name]:[value]** combination appears in the slushbucket when you add a capability to a MID Server. This combination allows you to see all the capabilities that have different values, even if the capability name is the same. For example, if you are using the Cloud Management capability, and you use the value field to specify the us-

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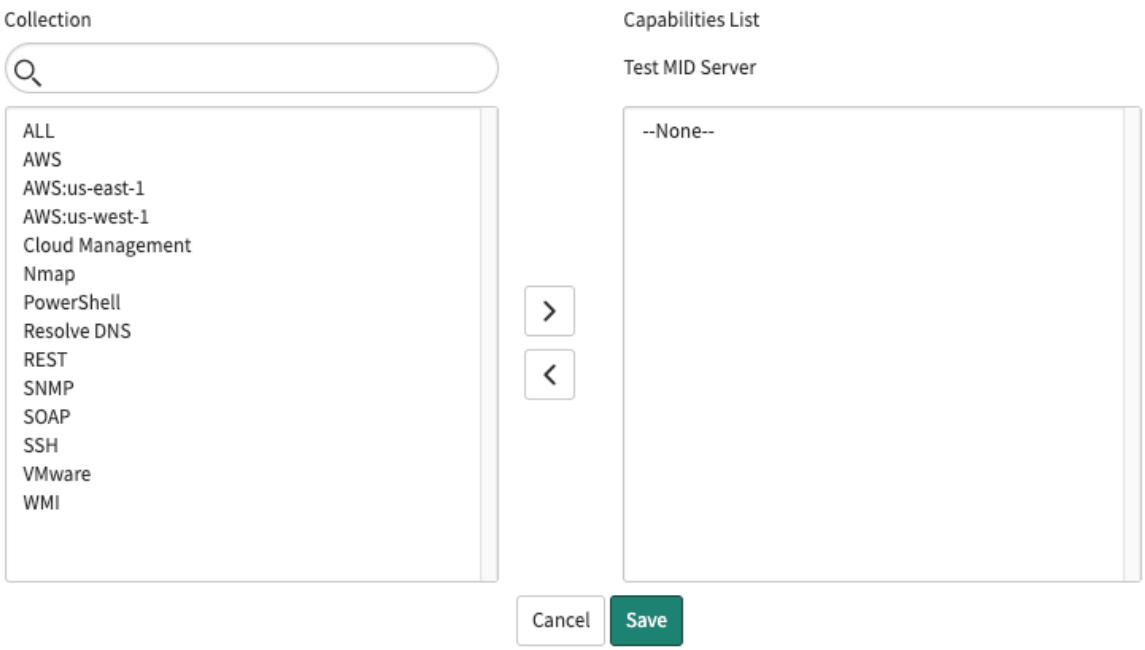
west logical datacenter on one of the capability records, you can see the combination in the **Collection** list.



MID Server selection

The MID Server is selected using an algorithm based on the capabilities available. The selector produces a list of suitable MIDs using filters in the following order: **server status** > **applications** > **IP range** > **capabilities**. The algorithm searches the capabilities in the following sequence and, if a step finds at least one MID server, the remaining steps are skipped:

1. **Exact value match:** Find each MID Server containing capabilities with name/value pairs with an exact match to all requested capability name/value pairs. Blank is a valid value. * (wildcard) values are ignored.
2. **Wildcard value match:** The same as an exact value match, but also allows a non-blank request value to match MID server capability records containing value *.
3. **Special capability name ALL:** Find each MID Server containing the special capability name ALL, ignoring capability's value field.

Note:
If the requested capability name does not exist in the ecc_agent_capability table, **BadArgumentException** is thrown rather than falling back to the ALL capability.

Scripted MID Server capability value matching

You can use value tests to create capabilities that find devices using values without requiring exact string matching. Action on these values is controlled by a user-defined script.

The Resolve DNS capability is provided in the base system and is configured to resolve DNS names into IP addresses for devices whose names end with a specified domain name. The capability **Value** entered is automatically prefaced with a dot during processing to match domain syntax. This value can contain one or more sub-domains, but must include the end of the domain string. Matching devices must end with the identical syntax. The script for the Resolve DNS capability determines if a device name matches the criteria defined by **Value**. If a match exists, the platform performs the address resolution automatically. For example, if the value for the Resolve DNS capability is `service-now.com`, the MID Server with this capability finds `lnxlab01.sandiego.service-now.com` and `dbsrv101.sanjose.service-`

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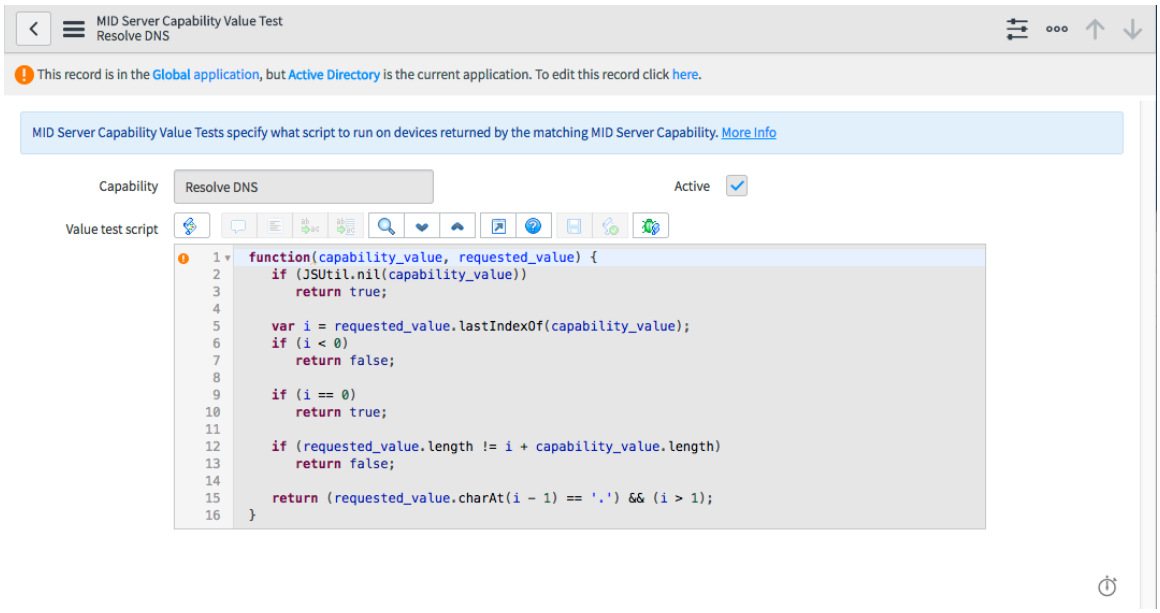
now.com. If the value is changed to `sandiego.service-now.com`, then the MID Server finds only `lnxlab01`.

Note:
If **Value** in the Resolve DNS capability is blank, then all domains match.

To view the script for evaluating this capability, navigate to **MID Server** > **Capability Value Tests** and select **Resolve DNS** from the list.



Configure a MID Server cluster

Group multiple MID Servers to form clusters, then configure clusters for fail-over protection or load balancing. Load-balancing clusters automatically balance work between each MID Server to improve stability and performance, as well as handle fail-over. Fail-over clusters have a configured order used to determine which MID Server to use next if a failure occurs.

Before you begin

Ensure that all MID Servers in the cluster have the same capabilities (Supported Applications, IP Ranges, and Capabilities). A MID Server should not belong to more than one cluster.

Role required: admin

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1. Ensure that the MID Server can connect to elements inside and outside your network
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4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

Create a new cluster or edit an existing cluster.

Procedure

1. Navigate to **All** > **MID Server** > **Clusters**.
2. Click **New** to create a new cluster, or open an existing cluster's record to edit.
3. Name the cluster and select the cluster type: **Failover** or **Load Balance**.
4. Right click in the header bar and select **Save** from the context menu.
5. Click **Edit** in the **Includes MID Servers** Related List.
6. Select appropriate MID Servers for this cluster from the slushbucket.

MID Server clusters

MID Server clusters enable multiple MID Servers with the appropriate capabilities to be grouped together for load balancing and fail-over protection.

External data sources

For performance and reliability reasons, these data sources should not be used with MID Server clusters. These external data sources should only be used with dedicated MID Servers.

- LDAP
- Export sets
- JDBC data sources

Note:
If a MID Server in a cluster fails, the fail-over MID Server starts over at the beginning of the ECC queue task even if much of the information from the JDBC data source was already returned. This can result in duplicate data. For more details, see the Using MID Server clusters for JDBC data sources can cause duplicate and out-of-date data [KB0727739] article in the HI Knowledge Base.

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How clusters work

MID Servers in clusters must be able to connect to the instance and to all the devices with which they are expected to communicate. If all MID Servers in a cluster are down, the discovery is canceled. Make sure all the MID Servers are added to any Access Control List (ACL) in use. MID Server clusters are managed by a business rule called MID Server Cluster Management, which checks to see if the MID Server assigned to a job in the ECC Queue belongs to a cluster.

Load balancing

If the cluster business rule determines that a MID Server is part of a load balancing cluster, the application using the MID Server automatically balances the work between the MID Servers in that cluster. It is good practice to put MID Servers with the same capabilities in a load balancing cluster.

Fail-over protection

MID Servers in a fail-over cluster each have a configured order that the platform uses to determine which MID Server to use next in case of failure. MID Servers in a fail-over cluster work independently and do not load balance with other MID Servers in that cluster (although they might also be members of load balancing clusters). When a MID Server fails, the MID Server Cluster Management business rule selects the highest available MID Server in the order to take over the work. The selected MID Server checks the ECC Queue and starts with jobs that are either Processing or Ready.

Note:
MID Server clustering does not support the ECC queue topics `Command` or `SystemCommand`. If these commands are received, the clustered MID Servers do not redirect the ECC queue to another MID Server. The ECC queue records stay on the ECC queue without being processed.

Configure a fail-over MID Server with at least the same capabilities as the MID Server it is intended to relieve.

Note:
If a MID Server fails while the Shazzam probe is running and auto-selection is configured, failover is not available. The Shazzam discovery stops. Discovery does not automatically choose another MID Server.

MID Server cluster event

The following event is triggered when the platform cannot find a MID Server with the appropriate capabilities to replace a MID Server in a fail-over cluster. Use this event to create an email to notify appropriate users that the cluster has failed.

MID Server cluster event

Event	Table	Description	Business Rule
mid_server.cluster.down	MID Server Cluster [ecc_agent_cluster]	A MID Server cluster has failed	MID Server Cluster Management

Combining clusters

A MID Server can be added to both types of clusters at the same time. This diagram shows a scenario in which a MID Server from a load balancing cluster (MID Server D) is also present in a

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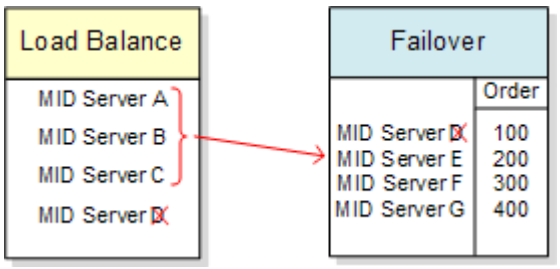
fail-over cluster. If MID Server D fails, MID Server E in the failover cluster is available to the load balancing cluster to perform the tasks previously assigned to MID Server D.



Specifying a specific MID Server cluster

You can specify a specific MID Server cluster for a Discovery schedule. The discovery process uses that cluster only. You cannot chain clusters or specify a single MID Server that belongs to multiple clusters.

Distributed MID Server clusters for Operational Intelligence

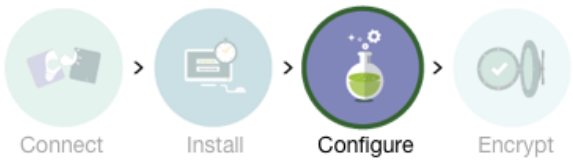
The distributed MID Server cluster type is used exclusively in Operational Intelligence, which analyzes Event Management events and generates anomaly alerts. These MID Servers communicate with one another to distribute and balance the workload. For details, see MID Server distributed clusters for Operational Intelligence

Set MID Server thread use

Change the number of threads used by the MID Server according to performance requirements. MID Servers which compete with other programs for CPU time can use fewer threads than the default. MID Servers which need more speed, and have a host computer powerful enough, can use more threads.

Before you begin

Role required: admin



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About this task

The three parameters define the maximum numbers of worker threads that can run simultaneously in each pool: `threads.interactive.max`, `threads.expedited.max`, and `threads.max`. Changing the thread parameters can affect the MID Server performance.

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The interactive thread pool is designed for executing interactive messages including system commands and heartbeats. They are typically lightweight, so usually there is no need to change the default value. The expedited thread pool is designed for executing messages that have higher priority than the standard ones but less than interactive ones. Unless you have applications that produce a lot of expedited messages, there is no need to change the default value for *threads.expedited.max*.

The standard thread pool is the busiest pool. Most probes are using it and they can take a lot of system resources such as CPU, memory, and so on. You can set the MID Server to use as few as five threads without issue. To increase the speed of the MID Server if the host is powerful enough or lightly loaded with other programs, you can increase the threads setting.

The threads setting depends on the limitation of the CPU speed, memory, and operating system of the host machine. You might have to experiment to find the optimal threads count that works best when the MID Server is busy so it does not exhaust the host machine's hardware limitations. This means you may have to refine the thread count to best meet your situation. The following general observations may be useful:

- PowerShell is resource intensive and threads may not scale linearly.
- Most MID Server tasks require file handles to do their job.
  - Windows: On the Windows operating system, file handles are available in a fixed quantity. If you configure too many MID Server threads on a Windows host, the MID Server can consume all the file handles before approaching maximum CPU usage. This situation appears as an *Out of file handles* error in the MID Server log and indicates that the MID Server is trying to use too many threads.
  - UNIX and Linux: UNIX and Linux hosts have a much different scheme for allocating file handles. Generally, you can increase MID Server thread use on these operating systems until the CPU of the host is overloaded. See your OS documentation for monitoring CPU usage.
- Each thread on the MID Server requires some memory. Exactly how much memory varies considerably from task to task and depends on the equipment being discovered. To increase the number of threads, you might have to increase the amount of memory that Java uses. If you configure insufficient memory, an *Out of memory* error appears in the MID Server log.
- You can set threads.max as high as 200, however, this setting may need to be changed depending on the OS. For example, Windows-based MID Servers running Discovery uses Powershell which is resource intensive. In this case, you may exhaust the CPU power of the host machine with just 50 threads count.

Follow the steps below to change the `config.XML` file. Alternatively, use the `threads.max` connection parameter. See MID Server Connection parameters for more details.

Procedure

1. Open the **\agent\config.xml** file using any text editor.
2. Locate the following lines:

```
<!-- MID Server Threads --><parameter name="threads.max"
 value="25"/>
```

3. Edit the value.
   Keep in mind the cautions described above.
4. Save the record.
5. Restart the MID Server service.

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Install and uninstall Nmap on a MID Server

If you decide to use credential-less Discovery in your network, you must install Nmap on each Windows MID Server that you want to use for this purpose. Self-hosted customers whose network security does not permit downloads from `install.service-now.com` must use a specific manual process to install and configure Nmap.

Before you begin

Role required: mid_admin



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- Assign MID Server IP ranges to all deployed MID Servers. The quickest and most reliable way to do this is with the Using MID Server IP range auto-assignment feature available in the Discovery Quick Start wizard. This method ensures that the set of MID Servers configured to access an IP address range is comprehensive.
- Identify the IP ranges you want to explore with credential-less Discovery. Ensure that these ranges can only be accessed by MID Servers with Nmap installed, running on supported Windows hosts.
- Use the **All** option for selecting IP ranges and observe these requirements:
  - Restrict the use of this feature to Windows MID Servers only.
  - Ensure that Nmap is installed on each of these MID Servers.
  - Ensure that the MID Servers can access the entire customer network.
- When you create a Discovery schedule with Nmap enabled, observe these requirements for the MID Server selection options:
  - **Specific MID Cluster**: Verify that Nmap is installed on all MID Servers in the cluster, where each MID Server in the cluster is configured to access the same set of IP ranges.
  - **Auto-Select Mid Server**: When running horizontal Discovery, verify that Nmap is installed on at least one of the MID Servers that can access the Discovery schedule's configured MID Server IP ranges.
  - **Specific MID Server**: Verify that Nmap is installed on each MID Server that can access the schedule's configured MID Server IP Ranges.

> **Note:**
> To use credential-less Discovery for Service Mapping, install Nmap on all MID Servers that can access the Discovery schedule's configured MID Server IP ranges.

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Role required: agent_admin

About this task

The Discovery - IP Based [com.snc.discovery.ip_based] plugin provides connection to the installer for Nmap and the programming elements that allow a Windows MID Server to run approved scripts on target CIs for credential-less Discovery. MID Servers on which Nmap is installed can execute an Nmap command configured to perform reverse DNS name resolution, discover MAC addresses, or gather OS information on target CIs without using credentials. The Discovery - IP Based plugin is activated automatically when the Discovery [com.snc.discovery] or Event Management and Service Mapping Core [com.snc.service-watch] plugins are activated.

Service Mapping and Nmap

Service Mapping does not check for the presence of the **Nmap** capability and selects the MID Server based on the IP address only. To ensure that Service Mapping does not select a MID Server without the **Nmap** capability, install Nmap on all MID Servers assigned to the IP address ranges for which you want credential-less Discovery to be available. If Service Mapping selects a MID Server for credential-less Discovery that does not have Nmap capabilities, this error message appears in the map at the site of the CI being discovered: `Nmap is not installed on MID Server. Verify all MIDs configured to handle selected IP Address have Nmap Capability. Nmap root directory path does not exist: <path>`

Amazon Web Service AWS

Running Nmap scans to or from any resource within the Amazon Web Service AWS environment is tightly regulated and requires the permission of AWS through the AWS Vulnerability/Penetration Testing Request form. AWS only permits testing of EC2 and RDS instances that you own. Tests against any other AWS services or AWS-owned resources are prohibited. In addition, any Nmap scan of a permitted instance must be performed within an approved time window. For these reasons, credential-less Discovery within an AWS environment is not appropriate, and if a violation of their policy occurs, could result in expulsion from the service.

Supported operating systems

Nmap is supported on all editions of these operating systems, including virtual machines and 64 bit systems:

- Windows 2012
- Windows 2016

MID Server requirements

Nmap can be installed on MID Servers that meet these requirements:

- Status is **Up**.
- MID Server is validated.
- MID Server does not already have the **Nmap** capability.
- MID Server must be logged in as a local admin if Nmap is not already installed. Administrative privleges are only necessary for the installation process. Once Nmap is installed, non-admin users can use and run credential-less discovery.

Note:
If there are multiple MID Servers installed on the same host machine and one of them has already installed Nmap using an admin user, the other MID Servers can enable credential-less discovery using a non-admin user.

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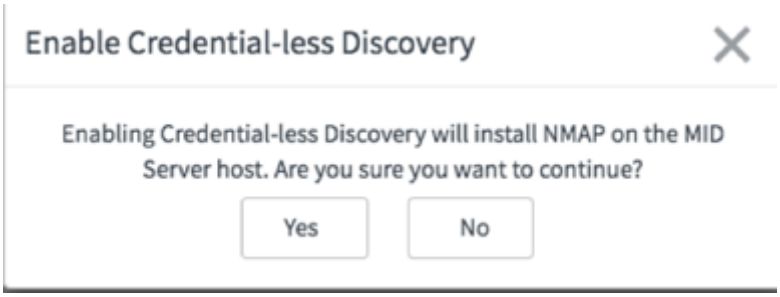
Warning:
The MID Server installation path must not contain the following characters:

- ( )
- { }
- [ ]

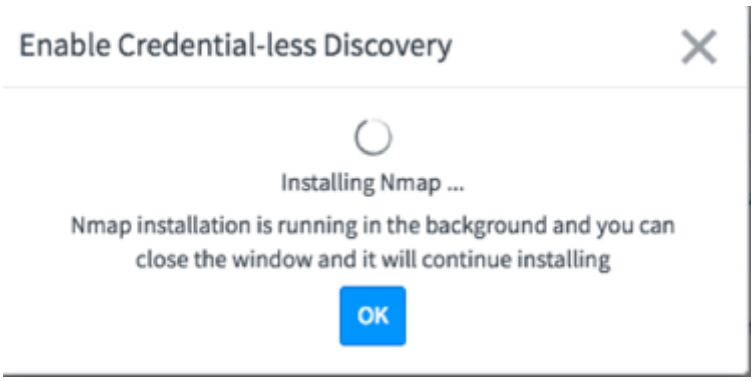
The Nmap installer replaces these characters with spaces. This prevents the installer from finding the correct path, and the installation fails. An example of a path that will fail is `C:\MIDServers\MID(1)\agent`.

Procedure

1. Navigate to **All** > **MID Server** > **Servers**.
2. Open the desired MID Server record.
3. Under **Related Links**, select **Enable Credential-less Discovery**.
   A confirmation dialog box appears.



4. Click **Yes** to continue with the installation.
   The instance runs the Nmap installer from `https://install.service-now.com`, a site within a ServiceNow datacenter that contains installers for the platform. This progress notice appears during installation:



   The **Logs** tab in the MID Server record shows the message: `Running system command: installNmap`.

5. Click **OK** if you want to hide the dialog box while the installer continues to run in the background.
   Installing Nmap also installs Npcap on the host, if it is not already installed. Npcap is Nmap's packet capture library for Windows that allows Nmap to perform port scans quickly and to identify the family of the operating system running on the target. Npcap is installed once on the host and can be used by any other application that requires it, such as Wireshark.

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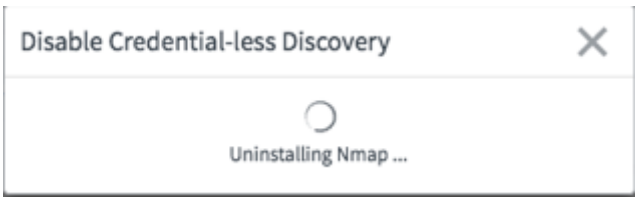
Note:
If a more recent version of Npcap is already installed on the Windows MID Server host, Nmap is installed without Npcap. If an older version of Npcap is installed on the host, the Nmap installer upgrades it to the newer version.

The installation process has either of these outcomes:

- **Success**: These conditions indicate a successful installation:
  - The version of Nmap that is installed appears in the **Nmap version** field in the MID Server record
  - The **Related Link** changes to **Disable Credential-less Discovery**.
  - The **Nmap** capability is assigned to the MID Server and appears in the **Capabilities** tab of the MID Server record.
- **Failure**: If the installation fails, an error message is logged to the MID Server Issue [ecc_agent_issue] table. If you run the installer again with success, the issue is marked as **Resolved**.

6. To uninstall Nmap for a selected MID Server, select **Disable Credential-less Discovery** under **Related Links** in the MID Server record.
This dialog appears during the uninstallation process:



The **Logs** tab in the MID Server record shows the message: `Running system command: uninstallNmap`.

Important:
Because Npcap can be used by other applications, uninstalling Nmap does not automatically uninstall Npcap. You must uninstall Npcap manually, after determining that no other dependencies exist.

Related topics

Credential-less Discovery

Install Nmap on a self-hosted system

Use this procedure to install Nmap on MID Server host machines in a self-hosted environment that does not allow network access to the ServiceNow® `install.service-now.com` download site.

Before you begin
Role required: admin, maint

About this task
You must install Nmap manually on each MID Server host and then configure the instance to execute credential-less Discovery.

Note:
This procedure does not apply to self-hosted customers whose MID Server hosts can access `install.service-now.com` from within their network.

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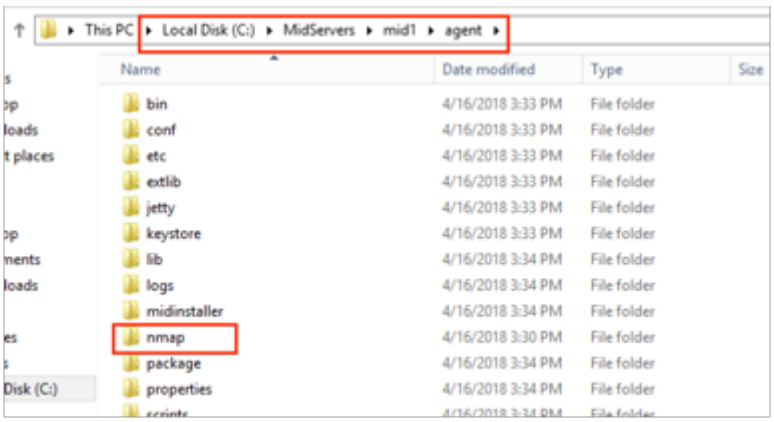
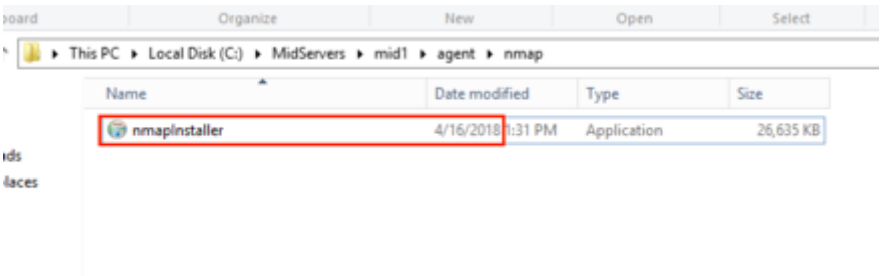
Procedure

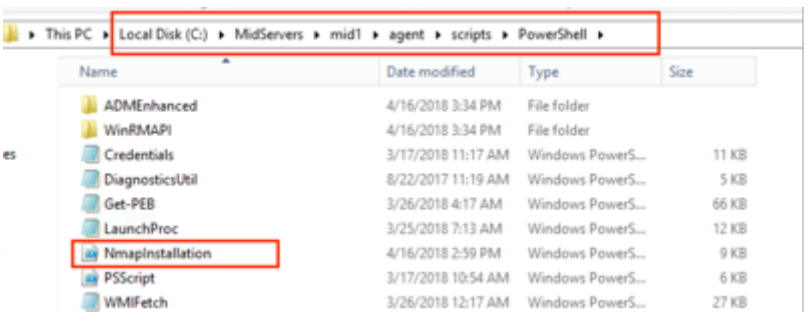
1. Navigate to **All** > **MID Server** > **Properties** (MID Server Property [ecc_agent_property] table) and open the record for the *mid.nmap.version* property.
   This property contains the version of Nmap that you must install. Record the version number.
2. Download the correct installer executable from one of these URLs:
   - https://nmap.org/dist/ : If the Nmap version in the property is 7.94, the executable you need is `https://nmap.org/dist/nmap-7.94-setup.exe`.
   - `https://install.service-now.com/glide/distribution/builds/package/thirdparty/nmap/nmap-setup-xxx-windows.exe`. If the Nmap version in the property is 7.94, the executable you need is `https://install.service-now.com/glide/distribution/builds/package/thirdparty/nmap/nmap-setup-7.94-windows.exe`
3. Create a folder called `nmap` in the MID Server `agent` folder of every MID Server you want to use for credential-less Discovery.



4. Copy the Nmap installer file that you downloaded to the `nmap` folder and rename it to `nmapInstaller.exe`.



5. Run the `agent\scripts\PowerShell\NmapInstallation.ps1` script and pass it the following parameters in the order in which they appear.
   This script runs the `nmapInstaller.exe` file.



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a. *$operation*: Task that `NmapInstallations.ps1` will process. To install Nmap, the task is **install**.

b. *$nmap_root_path*: Complete path for the `nmap` folder that you create in step 4.

c. *$nmap_self_installer*: Complete path for `nmapInstaller.exe` file that you copied in step 5.

d. *$nmap_command*: Complete path for the Nmap install command. The `NmapInstallations.ps1` script installs Nmap in the `nmap` folder created in step 4. This parameter is *$nmap_root_path*|*nmap.exe*.

e. *$nmap_uninstall_command*: Complete path for the Nmap uninstall command. This command is *$nmap_root_path*|*Uninstall.exe*.

f. *$nmap_npcap_version*: The Npcap version installed with Nmap. This value must be the same as the value of the *mid.nmap.npcap.version* property in the MID Server Property [ecc_agent_property] table.

g. *$nmap_safe_scripts*: List of safe scripts that Nmap uses. You can retrieve this list from the *mid.nmap.safe.scripts* property in the MID Server Property [ecc_agent_property] table.

6. Set up the parameters in the `NmapInstallation.ps1` script in this order:
./NmapInstallations.ps1 $operation $nmap_root_path $nmap_self_installer $nmap_command $nmap_uninstall_command $nmap_npcap_version $nmap_safe_scripts

   For example, the script might look like this:

```
PS
 C:\MidServers\mid1\agent\scripts\PowerShell> .
\NmapInstallation.ps1 "install"
"C:\MidServers\mid1\agent\nmap"
 "C:\MidServers\mid1\agent\nmap\nmapInstaller.exe"
"C:\MidServers\mid1\agent\nmap\nmap.exe"
"C:\MidServers\mid1\agent\nmap\Uninstall.exe" "0.91"
"allseeingeye-info.nse,amqp-info.nse,db2-das-info.nse,drda-info
.nse,freelancer-info.nse,
ike-version.nse,mcafee-epo-agent.nse,mqtt-subscribe.nse,openloo
kup-info.nse,oracle-tns-version.nse,
quake1-info.nse,quake3-info.nse,rfc868-time.nse,rpcinfo.nse,snm
p-info.nse,ventrilo-info.nse,
weblogic-t3-info.nse,xmpp-info.nse"
```

7. After installation is complete, add the **Nmap** capability to each MID Server you want to use for credential-less Discovery.

   Important:
   Only a **maint** user can add the **Nmap** capability to a MID Server. Contact Customer Service and Support to request temporary **maint** access to your instance.

   a. On the instance, open the MID Server record.

   b. Select the **Capabilities** related list.

   c. Click **Edit**.

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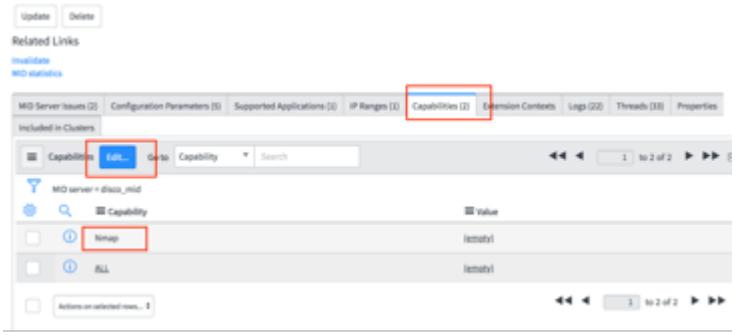
d. Select **Nmap** from the list of available capabilities and click **Save**.



Uninstall Nmap on a self-hosted system

Use this procedure to uninstall Nmap in a self-hosted environment that does not allow network access to the ServiceNow `install.service-now.com` download site.

Before you begin
Role required: admin, maint

About this task
Nmap must be manually uninstalled from each MID Server host machine and then disabled on the ServiceNow instance.

Procedure

1. Run *`Uninstall.exe`* in the `nmap` folder on each MID Server host configured for credential-less Discovery.
2. After uninstallation is complete, delete the `nmap` folder from the `agent` folder.
3. Remove the **Nmap** capability from each MID Server record.

> **Attention:**
> Only a **maint** user can remove the **Nmap** capability from a MID Server. Contact Customer Service and Support to request temporary **maint** access to your instance.

   a. On the instance, open the MID Server record.
   b. Select the **Capabilities** related list.
   c. Click **Edit**.
   d. Remove **Nmap** from the active capabilities list and click **Save**.

Configure MID Server as WinRM trusted host

In environments using Windows Remote Management (WinRM), Discovery or Service Mapping can discover servers using the WinRM protocol. Add servers, which are part of WinRM, as trusted hosts on all MID Servers that Discovery or Service Mapping use for discovery.

Before you begin
Role required: mid_admin

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1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

MID Server cannot access servers using the WinRM protocol unless these servers are configured as trusted hosts for this MID Server.

Perform this procedure on each MID Server used by Service Mapping or Discovery.

Procedure

1. On the MID Server, open the command-line shell.
2. To add all servers to the TrustedHosts lists, run the following command:
   ```
   winrm s winrm/config/client '@{TrustedHosts="*"}'
   ```
3. To add specific servers to the TrustedHosts list, run the command with the comma-separated hosts instead of the asterisk (*), for example:
   ```
   winrm s winrm/config/client
   '@{TrustedHosts="serverA,serverB,serverC"}'
   ```

MID Server domain separation

Use the MID Server user role to configure MID Servers to access separate domains. The credentials in the `config.xml` file of a MID Server determine which domains it can access. Specific MID Server policy records can be restricted for use only by MID Server from the same domain.

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1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The records that can be read, updated, or created by a MID Server are determined by the credentials configured for that MID Server in the `config.xml` file. These are the user credentials that a MID Server uses to access the instance and specify which domain's records that MID Server can access.

You can create versions of these specific MID Server policy records that only a MID Server from the same domain can use. This process separation is supported for records in tables that extend MID Server Synchronized Files [ecc_agent_sync_file]:

- MID Server MIB File [ecc_agent_mib]
- MID Server JAR File [ecc_agent_jar]
- MID Server Script File [ecc_agent_script_files]

Note:
Attachments on MIB or JAR file records might not appear as they did in a non-domain separated environment. The attachments do not appear because the **Attachments** [sys_attachment] table is data separated. When data is separated between domains, a record in a child domain cannot access records in a parent domain.

Set up domain separation for MID servers

Set up domain separation through the MID server user role and the MID Server configuration file.

Before you begin
Role required: agent_admin or admin

Procedure

1. Configure a MID Server user within a specified domain with the proper *mid_server* role.
2. Specify this user within the MID Server **config.xml** file.
   When you set the MID Server user credentials in the `config.xml` file, make sure they are in the proper domain.

What to do next
If you must change the MID Server domain:

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1. Stop the MID Server and delete the ecc_agent record.
2. Update the MID Server `config.xml` with the new user in the new domain and restart the MID Server service.

If you need to create versions of specific MID Server files that only MID Servers in your domain can use:

1. Open or create a record in one of these MID Server modules:
   - **SNMP MIBs**
   - **JAR Files**
   - **Script Files**
2. Update an existing domain policy or submit a new record.

> **Note:**
> Attachments on MIB or JAR file records might not appear as they did in a non-domain separated environment. The attachments do not appear because the **Attachments** [sys_attachment] table is data separated. When data is separated between domains, a record in a child domain cannot access records in a parent domain.

Configure a multi-domain MID Server

You can create a MID Server in the global domain that can explore targets in other domains.

Before you begin

Before configuring a multi-domain MID Server:

- Activate the Domain Support - Domain Extensions Installer [com.glide.domain.msp_extensions.installer] plugin.
- Ensure that your instance is domain separated.

Role required: admin

Procedure

1. Type **sys_properties.list** in the navigation filter and press **Enter**.
2. Locate the **glide.ecc.enable_multidomain_mid** property.
3. Set the value of the property to **true**.

> **Note:**
> Enabling this property has no effect on existing MID Servers. MID Servers in a domain prior to setting this property, remain in that domain.

4. Create a MID Server in the global domain.
   A MID Server created in the global domain after this property is set to **true** can explore any domain for which it has the credentials. However, this MID Server is restricted to trying only the credentials for the target domains requested by ECC Queue inputs.

> **Warning:**
> If you reset the **glide.ecc.enable_multidomain_mid** property to **false** after creating a multi-domain MID Server in the global domain, that MID Server writes all the data it receives to the global domain and not to the correct domains.

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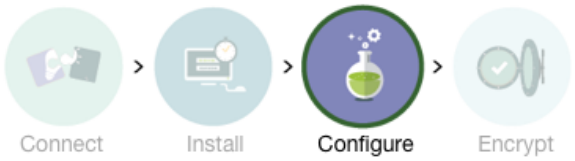
Synchronize a JAR file to MID Servers

You can upload a JAR file to an instance and synchronize it to all MID Servers, or write custom probes that use the synchronized JAR file.

Before you begin

Role required: admin, agent_admin



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8. Configure MID Server security

The MID Server JAR File [ecc_agent_jar] table is domain separated. You can create versions of these policies that only a MID Server from the same domain can use. For instructions, see Set up domain separation for MID servers.

Warning:
Synchronizing a JAR file with this procedure causes all MID Servers connected to the instance to restart automatically.

Procedure

1. Navigate to **All** > **MID Server** > **JAR Files**.
2. Click **New**.
3. Complete the following fields:
   - **Name:**A unique and descriptive name for identifying the file in the instance.
   - **Version:** A version number for the file, if one is available.
   - **Source:** Location of the JAR file for reference purposes. Source information is not used by the system.
   - **Description:** Short description of the JAR file and its purpose in the instance.
4. Click the paper clip icon in the banner.

5. In the Attachments dialog box, click **Browse** and select the file you want to attach.

   The platform attaches the JAR file to the record and restarts the MID Servers to synchronize the file. It is not necessary to update the record to attach the file.

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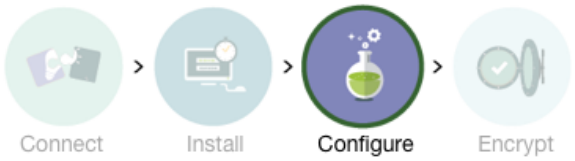
vCenter event collector

The vCenter event collector is a MID Server extension that listens for vCenter-related events and updates the CMDB accordingly.



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4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The event collector allows the CMDB to be updated with changes to virtual machines (VMs), in addition to the updates detected by Discovery. A change to a VM is sent as an event from the vCenter server to the vCenter event collector. When an event is received, the CMDB is updated accordingly. Full vCenter Discovery does not need to rerun. For some events, such as powered on and powered off events, Discovery does not need to run again at all. For most events, Discovery runs only on the necessary vCenter resource.

For example, if a VM is turned off, the vCenter server sends the event `VmPoweredOffEvent`. The vCenter event collector receives and processes the event and the CMDB is updated to reflect that the state of the corresponding VM is set to **off**.

Important:

With this extension, Discovery can only modify the state of a VM which exists in the CMDB. When an event with "CreatedEvent" occurs in its name, such as VmCreatedEvent, Discovery scans that VM and then creates the CI using the data it collects. When a new event occurs involving that CI, Discovery can update the existing record without launching another scan.

vCenter event collector supports domain separation by inheriting the domain of the specified Mid Server in the event collector context. However, it does not support multi-domain Mid Server configuration.

See Discovery for VMware vCenter for supported versions of vCenter.

How vCenter events are processed

The MID Server listens for the vCenter events configured in the vCenter Event Collector form. When one of these events is returned from vCenter, the instance parses the payload with a business rule that converts the vCenter event into a system event (sysevent). The instance then uses that sysevent to perform tasks, such as email notification.

Note:

If the MID server is paused when a vCenter event occurs, the MID server still processes the event. In this case, it is possible for the event collector to display a status of **Started**.

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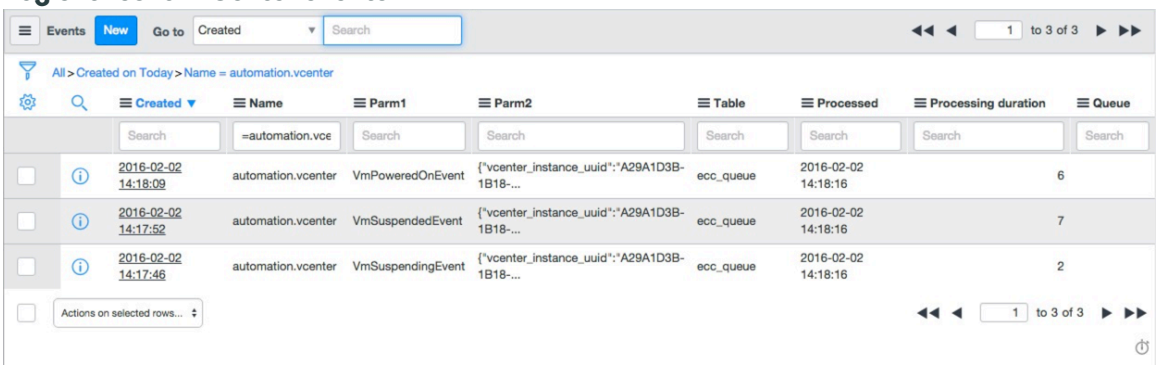
The resulting sysevents contain these values:

- **Name**: Name of the system event created from the vCenter event. This value is always *automation.vcenter*.
- **Parm1**: vCenter event that was returned. This event must be associated with an event collector record.
- **Parm2**: Event data provided by vCenter, in JSON format.

Log entries for vCenter events



Supported vCenter events

The following events are the only vCenter events handled by the base system when Discovery is activated. If you have upgraded your instance from an earlier version, you might not have the default events added with later releases. To use the missing events, manually add them.

vCenter events

Event name	Description	Launches probe
VM events		
VmPoweredOnEvent	The VM has been powered on from the powered off state or resumed from the suspended state. This event is sent when the VM is powered on. It does not account for the time it may take to boot the host operating system.	None
DrsVmPoweredOnEvent	The VM has been powered on by a distributed resource schedule (DRS), which balances workload between available resources.	None
VmRestartedOnAlternateHostEvent	The VM was restarted on another host because the original host failed.	None
VmPoweredOffEvent	The VM has been powered off. If the host OS is shut down, this event is sent after the host OS shuts down and the VM enters the powered off state.	None

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vCenter events (continued)

Event name	Description	Launches probe
VmPowerOffOnIsolationEvent	The VM has been powered off on an isolated host in an HA cluster.	None
VmShutdownOnIsolationEvent	The VM has been shut down on an isolated host in an HA cluster.	None
VmSuspendedEvent	The VM is suspended. This event is sent after the VM suspension is complete.	None
VmRelocatedEvent	The VM has been relocated while offline (either suspended or powered off). A VM migration of the VM to a different host, or the migration of any storage used by the VM triggers the event. Moves relationships.	None
VmMigratedEvent	One or both of the following occurs: • The VM has been hot-migrated, with vMotion, to another ESX server. • The storage for the VM has been hot migrated. Only Updates relationship and Deep Discovery.	None
DrsVmMigratedEvent	Migration of a VM recommended by a DRS. Moves relationships.	None
VmRemovedEvent	The VM instance has been deleted from vCenter.	None
VmClonedEvent	The VM was cloned successfully. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmCreatedEvent	The VM was successfully created. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmDeployedEvent	The VM was deployed successfully.	VMWare - vCenter VMs

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vCenter events (continued)

Event name	Description	Launches probe
	Creates new records and performs Quick Discovery.	
VmDiscoveredEvent	The vCenter successfully discovers the VM. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmRegisteredEvent	The VM was successfully registered. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmReconfiguredEvent	The VM was reconfigured. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmInstanceUuidAssignedEvent	A new instance UUID was assigned to the VM. Updates VM instance UUID.	None
VmRenamedEvent	The VM was successfully renamed. Changes the name.	None
VmUuidAssignedEvent	A new BIOS UUID was assigned to the VM. Adds the UUID of the VM.	None
VmMacAssignedEvent	A new MAC address was assigned to the VM. Assigns MAC address to event and triggers VMware-VM nics probe.	VMWare - vCenter VM NICs
VmMacChangedEvent	The MAC address of a VM was changed. Assigns MAC address to event and triggers VMware-VM nics probe.	VMWare - vCenter VM NICs
VmGuestShutdownEvent*	The guest VM shut-down.	None
VmStoppingEvent	The VM stopped.	None
VmResettingEvent	The VM reset.	None
Cluster events		
ClusterCreatedEvent	A cluster was created.	VMWare - vCenter Clusters
ClusterReconfiguredEvent	A cluster was reconfigured.	VMWare - vCenter Clusters
ClusterDestroyedEvent	A cluster was destroyed.	None
Datastore events		

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vCenter events (continued)

Event name	Description	Launches probe
DatastoreRenamedEvent	A datastore was renamed.	None
VMFSDatastoreCreatedEvent	A VM File System (VMFS) datastore was created.	VMWare - vCenter Datastores
DatastoreDiscoveredEvent	A host was added to VirtualCenter and datastores were discovered.	VMWare - vCenter Datastores
NASDatastoreCreatedEvent	An Network Attached Storage (NAS) datastore was created.	VMWare - vCenter Datastores
LocalDatastoreCreatedEvent	A local datastore was created.	VMWare - vCenter Datastores
VMFSDatastoreExpandedEvent	A datastore was expanded.	VMWare - vCenter Datastores
DatastoreDestroyedEvent	A datastore was removed from VirtualCenter.	None
Network events		
DVPortgroupCreatedEvent	A port group was created.	VMWare - vCenter Networks
DVPortgroupRenamedEvent	A port group was renamed.	None
DVPortgroupDestroyedEvent	A port group was destroyed.	None
Resourcepool events		
ResourcePoolDestroyedEvent	A resource pool was destroyed.	None
ResourcePoolCreatedEvent	A resource pool was created.	VMWare - vCenter Clusters
ResourcePoolMovedEvent	A resource pool was moved.	VMWare - vCenter Clusters
ResourcePoolReconfiguredEvent	A resource pool was reconfigured.	VMWare - vCenter Clusters
DVS events		
DvsCreatedEvent	A distributed virtual switch was created.	VMWare - vCenter Networks
DvsRenamedEvent	A distributed virtual switch was renamed.	None
DvsDestroyedEvent	A distributed virtual switch was destroyed.	None
Datacenter events		
DatacenterCreatedEvent	A datacenter was created.	VMWare - vCenter Datacenters
DatacenterRenamedEvent	A datacenter was renamed.	None

Configure and run the vCenter event collector extension

Configure the vCenter event collector extension in the MID Server module, and then add or remove supported events.

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Before you begin

Before configuring event collectors, perform these tasks:

- Deploy and start a MID Server.
- Ensure that the MID Server has access to the vCenter.
- Run discovery on the vCenter.

Role required: agent_admin, admin

About this task

Multiple MID Servers can listen to the same vCenter instance, and you can add multiple Event Collectors for different vCenters to a single MID Server. Make sure you configure the events on the event collector record that specify the correct MID Server.

Note:
You can add events to the vCenter event collector. However, not every event is supported by the base system event handlers. If you want to handle events other than those supported in the base Discovery system, you must create a script action to process the events. For instructions, see Script actions. As a reference, the instance processes the vCenter events in the base system with a script action called *`Discovery: Process vCenter events`*. Do not edit or delete this script action.

To configure the vCenter event processor extension:

Procedure

1. Navigate to **All** > **MID Server** > **Extensions** > **vCenter Event Collectors**.
2. Click **New** or open an existing extension.
3. Fill in the fields, as appropriate from the table.
4. Right-click in the header bar and click **Save** in the context menu.
   The **vCenter Event** related list appears, containing the default events that the system is configured to handle.
5. To select a different vCenter event, click **Edit** in the **vCenter Event** related list and browse for the event.

   The slushbucket does not display all the available events in the opening list. Use the filter to browse for events not displayed.
6. Under **Related Links** click **Start** to save the events in this collection and start the collector.
   The Related Links in this form work as follows:

Commands available in the vCenter event processor extension

Related Link	Description
Start	Starts the collector if it is not running. The extension connects to the specified vCenter server by enumerating the VMware credentials in the credential set until a connection can be made. Next, the extension tells the vCenter server to supply the events specified in the Collector Context.
Stop	Stops the running collector on the configured MID Server. No action is taken if the extension is not running.
Restart	Stops, then starts the collector on the configured MID Server.
Test	Tests the parameters for validity. If the IP address, hostname, and the set of events is valid then the test returns a successful status. If any of the parameters

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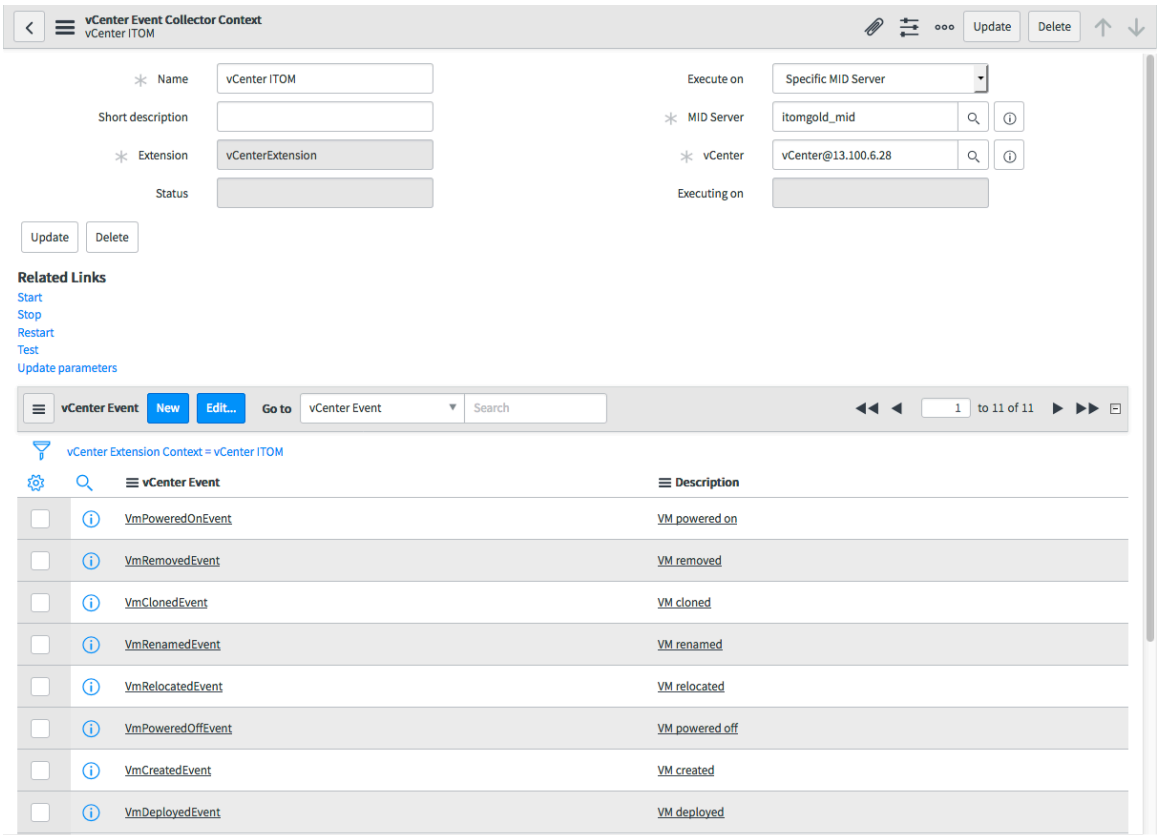
Related Link	Description
	are incorrect, an error is shown. Running a test does not affect any extensions that are currently running.
Update parameters	Sends updated parameters to the collector. Any changes you make to the collector while the MID Server is running do not take effect immediately when they are saved. If you click this control when the collector is not running, no update is made. In the case of the vCenter extension, the collector first tests the parameters for validity. If the parameters are valid, the extension disconnects from the vCenter server and reconnects with the new parameters.



Field	Description
Name	A unique name for this vCenter event collector extension for easy identification.
Short description	A description of this collector.
Extension	[Read-Only] The collector type is automatically set to **vCenterExtension**.
Status	This field auto-populates with the status of the collector. This field is blank until the

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Field	Description
	collector is started. After issuing a command to the collector, you see one of these values: ○ **Started**: The collector is running. ○ **Stopped**: The collector is not running. ○ **Offline**: The MID Server is down. ○ **Error**: The collector failed with an error. **Note:** The MID Server continues to process vCenter events, even if it is paused. The status of the event collector may show as **Started**.
Error Message	Message describing any error that causes a command, such as **Start** or **Stop**, to fail. This field only appears when the value in the **Status** field is **Error**.
Execute on	Location for running this collection. The possible options are **Specific MID Server** or **Specific MID Server Cluster**.
MID Server	The name of the designated MID Server if you selected **Specific MID Server** in the **Execute on** field. The name of the designated MID Server cluster if you selected **Specific MID Server Cluster**. If you selected the MID Server cluster option, an algorithm determines which server in the cluster runs the collector.
vCenter	The IP address or hostname of the vCenter server.
Executing on	[Read-Only] The name of the MID Server on which the collector is running. This field shows the name of the MID Server even if the MID Server is down. If the collector is stopped by the user, this field is empty.

Related topics

VMware discovery

SNMP trap collector extension

The SNMP trap collector is a MID Server extension that listens for SNMP traps from the devices on your network.

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1. Ensure that the MID Server can connect to elements inside and outside your network
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3. Configure your MID Server
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Upon receiving a trap, the MID Server sends the trap to the instance for further processing by Event Management. If Event Management is not active, traps are not processed and are discarded by the instance.

For the SNMP trap collector extension to receive traps from network devices, each device must designate the MID Server that runs the SNMP trap collector extension as a recipient of the trap. See the documentation for the network device to configure your hardware to do this. Generally, the SNMP trap collector extension should run on only one MID Server per VLAN. Multiple MID Server recipients on the same VLAN causes duplicate data in the CMDB. If network devices are separated by VLANs, multiple MID Servers may have trap collectors installed.

To configure multiple SNMP trap collector extensions, configure each in a separate record, with a unique name, and a designated MID Server.

Configure the SNMP Trap Collector Extension

For the SNMP trap collector extension to receive traps from network devices, each device must designate the MID Server that runs the SNMP trap collector extension as a recipient of the trap.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **MID Server** > **Extensions.** > **MID SNMP Trap Listener**
2. Click **New** or open an existing extension.
3. Fill in the fields from the table, as appropriate.
4. Click **Submit** or **Update**.



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Field name	Description
Name	A unique name for this SNMP trap collector extension for easy identification.
Short description	A description of the MID Server extension, if more description than the **Name** is necessary.
Extension	[Read-Only] The extension type is automatically set to **TrapExtension**.
UDP port	The port number that your network hardware uses when sending a trap to the designated MID Server. Port numbers 1024 and above are recommended. Port numbers 1023 and lower may be system reserved and can result in access violations for MID Servers that are not running with administrative credentials.
Status	[Read-Only] The status of the trap collector extension. This field is blank until the extension is run. After it is run, the value may be: ○ **Started:** The extension is running. ○ **Stopped:** The extension is not running. ○ **Offline:** The MID Server is down. ○ **Error:** The extension failed with an error.
Execute on	The location for running this extension: a **Specific MID Server** or a **Specific MID Server Cluster**. The recommended setting is **Specific MID Server**. Network hardware typically has to be configured to send to a specific IP address. If the listener moved to a different MID Server in the cluster, the trap would not be received.
MID Server	The name of the designated MID Server if you selected **Specific MID Server** in the **Execute on** field. The name of the designated MID Server cluster if you selected **Specific MID Server Cluster** in the **Execute on** field. If you selected **Specific MID Server Cluster**, a ServiceNow algorithm determines which server in the cluster runs the extension.
Executing on	[Read-Only] The name of the MID Server on which the extension is running. This field shows the name of the MID Server even if the MID Server is down. If the extension is stopped by the user, this field is empty.

5. In **Related Links**, run any of the following actions against the SNMP trap collector extension:

Related Link	Description
Start	Starts the extension if it is currently not running. The extension is started on the configured MID Server and port number.
Stop	Stops the running extension on the configured MID Server. No action is taken if the extension is not running.

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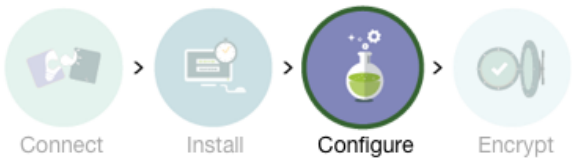
Related Link	Description
Restart	Stops, then starts the extension on the configured MID Server and port number.
Test	Verifies that the configured MID Server can run the SNMP trap collector extension on the specified port. Running a test does not affect any extensions that are currently running.
Update parameters	If you make changes to the extension configuration, use this option to update the parameters of the currently running extension. First, the parameters are tested for validity. If the parameters are valid, the extension disconnects and reconnects with the new parameters.

MID Server Resource Reservation

This feature allows resources to be reserved before a task is assigned to a thread. If the resources the task needs aren't available, then that task waits in the MID Server work queue while other tasks are assigned to the thread.



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For Discovery, the MID Server tasks are the probes or patterns it executes. While probes are waiting to be executed on the MID Server, they provide resource requirements (CPU, memory, and so on) and if they cannot be met, the probe waits in the work queue until the resources are available.

Note:
MID Server Resource Reservation delays probe execution until resources are available. This is based on extremely flexible criteria. The MID Server Resource Reservation feature is for advanced users and should not be configured until a problem is identified. This configuration depends entirely on the problem details.

Using the MID Server Resource Reservation allows for better use of threads since the threads are not assigned a task it cannot complete.

Features:

- Resource reservations apply to a single MID Server only
- Resources can depend on system or MID Server properties
- Resources can depend on probe parameters, allowing you to limit the number of active probes and patterns against a given IP

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- Reports resource usage
- Extensible (the customer defines their own resources)
- Scriptable

Benefits:

- Keeps PowerShell probes from impacting execution of other probes
- Can be used to limit the impact Discovery has on a target system
- Can be used to limit the number of "large" probes being executed by a MID Server at the same time
- Can be used to throttle Discovery (to minimize impact on the instance)

Use MID Server Resource Reservation

A resource is just a name and a count. Define the name of the resource, which probes use it, and how many of the resources those probes should use.

Before you begin

Role required: admin

- Make sure the MID Server property **mid.probe.wait.resources** is set to true to enable MID Server Resource Reservation. Changing this property requires restarting the MID Server.
- Choose a resource name. Anything in { } in the name is replaced by the probe parameter with that name. This name is typically used for per-host resources, for example, ssh{source} means a separate resource named "ssh" is available on every host being discovered. ("source" is the name of the probe parameter that contains the IP address being probed.)
- Decide how to specify the number of the resource used by probes or patterns.
  - Every probe uses a constant number of the resource: Create a "simple value" resource.
  - The number of resources used depends on a system property: Create an "expanding" resource.
  - The number depends on multiple factors: Create a "scripted" resource.
  - Expanding: Anything in { } is replaced by the system or MID Server property with that name. Logical operators are allowed, for example, "{mid.windows.management_protocol}".toLowerCase() == "winrm" ? 1:0
  - Scripted: the script is evaluated. The return value is expanded.

Procedure

1. Create a new resource.
   a. Navigate to **Discovery Definition** > **Limited Resources**> **Simple Value** and click **New**.
   b. Enter a resource name.
   c. Enter the number of resources used and click **Save**.
2. Define which probes use the resource.
3. Navigate to the desired tab and select from the list.

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- **Used by Topic** tab: Includes all probes with that topic. Click **Invert Topic** to include all probes without that topic. For example: SSHCommand with Invert Topic, means all probes except for SSH. Heartbeat and queue messages are always excluded.
- **Used by probes** tab: Includes a list of probes. Click **Invert Probes List** to include all probes without that probe. Horizontal Discovery probe means apply to all patterns.
- **Used by patterns** tab: Includes a list of patterns. You can also click Invert Pattern list.

4. Define availability on the MID Server.
5. Navigate to **Discovery Definition** > **Limited Resources** > **MID Resources**.
   - Resource: This is the reference to the resource.
   - Available: Number available. Anything inside brackets, is replaced by the system or MID Server property.
   - MID Server: MID Server to apply this to. (Empty) means all.
6. Set the resource order.
   a. Click in the **Order** field of each resource.
   b. Type in the number.
   c. Click the check mark to Save.

Note:
Less valuable resources should have a lower order – these resources are reserved and held until higher order resources can be obtained. For example, both the total PowerShell sessions (resource is "PowerShell") and the number of simultaneous sessions to any host (resource is "PowerShell{host}") are limited. Therefore, PowerShell{host} resource should have a lower order. Obtaining PowerShell first would impact all other PowerShell probes. Obtaining "PowerShell{host}" first only impacts other PowerShell probes to that host.

7. Review the Resource State that you have set up.
   a. Run a Discovery.
   b. Observe Resource State.
   c. Click **Get resource state** from the MID Server page or view in an ECC input payload.

   Result of Get resource state:

   - PowerShell{source} has additional entries for every {source} with a current allocation.
   - "Reserved by" may show multiple resources if the probe requires more than one resource.

   Result of ECC input payload:

   - The resource_wait attribute only exists if the probe had to wait for a resource.
   - The time displayed is in milliseconds.
   - The probe may have waited on multiple resources, with different wait time for each.

How MID Server Resource Reservation works

In addition to the work queue, the MID Server contains a waiting queue. When picking a task for execution, the waiting queue is always checked first. If no task in the waiting queue can execute, then the work queue is tried. Probes and patterns in the waiting queue reserve all necessary resources until they're able to execute.

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The first probe or pattern in the queue is offered available resources. It takes any of the lowest order resource that is available. After getting the required number of lowest order resources, the probe or pattern goes to the next lowest order resources, and so on. The order allows the user to configure which resources are more or less important. Lowest order resources are gathered first because holding these resources has less impact on execution of other probes and patterns.

Tables

mid_limited_resource

- Defines the resources used by a probe or pattern.
- Extended by mid_limited_resource_value, mid_limited_resource_expanded, and mid_limited_resource_script each containing a single additional field.
  - mid_limited_resource_value adds a single field named “value” to the base table.
  - mid_limited_resource_expanding adds a field named “expanding.”
  - mid_limited_resource_script adds a field named “script”.

mid_resource

- Sets the resources available on a MID Server.
- Values from this table are copied to ecc_agent_property.
- A business rule on this table creates the corresponding MID Server properties.
- It has a reference to a resource and the number available. If the number available is inside { } then it’s the name of a system property, MID Server config, or MID Server property (all three places are checked). So {mid.powershell_api.session_pool.max_size} is the value of that MID Server config that sets the size of the PowerShell session pool.

Base: mid_limited_resource table

Label	Column	Type	Size	Information
Resource Name	name	String	100	Unexpanded name of the resource
Active	active	Boolean		Allows temporary disable
Invert Topic	invert_topic	Boolean		
Invert Probe List	invert_probe_list	Boolean		
Invert Pattern List	invert_pattern_list	Boolean		

Note:
There are m2m tables that associate a mid_limited_resource record with topics, probes, and patterns. The “invert_” fields change the list from inclusion to exclusion.

Extensions: mid_limited_resource_value, mid_limited_resource_expanding, and mid_limited_resource_script tables

Label	Column	Type	Size	Information
Value	value	Integer		

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Extensions: mid_limited_resource_value, mid_limited_resource_expanding, and mid_limited_resource_script tables (continued)

Label	Column	Type	Size	Information
Expanding	expanding	String	1000	A slightly extended version of the availability number because it accepts logical and ternary operations, for example, "{mid.windows.management_proto == "WinRM" ? 1 : 0. If the management protocol is WinRM this evaluates to 1, otherwise it's 0.
Script	script	String	4000	The script is evaluated. If the result is a string, then it's expanded

mid_resource table

Label	Column	Type	Size	Information
Active	active	Boolean		Allows temporary disable
Available	available	String	255	Number of this resource available on MID Server
MID Server	ecc_egent	Reference		Reference to MID Server or empty for all
Order	order	Integer		Order in which resources are allocated
Resource	resource	Reference		Reference to the resource

Containerized MID Server

Containerized MID Server uses a Docker image of the MID Server that allows you to quickly deploy MID Servers at scale. MID Servers are deployed using orchestration tools like OpenShift or Kubernetes. Orchestration tools can automate their deployment and maintenance and add new containers on demand or replace failed containers automatically.

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To use Containerized MID Servers, you can download Docker recipes for Linux from the MID Server download page. Use the recipes to build the Docker images for the current release. The recipes are zipped and signed. Some features have been deprecated for the Washington DC family release. See [KB1559617] Deprecated Containerized MID Server Features in Washington DC for more information.

Containerized MID Server system requirements:

- AlmaLinux is supported.
- The recipes cannot be used to build images for previous MID Server versions.
- Discovery of NMAP and CyberArk are not supported.
- Other applications such as Orchestration and Integration Hub are not certified.

Once the Docker images are available, you can create new MID Server containers and configure them with configuration parameters passed through environment variables or secret files. Docker, Openshift, and Kubernetes secrets are supported. The MID Server application inside the container is run as a process by a non-admin user.

When a containerized MID Server record is first created on the instance, a random UUID is created and set to the **container_id** column. During the start-up sequence, this value is replaced by the actual container ID. The container ID can be used to differentiate between containerized and regular MID Servers. Non-containerized MID Servers' container ID have a null or empty value.

In order to automatically clean up the down MID Servers on Instance, a scheduled job called Purge Orphaned Containerized MID Servers is scheduled to run daily. This job removes orphaned containerized MID Servers if they are down longer than the value set by the **max_retention_days** property. The job also creates a warning MID Server issue each day before the removal day, if there are equal to or less than the value of **warn_days** remaining. The default values for **max_retention_days** and **warn_days** are 30 and 7, respectively.

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Auto-upgrade

Auto-upgrade works the same way for containerized MID Servers as it does for regular MID Servers. However, it is recommended to disable the auto-upgrade for containerized MID Servers. Whenever a new image is needed, build a new image and deploy it by updating the deployment YAML file then re-apply it.

Containerized MID Server auto-upgrade is controlled by the **mid.container.autoupgrade.enabled** config parameter and is set to true by default. The config parameter is read-only, therefore it can not be synced down from the instance.

Add the config parameter to a MID Server profile and use it with new deployment requests. The settings are then included in deployment YAML file when the deployment request is exported, or when it is manually added to an existing deployment YAML file and re-applied.

HealthCheck

A HEALTHCHECK rule is implemented to check MID Server health status based on heartbeat every 5 minutes. If there was no heartbeat activity in last 30 minutes, it is considered a failure. After 3 consecutive failures, it becomes unhealthy in the docker ps command output.

To see more HealthCheck details, run the following docker inspection command: `docker inspect --format='{{json .State.Health}}' <container-id>`

Basic Container Operations

Basic operations are supported on container side. For example, you can stop, start, or restart a running container using Docker commands.

docker stop <container_id>

This command shuts down the containerized MID Server.

docker start <container_id>

This command starts a containerized MID Server if it is stopped.

docker restart <container_id>

This command shuts down a MID Server and restarts it.

Build MID Server Docker Image

Build a MID Server Docker Image with the provided recipes to deploy a Containerized MID Server. Containerized MID Server uses a Docker image of the MID Server that allows you to quickly deploy MID Servers at scale.

Containerized MID Server Deployment and Auto-configuration

With the deployment and auto-configuration feature, an agent admin can enter all required MID Server #settings in a MID Server Profile on the instance and then submit a deployment request to K8s cluster. After the request is#processed, the new MID servers are automatically created and auto-configured. They are ready#to use in seconds. #If the MID Server profile is changed, the related Containerized MID Servers can also be updated on demand.

Build MID Server Docker Image for Linux

Deploy Containerized MID Servers on Linux by creating a Docker image with the provided recipes. Containerized MID Server uses a Docker image of the MID Server that allows you to quickly deploy MID Servers at scale.

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Before you begin
Role required: admin



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Prerequisites:

The host must use Docker engine and command-line interface (CLI) 20.10.4 or later.

Update the library to the newest version available, or at least the highest version with a security fix. If issues identified are part of a transitive dependency, find a version of the dependent library which includes a newer transitive version. If the transitive dependency cannot be upgraded by upgrading the dependent library, consider excluding the dependency and directly including a secure version.

Note:
Check docker availability by running the docker version command as administrator. See the the docker version command documentation for more information.

Procedure

1. Download the Linux Docker recipe ZIP file from the MID Server download page and verify its signature.
   For more information about the MID Server download page and signature verification, see Download MID Server files.
2. Unzip the ZIP file to a folder.
3. **Optional:** You can change the current directory to the new folder.
4. To build an image, run the build command: `> docker build <path-to-docker-recipe> [ --tag <docker-tag> ]`

   For more information on the command, see the Docker build command documentation. The path to the Docker file can be a relative path or the current directory if the file is in the Docker recipe directory.

   The default image tag is provided out-of-the box in the .env file with the **DOCKER_TAG** parameter. You can export this parameter before executing any docker command by running the command: `> export $(grep DOCKER_TAG .env)`. You can replace `<docker-tag>` with the **DOCKER_TAG** value in all the following commands.

   The build command takes the following build arguments:

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Property	Description
MID_INSTALLATION_URL	The link to download the MID Server installation file. By default, it is set to the download link for the Linux 64 bit Installation ZIP file provided on the MID Server download page.
MID_INSTALLATION_FILE	The name of a local MID Server installation file. The default value is empty. If this parameter is not empty, the recipe uses the local file instead of downloading from the installation server. This parameter uses the file name only, not the full path. Before the build, the local file must be copied to the `asset/` sub-folder of the recipe directory. MID Server releases prior to Rome are not supported. For example: `> docker build <path-to-dockerfile> --build-arg MID_INSTALLATION_FILE=<mid.installation.fi --tag <docker-tag>`
MID_SIGNATURE_VERIFICATION	The signature of the MID Server installation file must be verified. The default value is TRUE. If it is TRUE, the build process always verifies the digital signature of the MID Server installation file whether it is downloaded from the remote server or a local file. Otherwise, the signature verification is skipped. For example: `> docker build <path-to-dockerfile> --build-arg MID_SIGNATURE_VERIFICATION=false --tag <docker-tag>`
USER_ID and GROUP_ID	By default, when not specified, Docker creates a#MID Server user with user id = 1001 and group id = 1001. You may pass a custom user id and group id into container by using the#USER_ID#and#GROUP_ID#build arguments. Docker creates an user for the #MID Server #with the provided user id and group id. Inside the container image, all files under the MID Server installation folder are owned by this user and the root group (id=0). When the image is deployed on Kubernetes platform, this MID Server user becomes the container user who runs the MID Server. When the image is deployed on an OpenShift#platform, OpenShift may assign an arbitrary non-admin user id as the container user who runs the MID Server.

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Property	Description
	However, that user always belongs to the root group. In both cases, the container user has full access to the MID Server files. That way, the same image can be deployed on Kubernetes as well as on OpenShift.

5. **Optional:** After the image is built successfully, you can list the image built with command: > `docker image ls`

What to do next

To save disk space, if there are unused or intermediate images, run the following commands to remove those dangling images:

```
$ docker rmi $(docker images --filter "dangling=true" -q
 --no-trunc)
```

For example, before removing dangling images, the command `docker image ls` may show something similar to the following:

```
REPOSITORY                                    TAG
                        IMAGE ID       CREATED              SIZE
mid
 trackdiscocopper-10-09-2020_10-14-2021_2200   4542b6ab34af   21
 seconds ago       1.01GB
<none>                                        <none>
                           1cdae087a970   About a minute ago
 1.38GB
```

After removing the dangling images, the command `docker image ls` shows the following:

```
REPOSITORY                                    TAG
                        IMAGE ID       CREATED              SIZE
mid
 trackdiscocopper-10-09-2020_10-14-2021_2200   4542b6ab34af
 About a minute ago   1.01GB
```

Launch Containerized MID Server

Containerized MID Server uses a Docker image of the MID Server that allows you to quickly deploy MID Servers at scale. MID Servers are deployed using orchestration tools like Docker Swarm.

Before you begin

Role required: admin

Prerequisites:

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- Linux hosts must use AlmaLinux distribution 64 bit architecture, and AlmaLinux distro is recommended.

- The host must use Docker engine and command-line interface (CLI) 20.10.4 or later.

> **Note:**
> Check docker availability by running the docker version command as administrator. See the the docker version command documentation for more information.

Procedure

1. Once the image is available, launch the new MID Server using the docker run command and specify an env file or env variable options: `docker run --env-file <env_file_name_here> <docker_tag or image_id>`

> **Note:**
> Do not pass sensitive data using this command, as there may be security vulnerabilities. To pass sensitive data, use the procedures Pass sensitive data to a containerized MID Server with Docker Secrets and Pass sensitive data to a containerized MID Server with Kubernetes Secrets.

For more information, see the Docker documentation pages for the docker image ls command, the docker run command, and specifying an env file or env variable options. The env file is a simple text file using the name=value format. If a variable is specified in both env file and in the `--env` option, the variable defined in the command line takes precedence.

While deployment requests are the recommended method to launch containerized MID Servers, they can be alternatively configured with environmental variables. When the container is first started, the initialization script will take the environment variables and configure the MID Server application using the following environment variables:

MID_INSTANCE_URL

This variable sets the 'url' config parameter.

MID_INSTANCE_USERNAME

This variable sets the 'mid.instance.username' config parameter.

MID_INSTANCE_PASSWORD

This variable sets the 'mid.instance.password' config parameter.

MID_SERVER_NAME

This variable sets the 'name' config parameter.

MID_PROXY_HOST

This variable sets the 'mid.proxy.host' config parameter. This variable is not mandatory and is only necessary when a proxy is set up.

MID_PROXY_PORT

This variable sets the 'mid.proxy.port' config parameter.

MID_PROXY_USERNAME

This variable sets the 'mid.proxy.username' config parameter.

MID_PROXY_PASSWORD

This variable sets the 'mid.proxy.password' config parameter.

MID_SECRETS_FILE

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This variable specifies the full secret filename that contains sensitive data like passwords or certificate.

MID_MUTUAL_AUTH_PEM_FILE

This variable specifies the full filename of the client certificate file used for auto validation setup.

2. **Optional:** To see a list of containers, run the docker container ls command: `docker container ls [-a]`

Pass sensitive data to a containerized MID Server with Docker Secrets

You can configure containerized MID Servers with configuration parameters passed through environment variables or secret files.

Before you begin

Role required: Docker Swarm admin

About this task

You can pass sensitive data, such passwords or certificates, into a containerized MID Server using Docker Secret. Setup and start Docker Swarm before using this procedure.

When creating deployments, ensure that the replicas are kept to 1.

Procedure

1. Place the sensitive data in `mid-secrets.properties`
2. Create a docker secret using the docker secret create command: `docker secret create mid-secrets mid-secrets.properties`

   The first `mid-secrets` represents the secret in docker swarm, while the second `mid-secrets.properties` parameter represents the file path to read the secret on the host machine's filesystem. You can list all created secrets by running the command `docker secret ls`.

   For more information on the docker secret command, see the docker secret documentation.
3. Update the **MID_SECRETS_FILE** environment variable with the path to the secret file inside the container.
   The default path for Docker Swarm secrets on Linux is `/run/secrets/mid-secrets.properties`.
4. Deploy the MID Server Image Container to Swarm using the docker service create command: `docker service create --name mid-service --secret mid-secrets.properties --env-file mid.env <docker-tag or image-id>`

   Make sure that the `--secret flag` is provided for the container service to associate with the specified secrets.

Pass sensitive data to a mutual authenticated containerized MID Server with Docker Secrets

You can configure containerized MID Servers with configuration parameters passed through environment variables or secret files.

Before you begin

Role required: admin

Role required: Docker Swarm admin

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About this task

If certificate based authentication is enabled on the instance, the MID Server can be configured to auto-validate using a mutual authentication client certificate (PEM file). This can be done via setting the full path to the PEM certificate file inside container with the *MID_MUTUAL_AUTH_PEM_FILE* environment variable. For example, you can update variable to *MID_MUTUAL_AUTH_PEM_FILE= /run/secrets/certificate.pem* in the `mid.env` file.

You can pass the PEM certificate file into a container using Docker or Kubernetes secret. The following is an example command to pass the PEM certificate file into a container: `docker service create --name mid-service --secret mid-secrets.properties --secret <certificate-secret-name> --env-file mid.env <docker-tag or image-id>`

The mutual PEM certificate is installed on the MID Server during initialization. MID Server then connects to the instance and auto-validates. When the MID Server connects to the instance with mutual authentication successfully enabled, you might observe some of the following entries in the MID agent log:

- Installed custom certificate into the MID keystore
- Configured MID to use mutual authentication

Procedure

1. Prepare the mutual authentication PEM bundle.
2. Create a docker secret using the docker secret create command: `docker secret create mutual-auth-secret <mutual-auth-pem-file-on-local-filesystem> .`

   You can list all created secrets by running the command `docker secret ls`.
3. Update the **MID_MUTUAL_AUTH_PEM_FILE** environment variable with the path to the secret file inside the container.

   The default path for Docker Swarm secrets on Linux is `/run/secrets/<mutual-auth-pem-file-name>`.
4. Deploy the MID Server Image Container to Swarm using the docker service create command: `docker service create --name mid-service --secret mutual-auth-secret --env-file mid.env <docker-tag or image-id>`

   Ensure the `--secret` flag is provided for the container service to associate with the specified secrets.
5. Deploy the containerized MID Server to the pod with the **deployment.yml** and run the command: `kubectl create -f deployment.yml`

Pass sensitive data to a containerized MID Server with Kubernetes Secrets

You can configure containerized MID Servers with configuration parameters passed through environment variables or secret files.

Before you begin

Role required: Kubernetest admin

Setup and start Kubernertes cluster before using this procedure. For more information on Kubernetes Secrets, see the Kubernertes secrets documentation.

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Note:
Kubernetes doesn't work directly with a local image. Upload the MID Server image to a public registry or setup a local registry. See the official Docker instruction on building a docker registry.

When creating deployments, ensure that the replicas are kept to 1.

Procedure

1. Place the sensitive data in mid-secrets.properties accordingly.
2. Create a Kubernetes secret with the command: `kubectl create secret generic mid-secret --from-file=mid-secrets.properties`
3. **Optional:** You can list all created secrets by running the command: `kubectl get secrets`
4. Update the **MID_SECRETS_FILE** environment variable with the path to the secret file inside container.
   The path is defined in data field when creating a configuration file for a Secret.
5. Create a deployment with the following sample YML content:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: basic-example
spec:
  selector:
    matchLabels:
      app: MIDServerManagement
      provider: ServiceNow
  replicas: 1
  template:
    metadata:
      labels:
        app: MIDServerManagement
        provider: ServiceNow
    spec:
      containers:
        - name: basic-example-container
          imagePullPolicy: IfNotPresent
          image: "mid:imageTag"
          env:
            - name: MID_INSTANCE_URL
              value: "
 https://exampleinstance.service-now.com/"
            - name: MID_INSTANCE_USERNAME
              value: "mid_server_user_name”
            - name: MID_SECRETS_FILE
              value:
 "/opt/snc_mid_server/secrets/mid-secrets.properties“
            - name: MID_SERVER_NAME
              value: "Basic-Example-MID"
          volumeMounts:
            - mountPath: "/opt/snc_mid_server/secrets"
              name: "mid-mount-secret"
              readOnly: true
      volumes:
```

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```
      - name: "mid-mount-secret"
        secret:
          secretName: "mid-secret"
```

Note:
There are many ways to create a deployment or pod. For more information, see the Kubernetes deployment instructions.

6. Deploy the containerized MID Server to the pod with the deployment.yml and run the command: `kubectl create -f deployment.yml`

Pass sensitive data to a mutual authenticated containerized MID Server with Kubernetes Secrets

You can configure containerized MID Servers with configuration parameters passed through environment variables or secret files.

Before you begin
Role required: Kubernetest admin

Prerequisites:

If certificate based authentication is enabled on the instance, the MID Server can be configured to auto-validate using a mutual authentication client certificate (PEM file). This can be done via setting the full path to the PEM certificate file inside container with the *MID_MUTUAL_AUTH_PEM_FILE* environment variable. You can pass the PEM certificate file into a container using Kubernetes secret.

The mutual PEM certificate is installed on the MID Server during initialization. MID Server then connects to the instance and auto-validates. When the MID Server connects to the instance with mutual authentication successfully enabled, you might observe some of the following entries in the MID agent log:

- Installed custom certificate into the MID keystore
- Configured MID to use mutual authentication

Procedure

1. Prepare the mutual authentication PEM bundle.
2. Create a Kubernetes secret with the command: `kubectl create secret generic mutual-auth-secret --from-file=<mutual-auth-pem-file>`
3. **Optional:** You can check all created secrets by running the command: `kubectl get secrets`
4. Update the **MID_MUTUAL_AUTH_PEM_FILE** environment variable with the path to the secret file inside container.
5. Create a deployment with the following sample YML content:

```
6. apiVersion: apps/v1
7. kind: Deployment
8. metadata:
9.   name: mutual-auth-example
10. spec:
11.   selector:
12.     matchLabels:
13.       app: MIDServerManagement
14.       provider: ServiceNow
```

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```
15.   replicas: 1
16.   template:
17.     metadata:
18.       labels:
19.         app: MIDServerManagement
20.         provider: ServiceNow
21.     spec:
22.       containers:
23.         - name: mutual-auth -container
24.           imagePullPolicy: IfNotPresent
25.           image: "mid:imageTag”
26.           env:
27.             - name: MID_INSTANCE_URL
28.               value:
 "https://exampleinstance.service-now.com/"
29.             - name: MID_INSTANCE_USERNAME
30.               value: "mid_server_user_name”
31.             - name: MID_SERVER_NAME
32.               value: "Mutual-Auth-Deployment-MID"
33.             - name: MID_MUTUAL_AUTH_PEM_FILE
34.               value:
 "/opt/snc_mid_server/mutual-auth/yourpemfile.pem"
35.           volumeMounts:
36.             - mountPath: "/opt/snc_mid_server/mutual-auth"
37.               name: "mid-mount-mutual-auth"
38.               readOnly: true
39.       volumes:
40.       - name: "mid-mount-mutual-auth"
41.         secret:
42.           secretName: "mid-mutual-auth-secret"
```

6. Deploy the containerized MID Server to the pod with the **deployment.yml** and run the command: `kubectl create -f deployment.yml`

Containerized MID Server Deployment and Auto-configuration

An agent admin can enter a MID Server Profile and create a deployment request on the instance. She/he can then export the deployment request to a YAML file and use it to deploy MID Servers to Kubernetes or OpenShift cluster.

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6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Containerized MID Servers use a Docker image of the MID Server that allows you to quickly deploy MID Servers. The documentation for Build MID Server Docker Image for Linux provides steps for manually preparation and deployment. The following Containerized MID Server auto-configuration simplifies the process and makes it scalable.

MID Server profile

A MID Server profile contains all the settings required to configure a new MID Server, excluding sensitive data such as passwords and certificates. Sensitive data should be passed through Secrets created on the K8s cluster. The user only enters secret names and locations in the deployment request. An **agent_admin** role is required to create or change profiles. MID Server profiles are stored in the following tables:

- mid_server_profile
- mid_profile_config
- mid_profile_wrapper_config
- mid_profile_property
- mid_profile_application_m2m
- mid_profile_capability_m2m
- mid_profile_ip_range_m2m
- mid_profile_cluster_m2m

During deployment, the **mid_profile_config** and **mid_profile_wrapper_config** parameters are sent to the K8s cluster. These parameters populate the `config.xml` and `wrapper-override.conf` of the new MID Server. The other parameters are used by the auto-configuration on the instance. The user can access the MID Server profile from the module **MID Server Profiles** on the instance.

The MID Server name is not required in a profile because a profile can be used to deploy multiple MID Servers. Instead, the user is asked to enter MID Server names as part of a new deployment request. For the **mid_profile_wrapper_config**, the user can enter any parameters that they want to see in `wrapper-override.conf`. For example:

Name	Value

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wrapper.java.maxmemory	2048
wrapper.java.additional.3	-Djavax.net.debug=ssl:handshake

Other profile settings can be entered the same way as on a MID Server record.

MID Server Deployment Request

After creating a MID server profile, the user can make a new deployment request to prepare the deployment process. A deployment request can be different for different container orchestrators. See MID Server Deployment Request for more information.

Export MID Deployment Request for Manual Deployment

The user can export it to a K8s deployment YAML file. The user can download the YAML file to the K8s cluster and deploy new MID Servers with the following command: `kubectl apply -f <yaml_file>`

Docker image preparation

To prepare a Docker image, first build a MID Server image on a K8s cluster as explained in Build MID Server Docker Image. Upload the built image to an image registry and pull the image to a local image with the command: `docker pull registry/mid:<tag>`. Refer to Docker Registry Setup for Containerized MID Server II: Auto Configuration [KB1001380] for information on limitations on pulling an image directly from a remote registry.

Kubernetes preparation

See also How to build and deploy Containerized MID Servers in Kubernetes using StatefulSets [KB1325173].

Kubernetes service account setup

Ensure the service account has the proper RBAC set up to create, delete, and list permission for resources. The following example YAML file uses the default service account:

```
apiVersion: rbac.authorization.k8s.io/v1
 kind: ClusterRoleBinding
 metadata:
    name: default-service-acccount-as-cluster-admin
 subjects:

  - kind: ServiceAccount
    # Reference to upper's `metadata.name`
    name: default
    # Reference to upper's `metadata.namespace`
    namespace: default
 roleRef:
    kind: ClusterRole
    name: cluster-admin
    apiGroup: rbac.authorization.k8s.io
```

You may choose a custom service account and assign a **ClusterRole** to that service account and name space. The default name space is **default**. The following example YAML file uses a custom name space, **mynamespace**.

```
apiVersion: rbac.authorization.k8s.io/v1
 kind: ClusterRoleBinding
 metadata:
```

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```
    name: custom-serviceacccount-as-cluster-admin
subjects:

  - kind: ServiceAccount
    # Reference to upper's `metadata.name`
    name: mycustomserviceaccount
    # Reference to upper's `metadata.namespace`
    namespace: mynamespace
roleRef:
    kind: ClusterRole
    name: cluster-admin
    apiGroup: rbac.authorization.k8s.io
```

Kubernetes Secret setup

Secrets are created for **mid-secrets.properties** or PEM files for mutual authentication. For more information about how to create a Secret, see the section in Containerized MID Server.

Auto-configure new Containerized MID Servers

When a MID server is connected to the instance for the first time, a MID Server record is created. The MID Server record is populated with the container ID, profile ID and deployment name. The **Auto-Configure MID from profile** business rule is triggered when the new MID Server record is updated with a profile ID in the **profile_id** field. The business rule looks up the profile settings associated with that profile ID and configures the new MID server accordingly.

Sync MID Server Profile to existing MID Servers

The MID Server profile can be out-of-sync with the settings of existing MID Servers if the user updates the profile long after the related MID Servers were auto-configured. The user can synchronize the profile settings to the existing MID Server by selecting **Sync to MID Servers** on the instance.

MID Server Deployment Request

After creating a MID server profile, the user can make a new deployment request to prepare the deployment process. A deployment request can be different for different container orchestrators.

Before you begin
Role required: agent_admin

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6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

The user can access MID Server deployment request from the app module **MID Deployment Requests**.

Currently, only K8s deployment is supported. The K8s deployment request includes a reference to a MID Server profile, information about a MID Server docker image, K8s secrets, K8s deployment labels, and a list of MID Server names to assign to the new MID Servers.

Procedure

1. Enter information about the container image.

   In this section, you will specify which image is used with this deployment request and where it can be pulled from.

   Image Registry Path and Repository

   Enter a registry address and port, as well as a repository name where the image is stored. The syntax is `my.registry.address:port/repositoryname`.

   Image Tag

   Enter a tag that identifies the container image.

2. Specify the MID Server names.

   A deployment request can be made to create multiple MID Servers. You can choose to enter the MID Server names manually, otherwise the system automatically generates them. If you enter the names manually, each MID Server name must be unique.

3. Enter the Kubernetes cluster Information.

   K8s Namespace

   Enter a K8s namespace where the new MID servers are located. The default value is **default**.

   K8s Service Account

   Enter a K8s service account name that processes this deployment request. The default value is **default**.

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MID Secrets Name

Enter the name of a K8s secrets object that holds MID Server secrets.

MID Secrets File Path

Enter the absolute path of the MID Server secrets file inside the container.

MID Mutual Auth PEM Secrets Name

Enter the name of a K8s secrets object that holds the MID Mutual Auth PEM certificate.

MID Mutual Auth PEM File Path

Enter the absolute path of the MID Mutual Auth PEM file inside container.

K8s Deployment Label

Enter a deployment label which is a list of key/value pairs. The label is attached to K8s deployment. A valid label must be 63 characters or less and can be empty. Unless the label is empty, it must begin and end with an alphanumeric character and contain only dashes, underscores, dots, and alphanumeric characters.

What to do next

When a request is ready, the user can choose **Export to YAML file** to generate a K8s deployment YAML file and attach it to the same record. Once a request is processed, the entire record is set to read-only. There is a scheduled job that removes deployment requests older than 365 days.

Containerized MID Server Autoscaling

MID Servers can be deployed via StatefulSet with any number of replicas. They can scale automatically by leveraging Kubernetes Horizontal Pod Autoscaler (HPA). Horizontal Pod Autoscaler automatically updates a workload resource (such as a Deployment or StatefulSet) to match demand.



1. Ensure that the MID Server can connect to elements inside and outside your network
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3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
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Kubernetes can add or remove any numbers of stateful MID Server replicas as required by the workload. HPA only supports CPU and memory metrics. MID Servers can be deployed as a stateful application by providing the following information in the StatefulSet section of the deployment request form:

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- Name
- Headless service name
- Persistent volume claim (PVC)
- Parameters, such as storage class, access modes, and storage request
- The resource request/limit

The PVC declares the desired persistent volume where the MID Server stores config.xml, meta data files, and several of its sub-folders.

During workload fluctuations, a pod with a running MID Server container can be removed and replaced by a new one. StatefulSet ensures the same persistent volume is attached to the new pod, which allows the MID Server to resume its state.

The only sub-folders that can be mounted to the persistent volume are those that are initially empty with a new MID Server installation. The **config.xml** file and other meta data files must be backed up when the pod is shut down and restored during start-up.

Deployment requests exported as YAML files can be used to create a StatefulSet workload and new MID Server pods in the Kubernetes cluster.

When you make changes to the deployment YAML file and re-apply it, the existing pods of the deployment are recreated. With StatefulSet deployment, the configuration files are restored from the backup folder. The init script must detect the deployment environment changes and apply them to the configuration files before MID server is started.

HPA Autoscaling activation

HPA Autoscaling can be activated for any existing StatefulSet workload by creating an HPA controller.

When you create a deployment request, you can choose either HPA version 1 or version 2.

When creating a deployment request on the instance with an HPA configuration, apply the exported YAML file and HPA autoscaling begins working immediately.

Containerized MID Server Properties and Parameters

Containerized MID Servers have several properties and parameters unique to their features.

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Glide Properties

mid.container.deployment.volume_mount.subpaths

- Type: String
- Default value: mid_container,agent/extlib,agent/logs,agent/scripts,agent/security, agent/security_backup,agent/work

Specifies a comma-separated list of persistent volume mount sub-paths.

mid.container.deployment.headless_service_yaml_included

- Type: True | False
- Default value: True

Specifies if the Headless Service Resource is included in the exported YAML file.

MID Server configuration parameters

mid.drain.timeout

- Type: Integer
- Default value: 900

Specifies the timeout in seconds for the drain operation.

mid.drain.run_before_container_termination

- Type: Boolean
- Default value: true

Specifies if the containerized MID Server is drained before container termination.

mid.container.autoupgrade.enabled

- Type: True | False
- Default value: True

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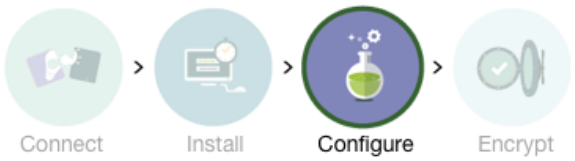
Controls the containerized MID Server auto-upgrade feature. The config parameter is read-only, therefore it can not be synced down from the instance.

Configure a MID Server for IPv6

A MID Server configured for IPv6 can connect to ServiceNow and use Discovery over IPv6 for specific addresses.

Before you begin

Role required: admin



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About this task

A pure IPv6 MID Server does not need to be configured for IPv6. It connects to IPv6 by default, and the **ecc_agent** record for the MID Server is automatically populated with IPv6. Contact Support to ensure your instance is IPv6 enabled.

On a dual stack host, the MID Server defaults to using IPv4. The following procedure configures a dual stack MID Server to use IPv6. The following tables are automatically updated during upgrade to Tokyo to support IPv4 and IPv6:

- **ecc_agent**
- **ecc_agent_router**
- **ecc_agent_ip_address**
- **ecc_agent_command_audit_log**

When using Discovery over IPv6, the following requirements apply:

Windows Discovery

Only WinRM is supported as of the Washington DC release. The requirements for WinRM over IPv6 are the same as IPv4. WinRM must be running on both the MID Server host and target, and the target must be configured as a trusted host on that MID Server.

Unix Discovery

Only SNC SSH is supported as of the Washington DC release. No additional configuration is needed to use SNC SSH over IPv6. J2SSH and Maverick are not supported but, if their protocols are used over IPv6, the command is executed without guaranteeing the correct results. In that case, the following error message is

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reported in the MID Server logs: `IPv6 is currently not supported for MID Server using Maverick (J2SSH), however the command will be executed.`

Procedure

1. Navigate to the Java VM configuration wrapper in `agent/conf/wrapper.override.conf`.
2. Open the file, then uncomment and change the following line of code to true:

   ```
   #wrapper.java.additional.109=-Djava.net.preferIPv6Addresses=false
   ```

   Change the previous line to read as follows:

   ```
   wrapper.java.additional.109=-Djava.net.preferIPv6Addresses=true
   ```

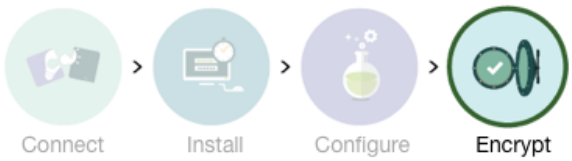
3. Restart the MID Server.
   The MID Server is now configured to connect to the instance over IPv6.

   Note:
   For dual stack MID Servers, changing the wrapper does not affect the data populated in the **ecc_agent** record, which is IPv4 by default.

4. To update the **ecc_agent** record to prefer IPv6 over IPv4, specify the following MID Server configuration parameter and set it to true: **mid.prefer_ipv6_addresses**.
5. Restart the MID Server.
   The dual stack MID Server populates the relevant fields in the **ecc_agent** record with IPv6 addresses. The tables **ecc_agent_router** and **ecc_agent_ip_address** are populated with both IPv4 and IPv6 entries on a dual stack host.

Securing and encrypting MID Server data

After configuring your MID Server, you can add security by encrypting MID Server parameter values in the `config.xml` file. Encryption protects data that the MID Server returns to the ECC Queue. Other available security options include the authorization of SOAP requests, restricting access to the MID Server configuration file, and establishing secure socket layer (SSL) connections.



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How MID Server password encryption works

The *username* and *password* are initially set in the `config.xml` file on the MID Server. When the MID Server retrieves the credentials, it replaces the clear-text password with an encrypted password automatically, using an AES256 encryption algorithm. In continued efforts to improve MID Server security, the encryption algorithm has been enhanced. The MID Server also maintains an encryption key that is generated each time it starts and remains in memory and not on the hard disk. When credentials need to be sent from the instance to the MID Server, the following process takes place:

1. The instance retrieves the encrypted *password* and the unencrypted *username* from the instance database table.
2. The instance decrypts the encrypted *password*, and then re-encrypts it using the MID Server encryption key.
3. The *username* and re-encrypted *password* are sent to the MID Server through the encrypted TLS session was already established between the MID server and the instance.
4. The MID Server receives the credentials and decrypts the *password* in memory before using the credentials for remote operations. At no point is the credential password stored on the disk in an unencrypted format.

Security options

The MID Server provides built-in security options for other content in the configuration file, such as the default encryptor, Windows Data Protection API, and options for custom encryption.

MID Server certificate check policies

Control the MID Server with the certificate check policies table to secure external traffic.

Encrypt or decrypt MID Server configuration file values

You can encrypt and decrypt any value in the MID Server `config.xml` file.

MID Server configuration file security

Protect sensitive MID Server configuration data in the **config.xml** file using internal and external data encryption and external data storage.

MID Server authentication credentials and SOAP requests

Set basic authentication credentials to update the web service invocation data and enforce basic authentication on each incoming SOAP request to the MID Server.

MID Server unified key store

The MID Server unified key store allows all products on the MID Server to use a common certificates and key pairs.

MID Server command audit log

The command audit log records the commands run by the MID Server for the Discovery application.

Rekey a MID Server

Rekey a MID Server to force it to restart and generate a new private key. Typically, this process is only necessary if the MID Server keystore is compromised.

Add SSL certificates for the MID Server

Add certificates to the MID Server to communicate over SSL.

MID Server SSH cryptographic algorithms

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The MID Server utilizes SSH clients to perform many discovery actions. The MID Server automatically determines the best cryptographic algorithm to use.

MID Server authentication credentials and SOAP requests

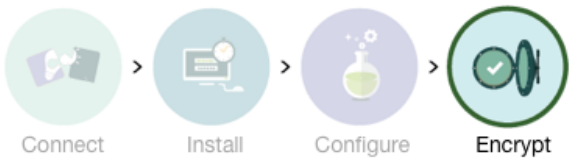
For added security, enforce basic authentication on each incoming SOAP request to the MID Server.

Attach a script file to a file synchronized MID Server

Attach a script file and synchronize it to a MID Server to prevent Windows enhanced security from blocking MID Server download files it determines are dangerous.

MID Server certificate check policies

MID Server uses three kinds of security checks to secure external traffic. The security checks use TLS/SSL certificate validation, hostname validation, and OCSP validation to improve security. Control these security checks with the MID Server certificate check policies table.



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TLS/SSL certificate validation

TLS/SSL encryption security uses asymmetric encryption, also called public-key encryption. This encryption uses two cryptographic keys: the public key and the private key. The public key is used for encryption of data and is publicly visible. The private key is used for decryption of data and its security is essential to verifying authenticity. For more information about preparing your network, see MID Server TLS/SSL certificate check policy Quebec upgrade information [KB0867397].

In TLS/SSL certificate validation, the MID Server attempts to connect to a web server secured with a TLS or SSL certificate. The web server sends a copy of its TLS/SSL certificate to the MID Server. The MID Server checks the authenticity of the certificate and sends a message to the webserver. The webserver responds with a digitally signed acceptance for initiating an TLS/SSL encrypted session. After which the MID Server can begin encrypted communication with the web server.

Hostname validation

Hostname verification is a part of HTTPS that involves a server identity check to ensure that the client is talking to the correct server. This check prevents sending information to a server after being redirected by a man in the middle attack.

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The check involves verifying that the `dnsName` of the certificate sent by the server matches the URL used to make the request. According to RFC 6125, hostname verification should be done against the certificate's subjectAlternativeName's dNSName field. In some legacy implementations, the check is done against the certificate's commonName field. If the names don't match, the connection is terminated.

Note:
Hostname validation derives the hostname from the validated certificate presented by the server. Therefore, TLS certificate validation is a pre-requisite for hostname validation.

Online Certificate Status Protocol (OCSP)

OCSP involves contacting the remote certificate authority server and verifying the certificate before the MID Server communicates further with the target server. Compromised certificates can be a security vulnerability, especially if those certificates have the ability to sign other certificates. If certificates have been broken or forged, then a certificate authority can inform a client which certificates are invalid and should not be used.

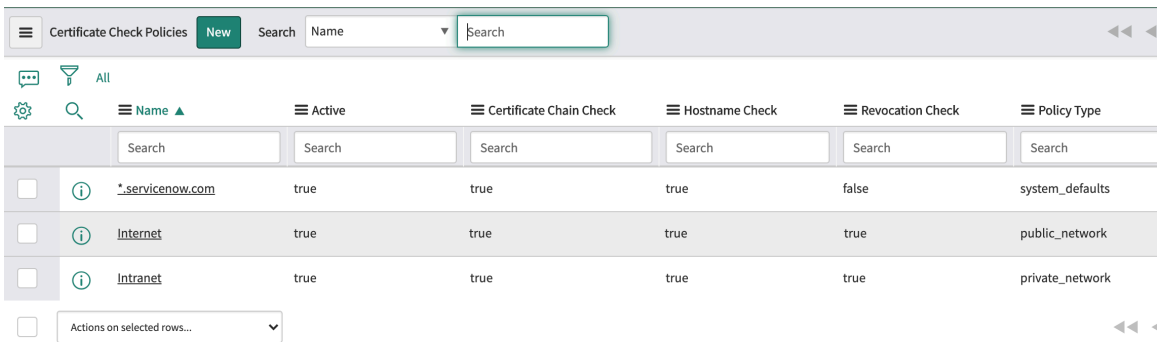
An OCSP responder (a server typically run by the certificate issuer) returns a signed response that the certificate is 'good', 'revoked', or 'unknown'. If it cannot process the request, it may return an error code.

The certificate's issuer may delegate another authority to be the OCSP responder. This creates a chain of certificates that must be verified. The responder's certificate must be issued by the issuer of the certificate in question. The responder’s certificate must include a certain extension that marks it as an OCSP signing authority.

Note:
OCSP checks are secondary HTTP calls made to an OCSP responder. The primary call may discontinue the connection based on the response from the OCSP responder.

MID Server security policy

MID Server security policies control all HTTPS traffic originating from the MID Server. This includes HTTPS connections from the MID Server to an internet endpoint, ServiceNow URLs, intranet endpoints, as well as cloud endpoints.



These connections can be further classified into 4 security policies:

ServiceNow endpoint policy

This policy is the system default exclusively for ServiceNow URLs. On the MID Server `config.xml`, there are bootstrap properties which are only used to make first connection to the instance and will get updated with the system_default policy.

Internet policy

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These policies cover all HTTPS connections initiated from MID Server to any endpoint on the internet.

Intranet policy

These policies cover the reserved IP subnets, such as self-hosted networks.

Overridden policy

You can override specific endpoints or URLs with this policy definition. Overridden policies take the highest order of precedence during operation.

Both tables are editable to include or exclude IP ranges, as well as control what kind of certificate validation checks need to be done. Enable all certificate validation checks to maximize security. The Quebec version has all policies and checks turned on by default for fresh installations.

For upgrading customers, the intranet policy has the certificate validation checks disabled by default. To improve security, configure and enable the policy for endpoints within the internal network.

Note:
Internal endpoints or URLs need to possess a valid CA signed certificate for a successful connection.

For endpoints that host a self-signed certificate, either import the certificate to the MID Server trust store or disable the policy checks which validate that host. For more information about adding certificates, see Add SSL certificates for the MID Server.

After upgrading to Quebec, go to the certificate check policies table and make changes to policy configuration if necessary. Once the MID Server starts up and connects to the instance, any subsequent HTTPS connection originating from the MID server will start applying these certificate checks at runtime. Insecure connections are broken with appropriate error messages.

Use Instance Security Policy

The MID Server configuration parameter **mid.ssl.use.instance.security.policy** controls whether the MID Server uses its bootstrap parameters rather than the security policy from the instance. By default, **mid.ssl.use.instance.security.policy** is set to false in the **config.xml** so the bootstrap policies are not overwritten by the instance's.

This default setting can prevent some problems during MID Server setup. For example if the host is unable to reach the OCSP responder, then a new MID Server installation is not disrupted by an instance's policy of requiring OCSP connection.

The configuration parameter **mid.ssl.use.instance.security.policy** can be set for each MID Server. When set to true, the MID Server syncs all policies with the instance and the bootstrap configuration parameters are overwritten by the ***.servicenow.com** policy on the instance **mid_cert_check_policy** table. The final policies update the policy map in the MID Server memory as well as the **config.xml**.

The default parameters in the **config.xml** are:

- `<parameter name="mid.ssl.bootstrap.default.check_cert_hostname" value="true"/>`
- `<parameter name="mid.ssl.bootstrap.default.check_cert_chain" value="true"/>`

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- `<parameter name="mid.ssl.bootstrap.default.check_cert_revocation" value="false"/>`
- `<parameter name="mid.ssl.use.instance.security.policy" value="false"/>`

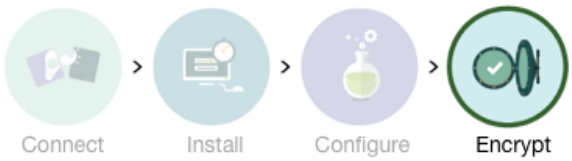
Self-hosted or on-prem instances must add the following parameter for the **config.xml**: `<parameter name="mid.ssl.bootstrap.default.target_endpoint" value="FQDN_OF_THE_INSTANCE"/>`

Encrypt or decrypt MID Server configuration file values

The value of any MID Server parameter in the `config.xml` file can be encrypted. The attributes for all encrypted values are managed from within the configuration file, including the security attribute of the login password.

Before you begin

Role required: admin



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Procedure

1. Navigate to the `agent` directory that was created when the MID Server was installed and open the `config.xml` file using a text editor such as WordPad.
2. Locate or add the parameter you want to encrypt.
   For example, you might want to protect your proxy server passwords by configuring this parameter:

   ```
   <parameter name="mid.proxy.password" value="securepassw0rd"/>
   ```

3. Add the encryption attribute **secure="true"**.

   ```
   <parameter name="mid.proxy.password" secure="true"
    value="securepassw0rd"/>
   ```

4. Restart the MID Server.
5. Open the `config.xml` file.
   The encrypted password appears as follows:

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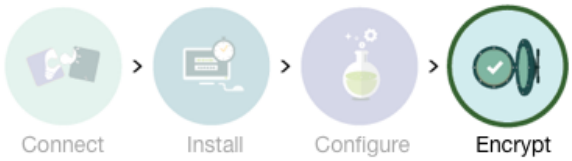
```
<parameter name="mid.proxy.password" secure="true"
 value="encrypted:rhrfUNYRzZAI8/BkTtZmNA==" />
```

.

6. To decrypt this or any other value in the `config.xml` file and display the value in clear text:
   a. Stop the MID Server.
   b. Set the **secure="true"** attribute to **false**.
   c. Replace the encrypted value with the clear text value.
   d. Restart the MID Server.

MID Server configuration file security

Sensitive MID Server configuration data can be protected using several different schemes, including internal and external data encryption and external data storage.



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The MID Server provides the following built-in security options for content in the **config.xml** file:

- **Default security provider**: Secures the data in the **config.xml** file by encryption. When the MID Server is restarted, any unencrypted data is encrypted and written to the **config.xml** file. The default security provider offers these encryption options:
  - **Default encryptor**: Default process for encrypting data in the MID Server **config.xml** file. See Encrypt or decrypt MID Server configuration file values for details.
  - **Windows Data Protection API (DPAPI)**: The operating system performs the data encryption, rather than the MID Server. DPAPI encryption is based on the logged in user's account. When this scheme is used, the data can only be decrypted by the same user account. If the account changes, the data must be re-encrypted.
  - **Custom encryption**: Implement the IMidServerEncrypter interface to create your own custom encryption scheme to manage sensitive **config.xml** data.
-
- **CyberArk**: Data security is provided by CyberArk integration configuration, which moves sensitive data from the **config.xml** file to a secure CyberArk vault. This solution does not encrypt the data.
- **Custom external storage**: Implement the ISecuredConfigProvider interface to create your own custom external storage system to manage sensitive **config.xml** data.

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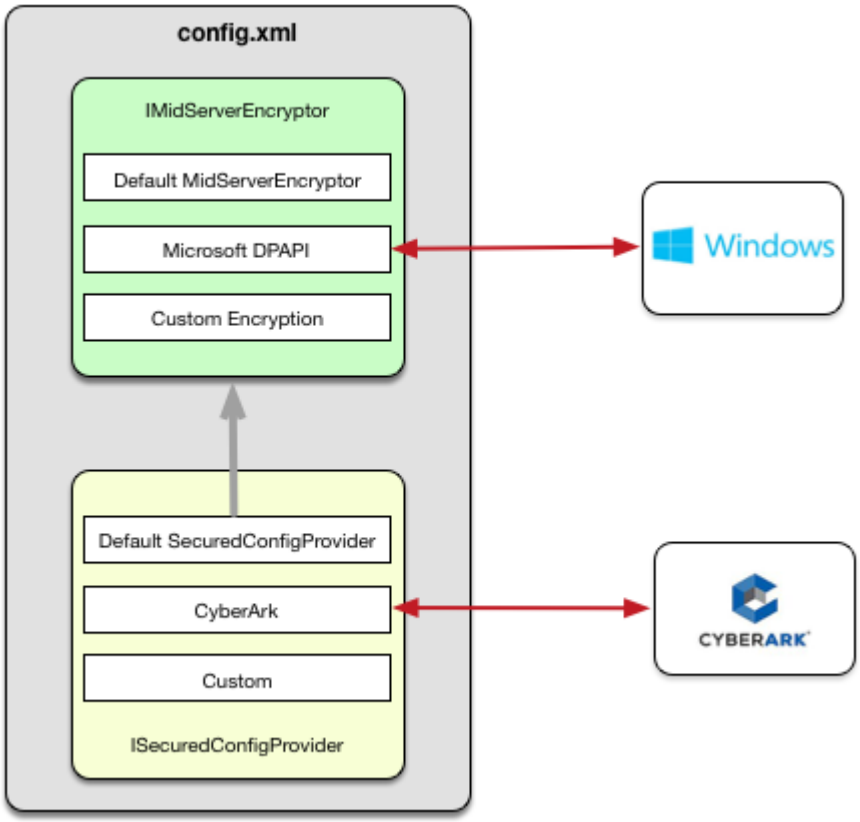
Secured content and encryption schemes



Encrypt MID Server configuration data with DPAPI

Windows Data Protection API (DPAPI) encrypts sensitive data from the **config.xml** file, based on the MID Server user account.

Before you begin

Role required: admin

About this task

DPAPI encryption provides another level of security for data such as credentials, IP addresses, and URLs in the MID Server **config.xml** file. The operating system performs the data encryption, rather than the MID Server. DPAPI encryption is based on the logged in user's account. When this scheme is used, the data can only be decrypted by the same user account. If the account changes, the data must be re-encrypted.

Procedure

1. Open the **config.xml** file in a text editor.
   This file is located in the **/agent** folder in your MID Server installation path.
2. Enable this parameter and value:
   ```
   <parameter name="mid.secure_encrypter"
   value="com.service_now.mid.services.config.WindowsDPAPIEncrypter"/
   >
   ```
3. Save the configuration file.
4. Restart the MID Server.
   Any values in clear text in the **config.xml** file are encrypted by the operating system.
5. Follow this procedure if you need to change the MID Server user account that is used for encryption.

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a. Stop the MID Server service.

b. Open the **config.xml** file in a text editor.
This file is located in the **/agent** folder in your MID Server installation path.

c. Re-enter all the encrypted values in clear text.

d. Make the changes to the MID Server user account in the ServiceNow® instance.

e. Restart the MID Server service.
The data is re-encrypted by the operating system, based the new MID Server user account.

Use CyberArk as a secure configuration provider

You can use a CyberArk vault to secure any sensitive data from the MID Server **config.xml** file.

Before you begin

Role required: admin

Before configuring CyberArk as secured config provider, make sure that **JavaPasswordSDK.jar** is available in the `<mid_installation_folder>/agent/extlib` folder.

About this task

CyberArk is commonly used to secure credentials in its external vault. However, a MID Server parameter in the **config.xml** file enables you to store other types of data in CyberArk.

Procedure

1. Open the **config.xml** file in a text editor.
This file is located in the **/agent** folder in your MID Server installation path.
2. Enable this parameter and value:
`<parameter name="mid.secure_config.provider" value="com.service_now.mid.services.config.CyberArkSecuredConfigProvider"/>`
3. Configure specific data to secure in the CyberArk vault.
Use the following example as a guide.

   a. Secure the MID Server credentials by setting this parameter to match the **ID** and **Type** for that data in your CyberArk integration configuration.

   ```
   <parameter name="mid.instance.username" secure="true"
    value="cyberark: id=<CyberArk ID>, type=<CyberArk type>"/>
   <parameter name="mid.instance.password" secure="true"
    value="cyberark: id=<CyberArk ID>, type=<CyberArk type>"/>
   ```

   b. Secure the URL of the instance by setting this parameter to match the **ID** and **Type** for that data in your CyberArk configuration.
   `<parameter name="url" secure="true" value="cyberark: id=<CyberArk ID>, type=<CyberArk type>"/>`

4. Save the configuration file.
5. Restart the MID Server.

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Change MID Server configuration file security schemes

The MID Server provides several schemes for securing sensitive data in the **config.xml** file and allows you to switch between these options to suit your security requirements.

Before you begin

Role required: admin

Procedure

1. Stop the MID Server service.
2. Open the **config.xml** file in a text editor.
   This file is located in the **/agent** folder in your MID Server installation path.
3. Re-enter all the encrypted values in clear text.
4. Disable the previous security scheme and configure the MID Server to use the new provider.
5. Restart the MID Server service.
   The data is re-secured or encrypted, based on the security scheme you have selected.

MID Server ISecuredConfigProvider interface

Use the methods in this interface to create custom providers that manage secured parameter values in the MID Server **config.xml** file.

Note:
These methods are contained in the **snc-automation-api.jar** file, located in the MID Server installation folder.

initialize

This method initializes the provider with additional configuration parameters and does not return a value.

Example

```
void intialize(java.util.Properties properties,
               IMidServerEncrypter encrypter)
       throws java.lang.Exception
```

Parameters

Parameters	Description
properties	Initialization properties.
encrypter	Encrypter to use if the provider is encryption based.

Exception

`java.lang.Exception`

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isParameterValueSecured

This method checks to see if the parameter value has been secured or not. This method returns a **boolean** type value.

Example

```
boolean isParameterValueSecured(java.lang.String paramValue)
```

Parameters

Parameter	Description
paramValue	The parameter value.

Returns

The parameter returns **true** if the parameter value is secured.

secureParameterValue

This method secures the parameter value if it has not been secured. This method returns a **string** type value.

Example

```
java.lang.String secureParameterValue(java.lang.String
 unsecuredParameterValue)
                                throws java.lang.Exception
```

Parameters

Parameter	Description
unsecuredParameterValue	The unsecured parameter value.

Returns

This method returns the unsecuired parameter value.

Exception

`java.lang.Exception`

unsecuredParameterValue

This method returns the unsecured value of the parameter. This method returns a **string** type value.

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Example

```
java.lang.String unsecuredParameterValue(java.lang.String
 parameterName)
                                    throws java.lang.Exception
```

Parameters

Parameter	Description
parameterName	The parameter name.

Returns

This parameter returns the unsecured value.

Exception

`java.lang.Exception`

MID Server IMidServerEncrypter interface

Use the methods in this interface to create a custom external encrypter for the MID Server **config.xml** file.

Note:
These methods are contained in the **snc-automation-api.jar** file, located in the MID Server installation folder.

initialize

This method initializes the encrypter with additional configuration parameters and does not return a value.

Example

```
void intialize(java.util.Properties properties)
        throws java.lang.Exception
```

Parameters

Parameter	Description
properties	Initialization properties.

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Exception

`java.lang.Exception`

encrypt

This method encrypts the unencrypted data and returns a **byte[ ]** type value.

Example

```
byte[] encrypt(byte[] unencryptedData)
        throws java.lang.Exception
```

Parameters

Parameter	Description
unencryptedData	The data unencrypted.

Returns

Encrypted data

Exception

`java.lang.Exception`

decrypt

This method decrypts encrypted data and returns a **byte[ ]** type value.

Example

```
byte[] decrypt(byte[] encryptedData)
        throws java.lang.Exception
```

Parameters

Parameters	Description
encryptedData	The data decrypted.

Returns

Decrypted data.

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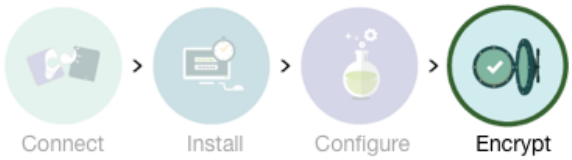
Exception
`java.lang.Exception`

MID Server authentication credentials and SOAP requests

Set basic authentication credentials to update the web service invocation data. For added security, you can enforce basic authentication on each incoming SOAP request to the MID Server.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Basic authentication credentials and SOAP requests

You can enforce basic authentication on each request. The MID Server is not able to communicate through a proxy server if the proxy server supports only NTLM authentication. You can use basic authentication with a proxy server or create an exception for the MID server host.

Supplying basic authentication information, regardless of whether it is required, has an added advantage. The web service invocation creates or updates data using the supplied credentials. For example, when you create an incident record, the journal fields have the user id of the basic authenticated user instead of the default Guest user. This behavior allows you to identify data added by a specific MID Server.

You can set basic authentication credentials for SOAP requests. Each SOAP request contains an Authorization header as specified in the Basic Authentication protocol.

The setting for enforcing strict security controls how the instance uses the credentials you provide for the MID Server. When the setting is enabled, you must provide a user ID with access to the tables the MID Server is trying to access. When the setting is disabled, any valid user ID allows the MID Server to access to all tables.

To learn more about properties that affect SOAP request processing, see Basic auth: SOAP requests in Instance Security Hardening Settings.

Require basic authorization for incoming SOAP requests

Enforce basic authentication on each incoming SOAP request to the MID Server.

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Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **System Properties** > **Web Services**.
2. Select the check box for **Require basic authorization for incoming SOAP requests**.
3. Click **Save**.
4. To provide basic authentication credentials for a MID Server, navigate to C:\Program Files \ServiceNow\<MID Server name>\agent and edit the `config.xml` file, as follows:

   a. Find the element *<parameter name="mid.instance.username" value=""/>* and enter the instance administrator user name as the value.

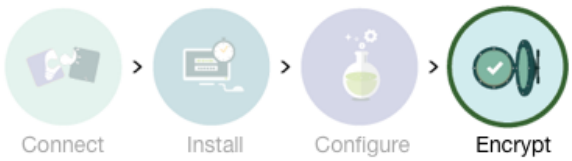
      Example
      For example, you might enter *<parameter name="mid.instance.username" value="admin"/>.*

   b. Find the element *<parameter name="mid.instance.password" value=""/>* and enter the configured password for this instance as the value.

      Example
      For example, you might enter *<parameter name="mid.instance.password" value="abc123"/>.*

MID Server unified key store

The MID Server unified key store allows all products on the MID Server to use common certificates and key pairs. This feature allows applications to use the same secure communication channel to the MID Server that the MID Server uses to connect to the instance.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

When the MID Server starts, the common name (CN) of the certificate is inspected to identify if a custom certificate has been installed. If a custom certificate is detected, the creation of the certificate/keypair will be skipped and an attribute is set on the ecc_agent record to indicate the usage of a custom certificate.

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When a custom certificate is used, the **Re-key** UI-action is disabled on the instance for the MID Server. A new UI action called **Remove custom keypair** is available to switch back to using a self-signed certificate. Using this action will cause the MID Server to remove the custom certificate and generate a new self-signed certificate, similar to the re-key option.

When a MID is upgraded, any custom certificates that were installed will be retained.

PEM bundle support

MID Server unified key store supports PEM bundle certificate and key pairs.

Sample PEM bundle

```
-----BEGIN PRIVATE KEY-----

MIIEvQIBADANBgkqhkiG9w0BAQEFAASCBKcwggSjAgEAAoIBAQC0pj5O8QKFpHy9

...

oPdU+h0grs9SJp6rFx0PzDY=

-----END PRIVATE KEY-----

Bag Attributes

    friendlyName: <myCustomCert>

    localKeyID: 54 69 6D 65 20 31 35 39 35 33 35 34 32 30 38 30
 35 31

subject=/C=US/ST=CA/L=Santa Clara/CN=epic1016883

issuer=/C=US/ST=CA/L=Santa Clara/CN=epic1016883

-----BEGIN CERTIFICATE-----

MIIDKzCCAhOgAwIBAgIEPqMQqDANBgkqhkiG9w0BAQsFADBGMQswCQYDVQQGEwJV

...

4g53RN+LqtJVeeQkZvIbZOfuSqypdVfudkS8dqxQALb8IuHUV7JOcBvOT79mSTs=

-----END CERTIFICATE-----
```

Install custom certificates in the MID Server unified key store

Install custom certificates to unify the security channels for various applications.

Before you begin
Role required: admin

When installing the certificate on a MID Server hosted in Linux, `install-certificate.sh` can be unresponsive if the Linux entropy pool count is less than a few hundred. Check the entropy count of the Linux pseudo random number generator (PRNG) with the following command:

```
cat /proc/sys/kernel/random/entropy_avail
```

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If the entropy count is too low, you can install an entropy generator such as RNGD or Haveged. For more information about installing Haveged for CentOS and Ubuntu, see How to Setup Additional Entropy for Cloud Servers Using Haveged.

Procedure

1. If the MID Server is running, stop the MID Server.

Note:

If the entry for alias **DefaultSecurityKeyPairHandle** is being modified, you must invalidate the MID Server before stopping it.

2. Create a PEM bundle certificate and keypair by running one of the following commands in the MID Server install folder.
   - Generate self-signed certificates for non-MTLS use cases with the command:

```
openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509
 -days 365 -out certificate.pem
```

   - Export the key store to a PEM bundle using the command:

```
openssl pkcs12 -in <myCustomCert>.p12 -nodes -out
 <myCustomCert>.pem
```

   - Get only certificates in the PEM format with the command:

```
openssl pkcs12 -in <myCustomCert>.p12 -out <myCustomCert>.pem
 -clcerts -nokeys
```

   - Get only keys in the PKCS#8 format with the command:

```
openssl pkcs12 -in <myCustomKey>.p12 -out <myPrivateKey>.key
 -nocerts -nodes
```

   - Install the certificate, or certificate chain, and private key for Windows hosts using the command:

```
bin/scripts/manage-certificates.bat -a <alias> <file path to
 PEM bundle>
```

   - Install the certificate, or certificate chain, and private key for Linux hosts using the command:

```
bin/scripts/manage-certificates.sh -a <alias> <file path to
 PEM bundle>
```

Note:

The header and footer of the PEM syntax must be the following:

```
-----BEGIN CERTIFICATE-----
```

```
-----END CERTIFICATE-----
```

The header and footer of the PKCS#8 syntax must be the following:

```
-----BEGIN PRIVATE KEY-----
```

```
-----END PRIVATE KEY-----
```

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3. Start the MID Server.
4. Validate the MID Server with the instance.
5. **Optional:** To revert the MID Server to use a self-generated certificate, select the MID Server in the instance and use the UI action **Remove custom certificate**.

> **Note:**
> The MID Server can also be reverted using the **Invalidate** UI action. Invalidating a MID Server removes any custom certificates that are installed and creates a new self-signed certificate for the MID Server.

What to do next

The *manage-certificates* has the following functions and the scripts must be run from the agent folder.

Enable mutual authentication

For Windows, use the command: `bin/scripts/manage-certificates.bat -m`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -m`

Remove mutual authentication and restore back basic authentication

For Windows, use the command: `bin/scripts/manage-certificates.bat -b <myUserName myPassword>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -b <myUserName myPassword>`

Add new certificates and certificate chains with a specified alias

For Windows, use the command: `bin/scripts/manage-certificates.bat -a <alias> <fileName>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -a <alias> <fileName>`

The `alias` is a unique name given to the certificate being imported. The MID Server requires a custom certificate for mutual authentication, with the default alias name `defaultsecuritykeypairhandle`. To configure MTLS communication between the MID Server and instance, the certificate entry must be added to the key store using the alias name `defaultsecuritykeypairhandle`.

The `fileName` is a file path that can contain a PEM certificate, or certificate chain, and a PCKS#8 private key. The file path to the PEM bundle can contain multiple certificates and a single private key. The header and footer of each PEM certificate must be the following:

```
-----BEGIN CERTIFICATE-----
```

```
-----END CERTIFICATE-----
```

The header and footer of the PKCS#8 syntax must be the following:

```
-----BEGIN PRIVATE KEY-----
```

```
-----END PRIVATE KEY-----
```

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An exception is thrown if the certificate chain fails validation. If the file contains multiple certificates, they must be ordered: leaf certificate, intermediate certificates, then root certificates.

Display certificate details for the specified alias

For Windows, use the command: `bin/scripts/manage-certificates.bat -g <alias>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -g <alias>`

This command displays information such as subject distinguished name, issuer name, and expiry date from the certificate.

List all existing aliases

For Windows, use the command: `bin/scripts/manage-certificates.bat -l`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -l`

This command lists all the alias names available in the *agent_keystore*.

Delete certificates using an alias

For Windows, use the command: `bin/scripts/manage-certificates.bat -d <alias>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -d <alias>`

This command deletes the alias and record from the keystore. The entry for alias *DefaultSecurityKeyPairHandle* can be deleted using this command.

Remove all entries from the keystore

For Windows, use the command: `bin/scripts/manage-certificates.bat -r`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -r`

This command deletes the existing entries from the keystore, except alias *DefaultSecurityKeyPairHandle*.

Related topics

Enable MID Server mutual authentication

Restore the MID Server key store with a backup

If the key store becomes corrupted or is accidentally deleted you can restore a backup of the MID Server key store. This is especially useful for key stores with custom key-pairs, because otherwise recreating custom key-pair data can be difficult and time consuming.

Before you begin

Role required: Agent admin

About this task

Starting with the Tokyo release, the MID Server automatically makes a backup of the **agent_keystore** file when it is changed. Backups are stored in **security_backup** under the agent

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folder. They are stored outside the security folder to protect against accidental deletions or corruptions of the security folder.

In the backup folder, there is a dedicated backup log file: **keystore_backup_audit_trail.log**. This log keeps track of backup files and backup activities. Each backup log entry has backup file name with a time stamp, a matching **keypairs.mid_id**, and a list of aliases of key-pairs in the backup.

Note:
For security purposes, the backup key store should have the same attributes as the original key store, such as owner, group, and permissions. Those attributes ensure the MID Server has the same protection at file system level.

The key store backups can be modified with the MID Server properties **mid.keystore.max_backups**, **mid.keystore.max_live_backups**, and **mid.keystore.backup_overwrite_timespan**. See MID Server properties for more information.

Procedure

1. Stop MID Server.
2. Navigate to the **security_backup** and view the **keystore_backup_audit_trail.log** to choose which backup to restore.
3. Copy that backup to the **agent_keystore** file in the security folder.
   Check the file permissions to make sure that it has the same owner and permissions as the original one. If **agent_keystore** already exists in that location, overwrite it with the backup.
4. Check **config.xml** to make sure that the **keypairs.mid_id** matches the one in the audit log file.
5. **Optional:** If the **keypairs.mid_id** do not match, update **config.xml** to match them.
6. Navigate to the instance and invalidate the MID server.
   This will create a **delete_mid_keypair** system command in the **ecc_queue**.
7. Find all **delete_mid_keypair** output messages for the MID Server and mark them as processed.
   The goal is to mark the MID Server as invalidated without triggering the key-pair deletion. Unless the system commands are marked as processed, MID Server deletes the **defaultsecuritykeypairhandle** key-pair regardless of whether it is custom or auto-generated.
8. Restart MID Server.
9. Navigate to the instance and validate the MID Server.

Enable MID Server mutual authentication

Configure the MID Server to use a client certificate for authenticating to the instance. This avoids the need to create a basic authentication credentials in the Key Store for the MID Server's configuration.

Before you begin

Role required: admin

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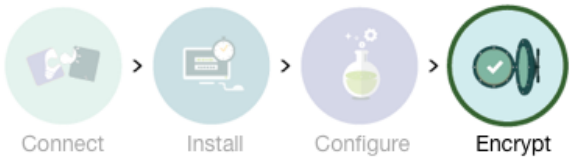

1. Ensure that the MID Server can connect to elements inside and outside your network
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5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

MID Server mutual authentication removes the MID Server user name and password and provides a client certificate for authentication. Whenever a server requests authentication, this certificate is sent instead. To use mutual authentication, certificate based authentication must be enabled. See Set up Certificate-based authentication for the procedure.

If a new MID Server is created with mutual authentication, it does not add capabilities automatically. An administrator must add capabilities to its record on the instance. However, existing MID Servers using basic authentication with capabilities are preserved when switching to mutual authentication.

A MID Server using mutual authentication cannot be re-keyed or validated as a UI action on the instance.

Self-signed certificates are not supported with mutual authentication. Internally signed certificates are only supported when signed by a private certificate authority. Commercially signed certificates are supported when signed by a commonly trusted certificate authority, such as those trusted by browsers and operating systems.

In the Quebec release, a MID Server using the Health Log Analytic application cannot be configured with mutual authentication.

Procedure

1. Contact ServiceNow support to request mutual authentication on the MID Server.
2. Obtain a certificate and private key from a respected certificate authority.

   MID Server mutual authentication only supports the PEM bundle format and private key in PCKS#8 format. The bundle must have both the private key and certificate. Open the certificate using a text editor and see if it is in text format. The header and footer of the PEM syntax is the following:

   ```
   -----BEGIN CERTIFICATE-----
   ```

   ```
   -----END CERTIFICATE-----
   ```

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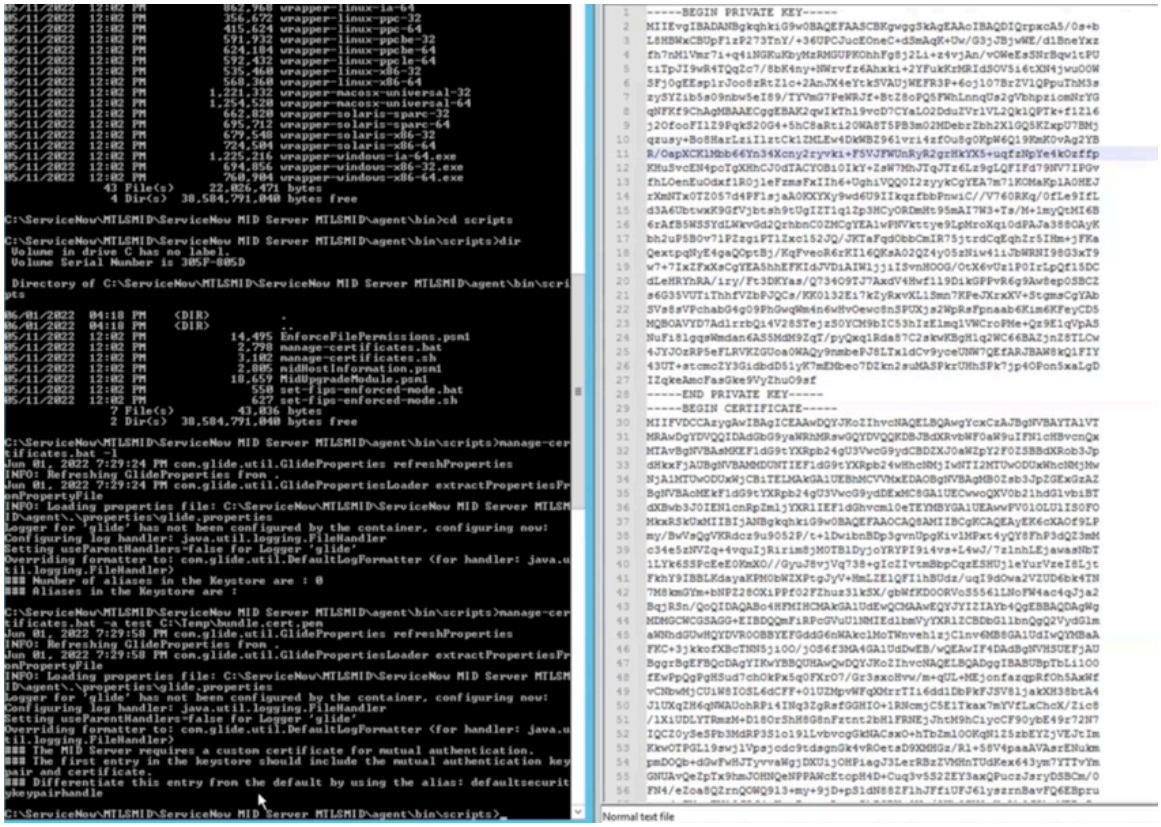

You can read the contents of a PEM certificate using the `openssl` command on Linux or Windows as follows: `openssl x509 -in cert.crt -text` . The private key must be in the PKCS#8 format. The header and footer of the PKCS#8 syntax is the following:

```
-----BEGIN PRIVATE KEY-----
```

```
-----END PRIVATE KEY-----
```

#You can check the contents of a private key using the `openssl` command on Linux or Windows as follows: `openssl rsa -in private.key -check`

> **Note:**
> If your certificate is not in PKCS#8 format, you get an error: `- main SEVERE *** ERROR *** Could not find valid private key`

3. Split up the PEM certificate into 3 different PEM files.
   a. Private key and leaf certificate
   b. Leaf certificate
   c. Intermediate certificates and root certificate
4. On the instance, upload file containing the intermediate and root certificates to the CA Certificate Chain table: **sys_ca_certificate.list**.

> **Note:**
> If uploading individually instead of a bundle, start with the root certificate, and then the intermediate certificate(s). It is preferrable to uploade this file as a PEM bundle, whose type is set to CA Cert, instead of splitting it into multiple files.

5. Check the uploaded CA Cert record on the instance and wait for the **Publish Status** to change to **Exists**.

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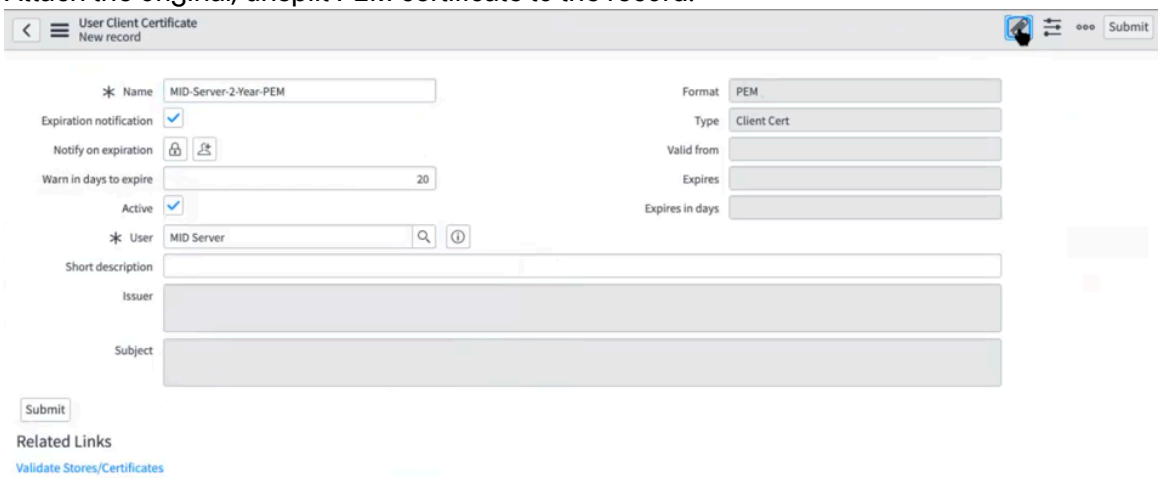
Note:
Do not proceed until the publish status is updated to **Exists**.

6. On the instance, navigate to **sys_user_certificate.list**.
7. Attach only the leaf certificate to **sys_user_certificate.list** without including the private key.
8. If the MID Server is validated, invalidate the MID Server before continuing.
9. Create a new record.

Note:
The record must have the MID Server's name and the **User Role** must be **MID Server**.

10. Attach the original, unsplit PEM certificate to the record.



Note:
Ensure that the attached file contains only the certificate.

11. If the MID Server is running, stop the MID Server.
12. On the MID Server host machine, run the following commands to install and manage the certificate and private key.

    Run the script from the root of the agent directory because it requires the jar files in the class path. The security directory is then created in the agent root folder and is used by MID Server. For example: `bin/scripts/manage-certificates.bat -m.`

    The *`manage-certificates`* has the following functions and the scripts must be run from the agent folder.

    Enable mutual authentication

    For Windows, use the command: `bin/scripts/manage-certificates.bat -m`

    For Linux, use the command: `./bin/scripts/manage-certificates.sh -m`

    Remove mutual authentication and restore back basic authentication

    For Windows, use the command: `bin/scripts/manage-certificates.bat -b <myUserName myPassword>`

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For Linux, use the command: `./bin/scripts/manage-certificates.sh -b <myUserName myPassword>`

Add new certificates and certificate chains with a specified alias

For Windows, use the command: `bin/scripts/manage-certificates.bat -a <alias> <fileName>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -a <alias> <fileName>`

The `alias` is a unique name given to the certificate being imported. The MID Server requires a custom certificate for mutual authentication, with the default alias name `defaultsecuritykeypairhandle`. To configure MTLS communication between the MID Server and instance, the certificate entry must be added to the key store using the alias name `defaultsecuritykeypairhandle`.

The `fileName` is a file path that can contain a PEM certificate, or certificate chain, and a PCKS#8 private key. The file path to the PEM bundle can contain multiple certificates and a single private key. The header and footer of each PEM certificate must be the following:

```
-----BEGIN CERTIFICATE-----
```

```
-----END CERTIFICATE-----
```

The header and footer of the PKCS#8 syntax must be the following:

```
-----BEGIN PRIVATE KEY-----
```

```
-----END PRIVATE KEY-----
```

An exception is thrown if the certificate chain fails validation. If the file contains multiple certificates, they must be ordered: leaf certificate, intermediate certificates, then root certificates.

Display certificate details for the specified alias

For Windows, use the command: `bin/scripts/manage-certificates.bat -g <alias>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -g <alias>`

This command displays information such as subject distinguished name, issuer name, and expiry date from the certificate.

List all existing aliases

For Windows, use the command: `bin/scripts/manage-certificates.bat -l`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -l`

This command lists all the alias names available in the *`agent_keystore`*.

Delete certificates using an alias

For Windows, use the command: `bin/scripts/manage-certificates.bat -d <alias>`

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For Linux, use the command: `./bin/scripts/manage-certificates.sh -d <alias>`

This command deletes the alias and record from the keystore. The entry for alias *DefaultSecurityKeyPairHandle* can be deleted using this command.

Remove all entries from the keystore

For Windows, use the command: `bin/scripts/manage-certificates.bat -r`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -r`

This command deletes the existing entries from the keystore, except alias *DefaultSecurityKeyPairHandle*.

13. Start the MID Server.

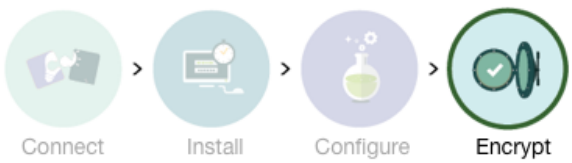
Related topics

Install custom certificates in the MID Server unified key store

MID Server unified key store

MID Server command audit log

The command audit log records the commands run by the MID Server for the Discovery application. Review the commands to check for anomalies or errors.



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The MID Server command audit log is a record of the commands the MID Server runs during discovery. For example, executing one pattern may run many separate commands. The MID Server command audit log supports Powershell commands for WMI and WinRM. For SSH commands, the audit log supports SSNC but not J2SSH. In Quebec, the command audit log only supports recording the commands run during discovery.

Enable the command audit log

The MID Server audit log is enabled with the MID Server property *mid.log.command_audit.enable*, which is set to false by default. Add the property in

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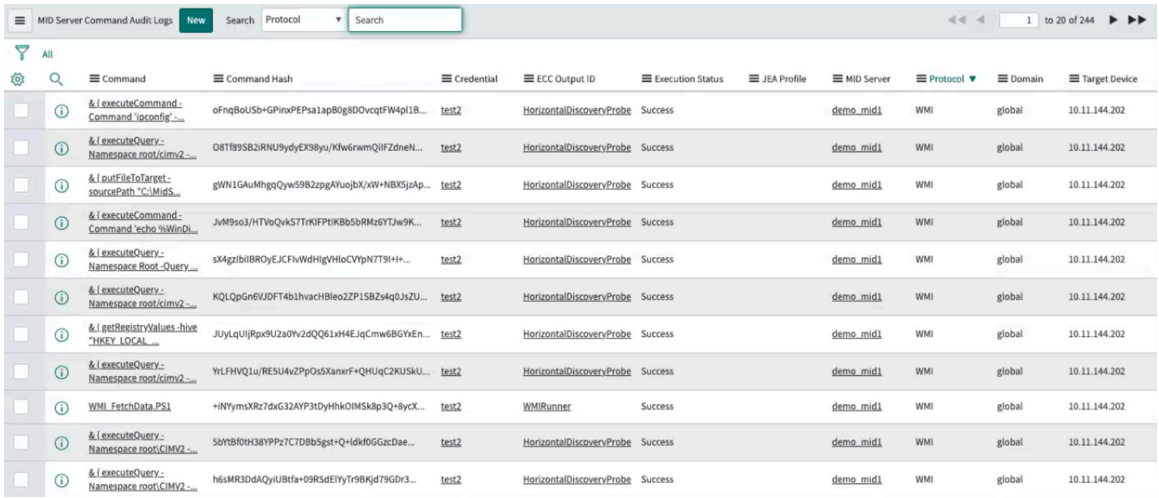
the **MID Server Properties** table [ecc_agent_property_list.do]. Once enabled, the MID Server command audit logs are accessed in the instance by navigating to **MID Server** > **Command Audit Logs** [ecc_agent_command_audit_log_list.do]. To see or change this table, the user must have the role **agent_security_admin**.



Data recorded in the command audit logs

The MID Server command audit log records the name of the command and the command hash. If, for example, during discovery a probe does not run a command but instead runs a script then the script name is recorded. The command hash is calculated based on the content of the script, regardless of the name. Therefore, changing the name does not affect the command hash.

When a probe, such as a WMIRunner, runs a command with multiple WMI fields then WMI creates one script to query those fields. The script is created temporarily on the MID Server host in the temp folder. After the script is run, it is removed from the temp folder. The script is given a name based on the fields and a random number. However, the hash key is always the same given the same contents.

The command audit log reports the execution status as either a success or failure. The record entry is a success if the command was run, or a failure if it was unable to run. The command audit log does not consider the result of the command being run. For example, a command which runs but fails gather data is still listed in the execution status as a success.

Discovery supports JEA profiles for WinRM. The MID Server command audit log records the JEA profile of the discovery command, if it is available. See Microsoft Just Enough Administration (JEA) for Discovery for more information on JEA profiles.

By default, the table is rotated every seven days. For more information, see Table Rotation.

Rekey a MID Server

Rekey a MID Server to generate a new private key. Private keys are used to decrypt automation credentials, so that MID Servers can transmit information securely. Key pairs are initially generated when a MID Server is validated, and MID Servers should be rekeyed periodically to meet security requirements.

Before you begin
Role required: admin

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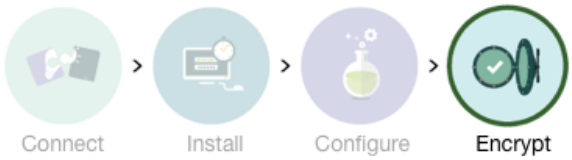

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About this task

When the MID Server comes back online, the system automatically validates the new key, and the MID Server resumes processing automation tasks.
Automation credentials are secured by encrypting them in the instance with the MID Server's trusted public key prior to transmission. When the MID Server is created, it generates a keypair, consisting of a public and private key. After the MID Server is validated, it can use the private key to decrypt automation credentials. You should occasionally rekey the MID Server to meet your organizations security requirements.

Procedure

1. Navigate to **All** > **MID Server** > **Servers**.
2. Open the MID Server whose keypairs you want to rotate.
3. Under **Related Links**, click **Rekey**.

Related topics

Validate the MID Server

Add SSL certificates for the MID Server

Configure the MID Server to connect to a source over SSL.

Before you begin

Role required: admin

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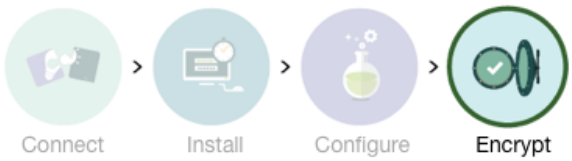

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8. Configure MID Server security

About this task

You can add certificates to the MID Server to communicate over SSL/TLS in one of two ways:

- Add certificates directly to the bundled JRE TrustStore file, using the following procedure.
- Specify a different TrustStore file for the MID Server to use. For more information, see Specify an external TrustStore for the MID Server.

Review both methods to evaluate which best meets your needs.

During MID upgrade the bundled TrustStore is overwritten. The MID Server attempts to migrate certificates from the existing TrustStore to the incoming one. To be migrated, certificates must meet the following criteria:

Quebec (backported to Orlando Patch 10 and Paris Patch 4)

- X.509 v3 certificates
- Basic Constraints Extension evaluates to false (or is not present)

Rome (backported to Paris Patch 7 and Quebec Patch 2)

- X.509 certificates
- Any certificate present in the source, but not the destination TrustStore

Certificates that do not meet the criteria are overwritten. Alternatively, you can specify an external TrustStore file which is unaffected by MID Server upgrades. For more information, see Specify an external TrustStore for the MID Server

In Rome and later families, the migration strategy utilized during upgrade is configurable via the MID Server configuration parameter *`mid.truststore.migration.strategy`*. It can take the following values:

- **migrate_delta**: the default strategy (outlined above for Rome)
- **migrate_non_ca**: a strategy matching the one outlined above for the Quebec family
- **do_not_migrate**: disables the TrustStore migration during upgrade, though a backup of the original TrustStore is made in the event of overwrite

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During this migration process, a backup of the original and upgrade TrustStores are made and stored in the agent's work directory: ...\agent\work\truststore_migration\<time epoch seconds>\. The original TrustStore is renamed to cacerts_before and the upgrade TrustStore is renamed to cacerts_from_upgrade.

Procedure

1. Open a command prompt and navigate to the folder containing the JRE keytool.
   This is the location of the JRE you installed. An example path might be: C:\Program Files\Java\jre1.8.0_161\bin
2. Import a certificate into the MID Server's cacerts keystore, using this command:
   `keytool -import -alias <certificate alias> -file "<path to certificate>" -keystore "<path to the JRE>\lib\security\cacerts"`

   For example, you might enter: `keytool -import -alias MyCA -file "C:\myca.cer" -keystore "C:\Program Files\Java\jre1.8.0_161\lib\security\cacerts"`

   Note:
   The keytool prompts you for a certificate password. If the certificate is for a CA, the keytool also asks whether to trust the certificate authority. To add a certificate to an instance, see Upload a certificate to an instance.

3. **Optional:** Display a list of the current certificates by running the command: `keytool.exe -list -keystore "C:\Mid Server\agent\jre\lib\security\cacerts"`

Specify an external TrustStore for the MID Server

The MID Server JVM can utilize a TrustStore external to the MID installation directory so any certificates added to the TrustStore are not overwritten during an upgrade. It is important that this TrustStore file reside outside of the MID installation directory, and the Truststore location can be specified by adding additional parameters to the MID Server's wrapper-override.conf file.

Before you begin
Role required: admin

Procedure

1. In the MID Server host, navigate to the wrapper-override.conf file.
2. Specify an external TrustStore by appending a custom parameter to the end of your MID's wrapper-override.conf file.
   For example, on a Windows MID with an external TrustStore found at C:\external_truststore\cacerts, the end of the file would appear similar to:

```
# Add additional custom parameters below

wrapper.java.additional.3=-Djavax.net.ssl.trustStore=C:\external_truststore\cacerts

wrapper.java.additional.4=-Djavax.net.ssl.trustStorePassword=<truststore's password>
```

   Note:
   If you have specified other additional parameters in this file then the numerical identifier, in this case 3 and 4, may differ.

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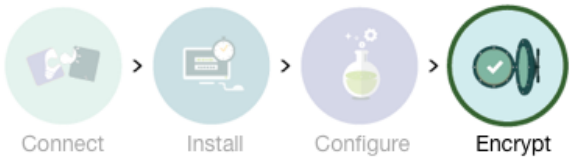
MID Server SSH cryptographic algorithms

The MID Server utilizes SSH clients to perform many discovery actions. During the SSH handshake, both the client and server first determine which algorithms both parties support, then client picks the highest priority algorithm. For the Host Key Algorithm, the client picks highest priority algorithm which both parties support that matches the key type.



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Default supported SSH algorithms by priority

Key Exchange Algorithm

1. ecdh-sha2-nistp256
2. ecdh-sha2-nistp384
3. ecdh-sha2-nistp521
4. diffie-hellman-group-exchange-sha256
5. diffie-hellman-group14-sha256
6. diffie-hellman-group16-sha512
7. diffie-hellman-group14-sha1
8. diffie-hellman-group1-sha1
9. diffie-hellman-group-exchange-sha1

Host Key Algorithm (used for public key signature during authentication)

1. ecdsa-sha2-nistp256
2. ecdsa-sha2-nistp384
3. ecdsa-sha2-nistp521
4. rsa-sha2-256
5. rsa-sha2-512
6. ssh-rsa
7. ssh-dss

Cipher Algorithm

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1. aes128-ctr
2. aes192-ctr
3. aes256-ctr
4. aes128-cbc
5. aes192-cbc
6. aes256-cbc

MAC Algorithm

1. hmac-sha2-256
2. hmac-sha1
3. hmac-sha2-512
4. hmac-sha1-96
5. hmac-md5-96
6. hmac-md5

Customize the SSH algorithms priority list

The MID Server SSH algorithm priorities can be customized based on security needs. Each algorithm is controlled by one of the following MID Server properties.

Note:
Glide Import on the instance uses the default algorithm list. The four MID Server properties do not affect Glide Import because it is not run on the MID server. SNCSSH is used for Glide Import on instance for SFTP and SCP.

- Key Exchange algorithms: **mid.ssh.algorithms.kex**
- Host Key algorithms: **mid.ssh.algorithms.host_key**
- Cipher algorithms: **mid.ssh.algorithms.cipher**
- MAC algorithms: **mid.ssh.algorithms.mac**

The properties accept comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. The following operators are based on the OpenSSH standard syntax and modify the algorithm priority list.

- The **+** operator appends the comma separated list of algorithms to the default algorithm list.
- The **-** operator removes the comma separated list of algorithms from the default algorithm list.
- The **^** operator places the comma separated list of algorithms at the front of the default algorithm list.

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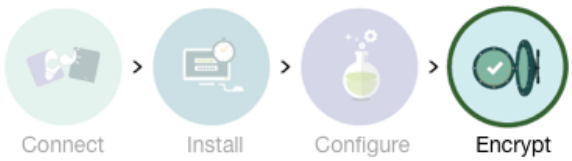
mid.ssh.algorithms.cipher	-aes128-ctr
mid.ssh.algorithms.host_key	+ssh-rsa
mid.ssh.algorithms.kex	diffie-hellman-group1-sha1, diffie-hellm...
mid.ssh.algorithms.mac	^hmac-md5

Attach a script file to a file synchronized MID Server

You can attach a script file to synchronize to a connected MID Server. Windows Internet Explorer enhanced security blocks downloaded files that it determines are potentially dangerous. However synchronizing the files avoids this security problem.

Before you begin

Role required: **admin**



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About this task

Enhanced security in Windows browsers, such as Internet Explorer, blocks downloaded files that it determines are potentially dangerous. This would block files downloaded for use by the MID Server. You would need to unblock each file manually through the browser.

To get around this issue, use file synchronization. File synchronization requires you to proactively take script files from your instance and save them on the MID Server. The files on the instance and the MID server stay synchronized, but there is no longer any need for the MID Server to download the whole file. File synchronization also protects any updates you make in those script files from being overwritten during the upgrade of an instance.

You can attach multiple files, but the last attached file gets synchronized to the MID Server. If you delete the attachment, the script file becomes inactive, and the synchronized file is deleted from the MID Server.

Procedure

1. Navigate to **All** > **MID Server** > **Script Files**.
2. Open the file to which you would like to attach the script file, or click **New** to create a new file.
3. Select **Use attachment**, and then click the paperclip icon to add the attachment.

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When **Use attachment** is checked, an attached script file overrides the script contained in the **Script** field. If this check box is cleared, the script in the **Script** field is used instead of the attachment.

The script file attachment name must match the MID Server script file name, since the record can contain other attachments.

4. Click **Update** to initiate the synchronization process.
   Ensure that the file name matches the script name. If you receive the error message: `File type not permitted or mime type does not match the file content`, request that your administrator turn off mime type validation on attachments. The system property **glide.security.file.mime_type.validation** controls this setting.

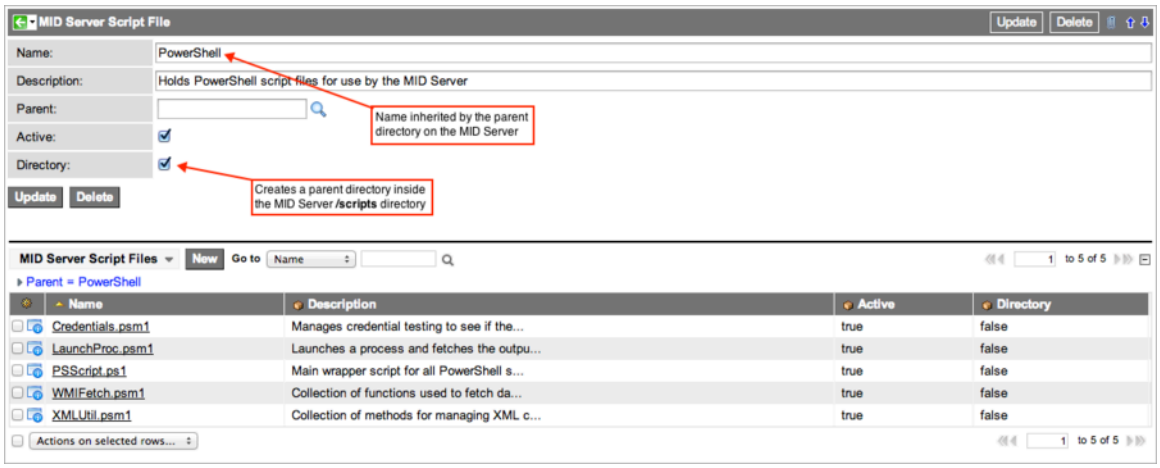
Enable script file synchronization for Windows enhanced security

Windows Internet Explorer enhanced security blocks downloaded files that it determines are potentially dangerous.

Script files synchronized with the MID Server are stored on the instance in the MID Server Script File `[ecc_agent_script_file]` table, which you can access in the **MID Server** > **Script Files** module.

When the MID Server first connects to the instance, the instance creates a directory called `\scripts` in the MID Server root. The instance then creates a parent directory in the path `\scripts\<parent name>` using definitions from the ecc_agent_script_file table. Finally, the instance creates the script files themselves inside the parent directory using the records from the ecc_agent_script_file table.

The record for the parent directory looks like this:



The instance creates each script file in the parent directory on the MID Server using the record *Name* from the ecc_agent_script_file table as the file name and the *Script* field payload as the file contents. A script file record looks like this:

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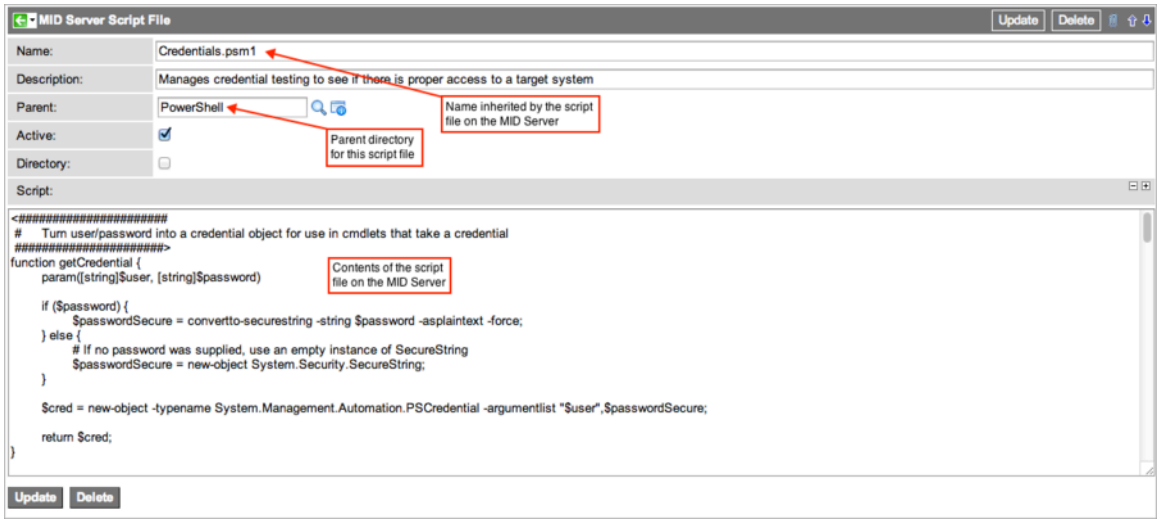


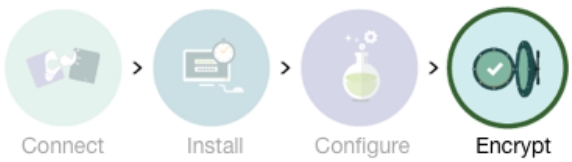
The synchronization of the script file continues to work as if the script was manually added to the form.

See Attach a script file to a file synchronized MID Server for instructions on how to attach a script file.

Note:
The MID Server Script File [ecc_agent_script_file] table is domain separated. You can create versions of these policies that only a MID Server from the same domain can use. For instructions, see Set up domain separation for MID servers.

MID Server FIPS Enforced Mode

The MID Server supports the National Security Cloud (NSC) IL-5 environment, which requires all utilized cryptography to be FIPS validated. The MID server can be run in FIPS Enforced Mode, where only cryptographic algorithms which are FIPS validated are utilized.



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The Federal Information Processing Standards are a group of standards compiled by the National Institute of Standards and Technology for use in computer systems. There are many FIPS publications, but for the sake of this discussion we are specifically referring to FIPS 140-2: Security Requirements for Cryptographic Modules. Cryptographic algorithms can proceed through a validation process specified by the NIST. For the purposes of our new secure cloud

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environment, the MID server will be utilizing algorithms that have been validated by such process.

Only MID Servers of the Rome release family or later with a JRE version of 11.0.9+11 or later can be set to run in FIPS Enforced Mode.

FIPS Enforced Mode

The following algorithms are not available for use in these SSH functions by the MID Server in FIPS Enforced Mode.

Key Exchange:

diffie-hellman-group1-sha1

Mac:

- hmac-md5
- hmac-md5-96

The following restrictions are now in place for SNMP for use by the MID Server in FIPS Enforced Mode.

- SNMP v1 and v2 are completely disabled.
- For SNMP v3, the following protocol uses are not permitted by the MID Server in FIPS Enforced Mode:
  - auth protocol: none or MD5
  - privacy protocol: none or DES

Other functionality that utilizes the MID Server may be impacted when run in FIPS Enforced Mode. Please refer to that functionality's specific documentation for details.

Enable MID Server FIPS Enforced Mode

The MID server can be run in FIPS Enforced Mode, where only cryptographic algorithms which are FIPS validated are utilized.

Before you begin

Role required: admin

Procedure

1. Deploy a new MID Server or upgrade existing MID Servers to the Rome family release or later.
2. Shut down the MID Server.
3. Execute the following bundled script provided to convert the MID to run in FIPS Enforced Mode:
   - For Windows hosts: `> <MID install directory>\agent\bin\scripts\set-fips-enforced-mode.bat on`
   - For Linux hosts: `$ <MID install directory>/agent/bin/scripts/set-fips-enforced-mode.sh on`

   Success will be logged to the console including the location of modified files and any backups generated during the conversion process. If invoked programmatically, success will be indicated by a 0 return code.
4. Start the MID Server.

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What to do next
The mode the MID is running in can be confirmed via two methods:

1. Check the agent logs after start-up and look for the following log line: `Running in FIPS Enforced mode`
2. Check the ecc_agent table on the instance and look for the value of the **FIPS Enforced** boolean column.

Manually convert the MID Server to FIPS Enforced Mode

The MID server can be run in FIPS Enforced Mode, where only cryptographic algorithms which are FIPS validated are utilized.

Before you begin
Role required: admin

About this task
To manually convert the MID Server to FIPS Enforced Mode while using an external JRE, you must perform the following steps while the MID Server is shut down:

- Convert the JRE's TrustStore to BCFKS type.
- Set the JRE's default KeyStore type to be BCFKS.
- Set the FIPS Enforced Mode flag in the MID Server's configuration file.

Procedure
1. Convert the JRE's cacerts file type to BCFKS by using the Java Keytool with a command similar to:
   `$ keytool -importkeystore -srckeystore` **<source keystore path>** `-srcstoretype` **<source keystore type>** `-srcstorepass changeit -destkeystore` **<destination keystore path>** `-deststoretype BCFKS -deststorepass changeit -provider org.bouncycastle.jcajce.provider.BouncyCastleFipsProvider -providerpath` **<BouncyCastle FIPS jar path>**

   Note:
   Rome and later MID installations contain a BouncyCastle jar suitable for this purpose. It can be found at: .../`agent/lib/bc-fips.jar`
2. The JRE's default KeyStore type can be set in the `<JRE installation directory>\conf\security\java.security` file.
3. In that file find the `keystore.type` line and set its value as follows:
   `keystore.type=bcfks`
4. In the MID Server's .../`agent/conf/wrapper-override.conf` file, uncomment the FIPS line and set its value to true.
   The line should read: `wrapper.java.additional.106=-Dorg.bouncycastle.fips.approved_only=true`

MID Server Governance

Improve MID Server security by setting an automatic timeout to invalidate and shut down inactive MID Servers. You can enable this feature and set the inactivity timeout period globally and for each MID Server.

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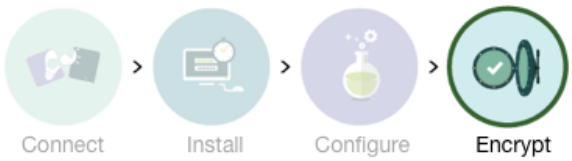

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Introduction

MID Server Governance prevents forgotten MID Servers connected to ServiceNow instances from being utilized if the instance is compromised. MID Server Governance keeps a record of the last status change of the MID Server validation/invalidation process.

This feature is not enabled by default, and is available out-of-the-box as part of the MID Server plugin. Once enabled, MID Server authentication is expired after a predetermined period of inactivity unless explicitly configured to never expire.

Enable and Configure MID Server Governance

MID Server Governance is enabled for all MID Servers by setting the following true/false system property: **mid.inactivity.timeout.enabled**. This property is not defined by default. The global inactivity timeout is specified by setting the following integer system property: **mid.inactivity.timeout.days**. The property takes an integer which specifies the timeout in days. The default timeout is 30 days if unspecified.

You can override the timeout for a particular MID Server by specifying **mid.inactivity.timeout.days** as a configuration parameter on that MID Server. A timeout value of 0 disables MID Server Governance on that MID Server. Therefore, you can set a global timeout and also change or disable timeouts for certain MID Servers.

You do not need to restart the MID Server after changing the Governance configuration. Governance works with either basic or mutual authentication.

Activity Tracking

The MID Server analyzes activity by tracking incoming and outgoing ECC queue messages . Once per hour, the MID Server reports the last activity to instance, which is stored in the ecc_agent record, and checks if the inactivity timeout has been reached. If the inactivity timeout has been reached and the MID Server is up, the MID Server is invalidated and shuts down. If the timeout is reached when the MID Server is down, a job on the instance determines if the MID Server is idle and invalidates it on the instance.

When MID server is approaching auto-invalidation timeout due to inactivity, the MID Server page will display a message indicating:

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- An info message when 3-7 days remain before inactivity timeout.
- An error message when less than 3 days remain before inactivity timeout.
- After a MID has been auto-invalidated, an error message is displayed indicating the date the MID was auto-invalidated.

Clearing the auto-invalidated state

After a MID Server has been auto-invalidated, the auto-invalidated status must be manually cleared in order to bring the MID back up successfully. The MID Server shuts down immediately if it is restarted without clearing this state. In addition, a MID issue will be logged indicating this occurrence.

The auto-invalidated state of a MID Server can be cleared by selecting the **Clear auto invalidated** UI action from the MID Server instance page. After invoking this UI action, the user should start their MID Server and continue with the usual validation process.

Purpose field

The purpose is a text field that the customer can update at any point to indicate the intended usage for the MID Server. This field is purely descriptive and has no further interactions.

MID Server upgrades

Upgrade MID Servers manually, or automatically through the instance. MID Server automatic upgrade is triggered when the instance upgrades and the MID Server no longer has the same version. The new MID Server package is downloaded from install.service-now.com, replaces the old one, and the MID Server starts with the new version.

> **Warning:**
> The MID Server can't auto-upgrade on a Windows host if the Windows Application Experience service is turned off. For information on the error that is displayed and instructions for re-enabling this service, see KB0597552.

MID Server upgrade requirements

Access to the MID Server download site

The MID Server host computer must have access to the ServiceNow download site at `install.service-now.com` to upgrade automatically. If you have a self-hosted ServiceNow environment that blocks access to the download site, you must import the MID Server installer package into your MID Server hosts manually. For instructions, see KB0760123 in the Self-Hosted knowledge base.

MID Server access to OCSP blocked

Firewalls and proxy configurations may block calls to the OCSP Entrust and DigiCert servers, which prevents the MID Server from working. You may need to change your firewall permissions so that the OCSP traffic goes through. For more information and resolutions, see the HI Knowledge Base article [KB1216223].

MID Server operating system compatibility

Upgrading Windows or Linux MID Servers with 32-bit operating systems isn't supported. For more information, see [KB0863694].

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The MID Server can't upgrade on a Windows host if the Windows Application Experience service is turned off. For information on the error that is displayed and instructions for re-enabling this service, see KB0597552.

The MID Server upgrade is blocked by some antiviruses running on Windows hosts. For information on the errors and list of these antiviruses, see KB0870329.

Any Linux MID Server upgrade that's service is installed under system in Madrid or lower needs to re-install the service after upgrade. If you didn't manually reinstall the service in previous upgrades and your MID Server service is still installed on Madrid or lower versions, during upgrade the MID Server automatically re-installs the service. To re-install the service MID Server needs to run as an admin user. If your MID Server upgrade needs to re-install the service, make sure that the MID Server user is admin, or you can manually re-install the service before upgrade. For information about manually re-install the service, see KB0821436.

When does the MID Server need to upgrade

Any MID Server with a version different from the instance version needs to upgrade. The following two system properties control the version of all MID Servers:

- **mid.buildstamp**: Identifies the MID Server version with an identifier based on the date of the build. This property uses the format of **mm-dd-yyyy-hhmm**. The MID Server checks for version information hourly. If no override version is configured, the MID Server looks at the **mid.buildstamp** property for the version to use. This property resets itself to the default version (the version that matches your instance version) when the instance is restarted or upgraded, so any user changes are lost at that time. The system appends the release name and patch information to the date and time format.

  Warning:
  This property is not visible by default and should not be configured.

- **mid.version.override**: Sets an override condition for the current version for all MID Servers in your environment. This action pins the MID Servers to a single version and disables the automatic upgrade feature. This property is not visible in the base system and must be added to the System Property [sys_properties] table when it is set. For details, see Add a system property.

When the MID Servers check the version each hour, they look at the **mid.version.override** property first. If this property is empty, the MID Servers get their version information from the **mid.buildstamp** property. If an override version is configured, the MID Servers use this value and ignore the version information in the **mid.buildstamp** property. This override value remains when the instance is restarted and is passed to the MID Servers. The value in the **mid.version.override** property is cleared during an upgrade, which forces the MID Server to reset itself to the version in the **mid.buildstamp** property.

In addition to **mid.version.override**, the MID Server version can also be controlled with the configuration parameter **mid.pinned.version** which pins the MID Server to a specific version.To pin a MID Servers, set the **mid.pinned.version** parameter with the name of that version in the **config.xml** file of each MID Server. Use the format **<version>-mm-dd-yyyy**. This setting overrides the property setting for the pinned MID Server version. For instructions, see Add a MID Server parameter. The value set in this parameter is not affected by an upgrade.

Warning:
Using **mid.version.override** and **mid.pinned.version** is not recommended. The different versions on the MID Server and instance can cause outage issues on the MID Server.

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Upgrade methods

Automatic

Automatic upgrade can be triggered by the instance or the MID Server itself. This functionality is available by default. Automatic upgrade occurs:

- When the instance is upgraded and the MID Server for that version is different than the version currently on the MID Server. The instance sends **autoUpgrade**system command to the connected MID servers.
- Every hour, the MID Server checks with the instance to see if there is a different version available for upgrade. You cannot modify this time period.

Manual

Manually start the upgrade by clicking a related link on the MID Server record. Use this method when you do not want to wait until the next hourly automatic update or if your upgrade failed and you want to force an upgrade. See Upgrade the MID Server manually for instructions.

Upgrade process

1. **Pre-upgrade Check:**Before starting the actual MID Server upgrade process, the MID Server runs a set of tests to make sure that the host machine meets the minimum requirements. Any errors encountered during this automatic test prevent the upgrade from occurring until the issues are resolved. The pre-upgrade test is enabled by default but can be disabled by adding and setting a system property. See MID Server pre-upgrade check for more information.
2. **Download the packages:**The MID Server downloads upgrade packages from install.service-now.com. These packages are in zip format and are downloaded to the agent folder in the **package/incoming** folder.
3. **Digital Signature Verification**

   After downloading every package, MID Server verifies the digital signature of the package. It throws an exception if the verification fails. The error will be recorded in the agent log and the MID Server issue table.

   If the packages are downloaded and replaced manually you can verify the signature manually. To manually verify the signature of an installation or upgrade package, use the jarsigner tool which is available for free with JDK. The following is the jarsigner command to initiate the verification: `Jarsigner -verify -verbose -certs -strict <zip-file>`

   The output should be similar to the following example:

```
- Signed by "CN=ServiceNow Inc., O=ServiceNow Inc., L=Santa
 Clara, ST=California, C=US"
Digest algorithm: SHA-256
Signature algorithm: SHA256withRSA, 2048-bit key
Timestamped by "CN=Symantec SHA256 TimeStamping Signer - G3,
 OU=Symantec Trust Network, O=Symantec Corporation, C=US" on
 Tue Nov 05 19:55:37 UTC 2019
Timestamp digest algorithm: SHA-256
Timestamp signature algorithm: SHA256withRSA, 2048-bit key

jar verified.

The signer certificate will expire on 2021-08-09.
The timestamp will expire on 2029-03-22.
```

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4. **Extracting Zip Files:**After downloading all required packages, the MID Server extracts the zip files.
   - **Before Rome**: The zip files are extracted in a folder under the operating system defined temporary folder. The folder name is a randomly generated number. The operating system temporary folder is specified by system property **java.io.tmpdir**. On a UNIX host, the value for this property is typically is `/tmp` or `/var/tmp`.
   - **From Rome onward**: The MID Server avoids using operating system defined temporary folders during MID Server upgrade. The zip files are extracted in a folder in the **work/upgrade_temp** folder under the agent folder. The folder name format is a randomly generated number. If you want to switch to the previous behavior and use an operating system defined temporary folder you can add **mid.upgrade.use_os_temp_folder**to MID Server's **config.xml** file and set it to true. To switch the behavior for all MID Servers, you can add it to the MID Server property [ecc_agent_property] with MID Server field blank.

   Note:
   If you are using KB0747569 to change the**java.io.tmpdir**and you want to keep it for future upgrades from Rome, set **mid.upgrade.use_os_temp_folder**to true after upgrading to Rome. If **mid.upgrade.use_os_temp_folder** is not set to true then **java.io.tmpdir** isn't applied during the MID Server upgrade and the folder under `agent\work\upgrade_temp` will be used.

5. **Replace old packages with the upgraded packages:**After downloading and extracting the upgrade packages, the MID Server replaces old files with the new files and starts with the new version. To replace the packages, the MID Server starts a process named **ServiceNow AI Platform Distribution Upgrade** and shuts down. ServiceNow AI Platform Distribution Upgrade waits for the MID Server to shut down properly, then replaces the required files as follows:
   - **Before Rome:**The process deletes all files and folders in the bin, lib and jre folders and copies the new files into those folders.
   - **From Rome onward:** The process replaces the files in the bin, lib and jre only if the new version of the file is different from the old version. **ServiceNow Platform Distribution Upgrade** does not clean the upgrade files and the unchanged files are kept.

   If the reinstalling service was required as a part of MID Server upgrade, ServiceNow Platform Distribution Upgrade reinstalls the service before starting the MID Server. For more information refer to KB0821436.

   Note:

   If the MID Server upgrade fails in this step the MID Server stays Down. Some anti-viruses block the file replacement in this step. For more information refer to KB0870329.

6. **Start the MID Server:**After replacing all required files with the new version, the ServiceNow AI Platform Distribution Upgrade starts the MID Server. When the MID Server comes Up with the new version, it cleans up all temporary folders used to extract the upgrade files.

Upgrade log messages

The MID Server log messages are available in the following log files:

- Pre-upgrade check log messages are available in agent.log file under agent/logs folder. The message **Performing pre-upgrade validation tests.** indicates that the pre-upgrade check has started. If all mandatory tests are passed, the message **Pre-upgrade validation tests successful. Continuing with upgrade process.** indicates the end of the pre-upgrade check.

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- Log messages for downloading missing files are also available in agent.log. Every package download starts with **Downloading package to PACKAGENAME.ZIP from https://install.service-now.com/ PACKAGEINFO** message. The download progress and the size of downloaded file is monitored in the log. After downloading every package, **Package was successfully downloaded from https://install.service-now.com/ PACKAGEINFO** indicates the successful download.

- Extracting the zip files is the last step available in the **agent.log**. The message **Upgrading MID server** indicates the start of this step, and the message **Extracting package PACKAGE.ZIP to EXTRACT_TMP_FOLDER** is shown for every package extraction. When all required zip files are successfully extracted, the MID Server starts the ServiceNow AI Platform Distribution Upgrade process and the message **Stopping MID server. Bootstrapping upgrade** shows the end of this step before MID Server goes Down.

ServiceNow AI Platform Distribution Upgrade logs include log messages for the process start up and for replacing files during the MID Server upgrade. The upgrade log messages are placed between the messages *************UPGRADE MAIN LOGIN START************* and *************UPGRADE MAIN LOGIN END*************. ServiceNow AI Platform Distribution Upgrade log messages can be found in the following log files:

- In the **glide-dist-upgrade.log** file under temp extract folder. This file is available in upgrade-wrapper/logs folder under temp extract folder. This log file includes process log messages and upgrade log messages.
- In the **dist-upgrade.log** file in `agent\logs` folder. This file only includes the upgrade portion of log messages. If there was some issue with the process startup you need to look at **glide-dist-upgrade.log.**
- In **wrapper.log**under `agent\logs` folder. After replacing files, ServiceNow AI Platform Distribution Upgrade appends **glide-dist-upgrade.log** to the wrapper.log file.

Update the wrapper configuration with upgrade-wrapper-override.conf

The wrapper configuration for `glide-dist-upgrade` can be updated using a `upgrade-wrapper-override.conf` file. Create a file named `upgrade-wrapper-override.conf` in the `agent/conf` folder. Any configurations in the `upgrade-wrapper-override.conf` are used during the upgrade process.

By modifying the configuration with `upgrade-wrapper-override.conf`, debug logs can be enabled at the `dist-upgrade` wrapper level and changes can be tested.

For example, the default timeout may not be long enough for certain JVM level commands. The timeout can be increased with `upgrade-wrapper-override.conf` for the `dist-upgrade` wrapper configuration.

MID Server states

Upgrading

The MID Server status is changed to Upgrading while the upgrade is running. The Upgrading state is similar to the **Paused** state. This is avoids potential miscommunication between the new version of the instance and the previous version of the MID Server during upgrade. While in the Upgrading state, you cannot resume or restart the MID Server. However, you can perform the same actions that you can when the MID Server is in the Paused state.

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Note:
If you are using an Istanbul instance but you are upgrading a pre-Istanbul MID Server to Istanbul, these upgrade states are not available. They are only available for MID Servers that are already on Istanbul.

Upgrade Failed

If the upgrade failed in pre-upgrade check step or download/extract packages step, failed upgrades are handled differently based on the version you are upgrading.

- Upgrade to another major release (such as Istanbul to the next full release): the status changes to **Upgrade Failed**.
- Upgrade from a minor version within a release (such as Jakarta patch 1 to patch 2): the MID Server continues using the version it is currently running. It does not perform the upgrade and the status eventually changes to **Up**, assuming the MID Server was already functioning properly.
- If the upgrade failed in last step, replacing old version of packages with the new version of packages, the MID Server stays **Down**.

MID Server upgrade history

Use the MID Server Upgrade History module for troubleshooting problems with MID Server upgrades. The module contains a record of each instance upgrade. Those records provide step-by-step status details for each MID Server's upgrade process. If an error occurs, it is noted in the step and a message is dynamically generated with further details. The table cleanup job automatically deletes issues that haven't been detected for 30 days, regardless of their state. For further information, see MID Server Upgrade History.

JRE TrustStore certificate migration during JRE updates

For JRE updates after upgrading to Quebec, the MID Server migrates existing self-signed certificates in the JRE TrustStore to the new JRE version's TrustStore. When these certificates are migrated, their aliases are prepended with the string "snc_".

In order for a certificate to be migrated it must be:

- an X509 certificate
- certificate standard v3
- have the basic constraint extension set to false (i.e. it is not CA issued)

The MID Server identifies when a JRE upgrade is about to take place and begins the migration process. Before the migration, the MID Server creates a backup of the original TrustStore as a fall-back in the event of failure. If there is a failure, the backup TrustStore can be manually restored.

MID Server pre-upgrade check

Prior to an upgrade, the MID Server runs tests to identify issues that could cause the upgrade process to fail or result in a MID Server outage.

Each MID Server contains an AutoUpgrade monitor that compares the MID Server version with that of the instance to determine if the MID Server needs to upgrade. If the AutoUpgrade monitor discovers that the MID Server version is out of date, the monitor runs pre-upgrade validation tests for that MID Server. If an issue is detected, a message is logged to the MID Server Issue [ecc_agent_issue] table, and the upgrade is blocked. The AutoUpgrade monitor continues to run every hour, until all the tests pass. If there are no blocking issues, the MID Server downloads the appropriate upgrade package and begins the upgrade process. The MID Server pre-upgrade

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check also runs for the upgrades triggered by the instance when the instance was upgraded, as well as for manual upgrades.

Pre-upgrade tests

The pre-upgrade runs two sets of tests: **Mandatory tests**and **Alert tests**. Every mandatory test is required to pass to start MID Server upgrade. If a mandatory test was not passed, the test is recorded in the agent log and a MID Server active issue is created in the MID Server issue [ecc_agent_issue] table. These errors are published before the actual MID Server upgrade occurs and must be resolved before the upgrade can continue. MID Server stops the Upgrade process and changes the status based on MID Server states. If any alert test was not passed, a message is added in the agent log and MID Server issue table, but the pre-upgrade check continues and MID Upgrade doesn't stop.

Pre-upgrade validation tests check the following mandatory tests:

- At least 1 GB of free disk space
- Access to the download site at install.service-now.com
- Verify the digital signature of a sample downloaded file
- Permission to execute, which involves the following:
  - Extract a Zip archiver to a temp folder
  - Copy file from temp folder to the agent folder
  - Read a text file and validate the content
  - Delete the pre-upgrade check contents
- MID Server host machine is not a 32 bit system
- On Linux MID Servers, the glibC version is at least 2.17

On Windows MID Servers, the pre-upgrade validation runs the following alert tests:

- Any MID Server Upgrade blocker services is running on the host machine
- Status of Application Experience on the host machine
- The MID Server must run as a non-administrator user. If the current **Log On As user** account for the MID Server is **LocalSystem** or is a user that is part of the Administrators group, then the upgrade fails and generates an error log.

Errors that block the upgrade

These messages describe failing a mandatory test and are published to the MID Server Issue [ecc_agent_issue] table. Failure of any of these tests blocks the upgrade.

Not enough free disk space. The system reports <n> bytes free

This message is displayed when less than 1 GB of free disk space is detected on the MID Server host. This error is also written to the MID Server agent log.

Unable to download updates from the install server

This message indicates that either the MID Server host does not have permission to download the installation package from install.service-now.com, or network problems prevent connection. This error is also written to the MID Server agent log.

Signature verification failed:<message>

This message indicates that a Verification Exception has occurred when pre-upgrade check tries to verify the digital signature of the downloaded check file.

Unable to verify digital signature:<message>

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This message indicates that the verification signature process was interrupted by an exception.

Unable to extract contents of pre upgrade check zip

This message indicates that the service account on the MID Server host does not have permission to extract the pre-upgrade ZIP archive to the temporary folder.

Unable to create folder <upgrade check file path>

This message indicates that the MID Server service account does not have permission to create the upgradeCheck folder for the pre-upgrade checking files in the agent/package path.

Unable to verify file permissions: <message>

This message indicates an exception has occurred when checking file permissions, such as a file that does not exist or access failure.

MID Server Windows Service is not running as LocalSystem or a local Administrator

This message warns that the Windows service is not running with the desired permissions.

Upgrade Failure: The host machine does not meet the minimum system requirements to upgrade the MID server.

MID upgrade is not supported on 32-bit host. Please refer to KB0863694 for more information.

Upgrade Failure: Host does not meet the minimum system requirements to upgrade the MID server. Please refer to MID Server product documentation on GlibC library for more information

This error can only occur for Linux MID Servers. Refer to Java version support for more information.

Non-blocking warnings

These warnings are displayed in the MID Server Issue [ecc_agent_issue] table and do not prevent a Windows MID Server from upgrading:

Unable to parse $logOnAsUser

This message warns that the Log On As User value for the Windows service is not in either of these expected formats:

- user@domain.company.com
- domain\user

Unable to look up Log On As user's groups

When the instance attempts to look up the logged on user's group memberships, it executes the **net user <username>** command. The instance expects a certain output structure by the Windows service from this command and issues this warning if the expected output does not match the actual output.

These PowerShell warnings are written only to the MID Server agent log. Because PowerShell is not required to use a MID Server, these configuration issues do not prevent a Windows MID Server from upgrading. However, these warnings might indicate issues in your environment that require attention.

Skipping PowerShell upgrade checks since PowerShell is not usable

PowerShell 3.0 (at a minimum) is not installed or powershell.exe is not available to the MID Server service user.

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Skipping Powershell test: Target folder has not been initialized

Skipping Powershell test: Unable to detect the service name

Service CiscoAMP running on the MID Server host machine is identified as a MID Server upgrade blocker

For more information, refer to KB0870329.

The Application Experience is disabled on the MID Server host, which can cause the auto-upgrade process to fail and the MID Server to go down. Enable the service on the host to ensure successful auto-upgrade

For more information, refer to KB0597552.

Continuing with upgrade, but the following issue was encountered during upgradeCheck: <exception message>

This message indicates that there was an issue running the PowerShell portion of the pre-upgrade tests.

Disabling the pre-upgrade check

A MID Server configuration parameter called **mid.upgrade.run_precheck** is set to **true** by default, which allows the automatic pre-upgrade test to run. To disable these tests for a single MID Server, add this parameter to that MID Server's config.xml file and set it to **false**. To disable these tests for all MID Servers, add a new record to the MID Server Property [ecc_agent_property] table called **mid.upgrade.run_precheck**. Set the value of this property to **false** and leave the **MID Server** field blank.

Pinning a MID Server to a specific version

You can pin all the MID Servers in your environment to a specific version by setting a system property, or you can configure specific versions for individual MID Servers.

Note:
Under most circumstances, do not pin the MID Server to a specific version. Pinning the MID server can make it out of sync with the instance, and lead to broken functionality. Instead, let the instance determine which MID Server version to use.

Version control properties

These system properties control the version for all MID Servers:

- **mid.buildstamp**: Identifies the MID Server version with an identifier based on the date of the build. This property uses the format of **mm-dd-yyyy-hhmm**. The MID Server checks for version information hourly. If no override version is configured, the MID Server looks at the *mid.buildstamp* property for the version to use. This property resets itself to the default version (the version that matches your instance version) when the instance is restarted or upgraded, so any user changes are lost at that time. The system appends the release name and patch information to the date and time format.

  Warning:
  This property is not visible by default and should not be configured.

- **mid.version.override**: Sets an override condition for the current version for all MID Servers in your environment. This action pins the MID Servers to a single version and disables the automatic upgrade feature. This property is not visible in the base system and must be added to the System Property [sys_properties] table when it is set. For details, see Add a system property.

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When the MID Servers check the version each hour, they look at the *mid.version.override* property first. If this property is empty, the MID Servers get their version information from the *mid.buildstamp* property. If an override version is configured, the MID Servers use this value and ignore the version information in the *mid.buildstamp* property. This override value remains when the instance is restarted and is passed to the MID Servers.

Important:
The value in the **mid.version.override** property is cleared during an upgrade, which forces the MID Server to reset itself to the version in the *mid.buildstamp* property.

Version control configuration parameter

To pin specific MID Servers on a desired version, set the **mid.pinned.version** parameter with the name of that version in the **config.xml** file of each MID Server. Use the format **<version>-mm-dd-yyyy**. This setting overrides the property setting for the pinned MID Server version. The MID Server version is checked every 20 minutes or whenever the MID Server restarts, at which point the pinned version is applied. For instructions, see Add a MID Server parameter.

Note:
The value set in this parameter is not affected by an upgrade.

Upgrade the MID Server manually

You can manually upgrade MID Servers at any time if you do not want to wait for the automatic upgrade.

Before you begin

Role required: mid_server or admin
For the upgrade to run, MID servers must be in the **Up** state and must be validated. The MID Server automatically runs the pre-upgrade test before upgrading. Any errors encountered during this test must be resolved for the upgrade to proceed.

About this task

The MID Server is upgraded to the version specified by build stamp on the instance, or by the upgrade property that you specify.

Procedure

1. Navigate to **All** > **Discovery** > **MID Servers** or **Orchestration** > **MID Server Configuration** > **MID Servers**.
2. Open the record of the MID Server that you want to upgrade.
3. Click **Upgrade MID** under **Related Links**.
4. Confirm that you want to perform the upgrade.

Resolving MID Server issues

Troubleshoot problems with the MID Server to find solutions. Monitor the MID Server to receive alerts about issues as they occur. Troubleshooting procedures exist to resolve specific problems with the MID Server. The Knowledge Base on Hi contains several articles to help you troubleshoot MID Server issues.

Monitor the MID Server

Monitoring a MID Server involves verifying entries in log files, confirming network connectivity, and checking MID server status.

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- If the MID Server is on a Windows host, navigate to the Windows Services console, locate the service name that matches the name that appears from the `wrapper-override.conf` file. If the MID Server process is the only Java process running on the host, monitor the memory used by java.exe and alert on less than the maximum configured memory defined in the ~\agent\conf\wrapper-override.conf folder.

- Ensure that the `agent0.log.0.lck` file appears in the ~\agent\logs folder to confirm that the MID Server running and logging system activity in the `agent0.log.0` file.

- Review the following logs for warning, critical, and severe errors: ~\agent\logs \agent0.log.0 ~\agent\logs\wrapper.txt See Manage ECC Queue content for a MID Server to see how to open log entries from the instance.

- Test MID Server connectivity to confirm that the MID Server host is able to communicate with the instance. Resolve any issues with the network connectivity such as conflicts with firewalls, access control lists, and routing errors.

- From the MID Server instance, navigate to the **MID Servers** page, and review the status of the MID Server. For additional information, click a **Name**.

- Set up email, SMS, and push notifications to alert you when issues occur with MID servers. The **MID Server Down** notification is enabled by default. See Notifications for details.

Java Flight Recorder

Java Flight Recorder (JFR) uses an articulate data model to analyze Java Virtual Machine (JVM) internal and application specific memory usage and thread related details. On hosts with Java 14 or later, Event Streaming enables analysis of specific JVM or application events.

The JFR file actions **Start JFR Recording**, **Stop JFR Recording**, or **Write JFR File**, are accessed on the instance in the MID Server's Related Links. By starting and stopping the JFR recording, you can dump JFR data to the disk on demand. While JFR recording is on, you can write to the JFR file from the MID Server instance page.

The JFR file is deleted by a scheduler to clean the data after 24 hours. This default behavior can be overridden by adding the following configuration parameter in the **config.xml**: `<parameter name="mid.jfr.data.clean.interval" value="<time in milisec>"/>`

Custom JFR events can be written to JFR file. To disable event writing, add the following configuration parameter to the **config.xml**: `<parameter name="mid.jfr.record.aprobe" value="false”/>`

Troubleshooting procedures

The following procedures provide information on resolving specific problems with the MID Server. Knowledge Base articles also cover a wide range of issues. If you are encountering problems which are not covered in these procedures, search the Knowledge Base for related articles. For instance, if you are experiencing symptoms such as the MID Server going down or not responding, or CIs being duplicated during discovery, see KB0597571 for information and recommended solutions.

MID Server active issues

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The ServiceNow® instance has a dedicated table that publishes active issues with MID Servers and alerts administrators when a MID Server is in danger of exceeding its resources.

Active MID Server post-cloning credential issues

The system provides automatic processes to detect and notify you of possible MID Server credential issues after instance cloning.

MID Server resource threshold alerts

The instance displays warnings when a MID Server breaches its resource thresholds for CPU and JVM memory usage, enabling users to create email notifications or custom scripts when a breach occurs.

MID Server user connectivity issues

The instance writes issues involving MID Server user logins and network connectivity to the MID Server Issue [ecc_agent_issue] table and creates events you can use in custom scripts or to send email notifications.

Interpreting MID Server user debugging output

Debugging output from the system log is available in either a summary or detailed view for MID Server user issues, but must be enabled manually.

MID Server Upgrade History

Use this module to troubleshoot errors that occur during the MID Server upgrade process. The MID Server Upgrade Histories table contains a record of each instance upgrade. The MID Server Upgrade Stages table shows the status of each MID Server and its upgrade progress, including any errors encountered.

MID Server active issues

The ServiceNow® instance has a dedicated table that publishes active issues with MID Servers and alerts administrators when a MID Server is in danger of exceeding its resources.

The MID Server Issue [ecc_agent_issue] table displays a number of common issues that a MID Server can experience, as they occur. Error checking processes attempt to pinpoint the most likely cause of the issue. Informative error messages name the affected MID Server and explain the possible cause of the issue. The ecc_agent_issue table retains its records for 30 days.

To access records in this table, navigate to **MID Server** > **Server Issues**.

Supported MID Server active issues:

- Bad user credentials after instance cloning.
- Unsupported Java Runtime Environment (JRE) on the MID Server host.
- Approaching resource thresholds for CPU usage and JVM memory.
- Errors detected during pre-upgrade testing.
- User authentication and authorization failures.
- Network connectivity interruptions and role configuration errors.

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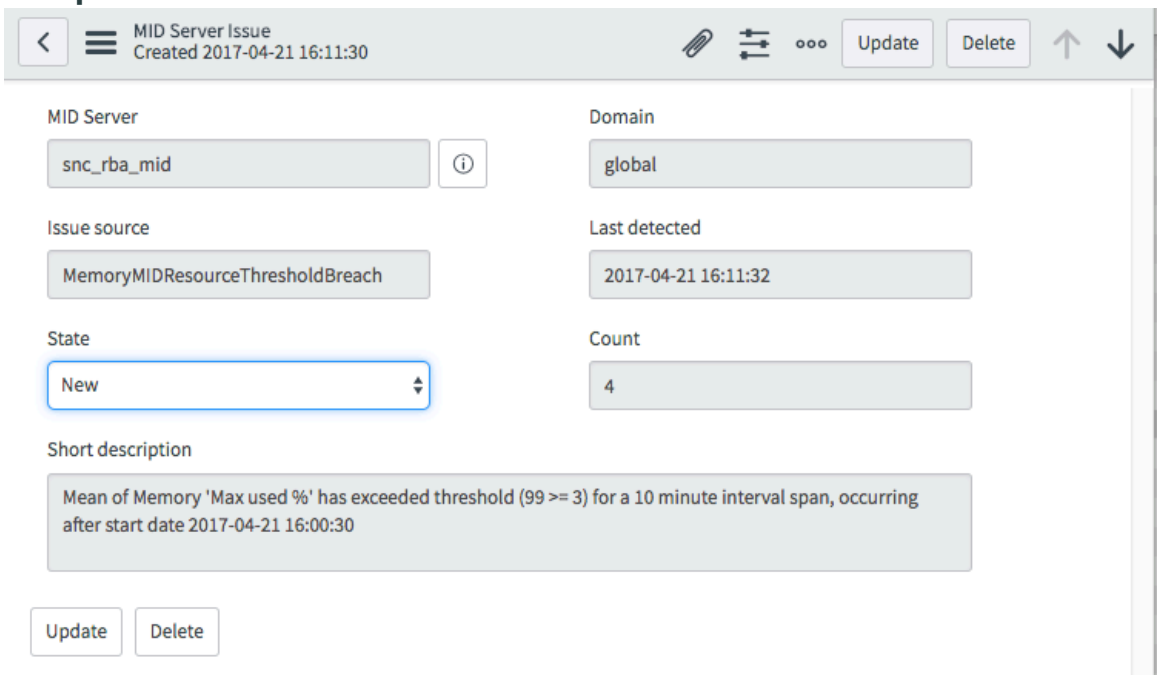
Example MID Server Issue record



MID Server fails to start

When a newly installed MID Server fails to start or shuts down prematurely, improper configuration could be to blame.

Duplicate MID Server names

When the MID Server service starts, it verifies that it is the only active (not down) MID Server with that name. If the MID Server discovers another active MID Server with the same name, the starting MID Server waits 5 minutes and sends another query. The MID Server repeats this query 12 times and logs each attempt in the agent log. If the IP address or home directory of an existing MID Server is changed, then that MID Server is invalidated. If the MID Server still detects a duplicate after this cycle, it creates a record in the MID Server Issue [ecc_agent_issue] table and shuts down.

Note:
The record in the MID Server Issue [ecc_agent_issue] table cannot be resolved automatically by the instance. Close this record manually for accounting purposes. Either mark the issue **Resolved** or delete it.

Upgraded MID Servers running multiple services

Beginning with the New York release, a batch file in the MID Server installer package ensures that only one Windows MID Server service is configured for an executable path (MID Server installation folder). Previous versions have not checked for this configuration. Upgraded MID Servers that run multiple services with the same executable path are prevented from starting. If you experience this issue, follow this procedure to reconfigure the MID Server to use only one service:

1. Delete the unwanted Windows service by running **sc.exe delete <service name>** from the command line.
2. Open the `wrapper-override.conf` file in the MID Server installation folder.

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3. Change the **wrapper.name** and **wrapper.displayname** parameters to the service name that you want to keep.
4. Restart the MID Server.

Active MID Server post-cloning credential issues

The system provides automatic processes to detect and notify you of possible MID Server credential issues after instance cloning.

During an instance clone, the MID Server [ecc_agent] table is not copied from the source instance, but the User [sys_user] table is copied. As a result, the source MID Server user credentials copied into the target instance might not match those used by the existing set of MID Servers used by the target. Bad credentials can cause those MID Servers to be down for the target instance. Processes on the instance notify you if a MID Server is down from suspected bad credentials following an instance clone.

Table for post-cloning credential issues

The MID Server Issue [ecc_agent_issue] table stores active MID Server issues after an instance clone. Records in this table show a MID Server's current state, evaluation times, and the **Issue source**. For cases in which a MID Server for a cloned instance is down because of possible bad credentials, the **Issue source** is **InstanceClone**. Data from the MID Server Issue [ecc_agent_issue] table are displayed in a related list on a MID Server record. Records in this table are removed if they have not been detected for 30 days. Ongoing issues reappear as they occur.

Post-cloning cleanup script and scheduled jobs

A cleanup script called `Bad MID Server credentials after clone` runs on the target instance after cloning and calls a script include called `BadMIDCredentialAfterClone`. This script include schedules the execution of the following jobs on the Schedule Item [sys_trigger] table:

- `BadMIDCredentialAfterClone-1`: Runs 15 minutes after clone execution.
- `BadMIDCredentialAfterClone-2`: Runs 75 minutes after clone execution.

These jobs log to the MID Server Issue [ecc_agent_issue] table any MID Servers that existed on the target instance prior to the clone that are in the **Down** state. These MID Servers are not ready for normal processing and might be down due to invalid credentials resulting from the cloning process. The state of MID Servers added to the target instance after the clone is not evaluated.

Note:
The MID Server log shows that the MID Server user associated with the target instance could not be authenticated or was missing the proper role.

Business rule that checks for bad credentials

The **Check for bad MID credential after clone** business rule monitors the MID Server [ecc_agent] table for MID Servers that are transitioning from **Down** to **Up**. If the business rule finds a MID Server making that transition, the rule attempts to find a matching MID Server in the MID Server Issue [ecc_agent_issue] table that has an issue source of **InstanceClone** and a state other than **Resolved**. If a match is found, the business rule updates the state of the MID Server in the [ecc_agent_issue] table to **Resolved**.

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Resolving MID Server issues

The error message in the MID Server Issue [ecc_agent_issue] table names the affected MID Server user. This message appears each time the business rule runs and finds a MID Server that is down from suspected bad credentials:`MID Server not operational (status: Down), possibly due to recent clone. Verify credentials for logged in User 'local-midserver'.`

Attempt to resolve the issue first by comparing the user's credentials with the credentials that the affected MID Server is expecting. If the credentials are incorrect, fix the problem and check the MID Server status again. If the credentials are correct, but the MID Server remains down, check the Knowledge Base for other possible causes.

MID Server resource threshold alerts

The instance displays warnings when a MID Server breaches its resource thresholds for CPU and JVM memory usage, enabling users to create email notifications or custom scripts when a breach occurs.

The MID Server Issue [ecc_agent_issue] table warns users when a MID Server exceeds configured thresholds of its allocated CPU and memory resources. These warnings are published before the MID Server experiences performance degradation or an out-of-memory error, enabling the administrator to increase resources and avoid downtime. Administrators can use a registered event to send email notification to selected recipients, advising them of any threshold breaches, or to create a custom script to do some other type of work. The instance continues to update the MID Server Issue [ecc_agent_issue] table to keep unresolved issues current.

By default, CPU and memory threshold alerts are disabled and no alerts are published to the MID Server Issue [ecc_agent_issue] table. To enable both types of alerting, add these properties to the System Property [sys_properties] table, and then set their values to **true**:

- **mid.threshold.resource.breach.enable.cpu.alerts**
- **mid.threshold.resource.breach.enable.memory.alerts**

For details on adding system properties to the platform, see Add a property using sys_properties.list.

Evaluation process

This processing occurs whether or not alerting is enabled:

1. Every 10 minutes, each MID Server transmits its CPU and memory consumption metrics to the instance. The instance inserts CPU metrics into the **Mean CPU used %** field of the ECC Agent Scalar Metrics [ecc_agent_scalar_metric] table and memory metrics into the **Max memory used %** field of the ECC Agent Memory Metrics [ecc_agent_memory_metric] table.
2. After a successful insert, the following business rules run on each table, invoking a script include that calls an appropriate function. Each function takes an average of the metric sets inserted into the tables, based on the configured sampling intervals.
   - **Update cpu mean on MID Server Status**: Calls the *`MIDResourceThresholdBreach.checkCpuUsage()`* script include.
   - **Update max memory on MID Server Status**: Calls the *`MIDResourceThresholdBreach.checkMemoryUsage`* script include.

   Each function takes an average of the metric sets inserted into the tables, based on the configured thresholds and sampling intervals. The instance first looks at each MID Server for configuration parameters that set custom threshold values or sampling intervals for that MID

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Server. If no configuration parameters for these attributes are found, the instance looks in the System Properties [sys_properties] table for custom values to use. If no properties are found, the instance uses the default threshold and interval values from the code.

Note:
Both the threshold percentages and the sampling intervals are configurable. See Configuring thresholds and sampling intervals for details.

Alerting process

When alerting for CPU or memory thresholds is enabled, this processing occurs:

1. If the aggregated average metric value equals or exceeds the configured percent threshold, the instance triggers the *mid.threshold.resource.breach* event. Administrators can use this event to create email notifications for threshold breach alerts or to create a custom script.
2. The instance inserts a record of the breach into the MID Server Issue [ecc_agent_issue] table with a **State** value of **New** and a **Count** of 1, and then publishes a message containing all the pertinent details of the breach. An example of this message is `Mean CPU used % has exceeded threshold (96>=91) for a 40 minute interval span, occurring after start date 2017-01-11 14:25:19`. This message appears in the **Short description** field of the MID Server Issue form and in the event. You can copy any part of the message into your email notifications.

MID Server issue states

When the administrator first examines an issue in the MID Server Issue [ecc_agent_issue] table, the administrator can change the **State** of the issue to **Acknowledged** to indicate that the issue is being addressed. Each time the instance detects a breach, it attempts to match the breach with an existing issue. If a MID Server already has an issue record for that breach in a **State** of **New** or **Acknowledged**, the instance updates the **Last Detected** field with the current date/time and increments the **Count** field in the existing record. This prevents the creation of duplicate records in the MID Server Issue [ecc_agent_issue] table and records the number of times after the initial incident that the breach reoccurred. The administrator can increase MID Server resources gradually and watch the effect on the **Count** field. When the counter stops incrementing, the administrator knows that the MID Server has adequate resources. When the MID Server resource have been adjusted appropriately, the administrator sets the **State** to **Resolved**. If a new threshold breach is logged that matches a MID Server issue with a **State** of **Resolved**, the instance creates a new issue record.

Note:
Any record in the MID Server Issue [ecc_agent_issue] table that has not been updated in 30 days is deleted, regardless of its state.

Recommendations for resolving resource issues

Administrators have the opportunity to resolve any resource issues with a MID Server when they receive notification of the event. Follow these recommendations for reducing the strain on MID Server resources:

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- **JVM memory**:
  - Allocate more max memory to the MID Server. For more information, see Set the MID Server JVM memory size.
  - Add additional MID Servers to share the workload. For more information, see MID Server clusters.
  - Reduce the amount of concurrent processing for the MID Server. This includes segmenting IP Address ranges into smaller segments for a Discovery schedule or loading smaller segments of data within an import job.
- **CPU**: Reduce the activity on the host or migrate the MID Server to a new host with more available resources.

> **Note:**
> MID Server can create a resource usage spike during Discovery, especially discovering against a large number of targets or executing multiple Power Shell sessions concurrently. The MID Server host's resource utilization automatically returns to normal after the Discovery execution successfully stops. To decrease CPU utilization, host the MID Server on a dedicated machine. If you encounter resource usage issues, make sure only one MID Server is run on each dedicated host machine. If the MID Server is hosted on a public cloud, add more CPU resources and avoid the noisy neighbor issue. For more information, see High CPU Usage on Host with MID Server(s) [KB0597639].

Tables used for resource threshold evaluation

Table	Description
MID Server Issue [ecc_agent_issue]	Stores data on various types of MID Server issues, including breaches of configured CPU and memory thresholds. Fields used for resource threshold breaches are: • **count**: Number of times a previously reported threshold breach occurs, if the event is not marked **Resolved**. • **last_detected**: Current date and time a threshold breach is detected. This field is updated each time a previously detected breach is found, if it is not marked **Resolved**. • **message**: Descriptive message summarizing the conditions that triggered the threshold breach event. This message includes the actual percentage of CPU and memory calculated and the configured thresholds that were breached. • **mid_server**: Name of the MID Server experiencing the resource threshold breach. • **source**: The issue source for the breach. These are the possible sources:

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Table	Description
	○ **CpuMIDResourceThresholdBreach**: CPU threshold issue sources. ○ **MemoryMIDResourceThresholdBreach**: Memory threshold issue sources.
MID Server Status [ecc_agent_status]	Stores the percentages used for the CPU and memory resources, averaged over configurable intervals for each resource. The fields used are: • Mean CPU used % • Max Memory used %
ECC Agent Scalar Metric [ecc_agent_scalar_metric]	Stores the CPU usage data inserted by each MID Server every 10 minutes. The table field used by resource threshold alerting is **mean**.
ECC Agent Memory Metric [ecc_agent_memory_metric]	Stores the memory usage data inserted by each MID Server every 10 minutes. The table field used by resource threshold alerting is **max_used_pct**.

Business rules that check for threshold breaches

Business rule	Description
Update cpu mean on MID Server Status	Runs after the MID Server inserts a record into the ECC Agent Scalar Metric [ecc_agent_scalar_metric] table. This business rule triggers the `MIDResourceThresholdBreach` script include function that evaluates threshold settings to determine if the MID Server has breached its configured CPU resource thresholds.
Update max memory on MID Server Status	Runs after the MID Server inserts a record into the ECC Agent Memory Metric [ecc_agent_memory_metric] table. This business rule triggers the `MIDResourceThresholdBreach` script include function that evaluates threshold settings to determine if the MID Server has breached its configured memory resource thresholds.

Configuring thresholds and sampling intervals

You can use the default threshold percentages and sampling intervals or configure custom values using either of these methods:

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- Add system properties to the instance and change the default values for all MID Servers.
- Add configuration parameters to change the default resource values for individual MID Servers.

The system properties and the configuration parameters use the same names.

Property/configuration parameter	Description
mid.threshold.mean_cpu.aggregate_interval_span	Number of 10 minute units in the interval for sampling CPU usage data. The default interval is 30 minutes (3 x 10 min.) **Default**: 3
mid.threshold.mean_cpu.percent	Usage percentage of the total CPU resources that initiates a threshold breach alert. **Default**: 95
mid.threshold.mean_max_memory.aggregate_interval_span	Number of 10 minute units in the interval for sampling memory usage data. The default interval is 30 minutes (3 x 10 min.) **Default**: 3
mid.threshold.mean_max_memory.percent	Usage percentage of the total memory resources that initiates a threshold breach alert. **Default**: 95

MID Server resource reporting

The MID Server dashboard contains two reports that give you views into the consumption of CPU and JVM memory resources. These reports show usage over the previous 30 days.

- **Avg Percentage of CPU Used**: Trending the daily average on CPU usage helps illustrate the amount of CPU processing that the MID Server host consumes. MID Servers deployed on the same host will report the same CPU usage.
- **Avg Percentage of Max Memory Used**: The maximum used percentage (*max_used_pct*) is a useful metric for determining if the MID Server has enough memory resources. This metric is a percentage of the max used memory over the total available memory. Trending this over time provides a visualization of how much memory is needed by the MID Server.

MID Server user connectivity issues

The instance writes issues involving MID Server user logins and network connectivity to the MID Server Issue [ecc_agent_issue] table and creates events you can use in custom scripts or to send email notifications.

Records in the MID Server Issue [ecc_agent_issue] table can provide insight into why your MID Server user cannot log in or why a MID Server cannot connect to the instance. The system displays records for connectivity problems in this table that include informative error messages suggesting possible causes. By default, a scheduled job called MIDUserConnectivity runs every four hours and launches the MIDUserConnectivity script include to evaluate MID Server

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connection activity. Records in the MID Server Issue [ecc_agent_issue] table reflect the status of MID Server login attempts and connectivity at the time the scheduled job runs.

From the perspective of the instance, the MID Server is **Down** when:

- User authentication fails
- User authorization fails.
- Network issues prevent MID Server from establishing a TCP/IP connection.

Note:
To associate a user with a MID Server, navigate to the `servicenow/<mid server name>/agent/config.xml` file and enter the user credentials in the **mid.instance.username** and **mid.instance.password** parameters. Make sure to restart the MID Server to activate your changes.

How issues are logged

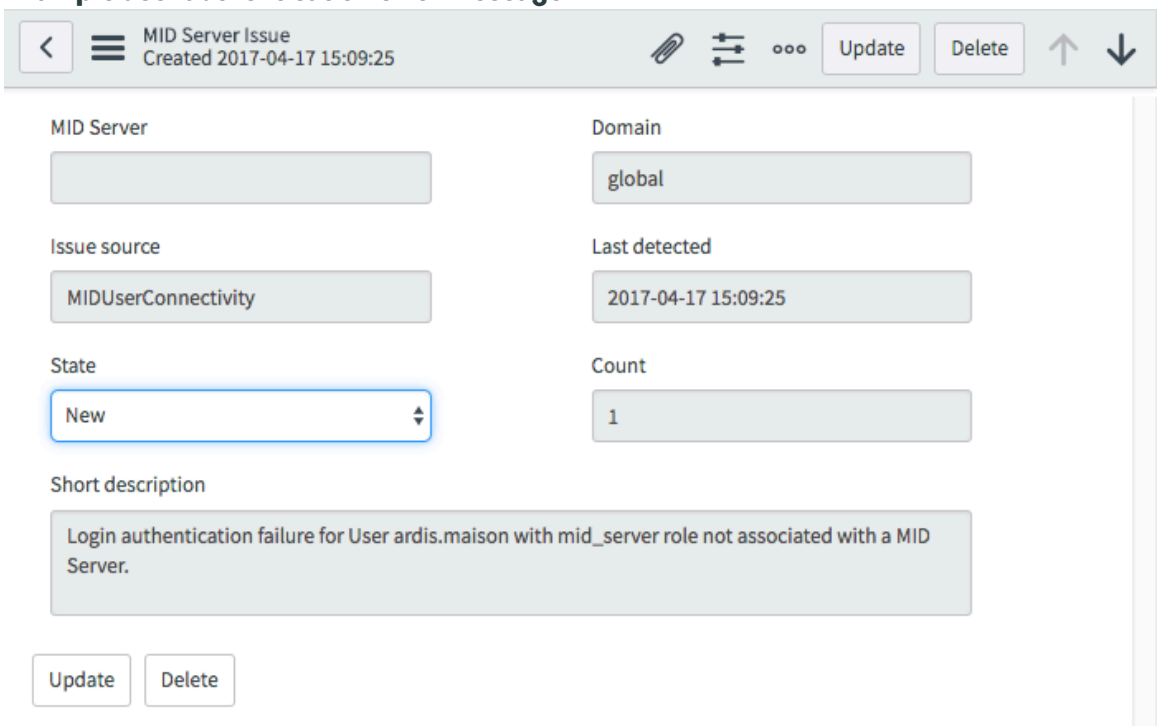
User authentication failures and authorization issues are logged automatically to the MID Server agent log file. The message for both is the same: **User cannot be authenticated or is missing the proper roles.** If the issue is related to authorization, the `agent.log` file shows the list of missing roles.

When debugging is enabled, MID Server issues are logged to the system log (syslog) and are available for display in either a summary or a detailed format. You can also change the sampling interval from the default 4 hours to something shorter for tracking your remediation efforts. For instructions on enabling and configuring debugging for MID Server user issues, see Test remediation efforts for MID Server user connectivity issues.

Data provided

When the instance encounters user connectivity issues, it opens a record in the MID Server Issue [ecc_agent_issue] table.

Example user authentication error message



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The MID Server Issue table contains these fields:

MID Server issue fields

Field	Description
Last detected	Date and time the issue was last detected.
Short description	Contents of the generated message that specifies a possible issue with the named user or the MID Server.
MID Server	Empty in the Jakarta release.
Issue source	The process that identified the issue. For all issues with MID Server user connectivity, the source is `MIDUserConnectivity`.
State	The current state of the issue. Possible states are: • **New**: Starting state when the instance creates the issue. • **Acknowledged**: State set when the administrator first examines the issue. • **Resolved**: Ending state, set by the instance, indicating that the issue has been resolved. If the scheduled job does not encounter the issue when it runs again, the instance automatically sets this value.
Domain	Domain associated with the MID Server user account.
Count	Number of times an issue has been detected. Each time the scheduled job runs and encounters the same issue, it increments this field.

User authentication failure

The credentials that the instance uses to authenticate a MID Server user are configured in the MID Server Configuration Parameters [ecc_agent_config] table. If the MID Server user attempts to log into the instance with invalid credentials, the instance rejects the connection, and writes the **login.failed** event to the Events [sysevents] table for the user. Administrators can use this event in a custom script or in email notifications for authentication failure.

Note:
If user authentication fails, user authorization is not attempted.

User accounts associated with a MID Server

Either of the following messages in the MID Server Issue [ecc_agent_issue] table indicate authentication failure for user accounts that are associated with a MID Server:

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- **Login authentication failure for User <user name> associated with 1 down MID Server. Check password on MID server.**
- **Login authentication failure for User <user name> associated with <n> down MID Servers. Check password on MID servers.**

The necessary conditions for these messages to appear are:

- The **Status** field in the MID Servers [ecc_agent] table that is associated with the MID Server indicates that the MID Server is **Down**.
- The user identified in the MID Server Configuration Parameters [ecc_agent_config] table is the user that one or more MID Servers is configured to use for authentication and authorization when connecting to the instance. The record in the [ecc_agent_config] table must have these values:
  - Parameter name [param_name] field set to **mid.instance.username**.
  - Value [value] field set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user failed during the scheduled time period. The record created in the [sysevent] table contains these field values:
  - Event Name [name] field is set to **login.failed**.
  - Parm1 [parm1] field is set to the user's name.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

User accounts with the mid-server role not associated with a MID Server

The following message appears when a user with the mid_server role who is not associated with a MID Server fails to authenticate: **Login authentication failure for User <user name> with mid_server role not associated with a MID Server.**

The necessary conditions for this message to appear are:

- The User Roles [sys_user_has_role] table contains a record linking the sys_id associated with the user record stored in the [sys_user] table, with the sys_id associated with the mid_server role record stored in the [sys_user_role] table.
- The user is not identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user failed during the scheduled time period.
  - The [sysevent] table contains a record with the Event Name [name] field set to **login.failed**.
  - The Parm1 [parm1] field is set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

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User authorization failure

The user authorization check occurs after the MID Server has successfully authenticated on the instance. In this step, the system ensures that the user account associated with a MID Server is granted the minimum roles required. A SOAP web service called *MIDServerCheck* performs the role checking on the instance. If the MID Server user has the proper roles, the connection is allowed and a *login* event is written to the Events [sysevents] table. If the user does not have the proper roles, the instance writes a **login.authorization.failed** event to the Events [sysevents] table. This event provides a comma separated list of the user's missing roles. Administrators can use this event in custom scripts or in email notifications for authorization failure.

Authorization can fail if a user is missing the mid_server role or any of the important SOAP roles, as in these cases:

- If the user has the soap_script role, the *MIDServerCheck* SOAP web service runs to check for the appropriate MID Server roles. If the user lacks the mid_server role or any of the other SOAP roles, authorization fails, and the **login.authorization.failed** event is created.
- If the user is missing the soap_script role, that user is not authorized to launch the *MIDServerCheck* SOAP web service, which checks for all required MID Server roles. Authorization fails, but the **login.authorization.failed** event is not created. When this occurs, the instance displays this message: **Connectivity of MID Server user <user name> cannot be detected by the instance**.

Users associated with one or more down MID Servers

Either of the following messages in the MID Server Issue [ecc_agent_issue] table indicate authorization failure for user accounts that are associated with a MID Server that is **Down**:

- **Login authorization failure for User <user name> associated with 1 down MID Server. Re-assign mid_server role to grant all required roles.**
- **Login authorization failure for User <user name> associated with <n> down MID Servers. Re-assign mid_server role to grant all required roles.**

The **MIDUserConnectivity** script include identifies active users associated with one or more down MID Servers whose last login attempt within the reporting period failed user authorization. This message is generated when user authorization failures are detected and reported by the MIDServerCheck scripted web service. However, user authorization failures are not reported for users who are not assigned the soap_script role. Should this occur, problems with the user are reported by the network connectivity message.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

- The user may or may not have the mid_server role.
- The user is identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user failed during the scheduled time period. The [sysevent] table contains a record with these settings:
  - Event Name [name] field set to **login.authorization.failed**.
  - Parm1 [parm1] field set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

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Users with the proper role not associated with a MID Server

The following message appears when a user with the mid_server role who is not associated with a MID Server fails authorization: **Login authorization failure for User <user name> with mid_server role not associated with a MID Server.**

This message is generated when user authorization failures are detected in which the user account, with the mid_server role, is not identified as a configured MID Server user in the [ecc_agent_config] table. It is possible that the user account was associated with a MID Server at the time of the failure.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

- The user has the mid_server role. The User Roles [sys_user_has_role] table has a record linking the sys_id associated with the user record stored in the [sys_user] table, with the sys_id associated with the mid_server role record stored in the [sys_user_role] table.
- The user is not identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user failed during the scheduled time period. The [sysevent] table contains a record with these settings:
  - Event Name [name] field set to **login.authorization.failed**.
  - Parm1 [parm1] field set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

Network issues

A network issue can prevent the MID Server from connecting to the instance's TCP/IP server to begin a session. In this case, the instance marks the MID Server as **Down**, because the instance failed to receive the MID Server heartbeat within the prescribed 5 minute interval.

Users associated with down MID Servers who have not attempted to log in

Either of the following messages in the MID Server Issue [ecc_agent_issue] table name users associated with MID Servers who have not attempted to log in during the reporting period:

- **User <user name> is associated with 1 down MID Server. No login attempts within reporting period.**
- **User <user name> is associated with <n> down MID Servers. No login attempts within reporting period.**

The MIDUserConnectivity script include reports active users associated with down MID Servers where network connectivity cannot be detected by the instance.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

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- The user may or may not have the mid_server role.
- The user is identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user which one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- There are no login attempts, either failed or successful, recorded in the Events [sysevent] table for the user during the scheduled reporting period.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

Users not associated with MID Servers who have not attempted to log in

The following message appears when a user with the mid_server role who is not associated with a MID Server has not attempted to login during the configured reporting interval: **User <user name> with mid_server role is not associated with a MID Server. No login attempts within reporting period.**

The MIDUserConnectivity script include reports active users with the mid_server role not associated with a MID Server, where connectivity cannot be detected by the instance.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

- The user has the mid_server role. The User Roles [sys_user_has_role] table has a record linking the sys_id associated with the user record stored in the [sys_user] table, with the sys_id associated with the mid_server role record stored in the [sys_user_role] table.
- The user is not identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- There are no login attempts, either failed or successful, recorded in the Events [sysevent] table for the user during the scheduled reporting period.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

Configuration issues

Any of the following messages, discussed above, can indicate a configuration issue:

- **Login authentication failure for User <user name> with mid_server role not associated with a MID Server.**
- **Login authorization failure for User <user name> with mid_server role not associated with a MID Server.**
- **User <user name> with mid_server role is not associated with a MID Server. No login attempts within reporting period.**

These are some common configuration errors:

- An administrator neglected to associate the user record with the MID Server record as shown in the MID Server Configuration Parameters [ecc_agent_config] table. This table is read-only and cannot be updated directly. To associate a user with a MID Server, configure the user name and password in the MID Server's `config.xml` file and restart the MID Server.

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- During the process of reconfiguring a MID Server to use a different account for TCP/IP connection, the administrator has not yet removed the mid_server role from the account or deleted the account.
- A multipurpose user account was created and granted a large number of roles, including the mid_server role, although this account was never intended to be used as a MID Server account.

User who successfully authenticates and authorizes but might not need mid_server role

The following message appears when a user with the mid_server role who is not associated with a MID Server successfully logs in: **User <user name> with mid_server role successfully connected but not associated with a MID Server. The mid_server role should be reserved for MID Server use only.**

The MIDUserConnectivity script include reports active users with the mid_server role who are not identified as a configured MID Server user, and whose last login attempt was successful during the scheduled time period. This message suggests that the user's credentials are being used by a system administrator or a process that is not running on a MID Server. The assumption here is that the mid_server role should only be used for applications deployed to a MID Server. The presence of this message reminds the system administrator to remove extraneous mid_server roles from user accounts that do not require them.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

- The user has the mid_server role.
- The user is not identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user succeeded during the scheduled time period. The [sysevent] table contains a record with these settings:
  - Event Name [name] field set to **login**.
  - Parm1 [parm1] field set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

Test remediation efforts for MID Server user connectivity issues

After attempting to resolve a user connectivity issue that appears in the MID Server Issue [ecc_agent_issue] table, you can test your remediation efforts without having to wait until the next scheduled reporting period by shortening the sampling interval.

Before you begin
Role required: admin

About this task
Reconfigure the sampling interval using this procedure and then examine the results in the MID Server Issue [ecc_agent_issue] table. You can set any time span for the sample, but you should define a window of not less than 5 minutes, since this is the default interval of the MID Server heartbeat that reports its status. The recommended method for configuring a shorter sampling interval is to copy and modify the code from the MIDUserConnectivity scheduled job, and then run it manually in the background script utility.

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Warning:
Avoid editing the script in the MIDUserConnectivity schedule record. If you make any change to this record, it will not be updated when you upgrade the instance.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.
2. Open the MIDUserConnectivity scheduled job.
3. Copy this line from the **Run this script** field:
   `MIDUserConnectivity(0).checkConnectivity(4 * (60 * 60 * 1000));`

   This code sets the 4 hour sampling interval in milliseconds and turns debugging off with the **MIDUserConnectivity(0)** value.
4. Navigate to **System Definition** > **Scripts - Background**.
5. Paste the code from the scheduled job into the **Run script** field.
6. Set the sampling interval to 5 minutes by changing the time calculation to **(5 * 60 *1000)**.
   The modified command looks like this:
   `MIDUserConnectivity(0).checkConnectivity (5 * 60 *1000);`
7. Click **Run script**.
8. Open the record of the MID Server that had the issue and select the **MID Server Issues** related list.
   The issue is updated as follows:
   - If the issue persists, the **Count** column is incremented, and the **Last detected** column shows the current date and time.
   - If the issue no longer exists, the system changes the **State** to **Resolved**.
9. **Optional:** You can enable debugging by selecting a level, and then run the script again to see the breakdown for each condition evaluated.
   Use these settings to select a debugging level:
   - For a summary view, enter **MIDUserConnectivity(1)**.
   - For a detailed view, enter **MIDUserConnectivity(2)**.

   For details about the type of debugging information provided, see Interpreting MID Server user debugging output.

Interpreting MID Server user debugging output

Debugging output from the system log is available in either a summary or detailed view for MID Server user issues, but must be enabled manually.

To enable debugging and display all connectivity issues in either of the available formats, you must run a method manually on your instance. For instructions on enabling debugging, see Test remediation efforts for MID Server user connectivity issues. For information about each error condition and how records are created in the MID Server Issue [ecc_agent_issue] table, see MID Server user connectivity issues.

Available formats

You can configure the instance to generate a simple summary of the issue or a detailed output that identifies users and MID Servers. Summaries provide a quick look at the issue conditions, by count, while the detailed view allows you to examine roles, MID Server associations, and login activity by named users.

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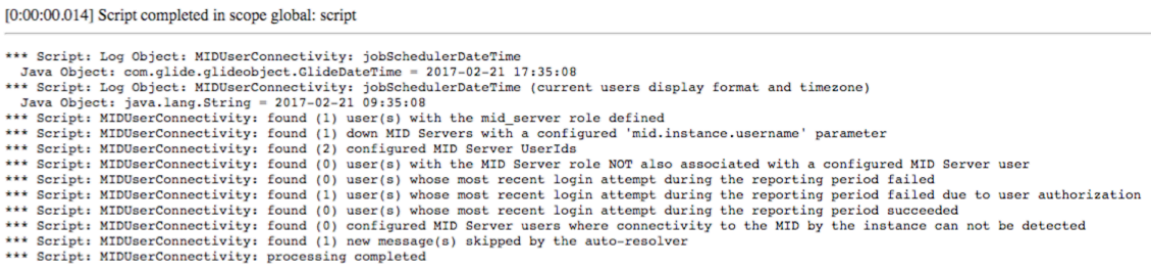
In this summary example of an authorization issue, the instance evaluates each condition and indicates how many users met that condition. You can see that a MID Server is down and that one of two users configured for a MID Server failed authorization. Because this is a summary, neither the MID Server nor the users are named.

Sample summary debug output



```
[0:00:00.014] Script completed in scope global: script

*** Script: Log Object: MIDUserConnectivity: jobSchedulerDateTime
  Java Object: com.glide.glideobject.GlideDateTime = 2017-02-21 17:35:08
*** Script: Log Object: MIDUserConnectivity: jobSchedulerDateTime (current users display format and timezone)
  Java Object: java.lang.String = 2017-02-21 09:35:08
*** Script: MIDUserConnectivity: found (1) user(s) with the mid_server role defined
*** Script: MIDUserConnectivity: found (1) down MID Servers with a configured 'mid.instance.username' parameter
*** Script: MIDUserConnectivity: found (2) configured MID Server UserIds
*** Script: MIDUserConnectivity: found (0) user(s) with the MID Server role NOT also associated with a configured MID Server user
*** Script: MIDUserConnectivity: found (0) user(s) whose most recent login attempt during the reporting period failed
*** Script: MIDUserConnectivity: found (1) user(s) whose most recent login attempt during the reporting period failed due to user authorization
*** Script: MIDUserConnectivity: found (0) user(s) whose most recent login attempt during the reporting period succeeded
*** Script: MIDUserConnectivity: found (0) configured MID Server users where connectivity to the MID by the instance can not be detected
*** Script: MIDUserConnectivity: found (1) new message(s) skipped by the auto-resolver
*** Script: MIDUserConnectivity: processing completed
```

Authentication failure

When a MID Server user cannot authenticate on the instance, the system displays these error messages in the detailed output:

- **Login authentication failure for User <user name> associated with 1 down MID Server. Check password on MID server.**
- **Login authentication failure for User <user name> associated with <n> down MID Servers. Check password on MID servers.**
- **Login authentication failure for User <user name> with mid_server role not associated with a MID Server.**

In this example, three users with the mid_server role, **midserver2**, **local-midserver**, and **ardis.maison**, failed to authenticate. Two of these users were configured for MID Servers that were **Down**, and the other user was not configured for any MID Servers. Each of these users has an authentication failure and is named in the appropriate error message.

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Detailed debugging log for authentication failure

```
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRole
  Array of 3 elements
    [0]: string = ardis.maison
    [1]: string = midserver2
    [2]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: downMIDServerConfiguredUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: userIDMIDServerMap
  Object
    ardis.maison: Object
      sys_domain: string = global
      mid_server: Array of 0 elements
    midserver2: Object
      sys_domain: string = global
      mid_server: Array of 1 elements
        [0]: string = 7faf7154fb023200fb70cd3b217069e9
    local-midserver: Object
      sys_domain: string = global
      mid_server: Array of 2 elements
        [0]: string = f0a86914fb423200fb70cd3b21706998
        [1]: string = 1aa2cf83c7213200fb709c569b976390
    1aa2cf83c7213200fb709c569b976390: string = snc_rba_mid
    7faf7154fb023200fb70cd3b217069e9: string = MIDServerWinVM-10.11.145.205-2-Local
    f0a86914fb423200fb70cd3b21706998: string = xsnc_rba_mid
*** Script: Log Object: configuredMIDServerUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRoleNotAssociatedWithConfiguredMIDServer
  Array of 1 elements
    [0]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsWithIssues
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptFailed
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptAuthorizationFailed
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptSuccessful
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsWhereConnectivityToMidCanNotBeDetectedByInstance
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: doNotAutoResolveMessages
  Array of 3 elements
    [0]: string = Login authentication failure for User midserver2 associated with 1 down MID Server.  Check password on MID server.
    [1]: string = Login authentication failure for User local-midserver associated with 2 down MID Servers.  Check password on MID servers.
    [2]: string = Login authentication failure for User ardis.maison with mid_server role not associated with a MID Server.
*** Script: MIDUserConnectivity: processing completed
```


MID Server ID map

The debugging output lists all MID Servers that are marked as **Down** and maps them to their user accounts by the MID Server **sys_id**. This map includes all user accounts that have the mid_server role, whether or not they are associated with a MID Server. If there are no **Down** MID Servers, the map is not displayed in the debugging output.

The map is presented in three sections:

- User accounts not associated with any MID Servers.
- User accounts associated with **Down** MID Servers, identified by their **sys_id**.
- The **sys_id** of each **Down** MID Server, identified by name.

MID Server ID map

```
*** Script: Log Object: MIDUserConnectivity: userIDMIDServerMap
  Object
    ardis.maison: Object
      sys_domain: string = global
      mid_server: Array of 0 elements
    midserver2: Object
      sys_domain: string = global
      mid_server: Array of 1 elements
        [0]: string = 7faf7154fb023200fb70cd3b217069e9
    local-midserver: Object
      sys_domain: string = global
      mid_server: Array of 2 elements
        [0]: string = f0a86914fb423200fb70cd3b21706998
        [1]: string = 1aa2cf83c7213200fb709c569b976390
    1aa2cf83c7213200fb709c569b976390: string = snc_rba_mid
    7faf7154fb023200fb70cd3b217069e9: string = MIDServerWinVM-10.11.145.205-2-Local
    f0a86914fb423200fb70cd3b21706998: string = xsnc_rba_mid
```


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Authorization failure

If a user is missing any of the required roles, the instance generates these authorization failure messages:

- **Login authorization failure for User <user name> associated with 1 down MID Server. Re-assign mid_server role to grant all required roles.**
- **Login authorization failure for User <user name> associated with <n> down MID Servers. Re-assign mid_server role to grant all required roles.**
- **Login authorization failure for User <user name> with mid_server role not associated with a MID Server.**

In this example, three users with the mid_server role, **midserver2**, **local-midserver**, and **ardis.maison** have failed authorization. One user is not associated with any MID Server, but the other two users are. The system has logged an authorization failure, indicating that the user is missing at least one critical role. To see what roles are missing, look at the comma separated list in the **Parm2** field in the **login.authorization.failed** event record. This record is the most recent login attempt in the Event [sysevent] table for the user account within the reporting period.

Detailed debugging log for authorization failure

```
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRole
  Array of 3 elements
    [0]: string = ardis.maison
    [1]: string = midserver2
    [2]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: downMIDServerConfiguredUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: userIDMIDServerMap
  Object
    ardis.maison: Object
      sys_domain: string = global
      mid_server: Array of 0 elements
    midserver2: Object
      sys_domain: string = global
      mid_server: Array of 1 elements
        [0]: string = 7faf7154fb023200fb70cd3b217069e9
    local-midserver: Object
      sys_domain: string = global
      mid_server: Array of 2 elements
        [0]: string = f0a86914fb423200fb70cd3b21706998
        [1]: string = 1aa2cf83c7213200fb709c569b976390
    1aa2cf83c7213200fb709c569b976390: string = snc_rba_mid
    7faf7154fb023200fb70cd3b217069e9: string = MIDServerWinVM-10.11.145.205-2-Local
    f0a86914fb423200fb70cd3b21706998: string = xsnc_rba_mid
*** Script: Log Object: configuredMIDServerUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRoleNotAssociatedWithConfiguredMIDServer
  Array of 1 elements
    [0]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsWithIssues
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptFailed
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptAuthorizationFailed
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptSuccessful
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsWhereConnectivityToMidCanNotBeDetectedByInstance
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: doNotAutoResolveMessages
  Array of 3 elements
    [0]: string = Login authorization failure for User midserver2 associated with 1 down MID Server.  Re-assign mid_server role to grant all required roles.
    [1]: string = Login authorization failure for User local-midserver associated with 2 down MID Servers.  Re-assign mid_server role to grant all required roles.
    [2]: string = Login authorization failure for User ardis.maison with mid_server role not associated with a MID Server.
*** Script: MIDUserConnectivity: processing completed
```


Network issues

Network issues may exist for these users who are associated with MID Servers, but who have not attempted to log in during the reporting period:

- **User <user name> is associated with 1 down MID Server. No login attempts within reporting period.**
- **User <user name> is associated with <n> down MID Servers. No login attempts within reporting period.**

Network issues may also exist for these users who are NOT associated with MID Servers, and who have not attempted to log in during the reporting period: **User <user name> with mid_server role is not associated with a MID Server. No login attempts within reporting period.**

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In this example, no login attempts have been detected for **midserver2**, **local-midserver**, and **ardis.maison**, all of whom have the mid_server role. Two of those users are associated with MID Servers that are marked **Down**. The other user is not associated with any MID Server. None of these users has attempted to log in to the system within the configured reporting interval. The system assumes that these users would make an attempt to log in unless network issues prevented them from doing so.

Note:
By default, the sampling period is 4 hours. However, during debugging or remediation, the sampling period can be reset to a value that matches the MID Server heartbeat interval of 5 minutes, or greater.

Detailed debugging log for network connection issues

```
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRole
  Array of 3 elements
    [0]: string = ardis.maison
    [1]: string = midserver2
    [2]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: downMIDServerConfiguredUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: userIDMIDServerMap
  Object
    ardis.maison: Object
      sys_domain: string = global
      mid_server: Array of 0 elements
    midserver2: Object
      sys_domain: string = global
      mid_server: Array of 1 elements
        [0]: string = 7faf7154fb023200fb70cd3b217069e9
    local-midserver: Object
      sys_domain: string = global
      mid_server: Array of 2 elements
        [0]: string = f0a86914fb423200fb70cd3b21706998
        [1]: string = laa2cf83c7213200fb709c569b976390
    laa2cf83c7213200fb709c569b976390: string = snc_rba_mid
    7faf7154fb023200fb70cd3b217069e9: string = MIDServerWinVM-10.11.145.205-2-Local
    f0a86914fb423200fb70cd3b21706998: string = xsnc_rba_mid
*** Script: Log Object: configuredMIDServerUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRoleNotAssociatedWithConfiguredMIDServer
  Array of 1 elements
    [0]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsWithIssues
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptFailed
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptAuthorizationFailed
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptSuccessful
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsWhereConnectivityToMidCanNotBeDetectedByInstance
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: doNotAutoResolveMessages
  Array of 3 elements
    [0]: string = User midserver2 associated with 1 down MID Server.  No login attempts within reporting period.
    [1]: string = User local-midserver associated with 2 down MID Servers.  No login attempts within reporting period.
    [2]: string = User ardis.maison with mid_server role not associated with a MID Server.  No login attempts within reporting period.
*** Script: MIDUserConnectivity: processing completed
```


Configuration issues

Any of the following messages can indicate a user configuration issue:

- **Login authentication failure for User <user name> with mid_server role not associated with a MID Server.**
- **Login authorization failure for User <user name> with mid_server role not associated with a MID Server.**
- **User <user name> with mid_server role successfully connected but not associated with a MID Server. The mid-server role should be reserved for MID Server use only.**
- **User <user name> with mid_server role is not associated with a MID Server. No login attempts within reporting period.**

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In this example, a user with the mid_server role has logged in successfully within the configured sampling interval. However, this user is not configured for a MID Server and might have the role in error.

Detailed debugging log for MID Server user account login



MID Server Upgrade History

Use this module to troubleshoot errors that occur during the MID Server upgrade process. The MID Server Upgrade Histories table contains a record of each instance upgrade. The MID Server Upgrade Stages table shows the status of each MID Server and its upgrade progress, including any errors encountered.

MID Server Upgrade Histories

Users with admin or agent-admin roles can find detailed information for any MID Server upgrade in the Upgrade History module for MID Server. Whenever an instance is upgraded, all MID Servers in the Up state are upgraded automatically. The Upgrade History module uses the MID Server Upgrade Histories table [ecc_agent_upgrade_history]. This table shows the following information:

- The old instance version.
- The new version.
- The number of successfully upgraded MID Servers.
- The number of MID Servers with pending upgrades. MID Servers have pending upgrades if the upgrade has failed or is in progress.

MID Server Upgrade Stages

Select an instance record to see more details about the MID Servers upgraded with that instance. The Pending Upgrades and Complete Upgrade Details related lists use the MID Server Upgrade Stages table [ecc_agent_upgrade_history_stage]. MID Servers pinned to a specific version generate an entry with a blank MID Upgrade History on the MID Server Upgrade Stages table [ecc_agent_upgrade_history_stage].

MID Upgrade History	Refers to a corresponding record in the [ecc_agent_upgrade_history] table.
Stage	Shows the progress of the MID Server through each stage of the upgrade process.
State	Shows the status of each stage.
Message	Displays dynamically generated messages about the upgrade stages, such as the file path to download directories or extract folders.

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	It also displays information about any errors encountered, even if those errors do not block the upgrade.

MID Server reference information

MID Server reference information includes system requirements and other information you need to configure a MID Server for your specific needs.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

System clones and the MID server

See KB0547597 for information on what to do with MID Servers when you are cloning your instance.

Reference topics

System requirements

Use the minimum system requirements to allocate resources for computers hosting MID Servers.

ECC Queue

Learn about the External Communication Channel (ECC) Queue, which is the connection point between the MID Server and the instance. Jobs that the MID Server needs to perform are saved in this queue until the MID Server is ready to handle them.

MID Server Dashboard

Use the reports and gauges in the MID Server dashboard to monitor ongoing operations.

MID Server properties

Use MID Server properties to control the behavior of all MID Servers or a particular MID Server.

MID Server parameters

Use MID Server parameters to control the behavior of a particular MID Server.

MID Server protected records and reserved characters

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Some MID Server records cannot be altered. Certain special characters are pre-defined in XML and cannot be used in passwords.

MID Server privileged commands

To discover certain information on a host server, the MID Server must run SSH commands with higher privileges. The platform provides default privileged commands for the MID Server to use and the ability to add additional commands to the system.

MIDSystem methods

MIDSystem variables (referred to by the variable name ms.) provide a variety of methods to get information about the MID Server.

MID Server heartbeat

Configure the interval that the instance uses when it checks the "heartbeat" of MID Server. By default, the instance checks the MID Server for a response every 5 minutes.

Set JVM memory size

Modify the JVM setting for your MID Server from the default size to suit the amount of work your MID Server does in your network.

Pause the MID Server

Pause the MID Server to temporarily prevent it from polling the ECC Queue for work or sending Discovery results back to the instance.

MID Server system requirements

Use these minimum system requirements to allocate resources for computers hosting MID Servers.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

MID Server supported systems

Windows server

To discover Windows-based servers, run Service Mapping patterns, or execute Orchestration commands on Windows devices, the MID Server must be installed on a Windows server. The MID Server supports these Windows operating systems, including virtual machines and 64-bit systems:

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- Windows Server 2012
- Windows Server 2016
- Windows Server 2019
- Windows Server 2022

Linux

The MID Server is supported on these Linux versions for virtual machines and 64-bit systems:

- Linux Red Hat 6 and above
- Ubuntu 1404 (Ubuntu 14) and above
- CentOS 7 and above

Note:
ServiceNow no longer supports new installations of 32-bit MID Servers or upgrades to version Rome. New MID Server installation are blocked through RPM and MSI installer on the following operating systems:

- CentOS 7
- Windows server 2008
- Windows server 2008 R2
- Windows 8
- Windows 10

MID Servers can be manually installed to any operating system with the ZIP file, however Windows 10 is unsupported. Unsupported MID Servers auto-upgrading to Rome create an issue record in MID Server Issues (ecc_agent_issue). For more information, see Supported platform changes for MID Server [KB0863694].

Security requirements

To meet high security standards, the MID Server performs x.509 certificate validation on HTTPS traffic when connecting to ServiceNow®. If a network appliance or proxy exists between the MID Server and the instance, that appliance needs to present a digital certificate signed by a trusted CA. If you are using a self-signed certificate or a certificate signed by an internal CA, import the certificate to the MID Server trust store. For more information on adding SSL certificates, see Add SSL certificates for the MID Server.

OCSP connectivity requirements

The Online Certificate Status Protocol (OCSP) is the protocol used to determine the revocation status of SSL/TLS certificates. When certificates are exchanged and validated, the MID Server needs to determine if the certificate has been revoked and shouldn't be trusted.

OCSP works by using a client, such as a MID Server, to receive a certificate from an HTTP website. The client sends a request to an OCSP responder: a server operated by the certificate authority (CA) that issued the certificate. The OCSP responder's response to the client indicates whether the certificate is valid or has been revoked.

In order to connect, the MID Server requires access to:

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- *.service-now.com or <instance_name>.service-now.com
- install.service-now.com
- http://ocsp.entrust.net
- http://ocsp.digicert.com (or other CA OCSP Responder)

While SSL/TLS certificates are always issued with an expiration date, there are certain circumstances in which a certificate must be revoked before it expires (for example, if its associated private key may have been compromised). Therefore, the current validity of a website's certificate must always be checked by clients regardless of its expiry date.

Clients fail a connection when they can't check the revocation status of a certificate. Firewalls and proxy configurations may block calls to the OCSP Entrust and DigiCert servers, which prevents the MID Server from working. You may need to change your firewall permissions so that the OCSP traffic goes through. For more information and resolutions, see the HI Knowledge Base article [KB1216223].

PowerShell requirements

The MID Server requires the minimum PowerShell version 3.0 and supports versions up to PowerShell 5.1. See Microsoft's documentation for more information about PowerShell requirements. To find your current PowerShell version using the instance, go to **ecc_agent_list.do**. Using the **Update Personalize List** gear icon, add **Host PowerShell Version** to the Selected column. Then sort the list of MID Servers by their PowerShell version to find outdated MID Servers. Alternatively, you can find the PowerShell version on the host machine by using the command **$Host.Version** in the host's PowerShell console. The PowerShell version is listed as PSVersion.

Java version support

Java 11.0.17 is bundled with the MID Server installer package and is installed on the host for all new MID Servers. The installer automatically configures Java 11.0.17 to run in your environment. No additional configuration is required. This version supports both 64-bit Windows MID Servers and 64-bit Linux MID Servers. The MID Server requires a minimum JRE version 11.0.8, and recommended version 11.0.17. If you are using a lower version than 11.0.8, you may see encryption related issues.

Testing showed that the MID Server works as expected with Oracle Java 11 version 11.0.5. If you need to upgrade the JRE to a different version, then coordinate with the appropriate account representative for support.

Upgraded MID Servers might use different Java versions depending on their operating system versions.

- MID Servers upgraded from earlier versions use the OpenJDK provided with the MID Server installer. This version of the OpenJDK was tested and certified for use with these MID Servers.
- MID Servers upgraded on any other operating system versions also automatically upgrade the JRE to the version provided with the installation package.

Note:
Linux MID Servers require glibC version 2.17. The library must be updated for JRE 11. On 64-bit Linux systems, you must install the 32-bit GNU C library (glibc). The installation command for CentOS is: `yum install glibc.i686`

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MID Server JRE downgrade support

If the ServiceNow® instance is downgraded from Quebec, then the MID Server is also downgraded. However, the JRE may not be downgraded unless the instance is downgraded to one of the following patches.

- New York Patch 12
- Orlando Patch 9
- Paris Patch 3

If the MID Server is downgraded from Quebec to a different patch than specified, follow the instructions in Install Java 11 on MID Servers [KB0752451].

Java Service Wrapper

The MID Server installer includes the Tanuki Software Java Service Wrapper, version 3.5.40.

Setting the JVM Memory size

The MID Server installs with 1 GB of JVM memory. If the suggested memory size for your product is greater than 1 GB, see Set the MID Server JVM memory size for the procedure to override the default setting.

Deployment types

System requirements for your instance are determined by the needs of the individual products you use that require a MID Server. Some applications, such as Health Log Analytics, have additional system requirements listed in their documentation.

Standard deployments

The following products are considered "standard" because their MID Servers share the same minimum disk space and memory requirements:

- Discovery
- Event Management
- Integrations
- Orchestration
- Service Mapping

The minimum standard requirements pertain to both a single product and a combined product deployment. You can deploy a single MID Server for multiple standard products without significantly increasing the disk or memory requirements.

High resource deployments

Cloud Management Platform (CMP) and Operational Intelligence are processing intensive and require more resources for each MID Server than the standard products. Install MID Servers for these products on dedicated hosts that do not support MID Servers for other products.

Recommended MID Server minimum requirements

MID Server performance and system requirement are driven my multiple factors including but not limited to:

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- The size of the customer infrastructure and specific function (Capability) MID Server is configured to perform.
- The number of MID Servers installed on the host.
- The number of threads per MID Server.
- The number and nature of other applications running on MID Server host.
- Architectural and design enhancements over ServiceNow releases. For example, using PowerShell for Windows Discovery in Orlando or changing default Java Garbage Collection policy in Quebec.

As a result, there is no one size requirement that fits for all MID Server deployments. The following documented sizing guidelines can be a starting point for deployments. However, customers need to monitor MID Server performance and resource utilization continuously, then tune and scale up their MID Servers as needed.

MID Server minimum system requirements

The minimum CPU configuration required for a MID Server is a quad core processor with a speed of 2+ GHz for a Windows Server 2012 R2 host with a single MID Server deployed and with standard configuration of 25 concurrent threads.

MID Server CPU utilization

Most of the MID Server applications, such as Discovery, are designed for maximizing their performance which results in maximizing the resource utilization for the MID Server. As a result, some customers might observe very high CPU utilization segments in the range of 90-100% while the MID Server is running Discovery schedules or similar applications.

The very high CPU utilization segments should not be a cause for concern because it aligns with architectural design of maximizing the throughput and does not have any negative impact on the Discovery performance. The MID Server host's resource utilization automatically returns to normal after the Discovery execution successfully stops.

Customers who notice frequent and long very high CPU utilization segments should avoid:

- Running more than one MID Server on same host when these MID Servers are expected to process active workloads at the same time, such as overlapping Discovery schedules.
- Sharing the MID Server host with other applications.
- Configuring performance alerts, which are purely based on CPU utilization, on MID Server host. If required, these alerts need to be used in conjunction with other performance monitors.

Configuring additional performance monitoring on MID Server host

While CPU utilization on MID Server is a good indicator of load on the host, it gives only limited visibility. Additional monitoring with System Processor Queue Length on Windows Operating Systems and Load Averages on UNIX Operating Systems is crucial.

- **Processor Queue Length (Windows OS):** the number of threads that are ready but currently unable to run on the processor due to another active thread. A bottleneck on the processor may occur where the number of threads in the queue is more than twice the number of processor cores over a continuous period.

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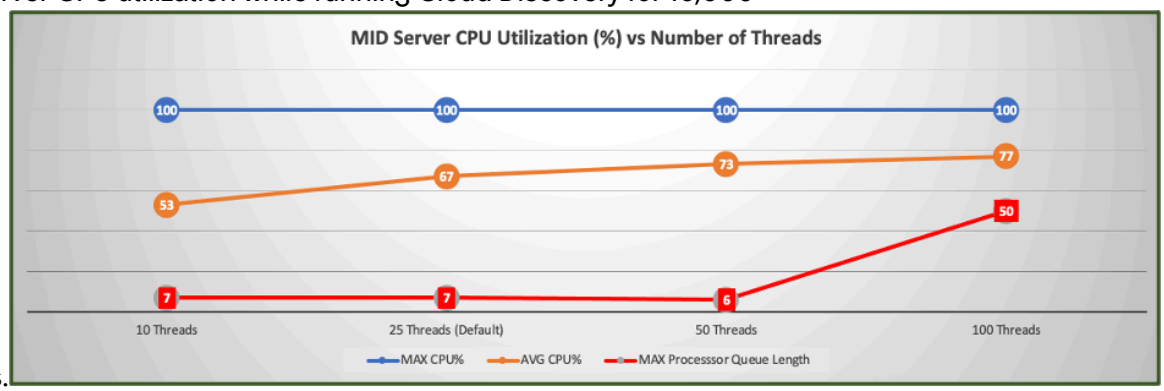
- **Load Averages (Unix OS):** the average system load on a Linux server for a defined period. It is the CPU demand on a server that includes sum of the running and the waiting threads. Typically, the top or the uptime command provides the load average of the server with output.

MID Server CPU Performance Case Studies

The impact of modifying number of MAX threads on MID Server CPU utilization

Based on internal benchmarking, the following is sample data for MID Server CPU utilization while running Cloud Discovery for 10,000 servers.

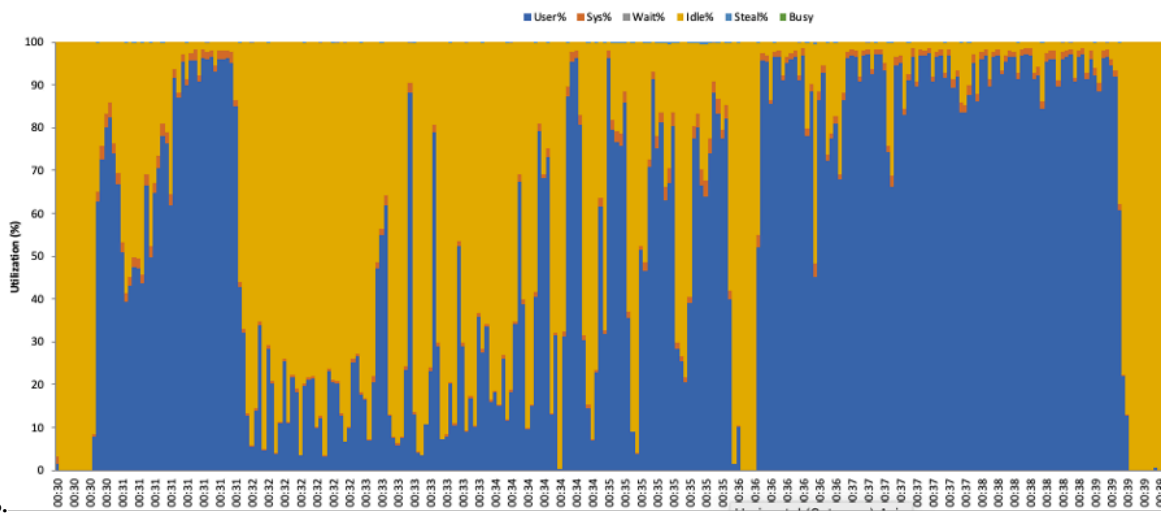


In these tests, the maximum CPU utilization was observed to be 100% independent of number of threads and OS. The average CPU utilization was observed to be proportional to number of threads. Increasing number of threads did not necessarily result in immediate CPU pressure. Increasing the number of threads from the default 25 to 50 did not create additional CPU pressure, as shown by the max processor queue length. However, increasing the max threads value to 100 caused a significant increase in processor queue length, indicating CPU pressure.

The impact of sharing MID Server with other applications or MID Servers on CPU utilization

Running Discovery is a CPU intensive operation for MID Server. Deploying other applications or MID Servers on same host creates additional CPU pressure on the host. This pressure results in a performance impact for running applications, including the MID Server. The following examples are sample CPU utilization data points for MID Server with different load patterns:

Dedicated host for a single MID Server: the average CPU usage is 48%.



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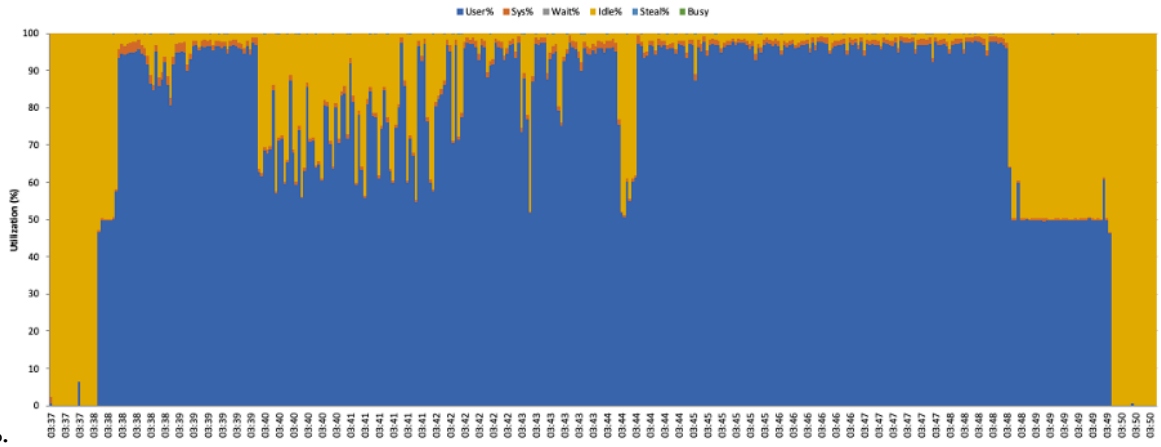
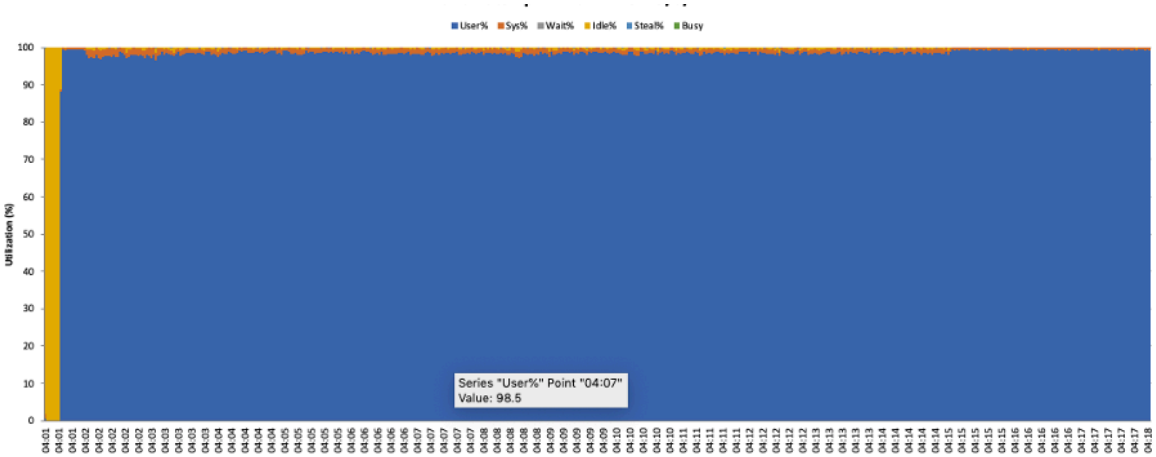
Host shared between a MID Server and another application with moderate load: the average CPU usage is 77%.



Host shared between a MID Server and another application with heavy load: the average CPU usage is 97%.



Scaling up MID Server and its impact on MID Server CPU resource utilization

When the MID Server is heavily constrained on CPU resources, scaling up the MID Server host, by adding more CPUs, helps ease resource pressure. However, this may not necessarily eliminate the very high CPU usage segments. MID Server applications like Discovery, which are designed for maximizing the performance, will continue to use additional available CPU resources. The following examples are sample CPU utilization data points for a 4 CPU MID Server host and an 8 CPU MID Server host running same Discovery schedules:

Parameter	4 CPU	8 CPU
Average CPU%	48%	28%
Max CPU %	98%	98%

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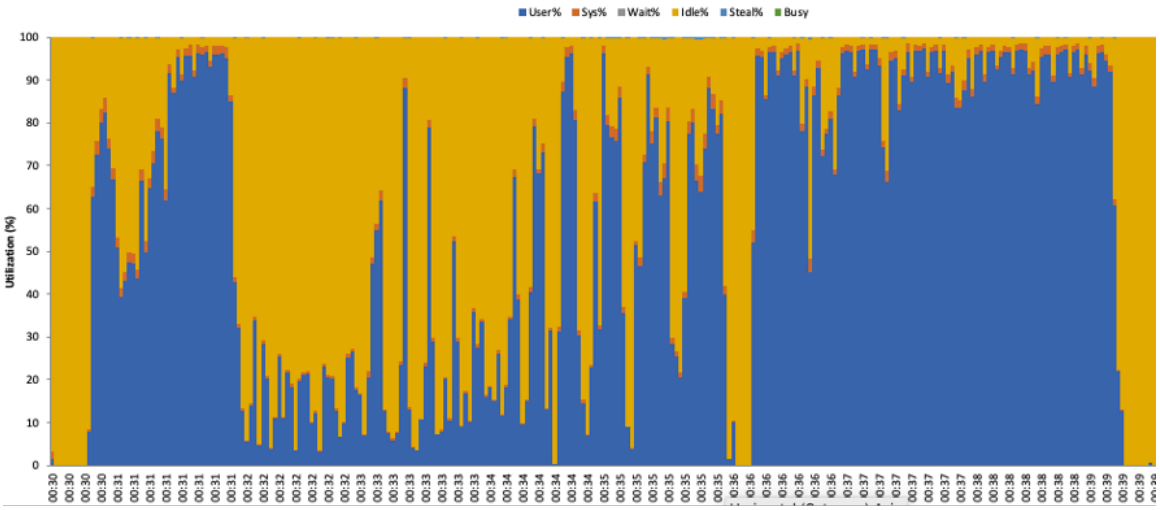
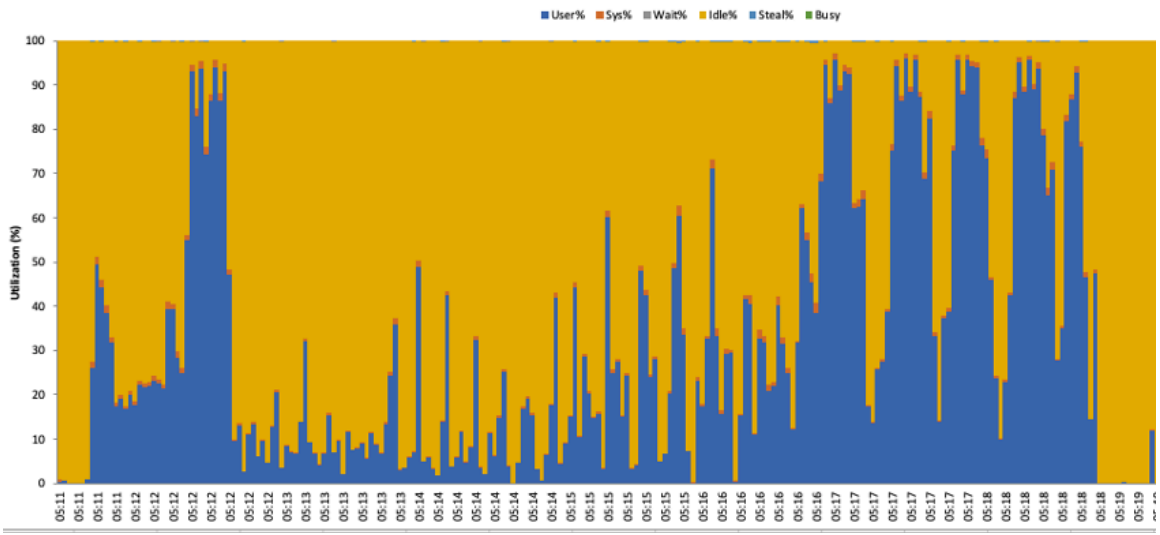
MID Server CPU utilization when deployed on a 4 CPU host:



MID Server CPU utilization when deployed on an 8 CPU host:



Monitoring performance

To ensure that the MID Server resource allocations are sufficient for your environment, monitor performance during peak periods of product execution from the MID Server dashboard.

MID Server ECC Queue

The External Communication Channel (ECC) Queue is a connection point between an instance and the MID Server. Jobs that the MID Server needs to perform are saved in this queue until the MID Server is ready to handle them.

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1. Ensure that the MID Server can connect to elements inside and outside your network
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3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Asynchronous Message Bus

The MID Server subscribes to messages published by the Asynchronous Message Bus (AMB), which notifies the MID Server that it has pending task records in the ECC Queue. If a task exists in the ECC Queue for that MID Server, the MID Server sets the status to "Processing". When finished working on a requested job, the MID Server reports back to the ECC queue with the results.

The MID Server opens a persistent connection to the instance through the AMB Client and listens on the `/mid/server/<mid_sys_id>` AMB channel. When an output record is inserted into the Queue [ecc_queue] table, an AMB message is sent to the MID Server's channel. The MID Server receives this message and immediately polls the ecc_queue table for work, unless the MID Server is busy and the message priority level is not Interactive.

The MID Server polls the ECC queue at the maximum regular interval defined in the **mid.poll.time** configuration parameter (40 seconds by default), regardless of AMB message activity. If the MID is busy and receeives an AMB message witrh a priority level other than Interactive, the queue poll time changes to **mid.poll.time.standard** (5 seconds by default). This polling of the ECC queue at a regular interval is done in case the AMB connection is dropped.

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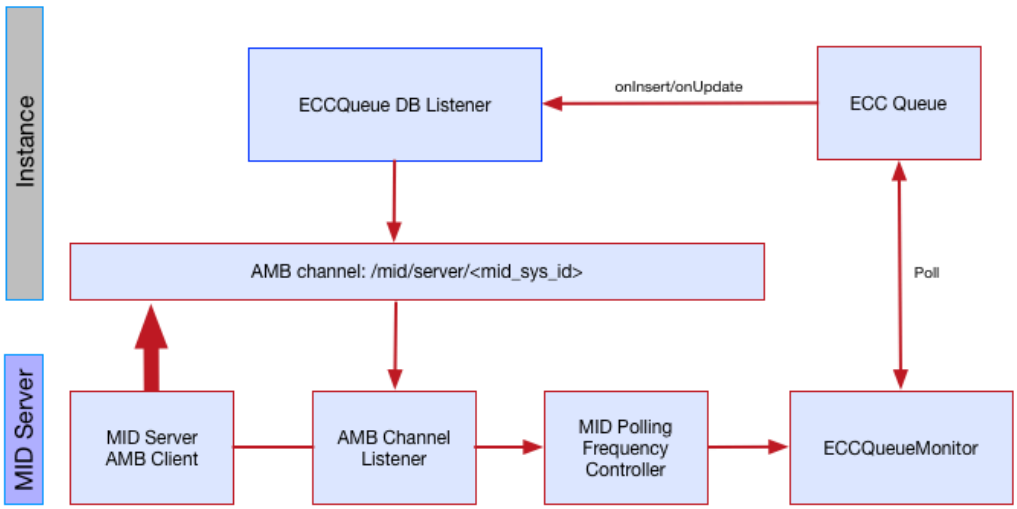
MID Server ECC queue polling process



Note:
The AMB client on the MID Server does not work in all environments and might need to be disabled to avoid performance issues. To disable AMB in your environment, set the **mid.disable_amb** parameter to **true**. When you disable AMB, the MID Server no longer receives notifications for each new ECC queue output record. See **mid.poll.time** in#MID Server parameters for more information.

ECC Queue information

You can access the ECC Queue by navigating any of these paths:

- **Discovery** > **Output and Artifacts** > **ECC Queue**
- **Discovery** > **Discovery Schedules** > **{schedule name}** > **{Discovery status record}**
- **ECC** > **Queue**
- **{Discovery Status record}** > **ECC Queue**

An ECC Queue provides the following information:

Field	Input value
Agent	The name of the external system that this messages is either from or to. If the message is from or to a MID Server, the agent name is in the form `mid.server.xxx`, where xxx is the name of a particular MID Server.
Topic	The name of the probe the MID server ran. If you are using a pattern for discovery, the Horizontal Pattern probe Horizontal Pattern probe appears.

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Field	Input value
Name	The actual command the probe ran. For example, if **Topic** is SSHCommand, then the **Name** field contains the actual shell command to run. If you are using a pattern for discovery, the following appears: **Pattern Launcher:** followed by the name of the pattern and the multipage number.
Source	The IP address that the discovery is to run against. A few probes run against multiple IP addresses; in those cases, this field contains a human-readable description.
Response to	This optional field contains a reference (sys_id) to the ECC Queue message that this message is in response to. Discovery makes extensive use of this field to track the hierarchy of messages that result from a given scheduled Discovery. Click the record icon for the value in this field to open the ECC Queue record for the activity that spawned the current probe or sensor record.
Queue	An indicator of whether this message was is an input message or an output message.
State	The state of the current ECC queue record. States update automatically.
Processed	The time when this message was processed.
Created	The time when this message was created.
Sequence	The unique sequence number for this message. This value is automatically generated when an ECC Queue record is inserted. Its use is deprecated.
Error string	An error message, if an error occurred during processing. This field is hidden on the standard form unless there was an error.
Payload	The body of the message in XML format. The returned XML has a root tag of `<results>` containing one or more `<result>` tags and a single `<parameters>` tag. The parameters are simply an echo of those sent to the MID server in the probe; they vary from probe to probe, but in general they tell the probe the details of what it is to do and how it should behave. The result tags are the most interesting ones: they contain the actual data generated by the probe.

ECC queue controls

The ECC Queue form contains these related links:

Related link	Description
Run again	Runs the probe again. You can re-run probes when you encounter a failed discovery or other unexpected results.
Go to CMDB item	Open the CI record for the CI that was updated during the discovery.
Go to Sensor	Open the record for the associated sensor.

ECC Queue retry policy

The following Plugin needs to be activated to be able to view the ECC Queue Retry Policy and Queue Retry Activity modules:

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- Plugin Name: ECC Queue Retry Policy
- ID: com.glideapp.ecc_retry_policy

Manage ECC Queue content for a MID Server

The ECC Queue allows you to create ECC Queue messages, access MID Server log entries, and retrieve statistics from an individual MID Server record.

Before you begin

Role required: admin, mid_server

Procedure

1. Send remote commands through a MID Server to a hosting device directly from the ECC Queue without running Discovery.

   a. Navigate to the ECC Queue and click **New**.

   b. Create a message with these settings:

   - **Agent**: The name of the MID Server that executes the command.
   - **Topic**: Command
   - **Name**: The actual command that you want to process. For Windows, this is expressed in a DOS command line structure. For Linux, the structure could be a bash command line entry.
   - **Queue**: Output
   - **Payload**: With proper XML tags, you can specify the command here instead of in the **Name** field. The advantage to this is that the command is not restricted by the **Name** field length of 120 characters. Use the following XML format for the command:

   ```
   <parameters>
      <parameter name="name" value="ACTUAL_COMMAND_LINE"/>
   </parameters>
   ```

2. Access entries in the ECC Queue that show **agent0.log.0** logs and **wrapper.log** logs for an individual MID Server.

   a. Open a MID Server record.

   b. Under **Related Links**, click **Grab MID logs, files and thread dump**.
   ECC queue records appear in the list using the following filter:

   - [Topic] [is] [SystemCommand]
   - [Source] [is] [grabLog]
   - [Agent] [is] [your MID Server]

   Only **agent0.log.0** and **wrapper.log** entries appear. These logs are also accessible in the ~\agent\logs\ file path.

   c. To open a log entry, click the link under the **Created** column.

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3. Access the **queue.stats** topic for useful information about individual MID Servers, such as memory and CPU usage data.

   a. Open a MID Server record.

   b. Under **Related Links**, click **MID Statistics**.
   ECC queue records appear in the list using the following filter:

   - [Topic] [is] [queue.stats]
   - [Agent] [is] [your MID Server]

MID Server dashboard

The MID Server dashboard is a central place for MID Server users to monitor ongoing operations. The dashboard consists of reports and gauges that display information from the MID Server Status table.



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3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
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7. Configure your MID Server
8. Configure MID Server security

The MID Server Dashboard is available from the **MID Server** > **Dashboard** module.

After upgrading to Discovery Admin Workspace version 1.3.1 (August 2024 Store), you can navigate to **Workspaces** > **Discovery Admin Workspace** > **Insights** and use the enhanced dashboard.

MID Server Overview tab

The Overview tab provides graphs showing the status of MID Servers, including any validation issues or pending upgrades and jobs. The tab also displays which MID Servers by capability.

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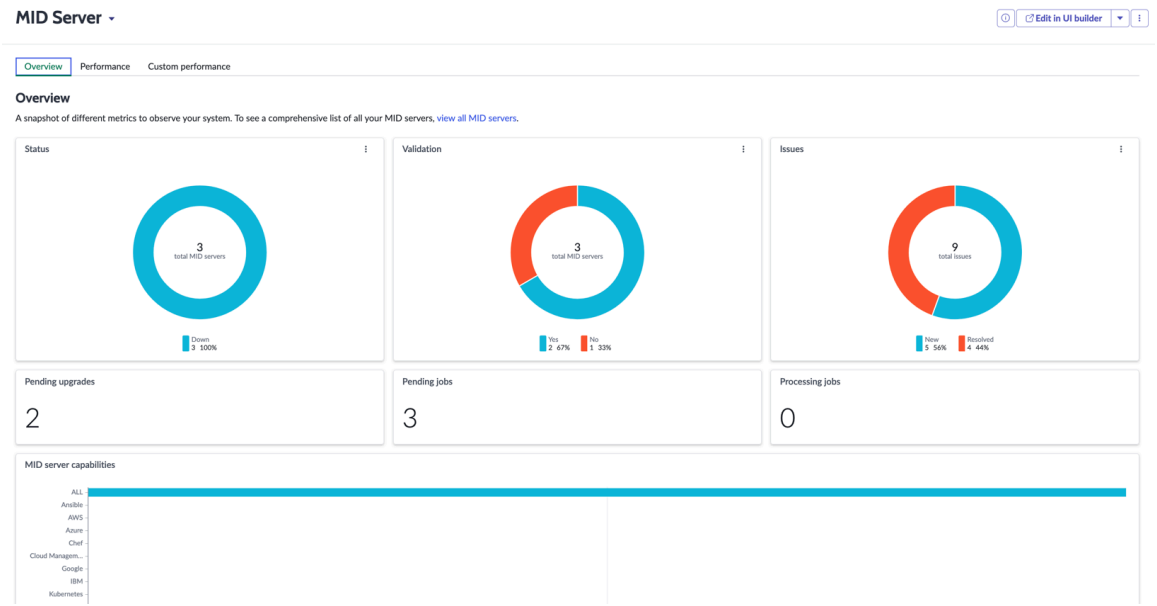
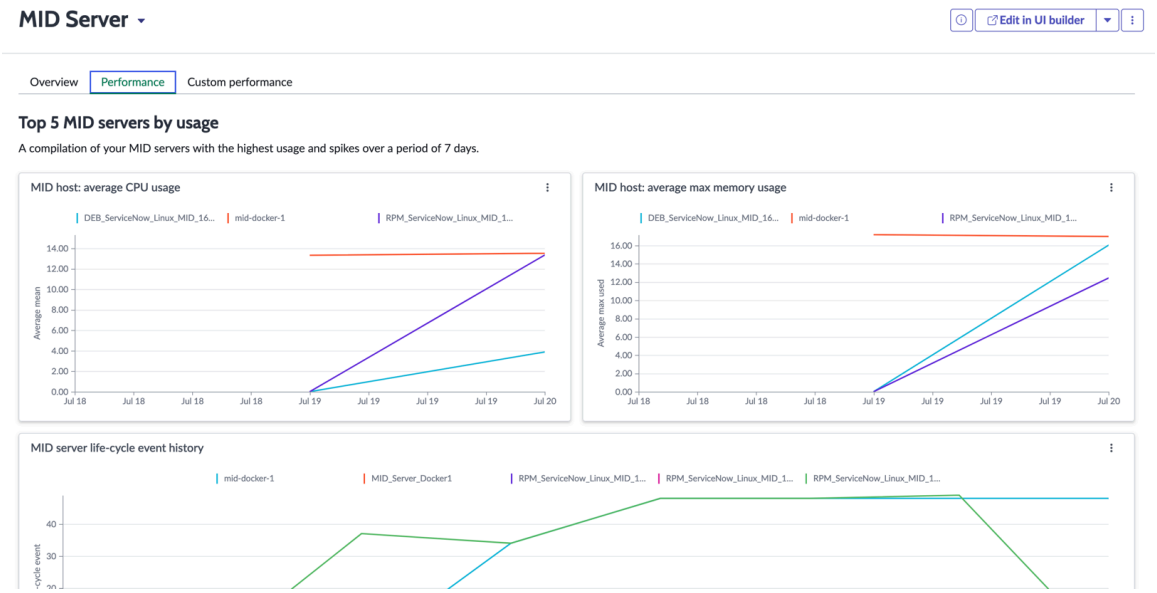


MID Server Performance tab

The Performance tab displays information relating to the MID Server CPU and memory usage, including the life-cycle event history.



MID Server Custom performance tab

The Custom performance tab enables users to set custom MID Server selection criteria to show particular MID Servers in a select time frame.

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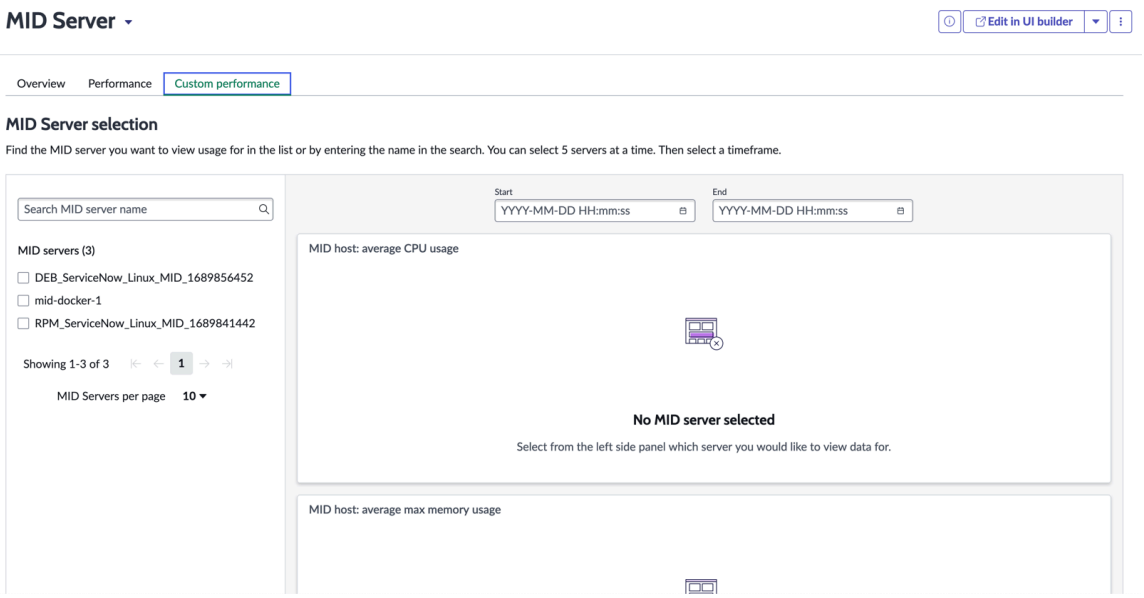
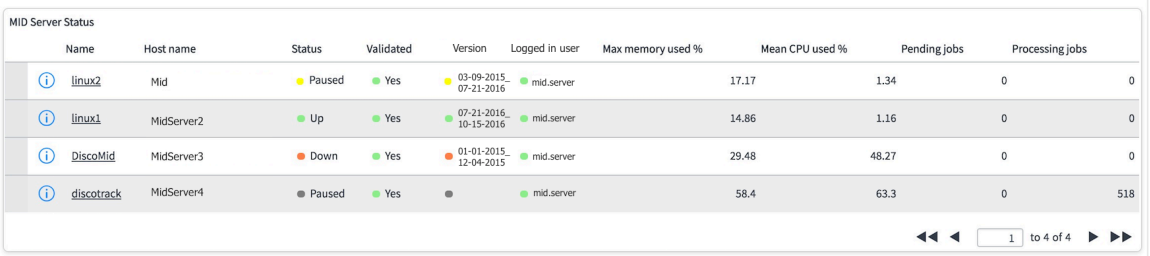


MID Server status gauge

The MID Server Status gauge on the dashboard displays basic information about each MID Server. This information comes from the MID Server Status [ecc_agent_status] table.

MID Server Dashboard gauge



If the version is not compatible, the MID Server status is not changed to **Down** in the MID Server dashboard. So it might still appear to be processing commands when it actually is not doing so. You must check the MID Server **Version** on the dashboard.

See KB0535181 for additional MID Server troubleshooting information.

The icons in the **Version** column indicates the following:

- **Red**: Incompatible. The MID Server and instance do not belong to the same release. You must upgrade the MID Server and verify that it is not pinned to an older version with the mid.version.override property. The MID Server will not be upgraded until the parameter is cleared.
- **Yellow**: Compatible, but an upgrade is recommended. This indicates that the MID Server version belongs to the same family as the instance, but not the same version.
- **Green**: Compatible. No upgrade necessary.
- **Gray**: Incompatible. The instance cannot detect the version.

Column	Description
Name	The name of the MID Server.
Host name	The name of the system that hosts the MID Server.

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Column	Description
Status	The status of the MID Server.
Validated	Whether or not the MID Server was validated.
Max memory used %	The highest percent usage of memory on the system that hosts the MID Server, in the configured sampling interval. The default interval is 30 minutes, but this value is user configurable. See MID Server resource threshold alerts for details.
Mean CPU used %	The average percent usage of CPU on the system that hosts the MID Server, in the configured sampling interval. The default interval is 30 minutes, but this value is user configurable. See MID Server resource threshold alerts for details.
Pending jobs	Number of pending ECC queue jobs for that MID Server.
Processing jobs	Number of processing ECC queue jobs for that MID Server.
Version	The version of the MID Server. An icon indicates the validity of the MID Server: • **Red**: Incompatible. The MID Server and instance do not belong to the same release. You must upgrade the MID Server and verify that it is not pinned to an older version with the mid.version.override property. The MID Server will not be upgraded until the parameter is cleared. • **Yellow**: Compatible, but an upgrade is recommended. This indicates that the MID Server version belongs to the same family as the instance, but not the same version. • **Green**: Compatible. No upgrade necessary. • **Gray**: Incompatible. The instance cannot detect the version.
User	The login name of the user. An icon indicates the validity of the user: • **Red**: Incompatible. The user does not have themid_server role or the user does not match the value in the mid.instance.username parameter (in the `config.xml` configuration file). Reconfigure the MID Server user and verify that it works. • **Green**: Compatible. The user has the mid_server role and matches the user in the configuration file. **Note:** The user can also have any of the SOAP roles that the mid_server role inherits.

MID Server properties

Properties control the behavior of all MID Servers or a particular MID Server.

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1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The MID Server properties are in the MID Server Property [ecc_agent_property] table and can be accessed by navigating to **MID Server** > **Properties**. To set these properties, you must add them, if they are not already present.

MID Server properties

alias_filtering_behavior

Sets the behavior of Discovery aliases. Behaviors define how strictly the system enforces the use of credential aliases in Discovery schedules.

- Type: string
- Default value: loose

The choices for behaviors are:

- **strict**: Aliases defined for the credential must match the aliases configured for the probe.
- **loose**: The probe's credential is used if it contains all the aliases specified in the schedule.

com.glide.closure_max_rows_per_table

Sets the maximum number of rows allowed in a table. This property is not visible by default and must be added.

- Type: integer
- Default value: 200000

concurrent.dist.download

Sets the number of concurrent MID Server auto-upgrades permitted by the instance. The default value of this property is 2, which allows the MID Server to use 2 of the 4 semaphores available on the instance for upgrading. If your instance has more than 4 INT semaphores, you can increase the value in this property to allow more concurrent upgrades.

- Type: integer
- Default value: 2

glide.stored_proc.data_type.validation

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Stops validation of data types in stored procedure parameters. Use this property if you use Orchestration to run a stored procedure on MySQL, Oracle DB, and MS-SQL databases and you want to avoid performing data type validation. Restart the MID Server service after you change the value of this property.

- Type: true | false
- Default value: false

mid.discovery.max_ci_count_per_page

Defines the maximum CI count per page.

- Type: integer (bytes)
- Default value: 500

You can also configure this as a configuration parameter on a individual MID Server.

mid.discovery.max_related_count_per_page

- Type: integer
- Default: 100

mid.discovery.max_relation_count_per_page

Splits the payload based on the number of relations in it.

- Type: integer
- Default: 10000

mid.discovery.max_total_items_size_per_page

Splits the payload based on the size of the items.

- Type: integer

mid.aws.sts.assume_role.disable_credential_caching

Set this property to **true** to prevent the caching of temporary credentials for Cloud Discovery. For more information, see Access setup for AWS service accounts Access setup for AWS service accounts.

- Type: true | false
- Default: false

mid.aws.sts.assume_role.credential_ttl_minutes

Set the number of minutes you want to cache temporary credentials for Cloud Discovery. For more information, see Access setup for AWS service accounts Access setup for AWS service accounts.

- Type: integer
- Default: 60

mid.ca.certificate.api.request.retry.count

Indicates how many times the Certificate Import query will retry after the rate limit has occurred.

- Type: integer
- Default: 3

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mid.ca.certificate.api.request.retry.interval

Used to delay Certificate import from CAs when the rate limit has occurred.

- Type: integer
- Default: 30000

mid.cloud.discovery.bypass.proxy

This configuration parameter accepts a comma separated list of DNS/IP addresses of proxy servers. The listed proxy servers are bypassed during Cloud Discovery. To bypass proxies on multiple cloud service providers (such as AWS or Azure), a separate MID Server must be set up for each provider. Otherwise, the MID Server proxy configuration is followed normally.

- Type: string
- Default value: none

mid.discovery.file_transfer_protocol

Used to determine the file transfer method used for probes or patterns.

- Type: Choice (SCP or SFTP)
- Default: SCP

mid.discovery.max_pattern_payload_size

Defines the maximum overall payload size for the payload of results that come from patterns.

- Type: integer (bytes)
- Default value: 50000000

You can also configure this as a configuration parameter on a individual MID Server.

mid.discovery.max_payload_size

Specifies the maximum string length of Discovery results that the MID Server sends to the instance. If the Discovery probe results exceed the limit, the MID Server discards them and returns a warning message.

For probes, this applies only to those probes where the *Used by Discovery* field is *true*. For patterns, this applies to the Horizontal Pattern probe.

Set the value to any negative number to disable the payload limit and allow payloads of any size to be sent to the instance. For example, -1.

- Type: integer (bytes)
- Default value: 5000000

You can also configure this as a configuration parameter on a individual MID Server.

mid.discovery.multiprobe.skip_others_on_error

Prevents probes in a multi-probe from iterating through available credentials when another member probe has already failed or timed out. If this property is set to **false**, each probe in the multi-probe attempts to connect to the target with the same invalid credentials. This condition results in longer probe execution times on the MID Server.

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This property is not visible by default and must be added to the sys_properties table to change the value.

- Type: true | false
- Default value: true

mid.eccq.max_payload_size

Specifies the maximum string length of a payload that the MID Server sends to the instance. The MID Server verifies the size of the payload before sending it to the instance. If the payload size exceeds the limit, the MID Server discards it and returns an error message in the payload.

- Type: integer (bytes)
- Default value: 20000000

You can also configure this as a configuration parameter on a individual MID Server.

mid.install_server.base_uri

Modifying this system property requires maint privileges. The MID Server uses the value provided as the base URL when making requests for update files.

- Type: string
- Default value: https://install.service-now.com

mid.jdbc.datastream.max.record.size

Specifies the maximum record size in KB.

- Type: integer
- Default value: 64
- Maximum value: 128

mid.jdbc.datastream.fail.when.attachement.limit.exceeded

Specifies if the data up to 4GB (four attachments, each of size 1GB) can be retrieved from the RDBMS. By default, a flow or action fails with an error, when there is data of more than 4GB to be retrieved. Set value to `false` to retrieve data of size 4GB without an error.

- Type: string
- Default: true

mid.keystore.max_backups

Specifies the maximum number of backups from manual key store operations through the **manage_certificate** script. If it is 0 or negative, no backup will be made.

- Type: Integer
- Default value: 3

mid.keystore.max_live_backups

Specifies the maximum number of live backups from running MID server. If it is 0 or negative, no backup will be made.

- Type: Integer
- Default value: 2

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mid.keystore.backup_overwrite_timespan

Specifies the number of seconds from the current backup time to determine if a the most recent backup in that time span should be replaced by the new one instead of creating a new backup and so removing the oldest backup, should the number of backups exceed the maximum limit.

- Type: Integer
- Default value: 60

mid.log.command_audit.enable

Enables the MID Server command audit log.

- Type: string
- Default value: false

mid.powershell.target_base_dir

Specifies the location of the target base folder used for Discovery using WMI. If another network share is mounted on each Window's target, the folder may be changed by updating this property.

- Type: string
- Default value: admin$\temp

mid.probe.collect_debug_info

An optional property to collect debug information. If this property is set to true, the probe collects credential debug information when it runs and puts that information in the payload of ECC input message. It doesn't affect how Discovery works.

- Type: true | false
- Default value: false

mid.probe.use_legacy_forward_dns

Enables the legacy DNSNameResolver probe and disables the default DNSNameResolver probe. See Probes used by Orchestration for more information.

- Type: true | false
- Default value: false

mid.probe.use_legacy_reverse_dns

Enables the legacy DNS probe and disables the default DNS probe. If you experience problems with the features of the default DNS probe, use this property to disable those features. The default DNS probe's features include being lightweight and faster due to executing in parallel, while the legacy probe is throttled by the MID Server because it executes in serial. The default probe utilizes DNS lookup by the MID Server host OS to make use of the OS maintained DNS cache, while the legacy probe does not. Consequently, after a DNS lookup by the default probe fails in Windows systems, the OS also tries looking up by NETBIOS name.

- Type: true | false
- Default value: false

mid.process_flow.log_listener.max_size

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Sets the maximum size in bytes of memory available to save log messages for Flow Designer actions running on a MID Server. The MID Server stores up to the limit in memory and discards additional log messages, then sends the messages back to the instance along with the execution plan.

- Type: integer (bytes)
- Default value: 10485760

mid.property.jdbc_operations

Tells the JDBCOrchestrationProbe what JDBC operations it is allowed to execute. Edit this property value to allow JDBC Orchestration activities to perform more operations. All operations are comma separated. Select a MID Server in the **MID server** field to define specific operations for that MID Server, or leave the field empty to apply the list of operations to all MID Servers. This property requires the Orchestration plugin.

- Type: string
- Default value: select,update,insert,delete,show,create,describe,begin,if,end,not,exists

mid.property.jms.command.allowed_factory_names

Comma delimited list of Java Messaging Service (JMS) connection factories that the MID Server requires for a custom JMS activity or action. This property requires the Orchestration plugin.

- Type: string
- Default value: connectionFactory, queueConnectionFactory, topicConnectionFactory

mid.property.ssh.use_snc

Enables the use of the SNCSSH client for Discovery and Orchestration. Change this property to **false** to use J2SSH. This property applies to all MID Servers connected to the instance.

- Type: true | false
- Default value: true

mid.property.powershell.use_base64_password

If the Credential is set to be specific to certain MID Servers, then the property can also be set to those same MID Servers. Leaving the MID Servers field empty will apply to all MID Servers.

- Type: true | false
- Default value: false

mid.sa.prefer_powershell

Enables MID Server to use PowerShell Remoting.

Note:
It is not recommended to change this property as it is being deprecated.

- Type: True | False
- Default value: true

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mid.sa.ssh.use_sncssh

Toggles SSH between non-interactive and interactive modes. True corresponds to non-interactive mode and allows probes to open sessions with the device without waiting for a prompt. False corresponds to interactive mode, which requires interactive sessions with the device for network devices and servers.

- Type: True | False
- Default value: true

mid.servicewatch.max_concurrent_connections

Defines the maximum number of concurrent tasks sent to an individual host by a single MID Server.

- Type: integer
- Default value: 7

mid.shazzam.regulator.interval_ms

Sets the interval, in milliseconds, in which Shazzam can launch packets.

- Type: integer
- Default value: 1

mid.shazzam.regulator.packets_per_interval

Sets the number of packets that Shazzam can launch in the time interval specified by the mid.shazzam.regulator.interval_ms property.

- Type: integer
- Default value: 1

mid.shazzam.threads

Specifies the number of concurrent threads that Shazzam uses. Setting this or the mid.shazzam.max_scanners_per_thread parameter to 0 disables Shazzam multi-thread optimization.

- Type: Integer
- Default value: 5

mid.shazzam.max_scanners_per_thread

Specifies the number of concurrent scanners processed by each Shazzam thread. Setting this or the mid.shazzam.threads parameter to 0 disables Shazzam optimization.

- Type: Integer
- Default value: 100

mid.sm.discolog.max_log_size

Limits the length of the log statements in the Horizontal Discovery Log. If the results are truncated, the **Command results** reports, "Result is larger than [value] characters and was truncated by the logger."

- Type: integer (characters)
- Default value: 1000

mid.sm.discolog.max_object_size

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Limits the length of the object in the Horizontal Discovery Log. Objects in the log statement are truncated to the number of characters set by this property's value. This property only affects the object character size in the Horizontal Discovery Log. The following message appears if an object is limited by this property "The max object size reached the maximum limit of [value]. To adjust this use the mid property mid.sm.discolog.max_object_size."

- Type: integer (characters)
- Default value: 5000

mid.snmp.use_getbulk

Specifies whether to use GETBULK to receive a large amount of data in batches. This can be used to globally configure all MID servers.

- Type: true | false
- Default value: true

GETBULK can also be set at the probe level or for an individual MID Server. Settings are listed in the order of precedence:

- SNMP probe parameter
- MID Server configuration parameter
- MID Server properties

mid.ssh.algorithms.kex

Modifies the Key Exchange SSH algorithm priority list. The property accepts a comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. For more information, see MID Server SSH cryptographic algorithms.

- Type: string
- Default value: ecdh-sha2-nistp256,ecdh-sha2-nistp384,ecdh-sha2-nistp521,diffie-hellman-group-exchange-sha256,diffie-hellman-group14-sha256,diffie-hellman-group16-sha512,diffie-hellman-group14-sha1,diffie-hellman-group1-sha1,diffie-hellman-group-exchange-sha1

mid.ssh.algorithms.host_key

Modifies the Host Key SSH algorithm priority list. The properties accept comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. For more information, see MID Server SSH cryptographic algorithms.

- Type: string
- Default value: ecdsa-sha2-nistp256,ecdsa-sha2-nistp384,ecdsa-sha2-nistp521,rsa-sha2-256,rsa-sha2-512,ssh-rsa,ssh-dss

mid.ssh.algorithms.cipher

Modifies the Cipher SSH algorithm priority list. The properties accept comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. For more information, see MID Server SSH cryptographic algorithms.

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- Type: string
- Default value: aes128-ctr,aes192-ctr,aes256-ctr,3des-ctr,aes128-cbc,aes192-cbc,aes256-cbc,3des-cbc

mid.ssh.algorithms.mac

Modifies the MAC SSH algorithm priority list. The properties accept comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. For more information, see MID Server SSH cryptographic algorithms.

- Type: string
- Default value: hmac-sha2-256,hmac-sha1,hmac-sha2-512,hmac-sha1-96,mac-md5-96,hmac-md5

shazzam.chunk_size

Maximum number of IP addresses Shazzam can scan in parallel. This property primarily controls outbound port consumption.

- Type: integer
- Default value: 100

mid.use_net_tools

Enables or disables the use of net-tools commands during discovery of devices running on the Linux operating system. Starting from Quebec, ITOM Visibility supports the iproute2 commands for discovery. By default, ITOM Visibility and discovery patterns first use net-tools commands, and only then, as a fallback, may use iproute2 commands. If all Linux-based devices and applications in your IT network use iproute2 commands, disable net-tools commands to make the discovery process more efficient.

- Type: true | false
- Default value: true

mid.servicewatch.use_full_linux_netstat_path

Controls if the *netstat* command is executed with its full installation path. This command lists open ports on Linux servers during the process detection phase of the top-down discovery.

- Type: true | false
- Default value: true

mid.servicewatch.num_paths_linux_netstat_to_check

Define the maximum number of installation paths to use during discovery of Linux servers. This property is relevant when you run the top-down discovery on Linux servers with several netstat installation paths, and the *mid.servicewatch.use_full_linux_netstat_path* property is set to true.

The top-down discovery attempts to execute the *netstat* command using each of these installation paths. The result of the first successful execution is used to determine the list of open ports.

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- Type: true | integer
- Default value: 5

mid.servicewatch.use_full_linux_ss_path

Controls if the *ss* command is executed with its full installation path. This command lists open ports on Linux servers during the process detection phase of the top-down discovery.

- Type: true | false
- Default value: false

mid.servicewatch.num_paths_linux_ss_to_check

Define the maximum number of installation paths to use during discovery of Linux servers. This property is relevant when you run the top-down discovery on Linux servers with several ss installation paths, and the *mid.servicewatch.use_full_linux_netstat_path* property is set to true.

The top-down discovery attempts to execute the *ss* command using each of these installation paths. The result of the first successful execution is used to determine the list of open ports.

- Type: true | integer
- Default value: 5

Create a MID Server property

Use a MID Server property to control either the behavior of all MID Servers or a particular MID Server.

Before you begin

Role required: admin

About this task

You set MID Server properties to override MID Server parameters. Configure MID Server properties in the MID Server plugin. Do not configure MID Server properties in the **glide.properties** file that is located in the properties folder of the agent. The **glide.properties** file gets overwritten during the upgrade process.

Procedure

1. Navigate to **All** > **MID Server** > **Properties**.
2. Click **New**.
3. Fill in the fields, as appropriate (see table).

MID Server properties fields

Field	Description
Name	Enter the property name.
Value	You can enter the value you want the property to have.

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Field	Description
	Note: If you are amending JDBC operations through the mid.property.jdbc_operations properties, you can enter verbs like BEGIN, END, IF, or common PL/SQL block statements. This will assist in being able to run CREATE or ALTER statements. You might have to restart the MID server before running some of the statements.
MID Server	Leave this field blank to set a MID Server property that affects all MID Servers. To set a MID Server property for a particular MID Server , select the MID Server.

4. After setting any MID Server properties, restart the MID Server to ensure the properties sync with the instance.

MID Server parameters

Parameters control the behavior of a particular MID Server and have lower precedence than MID Server properties.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

To add a parameter to a MID Server, see Add a MID Server parameter.

Important:
Changes to parameters only take effect when the MID Server is started (or restarted).

Note:
The value of any MID Server parameter in the config.xml file can be encrypted. See Encrypt or decrypt MID Server configuration file values for more information.

Required parameters

Note:
Using special characters in an XML configuration file requires you to encode them.

url

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Specifies the URL to the associated instance. Normally the URL is similar to https://instance.service-now.com, where you replace instance with the instance name. If you host your own instance, use the URL set by your organization.

- Type: string
- Default value: none

mid_sys_id

Records the MID Server record's unique identifier. This parameter should be empty when you initially configure a MID Server. Do not change the value.

- Type: string
- Default value: automatically set (GUID)

name

Use this parameter to supply a name that is meaningful for you. If you do not supply this parameter, the MID Server uses the default value. A set of business rules synchronizes the name in the configuration file with the name in the MID Server record. The business rules ensure that changing the name in one location also changes the name in the other location.

- Type: string
- Default value: YOUR_MIDSERVER_NAME_GOES_HERE

mid.instance.username or glide.glidesoap.username

If the ServiceNow instance has authentication enabled, as it is by default, set this parameter to define the user name the MID Server should use to log in to the instance. This user should have the mid_server role on the ServiceNow instance in order to access necessary tables and fields. You can use this parameter to define user names with special characters.

- Type: string
- Default value: none

mid.instance.password or glide.glidesoap.password

If your ServiceNow instance has authentication enabled, as it is by default, set this parameter to define the password the MID Server should use to log in to the instance. You can use this parameter to define passwords with special characters.

- Type: string
- Default value: none

CIM parameters

mid.cim.batch.size

Specifies the maximum number of messages sent at once to a CIM server.

- Type: integer
- Default value: 1

mid.cim.request.interval

Specifies the number of milliseconds to wait between requests to the same Common Information Model Object Manager (CIMOM).

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- Type: integer
- Default value: 0

mid.cim.host.connection.limit

Specifies the maximum number of simultaneous connections to each CIMOM. A value of zero disables simultaneous connections.

- Type: integer
- Default value: 0

Connection parameters

glide.mid.fast.responses

Instructs the MID Server to try sending messages to the instance as soon as they are ready. Normally the MID Servers end messages to the ServiceNow instance serially (that is, one message at a time). Since many probes can be run in parallel, there can be multiple messages transmitted simultaneously to the instance. Setting this parameter to **true** may decrease the time between a probe's completion and its response arriving at the instance. However, the multiple simultaneous messages consume resources, decreasing the overall instance responsiveness. If there are communications problems, this parameter's value can also cause a logjam on the MID Server, as threads normally used for running probes may become consumed for sending messages. Generally, leave this parameter out of your configuration. Setting it to **true** is meaningful only under very special circumstances.

- Type: true | false
- Default value: false

glide.mid.max.sender.queue.size

Places an upper limit on how large the queue is allowed to get. The MID Server starts deleting queued messages if this limit is exceeded. When the MID Server generates messages to the ServiceNow instance faster than it can send them, it queues them temporarily on the file system of the MID Server's host. This queue is normally quite small, and is completely emptied as soon as the MID Server processing slows for a short period. However, this queue can grow in size when there are communication problems between the MID Server and the instance, and especially if there is an integration running on the MID Server.

The parameter is of the form {number}{multiplier}, where {number} is any positive decimal number including non-integers, and the optional multiplier is any spelling of bytes, kilobytes, megabytes, gigabytes, or terabytes (only the first character is tested, and the test is case-insensitive). The default multiplier is bytes. White space is liberally tolerated. The following strings all represent valid parameters: "1000000000", "0.5m", "5 GB", "7.67gigas", "145.69392 meg", and "1.1 terra".

- Type: string
- Default value: 0.5 GB

instance.date.format

Specifies the format the instance uses for dates and times. The primary impact of setting this parameter is to allow the MID Server to correctly refresh its start and stop times on the MID Server record in ServiceNow. The format of this date/time string is identical to that used by the Java SimpleDateFormat class.

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- Type: string (Date format)
- Default value: yyyy-MM-dd HH:mm:ss

mid.disable_amb

Disables the Asynchronous Message Bus (AMB) notifications for new ECC queue output messages. For more information, see the Asynchronous Message Bus section inAsynchronous Message Bus. When AMB is enabled the MID Server uses a different default polling interval than when AMB is disabled. See the **mid.poll.time** parameter for more details. If you set a polling interval with the **mid.poll.time** parameter, the MID Server uses that value whether or not the AMB client is enabled.

- Type: true | false
- Default value: false

mid.https.truststore.password

Sets the trustStore password that is required for HTTPS connections with the Asynchronous Message Bus (AMB) Client.

- Type: string
- Default value: none

mid.https.truststore.path

Path to the trustStore to be used by the MID Server for TLS transactions (Asynchronous Message Bus (AMB) Client). Add this parameter only if you want to change the default path.

- Type: string
- Default: Path to the JRE trustStore bundled with the MID Server

mid.instance.skip_basic_auth

Allows the MID Server to connect to an instance using cookies instead of basic authentication credentials. When set to **true**, it uses cookies first. However, if the connection fails, the MID Server will try to connect again using basic authentication credentials.

- Type: true | false
- Default value: true

mid.jmx.enabled

Enables a JMX server on the MID Server, which exposes some management information to JMX consoles. Implementing JMX requires additional configuration of the Java runtime environment. Setting this parameter to **true** is only recommended for those with detailed knowledge of the Java security architecture and a specific need for JMX.

- Type: true | false
- Default value: false

mid.poll.time

Sets the default MID Server polling interval (in seconds). The polling interval is the amount of time the MID Server waits before checking the ECC queue for work when

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the MID Server is not busy. For more information, see the Asynchronous Message Bus section in.

When **mid.disable.amb** is set to false (the default setting), see the Asynchronous Message Bus section in Asynchronous Message Bus for more information about how **mid.poll.time** is used.

When **mid.disable.amb** is set to true, polling occurs on a fixed **mid.poll.time** interval, but polling switches to using **mid.poll.time.standard** (5 seconds by default) when the MID Server is busy.

- Type: integer (seconds)
- Default value: 40 when **mid.disable.amb** is false, or 5 when **mid.disable.amb** is true.

mid.probe.wait.resources

Indicates whether probe execution is delayed until resources are available. Used to enable MID Server Resource Reservation.

Note:
Requires MID Server restart.

- Type: true | false
- Default value: true

mid.property.long_runner

Identifies the name of a script include that manages long running commands.

Note:
This property is applicable till the Rome version only. If your instance is of a later version, you must configure the system property, *`glide.eccprobe.longrunner.class`*.

- Type: string
- Default value: LongRunner

threads.interactive.max

Sets the maximum number of interactive worker threads that can run simultaneously in the interactive thread pool. See Set MID Server Thread Use.

- Type: integer
- Default value: 10

threads.expedited.max

Sets the maximum number of expedited worker threads that can run simultaneously in the expedited thread pool. See Set MID Server Thread Use.

- Type: integer
- Default value: 20

threads.max

Sets the maximum number of standard worker threads that can run simultaneously in the standard thread pool. This parameter provides direct control over what CPU

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resources the MID Server consumes on the computer that hosts it. See Set MID Server Thread Use.

- Type: integer
- Default value: 25

> **Important:**
> You can set threads.max as high as 200, however, this setting may need to be changed depending on the OS. For example, Windows-based MID Servers running Discovery uses Powershell which is resource intensive. In this case, you may exhaust the CPU power of the host machine with just 50 threads count.

Credentials parameters

mid.aws.instance_profile_name

Name of the AWS IAM role configured on the EC2 instance. When configured, the MID Server uses the temporary credentials granted to this role by the AWS instance profile to Discover cloud resources.

- Type: string
- Default value: None (User must provide a non-blank value)

mid.credentials.provider

Specifies the Java class name of the credentials provider.

- Type: string
- Default value: com.service_now.mid.creds.standard.StandardCredentialsProvider

mid.secure_credentials.key_pairs.provider

Class that the MID Server uses to generate secure key pairs.

- Type: string
- Default value: com.service_now.mid.keypairs.provider.standard.StandardKeyPairsProvider

Debug parameters

debug.logging

[Deprecated] Specifies whether to enable logging of MID Server events and messages (both sent and received). Normally this parameter is only used by developers, but it is occasionally useful when troubleshooting a problem. Be aware that setting this parameter to **true** causes intensive logging on the MID Server, potentially using considerable disk space.

- Type: true | false
- Default value: false

This parameter has been replaced by the *`mid.log.level`* parameter.

debug

[Deprecated] Specifies whether to enable debug logging on the MID Server. Normally this parameter is only used by developers, but it is occasionally useful when troubleshooting a problem. Be aware that setting this parameter to **true**

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causes intensive logging on the MID Server, potentially using considerable disk space.

- Type: true | false
- Default value: false

This parameter has been replaced by the *mid.log.level* parameter.

file.probe.template.debug

Specifies whether to debug file probe templates.

- Type: true | false
- Default: false

mid.cim.debug

Specifies whether to enable debug logging for CIM, WBEM, SLP, or SMI-S.

- Type: true | false
- Default value: false

mid.ssh.debug

Enables SSH debug information in the log file. The parameter usage depends on whether the ServiceNow SSH client is enabled.

When the ServiceNow SSH client is enabled, the parameter functions as follows:

- Type: string
- Default value: false

  The following string values are valid for the ServiceNow SSH client:

  - true: Enables SSH debug information in the log file.
  - false: Disables SSH debug information in the log file.
  - <IP Addresses>: Specify which IP ranges to enable SSH debug information in the log file. You can enter IP addresses in the following formats:
    - An IP range defined by a slash and the number of bits in the subnetwork. For example, the string 10.10.10.0/24 scans 24 bits of IP addresses from 10.10.10.0 to 10.10.10.254.
    - An IP range defined by a dash. For example, the string 10.10.11.0-10.10.11.165 scans the IP addresses from 10.10.11.0 to 10.10.11.165.
    - A comma-separated list of specific IP addresses. For example the string 10.10.11.200,10.10.11.235 scans the IP addresses 10.10.11.200 and 10.10.11.235.
  - deferred: Logs SSH debug information in memory unless an error or warning occurs. If an error or warning occurs, the platform publishes the debug information to the log file. This ensures that only the part of the log file pertaining to the error or warning is recorded. If no error or warning is detected, the platform deletes the unused log data from memory when the session closes. Each session stores up to 1000 log messages. If the session exceeds 1000 log messages, the deferred log discards the oldest log message to make room for the newest log message.

When the ServiceNow SSH client is disabled, the parameter enables or disables SSH debug information in the log file:

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- Type: true | false
- Default value: false

Note:
The MID Server parameter **mid.ssh.debug** only affects SNCSSH and J2SSH. To enable Maverick client debug logging, set the MID Server configuration parameter **mid.log.level** to `debug, com.maverick=debug`.

mid.log.level

Specifies the logging level for the MID Server. Possible values are:

- debug
- info
- warn
- error

Note:
Values are case insensitive.

- Type: string
- Default value: info

mid.http.idle_connection_monitor.debug

Enables debug logging for the Idle Connection Monitor.

- Type: true | false
- Default value: false

DNS parameters

mid.dns_scan.regulator.interval_ms

Specifies the interval between DNS scans in milliseconds.

- Type: integer
- Default value: 10

mid.dns_scan.regulator.packets_per_interval

Specifies the number of regulator packets per DNS scan.

- Type: integer
- Default value: 1

mid.dns_scan.default_name_servers

Specifies the host names or IP addresses of the default name servers.

- Type: string
- Default value: none

mid.dns_scan.default_name_servers

Specifies the host names or IP addresses of the default name servers.

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- Type: string
- Default value: none

mid.dns_scan.additional_name_servers

Specifies the host names or IP addresses of any additional name servers.

- Type: string
- Default value: none

mid.dns_scan.load_balancing_enable

Specifies whether to enable load balancing of name servers.

- Type: true | false
- Default value: false

mid.probe.use_legacy_forward_dns

Enables the legacy DNSNameResolver probe and disables the default DNSNameResolver probe. See Probes used by Orchestration for more information.

- Type: true | false
- Default value: false

mid.probe.use_legacy_reverse_dns

Enables the legacy DNS probe and disables the default DNS probe. If you experience problems with the features of the default DNS probe, use this parameter to disable those features. The default DNS probe's features include being lightweight and faster due to executing in parallel, while the legacy probe is throttled by the MID Server because it executes in serial. The default probe utilizes DNS lookup by the MID Server host OS to make use of the OS maintained DNS cache, while the legacy probe does not. Consequently, after a DNS lookup by the default probe fails in Windows systems, the OS also tries looking up by NETBIOS name.

- Type: true | false
- Default value: false

Event Management parameters

mid.probe.event.bulk_size

Specifies the maximum size of an event payload, in MB.

- Type: integer
- Default value: 120

mid.probe.event.wait_time

Waiting period on an empty queue for sending events.

- Type: integer
- Default value: 1000

mid.probe.event.send.enabled

Enables or disables the sending of events.

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- Type: true | false
- Default value: true

mid.probe.event.queue.max_size

Specifies the maximum size permitted for the event queue before incoming events are rejected.

- Type: integer
- Default value: 100,000

mid.probe.event.max.retry_time

The maximum number of seconds MID retries sending events.

- Type: integer
- Default: 1800

mid.probe.event.queue.use_bulk

Specifies whether events are sent to the server singly or in bulk. If this parameter evaluates to **true** then events are sent to the server in bulk.

- Type: true | false
- Default value: true

mid.probe.event.suppress.whitespaces

Allows line breaks in description fields for multi-line events. Apply this parameter to each MID Server used with event connector instances. Choices are:

all

This setting removes all whitespaces.

leave_as_is

This setting keeps all whitespaces.

keep_newline

This setting keeps only new_line and removes all other whitespaces.

- Type: string
- Default: all

mid.em.metric.metric_to_ci_map_limit

Specifies the maximum number of active metrics allowed per CI map.

- Type: integer
- Default value: 200,000

mid.em.metric_binding_timeout_seconds

Specifies the number of seconds to wait before resending unhandled events

- Type: integer
- Default value: 300

mid.em.metric_binding_timeout_max_seconds

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Specifies the maximum number of seconds to wait before resending unhandled events.

- Type: integer
- Default value: 10800

mid.em.metric_max_elapsed_time_before_refresh

Specifies the maximum number of seconds before the metric source type cache is refreshed in memory.

- Type: integer
- Default value: 60

mid.em.matric_max_sql_string_length_for_types

Specifies the maximum length of the string (composed of types) used for an SQL command

- Type: integer
- Default value: 30000

mid.em.statistics_report_perioon_sec

Specifies the period, in seconds, between statistics reports to the instance. Use **0** to disable reporting. This parameter requires a restart.

- Type: integer
- Default value: 60

mid.em.metric_connector_max_run_time_seconds

Specifies the maximum number of seconds to collect metrics in every cycle.

- Type: integer
- Default value: 300

mid.em.metric_connector_history_min

Specifies the number of minutes to go back in history to retrieve metrics.

- Type: integer
- Default value: 180

mid.em.metric_event_logging

Specifies the level of metric and event logging. Choices are:

- none
- all
- events
- metrics
- metrics:<filter>
- events:<filter>

- Type: string
- Default value: none

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mid.em.metric_connector_late_arrivals_delay

Specifies the number of seconds to delay when collecting metrics.

- Type: integer
- Default value: 30

FTP connection parameters

mid.ftp.max_pool_size

Specifies the maximum size of the FTP Connection Pool, in megabytes.

- Type: integer
- Default value: 25

mid.ftp.max_per_target

Specifies the maximum number of the FTP connections per target.

- Type: integer
- Default value: 5

mid.ftp.max_conn_idle_time

Specifies the maximum amount of time, in milliseconds, that an FTP connection can sit idle in the pool.

- Type: integer
- Default value: 300000

mid.filesystem.max.ls

Specifies the maximum number of files that can be returned in the filesystem list directory command.

- Type: integer
- Default value: 10000

Logging parameters

disable_monitors

Specifies whether to disable the MID Server from actively checking for monitors on the instance.

- Type: true | false
- Default value: true

mid.show.queries

Instructs the MID Server whether to log details about every query it makes to the ServiceNow instance. Typically this parameter is only used by developers, but it is occasionally useful when troubleshooting a problem. Be aware that setting this parameter to **true** causes intensive logging on the MID Server, potentially using considerable disk space.

- Type: true | false
- Default value: false

disable.remote.logging

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Prevents the MID Server from logging any information to the MID Server log on the instance. Relatively little information is logged on the instance in any case, but setting this parameter to **true** eliminates all logging to the instance.

- Type: true | false
- Default value: false

disable.status

Prevents the MID Server from sending a status report to the instance every 10 minutes.

- Type: true | false
- Default value: false

mid.file_cleaner.disabled

Files and empty folders within the following folders may be deleted by this MID File Cleaner. Files last accessed more than 30 days ago are deleted. It runs on start-up, and then every 24 hours after that. You can force the File Cleaner to run by restarting the MID Server service.

Folders/files cleaned:

- `\agent\import`
- `\agent\export`- Used by the Export Set feature.
- `\agent\work\monitors\ECCSender\output_error` - Used for ECC input payloads that cannot be inserted for any reason
- `\agent\work\monitors\ECCSender\output_oversize` - Used for saving copies of payloads that are not sent to the instance because they are larger than the limit set by **mid.eccq.max_payload_size**, which defaults to 20000000 bytes
- `\agent\logs`- Specifically JFR Dumps

- Type: true | false
- Default value: false

mTLS protocol parameters

Add these parameters to the `config.xml` file in the `/agent` directory, in the MID Server installation directory.

mid.httpclient.protocol.myprotocol.path

Specifies the path to the keystore. The path can be absolute or relative. In the parameter name, make sure you replace **myprotocol** with the name of your protocol.

Type: String.

mid.httpclient.protocol.myprotocol.port

Specifies the port number for the protocol. In the parameter name, make sure you replace **myprotocol** with the name of your protocol.

Type: String.

mid.httpclient.protocol.myprotocol.password

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Specifies the mTLS credential password. In the parameter name, make sure you replace **myprotocol** with the name of your protocol. Add the encryption attribute *secure="true"* to encrypt the password using standard MID Server encryption.

Type: String.

Pattern parameters

mid.parsing.max_field_size

Sets the maximum character length of strings stored as temporary variables while patterns are run. Strings longer than this parameter's value are truncated to equal the value. Use the parameter to increase the limit when parsing longer strings.

> **Warning:**
> Exceeding the max field size limits of the SQL database implementation cause errors.

- Type: integer
- Default value: 1024

mid.sa.discovery.pattern_string_attributes.deduplicate

Reduces memory consumption for pattern execution context attributes by eliminating duplicate strings.

- Type: true | false
- Default: true

Proxy server parameters

mid.instance.use_proxy or mid.proxy.use_proxy

If your MID Server must go through a web proxy to access the ServiceNow instance, set this parameter to **true** to instruct the MID Server to use the proxy. You must also set the proxy server's host and port, and perhaps the user name and password as well.

- Type: true | false
- Default value: false

mid.proxy.host

If your MID Server must go through a web proxy to access the ServiceNow instance, set this parameter to define the proxy's host.

- Type: string
- Default value: none

mid.proxy.password

If your MID Server must go through a web proxy to access the ServiceNow instance, and your proxy requires a password, set this parameter to define that password.

- Type: string
- Default value: none

mid.proxy.port

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If your MID Server must go through a web proxy to access the ServiceNow instance, set this parameter to define the proxy's port.

- Type: integer (0-65535)
- Default value: 80

mid.proxy.username

If the MID Server must go through a web proxy to access the ServiceNow instance, and the proxy requires a user name, set this parameter to define that user name.

- Type: string
- Default value: none

Request timeout override parameters

mid.sa.cloud.request_timeout

Sets the timeout in milliseconds for cloud requests. This parameter overrides the **glide.http.timeout** system property, which specifies the maximum number of milliseconds to wait before an outbound REST transaction times out.

- Type: integer
- Default value: 30000

mid.http_classy.request_timeout

Sets the timeout in milliseconds for HTTP classification requests with the HTTP - Classify probe. This parameter overrides the **glide.http.timeout** system property, which specifies the maximum number of milliseconds to wait before an outbound transaction times out.

- Type: integer
- Default value: 30000

Security parameters

mid.windows_host.file_permissions.allow_list

Sets an inclusion list for Windows file permissions enforcement to improve security. The parameter takes a string of comma separated group names, user names, and SIDs. Group and user names must follow SAM account naming requirements. Domain accounts can be specified by using the SID.

- Type: string (comma separated group and user names)
- Default value: None

mid.windows_host.file_permissions.enforce

Enables the MID Server to use Windows file permissions enforcement to improve security. Setting this parameter to **false** will prevent the MID Server from updating the file permissions inclusion list, but will not revert the file permissions.

- Type: true | false
- Default value: true

Shazzam parameters

mid.shazzam.regulator.interval_ms

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Sets the interval, in milliseconds, in which Shazzam can launch packets. This parameter works with the *mid.shazzam.regulator.packets_per_interval* parameter to set the number of packets allowed in this interval. By default, Shazzam launches one packet each millisecond.

- Type: integer
- Default value: 1

mid.shazzam.regulator.packets_per_interval

Sets the number of packets that Shazzam can launch in the configured time interval. This parameter works with the *mid.shazzam.regulator.interval_ms* parameter, which sets that interval. By default, Shazzam launches one packet each millisecond.

- Type: integer
- Default value: 1

mid.shazzam.chunk_size

Specifies the maximum number of IP addresses that Shazzam scans in parallel. This parameter primarily controls outbound port consumption.

- Type: integer
- Default value: 100

mid.shazzam.threads

Specifies the number of concurrent threads that Shazzam uses. Setting this or the mid.shazzam.max_scanners_per_thread parameter to 0 disables Shazzam multi-thread optimization.

- Type: integer
- Default value: 5

mid.shazzam.max_scanners_per_thread

Specifies the number of concurrent scanners processed by each Shazzam thread. Setting this or the mid.shazzam.threads parameter to 0 disables Shazzam multi-thread optimization.

- Type: integer
- Default value: 500

SNMP configuration parameters

mid.snmp.enable_auto_public

Specifies whether to use the SNMP public community string automatically if no other SNMP credentials were successful.

- Type: true | false
- Default value: true

mid.snmp.request.timeout

Specifies the timeout value for the first OID request, in milliseconds. For subsequent requests (for example, table OIDs), the *mid.snmp.session.timeout configuration* parameter (see below) takes effect.

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Note:
You can override this parameter with the *timeout* SNMP probe parameter.

- Type: integer
- Default value: 1500

mid.snmp.session.timeout

Specifies the timeout value for subsequent OID request, in milliseconds. SNMP communication is stateless and does not have a session or connection in the normal sense. The system regards a positive response from the first OID request as a sign that it should expect prompt responses to subsequent requests. While the default is short, it may be useful to increase this parameter value to the same value as that used for *mid.snmp.request.timeout*.

Note:
You can override this parameter with the *establish_session_timeout* SNMP probe parameter.

- Type: integer
- Default value: 500

mid.snmp.use_getbulk

Specifies whether to use GETBULK to receive a large amount of data in batches. This can be used to configure an individual MID Server.

- Type: true | false
- Default value: True

GETBULK can also be set at the probe level or globally for all MID servers. Settings are listed in the order of precedence:

- SNMP probe parameter
- MID Server configuration parameter
- MID Server properties

mid.snmp.use_snmp4j

Use the Snmp4j library for SNMP communication. This is a strict requirement for SNMPv3. This parameter should only be set to **false** based on advice from Customer Service and Support.

- Type: true | false
- Default value: true

mid.snmp.use_snmp_v1_v2c

Attempt communication using the SNMPv1 and SNMPv2c protocol versions. It may require configuration of SNMP community credentials. This parameter is an alternative and **not a strict requirement for SNMPv3.**

- Type: true | false
- Default value: true

mid.snmp.use_snmp_v3

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Attempt communication using the SNMPv3 protocol version. Requires configuration of SNMPv3 credentials.

- Type: true | false
- Default value: true

SSH Discovery parameters

By default, the MID Server is configured to search for SSH commands in the following paths and the logged-on user's default paths:

- /usr/sbin
- /usr/bin
- /bin
- /sbin

mid.connection_cache

Specifies whether to cache connections. Set to **false** to disable connection caching. This parameter applies to SSH connections only.

- Type: true | false
- Default value: true

mid.ssh.set_path

Specifies whether to set the PATH environment variable for SSH commands.

- Type: true | false
- Default value: true

mid.ssh.local

Specifies whether to execute commands for the MID Server host machine (localhost) via SSH rather than from a console. This allows long-running commands to execute properly. This parameter applies to the legacy SSH client only.

- Type: true | false
- Default value: false

mid.ssh_connections_per_host

Controls the number of concurrent probes the MID Server can run against a given host. Lowering the number of concurrent connections can slow Discovery.

- Type: integer
- Default value:

  7 for the ServiceNow client

  3 for the legacy SSH client.

mid.ssh.sudo_preserve_environment

Specifies whether to use sudo to preserve the environment for SSH.

- Type: true | false
- Default value: false

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mid.ssh.terminal.width

Controls the maximum characters per line when handling sudo -l in the terminal. If the value is too low, the output can be broken into multiple lines and affect the parser. Set the value to a sufficient size to handle outputs as needed.

- Type: int
- Default value: 255

mid.ssh.path_override

Overrides the default paths set before executing a command. Enter one or more override paths delimited by a colon (:). The default path is /usr/sbin: /usr/bin: /bin: /sbin.

- Type: string (a colon-separated list of directories)
- Default value: None

The ServiceNow SSH client accepts the following prefixes in front of the path_overide value.

- *append*: Appends the override path to the end of the host's path. This is the default behavior.
- *replace*: Replaces the host path with the path_overide value.
- *prepend*: Appends the override path to the front of the host path.

mid.ssh.use_snc

Enables the ServiceNow SSH client (SNCSSH) on individual MID Servers. SNCSSH is a ServiceNow implementation of an SSH client and is active by default for all MID Servers on new instances, via a MID Server property. Enabling the ServiceNow SSH client disables the legacy J2SSH client.

Important:
Mixing SSH client types for MID Servers connected to the same instance is not a good practice.

- Type: true | false
- Default value: false

mid.ssh.max_retries

Specifies the maximum amount of times to retry an SSH operation after a time-out. The system sleeps two seconds between each connection attempt. By default, the MID Server retries once only. Set the parameter to *0* to disable retries.

- Type: integer
- Default value: 1

mid.ssh.alt_rm

Sets a different SSH remove file command.

- Type: string
- Default value: none

mid.ssh.initial_delay_ms

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Delays sending any SSH probe commands to a server after connecting to the target for the time specified, in milliseconds. This parameter applies to the legacy SSH client only.

- Type: integer (milliseconds)
- Default value: 0

mid.ssh.suppress_history

Suppresses the generation of the SSH history file. This parameter applies to the legacy SSH client only.

- Type: true | false
- Default value: false

mid.ssh.socket_timeout

Specifies the timeout value for the SSH socket to prevent issues created by a socket timeout. Some devices, such as systems with embedded controllers like UPSs and PDUs, that have SSH enabled require more time to respond to an authentication request. The default value of 2 minutes ensures such requests do not timeout prematurely.

- Type: integer (milliseconds)
- Default value: 120000 (2 minutes)

mid.ssh.channel_timeout

Specifies the amount of time that the MID Server waits for activity on the SSH socket before closing the connection. If there has been no activity on the SSH socket for the specified timeout value, the MID Server closes the connection. Some devices, such as systems with embedded controllers like UPSs and PDUs, that have SSH enabled may require more time to respond to an authentication request.

- Type: integer (milliseconds)
- Default value: 120000 (2 minutes)

mid.ssh.session_timeout

Specifies the amount of time that a cached session remains in memory after last use. Excessively small values tend to decrease performance. This parameter applies to the ServiceNow SSH client only.

- Type: integer (milliseconds)
- Default value: 300000 (5 minutes)

mid.ssh.command_timeout_ms

The timeout duration, in milliseconds, for the execution of an SSH command.

- Type: integer (milliseconds)
- Default value: 300000 (5 minutes)

mid.ssh.use_keyboard_interactive

Uses the keyboard interactive authentication mode in SSH daemons on which it is activated.

- Type: true | false
- Default value: false

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> **Warning:**
> An issue exists in Mac OS X Sierra and later with the authentication order of the **password** and **keyboard-interactive**modes that can cause Discovery to fail. For details about this issue and the configuration required for proper SSH authentication, see KB0623600.

mid.ssh.dh_group_length_min

Specifies the minimum group length in bits used for generating a "shared secret" key in Diffie-Hillman key exchange. The larger the key the more secure the SSH connection is but at the cost of performance.

- Type: integer (bits)
- Default value: 1024

mid.ssh.dh_group_length_max

Specifies the maximum group length in bits used for generating a "shared secret" key in Diffie-Hillman key exchange. The larger the key the more secure the SSH connection is but at the cost of performance.

- Type: integer (bits)
- Default value: 8192

mid.ssh.shells_supported

Defines the bourne-compatible shells supported by the MID Server. This value is a comma-separated list of supported shells, such as **ksh**, **dsh**, **bash** and **sh**.

- Type: string
- Default value: ksh,bash,sh

mid.ssh.discard_lrc_error

Discard long running command error output, emulating legacy behavior.

- Type: string
- Default value: j2ssh - true, sncssh - false

mid.ssh.pool_thread_ratio

Ratio of the SSH session pool capacity to the configured MID Server thread number (threads.max), expressed as a percentage. The number of permitted pool capacity sessions is set in this parameter. Regardless of the value set in this parameter, the system never permits the pool capacity to fall below 25 sessions.

- Type: integer
- Default value: 150

mid.ssh.disable_privilege_check

This parameter has no effect if the target is using a privileged command other than sudo. For more information, see MID Server privileged commands.

The remainder of this section only applies to targets which run sudo. When this parameter is set to **true**, the MID Server assumes that the user configured in the credential has the privilege to run the given command using sudo. The MID Server assumes the target user can run any command string following sudo on the target. When this parameter is set to **false**, the MID Server runs "sudo -l" on the target to verify the command which follows sudo has permission to run on the target.

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Regardless of this parameter's value, the MID Server always validates that sudo by itself can be run on the target.

Some releases do not show this parameter in the MID Configuration Parameters pull down list. In this case, you may optionally add this parameter in MID Properties.

- Type: true | false
- Default value: false

Upgrade parameters

mid.pinned.version

Name of the version to which this MID Server is pinned.

- Type: string
- Default value: MID buildstamp

> **Note:**
> To see the MID buildstamp for your instance, type **stats.do** in the navigation filter. An example of the buildstamp format is **london-06-27-2018__patch3-10-24-2018_11-11-2018_0542**.

mid.upgrade.use_proxy

If your MID Server must go through a web proxy to access the upgrade URL, set this parameter to **true** to instruct the MID Server to use the proxy. You must also set the proxy server's host and port. If the instance proxy user name and password are set, they are used for the upgrade proxy as well.

> **Note:**
> This parameter is not intended to control proxy details configured with **glide.mid.autoupgrade.proxy*** parameters.

- Type: true | false
- Default value: true

glide.mid.autoupgrade.proxy_host or glide.glidesoap.proxy_host

If your MID Server must go through a web proxy to access the upgrade URL, define the proxy's host here.

- Type: string (URL)
- Default value: none

glide.mid.autoupgrade.proxy_port or glide.glidesoap.proxy_port

If your MID Server must go through a web proxy to access the upgrade URL, define the proxy's port here.

- Type: integer (0-65535)
- Default value: 80

glide.mid.autoupgrade.proxy_user

If your MID Server must go through a web proxy to access the upgrade URL, define the proxy's user name here.

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- Type: string (URL)
- Default value: none

glide.mid.autoupgrade.proxy_password

If your MID Server must go through a web proxy to access the upgrade URL, define the proxy's password here.

- Type: string
- Default value: none

Windows Discovery parameters

mid.powershell_api.session_pool.max_size

Specifies the maximum number of sessions allowed in the session pool.

Note:
Setting or changing this parameter requires restarting the MID Server.

- Type: integer
- Default value: 25

mid.powershell_api.session_pool.target.max_size

Specifies the maximum number of sessions allowed in the pool per target host.

Note:
Setting or changing this parameter requires restarting the MID Server.

- Type: integer
- Default value: 2

mid.sa.prefer_powershell

Enables MID Server to use PowerShell Remoting.

- Type: true | false
- Default value: false

mid.powershell_api.winrm.use_ssl

Requires the use of SSL certificates for HTTPS connections using WinRM.

- Type: true | false
- Default value: false

mid.powershell_api.winrm.additional_pssesion_options

Controls advanced options for a PSSession. For more information about advanced PSSession options, see https://docs.microsoft.com/en-us/powershell/module/microsoft.powershell.core/new-pssessionoption?view=powershell-6.

mid.powershell_api.winrm.remote_https_port

Configures the port for connecting to Windows servers using PowerShell over HTTPS.

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- Type: integer
- Default value: 5986

mid.powershell_api.winrm.remote_port

Configures the port for connecting to Windows servers using PowerShell over HTTP.

- Type: integer
- Default value: 5985

mid.powershell_api.winrm.skip_ssl_cert_check

Skips the SSL certificate check when using WinRM for HTTPS connections.

- Type: true | false
- Default value: false

mid.powershell_api.winrm.skip_ssl_cert_check_options

Skips specific SSL certificate checks when using WinRM for HTTPS connections. Configure the MID Server to skip checks for certificates from a Certification Authority (CA), from the Common Name (CN) that identifies the host associated with the certificate, and for revoked certificates.

- Type: string
- Default value: -SkipCACheck -SkipCNCheck -SkipRevocationCheck

mid.powershell.use_credentials

Determines the credentials to use for Discovery with PowerShell. A setting of **true** directs the MID Server to run probes with the Windows credentials from the credentials table. To run probes with the credentials of the user for the MID Server service, set this parameter to **false**.

- Type: true | false
- Default value: true

mid.powershell.path

Enables an administrator to point to a specific PowerShell on a MID Server in cases where more than one PowerShell is installed. Supply the path to the folder containing the PowerShell executable, for example, `C:\mypowershell` or `C:\mypowershell\`. ServiceNow automatically appends the string powershell.exe to the path. Configure this parameter when both a 32-bit and 64-bit PowerShells are active on the same MID Server, and it becomes necessary to launch the correct PowerShell for the context. 64-bit Windows employs file system redirection and the MID Server runs as a 32-bit application. If trying to specify a path in %WinDir%\System32, Windows automatically redirects to %WinDir%\SysWOW64. To avoid redirection, specify the path as %WinDir%\Sysnative. For example, instead of C:\WINDOWS\system32\WindowsPowerShell\v1.0\, specify C:\WINDOWS\sysnative\WindowsPowerShell\v1.0\.

Note:
On a 64-bit version of Windows XP, a Microsoft hotfix may be required to enable this.

To discover applications running on a 64-bit Windows machine, the MID Server must be running on a 64-bit Windows host machine.

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- Type: string (path)
- Default value: none

mid.powershell.enforce_utf8

Enable this parameter to force commands on a target Windows system to return UTF-8 encoded output. Disabling it allows the target system to use its default encoding. This parameter is only valid when PowerShell is enabled.

Setting this value to **false** may result in incorrect values in the CMDB when non-ASCII characters are returned by a probe.

- Type: true | false
- Default value: true

mid.powershell.local_mid_service_credential_fallback

Enables automatically falling back to MID Server service credentials if all other credentials fail.

- Type: true | false
- Default value: true

mid.powershell_api.idle_session_timeout

Specifies the timeout value of idle PowerShell sessions in seconds.

Note:
Setting or changing this parameter requires restarting the MID Server.

- Type: integer
- Default value: 60

mid.powershell.command.parameter_passing

Enable this parameter to allow passing PowerShell parameters from the command line.

- Type: true | false
- Default value: false

mid.powershell.command.script.parameter_passing

Enable this parameter to allow passing PowerShell scripts from the command line.

- Type: true | false
- Default value: true

mid.windows.management_protocol

Enables administrators to select the Windows management protocol used for device and process classification. Options include: WMI and WinRM.

- Type: string
- Default value: WMI

mid.windows.probe_timeout

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Sets the timeout interval for all Windows probes on a specific MID Server. This value is overridden by the values configured for individual probes with the wmi_timeout probe parameter.

- Type: integer
- Default value: 300

mid.powershell.jea.append_username

Specifies whether user name of the current user will be appended to the JEA endpoint.

- Type: true | false
- Default value: False

mid.powershell.jea.endpoint

JEA configuration name (endpoint) on remote servers that the MID Server will connect to. Set to JEA_DISCO_BASIC.

- Type: string
- Default value: ""

Add a MID Server parameter

Use a MID Server parameter to control the behavior of a particular MID Server.

Before you begin

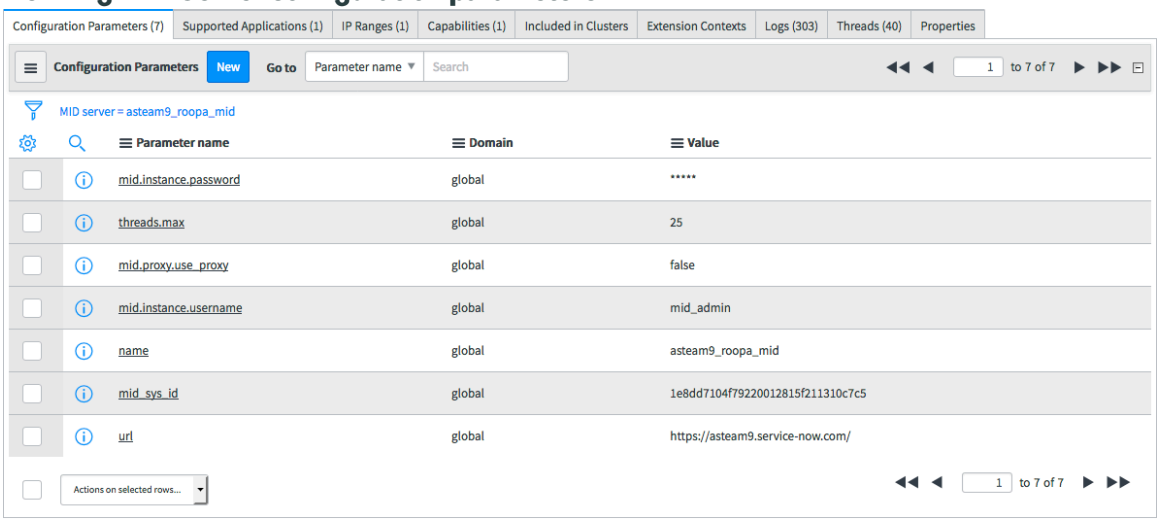
Role required: admin

Procedure

1. Navigate to **All** > **MID Server** > **Servers**.
2. From the list of MID Servers, select a MID Server to configure.
3. Select the **Configuration Parameters** related list.

   This shows all the parameters currently in the MID Server's configuration file. If there are any passwords, they are displayed in asterisks for security reasons. See MID Server parameters for a list of available parameters.

Defining MID Server configuration parameters



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4. To add parameters, click **New**, and then complete the form.
   After the form is submitted, the configuration file for that MID Server is modified to include the new parameter. Changes to existing parameters are reflected in the MID Server configuration file as well. Changes made to the MID Server configuration file do not take place immediately, but rather the next time the MID Server is restarted. The MID Server form has a related link for restarting the MID Server.

   Note:
   ServiceNow prevents you from saving changes, such as modifying or deleting parameters, that would cause the MID Server to lose communications with the instance. For example, you cannot change the url parameter. Any changes to these protected parameters must be made directly in the `config.xml` file for that MID Server.

5. **Optional:** Set parameters in the `config.xml` file.
   MID Server configuration is controlled by an XML file called `config.xml`. This file is located in the `/agent` directory, in the MID Server isntallation directory. You can edit this file directly to make any configuration changes to protected parameters. Many configuration changes, such as those that do not disrupt communication between the MID Server and the ServiceNow instance, may also be made from the instance.

   The structure of the `config.xml` file is simply an outer parameters tag and a series of inner parameter tags. Each parameter tag has name and `value` attributes.

   - To change the value of a parameter, edit the value attribute.
   - To add a parameter, add another parameter tag with its name and value.
   - To delete a parameter, delete the entire parameter tag.

   The order of the parameters within the file is not important. Notice the green comment sections in the sample. Use these elements to add useful comments to the configuration file.

   Note:
   When configuring the MID Server for use with a proxy server, be sure to remove the comment tags around the proxy sections that you configure.

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MID Server config.xml file

```
- <parameters>
    <!-- MID Server Configuration -->
    <parameter name="url" value="https://example.service-now.com"/>
    <parameter name="refresh_rate" value="65"/>
    <parameter name="name" value="Super Duper MID Server #1"/>
    <parameter name="mid_sys_id" value=""/>
    <!-- MID Server Threads -->
    <parameter name="threads.max" value="25"/>
    <!-- MID Server proxy configuration -->
    <parameter name="mid.proxy.host" value=""/>
    <parameter name="mid.proxy.port" value=""/>
    <parameter name="mid.proxy.username" value=""/>
    <parameter name="mid.proxy.password" value=""/>
  - <!--

            MID Server to instance configuration options

              mid.instance.use_proxy
                  - when talking to instance, should we use the proxy config?

              mid.instance.username
              mid.instance.password
                  - supply username and password if instance has basic authentication enabled

    -->
    <parameter name="mid.instance.use_proxy" value="true"/>
    <parameter name="mid.instance.username" value=""/>
    <parameter name="mid.instance.password" value=""/>
  - <!--

            MID Server upgrade options

              mid.upgrade.use_proxy
                 - when talking to upgrade server, should we use the proxy config?

              mid.upgrade.branch
                 - define a branch our MID Server is pinned to

    -->
    <parameter name="mid.upgrade.use_proxy" value="true"/>
    <parameter name="mid.upgrade.branch" value=""/>
</parameters>
```

Note:
The sample file here is from a Firefox browser. Conventional text editors, such as Notepad, WordPad, or TextEdit, do not display colors and variable fonts.

MID Server Configuration Parameter settings and priority

The MID Server's settings reside in multiple tables and the MID Server prioritizes them in a set order. MIDConfigParameter must be defined with the correct type-style builders.

MID Server settings priority

MID Server settings can reside in both the Configuration Parameter table and Properties tables. MID Servers prioritize the settings in the following order:

1. MID Configuration Parameter
2. MID Property (specific MID)
3. MID Property (global)

Invalid Record Prevention

Avoid creating duplicate records in the MID Property table because they can invalid records. Duplicate properties have the same name and are assigned to the same MID Server.

Similarly, avoid creating global configuration parameters because they are unsupported. Global configuration parameters are configuration parameters with no assigned MID Server. If a setting should be applied to all MID Servers, then use a global MID Property.

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MID Server File Cleaner

A monitor thread runs in the MID Server to clean up old files, to keep the size and quantity of files within the install folder manageable, and to prevent performance issues with the MID Servers.

Files and empty folders within the following folders may be deleted by this MID File Cleaner. Files last accessed more than 30 days ago are deleted.

It runs on startup, and then every 24 hours after that. You can force the File Cleaner to run by restarting the MID Server service.

Folders/files cleaned:

- \agent\import
- \agent\export - Used by the Export Set feature.
- \agent\work\monitors\ECCSender\output_error - Used since San Diego for ECC input payloads that cannot be inserted for any reason (see PRB1521761/KB0995569).
- \agent\work\monitors\ECCSender\output_oversize - Used since Eureka/Fuji for saving copies of payloads that are not sent to the instance because they are larger than the limit set by mid.eccq.max_payload_size, which defaults to 20000000 bytes (see PRB598334)
- \agent\logs - Specifically JFR Dumps (Utah release)

Logging

The MID Server agent log shows this monitor starting and shutting down with the MID Server.

```
2022-10-21T13:08:58.330+0200 INFO (MIDServer) [Main:265]
 Initializing MID Server
2022-10-21T13:10:36.527+0200 INFO (StartupSequencer)
 [Monitors:307] Enabling monitor: FileCleanerMonitor
...
2022-10-24T09:29:35.193+0200 INFO (MIDServer)
 [MIDServerState:160] MID Server stopping
2022-10-24T09:29:38.591+0200 INFO (MIDServer) [Instance:928]
 interrupting thread FileCleanerMonitor.21600
```

To see exactly when it runs, enable debug with parameter mid.log.level=debug

```
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\import
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\export
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\work\monitors\ECCSender\output_error
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\work\monitors\ECCSender\output_oversize
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\logs
```

There is no logging for individual file/folder deletes.

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Disabling the MID File Cleaner

Export Sets write files to the MID Server agent\export folders. The idea is then that a custom implementation on the customer side takes those files and moves them elsewhere, so that these files only need to remain in the MID Server application's install directory for a short time.

The MID File Cleaner can be disabled completely for all folders, by adding the MID Server Configuration Parameter **mid.file_cleaner.disabled=true**. When the parameter is not present, which is the out-of-box state, it defaults to false, and the file cleaner runs.

On the MID Server form, click New on the "Configuration Parameters" related list, select mid.file_cleaner.disabled, and enter the value "true".

This can also be manually added to the config.xml file: `<parameter name="mid.file_cleaner.disabled" value="true"/>`. See MID Server parameters for more information.

MID Server protected records and reserved characters

Some MID Server records cannot be altered. Certain special characters are pre-defined in XML and cannot be used in passwords.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

MID Server Records that cannot be altered

These records cannot be modified or deleted.

Table	Record
Public Page [sys_public]	InstanceInfo
Scripted Web Service [sys_web_service]	• InstanceInfo • GetMIDInfo • MIDAssignedPackages • MIDFieldForFileProvider • MIDFileSyncSnapshot

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Table	Record
	• MIDServerCheck • MIDServerFileProvider

Using special characters in an XML file

The XML specification defines five predefined entities that represent special characters, and requires that all XML processors honor them. If these characters are used in a password, you will experience unexpected results.

The following characters represent the five pre-defined entities:

- "
- &
- '
- <
- >

If you use the pre-defined entity characters in an XML file, such as the MID Server configuration file, you need to encode them. To encode pre-defined entities into an XML document:

- replace **"** with **"**
- replace **&** with **&**
- replace **'** with **'**
- replace **<** with **<**
- replace **>** with **>**

For example, to specify the password as `test&` in the MID Server config.xml file:

```
<parameter encrypt="true" name="mid.instance.password"
 value="test&amp;"/>
```

MID Server privileged commands

To discover certain information on a host server, the MID Server must run SSH commands with higher privileges. The platform provides default privileged commands for the MID Server to use and the ability to add additional commands to the system.

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1. Ensure that the MID Server can connect to elements inside and outside your network
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4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

An example of information that requires elevated privileges is information about storage disks on a host server, retrieved with the *`fdisk -l`* command. If your system cannot use sudo commands, you must configure the hosts in your network to use one of the other privileged commands. You can configure different privileged commands for different hosts. However, Discovery supports only one privileged command per host.

Important:
You can edit supported privileged commands, but do not delete them.

For a list of possible SSH commands requiring root privileges, see SSH credentials.

SSH privileged escalation command requirements

Command	Description
sudo	• Host must support the *`sudo -S -p <password>`* command and return the correct list of allowed SSH commands. • Credentials provided for Discovery must be able to run the command *`sudo -S -p <password> <commands>`*.
pbrun	• Host must support the *`pbrun -v`* command and return the correct version of PowerBroker. • Credentials provided for Discovery must be able to run *`pbrun <commands>`*. • Discovery does not support any other **pbrun -** options, such as a password prompt. • The instance must be able to reach the target host via SSH.
pfexec	• Host must support the *`pfexec id -a`* command and return the correct ID. • Credentials provided for Discovery must be able to run *`pfexec <commands>`*. • Discovery does not support any other **pfexec -** options, such as a password prompt.

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SSH privileged escalation command requirements (continued)

Command	Description
dzdo	• Host must support the *command -v dzdo* command and return the path to dzdo in standard output. • Credentials provided for Discovery must be able to run dzdo <commands>. • Discovery does not support any other *dzdo* – options, but Discovery supports password authentication for dzdo.

Long-running commands with sudo

Configure J2SSH and ServiceNow SSH to prevent long running commands using sudo from failing when the MID Server disconnects.

ServiceNow SSH allows probes to run sudo against individual commands or an entire, long-running script. This is also supported for the *pbrun* and *pfexec* privileged commands.

Sudo for individual commands

You can run sudo against individual commands within a probe, but only if all the following sudoer configurations are performed on the target:

- The `!requiretty` option is required.
- Allow individual commands to be run by the user in the provided credential with `NOPASSWD` configured.
- The target specifies an individual sudo call in the command or referenced scripts. For example, set sudo as `"sudo fdisk -I"` or `"${sudo:fdisk -I}"` rather than `"must_sudo"` for the entire script.

Note:
Running sudo against individual commands with ServiceNow SSH produces detailed and useful entries in the sudo logs on the target computer.

Running sudo on an entire script

If any of the required sudoer configuration requirements for individual commands is not in place, Discovery applies sudo to the initial and complete probes, and does not execute sudo remotely inside the command. This condition can be forced by setting **must_sudo** on the probe and eliminating any sudo commands within the probe.

This approach prevents long running commands from failing when the probe disconnects, but cannot specify individual commands in the sudoers configuration.

Logging

The logs from ServiceNow SSH sudo activity run against an entire script show cryptic entries, such as `/tmp/.run.aef13123fe124123`, which prevent administrators from controlling permissible commands and knowing the exact command that was run. Sudo run against individual commands produces more detailed log entries, such as `/sbin/fdisk -l`.

Add a new privileged command for use by the MID Server

Add a new privileged command to the Privileged Command [privileged_command] table that is available to your MID Servers.

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Before you begin
Role required: admin

About this task
Important:
Do not delete any of the supported commands.

Procedure
1. Navigate to **All** > **MID Server** > **Privileged Command** and click **New**.
2. Complete these fields:
   - **Command**: The name of the privileged command.
   - **Password Prompt**: The password prompt displayed to the user for this privileged command, or a regular expression that matches this password prompt. If this field is empty, no password is required for this privileged command, and no prompt is displayed. SUDO commands do not require a password prompt.
3. Click **Submit**.

Configure the MID Server to use specific privileged commands

You can configure the MID Server to use specific commands in a defined order.

Before you begin
Role required: admin

Procedure
1. Navigate to the list of MID Servers using one of the following paths:
   - **MID Server** > **Servers**
   - **Discovery** > **MID Servers**
   - **Orchestration** > **MID Servers**
2. Select the MID Server you want to configure.
3. Click the menu icon in the header bar and select **View** > **Advanced** from the context menu.

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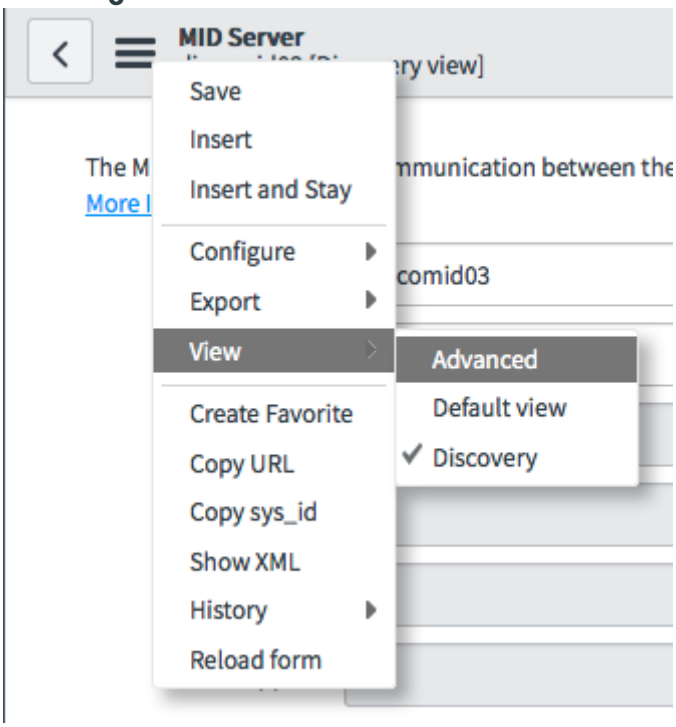
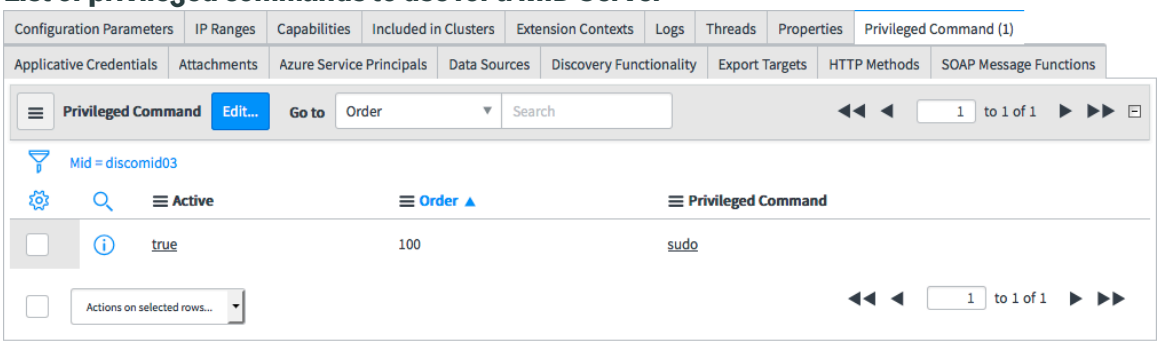
Selecting the Advanced view



4. In the **Privileged Command** related list, click **Edit**.
5. Select the command you want this MID Server to use and click **Save**.
   The default order of privileged commands is 100, but you can change the order as necessary. The privileged command with the smallest order number is tried first.

List of privileged commands to use for a MID Server



Create a pbrun profile privileged command

You can create a special configuration for the *pbrun* privileged command that allows it to run as a profile.

Before you begin

Role required: discovery_admin, admin

About this task

Of all the privileged commands, only the *pbrun* command can be configured to run as a profile, and only one of these special *pbrun* configurations can function on a MID Server.

Important:
Edit the existing *pbrun* record for this purpose. The system ignores any additional commands you create for *pbrun*.

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Procedure

1. Navigate to **All** > **MID Server** > **Privileged Command**.
2. Select **pbrun** from the list.
3. In the Privileged Command record, edit the value in the **Command** field to use the format *pbrun -u <profile>*.
   For example, you can set *pbrun -u admin* as a command to run with an admin profile.
4. Click **Update**.

What to do next

Return to Configuring MID Servers.

MIDSystem methods

MIDSystem variables (referred to by the variable name ms.) provide a variety of methods to get information about the MID Server.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Method summary	Description
log(String message)	Logs the given message with a standard prefix to indicate that the message was generated by JavaScript.
getConfigParameter(String parameter name)	Returns the value of the named configuration parameter.
include(String script include)	Include the MID Server script include with the given name into the current context.
getName()	Returns the name of the MID Server.
getSysID()	Returns the sys_id of the MID Server.
toJavaScript(Object)	Converts the given Java object into the equivalent JavaScript object.

This example writes a message to the log:

```
ms.log('Attempting to log in with user: ' +
this.getParameter('user'));
```

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Manually start, stop, and restart a MID Server

If you did not start the MID Server at the end of the installation procedure, you can manually start the MID Server.

Before you begin

Role required: MID Server Service account user or a Windows Admin account

This procedure is only for users who install the MID Server using the ZIP file. The Windows MID Server installer completes the installation automatically.

Procedure

1. Open the agent directory in the directory you created for the MID Server installation files. For example, the path might be C : `\ServiceNow\MID Server1\agent`.
2. Start the MID Server by executing the `start.bat` file.
3. To stop the MID Server, execute the `stop.bat` file.
4. To restart a stopped MID Server, either:
   - If the MID Server is stopped, execute the `start.bat` file.
   - If the MID Server is running, execute the `restart.bat` file.

MID Server heartbeat

The instance checks the MID Server for a response every 5 minutes, using a synthetic transaction monitoring system.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
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7. Configure your MID Server
8. Configure MID Server security

Checking for a heartbeat

ServiceNow instances send a synthetic transaction via the Heartbeat probe to every MID Server every 5 minutes. The Heartbeat probe functions exactly as a normal probe does and is sent by writing an output record to the ECC queue. A MID Server retrieves the record when it queries the ECC queue for work. The MID Server processes the probe just as it would any other probe and responds back to the instance. If the instance does not detect a response from a MID Server, the instance marks that MID Server as **Down**. If the MID Server responds, the instance considers the MID Server to be functioning and communicating properly with the instance.

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Note:
Make sure that your MID Server can communicate on **port 443**. See Configure MID Server network connectivity and MID Server system requirements for more information.

System events

When a MID Server transitions from one state to another, one of these events is triggered:

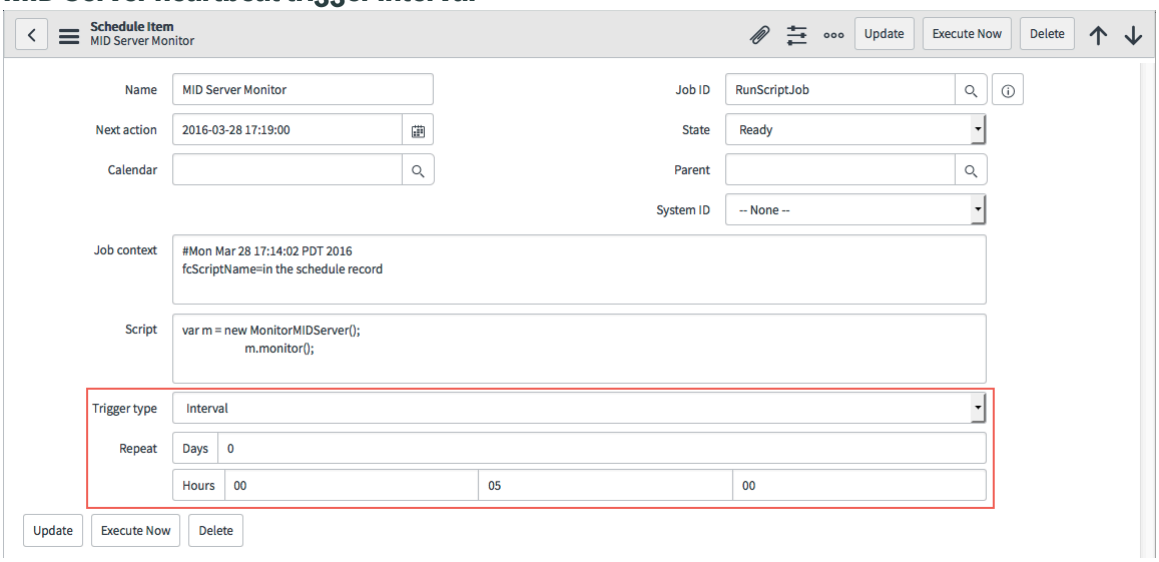
- *mid_server.up*: The MID Server goes from a status of **Down**, **Paused**, or **Upgrading** to a status of *Up*.
- *mid_server.down*: The MID Server goes from a status of *Up* to a status of *Down*.
- *mid_server.paused*: The MID Server is paused.
- *mid_server.upgrading*: The MID Server is being automatically upgraded because the instance is being upgraded.

You can use these events to send notifications or trigger actions that you specify in scripts.

Scheduled job

To change the trigger interval for the Heartbeat probe, navigate to **System Scheduler** > **Scheduled Jobs** > **Scheduled Jobs**. Open the **MID Server Monitor** record and edit the interval.

MID Server heartbeat trigger interval



Set the MID Server JVM memory size

The MID Server starts with a default JVM memory allocation, but you can modify this setting in the configuration file.

Before you begin
Role required: admin

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1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

In the base ServiceNow system, the MID Server JVM memory is set to 1024 MB, which is configured in the `\agent\conf\wrapper-override.conf` file in the MID Server installation directory. This setting might not be appropriate for the way your organization uses the MID Server. If you want the MID Server to work harder, allocate more resources to it. If the MID Server is located in a small branch office and runs in an environment where memory allocation is shared between a print server, mail server, or web proxy server, the allocation might have to be reduced.

Note:
For a complete list of minimum MID Server requirements, see MID Server system requirements.

Procedure

1. Open the `\ServiceNow\<MID Server name>\agent\conf\wrapper-override.conf` file in a text editor.
   For more information about this file, see Installing Multiple MID Servers on a Single System.
2. Locate the following lines in the file:

```
# OPTIONAL: Maximum Java Heap Size (in MB)
wrapper.java.maxmemory=1024
```

3. Edit the memory allocation.
4. Remove the comment tag (#) from the memory allocation parameter.
5. Save the file.
6. Restart the MID Server service.

Pause the MID Server

Pause the MID Server to temporarily prevent it from polling the ECC Queue for work or sending Discovery results back to the instance.

Before you begin

Role required: agent_admin

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1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

You can only pause validated MID Servers. You might want to pause the MID Server when your network infrastructure is undergoing changes. This prevents applications like Discovery from throwing errors during a particular maintenance window.

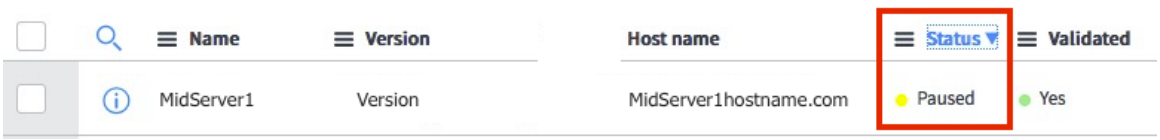
A paused MID Server continues processing commands that it had already retrieved before it was paused. When you resume the MID Server, the MID Server starts retrieving new commands to process.

Note:
Discovery continues to assign jobs to MID Servers that are **Paused**. MID Servers that are **Down** are not assigned jobs.

Procedure

1. Open the MID Server record.
2. Select a running MID Server that has been validated.
3. On the MID Server form, select **Pause MID** under **Related Links**.
   The state of the MID Server changes to **Paused**.

A paused MID Server



4. To resume MID Server processing, select **Resume MID** under **Related Links**.

MID Server pause

The MID server can be put into a **Paused** state to temporarily prevent it from polling the ECC Queue for work or sending Discovery results back to the instance.

Unlike stopping the MID Server from the Windows or Linux server command line on the MID Server machine, pausing the MID server is something that you can do from the instance. The MID Server pause feature is available starting with the Istanbul release.

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Note:
You can only pause validated MID Servers.

You can still perform these actions when the MID Server is paused:

- Access the MID Server logs and delete log entries.
- View MID server statistics. While the MID Server is in the **Paused** state it stops generating statistics. But you can still view the statistics generated before you paused the MID Server.
- Retrieve the MID Server thread dump.
- Make and save configuration changes and property changes to the server. The changes take effect after the MID Server is resumed.
- Clear the ECC queue.

The MID server heartbeat continues to function while the MID Server is in the **Paused** state. If the MID Server is upgraded while it is in the **Paused** state, the MID Server state automatically changes to **Up** after successful upgrade. It does not return to the **Paused** state.

During MID Server selection, paused MID Servers can still be selected but are prioritized below MID Servers that are not paused.

Events that occur during MID Server pause

The **vCenter** and **SNMP** event collectors, continue to run and process events when you pause the MID Server. These events are not part of the normal synchronous communication that the MID Server has with the instance that you see in the ECC queue. Events are still relayed to the instance and can even trigger actions on records in the instance, such as a CI update. For example, if vCenter detects that a virtual machine goes down or is deleted, a vCenter event makes a change to the status of the corresponding CI record for that virtual machine.

To prevent these events from being processed, stop the extensions from running. For more information, see:

- Configure and run the vCenter event collector extension
- Configure the SNMP Trap Collector Extension

Remote tables

Connect the ServiceNow AI Platform to third-party sources, or to another instance, so that you can retrieve external data and optionally cache it in memory. You can view external data in lists or forms and process it with standard Glide scripts. You can also group, sort, aggregate, and filter the data just like you would for standard internal tables.

Remote table components

Use the following components to build an external data framework:

Remote tables

You create remote tables to describe the schema for the data that you want to retrieve from an external source.

The table definition is in the ServiceNow AI Platform, but its rows, or external records, live in memory. You create a remote table the same way that you would create a standard internal table. You define columns and controls and designate application access for it just like you would do for an internal table. Unlike an internal table, a remote table does not get its records from the ServiceNow AI Platform

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database. It gets its records from running an associated script against an external data source.

To learn more about creating remote tables, see Create a remote table.

Script definitions

You create and associate a script definition with a remote table. The external data that you've retrieved using the script can be cached in memory. You can also designate how this data is cached and how long the data is cached in memory. Every time that you refresh a list that contains the external data from a remote table, the associated script runs again.

To learn more about script definitions and how to associate them with a remote table, see Create a script definition for a remote table.

How remote tables work

By using a remote table, you can retrieve the data from external sources or from another instance with REST or SOAP services. The external data lives in memory in read-only mode, which makes the data temporary, or transient, within the ServiceNow AI Platform. You can then view and manipulate the external data without importing or storing it.

You view the external data in lists or forms in the same way that you view internally stored data. You can manipulate this data by using standard Glide records, business rules, remote APIs, scripting, table reference fields, services, and development tools in the ServiceNow AI Platform.

Important:
If the data size that is retrieved from the external source is small, use the 1000 rows default limit in a remote table to minimize query times. If the retrieved data size is large and could be less performative, in the script definition, you can select the advanced **Enhanced Capacity** field to support a large number of rows.

External data life cycle within the ServiceNow AI Platform

The data that you retrieve from an external source has a finite duration, or life cycle, within the ServiceNow AI Platform.

- When you run a script that is associated with a remote table, the retrieved data lives in memory for as long as the list or form appears. After you close the list or form, that external data is purged from memory. The next time that you use or view the external data in this remote table, memory is repopulated from the external system.
- However, if you have defined caching parameters for the script, the external data remains cached in memory for the specified caching duration.

  For example, if you designate that the external data should be cached for 300 seconds, it remains cached in memory for 5 minutes. After that time expires, the cached data is purged from memory. The next time that you use or view the external data in this remote table, the cache is refreshed from the external system.

Practical applications for remote tables

Set up and use remote tables in your enterprise when:

- You want to fetch external data for temporary use without storing it in the ServiceNow AI Platform. For example, you can create a remote table that fetches weather-related data that appears on a homepage when a user logs in. You would then create an associated script definition that retrieves this data from a third-party weather source that is based on the user's location.

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- You want to retrieve customer details that are stored in an external Customer Relationship Management (CRM) application for viewing in Customer Service Management functions such as Agent Workspace.

  Note:
  To learn more about data retrieval for Customer Service Management, see Third-party data integration for CSM.

- You want to retrieve and view personnel data from Human Capital Management (HCM) applications such as Workday or SAP SuccessFactors for use in HR Service Delivery functions.

Post-filtering and sorting

When you run a remote table script, it applies post-filtering and sorting query conditions after it adds rows to a table. These applied conditions support any other required queries that the script does not handle. When you apply post-filtering and sorting, the remote table queries work like standard internal table queries.

When you create remote table scripts, you generally handle the most frequent and expansive queries in the script. Post-filtering queries and sorting can take a long time and may adversely affect how your instance performs. Use a small data set instead so that it doesn't take much time to do post-filtering and sorting.

Based on your use cases, determine if you should try a narrower query in the external call or a more expansive query. Because the internal filtering and sorting can be expensive to run on large result sets, use a narrower query when the data doesn't require extra filtering. Use a more expansive query when a more general query would return a small result set and would require extra filtering and sorting.

Differences between remote tables and the Integration Hub

Choose whether to use a remote table or Integration Hub to process external data.

- When you want to temporarily cache external data, use remote tables.
- If you want more advanced importing and transformation options, including Flow Designer, or if you want to develop custom integrations, use the Integration Hub.

Note:
If you create a remote table that uses the data from an external source that is outside of the ServiceNow AI Platform, you must have an Integration Hub subscription entitlement. To learn more about the Integration Hub, see Integration Hub.

Activate the remote tables plugin

If you have the admin role, you can activate the Remote Tables plugin (com.glide.script.vtable). This plugin includes demo data and activates related plugins if they are not already active.

Before you begin
Role required: admin

About this task
Remote Tables activates these related plugins if they are not already active.

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Plugins for Remote Tables

Plugin	Description
Remote Tables [com.glide.script.vtable]	Supports remote tables and associated script definitions that can be used to retrieve and optionally cache data from external sources.
Transformation Service [com.glide.transform]	Supports use of Transform APIs that are associated with the remote tables.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins (Washington DC)

Create a remote table

Create a remote table so that you can see the data that you retrieved from an external source.

Before you begin

Role required: admin

About this task

When you designate a table as a remote table, keep the following points in mind:

- You can create a remote table using this form, or by using the standard Create Tables form that you access from **System Definition** > **Tables**.

  Note:
  To learn more about creating tables in an instance, see Create a table.

- Before you create a remote table, you must have a good understanding of external data sources.

  For example, if you want to retrieve CRM data for use in Customer Service Management, you must understand how the data is structured in the external CRM source.

- Unlike standard internal tables, you can't extend a remote table from another table.

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- A remote table needs an external primary key to relate its temporary data to the data that is stored in the external source. When you designate a table as remote, only a sys_id field is auto-generated and appears in the Columns section, which it uses as its primary key for use in Glide records. All external table primary key values are converted to string values. CRUD (Create, Read, Update, Delete) fields are not generated for a remote table, as they are for standard internal tables.

Procedure

1. Navigate to **System Definition** > **Remote Tables** > **Tables**.
2. Click **New**.
3. On the form, fill in the fields.

Note:
You create a remote table in the same manner as a normal table, but designate it as a remote table. The following controls differ in how they operate and what you enter into them when you create a remote table:

Control	Description
Name	Table name, which is automatically populated based on the table label and a prefix as follows: ○ For a remote table in a scoped application, the name is prefixed with a namespace identifier and the string `st_` to indicate that it is remote and part of an application. ○ For a remote table in the global application, the name is prefixed with the string `u_st_`. You can't modify the prefix; however, you can modify the rest of the table name. The name can contain only lowercase, alphanumeric ASCII characters and underscores (_).
Extends Table	Option that is not available if you select the **Remote Table** option to designate that this table is remote. It no longer appears because you can't extend remote tables from other tables.
Remote Table	Option to designate this table as a remote table. A remote table is a table to which you can associate a script definition for retrieval of data from an external data source. Unlike a standard internal table, the data does not come from records in the current instance. To learn more about remote tables, see Remote tables.

4. In the Columns section, use the **Table Columns** embedded list to add columns to the remote table like you do when you create columns for a standard internal table.
5. In the Controls section, define additional remote table options like you do when you define additional table options for a normal table.
6. In the Application Access section, define the scope protection for the remote table like you do when you define additional table options for a normal table.
   For more information, see Application access settings.
7. Click **Submit**.

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Result
A remote table is created in the instance.

Create a script definition for a remote table

Define and associate a script with a remote table so that you can retrieve data from an external source with it. The ServiceNow AI Platform retrieves and caches the data for the remote table by running the script against an external data source so you can view or modify it. You can also designate how this external data is cached and how long the data is cached in memory until the script must run again.

Before you begin
Role required: admin

About this task
You create script definitions for remote tables like you do for other scripts. To learn more about entering, modifying, and debugging scripts, see JavaScript syntax editor.

Procedure
1. Navigate to **All** > **System Definition** > **Remote Tables** > **Definition**.
2. Click **New**.
3. On the form, fill in the fields.

Control	Description
Name	Name of the script that you are creating to associate with the selected remote table.
Table	Name of the remote table that you want to associate the script that you are creating. ○ For a remote table in a scoped application, the name is prefixed with a namespace identifier and the string `st_` to indicate that it is remote and part of an application. ○ For a remote table in the global application, the name is prefixed with the string `u_st_`.
Application	Application that is associated with this remote table. If you are working on an application or are creating a remote table from an application record, the field defaults to that application. Otherwise, the field defaults to **Global**. Any records that are created from the table record, such as modules and security rules, are assigned to this application by default.
Active	Option for activating the script that you are associating with the remote table. You can have multiple inactive script definitions for a remote table, but can only have one active script definition.
Advanced	Option to access the Caching section to designate how the memory caching should operate in the ServiceNow AI Platform for this remote table. **Note:** Only advanced users should set caching parameters for a remote table.

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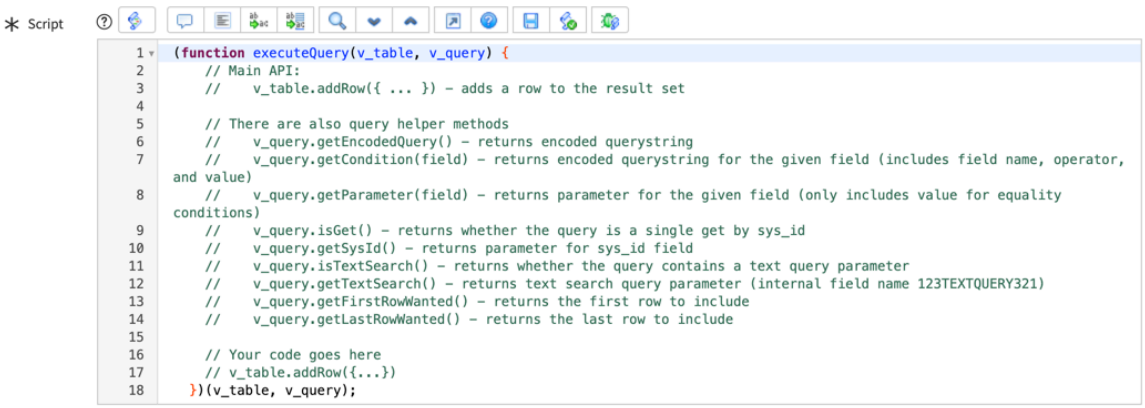
4. In the Script section, add your JavaScript syntax to the skeleton template:

> **Note:**
> The Script section shows up only when the Flow field is empty.



> **Note:**
> To learn more about entering, modifying, and debugging scripts, see JavaScript syntax editor.

5. In the Caching section, designate how this data is cached and how long the data is cached in the memory of the ServiceNow AI Platform:

Field	Description
Cache TTL	Cache time to live, expressed in seconds, that external data is cached in memory for this remote table script definition. For example, enter 300 to cache the data in the memory for 5 minutes. The maximum value you can enter is 60 minutes (3600 seconds).
Enhanced Capacity	Option to select the enhanced capacity to support more than 1000 rows in a remote table. **Note:** If the data size that is retrieved from the external source is small, use the 1000 rows default limit in a remote table to minimize query times. You can select the **Enhanced Capacity** field if the retrieved data size is large and can be less performative.

> **Note:**
> By default, the external data is cached in the memory by user.

6. Click **Submit**.

Result
When you activate a script definition, you associate it with the remote table so that you can retrieve and cache the external data.

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Related topics

v_query – Scoped, Global

v_table – Scoped, Global

Example 1: Retrieving all incident records from an external source

These are examples of script definitions you might create for retrieval and caching of data from sources external to your current instance. In this first example, we create a script to load all incident records from an external source.

For Remote Table API information, refer to:

- v_table()
- v_query()

```
/**
 * Using `v_query`, add the rows to `v_table`
 */
(function executeQuery(v_table, v_query) {
 fetchAllIncidents(v_table, v_query);
 /**
  * fetch all incidents records from the remote instance
  */
 function fetchAllIncidents(v_table, v_query) {
  // Uses RestMessage with name 'Remote Instance Incidents' and
 function 'All Incidents'
  // Create a RestMessage first which calls an external REST
 service
  try {
   var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'All Incidents');
   var response = restMessage.execute();
   var responseBody = response.getBody();

   // if REST call ends up in an error, set the last error
 message which shows up
   // at the bottom of the list view
   if (response.haveError()) {
    v_query.setLastErrorMessage(response.getErrorMessage());
    // can use gs.error() or gs.addErrorMessage() while
 debugging
    // gs.debug() messages visible in session debugger
    // gs.debug(response.getErrorMessage());
    return;
   }
  } catch (ex) {
   v_query.setLastErrorMessage(ex.message);
   // gs.debug(ex.message);
   return;
  }
  var transformerDefinition = getTransformerDefinition();
  var transformer = new
 sn_tfrm.Transformer(transformerDefinition, responseBody);
  // transformer parses the responseBody and extracts rows
  while (transformer.transform()) {
```

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```
    // row is field-value map e.g. { active:"true", number:
 "INC0000001"}
    var row = transformer.getRow();
    // you may do any additional transformations to the row like
 GlideDuration, GlideDataTime etc. For example,
    // row.duration = new GlideDuration(row.duration);
    // finally add the row to the remote table
    v_table.addRow(row);
   }
 }
 /**
  * returns a sn_tfrm.TransformerDefinition, which defines the
 mapping of the table fields and elements in the response body
  */
 function getTransformerDefinition() {
  // create a rule list to map a field to its element path
  var ruleList = new sn_tfrm.TransformerRuleList()
    .fromJSON() // the response body is a JSON
    // 'active' field maps to path '$.active'
    .addRule("active", "$.active")
    .addRule("caller_id", "$.caller_id.value")
    .addRule("number", "$.number")
    .addRule("short_description", "$.short_description")
    .addRule("sys_id", "$.sys_id")
    .addRule("updates", "$.sys_mod_count");
  var recordPath = "$.result";
  return new sn_tfrm.TransformerDefinition(ruleList,
 recordPath);
 }

})(v_table, v_query);
```

These code snippets are of note in this script:

```
function fetchAllIncidents(v_table, v_query) {
  // Uses RestMessage with name 'Remote Instance Incidents' and
 function 'All Incidents'
  // Create a RestMessage first which calls an external REST
 service
  try {
    var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'All Incidents');
    var response = restMessage.execute();
    var responseBody = response.getBody();

    // if REST call ends up in an error, set the last error
 message which shows up
    // at the bottom of the list view
    if (response.haveError()) {
     v_query.setLastErrorMessage(response.getErrorMessage());
     // can use gs.error() or gs.addErrorMessage() while
 debugging
     // gs.debug() messages visible in session debugger
     // gs.debug(response.getErrorMessage());
     return;
    }
  } catch (ex) {
```

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```
    v_query.setLastErrorMessage(ex.message);
    // gs.debug(ex.message);
    return;
   }
```

You can create a RestMessage and directly use it in the script. In this example, it uses a RESTMessageV2 API with the name of `Remote Instance Incidents`, and the function `All Incidents`, which gets all incident data. Once a response is returned from the server, an error message appears if problems are encountered in the data retrieval.

Note:
To learn more about use of RESTMessageV2 and how to define a direct message, see RESTMessageV2 - Scoped, Global and Direct RESTMessageV2 example.

If no problems are encountered in the data retrieval, it gets the data body for the records.

```
  var transformerDefinition = getTransformerDefinition();
  var transformer = new
sn_tfrm.Transformer(transformerDefinition, responseBody);
  // transformer parses the responseBody and extracts rows
  while (transformer.transform()) {
   // row is field-value map e.g. { active:"true", number:
"INC0000001"}
   var row = transformer.getRow();
   // you may do any additional transformations to the row like
GlideDuration, GlideDataTime etc. For example,
   // row.duration = new GlideDuration(row.duration);
   // finally add the row to the remote table
   v_table.addRow(row);
```

It then uses the Transformer API to perform any required data transformations, extracts rows, and then adds a row for each record to the remote table.

```
/**
  * returns a sn_tfrm.TransformerDefinition, which defines the
 mapping of the table fields and elements in the response body
  */
 function getTransformerDefinition() {
  // create a rule list to map a field to its element path
  var ruleList = new sn_tfrm.TransformerRuleList()
   .fromJSON() // the response body is a JSON
   // 'active' field maps to path '$.active'
   .addRule("active", "$.active")
   .addRule("caller_id", "$.caller_id.value")
   .addRule("number", "$.number")
   .addRule("short_description", "$.short_description")
   .addRule("sys_id", "$.sys_id")
   .addRule("updates", "$.sys_mod_count");
  var recordPath = "$.result";
  return new sn_tfrm.TransformerDefinition(ruleList,
 recordPath);
 }

})(v_table, v_query);
```

`getTransformerDefinition` defines the schema of the record in the external API response body. It maps each of the fields in the table script to an element in the external record. Any external data elements outside of this mapping are not supported or retrieved.

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Note:
You must map a sys_id in the transformer definition to an element in the external data. In this case, the sys_id is mapped to the external incident sys_id. The maximum length of the sys_id is 32 characters. You do this sys_id mapping so forms that use the external data can operate properly.

Related topics

Debugging remote table script definitions

TransformerDefinition API - Scoped, Global

TransformerRuleList API - Scoped, Global

TransformerScripted API - Scoped, Global

Example 2: Retrieving specific records from a third-party source

In this example, we create a script to retrieve specific types of incident records from a third-party source.

For Remote Table API information, refer to:

- v_table()
- v_query()

```
/**
 * Using `v_query`, add the rows to `v_table`
 */
(function executeQuery(v_table, v_query) {
 if (v_query.isGet()) {
  bySysId(v_table, v_query, v_query.getSysId());
 }
 else if (v_query.getParameter("caller_id")) {
  byCallerId(v_table, v_query,
 v_query.getParameter("caller_id"));
 }
 else {
  fetchAllIncidents(v_table, v_query);
 }
 /**
  * fetch all incidents records from the remote instance
  */
 function fetchAllIncidents(v_table, v_query) {
  // Uses RestMessage with name 'Remote Instance Incidents' and
 function 'All Incidents'
  // Create a RestMessage first which calls an external REST
 service
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'All Incidents');
  loadData(v_table, v_query, restMessage);
 }
 /**
  * fetches a specific record from the remote instance with Sys
 Id being `sys_id`
  */
 function bySysId(v_table, v_query, sys_id) {
  // Uses RestMessage with name 'Remote Instance Incidents' and
 function 'By SysId'
```

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```
 var restMessage = new sn_ws.RESTMessageV2('Remote Instance
Incidents', 'By SysId');
 // sets variable 'sys_id'
 restMessage.setStringParameterNoEscape("sys_id", sys_id);
 loadData(v_table, v_query, restMessage);
}
/**
 * fetches records from the remote instance with Caller
(caller_id) being `caller_id`
 */
function byCallerId(v_table, v_query, caller_id) {
 var restMessage = new sn_ws.RESTMessageV2('Remote Instance
Incidents', 'By CallerId');
 restMessage.setStringParameterNoEscape("caller_id",
caller_id);
 loadData(v_table, v_query, restMessage);
}
/**
 * Adds rows to `v_table` using `restMessage`
 */
function loadData(v_table, v_query, restMessage) {
 try {
  var response = restMessage.execute();
  var responseBody = response.getBody();

  // if REST call ends up in an error, set the last error
message which shows up
  // at the bottom of the list view
  if (response.haveError()) {
   v_query.setLastErrorMessage(response.getErrorMessage());
   // can use gs.error() or gs.addErrorMessage() while
debugging
   // gs.debug() messages visible in session debugger
   // gs.debug(response.getErrorMessage());
   return;
  }
 } catch (ex) {
  v_query.setLastErrorMessage(ex.message);
  // gs.debug(ex.message);
  return;
 }
 var transformerDefinition = getTransformerDefinition();
 var transformer = new
sn_tfrm.Transformer(transformerDefinition, responseBody);
 // transformer parses the responseBody and extracts rows
 while (transformer.transform()) {
  // row is field-value map e.g. { active:"true", number:
"INC0000001"}
  var row = transformer.getRow();
  // you may do any additional transformations to the row like
GlideDuration, GlideDataTime etc. For example,
  // row.duration = new GlideDuration(row.duration);
  // finally add the row to the remote table
  v_table.addRow(row);
 }
}
/**
```

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```
  * returns a sn_tfrm.TransformerDefinition, which defines the
 mapping of the table fields and elements in the response body
  */
 function getTransformerDefinition() {
  // create a rule list to map a field to its element path
  var ruleList = new sn_tfrm.TransformerRuleList()
   .fromJSON() // the response body is a JSON
   // 'active' field maps to path '$.active'
   .addRule("active", "$.active")
   .addRule("caller_id", "$.caller_id.value")
   .addRule("number", "$.number")
   .addRule("short_description", "$.short_description")
   .addRule("sys_id", "$.sys_id")
   .addRule("updates", "$.sys_mod_count");
  var recordPath = "$.result";
  return new sn_tfrm.TransformerDefinition(ruleList,
 recordPath);
 }
})(v_table, v_query);
```

These code snippets are of note in this script:

```
function fetchAllIncidents(v_table, v_query) {
  // Uses RestMessage with name 'Remote Instance Incidents' and
 function 'All Incidents'
  // Create a RestMessage first which calls an external REST
 service
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'All Incidents');
  loadData(v_table, v_query, restMessage);
 }
```

You can create a RestMessage and directly use it in the script. In this example, it uses a RESTMessageV2 API with the name of `Remote Instance Incidents`, and the function `All Incidents`, which gets all incident data. Once a response is returned from the server, an error message appears if problems are encountered in the data retrieval.

```
 function bySysId(v_table, v_query, sys_id) {
  // Uses RestMessage with name 'Remote Instance Incidents' and
 function 'By SysId'
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'By SysId');
  // sets variable 'sys_id'
  restMessage.setStringParameterNoEscape("sys_id", sys_id);
  loadData(v_table, v_query, restMessage);
 }
```

When you query a specific record using `GlideRecord.get("<sys_id>")`, then `v_query.isGet()` is `true`. It fetches the specific record from the external service.

```
function byCallerId(v_table, v_query, caller_id) {
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'By CallerId');
  restMessage.setStringParameterNoEscape("caller_id",
 caller_id);
  loadData(v_table, v_query, restMessage);
 }
```

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You can also handle any other specific query conditions in the script, such as using `caller_id` in the preceding code snippet. The remainder of this script operates in a manner similar to Example 1.

```
 function getTransformerDefinition() {
  // create a rule list to map a field to its element path
  var ruleList = new sn_tfrm.TransformerRuleList()
   .fromJSON() // the response body is a JSON
   // 'active' field maps to path '$.active'
   .addRule("active", "$.active")
   .addRule("caller_id", "$.caller_id.value")
   .addRule("number", "$.number")
   .addRule("short_description", "$.short_description")
   .addRule("sys_id", "$.sys_id")
   .addRule("updates", "$.sys_mod_count");
  var recordPath = "$.result";
  return new sn_tfrm.TransformerDefinition(ruleList,
 recordPath);
 }
})(v_table, v_query);
```

If no problems are encountered in the data retrieval, it gets the data body for the records. It then uses the Transformer API to perform any required data transformations, extracts rows, and then adds a row for each record to the remote table.

`getTransformerDefinition` defines the schema of the record in the external API response body. It maps each of the fields in the table script to an element in the external record. Any external data elements outside of this mapping are not available in the remote table.

Create a flow definition for a remote table

Build and create a flow for a remote table so that you can retrieve data from an external source with it.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Remote Tables** > **Definition**.
   A list of all remote tables definitions shows up.
2. Click **New** to create a new flow definition.
3. On the form, fill in the fields.

Control	Description
Name	Name of the script that you are creating to associate with the selected remote table.
Table	Name of the remote table that you want to associate the script that you are creating.

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Control	Description
	○ For a remote table in a scoped application, the name is prefixed with a namespace identifier and the string `st_` to indicate that it is remote and part of an application. ○ For a remote table in the global application, the name is prefixed with the string `u_st_`.
Flow	Option to build and define your own flow by leveraging the existing functions. Configure the mapping of the flow and tie it to thee required remote table. When the remote table is queried, the flow is triggered and the data is retrieved. See Defining the flow for more information. **Note:** The Script section doesn't show up when the **Flow** field has an entry.
Application	Application that is associated with this remote table. If you are working on an application or are creating a remote table from an application record, the field defaults to that application. Otherwise, the field defaults to **Global**. Any records that are created from the table record, such as modules and security rules, are assigned to this application by default.
Active	Option for activating the script that you are associating with the remote table. You can have multiple inactive script definitions for a remote table, but can only have one active script definition.
Advanced	Option to access the Caching section to designate how the memory caching should operate in the ServiceNow AI Platform for this remote table. **Note:** Only advanced users should set caching parameters for a remote table.

4. In the Caching section, designate how this data is cached and how long the data is cached in the memory of the ServiceNow AI Platform:

Field	Description
Cache TTL	Cache time to live, expressed in seconds, that external data is cached in memory for this remote table script definition. For example, enter `300` to cache the data in the memory for 5 minutes. The maximum value you can enter is 60 minutes (3600 seconds).
Enhanced Capacity	Option to select the enhanced capacity to support more than 1000 rows in a remote table. **Note:** If the data size that is retrieved from the external source is small, use the 1000 rows default limit in a remote table to minimize query times. You can select the **Enhanced Capacity** field if the retrieved data size is large and can be less performative.

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Note:
By default, the external data is cached in the memory by user.

5. Click **Submit**.

Define a flow logic

Set the triggers and actions to define a remote table flow logic.

Before you begin
Role required: admin

Procedure

1. Select the **Flow** field on the flow definitions form.
   The Flow properties dialog box shows up.
2. Set the **Trigger** and link the required remote table.
   For the set trigger, the flow pills get created in the right nav.
3. Set the action items in the Create Remote Table Record section.
   a. Set the Action as Create Remote Table Record.
   b. Drag and drop the Query ID pill from the right nav.

      Note:
      The Query ID is the id of the query that triggered the execution of the flow. It is a mandatory step to pass the Query ID to the Create Remote Table Record action to associate the Trigger to the Action.

   c. Select **Done** to save the action.
4. **Optional:** Add conditions to the flow logic if you want to create a different flow path.
   a. Fill up the Condition Label field.
   b. Set the condition by dragging and dropping the Query Parameter pill from the right nav.
   c. Select the add function icon next to the Query Parameter pill to add specifics.
      The Search Transform Functions dialog box shows up.
   d. Go to **Utilities** and select the next function depending on the Query Parameter type.
      For example, if the condition is set to search for a name, you can go to **Utilities** > **Get Item from Name/Values**. Fill up the **Key** details and select **Apply**. The **Key** field needs to specify the parameter you are looking for.

      Note:
      Ensure that the **Key** is the same as the Column name and not the Label name.
5. **Optional:** Add a log to the flow logic.
   a. Select Log as the **Action** and select a **Level**.
   b. Set the Message field by dragging and dropping the Query Parameter pill from the right nav.
   c. Select **Done** to create logs for the set condition.

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Debugging remote table script definitions

You can enable session debugging for remote table script definitions. To enable script definition logging in a session debug log, set the *glide.script.vtable.log.debug* property to **true**.

When you create remote table script definitions, you can use the `gs.debug()` command to add debug logs that are visible in the session debugger. The session debugger also contains debug logs with [RemoteTable] tags, each with the following information:

- Query definition
- Number of rows loaded in the remote table
- Number of aggregate rows `(if GlideAggregate)`

Prolonged use of the *glide.script.vtable.log.debug* property can affect performance, so it is best to set its value to **false** when you finish a debugging session.

Note:
If you are not on the application node that processed your remote table script, you may not see the resulting log statements. In this case, contact Technical Support.

Use the *v_query.setLastErrorMessage(message)* API to set the last error message that appears at the bottom of the list view. In script, you can retrieve this message using the *glideRecord.getLastErrorMessage()* API. To learn more about these APIs, see Text-To-Display.

Related topics

Available system properties

Script Debugger and Session Logging

Domain separation and remote tables

Domain separation is unsupported in remote tables. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

For more information on support levels, see Application support for domain separation.

Overview

Domain separation provides complete data isolation for domain-specific users.

How domain separation works with remote tables

When you create standard internal tables, you can add a sys_domain field, which results in domain separation of the data that is stored in the table. This functionality is not supported when you natively create remote tables, which results in lack of domain separation for rows that are added to a remote table.

However, script definitions that you create and associate with a remote table can be domain (data) separated. When you create the script, you can include DomainSupport APIs that provide

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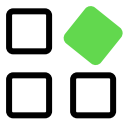
domain separation support. If the script definition is domain separated, only users that belong to the designated domain can view the data in the remote table.

Related topics

- Create a script definition for a remote table
- Domain separation

Manage content capabilities

Handle all the necessary aspects of document and knowledge base management for your enterprise with several ServiceNow products.

Document Services	Knowledge Management	Response templates
		
Create, maintain, and update your documents with this suite of products available for your instance.	Create and share knowledge articles, and provide information for user self-help and troubleshooting.	Leverage reusable text to display standard chat response messages to requesters in Agent Chat.

Document Services

Take care of all your documentation through ServiceNow® Document Services. Get storage space and tracking for large amounts of documents with Document Management. Examine files up to 50 MB without downloading, by using Document Viewer. Access to electronic documents is easily controlled through Managed Documents, with adjustable user parameters. Integrate third-party providers for document handling, including Microsoft OneDrive, Microsoft Azure AD, and more.

Knowledge Management

Keep your users up to date with knowledge bases crafted to fit with your ServiceNow instance. The Knowledge Management plugin enables sharing of articles for task resolution, self-help, troubleshooting, and any other information pertinent to your enterprise. Create and maintain articles, control access for reading, contribution, and feedback, and delegate administrative roles as needed for multiple groups and separate workflows.

Response templates

Resolve cases or support issues faster and more efficiently with response templates, which are reusable snippets of text. Use response templates in Agent Chat sessions to provide quick and consistent messages to your users.

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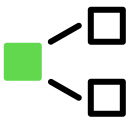
Document Services

Document Services provides a broad range of services related to document management, creation, maintenance, and conversion, and integrating with third parties such as Microsoft SharePoint.

Document Management  Manage large numbers of documents efficiently	Document Viewer  View documents directly in the ServiceNow AI Platform®
Managed Documents  Control documents within your instance	Multi Provider Document Services Framework  Integrate providers with your ServiceNow instance

Document Management

Manage large numbers of documents efficiently. Document Management provides storage space and a tracking system to easily upload, retrieve, and delete documents.

Document Viewer

View documents directly in the ServiceNow AI Platform® rather than having to download them. Document Viewer supports viewing various file types in the platform. The maximum document file size is 50 MB. Enable#Document Viewer and the tables you want to use with it at the instance level.

Managed Documents

Control electronic documents within your instance. Documents can move through the managed document cycle after the parameters have been set by the administrator and the Knowledge Document plugin installed.

Multi Provider Document Services Framework

Integrate providers with your ServiceNow instance to store files, upload, add versions, and download information with document providers.

- Upgrade to Washington DC
- Developer training
- Domain separation and Document Management

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Document generation apps

- PDFGenerationAPI API
- Document API
- DocumentListService API
- DocumentService API

Troubleshoot and get help

- Ask or answer questions in the Platform community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Document Management

The Document Management applications allows management of large numbers of documents efficiently. With the Document Management application, you can create, share, upload, track, and manage documents throughout the life-cycle of the workflow.

Get started

Explore  Explore Document Management	Activate  Activate Document Management	Access  Access Document Management
Use  Use Document Management	Reference  Reference Document Management	

Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

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Exploring Document Management

With the ServiceNow® Document Management application, you can manage large numbers of documents efficiently. Easily upload, retrieve, share and delete documents.

Document Management overview

With the Document Management application, you can create, upload, track and manage documents throughout the lifecycle of the workflow.

Use the document repository to easily upload, retrieve, share, delete and sign documents. Documents can also be linked to other records in the system.

Document Management benefits

Benefit	Feature
Classify documents for organization. Share documents to collaborate with internal and external users.	Document repository
Secure your documents by limiting who can access them. Share documents with selected users and user groups who have Reader, Writer, and Owner permissions.	Document security and access
Maintain versions of documents. Versions can be a file or a URL.	Document versions
Link a document record to other records, which can be any other table or record on the platform.	Document references
Link documents to other records on the platform.	Linking documents to a parent record
Create document lists and add multiple documents to a single list.	Document Management lists
Include documents in activity streams to include and track updates on attached documents to any record.	Document attachments in an activity stream
Send documents for review and approval before publishing.	Document approval and publish process
Digitally sign PDF documents by using your Personal Identity Verification (PIV) or Common Access Card (CAC) card.	Digital signature for PDF documents using CAC or PIV smart cards

Document Management plugin

With the ServiceNow® Document Management plugin (**com.snc.platform_document_management**), you can create documents, manage large numbers of documents efficiently, and track each version. The plugin is independent, with no dependencies on existing plugins and has been built on the existing **sys_attachment** framework.

Overview

There are Document Management roles the system admin can assign to maintain the lifecycle of documents. The system admin installs the plugin and then assigns one or more of these roles to users.

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The system admin installs the Document Management plugin (**com.snc.platform_document_management**).

The application contains four modules:

- Documents
- References
- Lists
- List Entries

Activate Document Management

Activate the Document Management plugin.

Before you begin

Role required: admin

About this task

The following items are installed with Document Management:

- Roles
- Tables

For more information, seeComponents installed with Document Management.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Document Management plugin (com.snc.platform_document_management) using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Document security and access

Document access permissions for users and groups provide you with security for your documents.

Owner access to documents

By default, the document owner has all privileges to the document and can do the following:

- Update the document parameters
- Upload document versions
- Create document references

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- Share a document with other users
- Delete a document

Note:

If the document owner changes, the new owner obtains all rights to the document and the previous owner loses access. If the previous owner wants to keep access to the document, the document should be shared instead of transferring owner access.

Document access settings

You can access documents through three different settings.

Document access settings

Access	Description
By referenced records	When a document is referenced to a parent record, any user with access to the parent record has access to the document.
Admin access	All document users with admin access can access the document.
Shared permissions	Enables sharing a document with other users as Reader, Writer, or Owner at different permission levels such as: • User Permissions • Group Permissions • Role Permissions • User Criteria Permissions

Sharing permissions and roles

Users can give permissions to other users based on their own access to the document. The permission levels are:

- Owner
- Writer
- Reader

To share documents with other users and groups you must have write access to the document record and roles to share at different levels.

Sharing permissions and roles

Sharing permissions	User permissions required	Role required
User Permissions	All users even if they don't have a role assigned	No role required. All users can share documents with other user

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Sharing permissions and roles (continued)

Sharing permissions	User permissions required	Role required
Group Permissions	Writers and Owners can assign access based on their access permissions	dm_user_group_read
Role Permissions	Writers and Owners can assign access based on their access permissions	dm_user_role_read
User Criteria Permissions	Writers and Owners can assign access based on their access permissions	dm_user_criteria_read

Share documents with users

Assign Reader, Writer or Owner permissions to users to enable them to read, download, update, or delete documents.

Before you begin
Role required: none

About this task
User permission is assigned to all users, even if they don't have a role assigned.

Procedure
1. Navigate to **Documents** > **Documents**.
2. Open the document record.
3. Select the **Sharing Permissions** check box.
4. Select the **User Permissions** tab.
5. Select **New** and select the permission level from the drop-down list.
6. Select the record for the user you want to assign permission to.
7. Click **Submit**.

Share documents with groups

As a Writer or Owner, assign access to user groups based on your access permissions.

Before you begin
Role required: dm_user_group_read

Procedure
1. Navigate to **Documents** > **Documents**.
2. Open the document record.
3. Select the **Sharing Permissions** check box.
4. Select the **Group Permissions** tab.
5. Select **New** and select the permission level from the drop-down list.
6. Select the user group you want to assign permission to.
7. Click **Submit**.

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Share documents with roles

As a Writer or Owner, assign access and permissions based on user roles.

Before you begin

Role required: dm_user_role_read

Procedure

1. Navigate to **Documents** > **Documents**.
2. Open the required document record.
3. Select the **Sharing Permissions** check box.
4. Select the **Role Permissions** tab.
5. Select **New** and select the permission level from the drop-down list.
6. Select the user role you want to assign permission to.
7. Click **Submit**.

Share documents with user criteria

As a Writer or Owner assign access to a document based on the user criteria permissions.

Before you begin

Role required: dm_user_criteria_read

Procedure

1. Navigate to **Documents** > **Documents**.
2. Open the document record.
3. Select the **Sharing Permissions** check box.
4. Select the **User Criteria Permissions** tab.
5. Select **New** and select the permission level from the drop-down list.
6. Select the user criteria you want to assign permission to.
7. Click **Submit**.

Using Document Management

Use Document Management to easily upload, retrive, share, publish, and delete documents.

Document repository

In the Document Management application, you can create, view, update, share documents in the document repository. When new documents are created, they’re placed into a record with metadata such as name, description, type, and so on. The record contains all the versions of the document so you can track and update the documents.

You can access the document by opening one of its versions. A document can contain numerous versions. The document record contains references to the documents and not contain actual document files.

When you want to add a document to a record, upload it as an attachment. Each time you update the document, you can create a new version. Alternatively, you can provide the link to a document in the URL field. You can include the review and approval workflow before publishing a document.

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You can generate and share the document link with authorized users for collaboration or to include the link on any page. The default version of the shared document will have public access and can be accessed by anyone within or outside the organization.

Create a document record

Create document records and include default versions for the documents.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select **New**.
3. On the form, fill in the fields.

New document record fields

Field	Description
Name	Name of the document.
Owner	Name of the document owner.
Reviewers	Name of the reviewers if any.
Template	Option to determine whether the document is a template.
Department	Name of the department that created the document.
Type	The type of document based on the content: guideline, policy, procedure, or contract.
Classification	Classification of the document: public, restricted, or confidential.
Audience	Audience of the document, either internal or external. **Note:** The **Audience** field is hidden in the default view.
State	The state the document is in: Draft, Submit, Review, or Complete.
Description	A brief description about the document.
Default Version	The document version that is used for document download. By default, the latest version is the default version.

4. Select the access setting.
5. Select **Submit**.

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Document versions

In the ServiceNow® Document Management application, documents display as versions in the record. You view these versions as a related list within the document record. A document can have many versions.

The term "document" refers to the container record that holds document information such as its name, description, type and other metadata. While the document record doesn't contain the actual document file, it does contain versions in the record, which you can open, update, and track.

Use the Attachment icon (📎) to add documents to a record.

Alternatively, you can provide the link to a document in the URL field. You then access the actual documents by selecting the versions in the related list.

Document version review and approval

All approver and reviewer users have read access to the documents that they're approving.

A document can have a reviewer or multiple reviewers and no approvers and vice versa. Users with admin and platform_document_management_admin roles have the option to create approval and review rules.

Document owners have the option to:

- Initiate approval and review workflow for a document version.
- Publish the approved version.
- See the activity stream of the approval and review workflow.
- Track the document **Version State**.

For multiple document versions, the latest reviewed and approved version gets published and the previous versions are retired.

Create a document version

Create a document version for each document.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **Documents** > **Documents** and click the document record.
2. Scroll down to **Versions** tab.
3. Select **New**.
4. Select the file type you want to upload and add any information related to the file under **Notes**.
   - To upload a file, select **Attachment**, select the file icon, and select the file.
   - To link to a document, select **URL** and provide the link.
5. Select **Submit**.
6. To submit the version for review and approval, go back and select the version and select **Submit Version**.

Download a document

Download an attached document version based on the selected default version.

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Before you begin
Role required: none

About this task
Note:
To download a document, the version file type must be an attachment and not a URL.

Procedure
1. Navigate to **All** > **Documents** > **Documents**.
2. Select the record.
3. Select the **Documents** tab.
4. Select the documents you want to download.
5. In the **Actions on selected rows** drop-down menu, select **Download Document**.

Share a document link

Create a shared link with public access to share and download a document for collaboration.

Before you begin
Role required: owner or writer

About this task
The **Share document** button is visible only when the document has a valid default version.

Procedure
1. Navigate to **All** > **Documents** > **Documents**.
2. Select the record that you want to share the document link for.
3. In the record, select **Share Document**.
4. For Link Validity, select **Permanent** to keep the link permanently, or select **Expire Link On**, and select the link expiry date.
5. Select the copy link icon ( ) to copy and share the document link to download the document.
6. Select **Done**.

Modify a shared link access

Modify the document shared link access to make the link inactive or change the expiration date.

Before you begin
Ensure that the Permalinks table is added in the related list.

Role required: owner or writer

Procedure
1. Navigate to **All** > **Documents** > **Documents**.
2. Scroll down to the **Documents Permalinks** tab.
3. For the document:
   - To make the link inactive, in the Active column, select **false**.
   - To add or modify the expiry date, in the Expiration column, select the date.

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Delete a document link

Delete a shared link to remove existing user access to the document.

Before you begin

Role required: owner or writer

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select the record that you want to share the link for.
3. In the record, select **Share Document**.
4. Select the delete icon () to delete the shared link.
5. In the dialog box, select **Delete** to confirm.

Delete documents

Delete documents in the document repository.

Before you begin

Role required: admin with admin access

or

Access permission: owner

or

User: owner

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Either delete a single document or multiple documents.
   - To delete a single document, open the document record and select **Delete**.
   - To delete multiple documents, select the document record entries, and from the Actions on selected rows drop-down menu, select **Delete**.

Document approval and publish process

A reviewer approves or rejects the document. A document can have multiple reviewers. During the approval process, the approver approves or rejects the document. A document goes through the approval process after the review process. A document is published after the review and approval process.

A document can have a reviewer or multiple reviewers and no approvers and vice versa. You must have the platform_document_management_admin or admin role to create approval and review rules.

Users who can create documents have the option to do the following:

- Add approvers and reviewers to a document.
- Initiate the approval and review workflow for a document version.
- Publish the approved version.
- See the activity stream of the approval and review workflow.

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All approvers and reviewers have read access to the documents that they're approving.

Document approval revision rule

The document approval and revision rule is created based on the conditions defined in the condition builder to determine which documents use the approval rule. After the approval rule is saved, reviewers and approvers are added if the conditions in the Condition field are met.

Note:
Document reviewer and approver directly added from the document record aren't added to the Document approval and revision rule.

Document review

If the reviewer rejects the document, the author and owner are notified and the review is canceled. The author, owner, and reviewer should discuss what changes must be made to the document. If the reviewer approves the document, the author and owner are notified that the review was successful, and the document can move to the approval stage. If multiple reviewers are assigned to a document, the first reviewer to act dictates what happens to the document. For example, there are two reviewers, A and B.

If reviewer A acts first and rejects the document, the review process stops and the revision state is set to Canceled. Reviewer B receives a notification email stating that the review was rejected and the status is changed to No Longer Required. If reviewer A acts first and approves the document, the review process stops and the document can move to the approval stage. Reviewer B's status is changed to No Longer Required.

Document approval

After the document has been reviewed, submit the document for approval. If the document doesn't have an approver, the approval process is omitted.

If the final approver approves the document, the author and the owner are notified. After the final approval is successful, the document stage changes to Ready for Publishing in the Document versions list.

If there are multiple approvers, the approval process works in sequence, and multiple approvers can be assigned to a single sequence. For example:

- Sequence 1: Approvers A and B
- Sequence 2: Approvers C and D
- Sequence 3: Approver E

The sequences take place in ascending chronological order, approvers A and B receive the approval request first (approvers C, D, and E aren't part of the process yet). Similar to the review process, the first approver to act within a sequence dictates what happens to the document. If approver A acts first and rejects the document, the approval process stops and the state is set to Canceled. Approver B's status is changed to No Longer Required. If approver A acts first and approves the document, the process stops and approver B's status is changed to No Longer Required. The document then moves to approval sequence 2. After at least one approver in each sequence approves the document, the author and the owner are notified that the document has been approved.

Publish a document

After a document has been created and edited, the revision can be submitted for draft review and final approval. After final approval, the document can be published.

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If the approval and publishing process is repeated, the published revision is retired when the new revision is published. Any workflows running against previous revisions are canceled when the document is published.

Create a document approval revision rule

Create a document approval revision rule for the document review and approval process.

Before you begin

Role required: platform_document_management_admin or admin

Procedure

1. Navigate to **All** > **Documents** > **Approval and Revision Rules**.
2. On the form, fill in the fields.

Approval revision rule form

Field	Description
Name	A unique identifier for the approval rule.
Description	A short description of the approval rule.
Document Conditions	A condition builder that determines which documents use this approval rule.
Active	Activates the rule.

3. Select **Submit**.

Add a reviewer

Add a single or multiple reviewers to the document approval and review rule for document review.

Before you begin

Role required: platform_document_management_admin or admin

About this task

The procedure described in this task applies to newly created records. For existing records, go to the document record, select the additional actions icon (☰) and select **Refresh Approvers and Reviewers** to match the rules and add reviewers.

Note:
Document reviewers can be directly added through the document record but they aren't added to the Document approval and revision rule.

Procedure

1. Navigate to **All** > **Documents** > **Approval and Revision Rules**.
2. Go to the rule that you want to add a reviewer or approvers to.
3. Select the **Reviewers** tab.
4. Select **New**.
5. In the **Reviewer** field, enter the name of the reviewer.

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6. Select **Submit**.
7. Repeat steps 3–6 to add multiple reviewers.

Add an approver

Add a single or multiple approvers to the document approval and review rule for document approval.

Before you begin
Role required: platform_document_management_admin or admin

About this task
The procedure described in this task applies to newly created records. For existing records, go to the document record, select the additional actions icon (☰) and select **Refresh Approvers and Reviewers** to match the rules and add approvers.

Note:
The document reviewer and approver can be directly added through the document record but they aren't added to the Document approval and revision rule.

Procedure
1. Navigate to **All** > **Documents** > **Approval and Revision Rules**.
2. Go to the rule that you want to add a reviewer or approvers to.
3. Select the **Approvers** tab.
4. Select **New**.
5. In the **Approvers** field, enter the name of the reviewer.
6. In the **Sequence** field, enter the sequence for the approver.

Note:
The document is sent to approvers in ascending order based on the sequence number entered. If two approvers have the same sequence number, only one approver's approval is needed to move on to the next approver in the sequence or to publish the document if there’s no approver in the sequence.

7. Select **Submit**.
8. Repeat steps 3–7 to add multiple approvers.

Send a document version for review and approval

Send a document version for review and approval before publishing the document.

Before you begin
Role required: none

Procedure
1. Navigate to **All** > **Documents** > **Documents**.
2. Select the document record.
3. Select the version and select **Submit Version**.

Approve or reject a document version

Approve or reject a document version after the review process is complete.

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Before you begin
Role required: approver_user

Procedure

1. Navigate to **All** > **Self-Service** > **My Approvals**.
2. Select the requested document for approval.
3. Select **Approve** to approve the document version or select **Reject** to reject the document version.

Approve or reject a document version through email

Approve or reject a document version request directly from your email.

Before you begin
Role required: approver_user

Procedure

1. Open the approval request email.
2. Select **Click here to approve** to approve the document version or select **Click here to reject** to reject the document version.

Publish a document

Publish a document revision that has been approved.

Before you begin
Role required: none

About this task
After a document has been created and edited, a version can be submitted for draft review and final approval. After the final approval, the document can be published. The published version becomes the default version of the document.

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select the document record.
3. Scroll down to the **Versions** tab.
4. Select the document version that has been approved.
5. Select **Publish Version**.

Digital signature for PDF documents using CAC or PIV smart cards

Use digital signatures to make the document signing experience seamless and to eliminate manual intervention by using your Personal Identity Verification (PIV) or Common Access Card (CAC) smart card.

CAC or PIV cards

The Common Access Card (CAC) and Personal Identification Verification (PIV) are smart cards used for general identification and authentication of user access. CAC and PIV hold a unique digital certificate and user information such as a photograph, personal identification number (PIN), and signature to identify each user.

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Sign PDF documents

ServiceNow enables you to integrate with Adobe, as well as configure and use PIV or CAC smart cards as an authenticator for digital signing of PDF documents. This integration provides the flexibility to use PIV or CAC cards to safeguard critical and valuable assets.

The Adobe Acrobat Reader desktop application enables you to digitally sign a PDF with CAC or PIV smart cards.

Note:
You should do the following to digitally sign a PDF with CAC or PIV smart cards:

- Install Adobe Acrobat Reader on your desktop.
- Configure your Google Chrome or Mozilla Firefox browser to open downloaded PDFs in Adobe Acrobat Reader.

Document template for digital signature

Digital signing for documents is configured with a document template. You must define document templates and signing workflows for digital signature using smart cards to generate and send auto-filled documents to be signed by different participants.

To configure digital signing for CAC or PIV smart cards, the following must be done:

- Use Document Templates to create and upload a PDF document
- Set up certificates in the sys_ca_certificate table
- Set up a map certificate in the sys_user_certificate table
- Review the *com.snc.pdfsigning.validation.method* property

  Note:
  This property is available from Washington DC Patch 3.

- Sign and review the PDF document

Install Document Template integration with digital signatures using a smart card

You can install the Document Template integration with Digital Signatures using Smart Cards application (com.sn.dt-digital-signature-smart-card-integration) if you have the admin role.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Document Template integration with Digital Signatures using Smart Cards application (com.sn.dt-digital-signature-smart-card-integration) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.

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3. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.

4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. Select **Install**.

Set up a document template for signing documents using a CAC or PIV smart card

Set up a document template for PDF using a Common Access Card (CAC) or Personal Identification Verification (PIV) card. Set up certificates to automate and simplify the process of filling, reviewing, and signing a document online.

Before you begin

Adobe Acrobat Reader must be installed on your desktop.

The Document Templates application must be installed. For more information, see Setting up Document Templates.

Role required: sn_doc.admin, sn_doc.reader, or admin

Procedure

1. Create a document template.

   a. Configure a PDF document template.

   > **Note:**
   > The **Signing type** field should be **Digital Signature Smart Cards**.

   b. Map fields for the PDF document template

   c. Select **Edit Document Preview** to define the label and placement of the button to submit the signature.

   d. Create participants for the PDF document template.

   e. To map templates to participants, go to the **Template Mapping** tab, select the field name, and add the participant name, and to map fields, select the field from the **Mapping field** drop-down menu.

   > **Note:**
   > The text fields can have pre-filled values mapped, and the digital signature field types should be mapped to the participants.

   f. Select **Update**.

   g. Select **Publish**.

2. Set up Certificate-based authentication.
3. Configure your browser settings to automatically open the downloaded PDF documents in Adobe Acrobat Reader.

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For Google Chrome, see PDF download setting for Google Chrome.

For Mozilla Firefox and Apple Safari, see Configure browser to use the Adobe PDF plug-in to open online PDF files.

4. Configure Adobe Acrobat Reader to add your download location as your Privileged Location.
   a. In Adobe Acrobat Reader, go to **Preferences** > **Security (Enhanced)**.
   b. Select **Add Folder Path** and add your download location as your Privileged Location.
   c. Select **OK**.

What to do next

Sign document templates for PDF documents using CAC or PIV smart card

Property value for digital signature using CAC or PIV smart cards

Specify the method that will be used to identify and validate the user who has signed the PDF using the *com.snc.pdfsigning.validation.method* property.

The property value *com.snc.pdfsigning.validation.method* is used for identifying and validating the user who has signed the PDF. Identifying the user is necessary to validate whether the correct user has signed the PDF. The IT team of a customer can define the way to validate a PDF depending on their policies and issued certificates.

Property value and action

Value	Action
common_name	Uses the Common Name (CN) field in the Subject of the certificate to check if a certificate exists in the sys_user_certificate table that is associated with a user.
email	Uses the email IDs in the certificate to locate a user in ServiceNow with a matching email ID.
any (default value)	Utilizes both of the above validation methods to resolve a user.
ignore	No user validation is performed on the signing fields.

Sign document templates for PDF documents using CAC or PIV smart card

Use the PDF document template to initiate digital signing, review, and generate a filled PDF document using a Common Access Card (CAC) or Personal Identification Verification (PIV) card.

Before you begin

Adobe Acrobat Reader must be installed on your desktop.

A document template must be set up for signing documents. For more information, see Set up a document template for signing documents using a CAC or PIV smart card.

Role required: none

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About this task

Procedure

1. Initiate the PDF document signing process with a custom implementation using script.
   For more information, see Using Document Templates: Generic use case.

   Note:
   HR cases can skip this step as custom implementation using scripts is for cases related to non-HR applications.

2. Sign the PDF document in Service Portal.
   - To navigate through the Employee Center, navigate to **All** > **Self-Service** > **Employee Center**.
   - To navigate through My Document Tasks, navigate to**Self-Service** > **My Document Tasks**.
3. Select the document task that is assigned to you.
4. Review the PDF document and select **Sign Document** to sign the document or **Reject** to reject the document.
   The signed document opens as a PDF document in Adobe Acrobat Reader.
5. Go to the sign location to click and select the mapped certificate or Digital ID file.
6. Enter the password for the Digital ID file, select **Sign**, and save the signed copy.
7. In the PDF document, select send to send the signed PDF document.
   The signed document is uploaded to the document task for verification.
8. Go to the **My Document Tasks** and select the document, review and select **Validate Document** to validate the document or select **Reject** to reject the document.
   The signature is successfully captured and authenticated after document validation.

Review the digitally signed document

Review the digitally signed PDF document to either approve or reject it.

Before you begin
Role required: none

Procedure

1. Navigate to your Document Tasks through either the Employee Center or through My Document Tasks.
   - To navigate through the Employee Center, navigate to **All** > **Self-Service** > **Employee Center**.
   - To navigate through My Document Tasks, navigate to**Self-Service** > **My Document Tasks**.
2. Select the document template task assigned to you and review the document.
3. To approve or reject the document, do one of the following.
   - To approve the document, select **Approve**.
   - To reject the document, select **Reject** and provide a reason for the rejection.

Document references

References are used for linking a document record to other records, which can be any other table or record on the platform.

A reference is a link or mapping between a document and a target or a parent record.

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You can add references directly and view all document references in other records across the platform by navigating to **Documents** > **References**.

You can create and link document references directly from references or from the document record.

Create document references from document record

Link the document record to other records in any other table or record.

Before you begin

Role required: none

Procedure

1. Navigate to **Documents** > **Documents**.
2. Select the document.
3. In the **Document References** tab, select **New**.
   In the dialog box, the **Document** field reflects the document you selected.
4. In the **Target Record** field, select the Lookup documents using list icon .
5. In the Select the document dialog box, for the **Table name** field, select the table for the record you want to link the document to.
6. In the **Document** field, select the Lookup using list icon ( ) and select the record to which you are linking the document.
7. Select **OK**.
8. Select **Submit**.

Create document reference from References

Link document references to any record directly from the References list. You can easily see all documents linked to tables and target records.

Before you begin

Role required: admin

About this task

Procedure

1. Navigate to **Documents** > **Documents** > **References**.
2. Select **New**.
3. Select the document.
4. In the **Target Record** field, select the Lookup documents using list icon .
5. In the Select the document dialog box, for the **Table name** field, select the table for the record you want to link the document to.
6. In the **Document** field, select the Lookup using list icon ( ) and select the record to which you are linking the document.
7. Select **OK**.
8. Select **Submit**.

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Delete a document reference from document record

Remove and unlink a document reference from a document record.

Before you begin

Role required: admin with admin access

or

Access permission: owner

or

User: owner

About this task

Note:
This action unlinks the document but does not delete the document.

Procedure

1. Navigate to **Documents** > **Documents**.
2. Select the document.
3. In the **Document References** tab, select the documents you want to unlink.
4. In the **Actions on selected rows** drop-down menu, select **Remove**.

Linking documents to a parent record

Documents can be linked to records referred to as "parent records." You can create a document version and reference it through a parent record. You can also view, edit, download, or delete document references in the parent record.

Note:

The terms "other record" and "parent record" are used interchangeably and refer to any records to which documents are linked.

You can use references to link a document record to any other table or record on the platform.

Enable viewing related documents in a parent record

Add the Documents related list to the record to be able to link and view documents related to the record.

Before you begin

Role required: admin

Procedure

1. Navigate to the record, (for example, Incident, Interaction, and so on).
2. Select the Additional Actions icon ( ) and select **Configure** > **Related Lists** .
3. Move **Documents** from the Available list to the Selected list.
4. Select **Save**.

Result

The Documents related list is added to the related lists available in the record.

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Create a document record in a parent record

Add documents to a parent record so they are available for downloading, sharing, or viewing directly from the record.

Before you begin

Role required: none

Procedure

1. Navigate to the record (for example, Incident).
2. Select the **Documents** tab.
3. Select **New**.
4. On the form, fill in the fields.

New document record fields

Field	Description
Name	Name of the document.
Owner	Name of the document owner.
Reviewers	Name of the reviewers.
Template	Option to determine whether the document is a template.
Department	Name of the department.
Type	The type of document based on the content, for example, guideline, policy, procedure, or contract.
Classification	Classification of the document such as public, restricted, or confidential.
Audience	Audience of the document, either internal or external.
State	The state the document is in: Draft, Submit, Review, or Complete.
Description	A brief description about the document.
Default Version	The document version used for document download. By default, the latest version is the default version.

5. Select the access settings.
6. Click **Submit**.

Upload a document version in a parent record

Upload a document version for each document in the parent record.

Before you begin

Role required: none

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Procedure

1. Navigate to the record (for example, Incident).
2. Select the **Documents** tab.
3. Right-click the document name.
4. Select **Upload Version**.
5. Select the file type you want to upload and add any information related to the file under **Notes**.
   - To upload a file, select **Attachment**, select the file icon, and select the file.
   - To link to a document, select **URL** and provide the link.
6. Select **OK**.

Related topics

Create a document version

Download a document from its parent record

Download documents related to a parent record directly from the record.

Before you begin

Role required: none

About this task

Note:
To download a document, the version file type must be an attachment and not a URL.

Procedure

1. Navigate to the required record (for example, Incident).
2. Select the **Documents** tab.
3. Select the documents you want to download.
4. In the **Actions on selected rows** drop-down menu, select **Download Document**.

Link existing documents to a parent record

Link documents that are in your repository to a parent record.

Before you begin

Role required: none

You must have sufficient permissions to access the document.

Procedure

1. Navigate to the required record (for example, Incident).
2. Select the **Documents** tab.
3. Select **Edit**.
4. Select the documents you want to link.
5. In the **Actions on selected rows** drop-down menu, select **Link Documents**.

Unlink documents from a parent record

Remove and unlink documents from a parent record when they are no longer relevant.

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Before you begin
Role required: admin

About this task
Note:
This action unlinks the document from the parent record but doesn't delete it from the repository.

Procedure
1. Navigate to the record (for example, Incident).
2. Select the **Documents** tab.
3. Select the documents you want to unlink.
4. In the **Actions on selected rows** drop-down menu, select **Remove**.

Delete a document from a parent record

Delete documents directly from a parent record.

Before you begin
Role required: admin with admin access

or

Access permission: owner

or

User: owner

Procedure
1. Navigate to the required record (for example, Incident).
2. Select the **Documents** tab.
3. Select and open the documents you want to delete.
4. Select **Delete**.

Document Management lists

Lists are a collection of template documents you can use to create documents that are linked to other target records. Only users with the admin role can access lists.

Document lists

A user with the admin role can create document lists and add multiple documents to a single list. Only users with the admin role can access lists.

Example: New hire onboarding

During new hire onboarding, employees must upload multiple documents such as ID, training certificates, and so on. Your organization can create documents as templates and group them under a list. Then when you reference this list to a target record, all the template documents under the list are created and linked to the target record.

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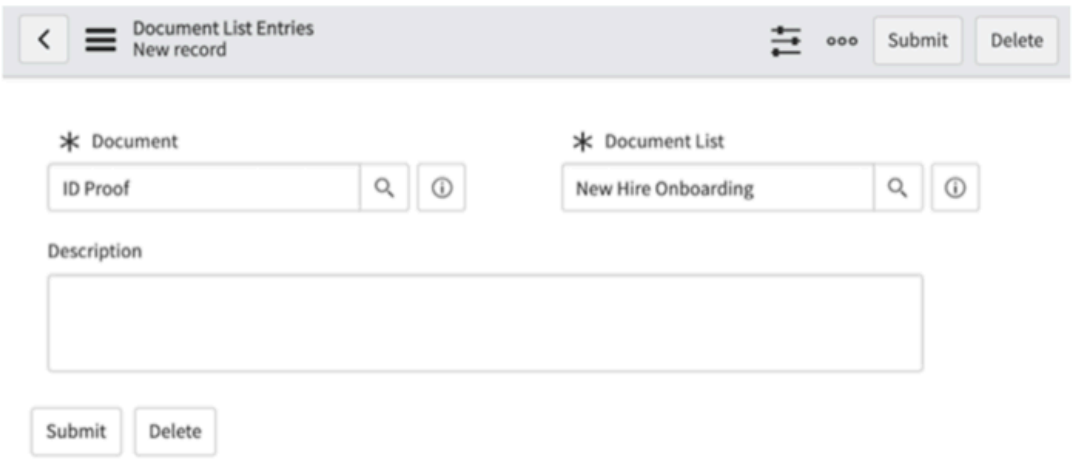
Document List Entries

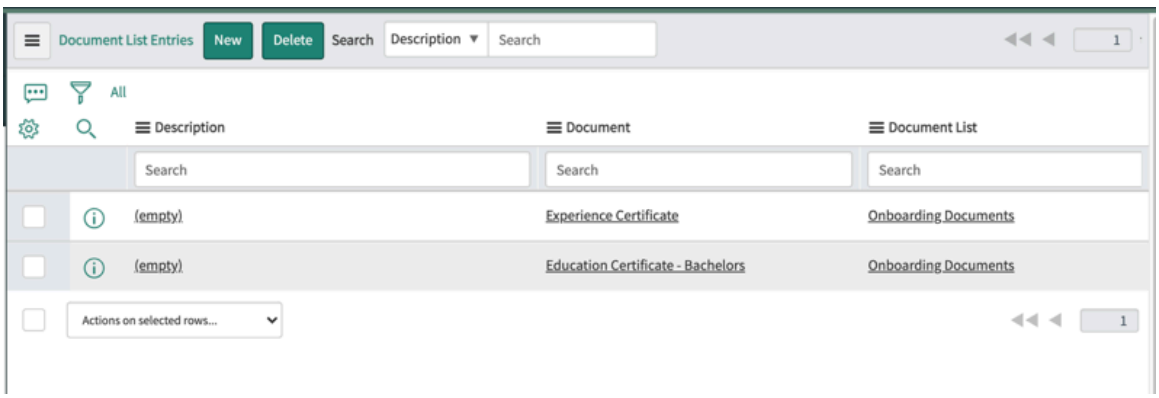


List entries

Lists entries are a mapping of a template document with a document list. Only template documents can be linked to a list, such as when documents have the **Template** option selected in the document record. The Document List Entries related list displays the list entries.

Note:
Users can link only documents that they have access to.

List entries



Related topics

Group document templates in a list for creating and linking documents to a target record

Add a document template to a document list

Group document templates in a list for creating and linking documents to a target record

Group document templates in a list to enable all the template documents in the list to automatically be created and linked to the target record when the list is referenced.

Before you begin

Role required: platform_document_management_admin

Procedure

1. Navigate to **Documents** > **Documents** > **Lists**.
2. Select **New**.

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3. Provide a name and description of the list.
4. Select **Submit**.

What to do next
Create a document template

Related topics
Add a document template to a document list

Add a document template to a document list

Add a template document to a document list that groups document templates for creating and linking to a parent record.

Before you begin
Role required: platform_document_management_admin

About this task
Note:
Only document templates can be linked to a list.

Procedure
1. Navigate to **Documents** > **Documents** > **List Entries**.
2. Select **New**.
3. On the form, fill in the fields.

List entry fields

Field	Description
Document	Name of the document template.
Document List	Name of the list.
Description	A brief description about the document list entry.

4. Click **Submit**.

Create documents using document lists for a target table record

You can create and reference documents on a target table record through the `DocumentListService` API.

Before you begin
See the DocumentListService API topic

Role required: admin

Note:
You cannot create documents through Document Lists with the user interface (UI). It must be done with APIs.

Document attachments in an activity stream

Include documents in activity streams to include and track updates on attached documents to any record.

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You can include and track attached documents in activity stream journal fields like work notes or comments that display task records.

To add and attach documents to a record's activity stream, you would need to complete the following tasks:

- Enable Document actions in activity stream
- Enable Documents in the record
- Add documents to the record

Include document actions in an activity stream

Include document actions in an activity stream to view and track updates to attached documents in a record.

Before you begin
Role required: admin

About this task
To add and attach documents to a record's activity stream, you would need to complete the following tasks:

- Enable Document actions in activity stream
- Enable Documents in the record
- Add documents to the record

Procedure

1. Enter `sys_properties.list` in the navigation filter.
2. Select the **glide.documents.journal.enabled** property.
3. On the form, set the **Value** field to **true**.
4. Select **Update**.
5. Select the **glide.documents.attach.fields**.
6. On the form, in the **Value** field, add the field name that you want the record to reflect.
   For example, you would enter work_notes for the **Work notes** field.

   Use a comma to add multiple field names.

   Note:
   Document updates are pushed only if the field names exist.

7. Select **Update**.

References

The following sections describe the installed components and roles for Document Management, along with domain separation and supported browser information.

Components installed with Document Management

Several types of components are installed with activation of the Document Management plugin, including tables and user roles.

Demo data is available for this feature.

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Roles installed

Role title [name]	Description	Contains roles
Admin	Provides Create, Read, Update, and Delete access to the document and its related tables. Admin users have access to List and List Entries modules.	platform_document_management_admin

Sharing permission roles

Role Name	Description
dm_sharing_levels_user	This role contains the following roles: • dm_user_role_read • dm_user_group_read • dm_user_criteria_read Provides the ability to share documents at all levels (group, role, and user criteria).
dm_user_role_read	Provides read access to the user role table and the ability to share documents based on user roles.
dm_user_group_read	Provides read access to the User Group table and the ability to share documents based on user groups.
dm_user_criteria_read	Provides read access to the User Criteria table and the ability to share documents based on user criteria.

Tables installed

Table	Description
ds_document	Stores document records containing document metadata.
ds_document_version	Stores document versions containing the actual document file or URL to the file.
ds_document_references	Stores references between document records and other records.

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Table	Description
	Note: The records can be from any other table and record on the platform Supports a many-to-many relationship between documents and target records.
ds_document_lists	Stores document lists, which are a collection of template documents used to create and link documents to other records.
ds_document_list_entry	Stores mappings between template documents and document lists.
ds_document_user_can_access_mtom	Stores permissions provided to users to access documents as a Reader, Writer, or Owner.
ds_document_ug_can_access_mtom	Stores permissions provided to user groups to access documents as a Reader, Writer, or Owner.
ds_document_ur_can_access_mtom	Stores permissions provided to user roles to access documents as a Reader, Writer, or Owner.
ds_document_uc_can_access_mtom	Stores permissions provided to user criteria to access documents as a Reader, Writer, or Owner.
ds_document_permalink	Stores the permalink and expiration date for the document.

Note:
The Documents [ds_document] and Versions [ds_document_version] tables can be extended.

Document Management roles

Document Management is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Administrator [platform_document_management_admin]

Provides Create, Read, Update, and Delete access to the document. Admin users have access to List and List Entries modules.

Contains Roles

List of roles contained within the role.

- dm_sharing_levels_user
- dm_user_role_read
- dm_user_group_read
- dm_user_criteria_read

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Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Domain separation and Document Management

Domain separation is supported for Document Management. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Overview

Document Management provides an access level approach to controlling the document access and providing security to the users.

How domain separation works in Document Management

When domains are separated in Document Management, users can see and manage documents and give access privileges only in their own (tenant) domain.

A user in the parent domain has access to documents in the child domain.

When a user creates a document, document list or document entries, then their domain is the same as the user's domain.

When the owner of the document changes then the related versions, references, and permission record's domain is updated with the domain of the parent document.

Use cases

- **Documents**

  Documents can be edited or accessed only within their domain. Access to a document can become void if a user belongs to a different domain from the document's domain.

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- Users in the global domain can access documents in all domains when the read access is granted to the user.
- Users in a non-global domain can access documents only in the same domain and global domain when document access is granted to the user.

- **Versions, References and Permissions table**
  - Users can access the versions, references, and, permissions table records only if they have access to the parent document.
  - If a user has access to the target record in the references table, access to the parent document is granted only if inherited access is enabled for the document and the user is in the same domain as the parent document.
- **List and List Entries**

  List and List Entries have domain pointing to the current user domain and can be accessed by the users with document admin rights.

Known issues

If a document contains references and if the owner of the document is changed and does not have access to the target record of one of the references, then the reference record might not be visible to the new owner.

For example, if the document owner, User A (Domain: D1) is changed to User B (Domain: D2) and User B does not have access to the target record of the reference table, User B might not be able to see the reference record.

Related topics

Domain separation for service providers

Document Viewer

Document Viewer enables you to view documents directly in the ServiceNow AI Platform rather than having to download them.

Document Viewer supports viewing various file types in the platform including UTF-8 character encoded PDF file. The maximum document file size is 50 MB. To use Document Viewer, enable it at instance level and for the tables for which you want to use it.

Note:
Document Viewer now supports FedRAMP instances.

You can view the following file types:

- MS Word (.doc) and (.docx)
- MS PowerPoint (.ppt) and (pptx)
- MS Excel (.xls) and (.xlsx)
- PDF
- PNG
- JPEG

Note:
The rotate option doesn't work for images.

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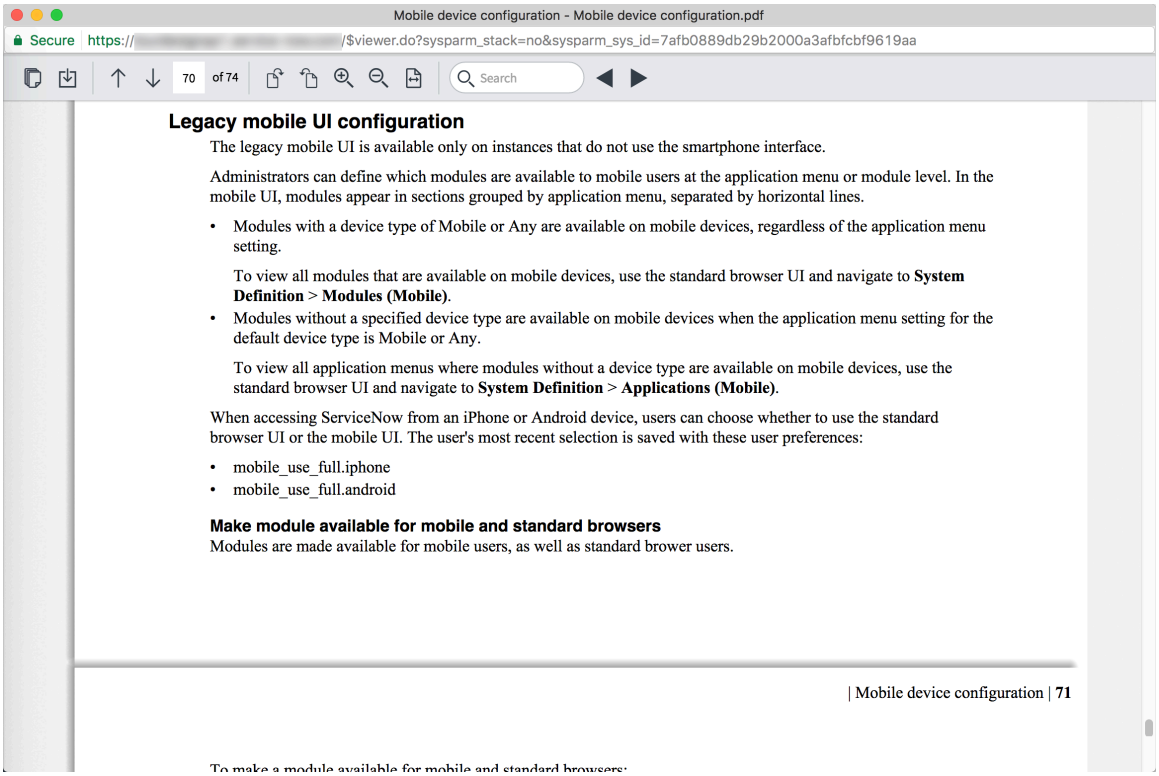
Other document types, for example, .zip or .exe files, are automatically downloaded without requiring Document Viewer. Document viewer converts word documents and spreadsheets to pdf first in order to view them. This might take some time to render the file the first time.

PDF view in Document Viewer



The following table describes the icons used in Document Viewer.

Icons in Document Viewer

Icon	Description
	Toggle the sidebar to see a preview of all the pages in the document.
	Download the attachment.
	Page up or down using the arrow buttons. You can also scroll or use your keyboard arrow keys.
	Rotate the page to the right.
	Rotate the page to the left.
	Zoom in or out of the document.
	Increase the page to the full width of Document Viewer.
	Search for keywords in the document. Use the arrows to toggle to the next search result.

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Related topics

View attachments with Document Viewer

Enable Document Viewer

Enable Document Viewer

Enable Document Viewer to view documents directly rather than download them to view them in their native applications.

Before you begin

Role required: admin

About this task

Document Viewer is enabled by default. Activate it at the instance level and then enable it at the table level for the tables where you want to use it. Ensure that the system property **com.snc.documentviewer.enable_document_viewer** is set to true or create it if it does not already exist. To de-activate Document Viewer, create the system property **com.snc.documentviewer.enable_document_viewer** manually and set it to false.

Procedure

1. Activate Document Viewer at the instance level
   a. Navigate to **All** > **System Definition** > **All Available Applications** > **All**.
   b. Enter `ServiceNow Document Viewer` or `com.snc.documentviewer` in the Search field.
   c. Select **Install**.
2. Activate Document Viewer for the tables where you want to use it.
   a. Navigate to **System Definition** > **Dictionary**.
   b. Search for the table, open the record with the type field **Collection**.
   c. Enter `Use Document Viewer` in the **Attribute** field.
   d. Enter `true` in the **Value** field.
   Document Viewer is enabled at the table level. Repeat this procedure for each table for which you want to enable Document Viewer.

Related topics

Disable Document Viewer

Document Viewer plugins

With Document Viewer, you can view documents directly in the ServiceNow Platform rather than having to download them. Two new plugins enhance the experience and provide more options for document viewing. You can collaborate with other people, copy, delete, restore, and view version history directly in a ServiceNow instance.

Overview

In previous ServiceNow releases, not all documents could be shared and used for team collaboration. With new plugins for the Platform Document Viewer, now you can:

- Collaborate (edit, share) with Microsoft OneDrive and copy documents to your ServiceNow instance.
- Upload a policy document authored in your ServiceNow instance as a Microsoft 365 document in Microsoft 365 SharePoint.

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- Attach shared links to a record. Clicking the link opens the document in Microsoft 365 SharePoint.
- ○ The link can be shared with a co-worker, who can view and edit the document in real time.
  - ○ The current version is also viewable in the ServiceNow instance.
- Use collaboration tools such as Microsoft 365 for review and co-authoring documents.

Plugins

To use this feature, install the following plugins:

- Microsoft OneDrive Spoke
- Microsoft OneDrive document service Spoke
- Microsoft Azure AD Spoke for Integration Hub
- Multi Provider Document Service Framework

See List of plugins (Rome) for a complete list of ServiceNow plugins.

After installation, you can use the base system subflows or customize them. Configure the subflows in the Document actions table. Once configured, they can be invoked as UI actions from List views or can be invoked through Script Include APIs.

Microsoft OneDrive integration plugin

Collaborate in Microsoft OneDrive and perform copy, delete, restore, and version actions on documents directly in a ServiceNow instance. This integration is bi-directional (performs in both directions): Changes are reflected in both Microsoft OneDrive and in the instance.

Microsoft Azure AD Spoke for IntegrationHub

The Microsoft Azure AD Spoke for Integration Hub provides actions that a Process Analyst can use when designing flows. The actions allow them to automate the management of users, security groups, and office groups. User management includes applying licenses that result in user provisioning into Office 365.

Multi Provider Document Service Framework plugin (glide plugin)

Plugin contains the data model needed to integrate with third-party document service providers.

Note:
To activate a plugin:

1. Navigate to **System Definition** > **Plugin**.
2. Enter the plugin name in the Search field.
3. Select **install**.

Tables

mp_provider_details

- Provider Details Name
- Provider Name
- Attributes

mp_document_version

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- Version
- Document
- Version Modified By
- Version Last Modified

mp_document_activity

- Document Name
- Document sys_id
- Document Version sys_id
- Document Action
- Provider Detail
- Notes

mp_documents

- Document name
- Provider Details
- Attachment
- URL
- Description

mp_document_action

- document_action_name
- provider_detail
- subflow
- provider_permission

mp_permission_configuration

- Entity_type
- Entity_id
- Attributes
- Provider_group_id
- Provider_group_name
- permission

mp_provider_permission

- permission
- provider
- Attributes
- description

mp_collaborator

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- collaborator_attributes
- collaborator_email
- collaborator_id
- collaborator_name
- Provider_detail
- user

Related topics

Document Viewer

View attachments with Document Viewer

View documents within the platform using Document Viewer rather than having to download them to your own file system.

Before you begin

Make sure that Document Viewer is enabled for the table containing the record. For more information, see Enable Document Viewer.

Role required: none

About this task

Document Viewer supports inline viewing of certain document types within the platform.

Procedure

1. Navigate to a record (incident, form, list, and so on) with an attachment.
2. Click View next to the file attachment name.

   Document Viewer displays the document.

   If the document does not display, Document Viewer does not support inline viewing in your situation and a message instructs you to download the document. The possible reasons are:

   - The document uploaded is platform encrypted or edge encrypted.
   - The file size exceeds the maximum allowed value of 50 MB.
   - The document is password-protected but it is not a PDF file.

   Click **Download Document** to view the document in the relevant external application.

Related topics

Enable Document Viewer

Disable Document Viewer

Disable Document Viewer at the instance level to disable it or at table level to disable it for specific tables within the instance.

Before you begin

Ensure the Add a system property (com.snc.documentviewer.enable_document_viewer) exists in your instance.

Role required: admin

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Procedure

Disable Document Viewer at the instance level or for specific tables.

Related topics

Enable Document Viewer

Managed Documents

Use the ServiceNow® Managed Documents application to control electronic documents within your instance.

After parameters have been set by the administrator and the Knowledge Document plugin installed, documents can move through the managed document cycle.

Managed Document features

Managed Documents is a lightweight, ITIL-based solution for creating and managing electronic documents within your instance.

This application adds a layer of control around any document by providing workflow, storage, security, and categorization options. It can be used for a variety of internal documents, such as policies and procedures, compliance documentation, and knowledge articles. Because it is integrated within the instance, Managed Documents offers a seamless alternative to 3rd-party systems.

Features

Feature	Description
Check-in/Check-out	Track revisions, approval history, and automated notifications for approvers and reviewers. Useful for compliance and risk authors, policy and procedure writers, and contract administrators.
Categorization	Classify documents for organization and search.
Access control	Share documents with selected users.
Revision control	Track changes to documents.
Digital signature for approval	Integration with the Approval with E-Signature plugin.
Workflow	Support consistent content review and approval.
Security	Use high security setting.

Managed Document concepts

The following concepts explain Managed Documents: Managed Document, Document Collection, Document Revisions, and Document Parameters.

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Concepts

Concept	Description
Managed Document	The **Document [dms_document]** table contains the documents controlled through the managed documents process.
Document Collection	The **Document Collection [dms_collection]** table allows related documents to be grouped together.
Document Revisions	Because managed documents must have clear records of individual versions of a document, revisions (including the file) are attached to the primary document record through a related list. Document revisions are controlled to keep a standard naming scheme and consistent version numbers. Once a document revision is ready, it can be submitted for review.
Document Parameters	**Important:** Parameters do not control application or document security. Parameters only organize documents, they do not affect who can access documents. To grant access to the Managed Documents application, you can assign a role. To grant access to a specific document, set user and group permissions. Each document can be associated with predefined parameters. The parameters can help with grouping documents. • Type: Defines the type of document being controlled. Documents of the same type use the same controls. • Classification: Defines document restriction level, such as public, restricted, or confidential. • Audience: Defines the groups with access to the document, such as internal or external. • Name Formats: Defines the format of document names, ensuring that documents of the same type have the same name scheme assembled from name components. • Name Components: Defines the document values used in the name formats. • Approval Rules: Defines the approvals the document must have before it can be published.

Defining Document Workflow

In the base system, all managed documents use the **Managed Documents** workflow after the **Active** check box is selected.

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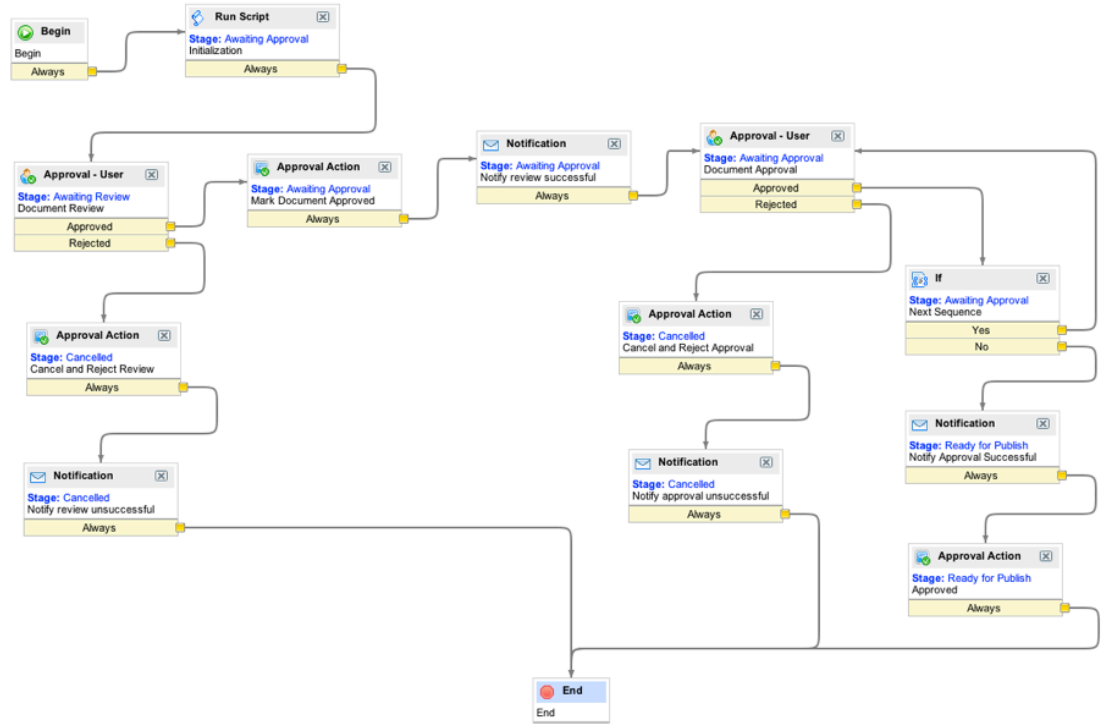
Document workflow



The document parameters defined in the workflow are often used as conditions to trigger more specific workflows, such as type-specific workflows or classification-specific workflows. If different kinds of documents should follow different workflows, use the Graphical Workflow Editor to create new workflows.

Defining Document Parameters

Before using the Managed Documents application, the user with the `document_management_admin` role needs to set the parameters that define the kinds of documents to be managed through the application. Managed Documents provides both base and custom parameter options.

Defining Document Parameters

The following document parameters should be defined:

- **Type:** identifies the purpose of the document. The type also determines the default document format and name format.
- **Classification:** indicates the security level assigned to the document and determines who can view or edit the document.
- **Audience:** specifies the intended readers of the document.
- **Name format:** specifies the name format to use when a document revision is added.
- **Name components:** are individual identifiers used inside a name format. Name components define a reference path (often by dot-walking) that holds the value specific to the document.
- **Approval rules:** determine which approvers are added to documents (in addition to the **Reviewers** specified on the document record).

Defining Types

To define a new type, navigate to **Managed Documents** > **Administration** > **Type** and click **New**.

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Field	Description
Name	A unique name for the type.
Code	A short code for the type. Referenced as a name component for the name format.
Label	A label to display in the **Type** choice list.
Name Format	The name format that documents of this type will use.
Order	A number indicating the type's sequence in the choice list.

The following types are available in the base system.

Name	Code	Label	Name format	Order
-- None --	null	-- None --	null	1
policy	POL	Policy	Default Policy	2
guideline	GUI	Guideline	Default	3
procedure	PROC	Procedure	Default	4
contract	CON	Contract	Default	5

Note:
For documents with a **Type** of **Contract**, a **Contracts** related list appears on the document record, listing any contracts the document is associated with.

Defining Approval Rules

To define a new approval rule, navigate to **Managed Documents** > **Administration** > **Approval Rules** and click **New**.

Field	Description
Name	A unique identifier for the approval rule.
Active	A check box indicating whether this approval rule is used.
Condition	A condition builder that determines which documents use this approval rule.
Description	A short description of the approval rule.

Once the approval rule is saved, the **Approvers** related list defines which approvers are added if the conditions in the **Condition** field are met.

The following approval rules are available in the base system.

Name	Condition
Internal policy	type=Policy ^ audience=Internal
Development policy	type=Policy ^ department=Development

Related topics

Defining Document Parameters

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Defining Audiences

To define a new audience, navigate to **Managed Documents** > **Administration** > **Audience** and click **New**.

Field	Description
Audience Name	A unique name for the audience.
Audience Code	A short code for the audience. Referenced as a name component for the name format.
Label	A label to display in the **Audience** choice list.
Order	A number indicating this audience's sequence in the choice list.

The following audiences are available in the base system.

Audience	Audience code	Label	Order
internal	INT	Internal	1
external	EXT	External	2

Related topics

Defining Document Parameters

Defining Classifications

Define a new classification on the Classification form.

Navigate to **Managed Documents** > **Administration** > **Classification** and click **New**.

Field	Description
Name	A unique name for the classification.
Code	A short code for the classification. Referenced as a name component for the name format.
Label	A label to display in the **Classification** choice list.
Order	A number indicating this classification's sequence in the choice list.

The following classifications are available in the base system.

Name	Code	Label	Order
public	P	Public	1
restricted	R	Restricted	2
confidential	C	Confidential	3

Defining Name Components

Name components define the document values used in the name format.

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For example, the name component `document.audience.code` dot-walks from the document record to the audience **Code**.

To define a new name component, navigate to **Managed Documents** > **Administration** > **Components** and click **New**.

Field	Description
Name	A unique identifier for the name component.
Short Description	A short description of the name component value.
Value	The path to the field holding the value used for the name format. Defined relative to a current revision record. For example: • Enter `revision` to use the revision **Number** field on the revision record. • Enter `document.name` to use the **Name** field on the revision's referenced document. • Enter `document.audience.code` to use the **Code** field for the audience referenced by the document. This dot-walking approach makes it possible to get any value related to the revision into the name format.

Note:
The **revision** component is a special component replaced by the appropriate revision number (rather than querying a value related to the current record). The revision is either automatically incremented or uses the latest revision number, depending on the setting on the document form.

The following components are defined in the base system.

Name	Short description	Value
Audience code	Displays the code assigned to the document audience.	document.audience.code
Classification code	Displays the classification code.	document.classification.code
Document name	Displays the document name.	document.name
Revision	Displays the document revision.	revision
Type code	Displays the code assigned to the document type.	document.type.code

Defining Name Formats

The name format automatically generates a name for a document revision by arranging name components in a standard code to match naming conventions.

For example, a name format with the name components **Type Code**, **Document Name**, and **Revision Number** and the separator **-**, would be formatted as:

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`TYPECODE-Name-RevNumber.fileformat`

In this example, a policy (code POL) named `IT Off-Boarding Policy`, with revision number **1.0**, and uploaded as a **.docx** file would have the name:

`POL-IT Off-Boarding Policy-1.0.docx`

To define a new name format, navigate to **Managed Documents** > **Administration** > **Name Formats** and click **New**.

Field	Description
Name	A unique name for the name format.
Separator	A separator to put between each of the components. Hyphens (-) and underscores (_) are commonly used. Using alphanumeric characters can create a confusing name format.
Description	A description of the name format.

Use the related list to add name components. Use the **Order** field to set the sequence in which name components are used.

The following name formats are defined in the base system.

Name	Separator	Description
Default	_	The default format. Document name and revision separated by an underscore.
Default Policy	_	The format for the policy document type.
Development documentation	(no separator)	The format for the software documentation type.
Development Sources	(no separator)	The format for the development and code sources type.
Intranet Improvement	(no separator)	The format for documents that describe intranet use.

Domain separation and Managed Documents

Domain separation is unsupported in Managed Documents. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

For more information on support levels, see Application support for domain separation.

Related topics

Domain separation for service providers

Managed Documents plugin

This page describes the applications and modules, database table structure, scripts, and roles.

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Database table structure

The following tables are added:

Tables

Display Name (Table Name)	Description
Document [dms_document]	The document details.
Revision [dms_revision]	The document revisions.
Audience [dms_audience]	The intended document readers.
Classifications [classification]	The document restriction level, such as public or confidential. (Does not define access to the document. Document security is set in user and group permissions.)
Type [dms_type]	The document purpose.
Component [dms_component]	The components of name formats. The value field is a dot-walking expression that is evaluated. An exception is made for the revision because it does not exist when the revision name is generated.
Name format [dms_name_format]	The composition of components to generate revision names.
Approval sequence [approval_sequence]	The approval sequences that users must follow.
Approval Rule [dms_approval_rule]	The criteria that records of the dms_document table must match. Used to automatically add approvers to a document.
Collection [dms_collection]	The document groups created by the user.

Scripts

Business rules that are added to sys_script

Rule	Description
Update Document	Changes the state of a document depending on its revisions.
Add Approvers	Populates the list of approvers in the document.

Script includes that will be added to sys_script_include

Script include	Description
DocumentManagement	Contains the main logics for the Managed Documents plugin.
DocumentManagementDB	Contains methods to perform CRUD operations on the database.

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Script includes that will be added to sys_script_include (continued)

Script include	Description
DocumentManagementSecurity	Helps manage the security of the Managed Documents system.
DocumentManagementAjax	Updates the details of the temporary revision that is created when opening the upload/check in revision form.
DocumentAttachmentAjax	Renames an attachment file.
DocumentRevisionWorkflowHelper	Helps perform basic workflow operations on a revision.
DocumentManagementApprovalMatcher	Helps obtain the user and group approvers for a document that matches approval rules.
DocumentApproverHelper	Contains logics to handle document approvers.
DocumentManagementUtils	Useful methods.
DocumentReferenceQualifiers	Static methods that return reference qualifiers.

Client script that is added to sys_script_client

Rule	Description
Document type change	Updates the name format field in the revision settings section of the document. Each type has a default name format.

Roles

This plugin introduces two new roles:

Roles

Role	Description
document_management_user	This role enables a user to access the Managed Documents plugin, create documents, and search for documents. Document reviewers and approvers need the document_management_user role to access the Managed Document plugin. (Please note that reviewers and approvers can also access a document revision from an approval record.)
document_management_admin	This role enables a user to change administrative settings for the Managed Documents plugin.

Note:
Each document has individual permissions, so even if a user is given the document_management_user role and has permissions to the application, the user can only view documents to which they have been given access.

Install the Managed Documents plugin

The Managed Documents plugin is available for activation by users with the admin role.

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Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Application** > **All Available Applications** > **All**.
2. Find the Managed documents (com.snc.document_management) plugin and select **Activate/ Upgrade**.

   If the plugin depends on other plugins, these plugins and their activation status are listed.
3. **Optional:** Select the **Load demo data** check box.

   (Optional) Some plugins include demo data—sample records that are designed to illustrate plugin features for common use cases. Loading demo data is a good policy when first activating the plugin on a development or test instance. You can load demo data after the plugin is activated by repeating this process and selecting the check box.
4. Select **Activate**.

Knowledge Document plugin

The Knowledge Document plugin extends the Managed Documents plugin by providing the functionality for managed documents to be published to the Knowledge Base.

Installed with Knowledge Document plugin

These elements are installed with the Knowledge Document plugin.

Dependencies

The Knowledge Document plugin depends on the Managed Documents plugin. Activating Knowledge Document activates Managed Documents.

Tables

Tables

Display Name [table_name]	Description
Knowledge Records [m2m_document_knowledge]	A many-to-many table storing the relationship between a document and a knowledge article.

UI Actions

UI actions

UI action	Description
Link to Knowledge	Creates or updates a knowledge article related to the current document, depending on whether a knowledge article already exists.

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Scripts

Script includes

Script include	Description
KnowledgeDocument	Holds the main logic for the Knowledge Document plugin.
KnowledgeDocumentDB	Class that gets, inserts, and updates data for the Knowledge Document plugin.

Link documents to Knowledge articles

Manage a document and access the latest version of the document from an article by linking the document to a Knowledge article.

Before you begin

Your administrator must have activated the following plugins:

- Knowledge Document plugin (com.snc.knowledge_document)
- Knowledge Management Advanced plugin (com.snc.knowledge_advanced)

The document is already uploaded and published. For more information, see Upload a document and Publish an approved revision.

You must have contribute access to the Knowledge Base within which the article linked to the document is stored.

If a Knowledge article is already linked to the document, you must have contribute access to the article.

Role required: document_management_user and knowledge

About this task

You can link the initial or revised version of a document to a Knowledge article. The document appears as an attachment to the linked article. Revising a document doesn't automatically update the document attached to the linked Knowledge article. Therefore, every time you revise a document, you must again link the revised document to the Knowledge article.

Note:

As the owner of a document or an administrator, you can link the document to a published article. If the article is checked out by another user, you can't link the document to the associated article, unless the article is published.

A managed document can only be linked to one article.

Procedure

1. Navigate to **Managed Documents** > **Documents** > **All**.
2. Click the document.
3. In the Knowledge Settings related list, fill in the fields.

Knowledge settings

Field	Description
Behavior	Process performed when the **Link to Knowledge** related link is clicked. A behavior is one of the following types:

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Field	Description
	○ **Always create record**: A new Knowledge article is created and linked with the latest published revision of the document as an attachment. ○ **Update existing record**: The linked Knowledge article is updated with the latest published revision of the document as an attachment. If no Knowledge articles exist for the document, a new Knowledge article is created. **Note:** Once you select a behavior setting for a document, you can't modify it later when revising the document.
Knowledge Base	Knowledge Base in which the Knowledge article is stored. You can associate a Knowledge article with one Knowledge Base only. If you are using an article template, you can modify this value only if the template is available in the other Knowledge Base.
Type	Article template to create a Knowledge article using defined fields and values. **Note:** when a Knowledge article is created, the **Type** field becomes read-only.
Valid to	Date that the article expires. Adds valid to date information to the same field in the Knowledge article.
Short description	A few words or short phrase describing the Knowledge article. Adds the short description to the same field in the Knowledge article.

4. Click the **Link to Knowledge** related link.
5. **Optional:** In the information message that is displayed, click the message link to view the Knowledge article.

Result

The uploaded document is added as an attachment to a Knowledge article. Depending on the **Behavior** field value specified in the Knowledge settings related list, the Knowledge article is created or updated with the document.

Create a document

After Managed Documents parameters have been set by the administrator, documents can be created, requested, checked out, edited, checked in, copied, and, if necessary, rolled back to an earlier version.

Once documents have been added to the Managed Documents application, they can be grouped into document collections.

Document approval

During the approval process, the approver approves or rejects the document. A document goes through the approval process after the review process.

Approval workflow

After the document has been reviewed, submit the document for approval. If the document does not have an approver, the approval process is omitted.

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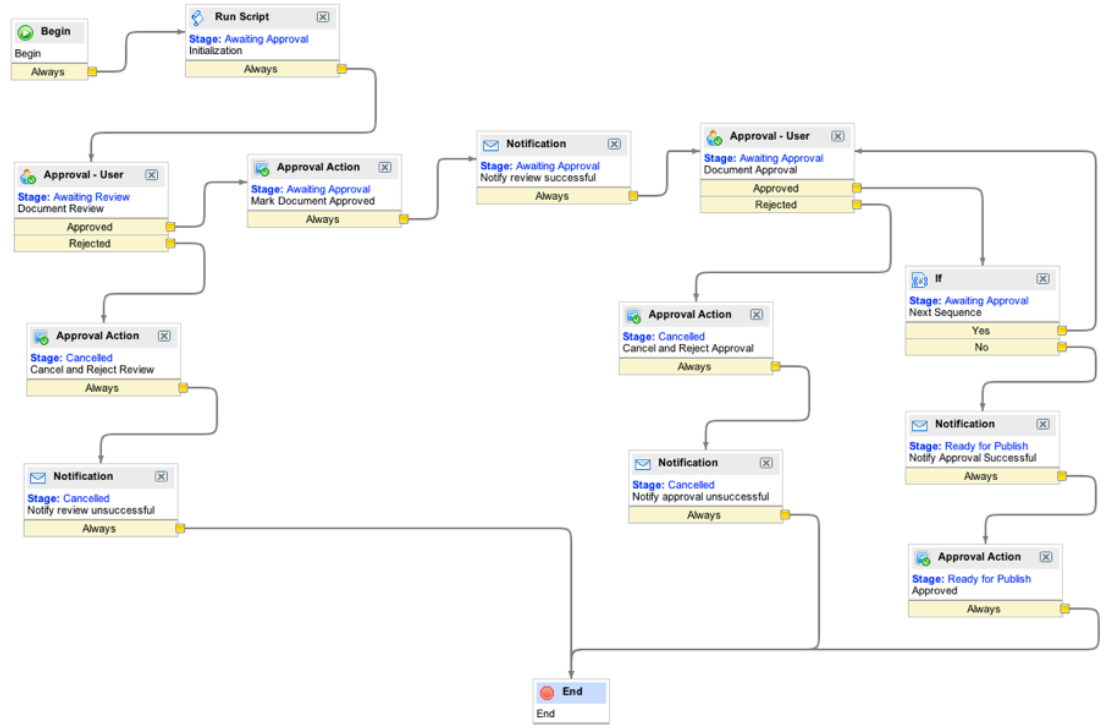
When the document is *Active*, the workflow *Document Management Default* is used to manage approvals:

Document Management Default workflow



If the approver rejects the document, the author and owner are notified and the document review is cancelled. The author, owner, and approver should discuss what changes need to be made to the document. When the document is ready, a new review can be initiated.

If the final approver approves the document, the author and the owner are notified. Once final approval is successful, the document stage changes to *Ready for Publishing* in the Document Revisions list:

Document Management Default workflow result

Process modification for multiple approvers

If there are multiple approvers, the approval process works in sequence and multiple approvers can be assigned to a single sequence. For example:

- Sequence 1: approvers A and B
- Sequence 2: approvers C and D
- Sequence 3: approver E

Because the sequences take place in ascending chronological order, approvers A and B receive the approval request first (approvers C, D, and E are not part of the process yet). Similar to the review process, the first approver to act within a sequence dictates what happens to the document. If approver A acts first and rejects the document, the approval process stops and the state is set to Cancelled. Approver B's status is changed to No Longer Required. If approver A acts first and approves the document, the process stops and approver B's status is changed to No Longer Required. Then, the document moves to approval sequence 2. After at least one approver in each sequence approves the document, the author and the owner are notified that the document has been approved.

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Review process

During the review process, the reviewer approves or rejects the document. Sometimes a document will have multiple reviewers.

If the reviewer rejects the document, the author and owner are notified and the review is cancelled. The author, owner, and reviewer should discuss what changes need to be made to the document. If the reviewer approves the document, the author and owner are notified that the review was successful and the document can move to the approval stage.

If multiple reviewers are assigned to a document, the first reviewer to act dictates what happens to the document. For example, there are two reviewers, A and B. If reviewer A acts first and rejects the document, the review process stops and the revision state is set to Cancelled. Reviewer B receives a notification email stating that the review was rejected and their status is changed to No Longer Required. If reviewer A acts first and approves the document, the review process stops and the document can move to the approval stage. Reviewer B's status is changed to No Longer Required.

Enable electronic signature for approval

Enabling electronic signatures for approval. Electronic signatures are helpful if you must obtain a digital signature for compliance or auditing purposes.

Before you begin

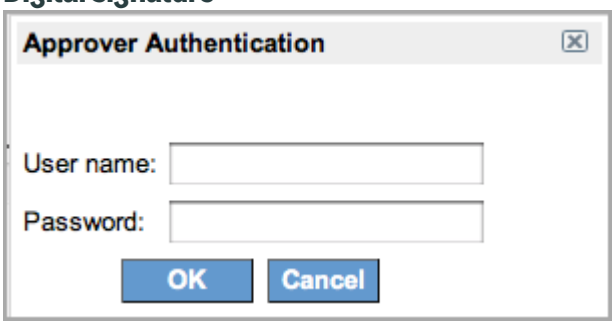
Role required: admin

About this task

You can activate the Approval with e-signature plugin to require that users type in a user name and password when reviewing and approving documents.

The digital signature is not tracked or stored in the document record. Users must simply type in a user name and password after clicking the **Approve** or **Reject** button.

Digital signature



After activating the Approval with E-Signature plugin, ensure that a row in the e-signature registry table is created for the dms_document_revision table.

Procedure

1. Navigate to **All** > **System Definition** > **e-Signature Registry**.
2. Check if *dms_document_revision* is already listed and **Enabled** is set to *true*.
3. If not listed, click **New**.
4. In **Table name**, select *Document Revision*.
5. Select *Enabled*.

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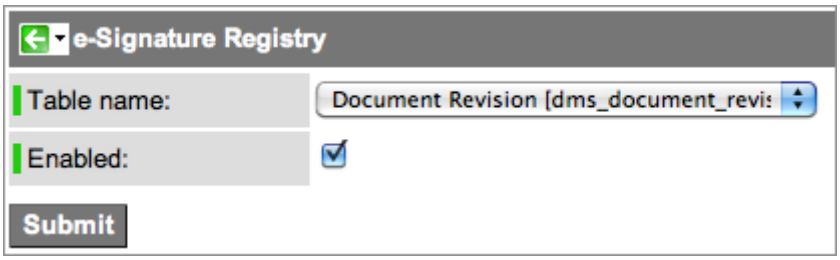
Example



6. Click **Submit**.

Publish an approved revision

Publish a document revision that has been approved.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

About this task

Once a document has been created and edited, a specific revision can be submitted for draft review and final approval. After final approval, the document can be published.

Publish the approved revision from the Document Revisions list.

Note:
Publishing documents to the Knowledge Base requires the Knowledge Document Plugin.

Procedure

1. Navigate to the document record.
2. In the Document Revisions List, click the revision marked **Ready for Publishing**.
3. Click **Publish Revision** to display the **Publish** dialog box.

   The revision number matches the latest revision number. If your standard is to change the revision number when the document is published, such as incrementing the version number to 1.1 or 1.0.1, the change can be made on this dialog box manually.
4. Click **Publish**.

   The published revision is highlighted in green and the stage of previous revisions is automatically changed to *Retired*:

   Note:
   If the approval and publishing process is repeated, the published revision is retired when the new revision is published. Any workflows running against previous revisions are canceled when the document is published.

Submit a revision for draft review

Submit a document draft for review.

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Before you begin
Role required: document_management_admin

or

Role required: document_management_user

About this task
Once a document has been created and edited, a specific revision can be submitted for draft review and final approval. After final approval, the document can be published.

When a draft of the document is ready, submit the draft for review. If the document does not have reviewers identified in the Reviewers field of the document record, the review process is omitted.

Procedure
1. Navigate to the document record.
2. Right-click the appropriate revision.
3. Select **Submit Revision**.

   The revision stage is set to *Awaiting Review*.

   The document name and parameters are changed to read-only. The document state is set to *Active*.

Create or request a new document

Once an administrator has set parameters for the Managed Documents application, you can create or request new documents.

Before you begin
Role required: document_management_admin

or

Role required: document_management_user

Procedure
1. Navigate to **All** > **Managed Documents** > **Create New**.
2. Complete the following fields:

New document fields

Field	Input value
Number	An identifying number for the document. Automatically generated using number maintenance.
Name	A name for the document. Note that the name for the document is combined with other naming components (as defined by the name format) to create the names for each document revision.
Requested by	The person asking that the document be created or updated.
Owner	The approver of the document request. Also responsible for setting completion date with requesters and authors.
Reviewers	The user or users who review the document and provide feedback to owners and authors.

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Field	Input value
Department	The department responsible for the document.
Type	The document purpose. This is a choice list derived from the type parameters.
Classification	The document classification, based on security, audience, and confidentiality. This is a choice list derived from the classification parameters. **Note:** This does not drive any functionality.
Audience	The document readers, such as external or internal. This is a choice list derived from the audience parameters. **Note:** This does not drive any functionality.
State	The current status of the document in the editing and publication process.
Checked out by	The user who currently has the document checked out.
Description	A short description of the document.
Revision Settings	
Name format	The format for the name of each individual revision of the document. For more information, see name format.
Revision format	A choice between the two digit (0.x) or the three digit (0.0.x) revision format.
Auto increment revision	If selected, the revision number automatically increments each time the document is revised.

The *User Permissions* related list determines which users have rights to view and contribute to the document:

User permissions

Field	Input value
User	A reference to a user who is entitled to read but not contribute to a document.
Type	A choice list describing how the user can interact with the document. Options are: ○ Reader - The user can read the document versions. ○ Editor - The user can upload new versions. ○ Owner - The user can edit the document.

The *Group Permissions* related list determines which groups have rights to view and contribute to the document:

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Group permissions

Field	Input value
Group	A reference to a group of users who are entitled to read and contribute to the document.
Type	A choice list describing how group members can interact with the document. Options are: ○ Reader - Group members can read the document versions. ○ Editor - Group members can upload new versions. ○ Owner - Group members can edit the document.

Specify an approver

You can specify approvers for a document record after you save it.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

About this task

You can have one approver or multiple approvers. For example, set multiple approvers to have one person do a quality check of the document and a different individual to serve as a final approver. Approvers are assigned a number. The lowest number (usually number one) approver always goes first, then any other approvers in ascending chronological order. Multiple approvers can have the same sequence number. For example, two approvers can do a quality check and be assigned sequence number 1. Then, two individuals can be final approvers and be assigned sequence number 2.

Procedure

1. Navigate to the document record.
2. Select the additional actions icon and select **Add Approver**.
3. Add a user name.
4. Select a sequence number from the drop-down list.
   Lower numbers approve before higher numbers. For example, approver number one approves before number two.
5. Click **Add User**.
6. Repeat steps 2-5 to add more approvers.

Check in a document

Check in the document after you revise it so other users can check out the document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

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Procedure

1. Navigate to the document record.
2. Select the **Upload/Check In Revision** related link.
3. Click **Browse** and navigate to the revised file.
4. Click **Open**.
5. Check the Name and Revision Number.
6. Click **OK**.

Copy a document

A document can be duplicated at any time. This is useful if you have an existing document that you want to use as a base for a new document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Right-click the header bar and select **Copy Document**.

   An information message with a link to the new document displays:

3. Click **OK**.

   The new document is renamed and includes the word "Copy."

> **Note:**
> Only the latest revision is copied.

Deactivate a document

To change the document state to *Inactive*, deactivate the document. This is useful when changes to a document have been put on hold. An inactive document can be reopened at any time.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Right-click the header bar and select **Deactivate Document**.

> **Note:**
> To activate a document, right-click on the header and click **Reopen Document**.

Reopen a deactivated document

A document that has been deactivated can be reopened.

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Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Right-click the header bar and select **Reopen Document**.

Roll back a document

A document can be rolled back to an earlier revision at any time. Before rolling back to an earlier revision, ensure that the document is not checked out and that you have Editor or Owner permissions for the document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. In the Document Revisions list, click the revision that you want to roll back to.
3. Right-click the header bar and select **Rollback**.
   The Rollback to Revision dialog box displays. The name and revision number are new. The note specifies the revision to which you are rolling back.
4. Change any information on the Rollback to Revision dialog box as necessary.
5. Click **OK**.
   The latest revision is now the revision that you selected for rollback.

Cancel a document

Change the document state to *Cancelled* when no more changes will be made to the document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

About this task

When canceling a document, there is no confirmation message, so ensure that you want to cancel the document.

Procedure

1. Navigate to the document record.
2. Right-click the header bar and select **Cancel Document**.

   An info message confirms the cancellation:

   The **State** is set to **Cancelled**.

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Check out a document

Documents in the Managed Documents application can only be revised by one user at a time. Check out the document to revise it.

Before you begin

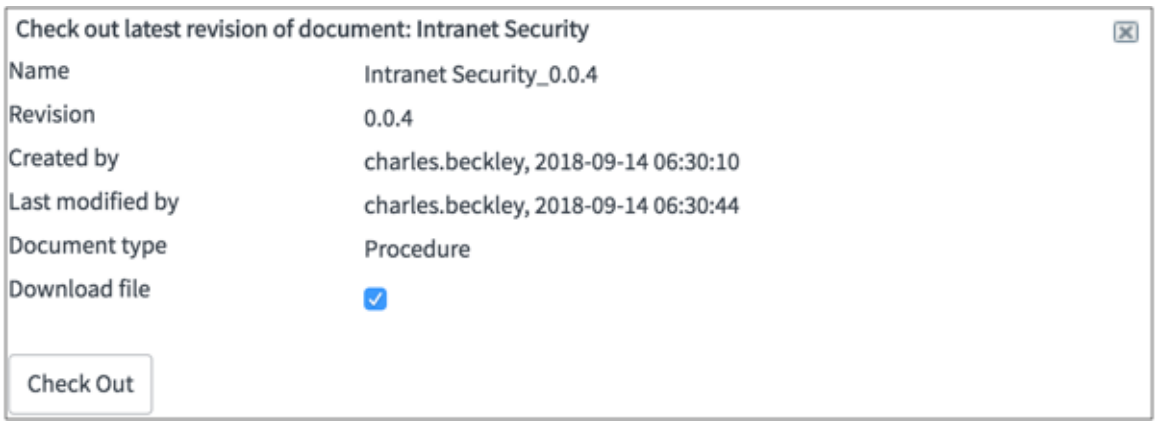
Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Select the **Check Out Document** related link.
3. Select **Download file** to download the current version of the document when it is checked out.



4. Click **Check Out**.

After checking out a document, you can edit the document and make any necessary changes.

Create a document collection

A document collection is a set of individual documents. After documents have been uploaded into Managed Documents, organize the documents by grouping them into collections.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to **All** > **Managed Documents** > **Document** > **My Collections**.
2. Select **New**.
3. Enter a *Name*.
4. **Optional:** Enter a *Description*.
5. Click **Submit**.
6. Click the name of the collection that you created.
7. Click **Edit**.

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8. On the left, double-click an available document or select a document and click **Add**.
9. Click **Save**.
   The Document Collection page displays and the individual documents in the collection are listed.

Upload a document

Upload a document into a saved record. You can upload text files, spreadsheets, presentations, PDF files, and more.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Click the **Upload/Check In Revision** related link.
3. Click **Choose File** and navigate to the file.
4. Click **Open**.
5. Check the Name and Revision Number.
6. Click **OK**.

   After the initial document is uploaded, subsequent revisions can be created by checking out the document.

Create a new managed document record

Configure the properties and policies for a managed document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to **All** > **Managed Documents** > **Create New**.
2. In the **Name** field, type `Policy`.
3. In the **Requested by** field, add your name.
4. In the **Owner** field, add your name.
5. In the **Reviewer** field, add your name.
6. In the **Type** field, select **Policy**.
7. In the **Classification** field, select **Confidential**.
8. In the **Audience** field, select **Internal**.
9. Under **Revision Settings**, select the **Auto increment revision** option.

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Example



10. Click **Submit**.

Check in a document after making changes

After making changes to a document, check the revised document into Managed Documents.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Open the document record.
2. Click the **Upload/Check in Revision** related link.
3. Click **Choose File**, select the revised file, and click **Open**.
4. Check that the **Name** and **Revision Number** contain the updated number.
5. Ensure that the **Check in** option is selected.
6. Click **OK**.
   The Document Revisions list updates to contain the most recent revision.

Check out a document to make changes

After a document is added to a managed document record, check the file out to make changes. Checking documents in and out keeps a record of document changes and ensures that only one person at a time is editing the document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Open the document record.
2. Select the **Check Out Document** related link.

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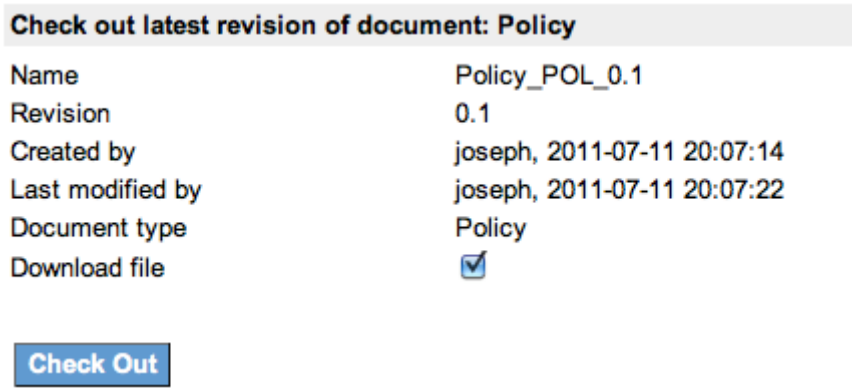

3. Select **Download file**.
4. Click **Check Out**.
5. Open the file and make a small change.
6. Save the document with the same name, but a new revision number.
   For example, `Policy_POL_02.txt`.

Publish a document in Managed Documents

After the document is reviewed and approved, publish the document within Managed Documents.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Open the document record.
2. In the Document Revisions list, click the name of the revision that was approved and is listed in the Ready for Publishing stage.
3. In the header bar, click **Publish Revision**.
4. In the Publish revision dialog box, check that the name and revision number are correct and click **Publish**.
   In the Document Revisions list, the revision you just published is now in the Published stage.

Send a document out for review and approval

When a document is ready, send it out for review and approval. If a reviewer or approver is not identified in the document record, the document is moved directly to the publishing stage.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

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Procedure

1. In the Document Revisions list, right-click the revised document and select **Submit Revision**. Because you identified yourself as the reviewer, you receive an approve request email message.
2. In the email message, click the link next to **Click here to view Approval Request**.
3. **Optional:** View the document by clicking the attachment name under **Document Revision**.
4. Click **Approve**.
   The Approvals page displays and lists the document you just approved.
5. Open the document record.
6. In the Document Revisions list, the revision you approved is now in the Ready for Publishing stage.

Upload a document as an attachment

After creating a document record, add the document to the record as an attachment.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Open the document record.
2. Select the **Upload/Check in Revision** related link.
3. Click **Choose File**.
4. Select a simple document, such as a text file, and click **Open**.
5. Check that the name reads `Policy_POL_0.1`.
6. Click **OK**.

   The document is listed under Document Revisions.

Multi Provider Document Services Framework

Enable your team to collaborate in real time and add versions, store, copy, delete, restore, and upload documents by integrating document providers with your ServiceNow instance.

Activate Multi Provider Document Services Framework

You can activate the Multi Provider Document Services Framework plugin (com.snc.multiprovider_documents) for Document Services if you have the admin role.

Before you begin

Role required: admin

About this task

The following items are installed with the Multi Provider Document Services Framework:

- Plugin
- Roles
- Tables

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Multi Provider Document Services Framework plugin (com.snc.multiprovider_documents) using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Installed with Multi Provider Document Services Framework

Several types of components are installed with activation of the Multi Provider Document Services Framework plugin, including tables and user roles.

Roles installed

Roles installed with multi provider framework

Role	Description
Admin mp_document_admin	Configures multiple providers, remote document actions, and corresponding subflows.
Document User mp_document_user	Creates, updates, and deletes documents managed for providers

Tables installed

Tables installed with multi provider framework

Table	Description
Multi Provider Document mp_document	The documents connected with the third-party provider.
Multi Provider Document Version mp_document_version	The versions related to documents.

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Tables installed with multi provider framework (continued)

Table	Description
Multi Provider Document Activity mp_document_activity	Logs the activity for document and document versions table and can be used to troubleshoot the actions taken on documents and versions.
Multi Provider Collaborators mp_collaborators	Third-party users collaborating on the ServiceNow instance.
Multi Provider Detail mp_provider_detail	Details of the thirty-party providers that have been configured.
Multi Provider Document Action mp_document_action	The actions associated with each subflow.
Multi Provider Permission mp_provider_permission	Permissions allowed by the provider.
Multi Provider Permission Configuration mp_permission_configuration	Role/group mapping to permissions provided from the mp_permission table for each provider.

Multi Provider Document Services Framework Framework roles

Multi Provider Document Services Framework Framework is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Administrator [mp_document_admin]

Configure multi provider, remote document action, and corresponding subflows.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

User [mp_document_user]

Create, update, and delete documents managed for providers.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Microsoft OneDrive integration with Document Services

Use Microsoft OneDrive to copy, delete, restore, and get version actions on documents directly in your ServiceNow instance.

Benefits of Microsoft OneDrive integration

Increase collaboration by integrating Microsoft OneDrive with your ServiceNow instance.

With Microsoft OneDrive integration you can do the following:

- Edit, share, and copy documents from Microsoft OneDrive to your ServiceNow instance.
- Edit, share, and copy documents from a ServiceNow instance to Microsoft OneDrive.
- Push a document authored in your ServiceNow instance to Microsoft SharePoint.
- Attach a shared link to a record.
- Share links to collaborate and edit documents in real time.
- Fetch the current version of the document.
- Collaborate with Microsoft 365 for reviewing, approving, or co-authoring documents.
- Migrate documents from Microsoft SharePoint to your ServiceNow instance.

Activation information

To integrate Microsoft OneDrive with Document Services, install the Multi Provider Document Services Framework plugin (com.snc.multiprovider_documents). For more information, see Activate Multi Provider Document Services Framework.

You also need to install the Document Services Framework for Microsoft OneDrive.

Document Services Framework for Microsoft OneDrive

Integrate the Document Services Framework with Microsoft OneDrive.

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Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft OneDrive spoke for Document Services Framework spoke v 1.2.2 is the latest version.

Supported versions

This spoke was built for Microsoft OneDrive Spoke for Document Services Framework V1.1, but might be compatible with later versions.

Key features

Microsoft OneDrive Spoke for Document Services Framework enables a flow designer to do the following:

- Upload documents to Microsoft OneDrive
- Collaborate
- Manage versions
- Download documents

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)
- Multi Provider Document Services Framework (com.snc.multiprovider_documents)
- Remote Directory Sync (com.snc.remote_directory_sync)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note:
Some of these plugins are licensable features and require appropriate licenses if used outside the spoke implementation.

Spoke subflows

The Microsoft OneDrive Spoke for Document Services Framework provides sample subflows to demonstrate the automation of Document Services tasks. To customize a sample subflow, copy it to a new application scope. The following tables list the available sample subflows for V1 and V2.

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Note:
Only V2 subflows support the Microsoft SharePoint site.

V1 Subflows

Subflow	Description
Add Collaborator To Group	Adds the supplied CollaboratorID as the Member or Owner specified by Type.
Collaborate Document	Associates a document with a group or a user on Microsoft OneDrive.
Collaborate Document With Recipient Type	Associates a document with a specified Recipient Type
Connect Document From OneDrive Using Path	Connects the Microsoft OneDrive document.
Copy OneDrive Document Version	Copies the document with the specified version from Microsoft OneDrive to an attachment in the ServiceNow instance.
Create Document	Copies the document to Microsoft OneDrive, creates a record in the Multi Provider Document [mp_document] table, and adds a version in the Multi Provider Document Version [mp_document_version] table.
Create Group	Creates a group as specified in Microsoft OneDrive and updates the Multi Provider Permission Configuration [mp_permission_configuration] table.
Delete Document	Deletes the document in Microsoft OneDrive and removes its corresponding records in the Multi Provider Document Version [mp_document_version] tables.
Delete Document Version	Deletes the specified version of the document in Microsoft OneDrive and the ServiceNow instance and deletes a record in the Multi Provider Document Version [mp_document_version] table.
Get All Document Version	Retrieves all document versions from Microsoft OneDrive and creates and updates records in the Multi Provider Document Version [mp_document_version] table.
Get Document from OneDrive	Copies the document from Microsoft OneDrive to the specified document name. It also creates a record in the Multi Provider Document [mp_document] table and in all document versions in the Multi Provider Document Version [mp_document_version] table.
Restore Document Version	Restore the document to the version in Microsoft OneDrive.
Sync Collaborators	Syncs all Microsoft Azure users into the Multi Provider Collaborators [mp_collaborators] table.

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V1 Subflows (continued)

Subflow	Description
	If the user is deleted or updated, the user's record in the Multi Provider Collaborators [mp_collaborators] table is checked, if it's present then the record is deleted or updated. If the user is newly added, then it creates an entry in the Multi Provider Collaborators [mp_collaborators] table under Multi Provider Documents. **Note:** The scheduled job with the name **Sync Collaborators** triggers the subflow for Sync Collaborators. You can choose from the available run a script option. The default option is **On Demand**. The job is run based on the set schedule and collaborators are synchronized accordingly. For more information, see Automatically run a script of your choosing.
Delete Collaborator Record	Deletes the specified collaborator record from the Multi Provider Collaborators [mp_collaborators] table.
Update Document Content	Updates the specified document with the provided attachment in Microsoft OneDrive that corresponds to the document ID. The attachment name should match the name of the document in Microsoft OneDrive.
Upload Large File	Uploads an attachment to Microsoft OneDrive. The maximum size of the file can't exceed 60 MB.
Get Latest URL	Gets the latest URL to a document in the Microsoft OneDrive.
Reconnect Document from Microsoft OneDrive	Reconnects to a document in Microsoft OneDrive. **Note:** Before using the subflow, ensure that the corresponding Microsoft OneDrive connection and credential are created and the Microsoft OneDrive authorization token is available.

V2 Subflows

Subflow	Description
Get Document Latest URL V2	Gets the latest URL from Microsoft OneDrive for the referred document ID.
Update Document Content V2	Updates the specified document with the provided attachment content in Microsoft OneDrive corresponding to the document ID from table Multi Provider Document sys_id. The attachment name should match with the name of the document in Microsoft OneDrive.
Collaborate Document V2	Associates a document with a specified recipient type.

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V2 Subflows (continued)

Subflow	Description
Connect Document From OneDrive Using Path V2	Connects the Microsoft OneDrive document that can also be tracked under Multi Provider Documents.
Copy OneDrive Document Version V2	Copies the document with the specified version from Microsoft OneDrive to an attachment in the ServiceNow instance.
Create Document V2	Copies the document to Microsoft OneDrive and creates a record in the Multi Provider Document [mp_document] table and the Multi Provider Document Version [mp_document_version] table for Multi Provider Documents.
Delete Document V2	Deletes the document in Microsoft OneDrive and removes its corresponding records in the Multi Provider Document [mp_document] table and the Multi Provider Document Version [mp_document_version] tables.
Delete Document Version V2	Deletes the particular version of the document in bothMicrosoft OneDrive and deletes a record in the Multi Provider Document Version [mp_document_version] table under Multi Provider Documents.
Get All Document Versions V2	Retrieves all the document versions from Microsoft OneDrive and creates or updates records in the Multi Provider Document Version [mp_document_version] table under Multi Provider Documents. This subflow supports documents from different sources supported by Microsoft OneDrive.
Get Document from OneDrive V2	Copies the document from Microsoft OneDrive to the specified document name. It also creates a record in the Multi Provider Document [mp_document] table and all its versions in the Multi Provider Document Version [mp_document_version] table under Multi Provider Documents.
Reconnect Document from Microsoft OneDrive V2	Reconnects to a document in the Microsoft OneDrive. **Note:** Before using the subflow, ensure that the corresponding Microsoft OneDrive connection and credential are created and the Microsoft OneDrive authorization token is available.
Restore Document Version V2	Restores the document to the version provided in the Microsoft OneDrive.

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V2 Subflows (continued)

Subflow	Description
Sync Collaborators V2	Syncs all Microsoft Azure users into the Collaborators [mp_collaborators] table under Multi Provider Documents.
Upload Large File V2	Uploads an attachment to Microsoft OneDrive. The maximum size of the file can't exceed 60 MB.
Remove Document Collaboration	Removes collaboration on a Microsoft OneDrive document.
Update Document Collaboration	Updates collaboration on a Microsoft OneDrive document.

Note:
The V2 subflows work only for documents attached to the platform using the Create Document V2 or Connect Document V2 subflows.

.

Spoke Actions

The Microsoft OneDrive Spoke for Document Services Framework provides sample actions to automate Document Services tasks when events occur in ServiceNow. The following table lists the available sample actions.

Action	Description
Delete Collaborator Record	Deletes the specified collaborator record from the Multi Provider Collaborators [mp_collaborators] table.
Delete document	Deletes the document record from the Multi Provider Document [mp_document] table.
Delete document and versions	Deletes the specified document and all of its versions from the Multi Provider Document Version [mp_document_version] table.
Delete document version	Deletes specified versions of a document from the Multi Provider Document Version [mp_document_version] table.
Delete versions of document	Deletes all versions of a specified document.
Look up Target Record Existence	Checks for the existence of a target record in the specified target table.
Look Up Files and Folders	Retrieves the list of files and folders under the given Folder ID for the selected Source and Source ID. If no source is selected, then it lists the contents of the root folder by default.
Look up Sites Based On Query String Stream	Lists all the sites satisfying the specified query string.
Update Delta Token	Updates the system property *deltaToken* with the specified delta token.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see .

Setup Microsoft OneDrive for Document Services

Integrate the ServiceNow instance and Microsoft OneDrive for Document Services by creating a custom OAuth application in Document Services to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Set up and connect Microsoft Azure AD Spoke, see Set up Microsoft Entra ID spoke and .

Microsoft OneDrive requirements:

- Microsoft OneDrive account
- Microsoft Azure account
- Microsoft OneDrive tenant administrator credentials

Role required: admin

About this task

Complete these steps from your Azure Developer account. See the Azure product documentation for instructions on creating and configuring custom applications.

Procedure

1. Log in to the Microsoft Azure registration portal with your organization credentials.
   For more information, see the Microsoft documentation on the Microsoft Azure App registration portal.
2. Register a new custom application.
   a. Provide the application name and the supported account type.
   b. Select **Register**.
   c. Enter the redirect URL in the following format: `https://<instance>.service-now.com/oauth_redirect.do`.
   An overview of the application's basic information is Displayed.
3. Copy the application ID to a text file.
   You will use this ID and the client secret generated in the next step to register the app as a third-party OAuth provider on your ServiceNow instance. The application ID is the client ID when you connect the application to your ServiceNow instance.
4. Add a client secret.
   a. In Microsoft Azure, navigate to **Manage** > **Certificates & secrets**.
   b. Provide a description and an expiration date.
   c. Select **Add**.
5. Enable the permissions you want the application to support.
   For more information, see the Microsoft Graph permissions reference documentation.

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a. In Microsoft Azure, navigate to **Manage** > **API permissions**.

b. Click the Microsoft Graph tile.

c. Select the delegated or application permissions that the application supports.

Delegated permissions enable the application to access the API as a signed-in user.

Application permissions enable the application to run as a background service or daemon without a signed-in user.

You must mention these API permissions in the **OAuth Entity scopes** tab while configuring the application registry.

d. Ensure that required API permissions are provided for your custom app.

Name	OAuth scope
Files.Read	Files.Read
Files.Read.All	Files.Read.All
offline_access	offline_access
Files.ReadWrite	Files.ReadWrite
Files.ReadWrite.All	Files.ReadWrite.All
AuditLog.Read.All	AuditLog.Read.All
Directory.AccessAsUser.All	Directory.AccessAsUser.All
Directory.Read.All	Directory.Read.All
User.Read	User.Read

e. Select **Add permissions**.

Register Microsoft OneDrive as an OAuth provider for Document Services

Use the information generated during Microsoft OneDrive account configuration to register Microsoft OneDrive as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Select **New**.
3. On the screen titled **What kind of OAuth application**, select **Connect to a third-party OAuth Provider**.
4. On the form, fill in the fields.

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Application Registries form

Field	Value required
Name	Name to uniquely identify the record.
Client ID	Application ID of the OneDrive application you created in Microsoft Azure.
Client Secret	The Client Secret you generated when you created the application in Microsoft Azure.
Default Grant type	This value should be **Authorization Code**.
Authorization URL	`https://login.microsoftonline.com/common/oauth2/v2.0/authorize` Note that you have to unlock this field and then lock it again.
Token URL	`https://login.microsoftonline.com/common/oauth2/v2.0/token` Note that you have to unlock this field and then lock it again.
Redirect URL	`https://<instance>.service-now.com/oauth_redirect.do` Note that you have to unlock this field and then lock it again.

5. Right-click in the form header and select **Save**.
   An OAuth Entity Profile record is created.
6. In the OAuth Entity Scopes related list, add scopes to match the permissions you defined when you configured the Microsoft OneDrive application.

   a. Select **Insert a new row**.

   b. Enter the name and the OAuth scope of the permission, which for these Document Services scopes are the same for both values.
      - Files.Read
      - Files.Read.All
      - offline_access
      - Files.ReadWrite
      - Files.ReadWrite.All

7. Right-click in the form header and select **Save**.
8. Select **Update**.

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Result
The system validates the OAuth credentials.

Google Drive integration with Document Services

Use Google Drive to manage and sync your documents, and get version actions on documents directly in your ServiceNow instance. You can also collaborate on documents and manage attachments hosted within Google Drive.

Benefits of Google Drive integration

Increase collaboration by integrating Google Drive with your ServiceNow instance.

With the Google Drive integration, you can do the following:

- Edit, share, copy, and delete documents from Google Drive to your ServiceNow instance.
- Edit, share, copy, and delete documents from a ServiceNow instance to Google Drive.
- Fetch the current version of the document.
- Collaborate for reviewing, approving, or co-authoring documents.
- Integrate with Google Drive to create, update, and collaborate on documents within the platform

Activation information

To integrate Google Drive with Document Services, install the Multi Provider Document Services Framework plugin (com.snc.multiprovider_documents). For more information, see Activate Multi Provider Document Services Framework.

Document Services Framework for Google Drive

Integrate the Document Services with Google Drive.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This Spoke was built for Document Services Framework V1.0, but may be compatible with Utah and later versions.

Key features

Document Services Framework for Google Drive enables a flow designer to:

- Upload document to Google Drive
- Collaborate
- Manage versions
- Download documents

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Spoke requirements

- Google Drive Spoke
- Google Directory Spoke

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)
- Multi Provider Document Services Framework (com.snc.multiprovider_documents)
- Remote Directory Sync (com.snc.remote_directory_sync)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note:
Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke subflows

The Document Services Framework for Google Drive provides sample subflows to demonstrate automating Google Drive tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Create Document	Copies the document to Google Drive and creates a record in Documents table with the folder ID and created version in Version table under Multi Provider Documents.
Create Document V1	Copies the document to Google Drive and creates a record in Documents table with shareable folder URL and created version in Version table under Multi Provider Document Services Framework Documents.
Create Group	Creates a group as specified in Google Drive and update the Permission Configurations table under Multi Provider Documents.
Add Collaborator To Group	Given a Group ID from Google Drive, this subflow will add the given collaborator as specified by role.
Collaborate Document	Adds a permission to a given user, group or domain, or to anyone, for a file. This permission is based on a permission type and role and is how collaboration is configured in Google Drive. If **User** or **Group** is selected, the email address is required for those users and groups. If **Domain** is selected, the domain name to create permission for is required. If **Anyone** is selected, then anyone has permission to the file or folder.
Connect Document From	Connects the Google Drive document using the ID can be tracked under Multi Provider Document Services Framework documents

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Subflow	Description
Google Drive Using ID	
Connect Document From Google Drive V1	Connect the Google Drive document using the sharable URL for the document can be tracked under Multi Provider Document Services Framework documents.
Copy Google Drive Document Version	Copies the document with the given version from Google Drive to attachment in ServiceNow.
Delete Document	Deletes the document in Google Drive and remove its corresponding records in documents and versions tables.
Delete Document Version	Deletes the document in Google Drive and remove its corresponding records in documents and version tables.
Get All Document Versions	Gets all the document versions from Google Drive and creates or updates records in Versions table under Multi Provider Documents.
Get Document From Google Drive	Copies the document from Google Drive to the Document Name referred by creating a record in documents table and all its versions in Versions table under Multi Provider Documents.
Get Document Latest URL	Constructs the web view URL and web edit URL for the file without verifying if the file actually exists in Google Drive. Consuming APIs are required to verify if the file is present or not.
Get Oldest Document Version	Returns the oldest version of the document.
Reconnect Document From Google Drive	Reconnects the Google Drive document that can be tracked under Multi Provider Documents.
Sync Collaborator	Syncs all Google Drive users in a domain with the Collaborators table under Multi Provider Documents.
Update Document Content	Updates the document with the attached content in Google Drive corresponding with the document ID from table Multi Provider Documents sys_id.

Spoke actions

The Document Services Framework for Google Drive provides actions to automate Document Services tasks when events occurs in your ServiceNow instance. Available actions include:

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Action	Description
Delete document and versions	Deletes the specified document along with versions from Multi Provider document and versions table.
Look Up Incremental Files and Folders	Returns a list of Google Drive files and folders under the given folder ID.
Look Up Files and Folders Stream	Retrieves the list of files and folders under the given folder.
Copy File Revision as Attachment	Copies the given Revision ID for a File ID to any record in ServiceNow.
Delete document version	Deletes the specified versions of a document from Multi Provider document versions table.
Look Up Target Record Existence	Checks for the existence of the target record in the specified target table.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Document Services framework for Google Drive.

Set up Document Services framework for Google Drive

Integrate a ServiceNow instance and Google Drive spoke for Google Drive by using Google Drive credentials to authenticate ServiceNow requests.

Before you begin

Request a Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Role required: admin

Procedure

1. Set up and connect Google Drive Spoke.
   For more information, see Set up Google Drive spoke.
2. Set up and connect Google Directory Spoke.
   For more information, see Google Directory Spoke.
3. Activate Document Services for Google Drive Spoke.
   For more information, see Document Services Framework for Google Drive.

Knowledge Management

The ServiceNow® Knowledge Management (KM) application enables the sharing of information in knowledge bases. These knowledge bases contain articles that provide users with information such as self-help, troubleshooting, and task resolution.

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Get started

Explore  Explore Knowledge Management	Configure  Plan and configure your Knowledge Management implementation	Use Knowledge Management  Search and find information on self-help, troubleshooting, and task resolution
Create and maintain articles  Create and maintain articles in the knowledge base	Knowledge Management Reference  Additional information to configure and administer Knowledge Management	Analytics and Reporting Solutions  Platform Analytics Solutions and Demand Insights dashboards to improve your business processes and practices

Troubleshoot and get help

- Ask or answer questions about Knowledge Management and review getting started recommendations and more in the ServiceNow Community
- View the Knowledge Management Process Guide on Now Create
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring Knowledge Management

Learn more about Knowledge Management with a sample workflow and review the benefits it can provide for different users in your organization.

Knowledge Management overview

Knowledge Management supports processes for creating, categorizing, reviewing, and approving articles. Users can search and browse articles as well as provide feedback.

To support multiple groups, knowledge bases can be assigned to individual managers. Separate workflows can be used for publishing and retiring articles, and separate access controls can be used to control reading and contributing.

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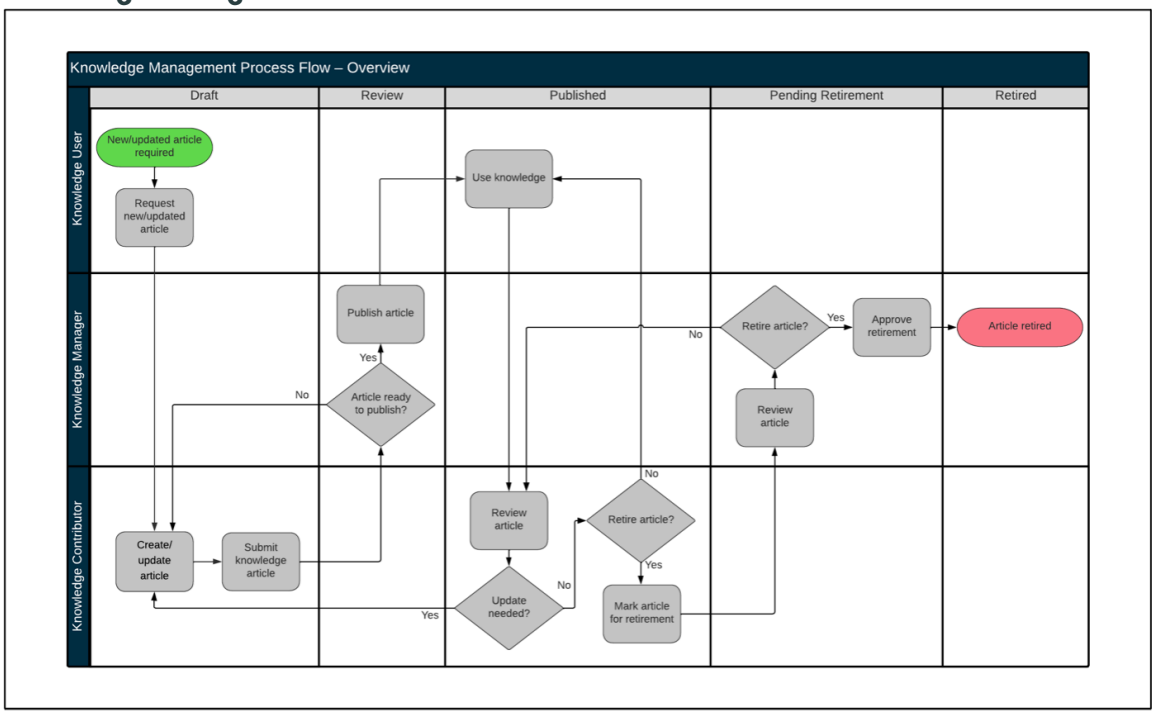
Knowledge Management workflow

This infographic shows a sample end-to-end workflow of how different users in an organization work together to create, share, use, and manage articles.

Knowledge Management



In this workflow:

1. The knowledge user needs a new or updated knowledge article and requests it.
2. The knowledge contributor creates or updates an article and then submits it for review.
3. The knowledge manager reviews the article and either publishes it or sends it back to the knowledge contributor for revisions.
4. The knowledge user reads and shares the article. In parallel, a knowledge manager continuously reviews articles to determine their relevancy.
5. The knowledge manager marks articles that are no longer needed for retirement.
6. A knowledge manager reviews and approves or rejects the article retirement.

Knowledge Management benefits

Benefit	Feature	Users
Create a consistent structure for knowledge articles	Knowledge article templates	Knowledge manager
Create multiple knowledge bases for different groups within your organization	Knowledge bases	Knowledge administrator and manager
Create a category structure for each knowledge base with any number of levels	Knowledge article categories	Knowledge manager

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Benefit	Feature	Users
Define permissions per knowledge base	User criteria, Scoped knowledge bases	Knowledge administrator and manager
Integrate with and search external knowledge sources	External content integration feature and Indexing and searching external content in AI Search	Administrator
Create knowledge articles using generative AI	Now Assist in Knowledge Management	Knowledge contributor
Import Word documents into knowledge articles and/or author knowledge in Word	Knowledge Management - Add-in for Microsoft Word, Word document importing	Knowledge contributor
Subscribe to relevant articles	Knowledge subscriptions	Knowledge user
Provide feedback and rate articles	Feedback and ratings	Knowledge user
Maintain a high quality of content and enable constant improvement	Article quality index (AQI)	Knowledge administrator (creates AQI), knowledge coach or domain expert (performs AQI reviews)
Identify knowledge gaps and improve the content of your knowledge base	Knowledge demand insights	Knowledge manager or domain expert
Determine the usage of knowledge content and confirm that the proper processes and procedures are being followed for content creation	Knowledge Management Platform Analytics Solutions	Knowledge manager

Sitemap Generator for the Knowledge Portal

The ServiceNow® Sitemap Generator application enables you to efficiently define and automatically generate XML sitemaps.

Sitemap Generator configuration requirements for the Knowledge Portal

The sitemap is generated from a script or static XML. Validating sitemaps isn't handled automatically, so verify when creating a sitemap that its contents meet the following requirements:

- Includes only the knowledge base configured for the Knowledge Portal
- Includes only Knowledge Portal pages with unauthenticated user access
- Excludes Knowledge Portal URLs that aren't publicly accessible
- Excludes pages that respond with a 301 redirect
- Excluded retired and expired knowledge base articles

For information about sitemap requirements for search engine optimization (SEO), see Build and submit a sitemap in the Google documentation.

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I18N - Knowledge internationalization

The optional knowledge internationalization features enable knowledge users to view articles in multiple languages.

Beginning with the San Diego release, the I18N: Knowledge Management Internationalization v2 (com.glideapp.knowledge.i18n2) plugin is installed when any language pack is activated. In versions prior to San Diego, this plugin was installed along with the Internationalization (com.glide.i18n) plugin.

Knowledge internationalization enables the knowledge management team to create language-specific knowledge articles and keep translations of the same article related to each other so they are easy to manage. Users can view and search within their own language while still being able to view articles in other languages when necessary.

Set a custom language for the article

Beginning with the San Diego release, users with elevated privileges can add a custom language by adding language entries in the Choice [sys_choice] table to display the selected article in multiple languages. On the article page, the **Language** list shows all the languages for which the article language translation is available.

Set the search language for articles

You can set the default language for searching articles to a language different from the logged-in language by specifying the language as the value of the *glide.knowman.search.default_language* system property. For example, if French is the logged-in language and you want to set English as the default language for searched articles, specify English in the system property. You can also switch to French in the UI to see the French articles. If the system property is not set, the logged-in language of the user is set as the default article language. For more information, see Other knowledge properties.

To enable search for different languages simultaneously, navigate to **Knowledge Administration** > **Knowledge Search** > **Properties** > **Enable multi language search** and select the **Yes** check box. For information about performing a search on all available languages simultaneously, see Search using Knowledge Management v3.

Note:
If the *glide.knowman.search.default_language* system property is inactive, you can search one language at a time. If the property is enabled, you can search for multiple languages simultaneously.

Scoped knowledge bases

To protect knowledge bases containing sensitive articles, use a scoped knowledge base. Even system administrators and knowledge administrators can't administer scoped knowledge bases unless explicitly authorized through user criteria.

For example, say you have a knowledge article with sensitive payroll information that should be seen only by the Payroll department and not by a system administrator or knowledge administrator. You could create a knowledge article with the sensitive information in a scoped knowledge base within the Human Resources: Core application.

Only users with the admin role of an application and the knowledge_admin role can administer a scoped knowledge base. You control access to knowledge bases of an application with application administration enabled, such as HR, through the ACLs of the knowledge tables in the application instead of global ACLs. To define access to a scoped knowledge base, specify appropriate user criteria for users, including system administrators and knowledge administrators.

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Note:
For Scope Master tables to derive scope and execute scoped ACLS, you must set the *glide.enforce_security_scope.<scope_name>* system property to true.

You can't modify the scope of existing knowledge bases. They remain in the global scope. However, you can create a scoped knowledge base to protect sensitive knowledge articles.

To create a scoped knowledge base for an application, in addition to the knowledge_admin or admin role, you must have access to view and select that application in the application picker (see Application picker). For example, before you create a knowledge base in the Human Resources: Core application, you must select the Human Resources: Core application in the application picker, and then create the knowledge base. Then, when you create a knowledge base, on the Knowledge base form, the application scope of the knowledge base is set in the **Application** field.

Related topics

- Create a knowledge base
- Select an application from the application picker
- Application administration
- Control access at the knowledge base level through user criteria

Machine learning solutions for Knowledge Management

Machine learning in Knowledge Management helps improve knowledge governance and quality of your knowledge base.

Machine learning in Knowledge Management has the following benefits:

- Improves the quality of your knowledge base by avoiding duplicate articles and makes the knowledge base more Knowledge-Centred Service (KCS) compliant.
- Suggests related articles to help you solve an issue or resolve a question.
- Identifies knowledge gaps and improves content of your knowledge base using the Knowledge Demand Insights feature.

Predictive Intelligence for Knowledge Management

The Predictive Intelligence for Knowledge Management capability uses machine-learning algorithms to provide various Knowledge Management capabilities, such as similar articles and knowledge demand insights.

Solution definitions for Predictive Intelligence for Knowledge Management

The solution definitions for Predictive Intelligence for Knowledge Management capability are available in the Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml). For more information about the plugin, see Additional plugins for Knowledge Management.

Solution definition and solution type

Solution Definition	Solution Type	Description
Knowledge Similar Articles	Similarity	Suggests related articles based on the short

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Solution definition and solution type (continued)

Solution Definition	Solution Type	Description
Note: This solution definition is available as a template on instances where both the Predictive Intelligence for Contextual Search plugin (com.snc.contextual_search_ml) and Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml) are activated.		description of articles. You can see the results in the following places: • The Knowledge results section on the Knowledge form when creating an article in the Knowledge Management Service Portal. If the Knowledge results section isn't displayed on the Knowledge form, you may need to configure the form, to add the **Contextual Search Results** field. For more information, see Configuring the form layout. • The Related Articles section on the knowledge article view page in the Knowledge Management Service Portal and Now Mobile applications. • The Agent assist in Agent Workspace when the **Similar Articles (ML)** option is selected.
Demand Insights: Case Clusters Need Knowledge	Clustering	Populates collections of closed and resolved customer service cases on the Demand Insights for Cases dashboard.
Demand Insights: Incident Clusters Need Knowledge	Clustering	Populates collections of closed and resolved incidents on the Demand Insights for Incidents dashboard.
Demand Insights: Similar Cases and Knowledge	Similarity	Compares similarity of incidents with knowledge bases and identifies similar closed and resolved customer service cases as candidate knowledge gaps.
Demand Insights: Similar Incidents and Knowledge	Similarity	Compares similarity of incidents with knowledge bases and identifies similar closed and resolved incidents as candidate knowledge gaps.

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Related topics

- Train the similarity solution for Knowledge Management to find related articles
- Create a knowledge article in Agent Workspace
- Knowledge demand insights
- Demand Insights for Cases dashboard

Knowledge article templates

Article templates have pre-defined fields structured in a specific order. These templates help create a consistent structure for knowledge articles.

Using the Knowledge Article Templates feature, as a knowledge administrator (a user with knowledge_admin role), you can create article templates, add or customize fields in a template, and activate or deactivate a template.

As a security administrator (a user with security_admin role), you can configure field-level security in any template to make it visible to specific users.

As an author, you can create articles using pre-defined article templates or any newly created article templates.

Pre-defined knowledge article templates

Use either the standard template or one of the pre-defined How To, What Is, FAQ or KCS article templates.

Note:

When you upgrade Knowledge Management to Kingston or later releases, all the existing articles from the earlier version automatically use the standard template of the upgraded version. For example, if you upgrade Knowledge Management from Jakarta to Kingston, all existing articles use the standard template available in the Kingston version.

All pre-defined templates are inactive by default. If you do not activate a template, the articles automatically use the standard template. As a knowledge admin, you can activate a template by navigating to **Knowledge** > **Administration** > **Article Templates**. Then in the article template list, set the **Active** field to true for one or more templates you would like to activate.

Templates are associated with knowledge bases. Only templates which are active and associated with a knowledge base are shown.

The template structure is stored in kb_article_template while the fields for each template are stored in kb_article_template_definition. For creating and manipulating templates navigate to **Knowledge** > **Article Templates**.

The table below lists the fields available in each template and the name of the template table.

Pre-defined knowledge article templates

Template name	Template fields	Maps to table	SEO Description Tag
FAQ	• Question • Answer	FAQ [kb_template_faq]	Question

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Pre-defined knowledge article templates (continued)

Template name	Template fields	Maps to table	SEO Description Tag
How To	• Introduction • Instructions	How To [kb_template_how_to]	Introduction
What Is	• Introduction • Explanation	What Is [kb_template_what_is]	Introduction
KCS Article	• Issue • Environment • Cause • Resolution	KCS Article [kb_template_kcs_article]	Issue
Standard	Text	kb_knowledge	Text

Activating knowledge article templates

The Knowledge Article Templates feature is activated with the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin. After the feature is activated, when creating an article, option to choose a template for the article appears. For details, see Activate the Knowledge Management Advanced plugin.

Deactivating knowledge article templates

You cannot delete an article template because article templates have an associated child table. Deleting a template would also require deleting the child table. Due to the limitations on dropping tables, article templates and template columns are explicitly made non-deletable. Instead, you can disable the Knowledge Article Templates feature by clearing the **Active** check box on the Article Template form.

Note:
The Standard template is available by default and can't be made inactive.

Related topics

Configure knowledge article templates

Knowledge blocks

Simplify knowledge authoring for writers and knowledge consumption for readers with knowledge blocks. Knowledge blocks are reusable pieces of content secured by user criteria that you can add to knowledge articles in a knowledge base. The user criteria controls which users can read or not read the block content in an article or search, enabling users to more easily view content that is relevant to them.

Knowledge blocks are available for use in ServiceNow AI Platform only.

How to use knowledge blocks

To use knowledge blocks, a knowledge administrator or manager must enable the knowledge blocks feature for each knowledge base in which the blocks will be used.

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Enable knowledge blocks for each knowledge base

Knowledge contributors can create knowledge blocks and insert them into articles in a knowledge base:

Note:
Knowledge blocks are not supported in articles of type wiki. By default, knowledge block doesn't show files attached to it. However, you can see images and text are visible on KB's created from block files.

- Create a knowledge block
- Add knowledge blocks to a knowledge article
- Preview a knowledge article with knowledge blocks by user or date

Knowledge block content can be read or not read in an article or search based on user criteria set at the knowledge base and knowledge block level. See Select user criteria for a knowledge block for more information.

Example: Holiday calendar with location-specific knowledge block content

You are part of an enterprise HR organization that maintains a company knowledge base. You want to create a holiday calendar so that employees know which days of the year are company holidays. Since the company has multiple locations and holiday dates vary based on where the employee is located, there are several ways that you could create the knowledge article.

One way is that you could create a knowledge article for each location, with an article for Location A, Location B, and so on.

- Pros: simplified consumption. Employees have a single article to search for and read.
- Cons: more work for HR. HR has multiple articles to manage and update for each location where the company has employees.

Another way is that you could create a single knowledge article that includes sections for each location.

- Pros: simplified authoring. HR has a single article to manage and update.
- Cons: more work for employees. Employee must scroll through and disregard extraneous content to find the section in the article that pertains to them.

With knowledge blocks, you can create a single knowledge article with location-specific block content secured by user criteria. This approach helps to reduce the workload for both HR and employees. As an HR agent, you have a single article to manage and update. Employees have a single article to search for and read, with the user criteria ensuring that they only view content that is relevant to them.

If you are using a custom search or knowledge article viewer

If you are using a custom search or knowledge article viewer with your application, you should integrate it with the appropriate knowledge or knowledge blocks API. (Integration is only necessary if you are using a custom search or knowledge article viewer.)

Integrating a custom search or knowledge article viewer with knowledge blocks

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Activation information

To use knowledge blocks in your application, you must activate knowledge blocks. For information on what components are installed with the feature, see Components installed with knowledge blocks.

Note:
Activating knowledge blocks automatically activates Knowledge Management Advanced, which enables advanced features such as article versioning. Knowledge blocks can be used with or without the article versioning feature. To disable the feature, see Disable the article versioning feature.

Knowledge subscriptions

Subscribe to knowledge bases and knowledge articles to receive email notifications about new articles and article revisions or comments.

- Subscribed to a knowledge base:
  - Knowledge base owners are auto-subscribed to all articles in the knowledge bases they own. They receive email notifications when new articles are created or revised (published) in the knowledge base.
  - Users who subscribe to a knowledge base receive email notifications when new articles are created in the knowledge base or if the existing articles are revised (published).
- Subscribed to a knowledge article:
  - Knowledge authors are auto-subscribed to the articles they create. They receive email notifications when the articles they created are checked out or revised (published) by other authors, and if the articles receive user comments.
  - Users who subscribe to an article receive email notifications when the article is revised (published).

Users can set their Knowledge notification preferences using **System Settings**. For more information, see Managing email notifications in Knowledge Management and Set knowledge notification preferences.

The knowledge subscription feature is available for both the Knowledge Management v3 user interface and the Knowledge Management Service Portal.

If the article versioning feature is enabled, the following notifications are also sent:

- An article is checked out
- An article is revised
- A new version of an article is published

Activation information

The knowledge subscriptions feature requires the Knowledge Management Advanced plugin (com.snc.knowledge_advanced). For more information, see Configure knowledge subscriptions.

Related topics

Use knowledge subscriptions

Knowledge article version numbers

Article versioning

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Knowledge demand insights

Identify knowledge gaps and improve content of your knowledge base using the Knowledge Demand Insights feature.

The Knowledge Demand Insights feature automates the discovery of knowledge gaps in your knowledge bases. Knowledge gaps are topics on which knowledge bases are missing knowledge articles.

Addressing knowledge gaps has the following benefits:

- Improve effectiveness of self-service: Self-service users get more relevant information for research, troubleshooting, and how to queries.
- Increase case or incident resolutions: Having relevant information available helps you deflect future cases.
- Improved case resolution: Agents can find more relevant knowledge articles to solve cases, incidents, problems, and so on.

Activation information

The Knowledge Demand Insights feature requires the Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml). For more information, see Predictive Intelligence for Knowledge Management and Additional plugins for Knowledge Management.

Demand insights dashboards

You can use a demand insights dashboard for your tasks to analyze candidate knowledge gaps and create knowledge gap feedback tasks. By default, the Knowledge Demand Insights feature includes **Demand Insights for Incidents**, **Demand Insights for Cases**, and **Demand Insights: Similar HR Cases and Knowledge** dashboards for incidents, customer service cases, and HR cases, respectively. For other tasks, you can create a dashboard. To access a demand insights dashboard, you must have read access to the tasks and the sn_km_ml.knowledge_curation_user role. For more information, see Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks.

Related topics

Demand Insights for Cases dashboard

Demand Insights for Incidents dashboard

Demand Insights for HR Cases dashboard

Self-Service Analytics

The Self-Service Analytics framework enables you to gather information about user activities and deflection outcomes related to those activities.

Display the effectiveness of self-service channels by using reports and dashboards based on the data generated by the Self-Service Analytics framework. This Self-Service Analytics data is used by the Self-Service Analytics dashboard for customer service. You can also use the Self-Service Analytics framework in dashboards of other applications that use the Subscriptions and Activity Feed Framework. For more information, see Self-Service Analytics dashboard for customer service.

Analyzing self-service deflection metrics has the following benefits:

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- Measure self-service effectiveness through self-service KPIs.
- Quantify successful self-service engagements to take corrective actions.
- Define custom self-service KPIs tailored to your organization.

Activation information

The Self-Service Analytics framework requires the Self-Service Analytics Core plugin (com.snc.self_service_analytics_core). For more information, see Activate Self-Service Analytics.

Note:
The data for the Communities and Virtual Agent channels are generated when the Communities plugin (com.sn_communities) and Glide Virtual Agent plugin (com.glide.cs.chatbot) are activated respectively.

Related topics

Configure Self-Service Analytics

Self-Service Analytics concepts

Platform Analytics Solutions for Self-Service Analytics for Customer Service

Self-Service Analytics concepts

You can quantify your self-service effectiveness by measuring case deflections.

The Self-Service Analytics framework enables you to measure case deflection by defining user activity patterns for a deflection outcome. A case deflection is when you are able to provide a resolution using one of the self-service channels, such as Knowledge, Communities, Catalog, and Virtual Agent, to a user who intended to create a case and as a result, no case is created.

By default, the Self-Service Analytics framework is used by the Self-Service Analytics dashboard for customer service. The framework can also be used in dashboards of other applications that use the Subscriptions and Activity Feed Framework.

The system includes predefined configurations for the Self-Service Analytics framework components associated with consumers and customer contacts. You can also configure these components for other user entities.

Self-service analytics components

Self-service analytics is based on the activity pattern associated with a deflection outcome. It consists of the following main components:

- Activity pattern (see Activity pattern components)
- Deflection outcome (see Deflection outcome components)

Activity pattern components

Activity pattern

A combination of pattern element, pattern element group, or both for a user entity such as consumers or customer contacts that is linked to an outcome. Each pattern element or pattern element group is implemented as regular expressions.

Example: The activity pattern Contacts: Case: Confirmed Deflection is a combination of pattern element groups Self-Service: Helpful and Self-service actions: Optionally Many.

Deflection outcome

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An activity pattern can lead to a deflection outcome. See Deflection outcome components.

Primary activity

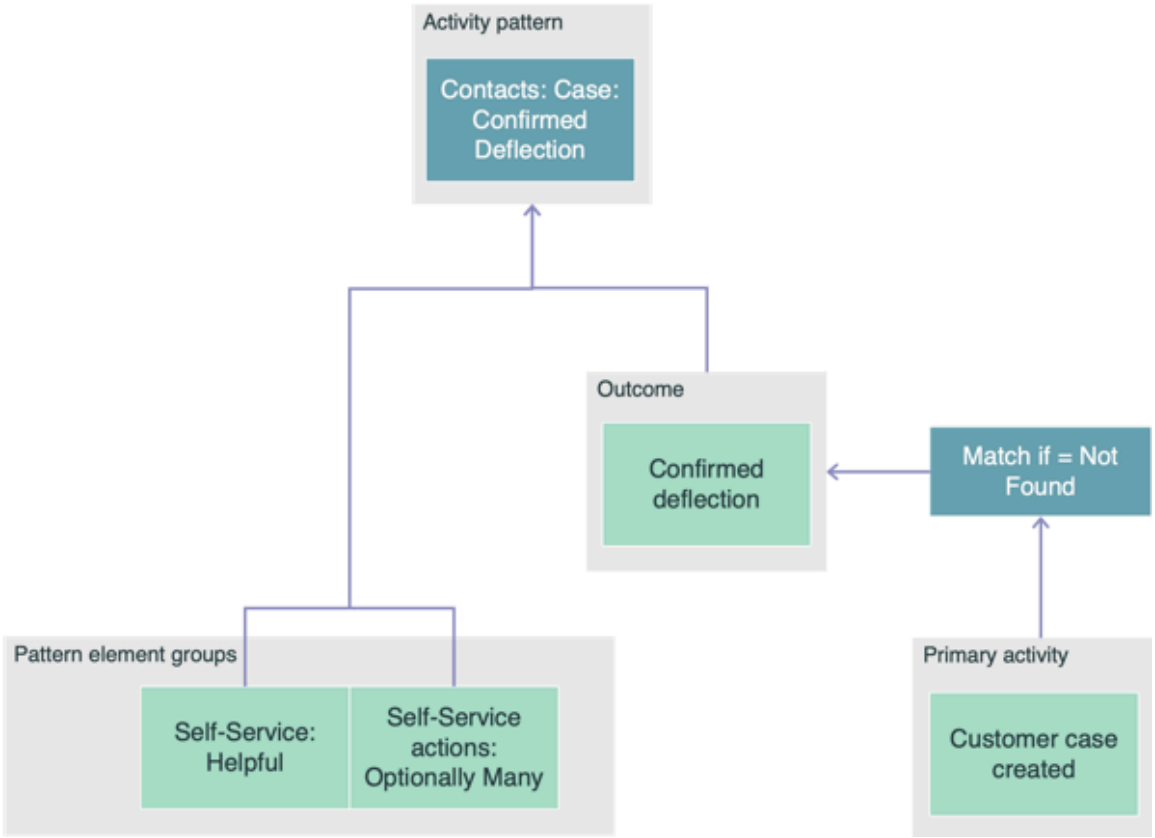
The final activity that determines the outcome associated with an activity pattern based on whether it happens or not.

Example: For the primary activity Customer created a case if the system does not find a match (that is a case was not created), the outcome Confirmed deflection is associated with the activity pattern Contacts: Case: Confirmed Deflection.

Pattern element group

A logical combination of two pattern elements, pattern element group, or both and how many times the combination occurs. For more information, see Pattern element group components.

The following figure illustrates the components of the activity pattern Contacts: Case: Confirmed Deflection.



Pattern element group components

Pattern element group

A logical combination of two pattern elements, pattern element group, or both and how many times the combination occurs. Each pattern element group is implemented as regular expressions.

The occurrence of the logical combination result is one of the following types:

- Once
- Optionally Once
- Optionally Many

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- At Least Once
- Range

Example 1: In the following table, the Knowledge engagements once pattern element group is true when it occurs only once and either Article viewed once is true or Article marked with positive feedback once is true.

Pattern element group example 1

Pattern element group	First Element	Second Element	Operator	Occurrence
Knowledge engagements once	Article viewed once	Article marked with positive feedback once	Or	Once

Example 2: In the following table, the Self-service engagements optionally many pattern group is true when engagements either have not occurred or have occurred multiple times and either the Knowledge or catalog engagements once is true or the Communities or virtual agent engagements once is true.

Pattern element group example 2

Pattern element group	First Element	Second Element	Operator	Occurrence
Knowledge or catalog engagements once	Knowledge engagements once	Catalog engagements once	Or	Once
Communities or virtual agent engagements once	Communities once	Virtual agent engagements once	Or	Once
Self-service engagements optionally many	Knowledge or catalog engagements once	Communities or virtual agent engagements once	Or	Optionally Many

Pattern element

Denotes a single activity type and how many times it occurs. Each pattern element is implemented as regular expressions.

Example: The pattern element Article viewed once denotes that the activity Viewed a knowledge article must occur once.

Activity type

An action that a user (consumer or customer contact) performs.

Example: The activity type Viewed knowledge article occurs when a user views a knowledge article.

The following figure illustrates the components of the pattern element group Knowledge engagements once.

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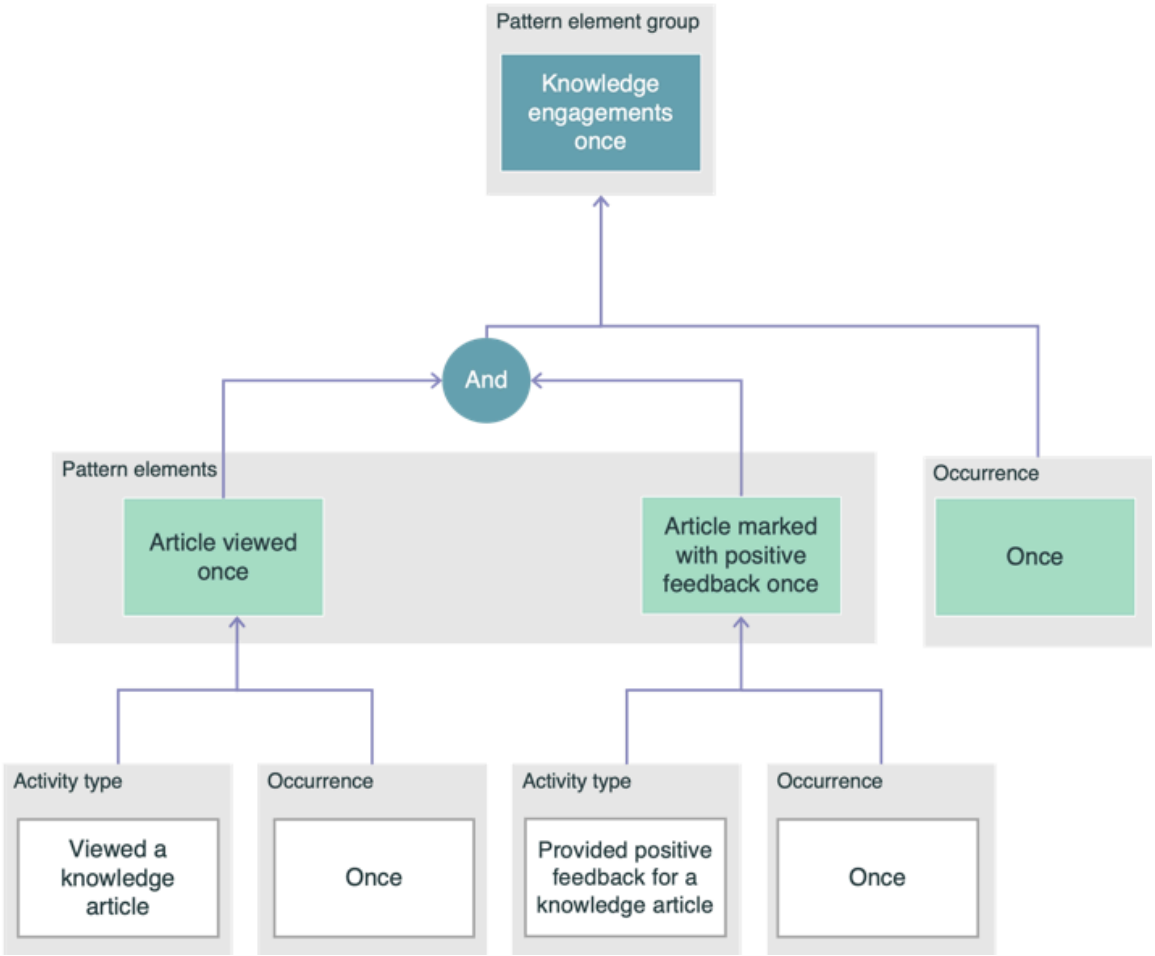

Activity context components

Activity context

A collection of activity groups a user might perform such as Catalog, Knowledge, Case, Communities, and Virtual Agent.

Example: The activity context Contact is a collection of activity groups Catalog, Knowledge, Case, Communities, and Virtual Agent associated with the customer contact.

Activity group

A logical grouping of activity types performed on the same object type such as a knowledge article, community answer, or customer service case.

Example: The activity group Knowledge is a logical grouping of the activities Viewed knowledge article and Marked the article helpful performed on a knowledge article.

Activity context group

An activity group that has been added to a context.

The following figure illustrates the components of the activity context Contact.

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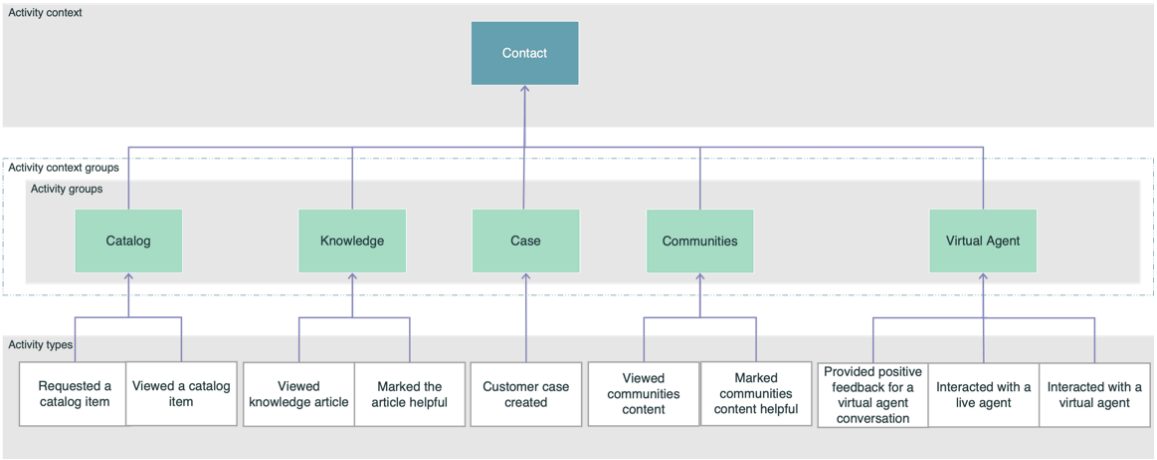

Deflection outcome components

Deflection outcome

In the context of deflection, an activity pattern can lead to one of the following three outcomes:

Confirmed deflection

The self-service content definitely prevented a case from getting created.

Potential deflection

The self-service content was viewed and no case was created, but it's unclear whether the content is the factor that prevented the case from getting created.

No deflection

A case was created after the self-service content was viewed.

Deflection configuration

Associates a window (duration) with an activity context. The window defines how long a system will wait for a case to be created to match with a deflection pattern.

Example: To track the create case activity for a consumer within a day, set the window as 1 day.

- If the consumer created a case within that window, the deflection pattern matched is a No deflection.
- If the consumer did not create a case within that window, the deflection pattern matched is a Potential deflection.
- If the consumer did not create a case and the last activity is submitted positive feedback for any self-service channel content within that window, the deflection pattern matched is a Confirmed deflection.

Deflection metrics

A transactional table that stores the outcome of matched patterns. By default, the scheduled job for Self-Service Analytics captures data and stores the generated data in the Deflection Metric [ssa_deflection_metric] table.

Deflection pattern

Associates deflection configuration with an activity pattern. A deflection pattern is implemented as a table.

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Related topics

Configure Self-Service Analytics

Translation management

Knowledge articles are authored and published in many languages and translating these articles to languages other than the language they are authored in requires creating translation tasks. Translation management enables you to manage these translation tasks.

The translation management feature enables the following translation activities:

- Translate published knowledge articles that are missing translations manually or use the machine translation option to automatically translate them.
- Create translation tasks automatically for specified languages.
- Configure assignment rules and auto-assigned tasks for a language, knowledge base, or category to a translator or a group of translators.

For information about activating translation management, see Activate translation management.

Enabling the *glide.knowman.translation.enable_translation_task* property adds the following menu options to the Translation Management submenu under the Knowledge menu:

- **All Open Tasks**
- **My Assigned Tasks**
- **Translator Mapping**

You can choose a default language when you log in to an instance. The available languages are based on the internationalization language plugins you have installed.

Related topics

Translate a knowledge article from a translation task

I18N - Knowledge internationalization

Activate the knowledge management internationalization plugin

Knowledge-Centered Service configuration

Knowledge-Centered Service (KCS) is a method for the creation and continuous improvement of knowledge based on the experience of agents and the patterns observed by knowledge reuse.

ServiceNow Knowledge Management is a KCS (V6) verified product. As a KCS (V6) verified product, Knowledge Management provides features to improve knowledge, such as article quality reviews, in-context knowledge capture, and feedback management.

Visit the following page on the ServiceNow Community for information about getting started with Knowledge Management and KCS: Knowledge Management Getting Started .

Activation information

The Knowledge-Centered Service configuration is activated with the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities). For more information, see Activate Knowledge Management KCS Capabilities.

Related topics

Managing KCS article states

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Article quality index for knowledge management

Assess the quality of knowledge articles with the article quality index (AQI). The AQI helps maintain consistent quality of knowledge articles attached to a knowledge base where articles are written by various authors.

Using AQI feature, a knowledge administrator (a user with knowledge_admin role) creates a checklist and adds a set of true or false questions to the checklist to assess the quality of knowledge articles. For each question, the knowledge_administrator assigns a weight based on its importance to the quality measurement and then attaches the checklist to a knowledge base.

A knowledge reviewer (a user with knowledge_coach and knowledge_domain_expert role) performs AQI review on knowledge articles attached to the knowledge base by answering the true or false questions in the checklist. The article quality is then scored based on the cumulative weight of all answers set to true in the checklist.

The average AQI scoring is displayed on the Content Quality tab of the Knowledge Management dashboard (see Knowledge Management dashboard).

Activating article quality index

The article quality index feature is activated with the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin. For details see, Activate the Knowledge Management Advanced plugin.

Related topics

Use Article Quality Index

Article versioning

Use the Knowledge Management article versioning feature to create and maintain multiple versions of a knowledge article.

Knowledge contributors can create a new version of a knowledge article from an existing published version. This existing version can be either the latest published version or an older outdated version. All changes are stored in the new version of the article and the information in the existing article remains the same.

If you import published knowledge articles from a ServiceNow instance that does not support article versioning, you must run the *Initialize Versions on Articles* fix script to enable article checkout and editing.

With the article versioning feature, a knowledge user can:

- Check out a published article and create another version.

  Note:
  Only an author (who checks out an article for revision), knowledge base owner, and user with knowledge_admin role can edit an article in the draft state.

- Select a previously published (outdated) version of an article and make it current.
- Recall an article that is being reviewed or scheduled for publication.
- Retire the latest published version of an article.

Note:
Only an author (who checks out an article for revision), knowledge base owner, and user with knowledge_admin role can edit an article in the draft state.

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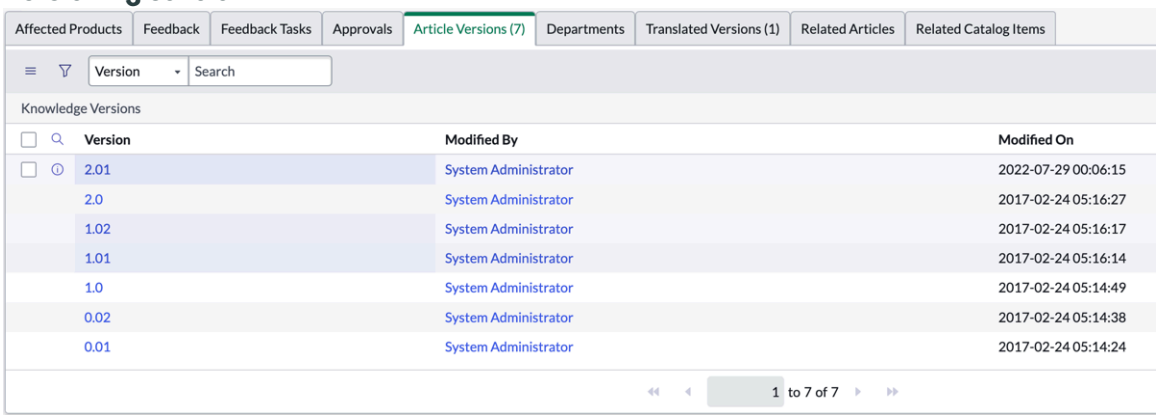
There are two types of article revisions: major and minor. Minor revisions include updates to an article that has not yet been published. Major revisions include updates to an article that has been published and is available to customers. To track the different revisions, the article versioning feature introduces version numbering. For more information, see Knowledge article version numbers

With the article versioning feature, the knowledge article number also includes the version number. All references to knowledge articles use this number format. For example, KB0010003 v2.0. To access all the versions of knowledge article, navigate to **All** > **Knowledge** > **Articles** > **All** and open article with multiple versions. In the Related list, you can access all the versions.

Versioning control



Activation information

The article versioning feature requires the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) to be activated and the *glide.knowman.versioning.enabled* property to be set to true (default value). For more information, see Activate the Knowledge Management Advanced plugin and Article versioning properties.

Related topics

Use article versioning

Knowledge Management FAQ

Ownership groups

Configure ownership groups and associate them with knowledge articles to maintain article quality, manage approvals, and for timely resolution of feedback.

For the ease of maintenance of knowledge articles, you can assign an ownership group to a knowledge article and shift the ownership of an article from a single person to a group. An ownership group consists of a group of members and a manager who are responsible for knowledge articles. Responsibilities include: approving knowledge articles, performing AQI checks to ensuring article quality, and managing feedback tasks for knowledge articles.

When a knowledge article is assigned to an ownership group:

- Only ownership group members have contribute access to the article even if they don't have contribute access to the knowledge base of the article. They can edit, approve, publish, and retire the knowledge article with which they are associated.
- Users who aren't a member of the ownership group can't contribute to the article even if they have contribute access to the knowledge base of the article.

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When Create a knowledge article from an incident in ITSM Agent Workspace or editing a knowledge article, you may need to configure the Knowledge form to add the **Ownership Group** field.

Activation information

To enable the use of ownership groups, enable the *glide.knowman.ownership_group.enabled* property. This property is available when the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. By default, the property is disabled.

Note:
If you use ownership groups, try not to disable the *glide.knowman.ownership_group.enabled* property later. If you must disable the property later, ensure that you manually reassign all knowledge articles associated with any ownership group, close all article approvals sent to ownership groups, and resolve all open feedback tasks assigned to ownership groups.

Contribute access to published articles

If an ownership group is associated with a knowledge article, the author or reviser of the article can't contribute to the article after the article is published. You can override this behavior by enabling the *glide.knowman.ownership_group.override* property. When the property is set to `true`, the authors or revisers of knowledge articles associated with ownership groups retain contribute access to their published articles. By default, the property is set to false.

Approval of self-authored articles for ownership group members

With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. You can override this behavior by disabling the *glide.knowman.ownership_group.allow_self_approval* property. By default, the property is set to true. When the property is set to `false`, ownership group members can't approve self-authored knowledge articles.

Related topics

- Manage ownership groups
- Knowledge Management properties

Automating feedback management to improve content

Manage high volumes of article feedback by enabling task generation for negative feedback. When an article is rated poorly or marked as unhelpful, a feedback task is generated.

If an ownership group is assigned to the article, the feedback task is assigned to the manager of the ownership group. Ownership group managers can reassign tasks to another group member, or group members can assign a feedback task to themselves.

If no ownership group is assigned to the article, the feedback task is assigned to the author or reviser of the article.

The task assignee can update the article, create a new article, request additional feedback, or reassign the task and receives notification after the feedback is updated or resolved.

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Note:
The actionable feedback feature is available in the Knowledge Management Service Portal and Agent Workspace. To use the actionable feedback feature in other service portals, you can activate the **Knowledge Article View** page route map.

Beginning with New York, the **Knowledge Article View** page route map is activated by default. Existing customers on release versions prior to New York can activate the **Knowledge Article View** page route map. For more information, see Activate the Knowledge Article View page on upgrade.

Related topics

- Enable actionable knowledge feedback
- Work on a feedback task
- Track the progress on a feedback task

Migrate to Knowledge Management v3

When you migrate to Knowledge Management v3 from v2, you must migrate legacy knowledge content and any customizations you have made to the Knowledge Base applications.

The following video provides more information on how to migrate from Knowledge Management v2 to v3.

Migrating from Knowledge Management v2 to v3

Knowledge Management v3 migration process

When you upgrade from knowledge v2, consider a multi-step migration process. This process ensures you can access existing knowledge content and allows you to fully migrate at your own pace.

Review automatic changes before upgrading. These changes are applied immediately when upgrading and may impact existing functionality.

1. Migrate knowledge functionality to use your customized functionality with the Knowledge Management v3 enhancements.
2. Migrate knowledge content to use the Knowledge Management v3 enhancements with your existing knowledge articles.

Configuring Knowledge Management

Plan and configure your Knowledge Management implementation.

Configuration overview

Visit the following page on the ServiceNow Community for information on setting up Knowledge Management: Knowledge Management Getting Started.

You can also use Knowledge Management capabilities within a website built on Adobe Experience Manager (AEM). For more information, see Integration with Adobe Experience Manager.

Using guided setup to implement Knowledge Management

Guided setup provides a sequence of tasks that help you configure Knowledge Management on your instance. To open guided setup for Knowledge Management, navigate to **Knowledge** > **Administration** > **Guided Setup**. For more information, see Using guided setup.

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Activate the Knowledge Management Advanced plugin

Activate the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) to enable advanced features for Knowledge Management.

Before you begin

Role required: admin

About this task

The Knowledge Management Advanced plugin includes feature code and demo data.

The Knowledge Management Advanced Installer plugin (com.snc.knowledge_advanced.installer) is used to activate the Knowledge Management Advanced plugin.

Note:
The Knowledge Management Advanced plugin is not automatically activated with the Knowledge Management v3 application.

The Knowledge Management Advanced Installer plugin performs two validation steps prior to activation.

- Determines if there are any active Knowledge Management v2 knowledge bases.
- Determines if there is a unique database index on the **Number** field. If a unique constraint has been added to the **Number** field, the plugin activation fails. Follow the instructions listed in KB0634959 to perform corrective steps to resolve the issue.

  You need access to HI to be able to view KB articles.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

The Knowledge Management Advanced plugin activates the following features:

- Article versioning: Enables maintaining multiple versions of a knowledge article. For more information, see Article versioning.

  Note:
  Migrate to Knowledge Management v3 completely to use article versioning.

- Article subscriptions: Enables managing knowledge base and knowledge article subscriptions. For more information, see Knowledge subscriptions.

  Note:
  The Knowledge Management Advanced plugin activates the Subscriptions and Activity Feed Framework plugin (com.snc.activity_subscriptions).

- Article quality index: Enables maintaining consistent quality of knowledge articles within a knowledge base where articles are written by various authors. For more information, see Article quality index for knowledge management.
- Article templates: Enables creating article templates for consistent structure of knowledge articles. For more information, see Knowledge article templates.

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- Ownership group: Enables creating ownership groups for knowledge articles. For more information, see Ownership groups.
- In-context article creation: Enables creating a knowledge article from a customer service case. For more information, see Enable creating an article from a customer service case.
- Translation management: Enables managing translation tasks created for published knowledge articles. For more information, see Translation management.

Demo data is included as part of the Knowledge Management Advanced plugin. If the validation step performed by the Knowledge Management Advanced Installer plugin completes successfully, the Knowledge Management Advanced plugin is activated automatically. However, the demo data is not included in this activation. To load the demo data, go to the Knowledge Management Advanced plugin page, click the **Load Demo Data Only** related link, and then click **OK**.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Knowledge Management setup guide for admins

Before users in your organization can start creating knowledge bases and knowledge articles, you must set up Knowledge Management. Work with stakeholders to define requirements for setting up Knowledge Management effectively to meet the needs of users.

Requirements

Role required: admin.

Before you begin

Meet with the stakeholders

Stakeholder	Responsibilities
Knowledge manager	Defines and oversees the knowledge management processes for day-to-day operations related to content publishing and usage.
Knowledge admin	Configures advanced settings for specific Knowledge Management features
Knowledge coach	Enables users to adhere to content standards.

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Stakeholder	Responsibilities
Knowledge domain expert	Provides domain knowledge expertise.
Version author	Contributor to a particular version of an article.
Content creators and reviewers	Create, review, and update articles in the knowledge bases.
Community managers	Focus on the creation and curating of social content.
Line managers	Manage teams that create and use knowledge articles

With stakeholders, determine the following requirements

- Who are the consumers of the content in the knowledge bases?
- Who are the writers, editors, and managers for the knowledge base articles?
- What are the required workflows to publish and retire articles?
- What are the unique behaviors required for your knowledge management implementation? For example, should attachments appear in search results?
- Do you want to translate knowledge articles into other languages?

What to do

Assign knowledge roles to users and groups

Determine which Knowledge Management roles are appropriate for each user, and then assign those roles .

Create custom Knowledge workflows

If the default knowledge workflows for publishing and retiring knowledge articles are not appropriate for your knowledge bases, create custom workflows for those knowledge bases.

Configure Knowledge properties

If the default knowledge properties do not fulfill the requirements of users, reconfigure the properties as necessary.

Activate support for other languages besides English

If languages other than English must be supported, activate the Knowledge Management Internationalization plugins.

Coordinate with knowledge managers for knowledge base setup

Let knowledge managers and administrators know that they can start configuring their knowledge bases. For details, refer them to the Knowledge base setup guide for knowledge admins and managers.

Next steps

Depending on any other requirements for the knowledge bases, you may be asked to help with additional tasks, such as configuring knowledge landing pages.

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Using guided setup to implement Knowledge Management

Knowledge Management guided setup provides a sequence of tasks that help you configure Knowledge Management on your instance. To open Knowledge Management guided setup, navigate to **Knowledge** > **Administration** > **Guided Setup**.

For more information about using the guided setup interface, see Using guided setup.

Knowledge base setup guide for knowledge admins and managers

After basic Knowledge Management setup is completed, you can set up a knowledge base for users to create and publish knowledge articles.

Create multiple knowledge bases for different groups within your organization to share information within and between those groups. Create scoped knowledge bases to enable only application administrators to administer the knowledge bases and restrict unauthorized access to application-specific data.

Administrators create knowledge bases, and assign them to individual managers responsible for controlling the behavior and organization scheme of each knowledge base.

Each knowledge base contains knowledge articles that provide information for users, such as policy, release notes, or instructions for a task. Each knowledge base can also use a separate workflow for publishing and retiring articles.

Requirements

Role required: knowledge_administrator, knowledge_manager, or admin.

Before you begin

Determine the following requirements for each knowledge base that you want to set up:

- Whether to create a scoped knowledge base? For more information, see Scoped knowledge bases.
- Who are the knowledge base managers that are responsible for approving articles?
- Who are the users and contributors for that knowledge base? Access for these users is defined through user criteria.
- What are the categories to be used to classify articles? Will users be able to create categories?
- Will users of the knowledge base be able to create new content?

What to do

Set up the knowledge base

1. Create the knowledge base.
2. Set up which users can read, create, or edit knowledge articles by selecting user criteria for the knowledge base.
3. Define the approval process for articles using workflows.
4. Define the knowledge categories that are needed for organizing articles in the knowledge base.
5. If you want a custom knowledge homepage, ask your ServiceNow administrator to create it.

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Next steps

Let users in your organization know that they can start creating and searching articles in the knowledge base. For details, refer users to the Knowledge Management guide for users.

If you have the knowledge_manager role, there are many other tasks that you can perform to maintain the knowledge base. You can pin articles so they are featured prominently in the search results and on landing pages. You can also assign other users as managers of a knowledge base. For details, see Configuration tasks for knowledge managers.

Activate the sitemap configuration and definition records for the Knowledge Portal

Include knowledge articles in your sitemap by activating the sitemap configuration and definition records.

Before you begin

- Activate Sitemap Generator
- Verify that an unauthenticated user can access the knowledge base article by accessing it as a guest user.
- Verify that the Public option is selected on the Knowledge Article View form.

Role required: admin

About this task

Beginning with the Washington DC release, the Sitemap Generator configuration is available with the base system and is inactive by default.

Procedure

1. Navigate to **All** > **Sitemap Generator** > **Sitemap Configuration**.
2. In the UX Sitemap Configurations [sys_ux_seo_sitemap_config] table, select the sitemap_config_KB record.
3. Enable the generation of sitemaps.
   a. On the form, select the **Active** check box.
   b. In the Sitemap Config Definition related list, double-click the **Type** field and select the **true** option from the list.
   c. Select the Save icon ( ).
4. Select **Update**.

Result

All active sitemaps regenerate once in a day and include content from any of their active sitemap definitions.

Activate the knowledge management internationalization plugin

To enable translation of knowledge articles, you must activate multiple plugins.

- Knowledge Management Advanced (com.snc.knowledge_advanced) plugin. For more information, see Activate the Knowledge Management Advanced plugin
- I18N:Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin. For more information, see Activate a plugin .

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- Internationalization plugins for each appropriate language. For more information, see Activate a language.

Note:

- Activating internationalization plugins for the available languages automatically activates the I18N: Internationalization plugin (com.glide.i18n) that instead activates the I18N: Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin.
- Beginning with the San Diego release, you can request ServiceNow personnel to customize your Languages [sys_language] table. You can create translations of knowledge articles into any combination of language and region configured in the table. These combinations must be in compliance with the Internet Engineering Task Force (IETF) BCP-47 standard. For more information, see The region subtag.

Installed components

The I18N:Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin installs the following components:

- A relationship named *Translated Versions* that creates a related list on the Knowledge form showing other articles that have the same parent article.
- A business rule named *knowledge query* that automatically filters the knowledge portal and search results based on the user's selected language.
- A UI macro named *kb languages*.
- Two fields, named *Language* and *Parent*, in the Knowledge [kb_knowledge] table and the Knowledge form.

Knowledge form changes

The I18N:Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin adds the following fields to the Knowledge form:

- **Language**: Language in which you are creating the knowledge article. The list is populated based on the languages enabled for the selected knowledge base.
- **Parent**: The article number that represents the base language article. This setting keeps translations of the same article related to each other. Consider choosing the same language consistently for the parent article.

Note:
The **Parent** field tracks translations of articles.

Additionally, the Translated Versions related list is automatically added to the Knowledge form after you save an article.

Activate knowledge blocks

You can activate knowledge blocks [com.snc.knowledge_blocks] if you have the admin role. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin
Role required: admin

About this task
Knowledge blocks activates these related plugins if they are not already active.

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Plugins for knowledge blocks

Plugin	Description
Knowledge Management Advanced [com.snc.knowledge_advanced]	Enables advanced features for Knowledge Management, such as article versioning. For a full list of features, see activate the Knowledge Management Advanced plugin. **Note:** Knowledge blocks can be used with or without the article versioning feature. To disable the feature, see Disable the article versioning feature.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Enable knowledge blocks for each knowledge base

Enable the knowledge blocks feature for each knowledge base where you plan to use the blocks. Once enabled, you can create knowledge blocks to add to knowledge articles within a knowledge base.

Before you begin

Make sure that the knowledge blocks [com.snc.knowledge_blocks] plugin is activated.

Role required: knowledge_admin or knowledge_manager

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Open the knowledge base record.
3. In the Knowledge Base form, select the **Enable blocks** check box.

   Note:
   If the **Enable blocks** check box is not visible, you can add the field to the form by right-clicking the form header and navigating to **Configure** > **Form Layout**.

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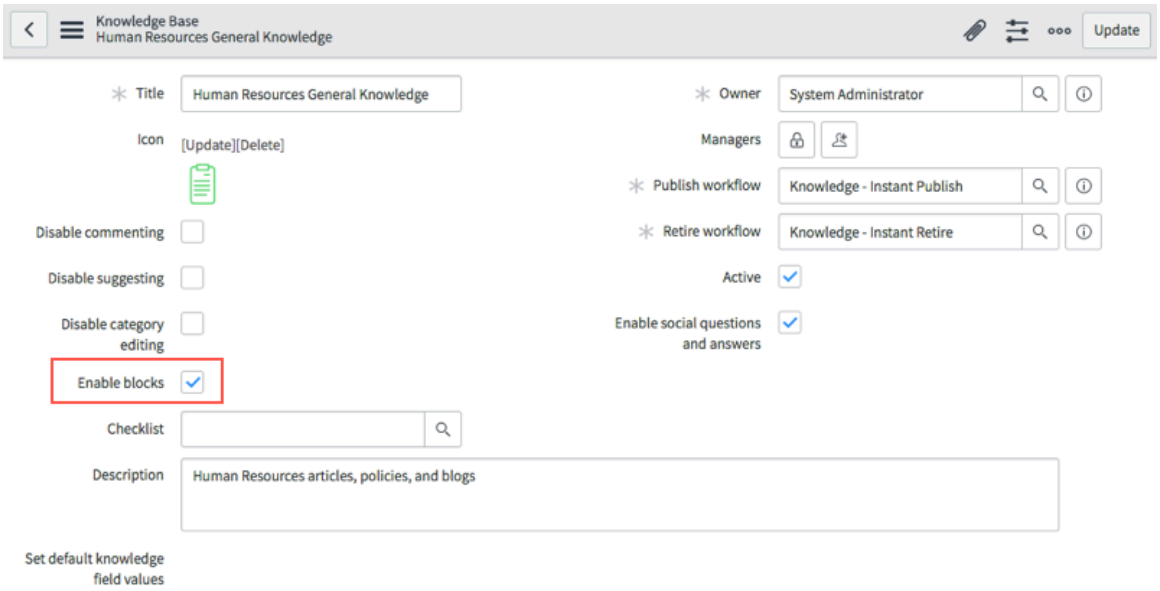

4. Click **Update**.

> **Note:**
> If you decide to later disable the knowledge blocks feature, all knowledge blocks within the knowledge base must be deleted before you can clear the box.

What to do next

Create knowledge blocks to use within the enabled knowledge base.

Related topics

- Knowledge blocks
- Using knowledge blocks
- Knowledge blocks authoring in Agent Workspace

Configure translation management

Configure translation management to create translation tasks.

Activate translation management

You can activate the Knowledge Management Advanced (com.snc.knowledge_advanced) and I18N:Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugins for translation management if you have the admin role.

Before you begin

Role required: admin

- Translation management requires the following plugins. Ensure that these plugins are activated before you install translation management.

  Required ServiceNow plugins

  Knowledge Management Advanced plugin [com.snc.knowledge_advanced]

  I18N:Knowledge Management Internationalization Plugin v2 [com.glideapp.knowledge.i18n2]

  The internationalization plugin for the languages you want to make available. The is automatically activated once any of the language plugins are activated.

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Translation management also requires enabling the *glide.knowman.translation.enable_translation_task* property to add translation task options to the Translation Management submenu under Knowledge menu.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Add a custom Localization Framework setting to enable bulk translations

Add a custom Localization Framework setting to translate multiple knowledge articles manually.

Before you begin

- Activate the Knowledge Management Advanced plugin.
- Activate Localization Framework.
- Activate a language.
- Bulk Translation is available with the base Washington DC release. If you are upgrading from a previous release, you must configure the following settings:
  - Enable the Localization Framework by setting the *glide.knowman.translation.enable_lf_article_translation* system property to true.
  - Set the *glide.knowman.translation.enable_translation_task* system property to false.
  - Set the *glide.knowman.translation.enable_localization_framework* system property to true.

Role required: admin

Procedure

1. Navigate to **All** > **Localization Framework** > **Settings**.
2. In the Setting list, select **New**.
3. Enter a name for the setting.
4. Select **Knowledge** from the **Artifact** list.
5. Select the languages into which you want the articles translated.
6. Select the **Workflow Preferences** tab.
7. Select **Translation -> Publish** from the **Workflow** list.

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8. Select the **Project Preferences** tab.
9. Enable the creation of bulk translation localization projects.
   - To enable manual creation, select **Enable projects**. For more information, see Create translation projects.
   - To enable the auto-creation of the localization projects, select **Enable projects** and **Enable auto creation**.

     If auto creation is enabled, selected localization requested items (LRITMs) are automatically bundled into a single localization project.
10. Select **Update**.

What to do next

Request bulk translations for multiple knowledge articles.

Add a custom Localization Framework setting to enable machine translation

Add a custom Localization Framework setting to enable machine translation for bulk translations of knowledge articles.

Before you begin

- Activate the Knowledge Management Advanced plugin.
- Activate Localization Framework.
- Activate a language.
- Bulk Translation is available with the base Washington DC release. If you are upgrading from a previous release, you must configure the following settings:
  - Enable the Localization Framework by setting the *glide.knowman.translation.enable_lf_article_translation* system property to true.
  - Set the *glide.knowman.translation.enable_translation_task* system property to false.
  - Set the *glide.knowman.translation.enable_localization_framework* system property to true.

Role required: admin

Procedure

1. Navigate to **All** > **Localization Framework** > **Settings**.
2. In the Setting list, select **New**.
3. Enter a name for the setting.
4. Select **Knowledge** from the **Artifact** list.
5. Select the languages into which you want the articles translated.
6. In the **Translation Preferences** tab, select the **Enable machine translate** check box to enable machine translation for knowledge articles.
7. Select the desired translator in the **Translator** field.
8. Select the **Workflow Preferences** tab.
9. Select **Auto Translation** > **Auto Publish** from the Workflow list.

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10. Select the **Project Preferences** tab.
11. Enable the creation of bulk translation localization projects.
    - To enable manual creation, select **Enable projects**. For more information, see Create translation projects.
    - To enable the auto-creation of the localization projects, select **Enable projects** and **Enable auto creation**.

      If auto creation is enabled, selected localization requested items (LRITMs) are automatically bundled into a single localization project.
12. Select the group that includes the localization_manager role in the **Localization manager group** field.
    The **Localization manager group** field appears only when the **Enable projects** and the **Enable auto creation** options are selected.
13. Select **Update**.

What to do next

Translate knowledge articles using Dynamic Translation

Activate Knowledge Management KCS Capabilities

You can activate the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) to enable the use of certain KCS roles and KCS article states.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Enable languages for a knowledge base

Select the languages you want enabled at a knowledge base level. Users can then create articles only for selected languages.

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Before you begin

You must activate the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin, and I18N: Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin.

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Select an existing knowledge base.
3. Click the lock icon to unlock the **Languages** field in the Knowledge base form.

   Note:
   You may need to configure the knowledge base form to include the **Languages** field.

   Click the form context menu icon ( ) and navigate to **Configure** > **Form layout**. Use slushbucket to add the Languages field.

4. Click **Submit**.

Configure the Knowledge Management Service Portal

The Knowledge Management Service Portal enables users to perform the same operations that are available with the Knowledge Management V3 plugin. From the portal, users can view knowledge bases and articles, search for information, sort and filter search results, and provide feedback.

- For new customers on the Madrid and later releases, the Knowledge Management Service Portal plugin (com.snc.knowledge_serviceportal) is active by default.
- For existing customers on release versions prior to Madrid, activate the plugin, if required.
- Configure the Knowledge Management Service Portal properties, including the property that directs users to the Knowledge Management homepage in the Knowledge Management Service Portal.

- Navigate to **Service Portal** > **Portals** and click **Knowledge Portal** (Knowledge Management Service Portal is named as Knowledge Portal). See Service Portal for more information about creating a custom interface.
- System administrators can configure portal pages and configure widgets for searching, sorting, and filtering knowledge base information. To configure widget instance options and configure search, sort, and filter features, see Knowledge Management Service Portal widgets
- To add knowledge bases to the Knowledge Service Portal, complete the following steps.
  1. Navigate to **Service Portal** > **Portals**, and click **Service Portal**.
  2. Click the **Knowledge Bases** related list.

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3. Click **Edit** to map one or more knowledge bases to the portal.

Note:
If no knowledge bases are added, all knowledge bases are available in the portal.

If knowledge bases are mapped, only those knowledge bases are available in the portal. All search results and all widgets display results from the mapped knowledge bases only.

- **Note:**

  Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Section 508 compliance features

Users can view and interact with the Knowledge Management article view page in the Knowledge Management Service Portal using Section 508 compliance features. See Enabling accessibility features for more information.

Related topics

- Knowledge Management FAQ
- Import a Word document to a knowledge base
- Import a Word document to a knowledge base using Knowledge Management v3

Enable external or public users to view knowledge articles from the Knowledge Management Service Portal

Enable knowledge articles on the Knowledge Management Service Portal to be visible to external or public users.

Before you begin

The Knowledge Management Service Portal plugin (com.snc.knowledge_serviceportal) must be enabled.
Role required: admin

About this task

If you are using Knowledge Management within the Customer Service Management (CSM) application, you can automatically make knowledge articles public by activating and running the *`Make KM Service Portal Pages Public`* fix script after you install the Customer Service Management plugin (com.sn_customerservice).

If you are using Knowledge Management as a standalone application, perform the steps in this procedure.

Procedure

1. Navigate to **All** > **Service Portal** > **Pages**.
2. In the Pages list, search for and select **kb_home**.

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Note:
If the application scope isn't set to Knowledge Management - Service Portal, you cannot edit the form and a warning message appears. To make the form editable, click the word **here** at the end of the message.

3. Enable public or external users to view knowledge articles from the Knowledge Management Service Portal.

Action	Description
Make knowledge service portal pages visible to public users	**a.** On the Page form, select the **Public** check box. **b.** Click **Update**.
Make knowledge service portal pages visible to external users	**a.** On the Page form, in the **Roles** field, click the edit user roles icon. **b.** On the Roles form, move **snc_external** from the available roles in the **Available** column to the **Selected** column. **c.** On the Roles form, click **Done**. **d.** On the Page form, click **Update**.

4. Repeat the steps 2 and 3 for **kb_article_view** and **kb_search** pages.
5. Manage access to the articles for the Knowledge Management Service Portal pages.

Action	Description
Enable access to the knowledge base for public.	After you set the page to public as described in step 3, ensure that the Cannot Read and Can Read user criteria are not set and the *glide.knowman.block_access_with_no_user_criteri* property is set to false for the knowledge bases you want to give access to public users.
Enable access to the knowledge base for external users.	After you add the snc_external role to the page as described in step 3, ensure that external users have read access to the knowledge bases for which you want to give access.

For more information about providing access to knowledge bases, see Managing access to knowledge bases and knowledge articles.

Knowledge Management Service Portal widgets

The Knowledge Management Service Portal uses a number of widgets to enable searches, display search results, and display articles, related articles, and related items.

In the Knowledge Management Service Portal, the Knowledge Management homepage, search results page, and article view page honor the Knowledge Management V3 system properties. If configured, widget instance options can override the system properties.

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Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Users with the knowledge_admin or admin role can configure the widget instance options used on the Knowledge Management Service Portal pages. Use the control + right-click menu to access the widget instance options and configure a widget instance. For more information, see Configure widget instance options.

Note:
Before configuring widget instance options, switch to the Knowledge Management - Service Portal scope.

Homepage widgets:

- Knowledge Homepage Search

  Customize search features for the homepage.

- Knowledge Bases Browse

  Displays knowledge base tiles in the homepage.

- Knowledge Featured Articles

  Displays a list of featured articles in the homepage.

- Knowledge Most Useful Articles

  Displays a list of most useful articles in the homepage.

- Knowledge Most Viewed Articles

  Displays a list of most viewed articles in the homepage.

Search results page widgets:

- Knowledge Breadcrumbs

  Displays navigation path to the current page and a search box for users to search the knowledge base.

- Knowledge Search
- Knowledge Facet Header

  Displays the title for the filter facets.

- Knowledge Field Facet

  Display search results filtered by knowledge base, knowledge category, and author.

- Knowledge Tags Facet

  Display search results filtered by article tags.

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- Knowledge Resource Facet

  Display search results filtered by article resource.

- Knowledge Query Facet

  Display search results filtered by article rating, number of article views, and last modified.

- Knowledge Result Sort

  Displays search results filtered by sort options for returned results.

- Knowledge Selected Filter

  Displays the selected facet filters and allows you to clear the selections.

- Knowledge Result

  Displays search results filtered by returned results.

Article view page widgets:

- Knowledge Breadcrumbs

  Displays navigation path to the current page.

- Knowledge Article Content

  Customize what information users can view and what actions they can perform in the article view page.

- Knowledge Article Helpful

  Enables users to mark the article as helpful.

- Knowledge Article Comments

  Enables users to add comments for the article.

- Knowledge Attachments

  Displays article attachments if the **Display Attachment** field for the article is enabled.

  Note:
  You must add the Knowledge Attachments widget to any page in addition to Knowledge Article Content widget. After upgrade, if this widget does not get added automatically, you must add it manually.

- Related Catalog Item

  Displays a list of catalog items mapped to the article. The widget appears only when the related catalog items are available for the selected article.

- Knowledge Related Articles

  Displays a list of related articles with information similar to the selected article. The related articles are manually mapped, automatically predicted, or both. The manually mapped articles appear first in the widget. The widget appears only when the related articles are available for the selected article.

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- Affected Products

  Displays the products related to the knowledge articles available in the **Affected Products** related list for the article. The widget appears only when the affected products are available for the selected article.

- Most Recent Tasks

  Displays the tasks attached to the articles available in the **Attached Tasks** related list for that article. The widget appears only when the related tasks are available for the selected article.

- Most Useful

  Displays a list of knowledge articles that users found most useful.

Activate the Knowledge Management Service Portal plugin

The Knowledge Management - Service Portal plugin (com.snc.knowledge_serviceportal) is active by default for customers on Madrid and later releases. Existing customers on release versions prior to Madrid can activate the plugin, if required.

Before you begin
Role required: admin

About this task
This plugin requires the following plugins:

- Knowledge Management V3 (com.snc.knowledge3)
- Service Portal for Enterprise Service Management (com.glide.service-portal.esm)

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

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Configure search widget instance options

Configure widget instance options for the search widgets on the Knowledge Management Service Portal homepage and search results page.

Before you begin

Role required: sp_admin or admin

About this task

The homepage uses the Knowledge Homepage Search widget and the search results page uses the Knowledge Search widget. Use the widget instance options to customize the search feature for these pages.

Procedure

1. Navigate to the Knowledge Management Service Portal homepage or search results page.
2. Control + right-click the search bar.
3. Click **Instance Options**.
4. Configure the search widgets settings.

Instance option	Page(s)	Description
Title	Knowledge Management Service Portal homepage	The title of the search widget. The default for the homepage is Welcome to Knowledge.
Search Placeholder	Knowledge Management Service Portal homepage	Default text that appears in the search bar.
Bootstrap color	Search result page	The color of the search widget.
Bootstrap size	Search result page	The size of the search widget.
Allow Empty Search	Search result page	Allow empty knowledge base searches. The default for the homepage uses the system property. The default for the search results page is Yes.
Allow Instant Search On Keypress	Search result page	Enables instant search results as you type a search term. The default for the search results page uses the system property.
Wait time (ms) between searches, if instant search is enabled	Search result page	The time, in milliseconds, to wait between searches if the instant search feature is enabled. The default wait time is 500 ms.
Alternate URL Parameters for Search	Search result page	Alternate parameters that appear in the search results URL. By default these parameters include keyword and query.

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Instance option	Page(s)	Description
Alternate URL Parameters for Language	Search result page	Alternate parameters that appear in the URL denoting the selected language.
Minimum Number of Characters for Search	Both	The minimum number of characters required to generate a search.
Glyph	Both	An icon that appears in the search bar.
CSS	Both	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.

5. Click **Save**.

Configure knowledge base tile widget instance options

Configure widget instance options for the knowledge base tile widgets on the Knowledge Management Service Portal homepage.

Before you begin
Role required: sp_admin or admin

About this task
The homepage uses the Knowledge Bases Browse widget to display knowledge base tiles.

Procedure
1. Navigate to the Knowledge Management Service Portal homepage.
2. Control + right-click a knowledge base tile.
3. Click **Instance Options**.
4. Configure the desired settings for the knowledge base tile widgets.

Instance option	Description
Title	The title that appears above the knowledge base tiles. The default is **Explore our Knowledge Bases**.
Bootstrap color	The color of the widget.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Order By	The order in which the knowledge base tiles appear on the homepage. Use any field on the Knowledge table. If this field is empty, tiles are displayed in alphabetical order. Other available options include article_count.

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Instance option	Description
Reverse Order	Enable this check box to display knowledge base tiles in the reverse order.
Post Question Label	The label on the button used to post a question. The default is **Ask a Question**.
Create Article Label	The label on the button used to create an article. The default is **Create Article**.
Post Question URL	The parameters that appear in the URL when posting a question.
Create Article URL	The parameters that appear in the URL when creating an article.

5. Click **Save**.

Configure the home page widget instance options

Configure widget instance options for the widgets used to display popular articles on the Knowledge Management Service Portal homepage.

Before you begin
Role required: sp_admin or admin

About this task
The homepage displays links to the featured, most viewed, and most useful articles using several widgets. The featured articles are displayed based on the keywords associated with the articles. For information on displaying articles in the Featured content section, see Pin a knowledge article. Most viewed and most useful articles are displayed based on the highest view and use count of the articles.

Procedure
1. Navigate to the Knowledge Management Service Portal homepage.
2. Control + right-click one of the widgets.
3. Click **Instance Options**.
4. Configure the desired settings for the widget.

Instance option	Description
Title	The title of the widget.
Bootstrap color	The color of the widget.
Glyph	An icon that appears in the widget.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Table	The table that contains the **Source Field** used to provide the featured, most viewed, and most useful articles widget options. The default table is Knowledge (kb_knowledge).

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Instance option	Description
Display Field	The title displayed for each article in the list. By default, this is the article short description.
Secondary Fields	Additional information displayed for each article in the list below the title. By default, this information includes the author, view count, the date that the article was last modified, and the article rating.
Max number of records to show	The maximum number of articles to include in the list.
Show even when empty	Enable this check box to display the widget even if there are no articles in the list.
Show Secondary Fields Label	Enable this check box to display the field labels for the additional information displayed for each article.
Knowledge Base	To restrict the articles that appear in this list to a specific knowledge base, select the knowledge base from the knowledge base list.

5. Click **Save**.

Configure sort widget instance options

Configure widget instance options for the knowledge sort widget on the Knowledge Management Service Portal search results page.

Before you begin

Role required: sp_admin or admin

About this task

The search results page uses the Knowledge Result Sort widget to provide sort options for the returned list of results. Use the widget instance options to customize the sort options.

Procedure

1. Navigate to the Knowledge Management Service Portal search results page.
2. Control + right-click the sort options at the top of the results list.
3. Click **Instance Options**.
4. Configure the desired settings for the sort widget.

Instance option	Description
Bootstrap color	The color of the search widget.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Hide Relevancy	Removes the relevancy sort option.

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Instance option	Description
Table	The table that contains the fields used to sort the list of knowledge items. The default table is **Knowledge**.
Sort Fields	The fields used for sorting the list of knowledge items.
Sort Field Labels	The labels for the fields that appear in the sort options. The default is **Views:desc,Newest:desc,Alphabetical**. The sort order for the sort field labels is ascending. To use a descending order, denote **:desc**.

5. Click **Save**.

Configure article list widget instance options

Configure widget instance options for the article lists on the Knowledge Management Service Portal homepage.

Before you begin
Role required: sp_admin or admin

About this task
The homepage uses the Article List widget to display different lists of articles, including Featured, Most Useful, and Most Viewed.

Procedure
1. Navigate to the Knowledge Management Service Portal homepage.
2. Control + right-click one of the article list headers.
3. Click **Instance Options**.
4. Configure the desired settings for the article list widget.

Instance option	Description
Title	The title of the article list.
Bootstrap color	The color of the widget.
Glyph	An icon that appears in the widget.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Table	The table that stores the list articles.
Display Field	The title displayed for each article in the list. By default, this is the article short description.
Secondary Fields	Additional information displayed for each article in the list below the title. By default, this information includes the author, view

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Instance option	Description
	count, the date that the article was last modified, and the article rating.
Max number of records to show	The maximum number of articles to include in the list.
Show even when empty	Enable this check box to display the article list even if it does not contain any articles.
Show Secondary Fields Label	Enable this check box to display the field labels for the additional information displayed for each article.
Knowledge Base	To restrict the articles that appear in this list to a specific knowledge base, select the knowledge base from the knowledge base list.

5. Click **Save**.

Configure search results list widget instance options

Configure widget instance options for the results list widget on the Knowledge Management Service Portal search results page.

Before you begin
Role required: sp_admin or admin

About this task
The search results page uses the Knowledge Result widget to provide display options for the returned list of results. Use the widget instance options to customize the display options.

Procedure
1. Navigate to the Knowledge Management Service Portal search results page.
2. Control + right-click the list of returned search results.
3. Click **Instance Options**.
4. Configure the desired settings for the results list widget.

Instance option	Description
Glyph	An icon that appears in the search bar.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Show Relevancy Score	Shows how relevant each search result is based on the search term. The default setting uses the system property.
Breadcrumb: Hide Categories	Hides the category in the breadcrumb that appears below the article short description in the results list. The default setting uses the system property.

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Instance option	Description
Breadcrumb: Knowledge Base Separator	The character used as a separator between the knowledge base and the category in the breadcrumb.
Breadcrumb: Category Separator	The character used as a separator between categories in the breadcrumb.
Default Sort Order	The default sort order for the list of returned results. The default sort order is **sys_view_count:desc**, which sorts the results by the number of views in descending order.
How to Display Attachments in Knowledge Search Results	How attachments are shown in the list of returned results. The default uses the system property.
Label for Show Pinned Articles Link	The text used for the pinned articles link.
Table	The table that stores the information returned in the search results.
Knowledge Secondary Fields	Fields that display additional information for each article in the search results.
Show Secondary Fields Label	Enable this check box to display the field labels for the additional information displayed for each result.
Pagination Type	Controls how additional knowledge article search results are displayed. ○ **Standard Pagination:** displays the search results in multiple pages. ○ **Infinite Scroll:** displays the search results while scrolling. The default pagination type is set to **Infinite Scroll**.
Maximum no. of articles displayed per page with standard pagination	The maximum number of items included in a page when the search results list is displayed using standard pagination.
Maximum no. of articles displayed after first fetch during infinite scroll	The maximum number of items included when the search results list is first displayed using infinite scroll.
Maximum no. of articles displayed at subsequent fetches during infinite scroll	The maximum number of items included when the search results list updates as the user scrolls to the bottom.
No. of links in pagination bar	The number of links displayed in the pagination bar.

5. Click **Save**.

Configure filter facet widget instance options

Configure widget instance options for the filter facet widgets on the Knowledge Management Service Portal search results page.

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Before you begin
Role required: sp_admin or admin

About this task
The homepage uses several widgets to filter the items in the search results list. There are two types of facet widgets:

- Simple field facets based on the Knowledge table fields
- Advanced query facets based on custom queries of the Knowledge table

Use the widget instance options to customize these facet widgets:

- Knowledge Field Facet (for filtering by knowledge base, knowledge category, and author)
- Knowledge Tags Facet (for filtering by tag)
- Knowledge Resource Facet (for filtering by resource, such as articles)
- Knowledge Query Facet (for filtering by rating, last modified, and number of views)

Note:
Query facets are displayed when there's at least one knowledge field facet added to the page.

Use default Knowledge Language Widget to include language filters in the knowledge Search Result page. To add a custom language widget, you need to deactivate the Knowledge Language Widget on the Knowledge Search Result page.

Procedure
1. Navigate to the Knowledge Management Service Portal search results page.
2. Control + right-click a filter facet widget.
3. Click **Instance Options**.
4. Configure the desired settings for the selected type of facet widget.

Instance option	Description
Title	Title of the filter facet widget.
Glyph	Icon that appears to the left of the title.
Order	Order in which the filter facet widgets appear on the left side of the search results page. If empty, the filter facet widgets sort alphabetically.
Bootstrap color	Color of the filter facet widget header.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Source Table	Table that contains the **Source Field** used to provide the filter facet widget options. The default table is Knowledge (kb_knowledge).
Source Field	Field in the **Source Table** that provides the filter facet widget options. Field types that

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Instance option	Description
	can be used as a source field include string, glide list, integer, reference, and boolean.
Facet Identifier	Unique name for the custom query facet that can be used in script code.
Facet Template	Template that determines the type of facet interaction. Knowledge Field Facet widget templates: ○ **Single Select**: users can select only one filter from this widget. ○ **Multi Select**: users can select more than one filter from this widget. ○ **Dropdown Select**: users can select more than one filter from a drop-down menu. Knowledge Query Facet widget templates ○ **Simple Query**: shows a label for each facet value. ○ **Rating**: shows rating stars.
Custom Template	Custom template that determines facet interaction and value selection.
Facet Options	Custom query in JSON format for the label, ID, order, and query for each facet value. Includes the table, value (encoded query), and display value (encoded query).
Order by	Order of the filter options within the facet widget. The default order is **label**, which sorts the options in alphabetical order. For reference fields, you can also state an order from the reference field table.
Minimum results for showing filter search bar	Minimum number of results required to display a search bar at the top of the filter facet widget.
Minimum results for showing scroll bar	Minimum number of results required to display a scroll bar in the filter facet widget.
Maximum length for string field	Maximum field length. Only fields whose length is less than this value are allowed to be added as a filter facet.
Alternate URL Parameters	Names of the URL parameters used to initialize this filter facet, if used in the URL as a search parameter.
Fetch Maximum Values	Option to fetch filter values from all knowledge articles in the search results. Selecting the **Fetch Maximum Values** option might impact the load time for search results. If this option is disabled,

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Instance option	Description
	the load time improves based on the *glide.knowman.search.facet_depth* property value. If the *glide.knowman.search.apply_acls* property is set to true, a filter value can appear in a filter facet even when there are no search results for that filter value. For example, a knowledge base without any articles might appear as a value in the knowledge base filter facet.
Show Empty Value	If enabled, shows an empty filter facet option that users can select to filter for articles that do not have this field set. For example, if an article does not have an assigned category, clicking the empty option lists all articles with no assigned category.
Show Only Facet Values Matching Results	Creates a dynamic filter facet widget that displays only those filter values that match the search results rather than showing all values. If you disable this instance option, the time needed to load the filter facet data is reduced.
Show category hierarchy (valid for kb_category only)	If enabled, shows categories with their hierarchy list up to the fourth-level. When you enable this option, you can select only one category at a time. Any articles that are included in the subcategories beyond the fourth-level also appear in the fourth-level of category. The search results filtered on a selected parent category include articles within that category and all the associated child categories.

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Instance option	Description
	Note: ○ If the number of knowledge articles returned in search results is greater than the search facet depth, all categories are displayed in this facet. Therefore, some categories shown in this facet might not be associated with any knowledge articles in the search results. By default, the facet depth is set to 300 and configured by an administrator in the *glide.knowman.search.facet_depth* property. ○ To configure the knowledge Search Results page widgets by adding more filters. Specifically if filters on language need to be applied they should be using the OOB Knowledge Language Widget. The field facet widget can be configured using language field in instance options for similar behaviour but in that case OOB Knowledge Language Widget instance should be inactivated on the Knowledge Search Results page.

5. Click **Save**.

Related topics

Knowledge Management properties

Configure a user action for the article view page

Configure a user action for the Knowledge Management article view page in the Knowledge Management Service Portal.

Before you begin

Role required: sp_admin or admin

About this task

The article view page uses the Knowledge Article Content widget to provide user actions. Use the widget instance options to customize these actions.

Ensure that the application scope on the ServiceNow AI Platform is set to Knowledge Management Service Portal.

User actions available for the article view page appear in a menu after clicking the overflow icon (⋯) in the article header. These actions enable users to flag an article, edit an article, or create an incident for an article.

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Procedure

1. Navigate to the Knowledge Management Service Portal article view page.
2. Control + right-click the article header.
3. Click **Instance Options**.
4. Configure the desired settings for the Knowledge Article Content widget.

Instance option	Description
Bootstrap color	The color of the widget header.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Hide All Actions	Hides the user actions in the article header including the **Subscribe/Unsubscribe** button and the overflow icon.
Show Version Information	Displays version information for the selected article. Requires the Knowledge Management Advanced plugin (com.snc.knowledge_advanced).
Show Create Incident Action	Displays the **Create Incident** user action when a user clicks the overflow icon in the article header.
Create Incident Action Label	The label for the user action that appears in the overflow icon menu. The default is **Create Incident**.
Create Incident Action URL	The target URL for the **Create Incident** user action. If no URL is specified, the system uses the URL in the *glide.knowman.create_incident_link* system property.
Redirect to the latest article	Redirects the article view page to the latest accessible version of the article, if available. Disable the **Show Version Information** option to hide the version information on the article view page because any version link will redirect to the latest version only.

5. Click **Save**.

Configure article helpful widget instance options

Configure the Knowledge Article Helpful widget instance options for the Knowledge Management article view page in the Knowledge Management Service Portal.

Before you begin

Role required: sp_admin or admin

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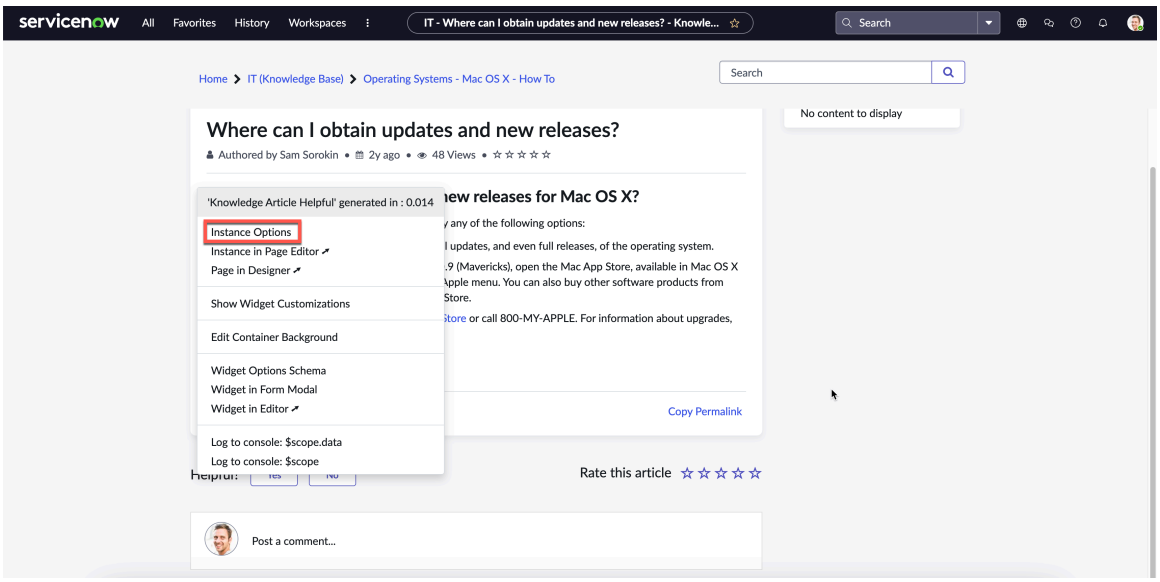
About this task

The article view page uses the Knowledge Article Helpful widget to allow users to provide feedback on the helpfulness of the article, display a confirmation message after a feedback is provided, and display the percentage of users who found the article to be useful. Use the widget instance options to customize these actions.

Procedure

1. Navigate to the Knowledge Management article view page in the Knowledge Management Service Portal.
2. Control + right-click **Helpful?**
3. Click **Instance Options**.



4. Configure the desired settings for the Knowledge Article Helpful widget.

Instance option	Description
Bootstrap color	The color of the widget header.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Show helpful percentage information	Check box to enable the display of percentage of users who found this article to be helpful.
Helpful Action Label	Label for marking this article as helpful or not.
Feedback Message	Text that displays when the user marks the article as helpful or not.

5. Click **Save**.

Configure article comments instance options

Configure the Knowledge Article Comments widget instance options for the Knowledge Management article view page in the Knowledge Management Service Portal.

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Before you begin
Role required: sp_admin or admin

About this task
The article view page uses the Knowledge Article Comments widget to allow users to rate an article, add a comment, or view existing comments for the article. Use the widget instance options to customize these actions.

Procedure
1. Navigate to the Knowledge Management article view page in the Knowledge Management Service Portal.
2. Control + right-click the comments section.
3. Click **Instance Options**.
4. Configure the desired settings for the Knowledge Article Comments widget.

Instance option	Description
Bootstrap color	The color of the widget header.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Other Options	
Show User Comments	Displays the field for users to enter comments. Available options: ○ Yes - displays the field that enables users to enter comments for the article. ○ No - hides the field that enables users to enter comments for the article. ○ Use system property - display or hide the comments field using article view properties.
Add Comment Label	Label for the field to add comments.
Maximum number of attachments that can be attached to a comment	Maximum number of attachments that can be attached to a comment included for a knowledge article.
Maximum attachment file size in MB that can be attached to a comment	Maximum attachment file size in MB that can be attached to a comment included for a knowledge article.

5. Click **Save**.

Configure related catalog item widget instance options

Configure the Related Catalog Item widget instance options for the Knowledge Management article view page in the Knowledge Management Service Portal. These options relate to the list of catalog items mapped to an article.

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Before you begin
Role required: sp_admin or admin

About this task
The knowledge article view page displays the Related Items section when an article has related catalog items. Use the widget instance options to customize the Related Items section on the article view page.

Procedure
1. Navigate to the Knowledge Management homepage in the Knowledge Management Service Portal by adding `/kb` to the end of your instance URL.

   Note:
   Your administrator might have changed this default navigation.

2. Search for and click the article for which you want to modify the instance options for the Related Catalog Item widget.
3. Press Control and right-click the Related Items section.
4. Click **Instance Options**.
5. Configure settings for the Related Catalog Item widget.

Instance option	Description
Source Table	Source table containing related catalog items. The source table specified in the base system is Related Catalog Items (kb_2_sc).
Source Column	Field in the source table referring to the source record. The source column specified in the base system is Knowledge article (kb_knowledge).
Title	Title that appears on the widget header. The default title is Related Items.
Max Number	Maximum number of catalog items to include in the Related Items section on the article view page. The maximum number specified in the base system is 5.
Use Full Width	Option for displaying the widget in a 12-column grid at 100% of the available width. If you clear the check box, the widget displays at 75% of the available width.
Target Column	Field in the source table referring to the target record. The target column specified in the base system is Catalog item (sc_cat_item).
Source Id	URL parameter containing the unique record identifier (sys_id) of the source record. For the article view page, the URL parameter containing the source ID is sys_kb_id.

6. Click **Save**.

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Related topics

Map catalog items related to an article

Configure knowledge related articles widget instance options

Configure the Knowledge Related Articles widget instance options for the Knowledge Management article view page in the Knowledge Management Service Portal. These options relate to the list of related articles mapped to an article.

Before you begin

Role required: sp_admin or admin

About this task

The knowledge article view page displays the Related Articles section when an article has related articles. Use the widget instance options to customize the Related Articles section on the article view page.

Procedure

1. Navigate to the Knowledge Management homepage in the Knowledge Management Service Portal by adding `/kb` to the end of the URL for your instance.

   Note:
   You can change the default navigation by configuring the property *`sn_km_portal.glide.knowman.serviceportal.portal_url`*.

2. Click to open the article for which you want to modify the instance options for the Knowledge Related Articles widget.
3. On the article page, press Control+right-click and select **Page in Designer**.
4. In the Service Portal Designer page, click the edit icon ( ) on **Knowledge Related Articles** widget to add the related articles.

   Note:
   You can also add **Knowledge Related Articles** widget using **Widgets** search field and drag-and-drop the widget to the blank field.

5. Configure settings for the Knowledge Related Articles widget.

Instance option	Description
Title	Title that appears on the widget header. The default title is Related Articles.
Bootstrap color	Color scheme of the widget header. Select a color for your widget from a list of common bootstrap colors.
Glyph	Icon that appears beside each list item displayed in the widget. To skip this field, select the empty glyph.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.

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Instance option	Description
Use Full Width	Option for displaying the widget in a 12-column grid at 100% of the available width. If you clear the check box, the widget displays at 75% of the available width.
Table	The table that contains the knowledge articles associated with the **Display Fields** and **Secondary Fields**. By default, the table is Knowledge (kb_knowledge).
Display Field	The title displayed for each article in the related articles list. The display field specified in the base system is the article short description.
Secondary Fields	Additional information displayed for each article in the list below the title. The secondary fields specified in the base system are author, view count, the last modified date of the article, and the article rating.
Max number of records to show	The maximum number of articles to include in the Related Articles section on the article view page. The maximum number specified in the base system is 5.
Show even when empty	Option for displaying the widget even if no articles are in the list.
Show Secondary Fields Label	Options for displaying the field labels for the additional information displayed for each article.
Knowledge Base	To restrict the articles that appear in this list to a specific knowledge base, select the knowledge base from the knowledge base list.
Source Table	Source table containing related articles. The source table specified in the base system is Knowledge (kb_2_kb).
Source Column	Field in the source table referring to the source record. The source column specified in the base system is Knowledge article (kb_knowledge).
Target Column	Field in the source table referring to the target record. The target column specified in the base system is Knowledge article (kb_knowledge).
Source Id	URL parameter containing the unique record identifier (sys_id) of the source record. For the article view page, the URL parameter containing the source ID is sys_kb_id.

6. Click **Save**.

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Related topics

Map related articles

Knowledge Management Service Portal properties

Search using the Knowledge Management Service Portal

Enter one or more words in the search bar on the Knowledge Management Service Portal homepage to view all search results.

Search results include items in which the short description, content, or attached files include the search term. By default, knowledge search results include articles, pinned articles, and social Q&A.

You can also filter the search results.

Enable multi-language search

The multi-language search facet is available when more than one supported language is enabled. All available languages are displayed in the facet and you can select which languages you want your search results to appear in. Your selection is maintained per session, but not across logins.

1. To enable different languages, activate the I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) or activate one of the internationalization plugins for the language you require.

   Note:
   Activating internationalization plugins for any of the available languages automatically activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

2. Navigate to **Knowledge** > **Administration** > **Knowledge Search Properties** > **Enable multi language search**.
3. Select the **Yes** check box to enable the feature.

   Note:
   If this property is not enabled, you can only search for one language at a time.

Search auto-correct feature

The Knowledge Management Service Portal homepage search tool also includes an auto-correct feature. When enabled, users can auto-correct a typing error in a search term by clicking one of the suggestions.

When a search term contains a misspelling, the search tool displays the search results page and includes one or more suggested terms at the top of the page under the heading **Did you mean**. Clicking one of these suggestions shows all the search results that match the selected term.

Users with the system administrator role can enable this feature.

1. Navigate to **System Properties** > **Text Search**.
2. Set the following properties to **true**:
   - Suggest alternate search spellings for knowledge or global search (glide.ts.dym.enable_spell_correct).
   - Suggest related searches for knowledge or global search (glide.ts.dym.enable_chain_suggest).
3. Click **Save**.

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Integrating Knowledge Management features with the Service Portal

To create a consistent user experience for Knowledge Management, integrate Knowledge Management Service Portal in your end-user facing Service Portal.

The Knowledge Management Service Portal includes the following features:

- Multiple knowledge bases
- A Knowledge Management article view page with feedback options
- A Knowledge Management search results page with options to filter and sort search results
- A number of widgets to enable searches, display search results, display knowledge articles, and so on

By default, all knowledge articles in the Service Portal are redirected to the Knowledge Management article view page using the **Knowledge Article View** page route map. If upgrading from a previous release, a system administrator can activate the **Knowledge Article View** page route map to take advantage of the features of the Knowledge Management article view page. For more information, see Activate the Knowledge Article View page on upgrade.

Note:
The Knowledge Management Service Portal supports only Zing search and not AI search.

System administrators perform the following tasks to integrate the Knowledge Management Service Portal features with the Service Portal:

- Integrate the Knowledge Management homepage with the Service Portal homepage.
- Integrate the Knowledge Management search results page with the Service Portal search results page.
- Add the Knowledge Management Service Portal widgets to quickly access knowledge articles from the Service Portal homepage (Optional).

Note:
These configurations apply to the base system pages within the Service Portal only.

Related topics

Service Portal pages

Knowledge Management Service Portal homepage features

Knowledge Management Service Portal search results page features

Knowledge Management Service Portal article view page features

Integrate the Knowledge Management homepage with the Service Portal homepage

Use a page route map to access the enhanced Knowledge Management homepage from the Service Portal homepage.

Before you begin

The Knowledge Management - Service Portal plugin (com.snc.knowledge_serviceportal) is activated.

Note:
This plugin is activated by default for customers on Madrid and later releases. Existing customers on release versions prior to Madrid must activate the plugin to perform this configuration task. For more information, see Activate the Knowledge Management Service Portal plugin.

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Role required: admin

About this task

The Knowledge Management homepage displays knowledge articles organized by knowledge base and category, featured content, and popular articles. You use a page route map to access the Knowledge Management homepage from the Service Portal homepage.

Procedure

1. Navigate to **All** > **Service Portal** > **Page Route Maps**.
2. Click **New**.
3. On the Page Route Map form, fill in the fields.

Page Route Map form

Field	Value
Service Portal(s)	Service Portal
Route from	kb_view2
Route to	kb_home
Active	Selected

Note:
On the Page Route Map form, you can fill in the **Short Description** and **Order** fields as appropriate.

4. Click **Submit**.

Result

You can now open the Knowledge Management homepage from the Service Portal homepage by clicking the Knowledge link or Knowledge Base icon link.

Integrate the Knowledge Management search results page with the Service Portal search results page

Use a custom knowledge search widget to access the enhanced Knowledge Management search results page from the Service Portal search results page.

Before you begin

Role required: admin

About this task

The Knowledge Management search results page in the Knowledge Management Service Portal includes options to filter and sort search results and a number of widgets to enable searches, display search results, display articles, and so on. In this procedure, to access the Knowledge Management search results page from the Service Portal search results page, you create a custom knowledge search widget named Search Within and add it to the Service Portal search results page.

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Procedure

1. Create a custom knowledge search widget named Search Within.

   a. Navigate to **Service Portal** > **Service Portal Configuration**.

   b. On the Service Portal page, click **Widget Editor**.

   c. Click **Create a new widget**.

   d. In the Add a Widget dialog box, in the **Widget Name** field, enter `Search Within`.
   The **Widget ID** field is automatically populated based on the widget name.

   e. Click **Submit**.

   The widget HTML template, client script, and server script display in the widget editor.

   f. In the widget editor, enter the following field values to replace any existing text.

   - In the **HTML Template** field, enter the following code to add a link to the Knowledge Management search results page in the Search Within widget from the Service Portal.

```
<div role="list" class="list-group">
  <span class="list-group-item active">${Search
 Within}</span>
  <a role="link" class="list-group-item"
 ng-href="{{data.url}}">${Knowledge}</a>
</div>
```

   - In the **Server Script** field, enter the following code to set the URL parameters for the Knowledge Management search results page:

```
(function(){
 var q = encodeURIComponent($sp.getParameter('q'));
 var kb = $sp.getValue('kb_knowledge_base') || "";
 data.url = '/sp?id=kb_search';
 if(q)
  data.url += "&keyword="+q;
 if(kb)
  data.url += "&kb_knowledge_base="+kb;
})();
```

   Note:
   For more information about these fields, see Widget developer guide.

   g. Click **Save**.

2. Add the custom knowledge search widget to the Service Portal search results page.

   a. Navigate to **Service Portal** > **Service Portal Configuration**.

   b. Click **Designer**.

   c. In the **Filter by title or Id** field, enter `sp_search`, the ID for the Service Portal search results page, and then select **Search**.

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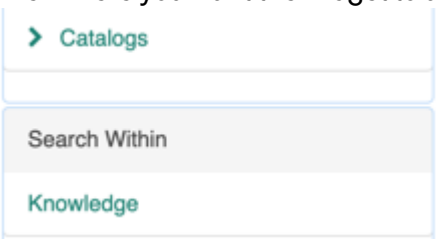
d. In the **Filter Widget** field, search for the Search Within widget and drag it onto the container where you want the widget to appear on the Service Portal search results page.



Tip:
To verify the location and appearance of the newly added Search Within widget on the Service Portal search results page, click the **Preview** tab.

The Search Within knowledge search widget is added to the Service Portal search results page. Clicking **Knowledge** in the widget and searching for a keyword will redirect you to the Knowledge Management search results page in the Knowledge Management Service Portal.

Add widgets to access knowledge articles from the Service Portal homepage

Add the Knowledge Management Service Portal widgets Featured Articles, Most Useful Articles, and Most Rated Articles to the Service Portal homepage to quickly access knowledge articles.

Before you begin
Role required: admin

About this task
For more information about Knowledge Management Service Portal widgets, see Knowledge Management Service Portal widgets.

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Configuration**.
2. Click **Designer**.
3. Select the Service Portal homepage.
4. In the **Filter by title or Id** field, enter `index`, the ID for the Service Portal homepage, and then select **Service Portal**.
5. In the **Filter Widget** field, search for the following Knowledge Management Service Portal widgets, and then drag them onto the container where you want them to appear on the Service Portal homepage.

Tip:
To verify the location and appearance of the added widgets on the Service Portal, click the **Preview** tab.

Result
Clicking a knowledge article link from one of the added widgets on the Service Portal homepage opens the Knowledge Management article view page in the Knowledge Management Service Portal.

Configure custom SEO tags for canonical URLs and localized knowledge articles

Discover relevant knowledge articles through search engines by adding custom SEO tags for canonical URLs and *`hreflang`* tags to the knowledge article view page.

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Before you begin
Role required: admin

About this task
Update the *SPSEOHeaderTagsArticleView* script include to add canonical URLs and *hreflang* tags to the knowledge article view page. You can also add custom header tags to the knowledge article view page by implementing the *generateCustomTagsForSEO* function.

Note:
The metatags will be added to the Knowledge Article View [kb_article_view] only when viewed by the user agents mentioned in *glide.knowman.serviceportal.seo_user_agent* system property. For more information, see Create and edit a page using the Service Portal Designer.

For information about the default behavior of canonical URLs and *hreflang* tags for the knowledge article view page, see SEO for canonical URLs and localized versions of knowledge articles.

Procedure
1. Navigate to **All** > **System Definitions** > **Script Includes**.
2. Search for `SPSEOHeaderTagsArticleView`.
3. In the **Name** column, click the **SPSEOHeaderTagsArticleView** link.
4. On the Script Include form, modify the functions for knowledge articles.

Functionality	Implementation
Return a canonical URL for a knowledge article	Modify the *generateCanonicalURL* function to return the fully qualified canonical URL of a knowledge article as a string. For example, use the following URL format for a knowledge article in the customer service portal: `"https://<instance name>.servicenow-com/csp?id=kb_article_view&sysparm_article=<article number>"`
Return an *hreflang* tag for translated versions of a knowledge article	Modify the *generateHrefLangArray* function to return an *hreflang* array for the current language and the available translations for a knowledge article. For example, use the following format for a knowledge article translated in French in the customer service portal: `[{locale:'fr', href:'https://<instance name>.servicenow-com/csp?id=kb_article_view&sysparm_article=<article number>'}]`
Return a custom header for a knowledge article	Modify the *generateCustomTagsForSEO* function to return any custom header tags as an array of strings used for the knowledge article view page. For example, use the following format for a custom tag for a knowledge article: `['<meta custom-tag="" property="og:title" content="Service Portal">']`
Return a SEO optimized HTML	Modify the *generateSEOTags* function to return the SEO optimized HTML content in *items.customSEOHTML*.

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Functionality	Implementation
content for SEO bots	

For more information about configuring script includes, see Script includes.

5. Click **Update**.

Create a knowledge base

Create a knowledge base to provide a self-service platform for users to store, share, and manage content. Configure knowledge bases into product or service categories and manage user access based on permissions. Customize workflows for publishing and retiring articles in the knowledge base.

Before you begin

Understand the requirements for setting up a knowledge base.

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge bases**.
2. In the Knowledge Bases list, click **New**.
3. On the Knowledge base form, fill in the following fields as appropriate:

Knowledge base form

Field	Description
Title	Unique name for the knowledge base.
Article Validity	Number of default days articles will be valid for after their created date. **Note:** The **Article Validity** field is configured to set the **Valid to** date for an article. The **Valid to** date is the date this knowledge article expires. When you create an article within a knowledge base, the date value in the **Valid to** field of the article is calculated as follows: Created (sys_created_on) + Article Validity (in days). An article author or editor can select whether to keep or change the **Valid to** date (see Create a knowledge article). If the **Article Validity** field is blank, the date in the **Valid to** field date is set to January 1, 2100.
Icon	An image that provides a visual reference to describe the knowledge base. This image is displayed next to all articles from this knowledge base in the article search results page.

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Field	Description
Disable commenting	Option to disable commenting. If selected, users cannot comment on articles in the knowledge base.
Disable suggesting	Option to disable edit suggestions. If selected, users cannot suggest edits to articles in the knowledge base.
Disable category editing	Option to disable editing of knowledge categories. If selected, only knowledge managers can add or edit knowledge categories for the knowledge base.
Disable rating	Option to disable the rating for knowledge articles. If selected, users cannot rate the article in the knowledge base.
Disable mark as helpful	Option to disable the mark as helpful. If selected, user cannot mark any article as helpful in the knowledge base.
Enable blocks	Option to enable the knowledge blocks feature. If selected, you can create knowledge blocks to add to knowledge articles within a knowledge base.
Checklist	Checklist to evaluate the quality of articles in the knowledge base.
Application	Application scope of the knowledge base. **Note:** This field is automatically set to the application selected in the application picker. For information about a scoped knowledge base, see Scoped knowledge bases.
Owner	The user responsible for the knowledge base. A knowledge base owner can assign other roles to the knowledge base.
Managers	Users who perform administrative functions on the knowledge base.
Publish workflow	The workflow for publishing the articles in the knowledge base. ○ **Knowledge - Instant Publish:** publishes articles in the knowledge base without requiring an approval. ○ **Knowledge - Approval Publish:** requests approval from the manager of the knowledge base before moving the articles to the published state.
Retire workflow	The workflow for retiring the articles in the knowledge base.

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Field	Description
	○ **Knowledge - Instant Retire:** retires articles in the knowledge base without requiring an approval. ○ **Knowledge - Approval Retire:** requests approval from the manager of the knowledge base before moving the articles to the retired state.
Active	Option to indicate that the knowledge base is active. If not selected, only users with the admin role or knowledge administrators can create, search for, or view its articles.
Description	A short description to describe the knowledge base.
Set default knowledge field values	Default configuration settings for the knowledge base.
Related products	List of products related to the knowledge base content.
Auto-create translation tasks	Option to enable creating translation tasks automatically after an article is published. If this option is selected, when a knowledge article is published in this knowledge base, translation tasks are automatically created for the configured languages. This field appears only when the translation management feature and *glide.knowman.translation.enable_translati* property are enabled. For more information, see Translation management and Knowledge Management properties.
Languages	Languages enabled for the knowledge articles in this knowledge base. If your system has more languages, use this option to select only those languages in which you want to translate knowledge articles in this knowledge base. You can add more languages later. However, you can remove languages only when no knowledge articles exist in that language. This field appears only when the translation management feature and *glide.knowman.translation.enable_translati* property are enabled. For more information, see Translation management and Knowledge Management properties.

4. Right-click the form header and click **Save**.

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5. In the related list section, view or configure the following items related to the knowledge base:

Name	Description
Knowledge	List of knowledge articles stored in this knowledge base.
Can Read	List of user criteria that grants read access and enables user matching the criteria to read articles in a knowledge base. **Note:** It is recommended to assign appropriate user criteria to secure read access. See, Select user criteria for a knowledge base.
Can Contribute	List of user criteria that grants contribute access and enables user matching the criteria to create and modify articles in a knowledge base. **Note:** It is recommended to assign appropriate user criteria to secure contribute access. See, Select user criteria for a knowledge base.
Article Templates	If you have activated the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin, the **Article Templates** related list is displayed. If there are article templates in the related list, articles in that knowledge base can only be created using one of the article templates listed. If the **Article Templates** related list is empty, articles can be created using any article template. Click **Edit** to map article templates to the knowledge base. **Note:** Admins, knowledge admins, and knowledge managers can edit the article templates for the knowledge base.
Featured Content	List of knowledge articles that appear in the homepage **Featured Content** section based on the corresponding keyword search set for each article.

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Name	Description
Knowledge Categories	List of knowledge categories associated with this knowledge base. **Note:** If the category is marked as inactive then you can't associate articles to the category. However, it does not have any effect on the existing articles of that category.

6. Click **Submit**.

Related topics

- Control access at the knowledge base level through user criteria
- Explicit roles
- Knowledge workflows
- Knowledge Management properties
- Create a custom knowledge homepage
- I18N - Knowledge internationalization

Configure knowledge bases for a portal

Select which knowledge bases are displayed in a portal to view the associated knowledge articles. If no knowledge bases are configured, users can view articles from all knowledge bases in the portal.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Portal** > **Portals**.
2. Select the portal for which you want to enable search for the desired knowledge bases.
3. In the Knowledge Bases related list, click **Edit**.
4. On the Edit Members form, move the desired knowledge bases from the available items in the **Collection** column to the **Knowledge Bases List** column.
5. Click **Save**.

Related topics

- Create a knowledge base

Configure knowledge subscriptions

Configure knowledge subscriptions by activating the Knowledge Management Advanced plugin and setting the subscription properties.

Before you begin
Ensure that the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated.

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Note:
The Knowledge Management Advanced plugin activates the Subscriptions and Activity Feed Framework plugin (com.snc.activity_subscriptions).

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Properties**.
2. In the **KM Subscription Properties** section, configure the following properties.

Property	Description
Enable subscribe feature for KM [glide.knowman.enable_km_subscription]	Enables or disables the Knowledge Management knowledge subscriptions feature.
List of roles (comma-separated) who can have subscription feature [glide.knowman.enable_km_subscription.roles]	A comma-separated list of the roles that can use the knowledge subscriptions feature and subscribe to knowledge bases and articles.
List of workflow states (comma-separated) that can have subscription feature [glide.knowman.enable_km_subscription.workflow_state]	A comma-separated list of the article states for which the knowledge subscription feature is available. The default states include **Draft**, **Review**, and **Published**.

3. Select **Save**.

Configuration tasks for knowledge managers

Having multiple knowledge bases allows an organization to spread management responsibilities across multiple users, known as knowledge managers.

As a knowledge manager, you can assign other managers, define category structures, configure which users can read and contribute articles, move and pin articles, and modify most fields on the Knowledge Base form. You can also approve the publishing or retiring of knowledge articles in those knowledge bases.

The primary manager of a knowledge base is the owner of that knowledge base. Each knowledge base must have one owner. There may be any number of additional managers for each knowledge base. The owner and all managers of a knowledge base automatically receive the knowledge_manager role. If the knowledge base is made inactive later, the knowledge_manager role is not automatically removed for these users.

Add a knowledge article to featured content

Add a knowledge article to appear in the Featured content section of the knowledge homepage and at the top of knowledge search results page.

Before you begin
Role required: knowledge_manager, knowledge_admin, or admin

About this task
Adding an article to featured content requires associating an article to specific keywords. You can search a keyword in the knowledge service portal or search results page to display articles in the Featured content section or at the top of the knowledge search results list.

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Note:
The articles added to the Featured content section do not appear in the global search results and Virtual Agent conversations.

- To display articles in the Featured content section, add a default keyword in the **glide.knowman.default_keyword** property **Value** field and add the same keyword to all articles you want to display in that section.
- To display articles at the top of the knowledge search results list, add a list of keywords to each article you want to display at the top of the list (it is not applicable for AI search).

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Bases**.
2. Select a knowledge base.
3. On the Knowledge form, click the Featured content related list.
4. Select **New**.
5. On the Knowledge keyword form, in the Knowledge field, search for and select the article.
6. In the Keywords field, click the unlock keywords icon ( ).
7. Select the lookup icon ( ) to open the **Knowledge keywords** list.
8. Select the keyword to add for this article.

Note:
If you're creating a new keyword, it must be a single word and cannot contain spaces.

9. Select the unlock keywords icon ( ) to add the keywords to the article.
10. Select **Submit**.

Result
The featured content on the knowledge service portal displays the article.

Define a knowledge article category

Each knowledge base has a hierarchy of categories that organizes the articles.

Before you begin
Role required: knowledge_admin, knowledge_manager, **CanContribute** access to the knowledge base

About this task
Define a hierarchy for categories by creating parent-child relationships. Each hierarchy consists of a top-level category and a structure of subcategories, which are also named the child categories. The category hierarchy is saved in the **Full category** field in the Knowledge Category [kb_category] table.

You can create and edit categories separately for each knowledge base.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Select a knowledge base you manage.
3. Create a top-level category.

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a. In the Knowledge Categories related list, click **New**.

b. On the Knowledge Category form, fill in the fields.

Knowledge Category form

Field	Description
Label	Label for the category. The label appears as the name of the category.
Value	Value for the category you use when referencing the category in scripts.
Parent ID	Top-level component associated with the category. This field is automatically set to the top-level component ID.
Active	Option to enable the category.

c. Click **Submit**.

4. **Optional:** Create a child category.
   a. Expand an existing category and click **New** within the expanded section.
   b. Fill in the Knowledge Category form.
   c. Click **Submit**.

What to do next

In addition to using categories defined by a knowledge manager, knowledge contributors can add and edit categories when editing an article.

Related topics

Select a knowledge article category

Assign a knowledge base manager

You can assign users as managers of a knowledge base.

Before you begin

Role required: knowledge_admin, or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Bases**.
2. Select a knowledge base you manage.
3. In the **Managers** field, click the unlock icon.
4. Add one or more users.
5. Click **Update**.
   After you save the knowledge base record, users selected as managers automatically receive the knowledge_manager role if they do not have it already.

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What to do next
You can remove a knowledge base manager by removing that user from the **Managers** field. If the user is not a manager of any other knowledge base, the knowledge_manager role is removed from that user.

Configure Self-Service Analytics

Configure the Self-Service Analytics framework so you can use the generated metrics in a dashboard.

Before you begin
Role required: admin

About this task
Complete the following tasks to use the metrics generated by the Self-Service Analytics framework in a dashboard of an application:

Procedure
1. Activate Self-Service Analytics.
2. Configure activity contexts for Self-Service Analytics.
3. Configure pattern elements for Self-Service Analytics.
4. Configure pattern element groups for Self-Service Analytics.
5. Configure activity patterns for Self-Service Analytics.
6. Set up the deflection configuration for Self-Service Analytics.
7. Configure scheduled jobs for Self-Service Analytics.

Related topics
Self-Service Analytics dashboard for customer service

Activate Self-Service Analytics

Activate the Self-Service Analytics Core plugin (com.snc.self_service_analytics_core) if you have the admin role. This plugin activates related plugins if they are not already active.

Before you begin
Role required: admin

About this task
The Self-Service Analytics Core plugin provides the Self-Service Analytics framework for configuring deflection contexts and activity patterns to collect the case reduction (deflection) metrics. The metrics are used in the Self-Service Analytics dashboard.

The Self-Service Analytics Core plugin activates these related plugins if they are not already active.

Plugins for Self-Service Analytics Core

Plugin	Description
Subscriptions and Activity Feed Framework [com.snc.activity_subscriptions]	Provides a generic set of artifacts to handle subscriptions for any defined subscribable object. Any entity can be defined as a subscribable object and a set of subscribers can subscribe to the objects. When a event occurs related

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Plugins for Self-Service Analytics Core (continued)

Plugin	Description
	to the subscribable object, activities can be tracked and subscribers can be notified.

Note:
The Self-Service Analytics Core plugin is also installed when you activate the Platform Analytics Solution for Self-Service Analytics for Customer Service. For more information, see Activate the Platform Analytics Solution for Self-Service Analytics for Customer Service.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Configure activity contexts for Self-Service Analytics

Define the type of activities you want to collect as Self-Service Analytics data for a user entity such as consumers and customer contacts.

Before you begin
Role required: sn_ssa_core.self_service_manager

About this task
The activity types you add to an activity context are already predefined for use in applications that use the Subscriptions and Activity Feed Framework. This framework is available when you install the Subscriptions and Activity Feed Framework plugin (com.snc.activity_subscriptions). The plugin is activated when you activate the Self-Service Analytics Core plugin (com.snc.self_service_analytics_core).

Procedure

1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Activity Context**.
2. In the Activity Contexts list, search for and select the activity context for your user entity.
   - For consumers, select **Consumer**.
   - For customer contacts, select **Contact**.
   - For user entities other than consumers and customer contacts, click **New** to create another activity context.

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Note:
To get the activity contexts Consumer and Contact by default, you must install Self-Service Analytics for Customer Service (com.snc.pa.self_service_analytics_csm) plugin.

3. On the Activity Context form, verify the default field values for consumers and customer contacts, or fill in the values for a custom configuration.

Activity Context form

Field	Description
Name	Unique name for your activity context.
Context Table	Table that includes the user entity whose actions need to be tracked and displayed on the Self-Service Analytics dashboard. For example, if you want to track all actions for a customer contact, select the Contact [customer_contact] table. Similarly, if you want to track all actions for a consumer, select the Consumer [csm_consumer] table.
Module	Module associated with the application that stores the activities data.
Application	Scope of the application. This field is automatically set based on the application scope selected in the application picker.
Domain	Domain in which the activities records exist.

4. If you are creating a new activity context, click **Submit** and then select the newly created activity context link from the Activity Contexts list.
5. In the Activity Context Groups related list, map an activity context with activity groups.
   - For consumers and customer contacts, verify the default field values for an existing configuration.
   - For user entities other than consumers and customer contacts, click **New** to create another activity group or map with an existing activity group.

   For a new activity group mapping, on the Activity Group form, fill in the fields and click **Submit**. In the Activity Context Groups related list, you then have to select the newly created activity group and add available activity types to the activity group.

Activity Group form

Field	Description
Activity Context	Activity context associated with the activity group.
Activity Group	Option to search for and select an activity group.
Application	Defines the scope of the application. This field is automatically populated based on the application scope.
Domain	Domain in which the activities records exist.

6. In the Activity Context Types related list, map an activity context with an activity type.

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- For consumers and customer contacts, verify the default field values for an existing configuration.
- For user entities other than consumers and customer contacts, click **New** to create another mapping or use an existing configuration.

For a new activity type mapping, on the Activity Source Context Mapping form, fill in the fields and click **Submit**.

Activity Source Context Mapping form

Field	Description
Activity Context	Activity context associated with the activity source.
Context Table	Table that includes the user entity whose actions need to be tracked and displayed on the Self-Service Analytics dashboard. This field is auto-populated based on the selected activity context.
Activity Type	Activity type you want to associate with the activity context.
Source Table	Table from which the data for the activity context is populated.
Filter Criteria	Filter conditions applied on the source table.
Advanced Mapping	Option to enable advanced mapping of activity source and activity context. You enter a script in the **Advanced Mapping Script** field.
Advanced Mapping Script	Script to use if the source and context mapping is not sufficient. This field appears only when the **Advanced Mapping** option is selected.
Module	Module associated with the application that stores the activities data.
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Domain	Domain in which the activities records exist.
Fetch from Activities	Option to enable a business rule defined for an activity type.

7. On the Activity Context form, click **Update**.

What to do next

Configure pattern elements for Self-Service Analytics.

Configure pattern elements for Self-Service Analytics

Configure a pattern element to specify a single activity type and how many times it occurs. Each pattern element is implemented as regular expressions.

Before you begin

Configure activity contexts for Self-Service Analytics.

Role required: sn_ssa_core.self_service_manager

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About this task

By default, the system includes pattern elements for analyzing activity patterns within Knowledge, Catalog, Communities, or Virtual Agent self-service channels. These pattern elements are available with the Self-Service Analytics for Customer Service plugin [com.snc.pa.self_service_analytics_csm].

Procedure

1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Pattern Element**.
2. In the Pattern Elements list, modify an existing pattern element or click **New** to create another pattern element.
3. On the Pattern Element form, fill in the fields.

Pattern Element form

Field	Description
Name	Name to identify the pattern element.
Activity Type	Activity type you want to associate with the pattern element.
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Occurrence	Frequency with which an activity should occur. An activity occurrence is one of the following types: ○ **Once**: An activity must have occurred only once. For example, an article was marked with positive feedback only once. ○ **Optionally Once**: An activity might not have occurred, but if it has, then it has occurred only once. For example, either no catalog request was created or only one was created. ○ **Optionally Many**: An activity might not have occurred but if it has, then it has occurred multiple times. For example, either no catalog request has been created or multiple requests have been created. ○ **At Least Once**: An activity has occurred at least once. For example, a community blog was viewed one or more times. ○ **Range**: An activity has occurred as many times as is specified in a range. You specify a range using the **Minimum** and **Maximum** fields. For example, if you specify a range of 2 to 4 Virtual Agent interactions, only 2, 3, or 4 interactions can have occurred.
Minimum	Minimum occurrence of an activity. This field appears only when **Range** is selected from the Occurrence list.
Maximum	Maximum occurrence of an activity. This field appears only when **Range** is selected from the Occurrence list.

4. Submit or update the pattern element.
   - Click **Submit** if you created a new pattern element.
   - Click **Update** if you modified an existing pattern element.

What to do next

Configure pattern element groups for Self-Service Analytics.

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Configure pattern element groups for Self-Service Analytics

Define a logical combination of two pattern elements, pattern element group, or both and how many times the combination occurs. Each pattern element group is implemented as regular expressions.

Before you begin

Configure pattern elements for Self-Service Analytics.

Role required: sn_ssa_core.self_service_manager

About this task

By default, the system includes pattern element groups for analyzing activity patterns within the Knowledge, Catalog, Communities, and Virtual Agent self-service channels. These pattern elements are available with the Self-Service Analytics for Customer Service plugin [com.snc.pa.self_service_analytics_csm].

Procedure

1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Pattern Element Group**.
2. Either configure an existing group or create a new group.
   - Select an existing group in the Pattern Element Groups list.
   - Create a new group by clicking **New**.
3. On the Pattern Element Group form, fill in the fields.

Pattern Element Group form

Field	Description
Name	Name to identify the pattern element group.
First Element	Conditional regular expression consisting of a pattern element or pattern element group.
Second Element	Another conditional regular expression consisting of a pattern element or pattern element group.
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Operator	Logical operator that returns the result of the combination of the first and second elements. Valid values are: ○ **And**: Both the first and second elements are true. ○ **Or**: Either the first or second element is true.
Occurrence	Frequency with which a pattern element or pattern element group must occur. An occurrence is one of the following types: ○ **Once**: Must have occurred only once. ○ **Optionally Once**: Might not have occurred but if it has, then it has occurred only once. ○ **Optionally Many**: Might not have occurred but if it has, then it has occurred multiple times.

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Field	Description
	○ **At Least Once**: Has occurred at least once. ○ **Range**: Has occurred within a range. You specify a range using the **Minimum** and **Maximum** fields.
Minimum	Minimum occurrence of the result of the logical combination of the first and second elements. This field appears only when Occurrence is set to **Range**.
Maximum	Maximum occurrence of the result of the logical combination of the first and second elements. This field appears only when Occurrence is set to **Range**.

4. Save the pattern element group settings.
   - Save a new pattern element group by clicking **Submit**.
   - Save the changes to an existing pattern element group by clicking **Update**.

What to do next
Configure activity patterns for Self-Service Analytics.

Configure activity patterns for Self-Service Analytics

Configure an activity pattern to combine the pattern element, pattern element group, or both for a user entity and link them to an outcome.

Before you begin
Configure pattern element groups for Self-Service Analytics.

Role required: sn_ssa_core.self_service_manager

About this task
By default, the system includes activity patterns for the activities Consumer created a case and Customer created a case. These pattern elements are available with the Self-Service Analytics for Customer Service plugin [com.snc.pa.self_service_analytics_csm].

Procedure
1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Activity Pattern**.
2. Either configure an existing activity pattern for your user entity or create a new one.
   - Select an existing activity pattern in the Activity Patterns list.
   - Create a new activity pattern by clicking **New**.
3. On the Activity Pattern form, verify the default field values for an existing activity pattern or fill in the values for a custom configuration.

Activity Pattern form

Field	Description
Name	Name to identify the activity pattern.
Description	Summary of the activity pattern.
Primary Activity	Activity to be tracked in the activity sequence after a pattern matches with an outcome using the pattern recognition. An activity sequence is a stream of activities a user performs.
Outcome	Result of an activity pattern.

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Field	Description
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Match If	Pattern recognition using the Match If function to associate the pattern with an outcome. For example, you can indicate that if the activity Consumer created a case is not found, you want to match it with the Confirmed Deflection outcome.
Domain	Domain in which the activities records exist.

4. Click **Submit** and then select the newly created activity pattern link from the Activity Patterns list.
5. In the Elements related list, select elements to map with the primary activity and use the **Order** column to decide the order of each element mapping.
   - To use an existing element, select an element, modify the fields and click **Update**.
   - To create another pattern element or pattern element group, click **New** and select the type of element, fill in the fields on the form, and then click **Submit**.

   An element can be a pattern element or pattern element group. For more information, see Configure pattern elements for Self-Service Analytics and Configure pattern element groups for Self-Service Analytics.

   In the **Order** column, the following conditions apply:
   - If there is only one matching table map, the system uses that map.
   - If there are multiple matching table maps with the same order, the system uses the map with the older created date.
   - If there are multiple matching table maps with different orders, the system uses the map with the highest order.
6. On the Activity Pattern form, click **Update**.

What to do next

Set up the deflection configuration for Self-Service Analytics.

Set up the deflection configuration for Self-Service Analytics

Associate a period of time with an activity context that defines how long a system will wait for a case to be created to match a deflection pattern.

Before you begin

Configure activity patterns for Self-Service Analytics.

Role required: sn_ssa_core.self_service_manager

Procedure

1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Deflection Configuration**.
2. In the Deflection Configurations list, search for and select the deflection configuration for your activity context.

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- For customer contacts, select **Contact Case Deflection Configuration**.
- For consumers, select **Consumer Case Deflection Configuration**.
- For user entities other than consumers and customer contacts, click **New** to create another deflection configuration or modify an existing configuration.

3. On the Deflection Configuration form, verify the default field values for an existing configuration or fill in the values for a custom configuration.

Deflection Configuration form

Field	Description
Name	Name for your deflection configuration.
Activity Context	Type of activities for which you want to collect data. For more information, see Configure activity contexts for Self-Service Analytics.
Description	Summary of the configuration.
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Window	Activity context window (duration) for tracking activities that match a deflection pattern. Example: To track the create case activity for a consumer within a day, set the window as 1 day. ○ If the consumer created a case within that window, the deflection pattern matched is not a deflection. ○ If the consumer did not create a case within that window, the deflection pattern matched is a potential deflection. ○ If the consumer did not create a case and the last activity is submitted positive feedback for any self-service channel content within that window, the deflection pattern matched is a confirmed deflection.

4. In the Deflection Patterns related list, add or modify existing deflection patterns to associate them with the deflection configuration or add a new pattern.
   This related list appears only if a deflection configuration exists.
5. In the Deflection Metrics related list, add or modify an existing deflection metric table that stores the deflection data for an activity pattern associated with a deflection type.
   This related list appears only if a deflection configuration exists. Alternatively, you can also configure a deflection metric table by navigating to **Self-Service Analytics** > **Deflection Metric**.
6. On the Deflection Configuration form, click **Update**.

What to do next

Configure scheduled jobs for Self-Service Analytics.

Configure scheduled jobs for Self-Service Analytics

Schedule when to run the deflection configuration to generate the activities that match an activity pattern within an activity window.

Before you begin

Set up the deflection configuration for Self-Service Analytics.

Role required: admin

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About this task

You configure the duration of processing the deflection configuration for a user entity. This configuration is optional for consumers and customer contacts. The scheduled job captures data for Self-Service Analytics and stores the generated data in the Deflection Metric [ssa_deflection_metric] table.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.
2. Configure the scheduled script processed for a user entity in a scheduled job.
   - For consumers, select **Deflection Analytics for Consumers**.
   - For customer contacts, select **Deflection Analytics for Contacts**.
   - For user entities other than consumers and customer contacts, click **New** and select **Automatically run a script of your choosing** to create another scheduled job or modify an existing schedule job.
3. On the Scheduled Script Execution form, verify the default field values for consumers and customer contacts or fill in the values for a custom configuration.

Scheduled Script Execution form

Field	Description
Name	Name to identify the scheduled script execution.
Active	Option to activate the script at the scheduled date and time. By default the job is inactive.
Run	Type of schedule to execute the script on. Choices are: ○ Daily ○ Weekly ○ Monthly ○ Periodically ○ Once
Day	○ If you select **Weekly** as the **Run** value, the day of the week. ○ If you select **Monthly** as the **Run** value, the day of the month.
Repeat Interval	If you select **Periodically** as the **Run** value, the duration between each script execution. **Note:** This setting does not account for Daylight Savings Time changes. For example, if you select a period of one day, this adds 24 hours to the starting time of the job. If the start time was configured during a period with Daylight Savings Time, the job executes with a one hour offset on days when that time zone is not in Daylight Savings Time.
Time	If you select **Daily**, **Weekly**, or **Monthly** as the **Run** value, the time of day, based on a 24-hour clock.
Starting	Date and time of the first scheduled script execution.
Application	Application that contains the script.

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Field	Description
Conditional	Option to run a scheduled job if certain conditions are met in the associated script.
Condition	Conditional script that determines whether a scheduled job must run. The last expression of the script should evaluate to a Boolean (true or false) value. This field appears only when the **Condition** check box is selected.
Run this script	Script to run at the scheduled date and time. For a new scheduled script, copy the script from the existing script (Deflection Analytics for Consumers or Deflection Analytics for Contacts) and modify the `deflectionAnalyticsService.captureDeflectionAnalytics('sys_ID')` field value to include the sys_id of your deflection configuration record. For information about identifying the sys_id, see The unique record identifier (sys_id).

4. Click **Update** for consumers and customer contacts or **Submit** to save a custom configuration.

Managing access to knowledge bases and knowledge articles

Determine whether certain users or categories of users can access knowledge bases and knowledge articles by controlling contribute and read access.

As a knowledge administrator, manager of a knowledge base, or owner of a knowledge base, you can assign user criteria to control contribute and read access at the knowledge base level, where:

- Read access determines the ability to view knowledge articles in a knowledge base.
- Contribute access determines the ability to create, modify, and retire knowledge articles in a knowledge base.

As a knowledge administrator, manager of a knowledge base, or owner of a knowledge base, you can assign user criteria, or roles, or both, to control read access at the knowledge article level.

Try to use only user criteria, which were introduced in Knowledge Management v3, to control access to knowledge articles. Roles were used for this purpose in Knowledge Management v2. If no user criteria is selected for a knowledge base, all users can read and all users with roles can contribute to that knowledge base.

Note:
By default, when contribute access isn't provided for a knowledge base, a user must meet both roles and user criteria conditions for read access. However, you can override roles set for a knowledge article and provide access through user criteria only by setting the *glide.knowman.search.apply_role_based_security* system property to `false`. Because this property isn't available by default, you must add it. For more information, see Add a system property.

User criteria for knowledge access

As a knowledge administrator, manager of a knowledge base, or owner of a knowledge base, you control access to knowledge bases or knowledge articles for a user through user criteria, which are described in the following table.

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User criteria definitions

User criteria	Result
Cannot Contribute	Cannot contribute (that is can't create, modify, or retire) knowledge articles within a knowledge base. The Cannot Contribute user criteria is available only for knowledge bases.
Can Contribute	Can contribute (that is can view, create, modify, or retire) knowledge articles within a knowledge base. The Can Contribute user criteria is available only for knowledge bases.
Cannot Read	At the knowledge base level, cannot view knowledge articles within a knowledge base. At the knowledge article level, cannot view a knowledge article.
Can Read	At the knowledge base level, can view knowledge articles within a knowledge base. At the knowledge article level, can view a knowledge article.

The access to knowledge base and its articles are defined based on the user criteria status for a user as described in the following table.

Combining knowledge base and knowledge article user criteria

Status	Access
The user matches both Can Contribute and Cannot Contribute at the knowledge base level	The user is denied contribute access to the knowledge base and its articles.
The user matches both Can Read and Cannot Read at the knowledge base level	The user is denied read access to the knowledge base and its articles.
The user matches Can Read at the knowledge base level and Cannot Read at the knowledge article level	The user is denied read access to the knowledge article.
The user matches Cannot Read and Can Read at the knowledge article level	The user is denied read access to the knowledge article.

Users with special knowledge privileges

Users with special knowledge privileges aren't evaluated based on user criteria and have knowledge bases and knowledge articles access as described in the following table.

Access of users with special privileges to knowledge bases and knowledge articles

User	Access
Knowledge administrator	• Contribute to and read all knowledge bases and their articles. • Modify the definition of all knowledge bases and assign user criteria to them.

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Access of users with special privileges to knowledge bases and knowledge articles (continued)

User	Access
	Note: This access doesn't apply to scoped knowledge bases. For more information, see Scoped knowledge bases.
Owner of a knowledge base	• Contribute to and read that knowledge base. • Modify the definition of that knowledge base and assign user criteria to it.
Manager of a knowledge base	• Contribute to and read that knowledge base. • Modify the definition of that knowledge base and assign user criteria to it. **Note:** If the article versioning feature is enabled, the manager of a knowledge base can't modify knowledge articles of other authors that are in the **Draft** state. For more information, see Article versioning.
Members of an ownership group associated with a knowledge article	Read, modify, approve, and retire that knowledge article (see Ownership groups).

Explicit roles and user criteria

Explicit roles (snc_external and snc_internal) are added to your instance when your administrator installs a plugin, such as the Customer Service plugin (com.sn_customerservice), that also activates the Explicit Roles plugin (com.glide.explicit_roles). If you create a knowledge base with the Explicit Roles plugin (com.glide.explicit_roles) activated, the application automatically adds the following predefined user criteria at the knowledge base level:

- **Users with 'snc_internal' role** – Added to the Can Read user criteria enabling only users with the snc_internal role have read access to the knowledge base.
- **Users with snc_internal' and another role** – Added to the Can Contribute user criteria enabling only users with the snc_internal role and at least one additional role have contribute access to the knowledge base.

When you upgrade to product versions (from Rome onwards) that offer the Explicit Roles plugin (com.glide.explicit_roles), the predefined user criteria **Users with 'snc_internal' role** and **Users with 'snc_internal' and another role** aren't automatically added to any existing knowledge bases created prior to the activation of the Explicit Roles plugin. To add these predefined user criteria to an existing knowledge base, run the *`Fix unsecured knowledge bases`* fix script. For more information about explicit roles and fix scripts, see Explicit Roles and Fix scripts.

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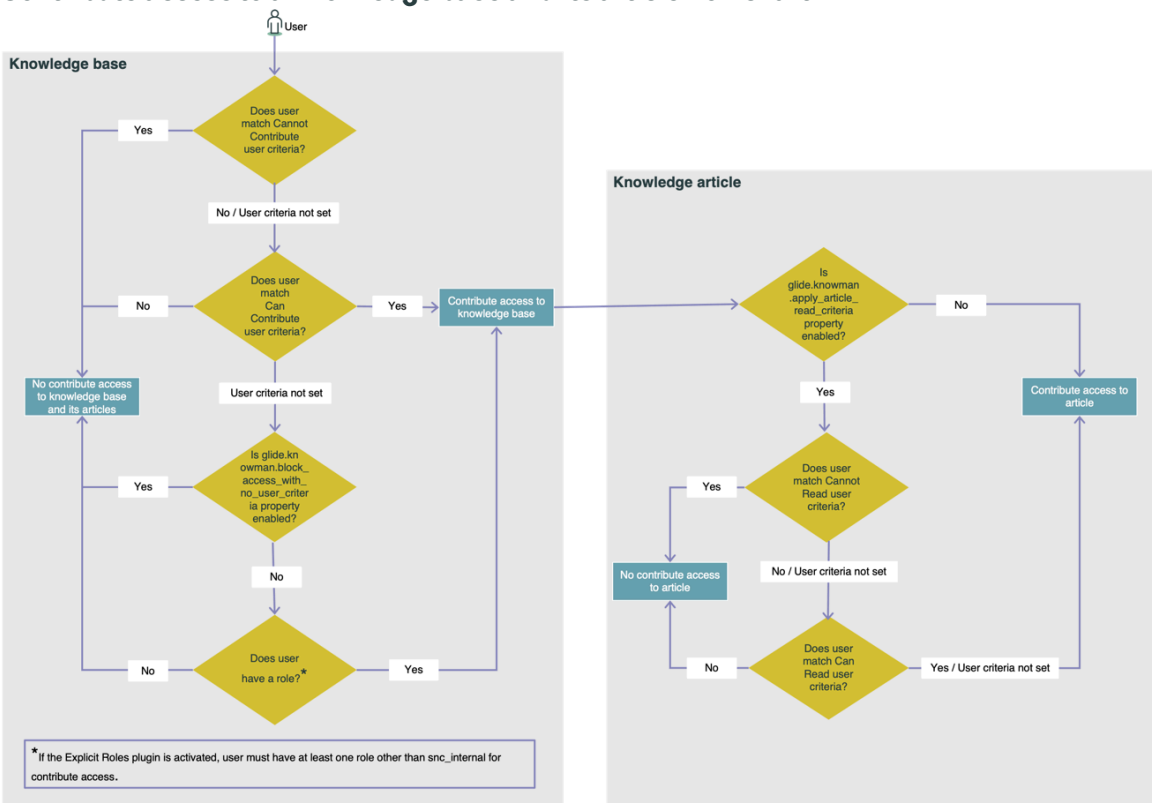
Determining contribute access to a knowledge base and its articles using user criteria

The flowchart in this section illustrates the user criteria checks that determine contribute access at the knowledge base and article levels.

Note:
In order for an unauthenticated user to view knowledge articles within the knowledge base, ensure that the audience for the Knowledge Management Service Portal pages is set to public; that is, the page can be accessed without the need for authentication. For more information, see Create and edit a page using the Service Portal Designer.

Contribute access to a knowledge base and its article flowchart



When either Cannot Contribute isn't set or a user doesn't match Cannot Contribute and additionally Can Contribute is not set, the *glide.knowman.block_access_with_no_user_criteria* property value is further evaluated to determine contribute access, as explained in the following table.

Contribute access to a knowledge base when user criteria for a knowledge base aren't set

Property value	Result
true	No user has contribute access to the knowledge base except users with special knowledge privileges.
false	All users, including unauthenticated users, with at least one role can contribute to the knowledge base. If the Explicit Roles plugin (com.glide.explicit_roles) is activated, users who have at least one role other than snc_internal can contribute to the knowledge base.

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Contribute access to a knowledge base when user criteria for a knowledge base aren't set (continued)

Property value	Result
	To check knowledge bases accessible to unauthenticated users, use the User Criteria Diagnostics feature. For more information, see Configure access to knowledge bases for unauthenticated users.

When a user has contribute access to a knowledge base, the *glide.knowman.apply_article_read_criteria* property is evaluated to determine contribute access to an article in the knowledge base, as explained in the following table.

Contribute access to an article when a user has contribute access to a knowledge base

Property value	Result
true	Article-level read access overrides the default contribute permission granted by contribute access at the knowledge base level.
false	Contribute access at the knowledge base level takes precedence over article-level user criteria and the user has contribute access to every article in the knowledge base.

Determining read access to articles in a knowledge base using user criteria

The following flowchart illustrates the user criteria checks that determine read access to a knowledge article.

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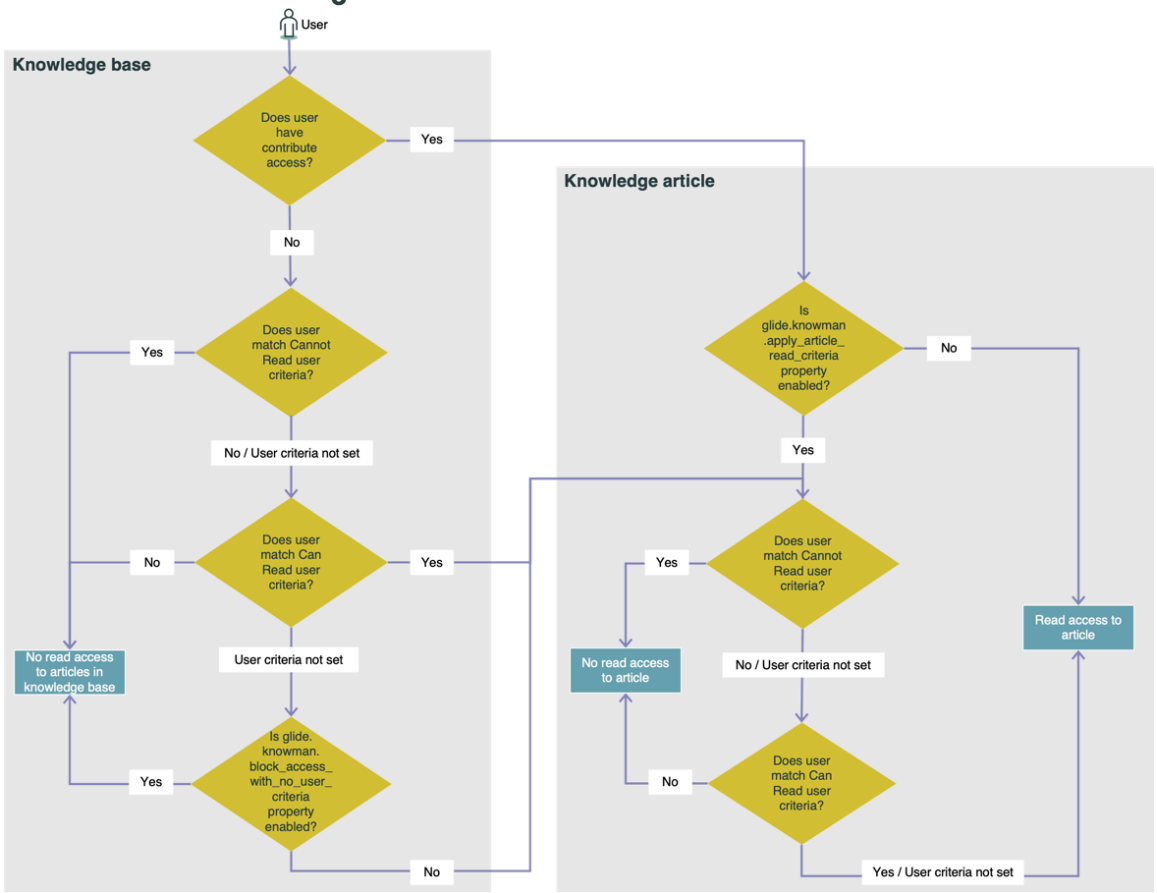
Read access to a knowledge article flowchart



When either Cannot Read isn't set or a user doesn't match Cannot Read and additionally Can Read is not set, the *glide.knowman.block_access_with_no_user_criteria* property value is further evaluated to determine read access, as explained in the following table.

Read access when user criteria for a knowledge base aren't set

Property value	Result
true	No user has read access except users with special knowledge privileges and users who have contribute access to the knowledge base.
false	All users, including unauthenticated users, have read access to the knowledge base and the article-level user criteria are further evaluated. To check knowledge bases accessible to unauthenticated users, use the User Criteria Diagnostics feature. For more information, see Configure access to knowledge bases for unauthenticated users.

When a user has contribute access to a knowledge base, the *glide.knowman.apply_article_read_criteria* property is evaluated to determine read access to an article in the knowledge base, as explained in the following table.

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Read access to an article when a user has contribute access to a knowledge base

Property value	Result
true	Article-level read access overrides the default read permission granted by contribute access at the knowledge base level.
false	Contribute access at the knowledge base level takes precedence over article-level user criteria and the user has read access to every article in the knowledge base.

Important:
After you add user criteria, you can use the user criteria diagnostics feature to verify the access that users have to a knowledge base or a knowledge article. For more information, see User criteria diagnostics for Knowledge Management.

Related topics

- Knowledge Management properties
- Configuration tasks for knowledge managers
- Knowledge Management FAQ
- Create user criteria for controlling access to knowledge bases and articles

Create user criteria for controlling access to knowledge bases and articles

Control access to knowledge bases and articles by creating user criteria.

Before you begin

Role required: user_criteria_admin

Note:
To create a user criteria record from the Knowledge module, you must have the user_criteria_admin role in addition to the knowledge role. For more information about access, see Managing access to knowledge bases and knowledge articles.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **User Criteria**.
2. Click **New**.
3. On the User Criteria form, fill in the fields.

User Criteria form

Field	Description
Name	Unique name of the user criteria.
Users	Users that must match the user criteria.
Groups	Groups that must match the user criteria.
Roles	Roles to match the user criteria.

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Field	Description
	Note: ○ Because the evaluation of a role is cached in the session, any change in the role requires you to log in again. ○ User criteria are not applicable for elevated privilege roles.
Advanced	Option to display or hide the advanced option that includes the **Script** field on the User Criteria form.
Script	Script to define any additional user criteria that returns true or false. This field is available when the **Advanced** option is selected on the User Criteria form. **Note:** ○ A script is evaluated in the scope that the user criteria are created in. ○ The evaluation of a script is cached in the session, so any change in the evaluation requires you to log in again. If a scripted user criterion is defined for a knowledge base, user access to knowledge bases is evaluated once per session. If the script results in changes after a session cache is built, the result takes effect in the next session. ○ Don't use `gs.getUser()` or other session APIs because they cause conflicts when used in diagnostic tools. Use the predefined `user_id` variable available in the script to get the user ID of the user being used to evaluate the script. ○ Scripts are evaluated dynamically. Therefore, including scripts in a user criteria can impact performance.
Active	Option to activate or deactivate the user criteria.
Companies	Companies that the user record must match.
Locations	Locations that the user record must match.
Departments	Departments that the user record must match.
Match All	Option to determine whether all elements from each populated user criteria field must match. If selected, only users who match all user criteria are given access. If cleared, the user must meet one or more of the set user criteria to be given access. By default, this check box is cleared so that any condition met provides a match. For example, consider a user criteria record for the following: ○ Locations A or B ○ Company C or D With **Match All** selected, only users that meet all of these conditions are matched. For example, a user with a location A and a company C. If **Match All** isn't selected, users meeting any of these conditions are matched. For example, a user with a location B.

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Field	Description
	Note: If you select **Match All**, ensure that you don't create contradictory conditions that can never be met. For example, if all users in location A work for company G, the conditions in this example can never be met.

4. Click **Submit**.

Related topics

Control access at the knowledge base level through user criteria

Control access at the knowledge article level through user criteria

Control access at the knowledge base level through user criteria

You specify user criteria for a knowledge base to control which users are granted access to read and contribute knowledge articles to that knowledge base.

Before you begin

Role required: knowledge_manager, knowledge_admin, or admin

Note:
To administer a scoped knowledge base, you must have the application-specific admin role in addition to the knowledge_admin or admin role. For more information, see Scoped knowledge bases.

About this task

You can assign user criteria to control read or contribute access. For example, you could enable all users in your Support department to have contribute access to a knowledge base by creating a user criteria record with the required department set to Support, and then including the user criteria record in the Can Contribute user criteria. For more information, see Managing access to knowledge bases and knowledge articles. Try to use only user criteria, which were introduced in Knowledge Management v3, to control access to knowledge bases. Roles were used for this purpose in Knowledge Management v2.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Click the link to knowledge base you manage.
3. Add user criteria to the knowledge base.

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a. Depending on the user criteria you want to set, select one or more of the relevant related lists.

Related list	Description
Can Read	Users can read knowledge articles in the knowledge base.
Cannot Read	Users can't read knowledge articles in the knowledge base.
Can Contribute	Users can create, modify, and retire knowledge articles in a knowledge base. Contribute access to a knowledge base also provides read access to all articles in the knowledge base.
Cannot Contribute	Users can't create, modify, retire, or read knowledge articles in the knowledge base.

Note:
If the related lists aren't visible, configure the Knowledge form to display them. For more information, see Add a related list to a form.

b. In the selected related list, add the required user criteria.

- As a user with the admin role, to add a new user criteria record, click **New**, specify the required fields, and then click **Submit**.
- As a user with the knowledge_manager, knowledge_admin, or admin role, to add an existing user criteria record, click **Edit**, move the required user criteria from the **Collection** column to the **Knowledge** column, and then click **Save**.

4. On the Knowledge Base form, click **Update**.

What to do next

After you add user criteria, you can use the user criteria diagnostics feature to verify the access that users have to a knowledge base or a knowledge article. For more information, see User criteria diagnostics for Knowledge Management.

Important:
After making user criteria additions or changes, you may need to log out and log back in to clear the prior configuration.

Related topics

Create a knowledge base

Create user criteria for controlling access to knowledge bases and articles

Control access at the knowledge article level through user criteria

Control access at the knowledge article level through user criteria

You specify user criteria for a knowledge article to control which users are granted read access to the knowledge article.

Before you begin

Role required: knowledge_manager, knowledge_admin

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Note:
You may need to configure the form to add **Can Read** and **Cannot Read** fields.

About this task

Try to use only user criteria, which were introduced in Knowledge Management v3, to control access to knowledge articles. Roles were used for this purpose in Knowledge Management v2. For more information, see Managing access to knowledge bases and knowledge articles.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Open a knowledge article.

   Note:
   You can update only the latest version of the knowledge article.

2. Assign access based on user criteria.

   Note:
   If the **Can Read** and **Cannot Read** fields aren't visible, configure the Knowledge form to display them. For more information, see Configuring the form layout.

3. On the Knowledge form, click **Update**, and then click **Publish** to apply the changes.

What to do next

After you add user criteria, you can use the user criteria diagnostics feature to verify the access users have to a knowledge base or a knowledge article. For more information, see User criteria diagnostics for Knowledge Management.

Important:
After making user criteria additions or changes, you may need to log out and log back in to clear the prior configuration.

Related topics

Create user criteria for controlling access to knowledge bases and articles

Control access at the knowledge base level through user criteria

Configure Knowledge Management - Add-in for Microsoft Word

Configure the Knowledge Management - Add-in for Microsoft Word to author and access knowledge articles in Microsoft Word.

Before you begin

Complete the following tasks to use the Knowledge Management - Add-in for Microsoft Word.

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Procedure

1. Activate Knowledge Management - Add-in for Microsoft Word.
2. Deploy Knowledge Management - Add-in for Microsoft Word.
3. Configure the security for Knowledge Management add-in for Microsoft Word.
4. **Optional:** Enable downloading of the source Microsoft Word document for a knowledge article.

Related topics

Authoring a knowledge article in Microsoft Word

Activate Knowledge Management - Add-in for Microsoft Word

Activate the Knowledge Management - Add-in for Microsoft Word plugin (com.snc.knowledge.ms_word) if you have the admin role. This plugin activates related plugins if they are not already installed.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Deploy Knowledge Management - Add-in for Microsoft Word

Deploy the Knowledge Management - Add-in for Microsoft Word for authoring knowledge articles from within the Microsoft Word.

Before you begin

In addition to having one of the following roles on the ServiceNow instance, you must be an Office365 administrator to deploy the Knowledge Management - Add-in for Microsoft Word.

Role required: admin, sn_outlook_addin.outlook_addin_setup

Procedure

1. Navigate to **All** > **ServiceNow Add-Ins for Office** > **Office Add-In-Manifests**.
2. In the Add-In Name column, click **Knowledge Management**.
3. Click **Download Manifest** to download the add-in manifest file to your desktop.

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Note:
For releases prior to the Paris Patch 3 release, the downloaded manifest reports validation errors in Office 365. For more information about resolving such errors, see the Enabling Knowledge MS-Word add-in fails validation [KB0858357] article in the HI knowledge base.

4. Deploy the Knowledge Management- Add-in for Microsoft Word.
   For more information, see Deploy add-ins in the admin center.

Related topics

Import a Word document to a knowledge base

Import a Word document to a knowledge base using Knowledge Management v3

Configure the security for Knowledge Management add-in for Microsoft Word

Use the *sn_km_word.glide.knowman.word.xframe* property to specify all the parent domains in the Microsoft Word Online application in which Knowledge Management - Add-in for Microsoft Word is embedded.

Before you begin

Ensure that you have activated the Knowledge Management - Add-in for Microsoft Word plugin and the application scope is set to Knowledge Management - Add-in for Microsoft Word.
Role required: admin

About this task

The domains you specify for the Microsoft Word application in the *sn_km_word.glide.knowman.word.xframe* property are used for setting the x-frame-options and content-security-policy headers. These settings securely display the Knowledge Management add-in for Microsoft Word in the online version of Microsoft Word documents.

Note:
If you don't set the *sn_km_word.glide.knowman.word.xframe* correctly, the Knowledge Management - Add-in for Microsoft Word fails to load in the Word document. For more information about resolving such errors, see the Knowledge Word Office Manifest fails validation [KB0860916] article in the HI knowledge base.

Procedure

1. In the navigation filter, enter `sys_properties.list`.
2. Search for the *sn_km_word.glide.knowman.word.xframe* property.
3. In the **Value** field, enter a domain.
   For multiple entries, separate the domains with commas.

   For example, to enter the Microsoft SharePoint and Microsoft OneDrive domains:
   `https://sitename.sharepoint.com,https://sitename-my.sharepoint.com,https://word-edit.officeapps.live.com`
4. Click **Update**.

Enable downloading of the source Microsoft Word document for a knowledge article

Set the *sn_km_word.glide.knowman.enable_document_download* property to enable users to download the source Microsoft Word document of a knowledge article from the knowledge article view page in a portal or workspace.

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Before you begin
Role required: admin

About this task
When a knowledge article is created using Microsoft Word, users accessing the knowledge article view page in a portal or workspace can download the source Microsoft Word document when the *sn_km_word.glide.knowman.enable_document_download* property is set to true.

Note:
After you enable the *sn_km_word.glide.knowman.enable_document_download* property, the Microsoft Word source document of a knowledge article also might appear in search results as an attachment to the article. Therefore, enabling this property might affect the search relevancy of a knowledge article.

Procedure
1. In the navigation filter, enter `sys_properties.list`.
2. Search for the *sn_km_word.glide.knowman.enable_document_download* property.
3. In the **Value** field, enter `true`.
4. Click **Update**.

User criteria diagnostics for Knowledge Management

Manage user access to a knowledge base or an article using user criteria diagnostics. Understand what access users have to a knowledge base or an article and determine which user criteria define those permissions.

User access to a knowledge base or an article can be restricted based on:

- Domain separation
- Access control list (ACL) rules
- Knowledge workflows
- User criteria set for a knowledge base or an article

This feature considers domain separation and user criteria to determine the user access to knowledge bases and articles.

Activation information

The user criteria diagnostics feature is activated with the Knowledge Management v3 plugin (com.snc.knowledge3). For more information, see Activate a plugin.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

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Diagnose user access to a knowledge base

Identify which users have access to a knowledge base and what enables that access.

Before you begin

Role required: knowledge_manager, knowledge_admin, or admin

Procedure

1. Access the **User Criteria Diagnostics** landing page using one of these options:

To access	Navigate to
Using the application navigator	**Knowledge** > **Administration** > **User Criteria Diagnostics**
From a knowledge base	**a.** **Knowledge** > **Administration** > **Knowledge Bases**. **b.** Select the knowledge base to diagnose user access. **c.** In the **Related Links** section, click **Run User Criteria Diagnostics**. The **User Criteria Diagnostics** landing page appears with the **Select knowledge base** field pre-populated.

2. To diagnose user access:

   a. In the **Select user** field, select a user.

   b. From the **Select record type** choice list, select **Knowledge base**.

   c. In the **Select knowledge base** field, select a knowledge base.
   Every time you select a different user, record type, or knowledge base, the page refreshes and displays data for the selected user.

   d. Click **Diagnose**.
   The page displays these details:

   - Whether the user has access to the knowledge base based on their domain. Only system administrators can view domain information and change the domain to give access to a user.
   - Which user criteria provides read or read and contribute access for this user to the knowledge base and what type of user criteria definition enables this access.
   - Whether a role that the user has (knowledge_manager, knowledge_admin, or owner of the knowledge base) enables this access.
   - For a user with no access to this knowledge base, which user criteria may be modified to grant the access.

Example:

The following image shows an example of a diagnosis where the user Alene Reback does not have access to the IT knowledge base.

Alena can get access to the knowledge base if:

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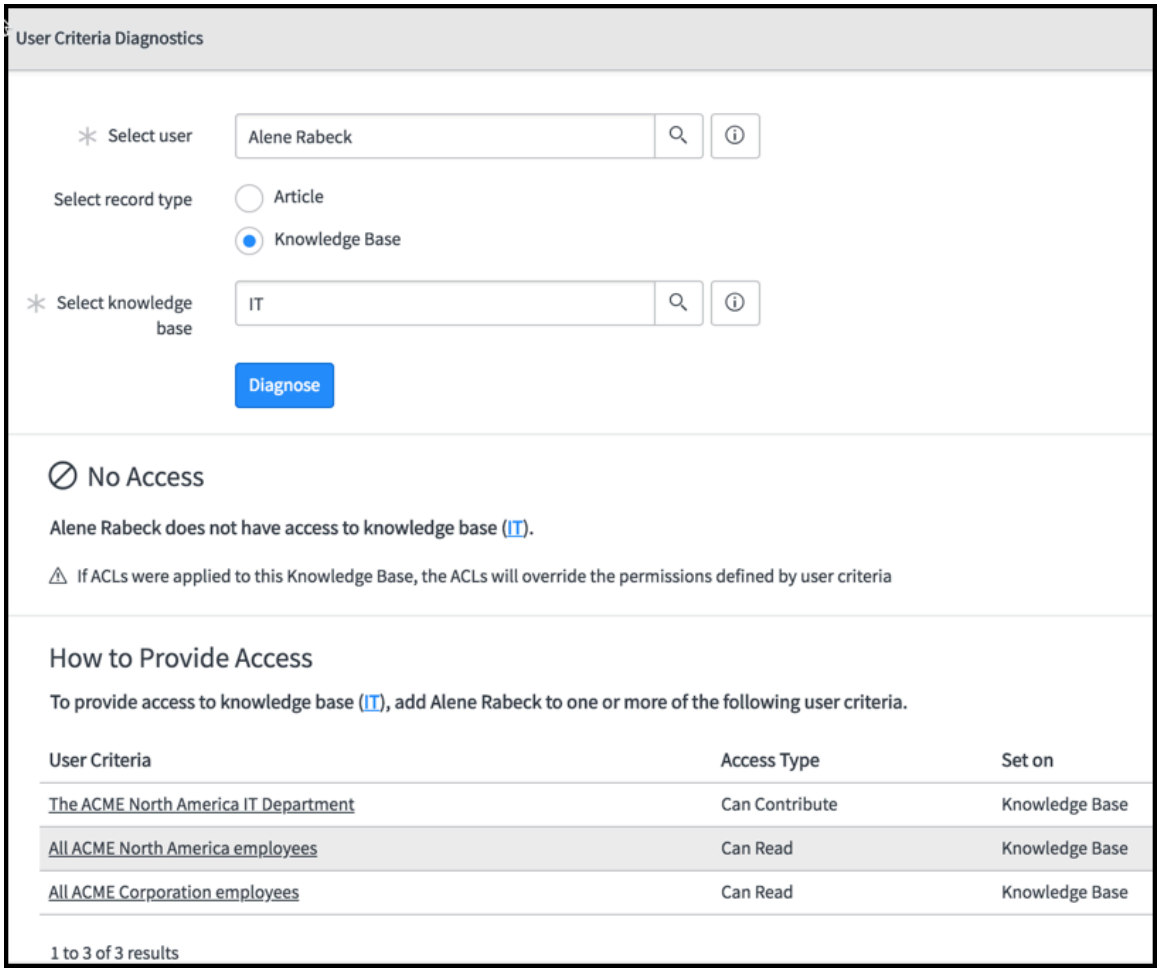
- Alena is added to one of the existing user criteria defined in the knowledge base.
- Alena is added to a new user criteria that is defined and added to the knowledge base.

Click the IT knowledge base link and provide the access by adding Alena to a user criteria for this knowledge base.



Diagnose user access to an article

Identify which users have access to an article and what enables that access.

Before you begin

Role required: knowledge_manager, knowledge_admin, or admin

Procedure

1. Access the **User Criteria Diagnostics** landing page using one of these options:

To access	Navigate to
Using the application navigator	**Knowledge** > **Administration** > **User Criteria Diagnostics**.
From an article	**a. Knowledge** > **Administration** > **Knowledge Bases**. **b.** Select the knowledge base that has the article to diagnose for user access.

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To access	Navigate to
	c. In the **Knowledge** related list, select the article. **d.** In the **Related Links** section, click **Run User Criteria Diagnostics**. The **User Criteria Diagnostics** landing page appears with the **Select article** field pre-populated.

2. To diagnose user access:

   a. In the **Select user** field, select a user.

   b. From the **Select record type** choice list, select **Article**.

   c. In the **Select article** field, select an article.
   Every time you select a different user, record type, or knowledge base, the page refreshes and displays data for the selected user.

   d. Click **Diagnose**.
   The page displays these details:

   - Whether or not the user has access to the knowledge article based on their domain. Only system administrators can view domain information and change the domain to give access to a user.
   - Which user criteria provides read or read and contribute access for this user to the article and what type of user criteria definition enables this access.
   - Whether a role of the user has (knowledge_manager, knowledge_admin, or owner of the knowledge base) enables this access.
   - For a user with no access to this article, which user criteria may be modified to grant the access.

   Note:
   Members of an ownership group are automatically given **Can Contribute** access to knowledge articles that their ownership group is associated with.

Example:
The following image shows an example of a diagnosis where the user Adela Cervantsz has read access to the KB article, KB0000001 v5.0, in the IT knowledge base because Adela belongs to one of the **Can Read** user criteria defined in the knowledge base.

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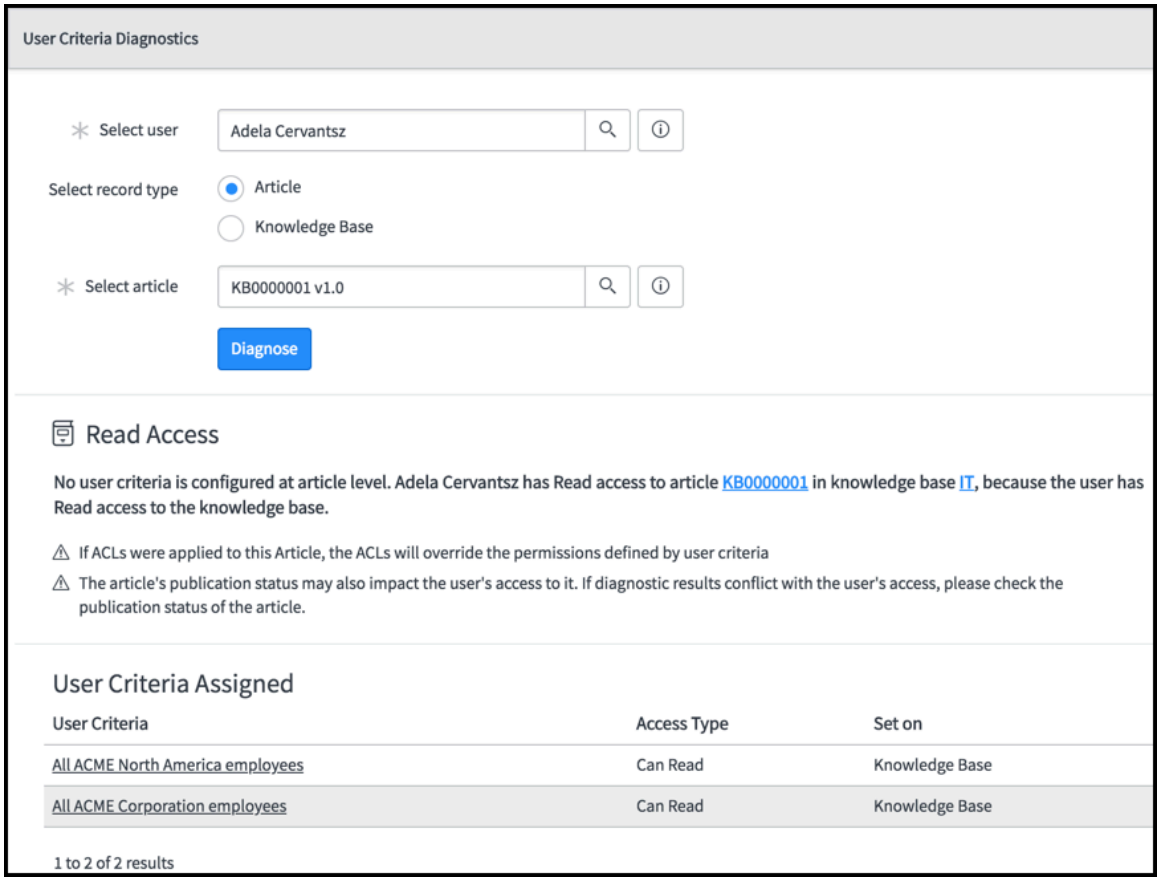

Configure access to knowledge bases for unauthenticated users

Identify knowledge bases accessible to unauthenticated users based on the user criteria and the system property settings.

Before you begin

You must activate the Knowledge Management v3 plugin (com.snc.knowledge3).

Role required: knowledge_manager, knowledge_admin, or admin

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **User Criteria Diagnostics**.
2. Click the **View knowledge bases accessible to unauthenticated users** related link.
3. Review knowledge bases accessible to unauthenticated users.
4. **Optional:** Restrict unauthenticated users to access a knowledge base by selecting the knowledge base and configuring its access settings.

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- Use user criteria to determine access to the knowledge base for unauthenticated users.

  (Optional) For more information, see Managing access to knowledge bases and knowledge articles.

- If no user criteria is specified for the knowledge base, as an administrator, you can set the value of the *glide.knowman.block_access_with_no_user_criteria* system property to **true**.

  For more information, see Knowledge Management properties.

Collect knowledge usage metrics

Capture metrics such as article views, page views, and portal searches to track aggregated knowledge usage by users.

Before you begin

Set the duration over which the metrics are aggregated through the *glide.knowman.usage_metrics_duration* property. For more information, see Other knowledge properties. By default, the property value is set to 60 minutes.

You must activate the Knowledge Management v3 plugin (com.snc.knowledge3).

Role required: admin

About this task

Monitor the knowledge usage metrics to improve the overall effectiveness of the knowledge usage across the portals.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.
2. Search and open the **Knowledge Usage Metrics** scheduled job.
3. In the **Knowledge Usage Metrics** form, select the **Active** check box to activate the scheduled job.
   The scheduled job is inactive by default.
4. In the **Run** field, select **Periodically** as the frequency of the scheduled job.
   See the Scheduled jobs topic for other frequency options.
5. In the **Repeat Interval** field, enter the repeated time interval at which the scheduled job should run.
   By default, the duration is set to 60 minutes.
6. Click **Update**.

What to do next

Modify the data retention policy for knowledge usage metrics to remove unwanted and older data from the knowledge usage metrics [kb_usage_metrics] table.

Modify the data retention policy for knowledge usage metrics

Remove unwanted and older data from the knowledge usage metrics [kb_usage_metrics] table through the data retention policy.

Before you begin

Role required: maint and admin

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About this task
Activating the data retention policy for the kb_usage_metrics table deletes records that you no longer need.

Procedure
1. Navigate to **All** > **System Maintenance** > **Table Cleanup**.
2. In the **Tablename** column, search for `kb_usage_metrics` and click the **kb_usage_metrics** link.
3. On the Auto Flush form, activate the kb_usage_metrics table cleanup job by selecting the **Active** check box.
4. **Optional:** Adjust the duration the system waits before deleting the records by modifying the value in the **Age in seconds** field.
   By default, the **Age in seconds** field value is set to 2,592,000 seconds (equivalent to 30 days).
   For more information, see Autoflush form.
5. Click **Update**.

Configure knowledge article templates

Configure knowledge article templates to customize and display content as per your requirements.

Create an article template and use it to create a knowledge article

Create new article templates in addition to the pre-defined templates. Add new fields based on how you want to customize and display your content.

Before you begin
You must activate following plugins:

- Knowledge Management Advanced (com.snc.knowledge_advanced)
- Knowledge Management Advanced Installer (com.snc.knowledge_advanced.installer)

Role required: knowledge_admin or admin

About this task
For each new article template, a child table of the Knowledge [kb_knowledge] table is created. When you add a new field to the template, a new column is added to that table created for the template.

Procedure
1. Navigate to **All** > **Knowledge** > **Administration** > **Article Templates**, and click **New**.
2. On the Article Template form, fill in fields.

Article Template form

Field	Description
Name	Name for the article template. The name can contain only lowercase, alphanumeric ASCII characters and underscores (_).
Description	Description for the article template.

Note:
The **Active** check box is selected by default making the template available for use.

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3. Right-click the form header and click **Save**.
4. In the Article Templates Field related list, add fields to the template.
   a. Click **New**.
   b. On the Article Template Field form, fill in the fields.

Article Template Field form

Name	Description
Field Name	Title to display on the template form.
Field Type	Available field types: ▪ HTML ▪ String ▪ Integer ▪ Date ▪ Date and time
Order	Position of the field in the article page view and the article edit view.
Article Template	(Read-only) Name of the article template associated with this field.
Template Table	(Read-only) Name of the table for this template.
Template Field	(Read-only) Name of the template column associated with this field.
Mandatory	Option to make this field as mandatory. When selected, this field is required to be filled.
Expand/Collapse	Defines whether the template field displays as collapsed or expanded by default.
Active	Option to display the field on the template.
Heading style	CSS formats applied to the template header. For example, to display the background of the template header in red, with a 24-px font size, Arial font family, and white text color, enter the following code: `background-color:red; font-size:24px; font-family:Arial; color:white;`
Field style	CSS formats applied to the template fields. Any CSS format applied at the field level is automatically applied to the header if not already specified in the **Heading style** field. For example, to display the 300px page width, 25px solid green border, 25px padding, and 25px page margin, enter the following code: `width:300px;`

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Name	Description
	`border:25px solid green; padding:25px; margin:25px;`
Preview text	Preview text displayed on the article template selector. Empty value will display random text.

c. Click **Submit**.

The field is added to the template.

5. **Optional:** In the **SEO Description Tag** field, search for and add article template field name. The content in this field is used as meta description tags to search for articles created using this article template.
6. Configure the Knowledge form to display the fields that you added to the template.
   a. Navigate to **Knowledge** > **Articles** > **Create New**.
   b. Select a knowledge base, and then the newly added article template.
   c. Right-click the header and select **Configure** > **Form Layout**.
   d. Select and move the fields you added to the article template from the **Available** column to the **Selected** column.
   e. Click the up or down icon to arrange the fields in the order in which you want them to appear in the Knowledge form.
   f. Click **Save**.

Note:
Authors who started a session before a template was created or activated will see the newly added template upon their next login.

What to do next

If you want to search for duplicate articles when creating an article from a new template, you must configure the article template table for contextual search. On the Table Configuration form, the **Search context** field must be set to **Knowledge ML Search**. For more information, see Configure table for a contextual search.

Configure the preview text setting for a standard article template

Configure the preview text setting to customize the default preview text for a standard article template.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Script Includes**.
2. On the Script Includes page, in the **Name** field, enter `ArticleTemplateUtilSNC`.
3. Open the ArticleTemplateUtilSNC record.
4. On the ArticleTemplateUtilSNC page, copy the following code from the **Script** field.

```
setPreviewTextForStandardArticle: function(){
            return null;
    },
```

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5. On the Script Includes page, in the **Name** field, enter `ArticleTemplateUtil`.
6. Open the ArticleTemplateUtil record.
7. On the ArticleTemplateUtil page, modify the code in the **Script** field by pasting the copied code as shown.

```
var ArticleTemplateUtil = Class.create();
                ArticleTemplateUtil.prototype =
 Object.extendsObject(ArticleTemplateUtilSNC,{
                type: 'ArticleTemplateUtil',
     setPreviewTextForStandardArticle: function(){
                        return null;
                },
                });
```

8. In the **Script** field, remove `null` and enter a preview text.
9. Select **Update**.

Result
The modified preview text displayed on the standard article template selector.

Example:
The following code is modified to show custom preview text. You can also include HTML tags to modify the appearance of preview text.

```
var ArticleTemplateUtil = Class.create();
                ArticleTemplateUtil.prototype =
 Object.extendsObject(ArticleTemplateUtilSNC,{
                type: 'ArticleTemplateUtil',
     setPreviewTextForStandardArticle: function(){
                        return 'Demo for standard article';
                },
                });
```

Restrict access to fields in an article template

Use encryption modules to set field-level security in article templates and display the fields based on role permissions.

Before you begin
Role required: security_admin

Note:
Use Knowledge blocks to restrict the content within the same field. For more information, see Knowledge blocks.

Procedure
1. Create an encryption module for the article template field to be encrypted.
   See Create a cryptographic module for details.
2. Associate the article template field with the encryption module.
   See Encrypting fields and attachments for details.

   a. Navigate to **System Security** > **Field Encryption** > **Encryption Field Configurations** and click **New**.

   b. On the form, fill in the fields.

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Encrypted Field Configuration form

Field	Description
Table	Table associated with the article template fields. For example, for the How to article template fields, select **How To [kb_template_how_to]**.
Column	Article template field to be encrypted. Only String, Date, Date/Time, and URL fields are supported. ▪ **String and URL fields**: You can add a new encryption configuration to either a parent table or a child table. ▪ **Date and Date/Time fields**: You can create encrypted field configurations to encrypt existing Date and Date/Time fields. You can add a new encryption configuration to a parent table only. You cannot add a new encryption configuration to a child table. **Note:** Depending on the number of records affected by the Date and Date/Time fields you are encrypting, it may take up to a few minutes to create the encryption configuration. Make sure that you create the encryption configuration for Date and Date/Time fields when transaction volume on the instance is low.
Encryption module	Encryption module you created for the article template field.
Method	▪ **Single Encryption Module**: Enables data to be encrypted with a single encryption module only. The field is encrypted with the encryption module defined in the **Encryption module** field. Users that do not have the encryption module cannot view or update field values. ▪ **Multiple Encryption Module**: Enables data to be encrypted with more than one encryption module. The field is encrypted by the encryption context of the first user to enter data. If the user has multiple encryption modules, the context defined in the encryption module selector is used. Because the encryption module is set on a per record basis, fields in a list can have different encryption modules. However, within a single record, the field can be encrypted by only one module. **Note:** Mass encryption is not available when using the **Multiple Encryption module** method. After a configuration is created using the single encryption module method, you can update the record to use multiple encryption modules. However, you cannot change a field using multiple encryption modules to use a single encryption module.

c. Click **Submit**.

3. Define role permissions for the encrypted field.

a. Navigate to **User Administration** > **Roles**.

b. In the **Name** column, click the link to the role you want to allow to view this field.

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c. In the **Encrypted context** field, search for and select the name of the encryption context for the article template field to apply for the selected role.

> **Note:**
> You may need to configure the Role form to add the **Encrypted context** field.

d. Click **Update**.

Result

Depending on their role permissions defined for the encrypted field, users can view the field on the article template.

Related topics

Encryption support

Generate SEO information for articles using article templates

Improve the searchability of knowledge articles by using the content in an article template field to generate SEO tags for articles created using that template. Search Engine Optimization (SEO) optimise searches in public search engine.

Before you begin

Role required: knowledge_admin or admin

About this task

> **Note:**
> If you are using the **Standard** article template, the content of the Text field is used to generate the tags.

You can define the number of characters to be used as tags in the *glide.knowman.seo.pages.meta_description.length* system property.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Article Templates**.
2. Select an article template.
3. In the **SEO Description Tag** field, search and select an article template field.
   The content in this field is used as meta description tags to search for articles created using this article template.
4. Click **Update**.

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Note:
You can change which article template field is used for generating SEO. Changes are applied only to knowledge articles created or updated after the change was made. To apply the update to all existing published articles created using this template, run the *Populate Meta Description on KB Articles* fix script.

Article template page



Integration with external knowledge sources

Use the external content integration feature to integrate content from various external sources and enable unified knowledge search results.

Users store and manage knowledge using various external sources and search each source separately for relevant results. External content integration enables acquiring and searching all WebDAV-compliant source content from a single location. This provides users with a seamless search experience across multiple knowledge sources and drives more usage to the platform.

Using this feature, knowledge administrators can define the external content to be imported into a knowledge base and periodically run a job to import the content. Knowledge users have a seamless user experience searching for relevant content across multiple knowledge sources.

Activate the External Content Integration plugin

The External Content Integration feature is activated with the Knowledge Management - External Content Integration plugin (com.snc.knowledge.external_integration).

Before you begin
Role required: admin
The Knowledge Management - External Content Integration plugin is not active by default.

The following plugins are automatically activated when the Knowledge Management - External Content Integration plugin is activated:

- Centralized Connection and Credentials plugin (com.snc.core.automation.connection_credential)
- Knowledge Management V3 plugin (com.snc.knowledge3)
- Knowledge Management Advanced Installer plugin (com.snc.knowledge_advanced.installer)

The **Knowledge** > **Administration** module displays the **External Knowledge Sources** and **External Knowledge Jobs** sub-modules when the Knowledge Management - External Content Integration plugin is activated.

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Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Define an external knowledge source

Before you import content, create and configure the connection between the a Web Distributed Authoring and Versioning (WebDAV) - compliant external knowledge source and the ServiceNow knowledge base into which you want to import content. Define import parameters for the external knowledge source.

Before you begin

Define Basic authentication credentials and Getting started with connections to the external source.

Caution:
This feature expects that the external source endpoint is a publicly accessible endpoint. Mid-server configuration is not supported.

Role required: admin

About this task

Only basic authentication is supported for the external content integration feature.

Procedure

1. Define the connection from the external source and the target knowledge base.

   a. Navigate to **Knowledge** > **Administration** > **External Knowledge Sources**.

   b. Click **New**.

   c. Fill in the following fields:

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Field	Instruction
Name	Enter unique name for the external source.
Target Knowledge Base	Select the knowledge base in which you want to create articles for the external content.
Connection Alias	Select the connection alias to connect to the external source.

d. Right-click the form header and click **Save**.

2. Set import parameters for the external content.

a. In the **Parameter** related list, click **New**.

b. In the **Name** field, select the name of the parameter from the drop-down list.

c. In the **Value** field, enter the desired value for the parameter.
The table below lists the parameters and the corresponding values that can be set for the external source.

Parameter Name	Instructions
Maximum size limit (in MB) for this source	Set maximum allowed content size for this source. Once this limit is reached, no further content is processed. Default value is 400 MB.
Maximum size limit (in KB) per file/content in this source	Set maximum allowed size limit for each file from this external source. If a file exceeds this limit, that file is not processed. Default value is 4000 KB.
Open search results in the original source system	Set value to **true** to open search results in the external source system. Set value to **false** to open search results in the target knowledge base. Default value is set to **false**.
Include folders with names that match these regex patterns	Enter a comma-separated list of regular expressions for folder names that need to be included from this external source.
Exclude folders with names that match these regex patterns	Enter a comma-separated list of regular expressions for folder names that need to be excluded from this external source.
Create articles when file names match these regex patterns	Enter a comma-separated list of regular expressions for file names that need to be included to create articles.
Do not create articles when file names match these regex patterns	Enter a comma-separated list of regular expressions for file names that need to be excluded to create articles.

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Parameter Name	Instructions
Maximum retry limit	Maximum number of retries to send request to the external source.

d. Click **Submit**.

Import content from an external knowledge source

Run an import job manually or set up a schedule to process the integrated external content.

Before you begin

Role required: admin or knowledge_admin

About this task

Each external source is associated with two handlers: the **Acquire handler** and the **Process handler**, for running the import job. The acquire handler uses a WebDAV client to acquire external content to create articles. You can customize the process handler to assign categories to articles or populate additional metadata for the knowledge articles. For more information refer

Options for Importing External Articles into ServiceNow Knowledge Management

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **External Knowledge Sources**.
2. Select the external knowledge source from which you would like to import content.
3. In the **Handler**tab, set a schedule to run the acquire and process handlers.
4. In the Related Links section, click **Run Scheduled Job**.
5. To view all jobs scheduled to run to import content for the external source, click the **Jobs**. You can open the most recent job to monitor the status.

Result

For each file in the external content source, a blank knowledge article is created and the external file is added as an attachment to the article. The short description of the article is derived from the file name of the external content source.

Note:
If the externally imported content is infected, a notification about each infected file is sent to the users with the knowledge_admin role and Knowledge Base owners. The notified users can then take required actions on the infected files.

Open knowledge search results in source system

While search results are aggregated within your instance, your users can also utilize features available in the source system (being able to edit in Microsoft SharePoint, for example). To open knowledge search results in a host system, configure the URL to the external source system to open articles from search results directly in the source system.

Before you begin

Make sure the **Open search results in the original source system** import parameter for the external knowledge source is set to **true**.

You can follow this procedure when you have a file as a knowledge article in Microsoft SharePoint, for example.

Role required: admin

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Procedure

1. Navigate to **All** > **System Definition** > **Script Includes**.
2. Open *KBWebDAVContentHandler*.
3. In the **Script** window, override the function *getFileURL* using script shown below.
   The *getFileURL* function is shown below.

```
//fileObj.getName() - Returns name of the file
     //fileObj.getPath() - Returns path to the file from root
folder
     //fileObj.getAbsolutePath() - Returns Absolute WebDAV URL
of the file
     //fileObj.getCreationDate() - Returns creation date of
the file as GlideDateTime object
     //fileObj.getModifiedDate() - Returns last modified date
of the file as GlideDateTime object
     //fileObj.getContentType() - Returns content type of the
file as GlideDateTime object
     //fileObj.getSize() - Returns size of the file
```

```
getFileURL: function(fileObj) {
     //write your logic here
},
```

4. Click **Update**.

Sample configuration for integrating external knowledge content

You can integrate content from multiple external sources so your users can acquire and search knowledge from a single location. Use this sample configuration to create a connection to your external account, configure external knowledge sources, and import content to enable search results for unified content.

Requirements for integrating external content

Make sure the Knowledge Management -- External Content Integration plugin (com.snc.knowledge.external_integration) is enabled and your external source is WebDAV-compliant.

Integrate external knowledge sources into the Knowledge Management application

Create authentication credentials and a connection alias to connect your external knowledge source to the ServiceNow Knowledge Management application. Define import parameters for your external source to import integrated content.

Before you begin

Role required: admin

Procedure

1. Enable basic authentication on your external account.

   Note:
   Your external account password is not affected when you enable basic authentication.

2. Create the connection to your external account using the basic authentication credentials.

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a. Navigate to **Connections and Credentials** > **Credentials**.

b. Click **New**.

c. Click **Basic Auth Credentials**.
Fill in the following fields:

Field	Description
Name	Name for the credential. For example, `Demo_Auth`.
User name	The external account user name created for basic authentication.
Password	The external account password for the user name.

d. Click **Submit**.

3. Create an HTTP connection to your external account.

a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

b. Select **New**.

c. In the **Name** field, enter the name of the connection alias.

Example
For example, `Demo_Account`.

d. Right-click the form header and click **Save**.

e. In the **Connections** related list, click **New**.
Fill in the following fields:

Field	Description
Name	Name for the HTTP connection. For example, `Demo_Connection`.
Credential	Credential created to connect to the external account. For example, `Demo_Auth`.
Connection URL	WebDAV URL to your external account. This is the WebDAV end point of your external account. **Note:** You can also import contents from a specific folder by appending the folder path to the URL. For example, https://<web link to your extermal_account>/KnowledgeIT.

f. Click **Submit**.

4. Configure the external knowledge source for importing content.

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a. Navigate to **Knowledge** > **Administration** > **External Knowledge Sources**.

b. Click **New** and fill in the following fields:

Field	Description
Name	Unique name for the external source. For example, `Demo_knowledge`.
Target Knowledge Base	Knowledge base in which you want to create articles for the external content. For example, `IT`.
Connection Alias	Connection alias to connect to the external source. For example, `Demo_Account`.

c. Right-click the form header and select **Save**.

d. In the Parameter related list, click **New**.

e. On the Parameter form, select the name of the import parameter that you want to configure for your external source and then set the value for the parameter.
The table below lists the parameters and the corresponding values that can be set for the external source.

Parameter name	Value
Maximum size limit (in MB) for this source	Maximum allowable content size to import from your external source. For example, `250 MB`.
Maximum size limit (in KB) per file/content in this source	Maximum allowable size for each article, including attachments, that you can import from this external source. For example, `2000 KB`.
Open search results in the original source system	Opens search results in the external source system if this value is set to **true**.
Include folders with names that match these regex patterns	Comma-separated list of regular expressions for folder names to include from this external source. For example, to include all folders names that start with the letters a and b, enter `a.*,b.*`.
Exclude folders with names that match these regex patterns	Comma-separated list of regular expressions for folder names to exclude from this external source. For example, to exclude all folders names that start with the letters a and b, enter `a.*,b.*`.
Create articles when file names match these regex patterns	Comma-separated list of regular expressions for file names that to include when creating articles. For example, to include all file names have `.docx` and `.pdf` extensions, enter `.*\.docx,.*\.pdf`.

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Parameter name	Value
Do not create articles when file names match these regex patterns	Comma-separated list of regular expressions for file names to exclude when creating articles. For example, to exclude file names have `.docx` and `.pdf`extensions, enter `.*\.docx,.*\.pdf`.
Maximum retry limit	Maximum limit for the number of times a connection request can be sent to the external source. For example, 5.

What to do next

Import content from an external knowledge source.

Related topics

- Open knowledge search results in source system
- Knowledge Management Service portal search results page

Duplicate knowledge article numbers

Importing knowledge articles into an instance can create articles with duplicate numbers.

The Knowledge **Number** field is auto-generated and is incremented every time you create a new article in an instance. The initial value for the **Number** field is 10,000. To customize this number:

1. Navigate to **System Definition** > **Number Maintenance**.
2. In the **Table** column, search for and select **Knowledge**.
3. In the Controls related list, in the **Number** field, enter a new number.
4. Click **Update**.

Importing knowledge articles from another instance or as part of the demo data for another application may introduce an article with a number that is already in use. Because the Knowledge **Number** field is not uniquely indexed, the import completes without error.

With duplicate knowledge article numbers present, links to article view pages that use the knowledge number can behave inconsistently. For example, if there are two articles with the same Knowledge number KB0000033, the following link may open either of these two articles randomly: *kb_view.do?sysparm_article=KB0000033*. This can happen in Knowledge search results where clicking on a result opens a different article instead of the article displayed in the search results.

Avoiding duplicate Knowledge article numbers

To avoid inserting Knowledge articles with duplicate numbers into a production environment:

- Do not import demo data articles in production environment.
- Verify the numbers of the articles to be inserted to make sure they are not already in use.
- Create a before insert business rule on the Knowledge table (kb_knowledge) to ensure the new number is not already in use.

You can also update the initial value for the Knowledge **Number** field so that newly created articles do not conflict with existing articles.

1. Navigate to **System Definition** > **Number Maintenance**.
2. In the **Table** column, search for and select **Knowledge**.

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3. In the Controls related list, in the **Number** field, update the count to a number greater than the largest value already in the system.
4. Click **Update**.

Create a custom knowledge homepage

As a system administrator, you can create a module allowing users to open a knowledge homepage for a specific knowledge base or category.

Before you begin

Role required: admin

About this task

Note:
This topic creates a legacy v3 knowledge homepage. You can create a portal homepage and configure it to get a new look and feel. For information, see Configure the Knowledge Management Service Portal.

Procedure

1. In the application navigator, point to the application name and click the edit application icon ().
2. In the **Modules** related list click **New**.
3. Enter a **Title** for the module.
4. In the **Link type** field, select **URL (from Arguments)**.
5. In the **Arguments** field, append one or more of the following values to `$knowledge.do#/search?`.

Option	Description
sysparm_kb=<knowledge base sys_id>	Enter the sys_id of a knowledge base to show knowledge articles from that knowledge base by default. If the specified knowledge base does not ex ist, the default knowledge homepage appears when accessing the custom homepage mod ule.
sysparm_category=<knowledge category sys_id>	Enter the sys_id of a knowledge category to show knowledge articles from that category by default. If the specified category does not exist, the default category for the selected knowledge base appears when accessing the custom homepage module.

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Option	Description
	Note: The category passed in this parame ter must belong to the knowledge base passed in the *sysparm_kb* parameter.
sysparm_order=<view_count, last_modi fied, or relevancy>	Enter the default sort order for articles to ap pear in.

Example:

Related topics

Configuring Knowledge Management

I18N - Knowledge internationalization

View knowledge logs

Knowledge logs display information about which users have viewed knowledge articles, what they looked for, and where.

Before you begin
Role required: knowledge_admin, knowledge_manager

About this task
Knowledge logs capture information from all the available sources where users can access knowledge articles, such as Customer Service Portal, Knowledge Management Service Portal, Now Mobile, Agent Workspace, and Knowledge Management v3.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Search Log** or **View Log**.
2. View the Search or View logs.

Knowledge logs

Log	Description
Search Log	View records of the search source, search terms, the highest click rank, and the number of search results of knowledge searches from all the available sources where users can access knowledge articles. The Search log displays data from the Knowledge Searches [ts_query_kb] table. For more information about the search source, see View the source of a knowledge article search.
View Log	View records showing who has viewed which knowledge articles, who has attached a knowledge article to a task and when, and identify final search terms when the

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Log	Description
	type-ahead search suggestions feature is enabled. The View log displays data from the Knowledge Use [kb_use] table. **Note:** ○ An administrator can activate the kb_use table cleanup job to delete any older records from the Knowledge Use [kb_use] table and improve the table performance. For more information, see Modify the data retention policy for View logs. ○ The View log record doesn't display information for a knowledge article accessed and viewed from the global search results.

Search Log fields and description

The knowledge search log stores the history of all knowledge searches performed by the users.

The Search log stores information from all the available sources where users can access knowledge articles. It displays data from the Knowledge Searches [ts_query_kb] table.

Note:
The Knowledge Search log captures data only from Zing searches. It does not work with AI searches.

As an administrator and knowledge manager, you can access the search log by navigating to **All** > **Knowledge** > **Administration** > **Search Log**.

The following table describes some of the fields in the Search log.

Search log field	Description
Search term	Search term used to perform the search.
Results	Number of matching knowledge articles returned by the search.
User	User ID of the user who performed the search.
Sort Order	Sort order (relevance, views, newest, or alphabetical) while performing the search.
Final Search Term	When this value is *true*, the value in **Search term** is the final successful search term used in the search session.
Highest Click Rank	The rank of the first search result the user clicked on to get the relevant search results. A lower search count indicates that the search operation is efficient.
Session Id	Unique identifier for the user session.

For information about finding the source used for searching a knowledge article, see View the source of a knowledge article search.

View Log fields and description

The knowledge View log stores the history of knowledge articles views and their usage.

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The View log shows who has viewed which knowledge articles and who has attached a knowledge article to a task and when. It identifies final search terms when the type-ahead search suggestions feature is enabled. The View log displays data from the Knowledge Use [kb_use] table.

As an administrator and knowledge manager, you can access the view log by navigating to **All** > **Knowledge** > **Administration** > **View Log**.

The following table describes some of the fields in the View log.

View log field	Description
Created	Date and time when the article was viewed or used by the user.
Article	Article that was viewed or used by the user.
User	User who viewed or used the article
Used	If set to true, the article was attached to a task (case, incident, and the like).
Viewed	If set to true, indicates that the article was viewed.
Search Id	Reference ID of the Search log (ts_query_kb). This links the search performed by a user to the article viewed from the search results.
Session Id	Unique identifier for user session.
Times Viewed	How many times the article was viewed.

View the source of a knowledge article search

Analyze knowledge searches by finding the source used for searching a knowledge article.

Before you begin

Role required: knowledge_admin, knowledge_manager

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Search Log**.
2. View the following data for a search record in the corresponding column of the Search log.

Search source details

Column	Search record data
Source Doc	Source record in the source table. For example, Problem: *problem_number*, Case: *case_number*, Incident: *incident_number*, Service Portal: *Customer Support*
Source Table	Label and name of the source table. For example, Knowledge [kb_knowledge], Service Portal [sp_portal], Case [sn_customerservice_case], Incident [incident], Problem [problem], KCS Article [kb_template_kcs_article]
Source Type	Application where the knowledge article search was performed.

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Column	Search record data
	The **Source Type** column is set to one of the following values: ○ **Portal**: Service Portal application ○ **Classic**: ServiceNow AI Platform application ○ **Workspace**: Agent assist in Workspace ○ **Knowledge Classic**: Knowledge Management v3 or v2 ○ **Other**: Unidentifiable source
Source URL	URL of the searched text query.

Related topics

View knowledge logs

Modify the data retention policy for View logs

Remove unwanted and older data from the Knowledge Use [kb_use] table through the data retention policy.

Before you begin
Role required: admin

About this task
The View log displays data from the Knowledge Use [kb_use] table. By default, all the records in the Knowledge Use [kb_use] table are retained. Activating the data retention policy for the kb_use table deletes records that you no longer need. The deleted data is not visible on the reports used in dashboards such as Self-Service Analytics for customer service and Knowledge Management dashboards.

Procedure

1. Navigate to **All** > **Instance Scan** > **Table Cleanup**.
2. In the **Tablename** column, search for `kb_use` and click the **kb_use** link.
3. On the Auto Flush form, activate the kb_user table cleanup job by selecting the **Active** check box.
4. **Optional:** Adjust the amount of time the system waits before deleting the records by modifying the value in the **Age in seconds** field.
   By default, the **Age in seconds** field value is set to 31,536,000 seconds (equivalent to 365 days). For more information, see Autoflush form .

   If the *glide.knowman.view_age.days* property, which sets the number of days used when summing article views, is active, the **Age in seconds** field value must be larger than that property's value. For more information, see Knowledge Management properties

   .
5. Click **Update**.

Use extension points for Knowledge Management

Use UI extension points to add knowledge article headers and footers to knowledge articles and to customize the email template for notifications when a knowledge article is commented on. Use scripted extension points to customize the feedback object used in the email template for notifications when a knowledge article is commented on.

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Before you begin

The Knowledge Management Advanced plugin (com.snc.knowledge_advanced) must be activated to view the KMFeedbackNotification UI extension point and the KMFeedbackObject scripted extension point. These notifications are part of the Subscriptions feature, which is activated with this plugin.

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Role required: admin

About this task

Using extension points makes it easier to integrate customizations without actually altering the base code. You can extend standard base functionality using customized scripts.

To use UI extension points in Knowledge Management, create an implementation and change the data as required. You can create multiple implementations per extension point, but for these scenarios, the use is limited to one implementation only. Example code is provided in the extension point, which can be edited, as required.

An implementation is delivered in the base system for scripted extension points. You can change the data and add additional fields, as required.

Procedure

1. To use UI extension points to customize headers and footers in knowledge articles, and the email notification that is sent when a knowledge article is commented on:

   a. Navigate to **System Extension Points** > **UI Extension Points**.

   b. Click the UI extension point you want to use.

   Note:

   - Use the KMArticleViewFooter and KMArticleViewHeader UI extension points to add knowledge article headers and footers to the knowledge article view pages (kb_view.do) in Knowledge Management v3.
   - Use the KMFeedbackNotification UI extension point to customize the email template for notifications when a knowledge article is commented on.

   c. Click **Create Implementation**.

   d. Change the data as required.

   e. Click **Update**.

2. To use scripted extension points to update the feedback object used in the email template for notifications when a knowledge article is commented on:

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a. Navigate to **System Extension Points** > **Scripted Extension Points**.

Note:
Use the KMFeedbackObject scripted extension point to customize the feedback object used in the email template for notifications when a knowledge article is commented on.

b. In the **API Name** column, click `global.KMFeedbackObject`.

c. In the **Implementations** related list, click the `KMFeedbackObjectBaseImpl` class.

d. Change the data and add additional fields, as required.

e. Click **Update**.

Related topics

Using extension points to extend application functionality

Using scripted extension points in server-side scripts

Using UI extension points in server-side UI macros

Using client extension points in client-side UI scripting

Train the similarity solution for Knowledge Management to find related articles

Train the Knowledge Similar Articles solution definition included within the Predictive Intelligence for Knowledge Management capability to find related knowledge articles when creating or viewing a knowledge article.

Before you begin

Ensure that the Predictive Intelligence for Contextual Search plugin (com.snc.contextual_search_ml) and Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml) are activated.
Role required: admin

Note:
This solution is only applicable to OOB (Out of Box) similarity solution and not to knowledge articles that are created manually.

Procedure

1. Navigate to **All** > **Predictive Intelligence** > **Similarity** > **Solution Definitions**.
2. In the Similarity Definitions list, search for and select the Knowledge Similar Articles solution definition (ml_sn_global_knowledge_similar_articles).
3. On the Similarity Definition form, verify the default field values for knowledge articles.

   For more information about the Similarity Definition form fields, see Create and train a similarity solution.

   Note:
   If the application scope isn't set to Knowledge Management - Machine Learning, you cannot edit the form and a warning message appears. To make the form editable, click the word **here** at the end of the message.

4. Click **Update & Retrain**.

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5. Open the Similarity Definition form for the Knowledge Similar Articles solution definition (ml_sn_global_knowledge_similar_articles).
6. In the ML Solutions related list, view the training solution progress in the **Progress** column. When **Progress** is 100%, in the ML Solutions related list, you can include more useful related articles by reviewing the similarity examples based on the similarity score and updating the similarity score threshold value.
7. **Optional:** Update the similarity score threshold.

   a. In the **Active** column, click the link for the solution.

   b. Review the similarity examples by clicking the **Similarity Examples** related link on the ML Solution form.
   For more information, see Review solution similarity examples.

   c. In the Solution Statistics related list on the ML Solution form, enter the required value in the **Similarity Score Threshold** field, right-click the ML Solution form, and then click **Save**.
   For more information, see Update your similarity score threshold.

Result

When the solution is complete, the related knowledge articles appear in the Knowledge results section on the Knowledge form in the ServiceNow AI Platform, in the Related Articles section on the knowledge article view page in the Knowledge Management Service Portal, and in Agent assist when the **Similar Articles (ML)** option is selected.

Related topics

- Predictive Intelligence for Knowledge Management
- Knowledge Management Service Portal article view page features
- Create a knowledge article
- Create a knowledge article in Agent Workspace
- Using Now Mobile for Knowledge Management

Enable actionable knowledge feedback

The actionable knowledge feedback feature is available when the Knowledge Management Service Portal (com.snc.knowledge_serviceportal) plugin is activated and the actionable knowledge feedback properties are enabled.

Before you begin

Role required: admin

About this task

The actionable feedback feature is available in the Knowledge Management Service Portal and Agent Workspace. To use the actionable feedback feature in other service portals, you can activate the Knowledge Article View page route map. For new customers, the Knowledge Article View page route map is activated by default.

Note:
The actionable knowledge feedback is not supported in Knowledge Management v3.

A feedback task is created for an article when the article is flagged. For generating feedback tasks when an article is marked as not helpful or rated below a set value, you must set the following associated properties.

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Note:
When you select **No** on the article form, an actionable feedback pop-up window appears. On the Actionable feedback form, choose one of the reasons to provide feedback. If you choose **Other** as a reason consider providing feedback details.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Properties**.
2. In the **Actionable Feedback Properties** section, configure the following properties:

Property	Setting
Create actionable feedback task when an article is flagged	By default, the property is set to **Yes** and feedback tasks are created when the article is flagged.
Create actionable feedback task when an article is marked as not helpful	Select **Yes**.
Create actionable feedback task when an article is rated at or lower than this value. 0 or no value indicates that actionable feedback tasks are not enabled for Rating type feedback	Enter a value from 1 to 5 to specify the rating threshold for generating a feedback task. For example, if you set this value to 3, a feedback task is generated when a user selects three or less stars to rate an article. **Note:** If you enter '0', a negative article feedback does not generate a feedback task.

3. Click **Save**.

Related topics

Actionable Knowledge Feedback Properties

Create field mapping from an HR case to a knowledge article

Copy information from an HR case into a knowledge article by creating custom mapping between the HR case table and the KCS article table.

Before you begin

Role required: admin

- Ensure that the Knowledge Advanced plugin (com.snc.knowledge_advanced) is active.
- Ensure that the Developer Application is set to **Human Resources: Core**.
- Ensure that the KCS Article template is active.
  1. Navigate to **Knowledge** > **Administration** > **Article Templates**.
  2. Set the **Active** field to **true** for the KCS Article template.

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Procedure

1. In the filter navigator, type `csm_table_map.list`.
2. Click **New**.
3. In the **Mapping Name** field, enter `HR Case KCS Article`.
4. In the **Source Table** field, enter `HR Case`.
5. In the **Target Table** field, enter `KCS Article`.
6. Right-click the form header and **Save**.
7. In the **Basic Field Mapping** related list, click **New**.
8. Create mappings for the following fields.

Source Field	Target Field
Sys ID	Source Task
Short description	Short description
Close notes	Resolution
Description	Cause

Note:
You can create field mappings for more fields, as required.

- In the **Source** field, select the field in the source HR Case table that contains the information to be copied to the field in the article template target table.
- In the **Target** field, select the field in the article template target table to which you need information copied to from the field in the source Incident table.

9. To customize when and how the **Knowledge** check box is displayed, click the **Condition** tab.
10. To map fields using advanced scripts, select the **Advanced Field Mapping** check box.
11. On the **Advanced field Mapping** tab, paste in the following code.

```
(function (source) {
   // Get the first comments from HR case and use it as Issue
 description for article
   target.short_description=source.short_description+"";
   target.kb_resolution=source.close_notes+"";
   target.kb_cause=source.description+"";
  var notes = source.comments.getJournalEntry(-1);
  var entries = notes.split("\n\n");
  var comment = "";
  if(entries[entries.length-2]){
      comment = entries[entries.length-2];
      var part = comment.toString().indexOf(")");
      if(part != -1){
comment =
 comment.toString().substring(part+2).replaceAll("\r\n","<br/>
");
  }
  }if(comment)
      target.kb_issue = comment;
```

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```
   //Only if selected article type is active
   var tem =  new GlideRecord("kb_article_template");
   tem.addQuery("child_table","kb_template_kcs_article");
   tem.addActiveQuery();
   tem.query();
   if(!tem.hasNext())
       return false;

   //Do not allow to create the knowledge again
   var now_GR = new GlideRecord("kb_knowledge");
   gr.addQuery("source",source.sys_id);
   gr.query();
   if(gr.next())
       return false;

   return true;
})(source);
```

The first comment on an HR case is mapped to the **Issue Description** field in the knowledge article.

Note:
If the same source or target field is configured in both the basic and advanced field mappings, the advanced field mapping overrides the basic field mapping.

If the fields configured in the basic and advanced field mapping are different, the field configurations in the advanced field mapping are appended to the field configurations in the basic field mapping.

Add a property to enable creating knowledge articles from HR cases

Add a property, which is required to allow users to create a knowledge article from an HR case.

Before you begin

Role required: admin
Ensure that the Developer Application is set to **Human Resources: Core**.

Procedure

1. In the Filter navigator, enter `sys_properties.list`.
2. Click **New**.
3. Fill in the following fields.

System Property form

Field	Description
Name	enable_kcs_hr
Description	Enable Knowledge Centered Services (KCS) for HR Service Delivery.
Type	true|false
Value	true

4. Click **Submit**.

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Create a UI action to enable creating knowledge articles from HR cases

Create a UI action to add the Knowledge check box to the HR case form.

Before you begin

Role required: admin
Ensure that the Developer Application is set to **Human Resources: Core**.

Procedure

1. Navigate to **All** > **System UI** > **UI Actions**.
2. Click **New**.
3. Fill in the following fields.

UI Action form

Field	Description
Name	Create Knowledge
Table	HR Case
Action name	create_knowledge

4. Select the **Client** check box.
5. Select the **List v3 Compatible** check box.
6. Select the **Form button** check box.
7. In the **Onclick** field, enter `createKnowledgeClient()`.
8. In the **Condition** field, enter `gs.getProperty("sn_hr_core.enable_kcs_hr") == 'true' && new global.CSMTableMapUtil (current).findMapByName("sn_hr_core.hr_case_kcs_article") && new global.KBKnowledge().canCreate()`.
9. In the **Script** field, enter the following code.

```
function createKnowledgeClient() {
    if (g_form.modified) {
        alert(new GwtMessage().getMessage('You have unsaved
 changes. Please save them to continue.'));
    }else{
        //Call the UI Action again but skip the 'onclick'
 function
        gsftSubmit(null, g_form.getFormElement(),
 'create_knowledge');
//MUST call the 'Action name' set in this UI Action
    }
}

//Code that runs without 'onclick'
//Ensure call to server-side function with no browser errors
if (typeof window == 'undefined')
    CreateKnowledgeServer();

    function CreateKnowledgeServer(){
    current.update();

    var map = new global.CSMTableMapUtil (current);
```

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```
    map.findMapByName("sn_hr_core.hr_case_kcs_article");
    var targetURL = map.getTargetURL();
    var referenceLink =
"&sysparm_collection=sn_hr_core_case&sysparm_collectionID="+cur
rent.sys_id+"&sysparm_collection_key=task&sysparm_link_collecti
on=m2m_kb_task&sysparm_collection_related_field=kb_knowledge&sy
sparm_referring_url=sn_hr_core_case.do%3fsys_id%3d"+current.sys
_id;
    if(targetURL)
        action.setRedirectURL(targetURL[0]+referenceLink);
}
```

10. Click **Submit**.

Enable creating an article from a customer service case

You can enable authors to reuse information in a case by copying case details into an article template. Use the pre-defined customer service source case table to article template target table configuration or create custom configurations between the two tables to copy information from a case to an article.

Before you begin

- The Knowledge Management Advanced plugin must be active.
- The Properties installed with Customer Service Management must be enabled
- The pre-defined KCS article template or a newly created article template must be active.

  Note:
  You can do one of the following to create an article from a case:

  - Use the pre-defined **Case KCS Article** mapping as is or modify the field mappings between the case source table and article template target table.
  - Create a new article template target table and map it to the case source table and customize the field mappings between them. For information on creating article templates, refer to Create an article template.
- Knowledge users use the **Create Knowledge** button in a case form to create an article from a case and must have "can contribute" permission for at least one active knowledge base to create an article from a case. For information on user permissions, see Knowledge Management roles.

Role required: sn_customerservice.customer_admin or admin

About this task

The pre-defined **Case KCS Article** mapping is stored in the CSM Table Map [csm_table_map] table. This configuration has the sn_customerservice_case source case table configured to the kb_template_kcs_article target article template table with the four field mappings pre-configured between the tables. You can customize the existing field mappings or map additional fields between the tables.

Procedure

1. In the application filter navigator, type `csm_table_map.list`.
2. Click **Case KCS Article**.
3. From the **Target Table** list, use the pre-defined KCS article template table or select the newly created article template table.

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4. Map each customer service case field that must be used to create knowledge articles.

   a. In the **Basic Field Mapping** related list, click **New**.
   To map fields, fill in the following fields:

   Customer service case table to article template target table field mapping

Field	Instructions
Source Field	Select the field in the source case table that contains the information to be copied to the field in the article template target table.
Target Field	Select the field in the article template target table to which you need information copied to from the field in the source case table.

   b. Click **Submit**.

   c. To map fields using advanced scripts, select the **Advanced Field Mapping** check box and then map the fields between the source and the target table using advanced scripts in the **Advanced Field Mapping** tab.

   Note:

   If the same source or target field is configured in both the basic and advanced field mappings, the advanced field mapping overrides the basic field mapping.

   If the fields configured in the basic and advanced field mapping are different, the field configurations in the advanced field mapping are appended to the field configurations in the basic field mapping.

   d. To customize when and how the **Create Knowledge** button is displayed, use the condition builder in the **Condition** tab or select **Use Advanced Condition** check box and configure using advanced scripts.

   Note:
   If you change the target table in the **Case KCS Article** mapping, also update the scripts with the configuration changes for display of this button.

5. Click **Update**.

Configuration tasks for knowledge demand insights

Review the following configurations tasks for knowledge demand insights.

Configure Knowledge Demand Insights

Configure the Knowledge Demand Insights feature to identify which topics are missing knowledge articles and creating actionable knowledge gaps for missing topics.

Before you begin
Activate the Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml). For more information, see Predictive Intelligence for Knowledge Management and Additional plugins for Knowledge Management.

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About this task

To configure the Knowledge Demand Insights feature, use the Knowledge Management guided setup. The guided setup takes you through the entire setup and configuration process.

This task provides general steps to configure the Knowledge Demand Insights feature. For more information about the feature, see Knowledge demand insights.

Procedure

1. Configure similarity and clustering solution definitions to enable comparing knowledge bases with a task type.
2. Configure the combination of the task table and similarity and clustering solution definitions that are processed in a scheduled job for a task type.
3. Configure scheduled jobs for each task.
4. Configure assignment rules to automatically assign feedback tasks of type Knowledge gap.

> **Note:**
> If no assignment rules are configured, a knowledge admin or knowledge manager can later use the Feedback Management feature in the Knowledge module to manually assign a feedback task.

Related topics

Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Configure solution definitions to find gaps in a knowledge base

The Knowledge Demand Insights feature finds knowledge gaps by comparing knowledge bases with existing tasks. To enable comparing knowledge bases with a task type, you must first configure similarity and clustering solution definitions.

Before you begin

This task describes the process for configuring a solution definition.
Instead of doing the configuration through this procedure, consider using a guided setup. Navigate to **Knowledge** > **Administration** > **Guided Setup**, click **Get Started**, and then scroll to the Knowledge Demand Insights section.

Role required: admin

About this task

Configure one similarity type and one clustering type solution definitions for each task type: incidents, customer service cases, or other tasks. A similarity solution definition collects and compares your existing records to new similar records. A clustering solution definition groups similar records into clusters so you can address them collectively or identify patterns.

Procedure

1. Navigate to **Knowledge Demand Insights** > **Solution Definitions**.
2. In the Solution Definitions (ML view) list, search for and select the similarity solution definition for the task type.
   - For customer service cases, select **Demand Insights: Similar Cases and Knowledge (ml_sn_global_similar_cases_and_kbs)**.
   - For incidents, select **Demand Insights: Similar Incidents and Knowledge (ml_sn_global_similar_incidents_and_kbs)**.

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- For HR cases, select **Demand Insights: Similar HR Cases and Knowledge (ml_x_sn_hr_core_global_demand_insights_similar_hr_cases_and_knowledge)**.
- For tasks other than customer service cases, incidents, and HR cases, click **New** to create another similarity solution definition.

3. On the Similarity Definition form, verify the default field values for customer service cases or incidents, or fill in the values for a custom configuration.

Note:
If the application scope isn't set to Knowledge Management - Machine Learning, you cannot edit the form and a warning message appears. To make the form editable, click the word **here** at the end of the message.

Similarity Definition form

Field	Description
Label	Unique name for your similarity solution.
Word Corpus	Defines which knowledge articles and tasks are selected for knowledge gap analysis. If you don't have a relevant word corpus, follow the steps in Create a word corpus.
Table	Table that contains the knowledge article records. Set the value to Knowledge [kb_knowledge] unless you use a different table for storing knowledge articles. After you assign a table value, the number of records that match the filter conditions is displayed as a link.
Fields	Fields from the Knowledge table selected for knowledge gap analysis.
Filter	Filter conditions applied on the Knowledge table to filter knowledge article records for knowledge gap analysis.
Test Table	Table that contains the task records that you want to compare with knowledge article records.
Test Fields	Fields from the task table selected for knowledge gap analysis.
Processing Language	Dominant language of the dataset you're training on the solution definition. By default, English processing is applied to all datasets. For example, if you select Italian, the system processes the data in both English and Italian. **Note:** The term processing indicates some of the language-specific steps used as part of training a solution. These steps might include tokenizing words, removing stop words, and stemming.
Stopwords	Common terms in the processing language that are excluded from the search, for example, prepositions. When you select your processing language, the system automatically adds a Stopwords list that uses the same language. For example, if your processing language is Italian, the **Default Italian Stopwords** list appears. The **Default English Stopwords** list also appears in your selection as well.

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Field	Description
Training Frequency	Frequency with which the model for similarity solution definition must be retrained.
Update Frequency	Frequency with which to include new records in the model for the similarity solution definition.

4. Submit and train the solution definition.
   - For a new solution definition record, click **Submit & Train**.
   - For an existing solution definition record, click **Update & Retrain**.
5. **Optional:** Include more useful related articles by reviewing the similarity examples based on the similarity score and updating the similarity score threshold value.
   For more information, see Review solution similarity examples and Update your similarity score threshold.
6. In the Solution Definitions (ML view) list, search for and select the clustering solution definition for the task type.
   - For customer service cases, select **Demand Insights: Case Clusters Need Knowledge (ml_sn_global_cases_need_knowledge_cluster)**.
   - For incidents, select **Demand Insights: Incident Clusters Need Knowledge (ml_sn_global_incidents_need_knowledge_cluster)**.
   - For HR cases, select **Demand Insights: HR case clusters need knowledge (ml_x_sn_hr_core_global_demand_insights_hr_case_clusters_need_knowledge)**.
   - For tasks other than customer service cases and incidents, click **New** to create another clustering solution definition.
7. On the Clustering Definition form, verify the default field values for customer service cases or incidents, or fill in the values for a custom configuration.

Note:
If the application scope isn't set to Knowledge Management - Machine Learning, you cannot edit the form and a warning message appears. To make the form editable, click the word **here** at the end of the message.

Clustering Definition form

Field	Description
Label	Unique name for your clustering solution.
Word Corpus	Which tasks are selected for collections.
Table	Table that contains the filtered tasks that require knowledge articles. Set the value to Task knowledge coverage [kb_task_knowledge_coverage] unless you use a different table for storing filtered tasks. After you assign a table value, the number of records that match the filter conditions is displayed as a link.
Fields	Fields from the Task knowledge coverage table selected for knowledge gap analysis.
Filter	Filter conditions applied on the Task knowledge coverage table to filter knowledge article records for knowledge gap analysis.

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Field	Description
Processing Language	Dominant language of the dataset you're training on the solution definition. By default, English processing is applied to all datasets. For example, if you select Italian, the system processes the data in both English and Italian. **Note:** The term processing indicates some of the language-specific steps used as part of training a solution. These steps might include tokenizing words, removing stop words, and stemming.
Stopwords	Common terms in the processing language that are excluded from the search, for example, prepositions. When you select your processing language, the system automatically adds a Stopwords list that uses the same language. For example, if your processing language is Italian, the **Default Italian Stopwords** list appears. The **Default English Stopwords** list also appears in your selection as well.
Update Frequency	Frequency with which to include new and updated records in the model for the clustering solution definition.
Training Frequency	Frequency with which the model for clustering solution definition must be retrained.

8. Submit and train the solution definition.
   - For a new solution definition record, click **Submit & Train**.
   - For an existing solution definition record, click **Update & Retrain**.

What to do next

Complete the KB curation configuration form to define the scheduled jobs for demand insights. For more information, see Configure the mapping of solution definitions with task tables.

Related topics

Predictive Intelligence for Knowledge Management

Create and train a similarity solution

Create and train a clustering solution

Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Configure the mapping of solution definitions with task tables

Configure the combination of the task table and similarity and clustering solution definitions that are processed in a scheduled job for a task type. You can create another demand insights configuration or modify an existing configuration to define a scheduled job for demand insights.

Before you begin

This task describes the process for configuring a scheduled job.
Instead of doing the configuration through this procedure, consider using a guided setup. Navigate to **Knowledge** > **Administration** > **Guided Setup**, click **Get Started**, and then scroll to the Knowledge Demand Insights section.

Ensure that you have configured a similarity type and clustering type solution definitions for a task type. For more information, see Configure solution definitions to find gaps in a knowledge base.

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Role required: admin

About this task

A scheduled job for each task type runs business rules and then executes the similarity and clustering solution definitions. In the Demand Insights Configuration module, you configure the combination of the task table and similarity and clustering solution definitions that are processed in a scheduled job for a task type. This configuration is optional for customer service cases and incidents.

Note:
For task types other than customer service cases and incidents, a user with the admin role must also perform the following tasks:

- Assign the sn_km_ml.knowledge_curation_user role and the appropriate roles for the task type to the users performing the knowledge gap analysis. To assign roles, perform the Assign knowledge curator roles guided setup task, which are available in the Knowledge Demand Insights section of the Knowledge Management guided setup.
- Create a demand insights dashboard for the task type. To create a dashboard, see Create or configure a responsive dashboard.

Procedure

1. Navigate to **All** > **Knowledge Demand Insights** > **Demand Insights Configuration**.
2. Configure the combination of the task table and similarity and clustering solution definitions that are processed in a scheduled job.
   - For customer service cases, select **sn_customerservice_case**.
   - For incidents, select **incident**.
   - For HR cases, select **sn_hr_core_case**.
   - For tasks other than customer service cases, incidents, and HR cases, click **New** to create another combination.
3. On the KB curation configuration form, verify the default field values for customer service cases or incidents or fill in the values for a custom configuration.

KB curation configuration form

Field	Description
Curation table	Name of the table you want the data to pull information from. For example, for customer service cases, select Case [sn_customerservice_case] and for incidents select Incident [incident].
Fields	Fields in the curation table that include the ID of knowledge articles, for example, the knowledge article ID KB07276660 in the field resolution notes,
Query condition	Conditions for filtering the number of tasks from the curation table. You can create conditions using the condition builder (see Condition builder).
Similarity solution definition	Similarity solution definition for your task type. For example, for customer service cases, select **Demand Insights: Similar Cases and Knowledge**.

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Field	Description
Clustering solution definition	Clustering solution definition for your task type. For example, for customer service cases, select **Demand Insights: Case Clusters Need Knowledge**.

4. Click **Update** for incidents or customer service cases or **Submit** to save a custom configuration.

What to do next

Set the frequency of the scheduled job for your task. For more information, see Set the frequency of knowledge gap analysis.

Related topics

Configure solution definitions to find gaps in a knowledge base

Set the frequency of knowledge gap analysis

Set the frequency of the scheduled job for your task to automatically run knowledge gap analysis.

Before you begin

This task describes the process for setting the frequency of knowledge gap analysis. Instead of doing the configuration through this procedure, consider using a guided setup. Navigate to **Knowledge** > **Administration** > **Guided Setup**, click **Get Started**, and then scroll to the Knowledge Demand Insights section.

Role required: admin

Procedure

1. Navigate to **All** > **Knowledge Demand Insights** > **Scheduled Jobs**.
2. In the Scheduled Jobs list, select the scheduled job for your tasks in the **Name** column.
   - For customer service cases, select **[Knowledge Curation]: Generate Case Clusters**.
   - For incidents, select **[Knowledge Curation]: Generate Incident Clusters**.
   - For HR cases, select **[Knowledge Curation]: Generate HR Case Clusters**.
   - For tasks other than customer service cases, incidents, and HR cases, create another scheduled job. For more information, see Create a scheduled job.
3. On the Scheduled Script Execution form, either accept the default value of running the analysis once a quarter (every 90 days) or change the frequency.

   Note:
   For best performance results, try not to perform knowledge gap analysis more frequently than once a month.

4. Click **Update**.

   Note:
   If the application scope is not set to Knowledge Management - Machine Learning, a warning message appears and the **Update** button is not available. Click the word **here** at the end of the message to change the scope and click **Update**.

5. **Optional:** To run the job immediately, click **Execute Now**.

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Result
The knowledge gap analysis is repeatedly run at the duration as configured in the scheduled job.

What to do next
Create assignment rules to assign knowledge gap feedback tasks. For more information, see Assign knowledge gap feedback tasks to content authors.

Related topics
Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Assign knowledge gap feedback tasks to content authors

Create assignment rules to assign knowledge gap feedback tasks to authors or groups of content creators.

Before you begin
Role required: admin or assignment_rule_admin

About this task
Knowledge gap feedback tasks created through the Knowledge Demand Insights feature create feedback tasks of type **Knowledge gap**.

Procedure
1. Navigate to **All** > **Knowledge Demand Insights** > **Knowledge Gap Assignment**.
2. In the Assignment Rules list, click **New**.
3. On the Assignment rule form, fill in the fields.

Assignment rule form

Field	Description
Name	Descriptive name for the assignment rule.
Active	Option to activate the assignment rule. Only active assignment rules take effect.
Applies to tab	
Table	Table to store the feedback tasks on knowledge articles. This field is automatically set to **Knowledge Feedback Task [kb_feedback_task]**.
Conditions	Conditions for assigning feedback tasks of the Knowledge gap type. This field is automatically set to **[Feedback Task Type] [is] [Knowledge gap]**. You can add more conditions as appropriate.
Assign to tab	
User	User assigned the feedback task type of knowledge gap.
Group	Ownership group assigned the feedback task type of knowledge gap.
Script tab	
Script	Script you can use to specify more complex conditions for assignment rules using dynamic variables and loops.

4. Click **Submit**.

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Related topics

Create an assignment rule

Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Use the demand insights dashboard for your tasks to analyze candidate knowledge gaps and create knowledge gap feedback tasks.

Before you begin

You must have read access to the tasks that you want to analyze and the sn_km_ml.knowledge_curation_user role.

About this task

A demand insights dashboard displays tasks as topics for which your knowledge bases do not have adequate knowledge coverage. You can create and assign knowledge gap feedback tasks for a topic so your knowledge bases can better be used to solve and deflect any issues described in a task. Tasks represent customer service cases, incidents, problems, and so on.

Procedure

1. Navigate to **Knowledge Demand Insights** and select the demand insights dashboard for your tasks, or navigate to **All** > **Self-Service** > **Dashboards**.
   - For customer service cases, select **Demand Insights for Cases**.
   - For incidents, select **Demand Insights for Incidents**.
   - For HR cases, select **Demand Insights for HR cases**.

   Note:
   For tasks other than customer service cases, incidents, and HR cases, you can create another dashboard or update an existing dashboard. For more information, see Create and use dashboards.

2. To view similar tasks grouped together, click a bar in the Pareto chart.
   Each bar represents a collection of similar tasks grouped together because they are likely to be on the same topic. The bars covering the largest number of tasks start from the left in a descending order. The blue line indicates how many bars you must analyze to cover 80% of all tasks that don't have good knowledge coverage. For more information, see Pareto chart for Knowledge Demand Insights.
3. **Optional:** To generate a representative sample to see a smaller list, in the Knowledge Curation Tasks list, click **Generate Representative Sample**.
   If the Knowledge Curation Tasks list is large, you can generate a representative sample subset of a Knowledge Curation Tasks list. This smaller list aims to accurately reflect the characteristics of the tasks included in the main list.
4. Analyze the sample to create a knowledge gap feedback task or ignore the tasks within a collection.

Result

If tasks within a collection are reported as knowledge gaps, a common feedback task for all the selected tasks is created and appears in the Knowledge Management application. You can use the assignment rules to assign a feedback task to an ownership group or author. In the

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Knowledge Curation Tasks list, the **Is knowledge gap created** column value for the selected tasks is set to **true**.

If you select an ignored collection from the demand insights dashboard, you can no longer report tasks within the collection as knowledge gaps.

Related topics

Demand Insights for Cases dashboard

Demand Insights for Incidents dashboard

Using Knowledge Management

Use Knowledge Management to search and find information on self-help, troubleshooting, and task resolution in knowledge bases.

Knowledge Management guide for users

After knowledge bases are set up, you can start searching and creating articles.

Requirements

Role required: All users can read knowledge articles. Users with the knowledge or any other fulfiller role, such as sn_customerservice_agent, can create and edit knowledge articles in a knowledge base, unless the knowledge manager has restricted access to the knowledge base or knowledge articles.

If you need these permissions, contact the knowledge manager or knowledge administrator for the knowledge base.

What to do

Create knowledge articles

If you have the required permissions for a knowledge base, you can create articles for it. You can Create a knowledge article from an incident in Service Operations Workspace or by importing Word documents.

You can also create knowledge articles from incidents and problems.

Search for knowledge articles

From the Knowledge homepage, you can select a knowledge base to search for articles and answers. You can view only the knowledge bases to which you have access.

Access to knowledge using your mobile device is supported.

Next steps

After articles are created, you can perform the following tasks to make sure that articles are organized in the right knowledge bases and retired when appropriate. If existing knowledge bases do not fit your needs, you can request a new knowledge base.

- Move a knowledge article
- Retire a knowledge article
- Request a knowledge base

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Knowledge Management Service Portal homepage features

The Knowledge Management Service Portal homepage displays knowledge articles organized by knowledge base and category, as well as featured content and popular articles. Learn how to navigate the homepage to search for and find useful and relevant information quickly.

To use the Knowledge Management Service Portal, the Knowledge Management — Service Portal plugin (com.snc.knowledge_serviceportal) must be activated.

Note:
It's active by default for customers on the Madrid and later releases.
Existing or upgrade customers must activate the plugin and enable the *glide.knowman.serviceportal.enable_redirect* property.

To see the Knowledge Management Service Portal homepage, add `/kb` to the end of the URL for your instance. You can change the default navigation by configuring the system property *sn_km_portal.glide.knowman.serviceportal.portal_url*.

Your organization can customize the homepage, so it may look different to the following image. You must be logged in to view the knowledge homepage.

Knowledge Management Service Portal homepage features

UI component	Description
Knowledge profile menu	Click your profile photo to either view your knowledge profile or logout.
Search	Enter a search term to search knowledge bases.
Counters	Displays the number of available knowledge bases and the total number of knowledge articles.
Ask a question	This action is available to logged-in users with the knowledge role. Click **Ask a Question**, which opens a question page. Fill in the **Question** and **Question details** fields, and click **Post question** to post the question.
Overflow icon (⋯)	Click the Overflow icon and select **Create Article** to create a knowledge article.
Browse knowledge bases	Click a knowledge base to view knowledge articles and questions stored in it. View counters of how many articles and questions are stored in the knowledge base. Click **Show All** to view up to eight available knowledge bases.
Subscribe	Click **Subscribe** to subscribe to that knowledge base. Unsubscribe by clicking **Unsubscribe**.
Featured	Lists any knowledge articles that were pinned. For more information, see Add a knowledge article to featured content.
Most Useful	Lists the top five articles that were marked as helpful.
Most Viewed	Lists the top five articles with the most views.

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Note:
The Knowledge Management Service Portal homepage is mobile responsive.

Knowledge Management Service Portal search results page features

View a list of search results as well as options for sorting and filtering the items in the list. You can also use knowledge search in other Service Portals.

Note:
When you perform a new search, the filters you selected earlier on the Knowledge Management search results page are not saved. Further, this search feature supports only Zing search and not AI search. You must reselect the filters that you want to apply for every search.

Knowledge Management Service Portal search results page

UI component	Description
Search bar	Use the search bar at the top of the page to search for additional information.
Sort	Sort the items in a knowledge base or search results list using the Sort by options at the top of the list. • Views: sorts by number of article views. • Newest: sorts by the date created or updated. • Alphabetical: sorts alphabetically by the article Short description field. • Relevancy: sorts by relevance to the search term. The header displays the number of search results, which updates as the user selects and de-selects filters. When you navigate away from the search results page and then return, your last sort selection is retained.
Search results list	View knowledge articles and pinned articles. Knowledge article search results include articles in which the short description, text content, or attached file content includes the search term. View the knowledge article short description, the knowledge base in which the article is stored, author name, number of views, and rating information.
Language filter facet widget	Language: lists the languages that have been activated. Select one or more languages to display search results in. Your selection is maintained across logins. If multi-language search is enabled, you can search for multiple languages simultaneously.
Knowledge base filter facet widget	Knowledge Base: lists the available knowledge bases

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Knowledge Management Service Portal search results page (continued)

UI component	Description
Category filter facet widget	Category: lists the available knowledge categories. **Note:** Shows a hierarchy of categories if the administrator configured the Show category hierarchy (valid for kb_category only) instance option for the facet widget.
Other filter facet widgets	Use filter facets to refine your search results. The selections you make filter the items displayed in the search results list. The search results list updates to display only those items that match your selections. Deleting a selection from the filter facet or breadcrumb reverses the filtering in the list. Clear selected filter options by: • Deleting a single option from the search results list header. • Clicking Clear all in the search results list header. • Clicking Clear in the filter facet widget header. • Author: lists the names of the authors for the knowledge articles included in the search results list • Tags: lists the available knowledge tags • Resource: lists the types of items available, such as knowledge articles • Rating: lists article ratings from 0-5 stars (clicking a rating displays articles that have the selected rating and higher) • Last Modified: lists selections based on the timing of knowledge item modifications such as Past Month or Past Week • View Count: lists the knowledge item view counts such as More Than 50 or Less Than 10. Set the number of days to consider when calculating view count using the *glide.knowman.view_age.days* property. For more information on this property, see Knowledge portal properties.
View additional search results	Depending on the system setup, view additional search results using one of these options: • Standard Pagination: displays the search results in multiple pages. • Infinite Scroll: displays the search results while scrolling.

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Note:
If a custom widget on the knowledge search results page uses the *KnowledgeSearchService* angular service, you must add the *sn.knowledgeApplication* dependency to enable the functionality of the custom widget.

1. Navigate to **Service Portal** > **Dependencies**.
2. In the **Name** field, search for the *sn.knowledgeApplication* dependency.
3. If a message appears, click **here** to edit.

   You have to be in the **Knowledge Management - Service Portal** application to edit.
4. Click **Update**.

The search functionality in Knowledge Management Service Portal pages uses the **Knowledge Base Search** search context to fetch results. As an administrator, you must not update the definition of this search context because it may impact the search behavior. For more information about contextual search, see Contextual search concepts.

Knowledge Management Service Portal article view page features

The knowledge article view page in Knowledge Management Service Portal displays the knowledge article details, including the article number, short description, and article content. You can also give feedback or comment on an article.

Knowledge article view page in Knowledge Management Service Portal

UI component	Description
Breadcrumb	View which knowledge base the knowledge article is in.
Header	View the knowledge article number.
Subscribed	Click **Subscribe** to subscribe to the knowledge article. Unsubscribe by clicking **Unsubscribe**.
Actions ···	Edit the knowledge article or flag an article that contains incorrect or inappropriate content. To edit the article, you must have contribute access to the knowledge article. **Note:** The flagged comment appears in the comment section without reloading the page. If the article was created using Microsoft Word, download the article as a Microsoft Word document to your computer by clicking **Download as Word**. This option appears only when the article was originally created using Microsoft Word and the system administrator has enabled the *sn_km_word.glide.knowman.enable_document_download* property.
Article title	View the short description of the article as the title of the article.
Language list	Select a language for the selected article. This field appears if the translations of the knowledge article in other languages are available.
Knowledge article content	View the text and images of the knowledge article.

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Knowledge article view page in Knowledge Management Service Portal (continued)

UI component	Description
	View who authored the article and when as well as the number of views (including multiple views from the same user) the article has.
Copy Permalink	Click **Copy Permalink** to copy the URL of the latest article version to the clipboard. **Note:** The version of the article that loads for the user using the permalink depends on their level of access to the article. Users with view access will see the most recent published version. Users with contribute access will see the most recent version of the article, even if it is a draft.
Helpful?	Provide feedback on an article by marking it as helpful or not. View a percentage value of how many other users found the article helpful.
Rate this article	Rate a knowledge article.
Click here to comment to this article	Add a comment to an article
Attachments	View a list of article attachments if the **Display Attachment** field for the article is enabled.
Related Items	View a list of catalog items mapped to the article. The section appears only when the related catalog items are available for the selected article.
Related Articles	View a list of related articles with information similar to the selected article. The related articles are manually mapped, automatically predicted, or both. The manually mapped articles appear first in the section. The section appears only when the related articles are available for the selected article.
Affected Products	View a list of which products were affected.
Most Recent tasks	View a list of tasks, such as incidents, cases, problems, and so on, recently associated with the article.
Most Useful	View a list of knowledge articles that users found most useful.
Search bar	Use the search bar to start a new search. The search is executed in the current portal where you are viewing the article.

Note:

- If enabled, users can subscribe to articles, view article versions, and create feedback for articles that are rated as not helpful.
- The dynamic titles don't apply to the knowledge article view page in the Knowledge Management Service Portal.

Knowledge article URL parameters

You can add parameters to an article URL to view the latest version and an existing translation.

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Knowledge article URL structure

The knowledge article URL appears in the following structures:

- Accessed from **Service Portal**: `https://<instance-name>.service-now.com/kb?id=kb_article_view&sysparm_article=<article number>&sysparm_language=<language code>`

  For example, the URL `https://yourbusiness.service-now.com/kb?id=kb_article_view&sysparm_article=KB0010053&sysparm_language=EN` returns the article with the most recent version in the selected language, if the translation for the selected language exists.

  Note:
  If you open an article with sysparm_article and sys_kb_id parameters that belong to different articles, the article loads based on a sysparm_article.

- Accessed from **Knowledge Base View (kb_view) UI page**: `kb_view.do?sysparm_article=<article number>&sysparm_language=<language code>'`

  For example, the URL `https://yourbusiness.service-now.com/kb_view.do?sysparm_article=KB0010044&sysparm_language=en`returns the article with the most recent version in the selected language, if the translation for the selected language exists.

Note:
The listed parameters can include the sys_id in the url parameter.

Parameters

The following parameters are available for knowledge article URLs.

Parameter	Possible values
sysparm_article	Returns the most recent article version. For example, `https://yourbusiness.service-now.com/kb?id=kb_article_view&sysparm_article=KB001005`
sysparm_language	Returns the most recent article version in the input language if a translation exists. For example, `https://yourbusiness.service-now.com/kb?id=kb_article_view&sys_id=3b07857187032100d`

Managing email notifications in Knowledge Management

Reminders enable relevant users to review knowledge articles and complete tasks associated with them.

By default, the Knowledge Management application includes the following types of email notifications:

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- Email notifications for knowledge article feedback tasks.
- Email notifications for knowledge subscriptions.
- Email notifications for knowledge article approval publishing workflow.
- Email notifications for translation tasks.
- Email notifications for expiring knowledge articles.
- Email notifications for article quality index (AQI) reviews.

You can decide if you must receive any knowledge notifications by setting notification preferences. For more information, see Set knowledge notification preferences.

Email notifications for knowledge article feedback tasks

The email notifications for knowledge article feedback tasks are available when your administrator activates the Knowledge Management Core plugin (com.glideapp.knowledge).

The following table describes the recipient list of notifications for knowledge article feedback tasks and the associated conditions when a notification is sent.

Recipient list of the email notification for knowledge article feedback tasks

Notification	Condition	Recipients
KM Feedback Task: Commented	A comment was added to a user feedback task.	User who was assigned the feedback task
KM Feedback Task: Created	A user feedback task was created.	User who was assigned the feedback task
KM Feedback Task: Info from Submitter	More information was requested from the submitter of a user feedback task.	User who submitted the feedback task
KM Feedback Task: Reassigned	A user feedback task was reassigned.	User who was reassigned the feedback task
KM Feedback Task: Resolution Accepted	A resolution described in a user feedback task was accepted.	User who was assigned the feedback task
KM Feedback Task: Resolution Rejected	A resolution described in a user feedback task was rejected.	User who was assigned the feedback task
KM Feedback Task: Resolved	A user feedback task was set as resolved.	User who submitted the feedback task

Email notifications for knowledge subscriptions

The email notifications for knowledge subscriptions are available when your administrator activates the Knowledge Management Core plugin (com.glideapp.knowledge). For notifications associated with ownership groups, your administrator must also activate the Knowledge Management Advanced plugin (com.snc.knowledge_advanced).

The following table describes the recipient list of notifications for knowledge subscriptions and the associated conditions when a notification is sent.

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Recipient list of the email notification for knowledge subscriptions

Notification	Condition	Recipients
KM Subscription Group: Article checkout	A subscribed knowledge article was checked out	• Author (if no Ownership group is associated with the article) • Ownership group manager and members (if an Ownership group is associated with the article) • Revisers **Note:** The user who checked out the article does not receive the notification.
KM Subscription Group: Article commented	A comment was added to a subscribed knowledge article	• Author (if no Ownership group is associated with the article) • Ownership group manager and members (if an Ownership group is associated with the article) • Revisers
KM Subscription: Article published	A knowledge article was created in a subscribed knowledge base	• knowledge base owner • Knowledge base subscribers
KM Subscription: Article revised	A subscribed knowledge article was edited	• Knowledge base owner • Knowledge article subscribers • Author • Revisers
KM Subscription: Article revised in subscribed KB	A knowledge article in a subscribed knowledge base was edited.	• Knowledge base owner • Knowledge article subscribers • Author • Revisers • Knowledge base subscriber

Note:
An email notification is sent to a reviser of a knowledge article when the article versioning feature is enabled.

Email notifications for knowledge article approval publishing workflow

The email notifications for knowledge article approval publishing workflow are available when your administrator activates the Knowledge Management Core plugin (com.glideapp.knowledge).

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The following table describes the recipient list of notifications for the knowledge article approval publishing workflow and the associated conditions when a notification is sent.

Recipient list of the email notification for the knowledge article approval publishing workflow

Notification	Condition	Recipients
KM: Approve article for publishing	A knowledge article was approved for publishing with the ownership group feature disabled.	Knowledge base owner and managers
	A knowledge article was approved for publishing with the ownership group feature enabled.	Ownership group manager and members
KM: Article approved for publish	A knowledge article was approved for publication.	User (author or reviser) who submitted the article for approval
KM: Article rejected for publish	A knowledge article was rejected for publication.	User (author or reviser) who submitted the article for approval

Note:
An email notification is sent to a reviser of a knowledge article when the article versioning feature is enabled.

Email notifications for translation tasks

The email notifications for translation tasks are available when your administrator activates the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) and I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2). The 18N: Internationalization plugin (com.glide.i18n) activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

The following table describes the recipient list of notifications for translation tasks on knowledge articles and the associated conditions when a notification is sent.

Recipient list of the email notification for translation tasks

Notification	Condition	Recipients
KM Translation Task: Assigned to me	A translation task was assigned.	User who was assigned the translation task
KM Translation Task: Closed	A translation task was closed after the translated version of the knowledge article was published.	• User who was assigned the translation task • User who submitted the translation task

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Email notifications for expiring knowledge articles

The email notifications for expiring knowledge articles are available when your administrator activates the Knowledge Management Core plugin (com.glideapp.knowledge) and sets the value of the *glide.knowman.enable_article_expiry_notification* property to `true`. By default, the property value is set to false.

Knowledge articles have an expiration date set using the **Valid to** field when creating the article. Articles do not appear in search results after the Valid to date.

On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are scheduled to expire in the next month. The user can then determine whether to extend the **Valid to** date to continue providing access to the article.

Note:
To extend the **Valid to** date of a knowledge article, see Edit a knowledge article

The content of the email notification is determined by the number of articles expiring in the coming month.

- Up to 10 – The email notification includes a list of article links displayed in a tabular format and arranged in ascending order by their Valid to date. Clicking a link opens the article in ServiceNow AI Platform.
- More than 10 – The email notification includes a **View the list of expiring articles** link, which when accessed opens a list in ServiceNow AI Platform of all articles expiring in the next month.

The following table describes the recipient list of notifications for expiring knowledge articles and the associated conditions when a notification is sent.

Recipient list of the email notification for expiring knowledge articles

Notification	Condition	Recipients
KM: Article Expiry Warning	An article is scheduled to expire in the next month with the ownership group feature disabled.	• Author • Knowledge base owner and managers • Reviser for the updated and checked-out versions
	An article is scheduled to expire in the next month with the ownership group feature enabled.	• Author • Knowledge base owner and managers • Reviser for the updated and checked-out versions • Ownership group manager and members

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Note:
An email notification is sent to a reviser of a knowledge article when the article versioning feature is enabled.

Email notifications for article quality index (AQI) reviews

The email notifications for an article quality index review on knowledge articles are available when your administrator activates the Knowledge Management Advanced plugin (com.snc.knowledge_advanced).

The following table describes the recipient list of notifications for an AQI review on knowledge articles and the associated conditions when a notification is sent.

Recipient list of the email notification for AQI reviews

Notification	Condition	Recipients
KM: AQI on Article	An AQI was performed and submitted on a knowledge article with the ownership group feature disabled.	User (author or reviser) who last updated the article
KM: AQI on Ownership Group Article	An AQI was performed and submitted on a knowledge article with the ownership group feature enabled.	• User (author or reviser) who last updated the article • Ownership group

Note:
An email notification is sent to a reviser of a knowledge article when the article versioning feature is enabled.

Related topics

- Activate the Knowledge Management Advanced plugin
- Additional plugins for Knowledge Management
- Ownership groups
- Validity of a knowledge article
- Knowledge subscriptions

Set knowledge notification preferences

Set notification preferences for knowledge bases and knowledge articles.

Before you begin
Role required: knowledge

About this task
Users can set notification preferences from the Knowledge menu or from the Knowledge Management Service Portal.

Procedure

1. Navigate to the Notification Settings page.

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2. Click the Notification Preferences tab.
3. Click **Knowledge Base** and enable or disable the knowledge base notification options.
4. Click **Knowledge Articles** and enable or disable the knowledge article notification options.

Using the homepage of Knowledge Management v3

The Knowledge Management v3 homepage displays knowledge articles organized by knowledge base and category, as well as featured content and popular articles.

To view the default knowledge homepage, navigate to **Self-Service** > **Knowledge**.

Note:

- The knowledge homepage is not compatible with Internet Explorer 9 or earlier. Using one of these browsers will cause you to be redirected to the legacy knowledge portal.
- The Knowledge v3 home page is not customizable. Use the Knowledge Management Service Portal for an easily configurable user experience.
- Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

If you access knowledge from a service management application, the knowledge homepage for the associate application opens.

Only published and not yet expired knowledge articles (that is the valid do date not yet reached) appear on the homepage.

From the homepage, you can import a Word document to a knowledge base by clicking **Import Articles**.

Note:
From Madrid, you can import a word document from the Import Articles module available in the Application Navigator. This feature is active by default for customers on Madrid and later releases. Existing customers on release versions prior to Madrid use the Word import functionality on the Knowledge V3 homepage. Upgrade customers use the Word import functionality on the Knowledge V3 homepage by default. If required, add the Import Articles module to the Application Navigator. If you add the module, the **Import Articles** button does not appear on the Knowledge v3 homepage.

You can also create a new article using the **Create An Article** button.

- Import a Word document
- Create a knowledge article from an incident in Service Operations Workspace

Note:
You must have contribute access to at least one active knowledge base, otherwise these buttons do not appear. See Configuration tasks for knowledge managers.

You can select a knowledge base to browse articles within that knowledge base. You can view only knowledge bases you can access.

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Articles are organized by category or by tag. Categories are listed alphabetically. You can sort content by most recent update or by number of views.

You can comment on an article. There is no HTML formatting available for comments on the Knowledge V3 homepage.

Existing customers on release versions prior to New York can view knowledge article feedback comments in the following ways.

- On the Knowledge v3 homepage.
- If the Knowledge Management — Service Portal plugin (com.snc.knowledge_serviceportal) is installed, on the Knowledge Service Portal.
- If the Use Live Feed for knowledge feedback property is active, in the Live Feed.

For new customers on New York and later releases, comments can only be viewed in the Knowledge Service Portal.

An administrator can configure the knowledge homepage to display the number of articles within each category. This count includes articles from subcategories. To display the article count, set the *glide.knowman.show_number_on_categories* property to `true`.

Related topics

Define a knowledge article category

Import a Word document to a knowledge base using Knowledge Management v3

Import a Word document to a knowledge base

Search using Knowledge Management v3

Search for knowledge articles from the knowledge homepage using the search bar on the Knowledge Management v3 homepage.

Search results include only articles and questions you are authorized to read. The search results count do not take into consideration any security rules set for the articles. The number of articles you can access may be lower than the count displayed in the search results page. Documents that are attached to articles are also listed in the search results.

Note:

- To change how the attachments are displayed in the search results, set the **How to display attachments in Knowledge Search Results** *glide.knowman.search.attachment* property. Attachments can be displayed with a text snippet, link only, or not at all.

  Warning:
  Attachments set to display with a text snippet may cause slowness.

- To use wildcards in your search, navigate to **Contextual Search** > **Search Contexts** > **Knowledge Base Search** and select **Enable wildcard searches**.

Sort knowledge content by relevancy, most recent update, or number of views.

Filter results using the check boxes that appear. Filtering options appear depending on the search text. Knowledge homepage; browsing and searching for articles; viewing articles, providing feedback; posting questions; importing/creating articles

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Filtering options

Field	Description
Knowledge Bases	Select a knowledge base to search. You can select only knowledge bases you can access. If you do not select a specific knowledge base, search results include articles and questions from all knowledge bases that you can access. You can also select a knowledge base from the choice list in the search bar. For pinned articles, only those in the selected knowledge base in the corresponding language appear.
Categories	Select one or more knowledge categories. Categories are listed alphabetically.
Authors	Select one or more authors.
Language	The multi-language search feature is available when more than one supported language is enabled. **1.** To enable multi-languages, activate the I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) or activate one of the internationalization plugins for the language you require. **Note:** Activating internationalization plugins for any of the available languages automatically activates the I18N: Knowledge Management Internationalization Plugin v2 plugin. **2.** To display search results in all available languages simultaneously, enable the *glide.knowman.enable_multi_language_search* property. **a.** Navigate to **Knowledge** > **Administration** > **Properties** > **Knowledge Search Properties** > **Enable multi language search** and select the **Yes** check box. **b.** Enter `sys_properties.list` in the filter navigator, search for the property to configure, and in the **Value** field, enter `true`. **Note:** By default, the *glide.knowman.enable_multi_language_search* property is not enabled. Search results are displayed based on the language you select in the language filter on the Search page.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Related topics

Knowledge Management properties

Import a Word document to a knowledge base using Knowledge Management v3

Import a Microsoft Word document using Knowledge Management v3 homepage to create a knowledge article.

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Before you begin

You must have contribute access for at least one active knowledge base.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

The **Import Articles** button does not appear in the following conditions:

- The Import Articles module is available in the application navigator.

Note:
Beginning with Madrid, the Import a Word document feature is enabled by default and the Import Articles module is displayed in the application navigator. The Import a Word document feature isn't enabled automatically for the existing customers who can continue using the **Import Articles** option on the Knowledge Management v3 page. For more information, see Import a Word document to a knowledge base.

- You cannot contribute to any knowledge base.

Note:
An administrator can control the visibility of the **Import Articles** button by setting the other knowledge property **Hide the 'Import' functionality (button and drag-n-drop) for all users** (*glide.knowman.import.hide_import_functionality*) to true.

Role required: None

About this task

You can import Microsoft Word documents in the .doc and .docx file formats.

Note:
The file extension must be lowercase.

When you import a document, text content from the document is used to create the knowledge article. The articles support all editing functions supported by the TinyMCE editor. All HTML supported by TinyMCE such as tables, lists, and links, as well as styling such as bold and italics, are preserved. Images from the document are added as attachments to the knowledge article and embedded in the article body.

Note:

You can import multiple files at a time. Closing the browser or navigating away cancels any in-progress uploads but does not delete articles created from completed imports.

You cannot import documents to knowledge from mobile devices.

The following styles and elements are preserved when importing a .doc or .docx file into a knowledge base. Styles and elements not included in this list may not be preserved when importing a document.

- Titles
- Headings

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Note:
Only default heading settings are supported. For any headings and subheadings with numbers, the numbers are not imported.

- Images

Note:
Images may not be aligned exactly as in the Word document you import.

- Links

Note:
Links are preserved for documents with .docx format only.

- Bold text
- Italic text
- Underlined text
- Ordered and unordered lists

Note:
After import, the bullets in an unordered list are replaced with dots.

- Tables

Note:
Only default heading settings are supported. Custom heading styles are imported using the default settings for those styles. Table styling and borders are not supported.

Procedure

1. Navigate to **All** > **Self-Service** > **Knowledge**.
2. Select one or more document files and drag onto the knowledge homepage.
3. Select the **Knowledge base** to add the new article to.
   You can select only knowledge bases you can contribute to.
4. **Optional:** Select a **Category** from within that knowledge base.

   Note:
   Use the category picker to add a category. The picker does not differentiate between the different category levels. You can select a category or sub category and add it to the **Category** field.

5. **Optional:** Select the **Publish** check box to start the publishing workflow for each imported article immediately after the import finishes.
   This check box applies only when importing to v3 knowledge bases and only if the **Show publish checkbox on the knowledge import pop-up** property is set to **Yes** on the Knowledge Management properties form. You cannot automatically publish articles imported to v2 knowledge bases.

   Knowledge v2 articles go into **Draft** state. Knowledge v3 articles go into **Review** or **Published** state, depending on the workflow attached to the knowledge base (Approval Publish or Instant Publish).

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6. Select **Import**.

   A new article is created in the selected knowledge base and category using the content from the uploaded document. If you uploaded multiple documents, one article is created for each. If you use knowledge internationalization, the language of the new article is set to the currently selected system language.

   After the upload completes, a popup window appears displaying the number and short description of the newly-created articles. Click an article to view the full record.

   If any errors occur during the upload, a popup window appears to display the error.

Related topics

Import a Word document to a knowledge base

Request a knowledge base

If existing knowledge bases do not fit your needs, you can request a new knowledge base through the service catalog. If the request is approved, you are added as the owner of the new knowledge base.

Before you begin

Role required: none

About this task

If no knowledge base exists that fit your needs, all users can request a new knowledge base.

Procedure

1. Navigate to **All** > **Self-Service** > **Service Catalog**.
2. Select **Can We Help You?**.
3. Select the **Request Knowledge Base** catalog item.
4. Enter the reason you want the knowledge base, and a name for the knowledge base.
5. Click **Submit**.

What to do next

You are notified when the request is approved or rejected. If the request is approved, you are added as the owner of the new knowledge base. You can then assign managers and manage articles in the new knowledge base.

Knowledge bases created through this request process are inactive by default, so you must activate the knowledge base to make it available for users.

Related topics

Assign a knowledge base manager

Add a knowledge article to featured content

Create a knowledge article

Import a Word document to a knowledge base

Import a Word document to create a knowledge article.

Before you begin

You must have **Can Contribute** access to at least one active knowledge base.

Role required: knowledge

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About this task

Beginning with Madrid, the Import a Word document feature is enabled by default and the Import Articles module is displayed in the application navigator.
These styles and elements are preserved when importing a .doc or .docx file into a knowledge base. Styles and elements not included in this list may not be preserved when importing a document.

- Titles
- Headings

Note:
Only default heading settings are supported. For any headings and subheadings with numbers, the numbers are not imported.

- Images

Note:
Images may not be aligned exactly as in the Word document you import.

- Links
- Bold text
- Italic text
- Underlined text
- Ordered and unordered lists

Note:
After import, the bullets in an unordered list are replaced with dots.

- Tables

Note:
Only default heading settings are supported. Custom heading styles are imported using the default settings for those styles. Table styling and borders are not supported.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Import Articles**.
2. Enter the knowledge base to add the article to.
3. **Optional:** Select a **Category** from within the knowledge base.

Note:
Use the category picker to add a category. The picker does not differentiate between the different category levels. You can select a category or sub category and add it to the **Category** field.

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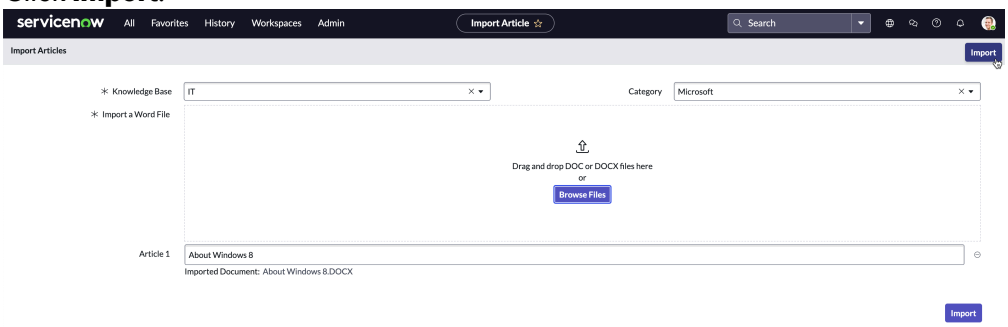
4. **Optional:** Select the **Publish** check box to start the publishing workflow for each imported article immediately after the import finishes.

   Note:
   The **Publish** check box appears only when the **Show publish checkbox on the knowledge import pop-up** property is enabled. To enable the property, navigate to **Knowledge** > **Administration** > **Properties** and select the check box for the **Show publish checkbox on the knowledge import pop-up** property.

5. Select one or more Word files to import.
6. Click **Import**.



An article is created in the selected knowledge base and category using the content from the uploaded document.

- If you uploaded multiple documents, one article is created for each.
- If you use knowledge internationalization, the language of the article is set to the system language selected.
- When the upload completes, a pop-up window displays the number and short description of the articles. Click an article to view the full record.
- If any errors occur during the upload, a pop-up window displays the error.
- If the **Publish** check box is activated, knowledge articles go into **Review** or **Published** state, depending on the workflow attached to the knowledge base.
- If the **Publish** check box is not activated, the knowledge articles go into **Draft** state and are then reviewed before publishing.

Related topics

Import a Word document to a knowledge base using Knowledge Management V3

Use knowledge on mobile devices

All users can access knowledge from mobile devices to search for and view knowledge articles.

You can also view recently viewed and most popular articles, search for articles, browse articles by category, and provide feedback to knowledge articles from Now Mobile. For information, see Using Now Mobile for Knowledge Management.

Browse knowledge on mobile devices

You can browse knowledge bases using a mobile device.

Navigate to **SELF-SERVICE** > **Knowledge Base**.

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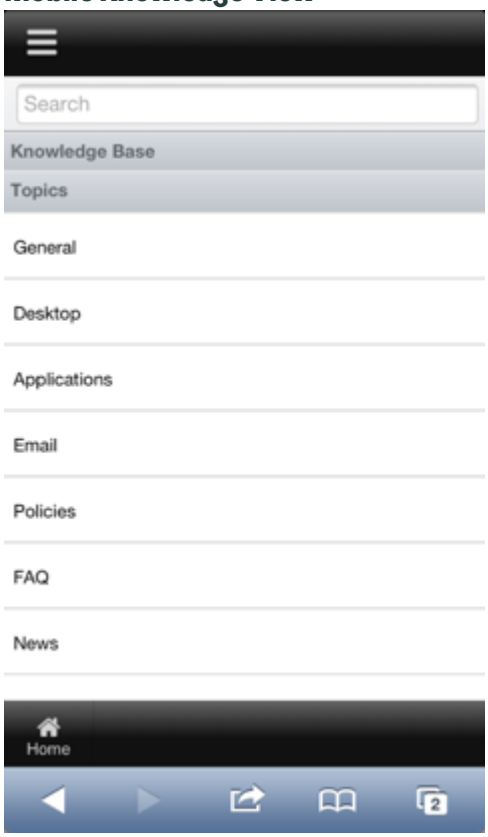
Mobile Knowledge View



Browse Knowledge by tapping on a category and browsing articles or subcategories.

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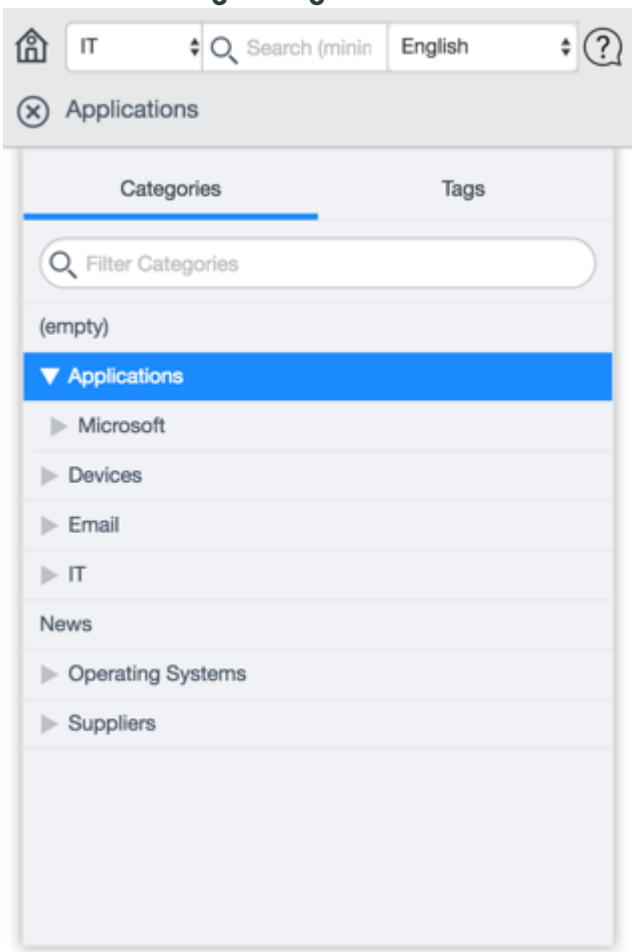
Mobile Knowledge Categories



Note:

Select the desired category and click the close icon (⊗) for the selected category to reflect in the search results.

View knowledge articles on mobile devices

You can read knowledge content using a mobile device.

Tap a title to view the article.

Note:

You cannot edit or add comments to knowledge articles on the mobile interface.

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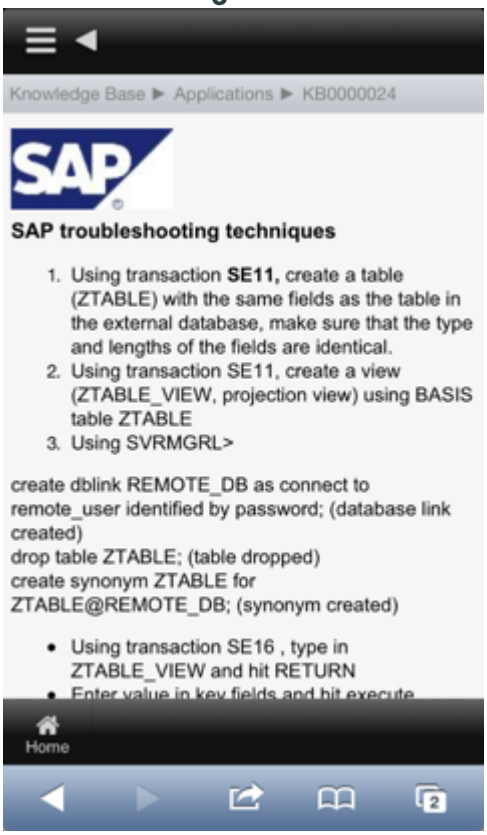
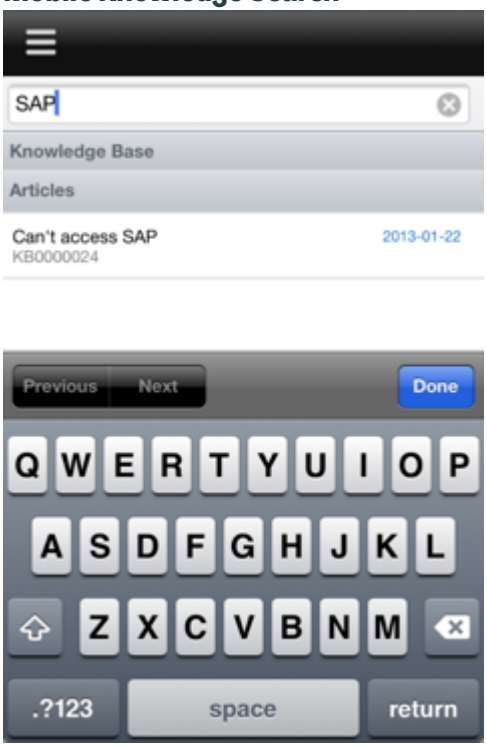
Mobile Knowledge Article View



Search knowledge on mobile devices

Find a specific article by searching on a particular term.

Mobile Knowledge Search



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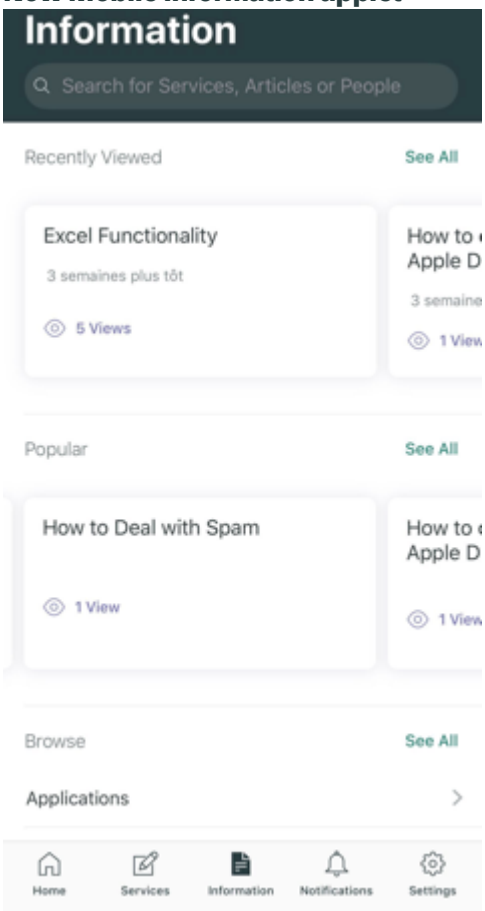
Using Now Mobile for Knowledge Management

Access knowledge articles from anywhere using the Information applet on the Now Mobile app. You can view recently viewed and most popular articles, search for articles, browse articles by category, and provide feedback for articles.

To access articles from the Information applet on the Now Mobile app, you must first download the ServiceNow mobile application on an iOS platform from the Apple App Store or on an Android platform from the Google Play Store.

Now Mobile Information applet



Make sure your administrator has activated the Now Mobile app. For more information, see Now Mobile app.

After you access an article, you can view the author, published date, number of views, and the overall rating details of the article. In addition, you can respond to and evaluate articles and view related items, related articles, and attachments.

Using Now Mobile app, even external users can access and provide feedback to the knowledge articles. For more information about external user functionalities and capabilities, see Mobile external users.

Activation information

The Information applet is available on the Now Mobile app. The ServiceNow Mobile Request - Knowledge Management Screens and Applet Launcher plugin (com.glideapp.knowledge.mobile_requestor) activates the Information applet. The Information applet is activated by default for both new and upgrade customers.

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Related topics

- Configure knowledge bases
- Now Mobile app
- View the most popular or recently viewed articles in the Now Mobile Information applet
- View an article in the Now Mobile Information applet
- Provide feedback for a knowledge article in the Now Mobile Information applet

View the most popular or recently viewed articles in the Now Mobile Information applet

The Information applet on the Now Mobile app enables you to access knowledge articles from a mobile device.

Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

Procedure

1. Access your instance using the mobile application.
2. On the Now Mobile app, tap **Information**.
3. Access your recently viewed or the most popular knowledge articles

Information applet article views

Section	Description
Recently Viewed	Up to five of the articles you viewed within the last 30 days.
Popular	Up to five of the most popular knowledge articles. The Now Mobile app homepage includes a similar section that displays up to three of the most popular articles.

Note:
Tap **See All** to view the complete list of articles within the selected section.

Related topics

- Browse articles in the Now Mobile Information applet
- Search for an article in the Now Mobile Information applet
- Control access at the knowledge article level through user criteria

Browse articles in the Now Mobile Information applet

You can browse articles within a category in the Now Mobile Information applet to see articles related to a particular subject or grouping.

Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

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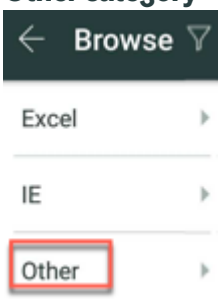
Procedure

1. Access your instance using the mobile application.
2. On the Now Mobile app, tap **Information**.
3. In the Browse section, tap a category from the categories list to view articles and child categories associated with the selected category.

   Note:
   Tap **See All** to view the complete categories list.

4. Tap further categories until you view the articles list associated with the desired category. The articles associated with a parent category are grouped under a dummy child category labeled as **Other**.

   Other category

5. To view an article, tap the article in the articles list.

Related topics

View an article in the Now Mobile Information applet

Control access at the knowledge article level through user criteria

Search for an article in the Now Mobile Information applet

You can search for an article in the Now Mobile Information applet.

Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

Procedure

1. On the Now Mobile app, tap **Information**.
2. Tap **Search for Services, Articles or People**, and enter a search term related to the article.
3. Tap the search icon on your app keyboard.
   The app displays search results.
4. Tap **Articles** to view only articles in the search results.
5. Tap an article in the search results to view the article content.

Related topics

View an article in the Now Mobile Information applet

Control access at the knowledge article level through user criteria

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View an article in the Now Mobile Information applet

You can view the author, published date, number of views, and the overall rating details of the article in the Now Mobile Information applet. In addition, you can respond to and evaluate articles and view related items and related articles.

Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

Procedure

1. On the Now Mobile app, tap **Information**.
2. Search for or select the desired article from the sections available in the Information applet. The article page displays the content and associated information for the selected article such as author, published date, number of views, and the overall rating. The page also displays the following sections:

UI component	Description
Related Articles	Up to five related articles that are manually mapped, automatically predicted, or both. The manually mapped articles appear first in the Related Articles section. This section appears only when related articles are available for the selected article.
Related Items	Up to five related items that are manually mapped. This section appears only when related items are available for the selected article.
Attachments	Files attached to an article. This section appears only when the attachments are available for the selected article. To view a file, tap the file name. If an article contains more than two attachments, tap the number of attachments indicator and then tap the file name.

Note:
Tap **See All** to view the complete list of articles within the Related Articles or Related Items section.

3. **Optional:** Respond to and evaluate the article.

Related topics

Provide feedback for a knowledge article in the Now Mobile Information applet

Control access at the knowledge article level through user criteria

Provide feedback for a knowledge article in the Now Mobile Information applet

You can contribute to feedback on knowledge articles by rating an article, marking an article as helpful or not helpful, and posting and replying to comments for an article in the Now Mobile Information applet.

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Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

Procedure

1. On the Now Mobile app, tap **Information**.
2. Select the desired article.
3. Contribute to the article feedback by rating it, marking it as helpful or not helpful, or leaving a comment.

Action	Description
Rate the article	Tap the star icons displayed on the article to indicate its effectiveness on a scale of 1 to 5. For ratings between 1 to 3 stars, a feedback task is automatically created for the article and assigned to the author or ownership group, as configured.
Mark an article as helpful or unhelpful	Tap the helpful icon () or the not helpful icon ().
Enter your comment	Enter a comment in the **Type your comment here** box and tap **Submit**.
View all comments and replies posted for the article	Scroll down to the Comments section.
Like a comment on the article	Underneath a comment, tap the like icon ().
Reply to a comment on the article	Underneath a comment, tap the reply icon (), enter your comment in the text box that appears, and then tap **Submit**.
Delete any previous comments or replies you posted earlier	Go to a comment or reply, and then tap the delete icon (). If a message appears, tap **OK**. Only users who have posted the comment, knowledge administrators, and knowledge owners can delete a comment.
View an attachment to a comment	View files, if available, attached to a comment. To view a file, tap the file name. If a comment contains more than two attachments, tap the number of attachments indicator and then tap the file name.

Related topics

View an article in the Now Mobile Information applet

Control access at the knowledge article level through user criteria

Manage ownership groups

Create ownership groups and associate them to knowledge articles. Knowledge group managers or knowledge administrators can edit ownership groups.

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Before you begin

The Knowledge Management Advanced plugin (com.snc.knowledge_advanced) must be activated.

Role required: Users with the knowledge_domain_expert or knowledge_admin roles can create ownership groups.

Users with the knowledge_group_manager or knowledge_admin roles can edit ownership groups.

About this task

Create an ownership group by adding members and a manager. Knowledge administrators approve ownership groups.
When knowledge articles are created, ownership groups can be associated to them. Ownership groups manage article approvals and feedback and can edit and retire knowledge articles that they are associated with.

Knowledge group managers can edit ownership groups managed by them by adding or removing members without the need for approval. They cannot change the manager assigned in their groups. Only knowledge administrators can reassign managers.

Procedure

1. Navigate to **All** > **Knowledge** > **Ownership Groups** > **Manage Group**.
2. To create an ownership group, from the Request Type list, select **Create Ownership Group**.

   Note:
   To edit an existing ownership group, from the Request Type list, select **Edit Ownership Group**.

3. Fill in the fields on the form.

Manage Knowledge Ownership Group form

Field	Description
Name	Name of the ownership group.
Group email	An email address for the ownership group. Emails are sent to group members in these cases. ○ Activity on articles they are associated with, for example, comments. ○ Article quality checks (AQI) performed on articles they are associated with. If no group email is defined, emails are sent to individual group member emails.
Description	Description that defines the ownership group.
Manager	Manager for the ownership group.
Group members	Members of the ownership group.

4. Click **Order Now**.

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The ownership group is sent to the knowledge administrator for approval. Once approved, the ownership group is ready to use and associate to a knowledge article.

Note:
You can also create an ownership group from an existing group.

a. Navigate to **System Security** > **Users and Groups** > **Groups**.

b. Click a group.

c. In the **Type** field, enter `Knowledge`.

Note:
If the **Type** field does not appear on the form, configure the form layout to add it.

d. In the **Manager** field, enter a manager and add the role knowledge_group_manager.

e. In the Roles related list, click **Edit** and add the role knowledge_group_member to the group.

Use article versioning

Use article versioning to create and maintain multiple versions of a knowledge article.

Manually update customized files

If you have customized any of the files that are updated as part of the Knowledge Management Advanced Installer plugin, these files are skipped during plugin activation and must be updated manually.

Manually update your customization to include the article versioning-related changes.

- Add the **Version** field to the Knowledge form layout and the Knowledge list view, if it is not already present.
- Add the **outdated** choice to the **Workflow** choice list field on the Knowledge form, if it is not already present. Keep the value as **outdated** because of dependencies that article versioning functionalities have on this choice.
- Update the **Knowledge** > **My Flagged** and **Self-Service** > **My Knowledge Articles** modules to include the following condition in the **Filter** field, if these modules do not already reflect this change: **Revised by is (dynamic) me**.

If you have customized any of the Knowledge Management Overview dashboard reports, these files are also skipped during plugin activation and must be updated manually.

Check out a published article and create a new version

Create a new version of a knowledge article by checking out the latest published version.

Before you begin

Roles required: knowledge owner, knowledge manager, or knowledge administrator

About this task

You cannot check out a published article unless there is already a checked out version. If a version has been checked out, the **Checkout** button does not appear on the Knowledge form header and you cannot edit the knowledge article. To make changes, you must first publish the knowledge article.

When you check out an article, the default value of **Valid to** field of the article is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). If the **Article Validity** field is blank, the date in the **Valid to** field date is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date.

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When you check out an article, attachments from the article's base version are copied into the new article version and relative paths to these attachments are also updated.

Note:
For article versions that were created in the previous releases, the relative paths to the attachments may not be updated. To update them, activate and run the *Fix attachment links on article versions* fix script.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Published**.
2. Select the desired article from the list.
3. Click **Checkout** in the Knowledge form header.
   The system creates a new version of the knowledge article and displays a message to the user. The article number for the new version remains the same, the version number is increased by 0.01, and the state changes to **Draft**.
4. Make your changes and click **Publish**.
   The new version of the article is added to the Knowledge list and to the **Article Versions** related list on the Knowledge form.

Revert an outdated article to the current state

Use an outdated version of an article to create a new version.

Before you begin
Roles required: knowledge base owner, knowledge_manager, knowledge_admin

About this task
This action is available for earlier published version that have a state of **Outdated** and only when there is no checked out version. If a version has been checked out, the **Make this current** button does not appear on the Knowledge form header.

Procedure

1. Navigate to **Knowledge** > **Articles** > **All**.
2. Open an article in the **Outdated** state.
3. Click **Make this current** in the Knowledge form header.
   The system displays the Knowledge form. The version number increments to the latest version number plus 0.01 and the state changes to **Draft**. For example, if the latest published version of an article is 3.0 and you select the outdated 1.0 version to become the current version, the version number increments to 3.01.

View all versions of an article

View a list of all available versions for a selected knowledge article and then view the selected version in a new tab.

About this task
The list of all available versions for a selected knowledge article is displayed in the **Article Versions** related list on the Knowledge form. Users with read access can see major versions. Users with contribute access can see major and minor versions.

Procedure

1. Navigate to **Knowledge** > **Articles** > **All**.
2. Open the desired article.

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3. Click the **Article Versions** tab to display the related list.
4. Click **Version** to display the desired article version in a new tab.
5. If desired, click the **View Version** related link to see the article view page.

Compare two versions of an article

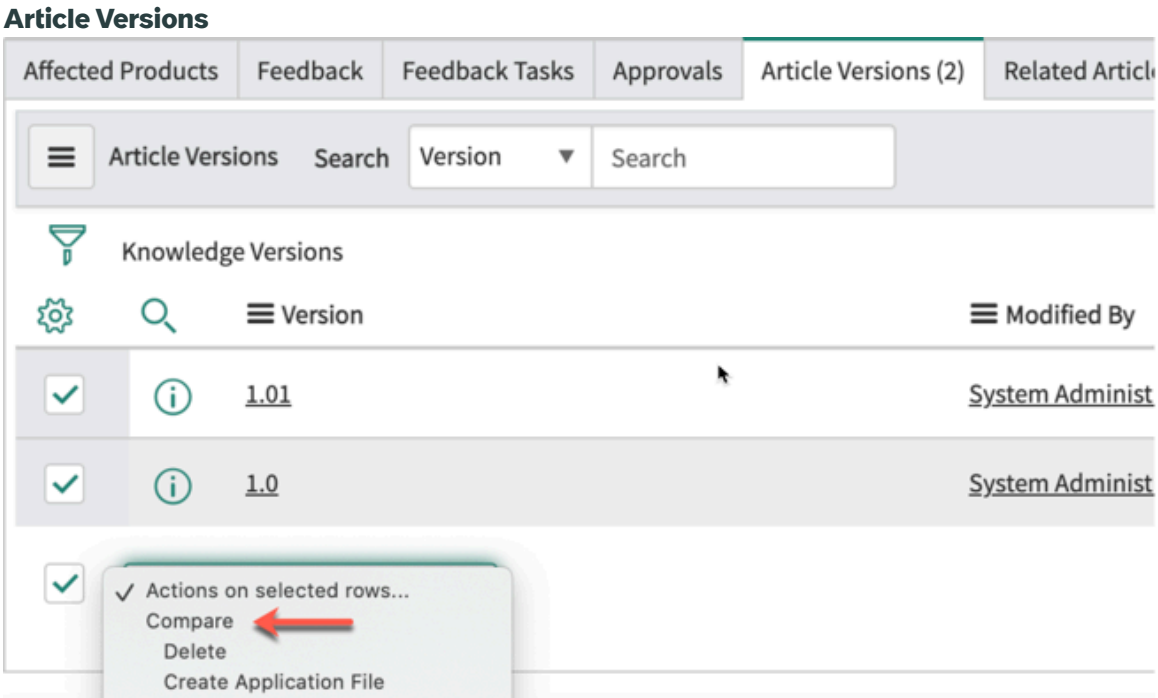
Select and compare two versions of a knowledge article.

Before you begin
Role required: knowledge_manager, knowledge_admin

Note:
For better comparison experience of the knowledge article versions, see Compare knowledge article versions in Agent Workspace.

Procedure

1. Navigate to a **Knowledge** > **Articles** > **All**.
2. Click a knowledge article with multiple versions.
3. In the Article Versions related list, select the check boxes for the two versions of the article to compare.



4. In the Actions on selected rows list, select **Compare** from the list.
The Compare versions page opens and lists the fields (including Article body) for the selected article versions in a side-by-side format. Differences between the two article versions are highlighted.

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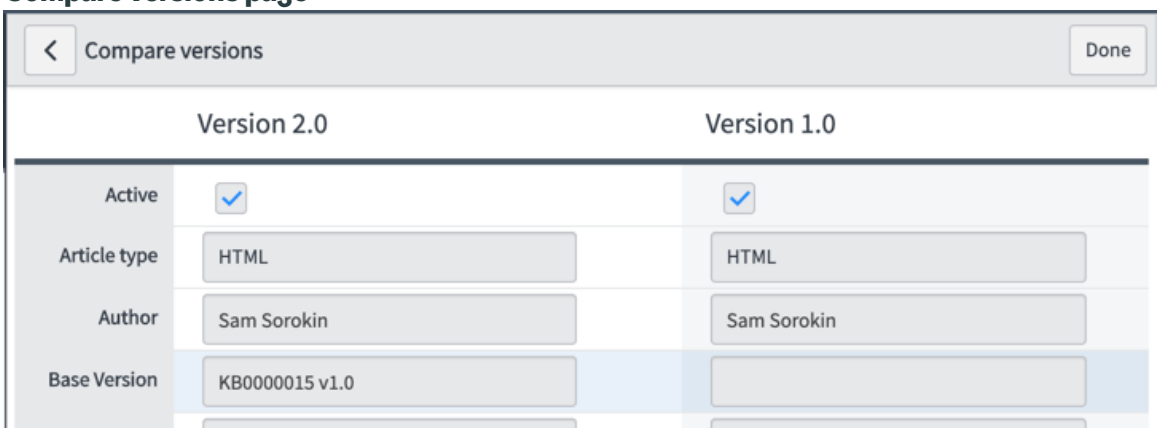
Compare versions page



5. Click **Done** to return to the Knowledge form.

Retire a versioned article

You can retire the latest published version of a knowledge article. Retiring a knowledge article doesn't create a version. It simply marks the article as **Retired**.

Before you begin

Role required: knowledge administrator, knowledge manager, and latest publisher of the versioned knowledge article (not available for kcs_candidate or kcs_contributor)

About this task

You can only retire an article, which has no checked out version. If a version has been checked out, the **Retire** button doesn't appear on the Knowledge form header.

Note:
For the Knowledge - Approval Retire workflow, this happens only when the retire request is approved.

You can still access outdated articles that have been attached to incidents by navigating to the article view page with the sys_id of the article. Outdated articles include a message that an updated article is available.

If versioning is disabled, only the latest version of the article is shown in search results and list views.

Retired knowledge articles can't be searched by external users or customers. To reuse a retired article, create an article with the same content, which is published once approved.

Beginning with the Utah release, you can give a replacement article while retiring a knowledge article. When the retired article is accessed, you will automatically be redirected to the replacement article with a display message `The article KBxxx is retired and has been replaced with the knowledge article KBxxx`. If no replacement article is available, the page displays the message `Knowledge record not found`.

- Article with replacement returns a 301 code.
- Article without any replacement returns a 404 code.
- By default, the *`glide.knowman.enable_article_replacement_on_retire`* system property is set to true to give a replacement article for a retired article. The setup to redirect an article to a replacement article is set by default.

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Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Published**.
2. Select an article.
3. Click **Retire** in the Knowledge form header.
   The system returns to the Knowledge list. The state of the article changes to **Pending retirement** and the state of previously published versions change to **Outdated**.

> **Note:**
> You can't check out or edit a retired article.

Result
The selected article is retired and can be accessed from **Knowledge** > **Articles** > **Retired**

Disable the article versioning feature

Users with the system administrator role can disable the article versioning feature by setting a property.

Before you begin
Role required: admin

About this task
The **Enable article versioning feature**(glide.knowman.versioning.enabled) property controls the article versioning feature. Setting this property to **false** disables the article versioning feature. Once disabled:

- The **Version** field is removed from the Knowledge form. The **Version** column remains on the Knowledge list and can be removed manually.
- The **Article Versions** related list is removed from the Knowledge form.
- The **Recall**, **Checkout**, and **Make this current** buttons are removed from the Knowledge form.
- Outdated articles are removed from Knowledge list views.
- The version history does not appear on the article view page.

Articles continue to be versioned in the background. Minor versions are incremented until an article is published and then the version number is increased to the next major version.

Users can still access outdated articles that have been attached to incidents. Outdated articles include a message that an updated article is available.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Properties**.
2. Locate the **Enable article versioning feature** property in the Article Versioning Properties section.
3. Click the check box to disable the property.
4. Click **Save**.

Using knowledge blocks

Use knowledge blocks to simplify knowledge authoring for writers and knowledge consumption for readers.

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Create a knowledge block

Create or modify a knowledge block to define a reusable piece of content that can be inserted into knowledge articles in a knowledge base. The knowledge block is secured by user criteria, which controls what users, groups, roles, companies, locations, or departments can read or not read the content in an article or search, enabling users to more easily view content that is relevant to them.

Before you begin

Activate knowledge blocks

Role required: user must have contributor access to the knowledge base.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Blocks** > **Create New**.
2. Click **New** or open a record.
3. Fill in the fields on the form.

Knowledge Block form

Field	Description
Number	This field is automatically set to a knowledge block number.
Knowledge base	Name of the knowledge base. The knowledge blocks feature must be enabled for each knowledge base that you plan to create blocks. See Enable knowledge blocks for each knowledge base.
Category	Name of the knowledge category or subcategory.
Ownership Group	Ownership group for the knowledge block. This field appears when the ownership groups feature is enabled. Knowledge blocks can be used with or without the ownership groups feature. To learn more about ownership groups, including how to enable the feature, see Ownership groups.
Can read	User criteria to apply for read access at the knowledge block level. User criteria set at the knowledge base and knowledge block level controls which users can read or not read block content within an article. To learn more about selecting user criteria for a knowledge block, see Select user criteria for a knowledge block.
Cannot read	User criteria to apply for cannot read access at the knowledge block level. User criteria set at the knowledge base and knowledge block level controls which users can read or not read block content within an article. To learn more about selecting user criteria for a knowledge block, see Select user criteria for a knowledge block.
Valid to	Date that the knowledge block expires. After the valid to date:

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Field	Description
	○ Knowledge article viewer will no longer display expired knowledge block content in the associated knowledge article. ○ Search will no longer return knowledge articles if the keywords are contained in the expired blocks.
Short Description	Description of the knowledge block.
Text	Text of the knowledge block.
Version	This field is automatically set to a version number when the article versioning feature is enabled. Knowledge blocks can be used with or without the article versioning feature. To learn more about article versioning, including how to disable the feature, see Article versioning.
Article type	This field is automatically set to HTML. **Note:** Knowledge blocks are only supported with HTML knowledge articles.
Workflow	This field is automatically set to the publication state of the block, such as Draft, Published, or Retired.
Source task	Not applicable.

4. Click **Save** or **Update** to create or update the block.
5. Click **Publish** to publish the block.

Note:
Any additional steps required to publish the knowledge block, such as approvals, depend on the publishing workflow for the knowledge base. See Knowledge workflows for more information.

What to do next
After the knowledge block is published, you can add the block to an article within the knowledge base.

Select user criteria for a knowledge block

Control which users can read or not read knowledge block content within an article in a knowledge base by setting user criteria at the knowledge base and knowledge block level. As a knowledge contributor, you can apply user criteria at the knowledge block level.

Before you begin
Activate knowledge blocks

Role required: knowledge_admin or admin

Procedure
1. Navigate to **Knowledge** > **Knowledge Blocks** > **All**.
2. Open a knowledge block.

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3. Apply the desired user criteria for the **Can Read** and **Cannot Read** fields.

Name	Description
Can Read	User criteria to apply for read access at the knowledge block level.
Cannot Read	User criteria to apply for cannot read access at the knowledge block level.

Note:

- You can use existing or create new user criteria records. To create a new record, see Create a user criteria record in Knowledge Management.
- If a user meets any **Can Contribute** criteria at the knowledge base level, they can read all knowledge block content, regardless of the **Can read** and **Cannot read** criteria set at the knowledge block level.
- If a user meets any **Cannot read** criteria at the knowledge block level, they cannot read the block content, regardless of the **Can read** criteria set at the knowledge block level.
- If a user has access to knowledge article and doesn't have access to one or more blocks within article then user can still read the content but without specify block content.

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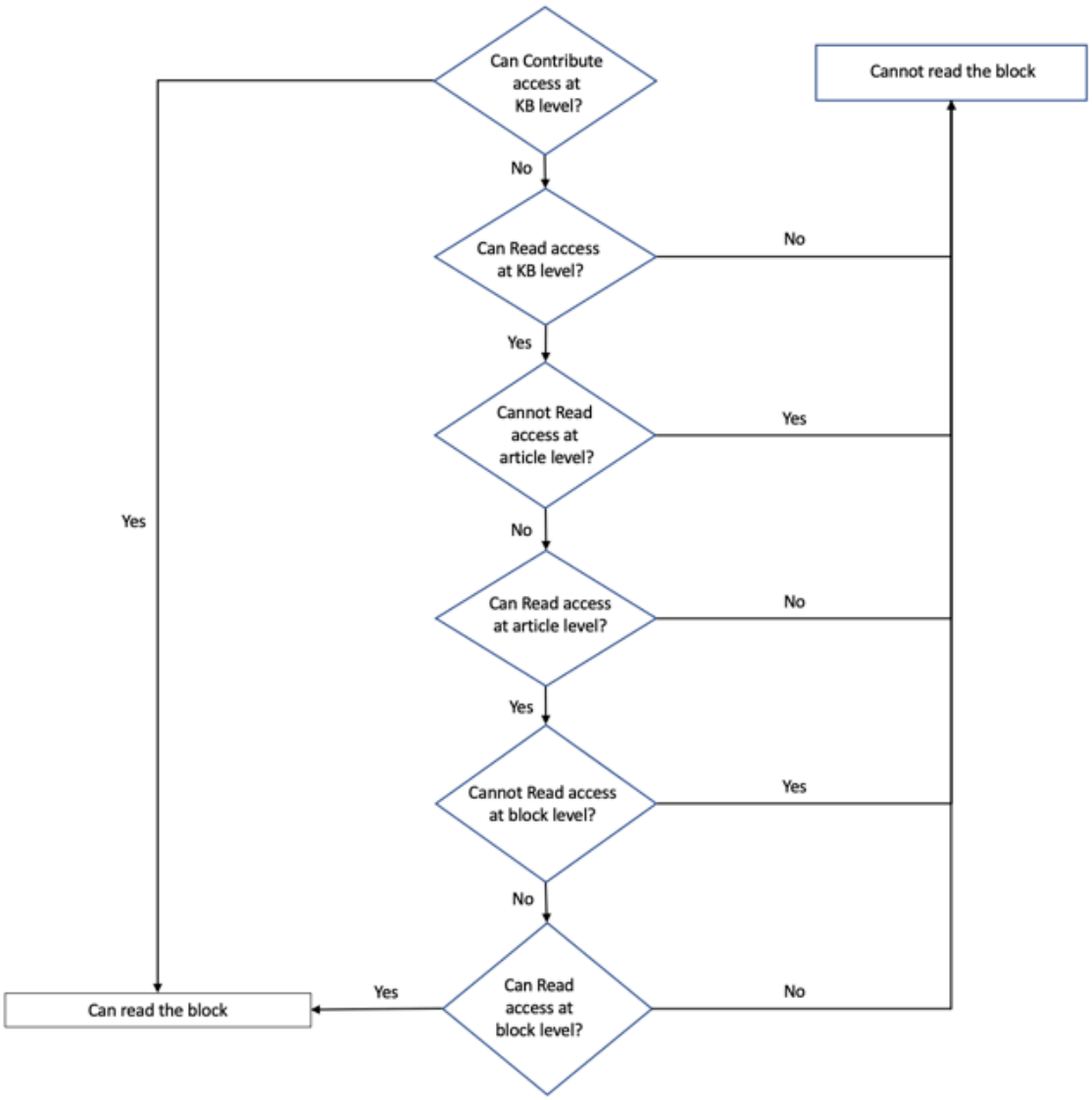

4. Right-click the form header and click **Save**.

What to do next

- To finish and publish the block, see Create a knowledge block.
- To add the block to an article, as well as preview the article by impersonating different users, see Add knowledge blocks to a knowledge article.

Retire a knowledge block

You can retire a published knowledge block so that it's no longer available for users to view or search.

Before you begin

Role required: user must have contributor access to the knowledge base.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Blocks** > **Published**.
2. Open the applicable record.

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3. Select **Retire** to retire the knowledge block.

Note:

- Starting from the Washington DC release, you can retire the knowledge block attached to an article by setting the (*glide.knowman.allow_retire_block*) system property to true.
- Any additional steps required to retire the knowledge block, such as approvals, depend on the workflow for the knowledge base. See Knowledge workflows for more information.
- A knowledge block can only be deleted if it's not being used in any knowledge article, including any retired article or previous version of an article.

Result

The retired knowledge block is no longer visible in the article.

Add knowledge blocks to a knowledge article

You can insert one or more knowledge blocks into a knowledge article within a knowledge base. Each knowledge block is secured by user criteria, which controls who can read or not read the content in an article.

Before you begin

Activate the Knowledge Management Advanced plugin

Role required: user must have contributor access to the knowledge base.

Procedure

1. Navigate to **All** > **Self-Service** > **My Knowledge Articles**.
2. Click **New** or open a record.
   On clicking **New**, you are provided options to select an article template. The article templates appear when you activate them in the **Knowledge** > **Article templates**.
3. Select an article template.

Note:
You can add or remove knowledge blocks in more than one HTML field of any article template including custom templates.

4. Fill in the fields on the form, as appropriate.
   For more details on creating a knowledge article, see Create a knowledge article from an incident in ITSM Agent Workspace.

Note:
Knowledge blocks are only supported with HTML knowledge articles. Make sure that the **Article type** field is set to **HTML**.

5. In the article body, click where a block needs to be inserted and then click **Add Blocks**.

   If the **Add Blocks** button is not visible, make sure that the knowledge blocks feature is enabled for the knowledge base that the article is in. See Enable knowledge blocks for each knowledge base for more information.

Note:
Blocks can be added to only the text field.

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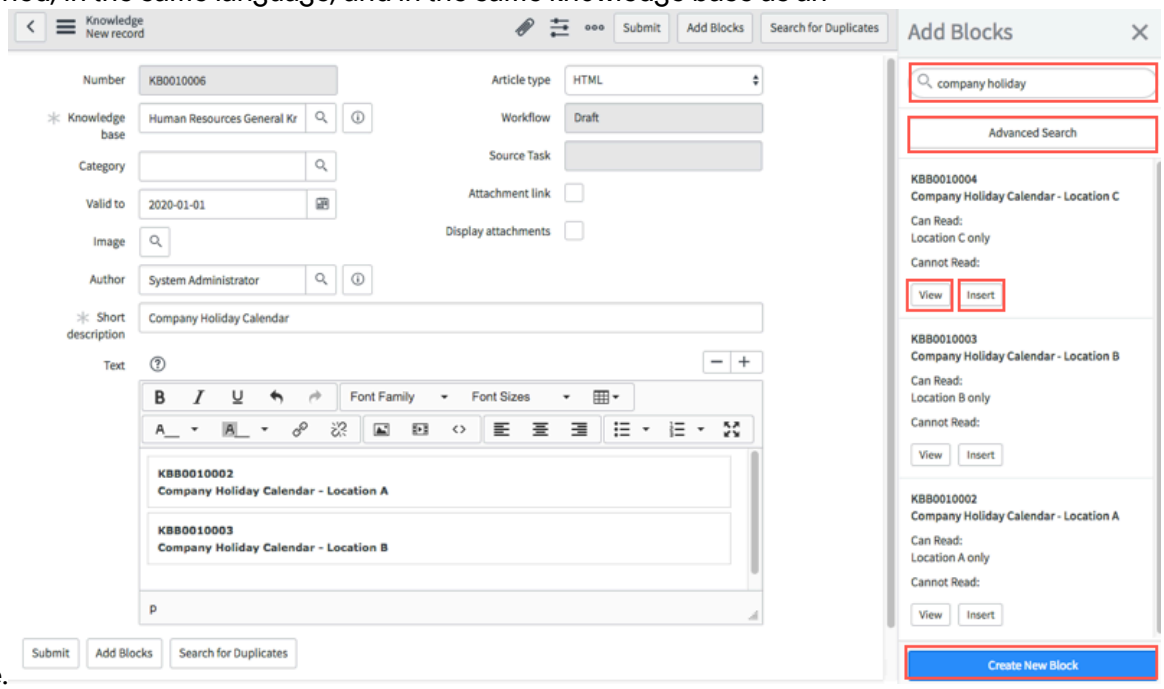
In the **Add Blocks** side panel, you can search for, do an advanced search, view, and insert knowledge blocks into the article. To use condition builder with advanced search, see Condition builder. You can also create blocks directly from the side panel.

- You can configure the number of search results displayed in the **Add Blocks** side panel using the *glide.knowman.add_blocks.search_results* property. By default, the minimum number of search results displayed is 6 and the maximum number of search results displayed is 25. See Knowledge properties for more information.
- If there are knowledge blocks you cannot find, make sure that the blocks are published, in the same language, and in the same knowledge base as an article.



6. **Optional:** Rearrange knowledge block in the article body.

Example

(Optional) The following GIF shows an example of a user moving a knowledge block within an article using a keyboard.

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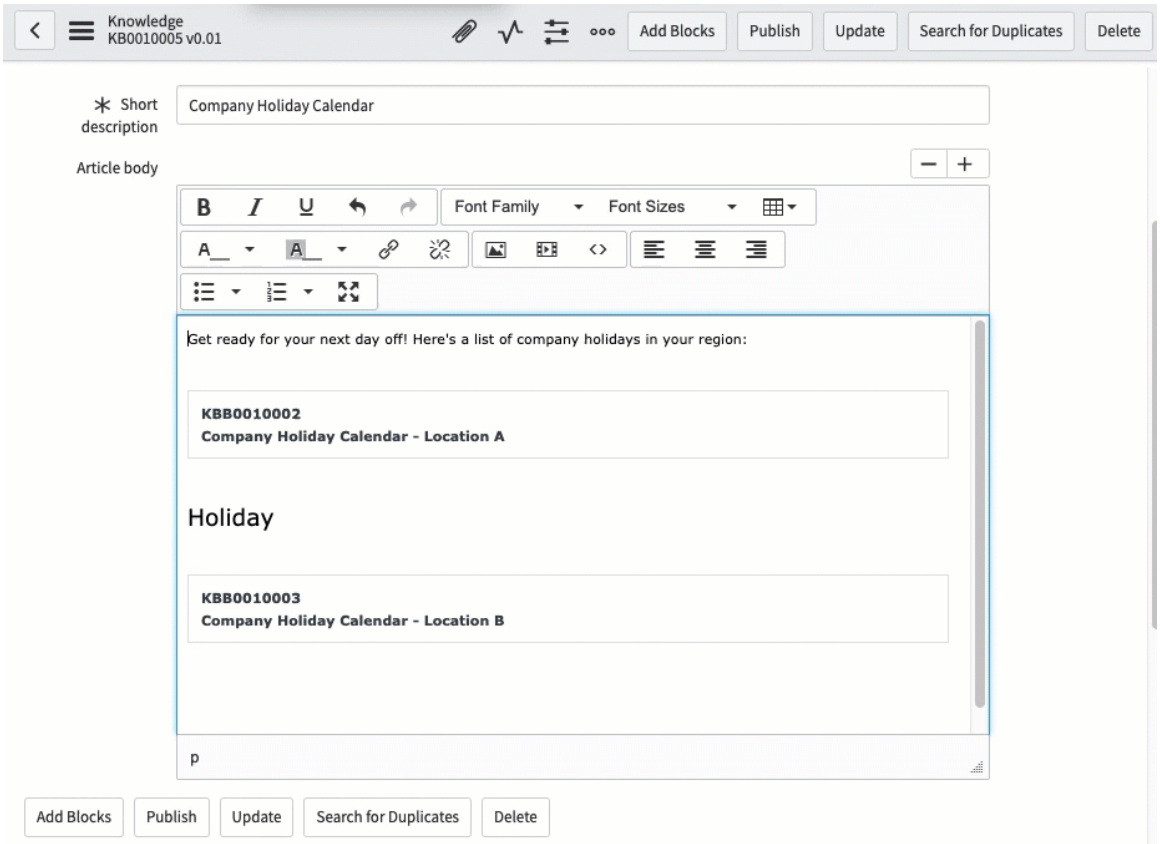

7. Click **Save** or **Update** to create or update the article.

> **Note:**
> You can preview the article with the blocks by user or, if published, date. See Preview a knowledge article with knowledge blocks for more information.

8. Click **Publish** to publish the article.

> **Note:**
> Any additional steps required to publish the knowledge article, such as approvals, depend on the publishing workflow for the knowledge base. See Knowledge workflows for more information.

Preview a knowledge article with knowledge blocks

Preview a knowledge article with knowledge blocks by user or, if published, by date. For an unpublished article, you can preview the article by user by impersonating different users to see how the article displays or hides block content (based on the user criteria set at the knowledge base and knowledge block level). For published articles, you can preview the article by both user and date to see how the article appears in past versions for different users.

Before you begin

Role required: user must have contributor access to the knowledge base.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**, and open one of the modules, such as **Unpublished** or **Published**.
2. Open the knowledge article with knowledge blocks.
3. In the **Related Links** section, click **Preview Article with Blocks**.

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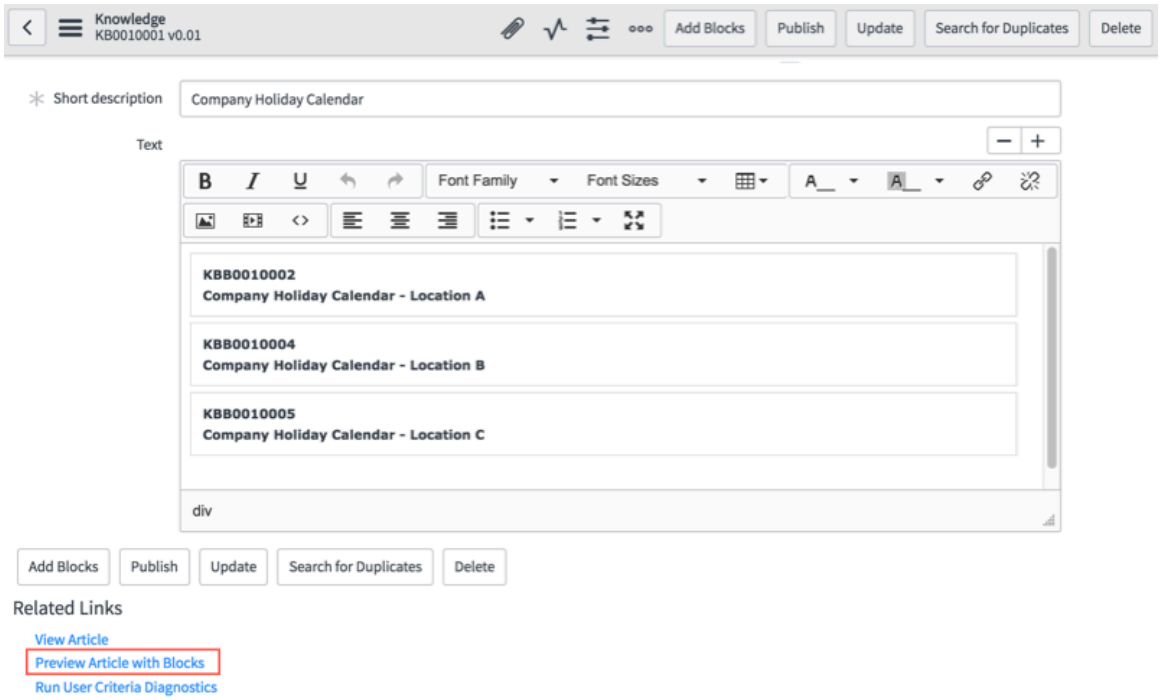

4. Preview the article as one of the following.

Knowledge blocks authoring in Agent Workspace

Reuse content by creating, editing, and publishing knowledge blocks in Agent Workspace.

You can perform the following knowledge blocks-related tasks in Agent Workspace:

- Create a knowledge block for a knowledge base.
- Manage all unpublished and published knowledge blocks authored by you.
- Add knowledge blocks to a knowledge article.

  When adding a knowledge block to a knowledge article, you can also add knowledge blocks to any fields associated with an article template if used for an article.

- Retire a knowledge block not used in any knowledge articles.

View a knowledge block in Agent Workspace

View a knowledge block in Agent Workspace, including the block number, short description, and block content.

Before you begin

You must have read access to the knowledge base that stores the knowledge block you want to view.
Role required: agent_workspace_user and knowledge

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. View knowledge blocks authored by you or by other people.
   - View all blocks by navigating to **Lists** > **Knowledge Blocks** > **All**.
   - View blocks authored by you by navigating to either **Lists** > **Knowledge Blocks** > **Published** or **Lists** > **Knowledge Blocks** > **Unpublished**.

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3. Click the link to the knowledge block that you want to view.
4. **Optional:** View another version of the knowledge block by selecting the version in the Version list.

> **Note:**
> The Version list appears only when the article versioning feature is enabled. For more information, see Article versioning.

Result

The selected version of the knowledge block opens within Agent Workspace. Any earlier version of the knowledge block is indicated as outdated. When viewing an earlier version, click the version number of the knowledge block to view a list of all versions.

Related topics

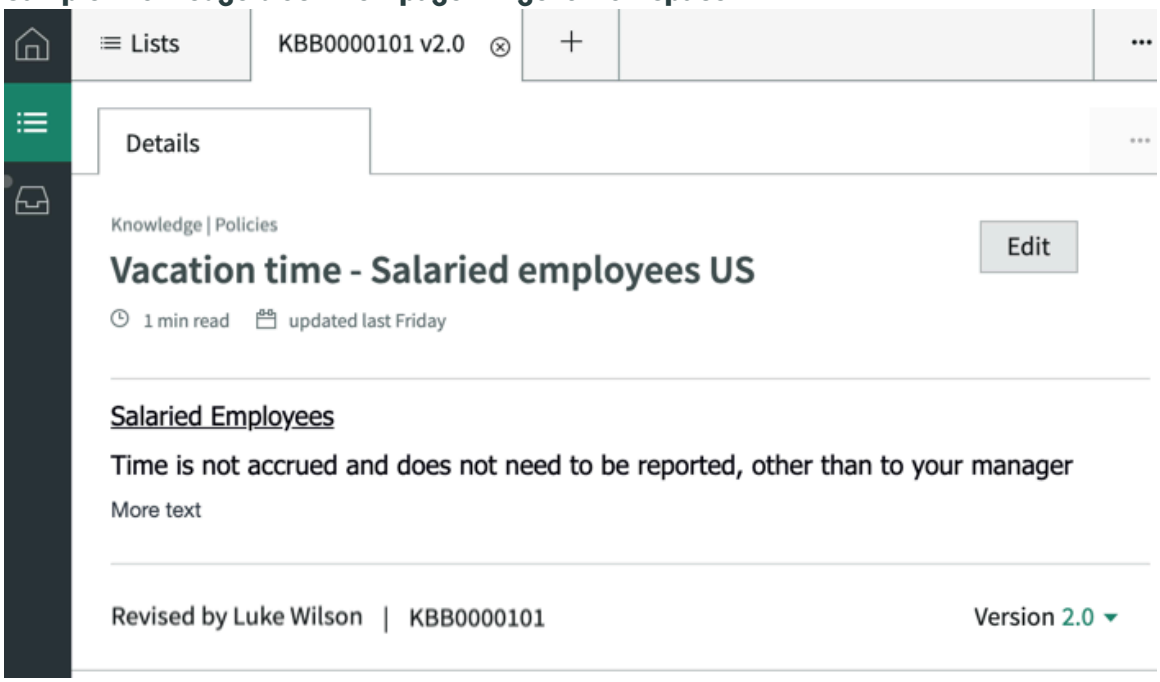
- Knowledge block details displayed in Agent Workspace
- Create a knowledge block in Agent Workspace
- Edit a knowledge block in Agent Workspace
- Publish a knowledge block in Agent Workspace

Knowledge block details displayed in Agent Workspace

View the details of a knowledge block in Agent Workspace.

The knowledge block view page in Agent Workspace provides several details about a displayed block.

Sample knowledge block view page in Agent Workspace



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Article information displayed on the knowledge block view page in Agent Workspace

Details	Description
Knowledge base	Knowledge base that stores the knowledge article and the article category. In the figure, Knowledge is the knowledge base and Policies is the knowledge block category.
Read time	Average time to read the knowledge block, which can help you decide whether you have time to read the block. The read time is calculated based on an average reading speed of 200 words per minute. For blocks in languages such as Chinese, Japanese, and Korean, the read time is calculated based on an average speed of 500 characters per minute. If images are present in an article, the read time is calculated using the following rules: • For the first image add 12 seconds, for the second image add 11 seconds, and so on. • If there are more than 10 images, after the tenth image add 3 seconds for each image.
Last updated time	Last time the knowledge block was updated in number of days for the current week, number of weeks, or number of years.
Knowledge block content	Text and images in the knowledge block.
Authored by	Author of the knowledge block. This field appears only in the first version of a knowledge block.
Revised by	User who revised the knowledge block. This field appears if a knowledge block was later edited.
Knowledge block number	Unique number automatically assigned to the knowledge block. In the figure, KBB0000101 is the block number.
Version	Selected version of the knowledge block. This field appears when the article versioning feature is enabled. In the figure, 2.0 is the selected version of the knowledge block.

Related topics

- View a knowledge block in Agent Workspace
- Create a knowledge block in Agent Workspace
- Edit a knowledge block in Agent Workspace
- Publish a knowledge block in Agent Workspace

Create a knowledge block in Agent Workspace

Create a knowledge block for a knowledge base in Agent Workspace to reuse a piece of content in knowledge articles in that knowledge base.

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Before you begin

- Enable the knowledge blocks feature for the knowledge base where you plan to create blocks. For more information, see Enable knowledge blocks for each knowledge base.
- You must have contribute access to the knowledge base within which you want to create the knowledge block.

Role required: agent_workspace_user and knowledge

About this task

You can also create blocks when accessing an article panel. For more information, see Add a knowledge block to a knowledge article in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. **Optional:** Check whether a knowledge block on this subject is already available.
   a. Navigate to **Lists** > **Knowledge Blocks** > **All**.
   b. Set a filter to search for possible matching knowledge blocks.
      - Click a column header. Based on the data type included in the column, in the Filter section, select the filter options or enter the filter conditions you want to apply. For example, for the Workflow column, you can select the following states:
        - Draft
        - Review
        - Scheduled for publish
        - Published
        - Pending retirement
        - Retired
        - Outdated
      - Click the show filter panel icon (), and click **Advanced view**. In the Advanced view dialog box, specify conditions in the **All of these conditions must be met** field and click **Update**.
3. Click **New** in a Knowledge Blocks list.
4. On the Knowledge Block form, fill in the fields.

Field	Description
Number	Unique number for identifying the knowledge block. This field is automatically populated.
Knowledge base	Name of the knowledge base to which you are adding the knowledge block.
Category	Name of the knowledge category or subcategory associated with the knowledge base.

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Field	Description
Ownership Group	Ownership group for the knowledge block. This field appears when the ownership groups feature is enabled (see Ownership groups). **Note:** Knowledge blocks can be used without the ownership groups feature.
Can Read	User criteria to apply for read access at the knowledge block level. **Note:** User criteria set at the knowledge base and knowledge block level control which users can read block content within an article. (For more information, see Select user criteria for a knowledge block.)
Cannot Read	User criteria to apply for cannot read access at the knowledge block level. **Note:** User criteria set at the knowledge base and knowledge block level controls which users can read block content within an article. (For more information, see Select user criteria for a knowledge block.)
Valid to	Date that the knowledge block expires. Once the valid to date has passed: ○ The Knowledge article view page no longer displays expired knowledge block content in the associated knowledge article. ○ Knowledge article searches no longer return knowledge articles if the keywords are contained only in the expired blocks.
Short description	Description of the knowledge block.
Article body	Content of the knowledge block.
Version	Version number of the knowledge block. This field is automatically set to a version number when the article versioning feature is enabled. **Note:** Knowledge blocks can be used without the article versioning feature. To learn more about article versioning, including how to disable the feature, see Article versioning.
Article type	Markup language used for formatting the block. This field is automatically set to HTML because

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Field	Description
	Note: knowledge blocks are supported only with HTML knowledge articles.
Workflow	Publication state of the block. This field is automatically set to the publication state of the block, such as Draft, Published, or Retired.

Note: You can ignore the **Source Task** field, which is not used.

5. Click **Save**.
   The knowledge block is saved and appears in the Unpublished list of Knowledge Blocks in Agent Workspace and additional functionality becomes available on the form.
6. **Optional:** Publish the block by clicking **Publish**.

   (Optional) A knowledge block is published depending on the workflow setting of its knowledge base.

   - **Knowledge - Instant Publish**: The knowledge block is immediately published.
   - **Knowledge - Approval Publish**: The knowledge block is published on approval completion.

   When published, your knowledge block appears in the Published and All lists under Knowledge Blocks in Agent Workspace. If the article versioning feature is enabled, the version number of the knowledge block is incremented.

Related topics

Edit a knowledge block in Agent Workspace

Edit a knowledge block in Agent Workspace

Edit knowledge blocks within a knowledge base in Agent Workspace to update the reused content across articles within the knowledge base.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge block you want to edit. By default, the knowledge block doesn't show attached files and it only shows as a link.
Role required: agent_workspace_user and knowledge

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Blocks** > **All**.
3. Click a knowledge block link.
4. Modify the fields on the Knowledge Block form.

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- For an unpublished knowledge block, the Knowledge Block form opens when you select the article.
- For a published knowledge block, click **Edit** to access the Knowledge Block form.

> **Note:**
> If the article versioning feature is enabled, you can edit only the latest version of a knowledge block. Click **Checkout** after you click **Edit**.

5. Click **Save**.
   The knowledge block is saved and appears in the Unpublished list under Knowledge Blocks. If the article versioning feature is enabled, the version of the knowledge block is incremented by 0.01.
6. **Optional:** Publish the knowledge block by clicking **Publish**.
   The knowledge block is published depending on the workflow setting of its knowledge base.
   - **Knowledge - Instant Publish**: The knowledge block is immediately published.
   - **Knowledge - Approval Publish**: The knowledge block is published on approval completion.

   When published, your knowledge block appears in the Published and All lists under Knowledge Blocks in Agent Workspace. If the article versioning feature is enabled, the version number of the knowledge block is updated to the next whole number (for example, from 2.02 to 3.0).

Publish a knowledge block in Agent Workspace

Publish a knowledge block to make it available to add to knowledge articles.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge block you want to publish.
Role required: agent_workspace_user and knowledge

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Blocks** > **Unpublished**.
3. Click a knowledge block link.
4. On the Knowledge Block form, click **Publish**.

Result

A knowledge block is published depending on the workflow setting of its knowledge base.

- **Knowledge - Instant Publish**: The knowledge block is immediately published.
- **Knowledge - Approval Publish**: The knowledge block is published on approval completion.

When published, your knowledge block appears in the Published and All lists under Knowledge Blocks in Agent Workspace. If the article versioning feature is enabled, the version of the block is incremented.

Related topics

View a knowledge block in Agent Workspace

Approve a knowledge block in Agent Workspace

Approve a knowledge block that is awaiting your review in Agent Workspace.

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Before you begin
Role required: agent_workspace_user and knowledge

Procedure
1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Blocks** > **Unpublished**.
3. Click a knowledge block link that is in the **Review** workflow state.
4. Click **Edit**.
5. In the Approvals related list, in the **State** column, click **Requested**.
   The Approval form opens in another tab within Agent Workspace.
6. From the State list, select **Approved**.
7. Click **Save**.

Result
The approved knowledge block is published immediately. If the article versioning feature is enabled, the version number of the knowledge block increments to the next whole number (for example, from 2.02 to 3.0). On the Knowledge Block form, the workflow state changes to **Published**. The new published version of the knowledge block is added to the Block Versions related list on the Knowledge Block form. The version is also available in the All list under Knowledge Blocks in Agent Workspace, go to **Knowledge Blocks** > **All**.

Add a knowledge block to a knowledge article in Agent Workspace

Add a knowledge block to a knowledge article in Agent Workspace.

Before you begin
- Both the knowledge article and the knowledge block must be in the same knowledge base.
- You must have contribute access to the knowledge base.
- Ensure that the knowledge blocks feature is enabled for the knowledge base that the article is in. For more information, see Enable knowledge blocks for each knowledge base.

Role required: agent_workspace_user and knowledge

Procedure
1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Articles** > **All**.
3. Click an existing article link.
   For more information, see Edit a knowledge article in Agent Workspace.

   Note:
   - Knowledge blocks are supported only with HTML knowledge articles. Make sure that the **Article type** field is set to **HTML**.
   - If a knowledge article uses an article template, you can add knowledge blocks to any fields associated with the article template.

4. In the contextual side panel, click the add blocks icon ().
5. Search for the article to which you want to add the knowledge block.
   To use condition builder with advanced search, see Condition builder .
6. Click **Insert** to add the knowledge block to the article.

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If there are no knowledge blocks, click **Create New Block** and follow the procedure to create another block. For more information, see Create a knowledge block in Agent Workspace.

7. Click **Update** to save your changes.

> **Note:**
> You can preview the article with the blocks. For more information, see Preview a knowledge article with knowledge blocks in Agent Workspace.

8. Click **Publish** to publish the article.

The knowledge article is published depending on the workflow setting of its knowledge base. For more information, see Publish a knowledge article in Agent Workspace.

Preview a knowledge article with knowledge blocks in Agent Workspace

Preview a knowledge article with knowledge blocks in Agent Workspace.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article.
Role required: agent_workspace_user and knowledge

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Articles** > **All**.
3. Select the article in which you want to preview a knowledge block and click **Edit**.
4. Click **Preview with Blocks**.
   The article edit page refreshes to show options for previewing a knowledge block.
5. **Optional:** Click **Show Blocks** to highlight the knowledge blocks added to the article.
6. Click **OK**.

Retire a knowledge block in Agent Workspace

Retire a published knowledge block if you no longer want it to be available for users to view or search.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge block you want to retire.
Role required: agent_workspace_user and knowledge

About this task

You can retire knowledge blocks only if they are not used in any knowledge articles.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Articles** > **Published**.
3. Select the knowledge block you want to retire.
4. Click **Edit**.
5. Click **Retire**.

Result

The knowledge block is retired depending on the workflow setting of its knowledge base.

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- **Knowledge - Instant Retire**: The knowledge block is immediately retired.
- **Knowledge - Approval Retire**: The knowledge block is retired on approval completion.

When retired, your knowledge block no longer appears in the Published list under Knowledge Blocks in Agent Workspace.

Integrating a custom search or knowledge article viewer with knowledge blocks

If you are using a custom search or knowledge article viewer with your application, you can integrate that custom search or viewer with the appropriate knowledge or knowledge blocks API.

Note:
Integration is only necessary if you are using a custom search or knowledge article viewer.

KBPortalServiceImpl - Global

The `KBPortalServiceImpl` API is included with Knowledge Management V3 [com.snc.knowledge3] as a script include. It provides methods to use with knowledge, such as integration with a custom search.

KBPortalServiceImpl - KBPortalServiceImpl()

Instantiates a KBPortalServiceImpl object in a global application.

Parameters

Name	Type	Description
None		

KBPortalServiceImpl - getResultData(Object request)

Returns search results based on keywords from the knowledge article and from relevant knowledge block content that the user has access to read.

If you have activated the knowledge blocks feature and are using a custom search for knowledge with your application, your search may not return relevant articles when keywords are contained in the blocks. To return search results based on keywords from the article and from relevant block content that the user has access to read, you must call the `getResultData()` method inside your custom search.

Parameters

Name	Type	Description
request	Object	JSON object to refine the search.

Returns

Type	Description
Object	Array of search results in JSON format based on keywords from the knowledge article and from relevant knowledge block content that the user has access to read.

Example: Integrating a custom search with knowledge blocks

```
function doKeywordSearch(queryText, count, queryLocation) {
  var results = [];
```

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```
 // To set up the request.
 var request = {
   keyword: queryText,
   language: "",

   // To pass data to filter on different metadata.
   variables: {
     kb_knowledge_base: ['Knowledge'],
     kb_category: '',
     author: ['']
   },

   // Provide the following.
   context: gs.getProperty('glide.knowman.sp.search_context',
'Knowledge Search'),
   resource: 'Knowledge',
   order: "relevancy,true",

   // Provide the pagination variables.
   start: queryLocation,
   end: queryLocation+count,

   attachment: false,

   // Provide any additional metadata you want to include in
your results.
   knowledge_fields: [
     "number",
     "sys_id",
     "published"
   ]
 };

 // To execute the search.
 var response = new KBPortalServiceImpl();
 response.getResultData(request);

 // To send the search results back to the UI or to store
results in your object.
 for (var i = 0; i < response.results.length; i++) {
   result = response.results[i];
   var article = {};
   article.sys_id = result.meta.sys_id.display_value;
   article.number = result.meta.number.display_value;
   article.short_description = article.short_description;
   article.title = result.title;
   article.published = result.meta.published.display_value;
   article.publishedUTC = result.meta.published.display_value;
   article.text = article.text;
   article.score = result.meta.score;
   article.label = article.short_description;
   article.shortDescription = article.short_description;
   results.push(article);
 }
```

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```
  return results;
}
```

KBBlock - Global

The `KBBlock` API is included with knowledge blocks [com.snc.knowledge_blocks] as a script include. It provides methods to use with the knowledge blocks feature, such as integration with a custom knowledge article viewer.

KBBlock - KBBlock()

Instantiates a KBBlock object in a global application.

Parameters

Name	Type	Description
None		

KBBlock - getArticleContent(GlideRecord knowledgeRecord)

Gets knowledge articles with relevant knowledge block content that a user has access to read.

If you have activated the knowledge blocks feature and are using a custom knowledge article viewer with your application, your viewer may not display articles that expand the relevant block content. To expand block content that a user has access to read, you must call the `getArticleContent()` method inside your custom viewer.

Parameters

Name	Type	Description
knowledgeRecord	GlideRecord	GlideRecord of the knowledge article to display.

Returns

Type	Description
String	Knowledge article with relevant knowledge block content that a user has access to read.

Example: Integrating a custom knowledge article viewer with knowledge blocks

```
// This function returns the article text with expanded block
 content.
function getArticleText(kbSysId) {
  var knowledgeRecord = new GlideRecord('kb_knowledge');
  var kbText='';
  if(knowledgeRecord.get(kbSysId)) {
    if(new
 GlidePluginManager().isActive('com.snc.knowledge_blocks')) {
      kbText = new KBBlock();
      kbText.getArticleContent(knowledgeRecord);
    }
    else
      kbText = knowledgeRecord.getValue('text');
    }
  return kbText;
```

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```
}

// This is an example of how to call the function defined above.
var kbText = getArticleText('01a1ca5b6710130038876c3b5685efd3');
```

Use knowledge subscriptions

Use knowledge subscriptions to receive email notifications about new articles and article revisions or comments.

Subscribe to a knowledge base

Subscribe to a knowledge base and receive notifications when articles are added to that knowledge base.

Before you begin

You must activate the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin. For more information, see Configure knowledge subscriptions.

Role required: knowledge

About this task

Users can subscribe to a knowledge base from either the Knowledge Management v3 user interface or the Knowledge Management Service Portal.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Homepage**.
2. Click the **Subscribe** link on the knowledge base tile.
   The link changes to **Subscribed** and includes a check mark.

Result

Receive notifications when articles are added to the subscribed knowledge base.

Unsubscribe from a knowledge base

Unsubscribe from a knowledge base.

Before you begin

Role required: knowledge

About this task

Users can unsubscribe from a knowledge base from either the Knowledge Management v3 user interface or the Knowledge Management Service Portal.

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Note:
If you subscribe to an article and then subscribe to the knowledge base, unsubscribing from the knowledge base also unsubscribes you from the article.

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Homepage**.
2. Point to and click the **Subscribed** link on the knowledge base tile, which toggles to **Unsubscribe**.
   After unsubscribing you from the knowledge base, the link toggles to **Subscribe**.

Subscribe to a knowledge article

Subscribe to a knowledge article within a knowledge base to receive email notifications about new articles and article revisions or comments.

Before you begin
Role required: Check with your admin

About this task
Users can subscribe to a knowledge article from either the Knowledge Management V3 user interface or the Knowledge Management Service Portal.

Note:

- Users who are already subscribed to a knowledge base are also subscribed to the articles within that knowledge base.
- To subscribe to articles from the base service portal (`https://<instance name>/sp?`), you must navigate to the Knowledge Management Service Portal pages (for example, `https://<instance name>/sp?id=kb_home`) from the base service portal.
- To manage the knowledge subscription for knowledge base and knowledge article, see Manage knowledge subscriptions.
- Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Homepage**.
2. Click **Subscribe** at the top of the knowledge article.
   The system shows an information message about the article subscription and the button toggles to **Subscribed**. If the email notification contains an article link, the link points to the Knowledge Management Service Portal. The email notification for a subscribed article includes the knowledge article ID, short description, and link to the article.

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Unsubscribe from a knowledge article

Unsubscribe from a knowledge article.

Before you begin
Role required: knowledge

About this task
Users can unsubscribe from a knowledge article from either the Knowledge Management v3 user interface or the Knowledge Management Service Portal.

Note:
If you are subscribed to a knowledge base and you unsubscribe from an article in that knowledge base, you must also unsubscribe from the parent knowledge base.

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Homepage**.
2. Point to and click **Subscribed**, which toggles to **Unsubscribe**.
   If you are subscribed to the knowledge article, this action results in an information message that the article subscription has been removed. If you are also subscribed to the parent knowledge base, proceed to the next step.
3. If you are subscribed to the parent knowledge base, click **Yes** on the Unsubscribe pop-up window.
   This action results in an information message that the knowledge base subscription has been removed.

Manage knowledge subscriptions

Manage knowledge base and knowledge article subscriptions from the Notification Settings page.

Before you begin
Role required: knowledge

About this task
Users can manage knowledge subscriptions from the Knowledge application or from the Knowledge Management Service Portal.

Procedure

1. Navigate to the Notification Settings page.
2. Click the Subscriptions tab.
3. Click **Knowledge Base** or **Knowledge Articles** to see a list of current subscriptions.
4. To unsubscribe from a knowledge base or knowledge article, click **Subscribed**.
   The link toggles to **Unsubscribed**.

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Use translation management

Use translation management to create and manage translation tasks.

Create translation assignments for knowledge articles

Assign knowledge articles to language experts to ensure accurate translations. Identify the language experts and create assignment rules so that translation tasks are automatically assigned to language experts and groups.

Before you begin

Role required: knowledge_admin or admin

About this task

Translation tasks are automatically assigned once the assignment rules are created. Assignment rules are applied only if a task is not already assigned to another user or group.

Procedure

1. Navigate to **All** > **Knowledge** > **Translation Management** > **Translator Mapping**.
2. Click **New** to create a new assignment rule.
3. Enter a name for the assignment rule in the **Name** field.
4. In the **Applies To** tab, choose the task type you want to assign by setting a condition.
   a. Select the **Knowledge Translation Task [kb_translation_task]** table from the **Table** drop-down list.
   b. Set a condition for assigning tasks in the **Conditions** field.
   For example, to assign tasks for translation into English, you would set the condition to**[Translated language][is][English].**
5. In the **Assign To** tab, select the user or group you want to assign the task to.
6. **Optional:** Click the **Script** tab to enter a script to further customize the assignment rule.
7. Click **Submit**.

Result

An email notification is sent to the user or group that has been assigned the task with a link to the translation task and source article.

Auto-create translation tasks

Auto-create translation tasks in specified languages to avoid having to manually create translation tasks after an article is published. The available languages are determined by the language plugins that have been installed on your instance.

Before you begin

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Select an existing knowledge base.
3. Display the languages you have installed by clicking the lock icon to unlock the **Languages** field.
4. Select the languages for which you want to create tasks from the drop-down list.

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5. Select **Auto-create translation tasks**.
6. Click **Submit**.

What to do next

Open a knowledge article and access the Knowledge Translation Tasks related list to view the associated translation tasks.

Bulk Translation for knowledge articles

Perform bulk translations of knowledge articles in multiple languages using the Localization Framework application.

The Bulk Translations feature extends the localization service in Knowledge Management to support customers across geographies by localizing knowledge articles in the language they speak. You can select multiple knowledge articles and translate them into different languages by using the ServiceNow® Localization Framework application. Once the translation process is complete, you can access the translated article from the Knowledge [kb_knowledge] table. You can request translations for up to 200 articles at a time.

Translation workflow

You can define a workflow to determine the actions required to complete a translation. For information, see Workflows in the Localization Framework .

Preferences configuration

Through preferences, define the translations, workflow, and project preferences to request translation for activated languages. For more information, see Configure the Localization Framework preferences .

Artifact configuration

The Knowledge artifact is included in the Artifact Configurations [sn_lf_config] table and is active by default. For more information, see Localization Framework support for Knowledge Base .

Translation validations

Translation validation enables you to review and manage the translation request before submitting knowledge articles for translation. The validations to be executed are:

- The requested language is allowed in the knowledge base.
- Blocks used in the article have translations present in the target language.
- Source articles are not in the retired or outdated state.
- The article's source language is different from the requested language.
- The source article shouldn’t be a translated article.
- The total number of selected articles is less than 200.

Use Bulk Translation for manual translation

Translate knowledge articles into different languages through bulk translations.

Bulk Translation uses the ServiceNow® Localization Framework application, which enhances the translation process of knowledge artifacts through configurable workflows. You can select multiple knowledge articles and the preferred language into which you want to localize your content.

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Request bulk translations for multiple knowledge articles

Request translations for multiple knowledge articles through Bulk Translations to localize them into one or more languages.

Before you begin

Add a custom Localization Framework setting to enable bulk translations.

Role required: Localization requester to request translations

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. Select the articles you want to translate.
3. Select **Request Translations**.

   Note:
   . Check the validation list to ensure that all articles to be translated have been validated. For more information, see Bulk Translation for knowledge articles.

4. In the **Request Translations** dialog box, select the languages into which you want to translate the articles.
5. Select **Submit**.

Result

Localization tasks are created for the selected items in all the selected languages. A success message with a link to the list of requested items is displayed. Select the link to see the list of requested items.

Translate multiple knowledge articles into different languages

Translate multiple knowledge articles to localize your content into different locales.

Before you begin

- Add a custom Localization Framework setting to enable bulk translations.
- Request bulk translations for multiple knowledge articles.

Role required: Localization fulfiller to fulfill translation request

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Translations** > **My translation request**.
2. On the Localization Request Items page, select the gear icon ( ) to add the **Localization task** to your task list.
3. Open any localization task.
4. On the Localization Task page, select **Translate** in the form header.
   A two-column comparison UI page displays a **Source Language** column on the left and **Target Language** column on the right. You can set the display as follows:
   - Select **Expand all** to expand all the groups on the comparison UI.
   - Select **Collapse all** to collapse all the groups on the comparison UI.
   - Select **Show groups with missing translations** to see only the groups that have missing translations when the content is translated.

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5. In the comparison UI page, copy the content from **Source Language** column and paste it in **Target Language** column.
6. Repeat the copy and paste process for each listed article.
7. Select **Publish Translation**.
8. In the **Publish Translations** dialog box, select **Publish Translations**.

Result
The selected articles are translated into the selected languages and marked as version 0.01. The articles can be accessed from the Knowledge [kb_knowledge] table.

Use Bulk Translation for Dynamic Translation

Translate knowledge articles into different languages using machine translations.

Dynamic Translation for Bulk Translation translates knowledge articles content in real-time and offers a seamless localization experience to your customer. With the help of language translator, dynamic translation automatically detects the language of the user-entered texts and displays translated text in the comparison UI page.

Translate knowledge articles using Dynamic Translation

Use machine translation to automatically translate knowledge articles into different languages.

Before you begin
Add a custom Localization Framework setting to enable machine translation.

Role required: Localization requester to request translations

About this task
Dynamic Translation uses the ServiceNow® Localization Framework to translate knowledge articles into different locales without any manual intervention.

Procedure
1. Navigate to **All** > **Knowledge** > **Articles**.
2. Select the articles you want translated.
3. Select **Request Translations**.

> **Note:**
> .Check the validation list to ensure that all articles to be translated have been validated. For more information, see Bulk Translation for knowledge articles.

4. In the **Request Translations** dialog box, select the languages into which you want the articles translated.
5. Select **Submit**.
   Dynamic Translation automatically initiates a translation process and creates a translated article.

Result
The selected articles are translated in selected languages and marked as version 0.01. The article can be accessed from the Knowledge [kb_knowledge] table.

Translate a knowledge article from a translation task

Start translating articles once they are published and assigned to you for translation.

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Before you begin

- Activate the Dynamic Translation plugin (com.glide.dynamic_translation).
- Enable the *glide.knowman.translation.enable_translation_task* property. For more information, see Translation management.

Role required: admin, knowledge_admin, or knowledge

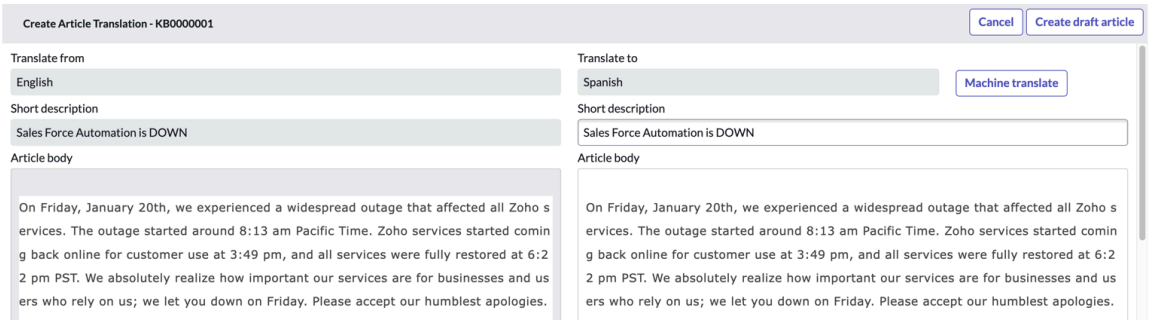
About this task

Note:
This procedure has been superseded by the Localization Framework. For more information see Localization Framework support for Knowledge Base. This information is provided for legacy context.

For information about how administrators configure the translation API, see DynamicTranslation API.

Procedure

1. Navigate to **All** > **Knowledge** > **Translation Management** > **My Assigned Tasks**.
2. In the Knowledge Translation Tasks page, select one of the listed translation tasks assigned to you.
3. Select **Translate**.
   The **Translate from** and **Translate to** panes are side-by-side for easy comparison, as shown in the following figure.



4. Select **Machine translate** to automatically translate to the targeted languages.
5. Select **Create draft article** to create a draft version of the translated article.
   If a translated article is already present for that language, a new draft version overwrites the existing translated content.
6. Select **Publish**.

Note:
By default, the translated version is always created as v1.0 so that the parent version remain same for all the translated versions. For more information, see Translated KB articles always show Parent version 1.0 regardless of version used for translation.

Result

The newly created draft is listed in the **Translated Versions** tab.

Translate knowledge blocks within an article

If a selected article indicates that a knowledge block is missing a translation, you must translate the knowledge block before you can translate the article.

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Before you begin
Role required: translator

Procedure

1. Navigate to **All** > **Knowledge** > **Translation Management** > **My Assigned Tasks**.
2. In the Knowledge Translation Task page, select a translation task and click **Translate**.
   A message stating that the knowledge article contains one or more knowledge blocks that have missing translations is displayed.
3. Click on the link in the message to view the list of blocks that require translation.
4. Click the block that requires translation and click **Translate**.
   The newly translated blocks appears in the **Translated Block Versions** related list.

Related topics

Add knowledge blocks to a knowledge article

Request missing translations for available languages

Manually create translation tasks if an article does not have translation tasks created for all the languages you have configured.

Before you begin

- Role required: none
- Verify that the *glide.knowman.translation.enable_translation_task* property is set to true.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Published**.
2. Select an article from the list of published articles.
3. Click the **Request translations** related link.
4. Select the languages from the list that are unselected, which indicates they do not have associated translation tasks.
5. Click **Submit**.

Result
The translation tasks for the languages are created and listed in the Knowledge Translation Tasks tab.

Work on a feedback task

You can change the state of a task and resolve or reassign tasks generated by article feedback.

Before you begin
Role required: knowledge

About this task

- If no ownership group is assigned to the article, the feedback task is available to you as the author or reviser of the article.
- If an ownership group is assigned to the article, a feedback task is assigned to you as an ownership group manager. As a manager, you can reassign the task to another group member. All group members see the feedback task in **All Open Tasks**. As a group member, you can reassign the task to yourself to appear in **My Assigned Tasks**.

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Procedure

1. Navigate to **All** > **Knowledge** > **Feedback Management** > **My Assigned Tasks**.
2. Select a feedback task.
3. Review the feedback given by the submitter.
   When a feedback task is generated, the information in the article feedback form is copied to the feedback task form as follows:

Feedback task form field	Information from article feedback form
Reason	The selected reason for the feedback.
Description **Note:** If feedback is negative and the **Details** field is left blank, this field indicates whether the article was not helpful or rated poorly.	Text in the **Details** field.

4. To work on the feedback task:

Track the progress on a feedback task

Monitor open and closed feedback tasks and track the duration of time a feedback task remains in each state.

Before you begin

Role required: Owner of the knowledge base, knowledge_manager, knowledge_admin, or admin

Procedure

1. Navigate to the open or closed tasks you want to track.
2. In the **Knowledge Feedback Task Metrics** related list section, select a feedback task metric to view the start and end time and the duration of the feedback task.

Note:

- If you are a knowledge administrator, you can view the feedback tasks and task metrics of articles in the knowledge bases. If you are a knowledge owner or knowledge manager, you can view feedback tasks and task metrics of all articles in the knowledge bases you own or manage.
- You may need to configure the form to add **Knowledge Feedback Task Metrics** in the related list section. For more information, see Add a related list to a form.
- The feedback task state is unaffected by changes in the article state. Therefore, when the article is retired, the feedback owner or group assigned to the feedback task has to close or resolve the feedback task.

Use Article Quality Index

Use article quality index (AQI) to assess the quality of knowledge articles.

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Create an AQI checklist

Create a checklist of questions that reviewers can use to evaluate the quality of knowledge articles.

Before you begin

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Article Quality Index** > **AQI checklists**, and click **New**.
2. Fill in the following fields:

Field	Description
Checklist	Name for the checklist.
Description	Description for the checklist.

3. Right-click the form header and click **Save**.
4. In the **Checklist Questions** related list, add questions to the checklist.
   Add questions and adjust the weight of the questions until the combined weight of all questions is equal to 100. The weight defines the score that is added to the total AQI review score of the article when the answer for that question is set to **true**. The maximum score that can be applied to an article in an AQI review is 100.

   Note:
   The default AQI pass score is 70. You can change the pass score in the Article Quality Index properties.

   To add a question:

   a. Click **New**.

   b. Fill in the following fields:

Checklist Question form

Field	Description
Question	Text for the question to evaluate articles.
Description	Short description for the question.
Order	Value for the display order of questions in the checklist. The lower the value in the **Order** field, the higher the question displays in the checklist.

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Field	Description
	Note: Before you assign a value for the display order, think about how many questions you would create for the checklist. For example, if you have five questions in a checklist, you can assign the value in increments of 20. This ensures that you have enough values to assign if you add questions to the checklist later.
Weight	A value for the question to score the article quality. This value is added to the AQI score when the answer for the question is set to **true**. **Note:** ▪ The combined weight of all questions cannot exceed 100. ▪ The sum of weights of all questions in a checklist must be equal to 100 to be assigned to a knowledge base.

c. Click **Submit**.

5. After you finish adding questions to the checklist, click **Update** on the AQI Checklist form.

What to do next
After you create a checklist, assign it to a knowledge base.

Assign an AQI checklist to a knowledge base

Before a knowledge reviewer can start performing the AQI review, you must assign an AQI checklist to a knowledge base.

Before you begin
You can only assign a checklist to a knowledge base when the weight of all questions in the checklist is equal to 100. Each knowledge base can have one assigned checklist. However, a checklist can be assigned to more than one knowledge base.
Role required: knowledge_admin or admin

About this task

Procedure
1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Click a knowledge base to which you want to assign a checklist.
3. On the Knowledge Base form, click the search icon in the **Checklist** field and select the AQI checklist to apply.
4. Click **Update**.

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What to do next
After you assign an AQI checklist to a knowledge base, you can start performing AQI reviews.

Remove an AQI checklist from a knowledge base

Before you can edit a checklist that is assigned to a knowledge base, you must remove it from the knowledge base.

Before you begin
A checklist with pending AQI reviews cannot be removed from the knowledge base until all AQI reviews associated with the checklist are complete.
Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Click a knowledge base from which you want to remove a checklist.
3. On the Knowledge Base form, delete the name of the AQI checklist from the **Checklist** field.
4. Click **Update**.

Delete questions from an AQI checklist

Deleting a question in a checklist deletes the text in the question of previously performed AQI reviews that use the checklist. Deleting an AQI question from a checklist will not affect the score of the previously performed AQI reviews. However, the text of the question will not be displayed in the checklist.

Before you begin
You can delete questions from a checklist if the following conditions are met:

- The checklist is not attached to a knowledge base. For more information, see Remove an AQI checklist from a knowledge base.
- There are no AQI reviews using the checklist in progress.

Role required: admin

Procedure

1. Navigate to **All** > **Knowledge** > **Article Quality Index** > **AQI checklists**.
2. Click the AQI checklist from which you want to delete one or more questions.
3. In the Checklist Questions related list, select the check box next to the questions that you want to delete.
4. From the **Actions on Selected Rows** choice list, select **Delete**.
5. In the Confirmation window, click **Delete**.

Perform the Article Quality Index review

Perform the Article Quality Index (AQI) review to evaluate the quality of the article.

Before you begin
The knowledge base must have an assigned AQI checklist.
Role required: knowledge_domain_expert, knowledge_coach, knowledge_admin, or admin

About this task
Configure the *glide.knowman.aqi.article_workflow_states* property to set the article workflow states where you could perform AQI reviews. You can perform several AQI

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reviews for an article. If you perform several AQI reviews for the same version of the article, the latest AQI score appears in the **Latest AQI** field in the article.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** and click **Published**.
2. Click an article link.

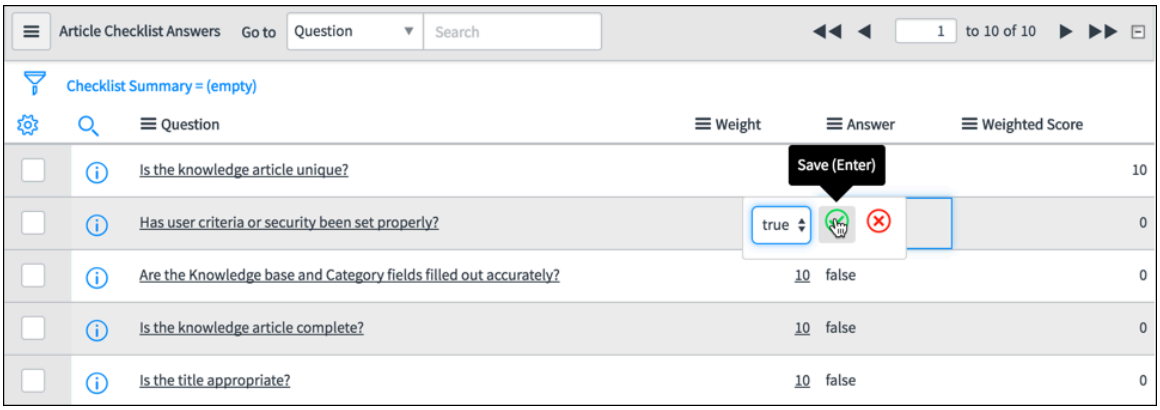
   Note:
   To read the article and perform the AQI review simultaneously, open the article in two separate tabs or window in your browser. You can then read the article from one tab or window and perform the AQI from another tab or window.

3. Perform the AQI review.

4. In the **Article Checklist Answers** related list, read the questions and evaluate which ones are true.

   Double-click the **Answer** cell for each question that is true, select **true**, and select the green check mark.

   Note:
   The associated **Weighted Score** is applied to the AQI score when the answer is set to **true.**



   Note:
   - If you perform several AQI reviews for the same version, the latest AQI score appears in the **Latest AQI** field in the article.
   - If you're using Knowledge Management within the Customer Service Management application, you can automatically make knowledge public by running the *`Make KM Service Portal Pages Public`* fix script after you install the Customer Service Management plugin (com.sn_customerservice).

   Standard Pagination - Displays the search results in multiple pages.

   Infinite Scroll - Displays the search results while scrolling.

5. Perform one of the following actions:

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What to do next

To view all the AQI reviews you completed, navigate to **Knowledge** > **My Completed AQI Checklists**.

View all pending and completed AQI reviews

View checklists of all users to monitor the pending and completed reviews.

Before you begin

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Article Quality Index**
2. Do one of the following:
   - To view all completed AQI checklists, select **All Completed AQI Checklists**.
   - To view all pending AQI checklists, select **All Pending AQI Checklists** .

Delete AQI reviews

Delete an AQI review that was created by mistake or is no longer required.

Before you begin

Roles required:

- To delete an AQI in a submitted state: admin or knowledge admin
- To delete an AQI not in a submitted state: knowledge admin or the reviewer who initiated the AQI

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **My Pending AQI Checklists**.
2. Select all checklist reviews you would like to delete.
3. Click **Delete**.

Managing KCS article states

Manage the readiness of KCS articles and comply with regulated information using KCS article states.

For information about the KCS article states, see KCS v6 Practices Guide .

For information about all the KCS roles, see Knowledge Management roles.

Activation information

Activate the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) to enable the use of KCS roles (kcs_contributor, kcs_publisher, and kcs_candidate) and metadata fields for the KCS article state (governance and confidence). For more information, see Activate Knowledge Management KCS Capabilities.

Note:
If you are not an admin and has either kcs_contributor or kcs_candidate roles, you cannot retire an article.

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Article confidence

The confidence state of an article indicates where the article is in its life cycle. Only users with the knowledge_coach, knowledge_admin, kcs_contributor or kcs_publisher role can modify the value of the **Confidence** field.

For articles existing before the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) was activated, the **Confidence** field is automatically set to **None**.

If an article is created after the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) is activated, the **Confidence** field is automatically set based on the workflow state of the article.

Article workflow states and confidence values

Workflow state	Confidence field value
Draft, Review, or Scheduled for publish	Work in Progress
Published	• Validated: For articles published by users with the knowledge_coach, kcs_contributor, or kcs_publisher role. • Not Validated: For articles published by users with a role other than knowledge_coach, kcs_contributor, or kcs_publisher.
Pending retirement or Outdated	Same as in the Published workflow state.
Retired	Archived

Article governance

The governance state of an article indicates which users can manage articles specific to a regulatory requirement, either experience based or compliance based. Users with contribute access to a knowledge article can modify the value of the **Governance** field.

Related topics

Create a knowledge article from an incident in ITSM Agent Workspace

Create a knowledge article in Agent Workspace

Knowledge article creation from an incident

Enable users to quickly and easily reuse information from an incident in a knowledge article.

Perform the following steps to enable creating a knowledge article from an incident. You can create a knowledge article from an incident using Incident KCS Article template. For more information, see Create a knowledge article from an incident using an article template.

Create field mapping from an incident to a knowledge article

Copy information from an incident into a knowledge article by creating custom mapping between the Incident table and the KCS article table.

Before you begin

Role required: admin

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- You must activate the Knowledge Advanced plugin (com.snc.knowledge_advanced).
- You must activate the KCS Article template.
  1. Navigate to **Knowledge** > **Administration** > **Article Templates**.
  2. Set the **Active** field to **true** for the KCS Article template.

Procedure

1. In the filter navigator, type `csm_table_map.list`.
2. Click **New**.
3. In the **Mapping Name** field, enter `Incident KCS Article`.
4. In the **Source Table** field, enter `Incident`.
5. In the **Target Table** field, enter `KCS Article`.
6. Right-click the form header and **Save**.
7. In the **Basic Field Mapping** related list, click **New**.
8. Create mappings for the following fields.

Source Field	Target Field
Sys ID	Source Task
Short description	Short description
Resolution notes	Resolution

Note:
You can create field mappings for more fields, as required.

- In the **Source** field, select the field in the source Incident table that contains the information to be copied to the field in the article template target table.
- In the **Target** field, select the field in the article template target table to which you need information copied to from the field in the source Incident table.

9. To customize when and how the **Knowledge** check box is displayed, click the **Condition** tab.
10. To map fields using advanced scripts, select the **Advanced Field Mapping** check box.
11. On the **Advanced field Mapping** tab, paste in the following code.

```
(function (source,target) {
    // Get the first comments from incident and use it as Issue
 description for article
    var notes = source.comments.getJournalEntry(-1);
    var entries = notes.split("\n\n");
    var comment = "";
    if(entries[entries.length-2]){
        comment = entries[entries.length-2];
        var part = comment.toString().indexOf(")");
        if(part != -1){
comment =
 comment.toString().substring(part+2).replaceAll("\r\n","<br/>
");
    }
    }if(comment)
```

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```
        target.kb_issue = comment;
})(source,target);
```

The first comment on an incident is mapped to the **Issue Description** field in the knowledge article.

Note:
If the same source or target field is configured in both the basic and advanced field mappings, the advanced field mapping overrides the basic field mapping.

If the fields configured in the basic and advanced field mapping are different, the field configurations in the advanced field mapping are appended to the field configurations in the basic field mapping.

Add a property to enable creating knowledge article from incidents

Add a property, which is required to allow users to create a knowledge article from an incident.

Before you begin
Role required: admin

Procedure

1. In the Filter navigator, enter `sys_properties.list`.
2. Click **New**.
3. Fill in the following fields.

System Property form

Field	Description
Name	enable_kcs_incident
Description	Enable Knowledge Centered Services (KCS) for Incident Management.
Type	true|false
Value	true

4. Click **Submit**.

Create a UI action to enable creating knowledge articles from incidents

Create a UI action to add the Knowledge check box to the Incident form.

Before you begin
Role required: admin

Procedure

1. Navigate to **System UI** > **UI Actions**.
2. Click **New**.
3. Fill in the following fields.

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UI Action form

Field	Description
Name	Create Knowledge
Table	Incident
Action name	create_knowledge

4. Select the **Client** check box.
5. Select the **List v3 Compatible** check box.
6. Select the **Form button** check box.
7. In the **Onclick** field, enter `createKnowledgeClient()`.
8. In the **Condition** field, enter `gs.getProperty("enable_kcs_incident") == 'true' && new global.CSMTableMapUtil (current).findMapByName("incident_kcs_article") && new global.KBKnowledge().canCreate()`.
9. In the **Script** field, enter the following code.

```
function createKnowledgeClient() {
    if (g_form.modified) {
        alert(new GwtMessage().getMessage('You have unsaved
 changes. Please save them to continue.'));
    }else{
        //Call the UI Action again but skip the 'onclick'
 function
        gsftSubmit(null, g_form.getFormElement(),
 'create_knowledge');
//MUST call the 'Action name' set in this UI Action
    }
}

//Code that runs without 'onclick'
//Ensure call to server-side function with no browser errors
if (typeof window == 'undefined')
    CreateKnowledgeServer();

function CreateKnowledgeServer(){
    current.update();

    var map = new global.CSMTableMapUtil (current);
    map.findMapByName("incident_kcs_article");
    var targetURL = map.getTargetURL();
        if(targetURL)
        action.setRedirectURL(targetURL[0]);
}
```

Knowledge content migration from v2 to v3

To use the new functionality available in knowledge v3 with legacy articles, you must migrate these articles out of the default knowledge base.

To migrate knowledge content, move articles out of the default knowledge base by changing the **Knowledge Base** value for each article. The state of the article remains unchanged when

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moving articles. After selecting a new knowledge base, assign a category to each article using the category structure defined in the new knowledge base.

After you migrate a knowledge article, the legacy feedback functionality is automatically replaced with the new knowledge feedback mechanisms. Legacy feedback is copied to the Live Feed Message [live_message] table to ensure previously submitted feedback is available for knowledge v3 articles.

Move a knowledge article

You can move articles between knowledge bases.

Before you begin

Role required: User must have contributor access to the knowledge base.

Note:

- When versioning is enabled, and you move an article from one knowledge base to another, the latest version of an article is moved to the new knowledge base. However, the previous versions of the article remain in the old knowledge base. It is recommended to retire the article from the old knowledge base. For more information, see Retire a knowledge article.
- Although you can move an article from one knowledge base to another consider creating an article in new knowledge base.

Procedure

1. Edit a knowledge article.
2. Change the **Knowledge Base** field value.
   After moving an article, the Apply Default Values dialog box prompts you to populate certain fields in the article with default values from the new knowledge base. If the new knowledge base has no default values, the dialog box does not appear.
3. Click **OK** to overwrite fields with the default values, or **Cancel** to leave all fields unchanged.

   A knowledge manager can define default values for articles in knowledge bases you manage using the **Set default knowledge field values** field on the Knowledge Base form.
4. Click **Update**.

Creating and maintaining articles

Share your ideas and experience by creating a knowledge article. Review and provide feedback on knowledge articles, and resolve issues yourselves rather than contacting customer service or an internal helpdesk.

Create a knowledge article

Knowledge contributors can create and edit knowledge articles within a knowledge base to share information across your organization.

Before you begin

To view an article template, you must activate the article templates feature and enable the desired templates.

Role required: knowledge, knowledge_manager, knowledge_admin, knowledge_coach, knowledge_domain_expert, knowledge_group_member, admin. You must have contribute access to at least one active knowledge base.

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About this task

Users with at least one role can create and edit knowledge articles. These users are known as knowledge contributors. Users without any role can read articles and submit feedback, but can't create or edit articles.
Some knowledge bases may allow only certain users to contribute. For example, a member of the IT department can create knowledge articles in the IT knowledge base, such as desktop support information or articles describing company IT processes.

Procedure

1. There are three ways of creating knowledge articles.
   - Navigate to **Self-Service** > **Knowledge** and select the Create an Article icon.
   - Navigate to **Knowledge** > **Articles** > **Create New**.
   - From the Knowledge Management homepage, select the more icon () and then select **Create Article**.
2. On the Create new article page, select a knowledge base.
   The list of article templates to select in the next step is filtered according to the article templates available for the selected knowledge base.

   Note:

   On the Create new article page, you can select to **Switch to older version of this page** or **Switch to updated version of this page (recommended)**.

3. Select an article template.
4. Select **Next**.
   The Knowledge form is displayed based on the article template selected.
5. On the Knowledge form, fill in the fields.

Knowledge form

Field	Description
Number	Number of the article. This field is automatically set to a number. For more information, see Duplicate knowledge article numbers.
Knowledge Base	The knowledge base selected for this article. **Note:** An article can only be associated with one knowledge base. You can change the knowledge base, but only if the selected article template is available in the knowledge base.
Category	The category for this article. Select a **Knowledge Base** before you can select a category. Articles without a category appear on the knowledge homepage in the (empty) category.
Ownership Group	The ownership group for this knowledge article. An ownership group is a group of members and a manager who are responsible for approvals, ensuring article quality, and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they're associated with.

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Field	Description
	Note: If no ownership group is assigned, the article automatically goes to the knowledge administrator and knowledge manager for approval.
Language	Language in which you're creating the article. The list is populated based on the languages enabled for the selected knowledge base.
Schedule publish date	Date in future when the article is published automatically. If approvals are enabled, the approval process must be completed before this date.
Valid to	The date this knowledge article expires. Articles don't appear in search results after the **Valid to** date or if the **Valid to** date is empty. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date that the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is empty, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. For more information, see Validity of a knowledge article. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management. **Note:** If the system date format or user preferences is set to use `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Confidence	Maturity of an article based on its completeness and reusability.
Version	Version of the article. This field appears only when the article versioning feature is enabled. For more information, see Article versioning.
Parent	Number of the article that represents the base language article. This setting keeps translations of the same article related to each other. Consider choosing the same language consistently for the parent article. This field appears only when the I18N:Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated. For more information, see I18N - Knowledge internationalization. **Note:** The **Parent** field contains the first version of the parent article only. This field is used by the translation management feature to maintain the relationship between the source article and its translations.
Article type	The type of article, either HTML or wiki.

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Field	Description
	Note: This field is only visible in the standard template.
Workflow	[Read-Only] The publication state of the article, such as **Draft**, **In Review**, or **Published**. When inserting a new article from an existing article, the state of the new article is reset to **Draft**.
Source	The task this knowledge article was created in response to, if any. This field is set automatically when you create the knowledge article from a task record.
Attachment link	Option for downloading an attached file automatically when a user accesses the article, instead of opening the article view. Add one or more attachments to the article to use this option. **Note:** You may attach multiple files, but most web browsers permit users to download only the first one. To ensure download of all the files, bundle them into an archive, such as with WinZip, and attach the archive. The Attachment link option applies to articles accessed from search links only. Articles accessed as links within other knowledge articles won't replicate this behavior.
Display attachments	Option for displaying attachments to users viewing this knowledge article. Attachments appear below the article text. Add one or more attachments to the article to use this option.
Governance	An attribute of an article that enables you to control sensitive, critical, or regulated information. Not all articles have the same requirement for compliance reviews. Some articles are based on the collective experience of the people who use the articles (experience-based). Other articles have policy or legal information that require tight control (compliance-based).
Short description	The title of the article. This title appears when browsing and searching for a knowledge article, and at the top of the article. You can enter up to 100 characters in this field. **Note:** If contextual search is enabled, the knowledge articles similar to the entered short description text appear in the Knowledge results section.
Article body	Content for the article. A preview of the content appears when browsing and searching for a knowledge article. Use the editing functions in the HTML editor to create content. For more information, see Editing functions for knowledge articles in the HTML editor.
Meta	Tags for optimizing search from external search engines. Separate multiple entries by commas. You may need to configure the form to add this field. For more information, see Configuring the form layout.

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Field	Description
	Note: If AI Search is enabled for the Knowledge Management Service Portal, the tags you add to the **Meta** field aren't indexed. To fine-tune AI Search results, your administrator can configure result improvement rules. For more information, see AI Search in Service Portal.

Note:
The **Confidence** and **Governance** fields appear when the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) is activated. For more information, see Managing KCS article states.

6. To preview the article select the **View Article** link in the Related Links section located below the form.

   Note:

   Viewing the article through this link is only to facilitate a preview of the edited article and, does not add to the actual view count of the article on the document site.

7. **Optional:** To search for similar articles, enter the text in the **Related Search** field or continue with the default text in the Knowledge results section.
   If the Knowledge results section isn't displayed on the Knowledge form, an administrator can configure the form layout to add the **Contextual Search Results** field to the form.
   - To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

     Note:
     This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management to find related articles.

   - To find knowledge articles that match the entered search text, choose **Search Articles**.
8. **Optional:** To view the entire article in a pop-up window, select the link to the article title.
9. Select **Submit** to create the article.
10. **Optional:** Select **Search for Duplicates** for any redundant content in existing articles.
11. **Optional:** Select the link in the **For SEO suggestions on this article, click here** message, if available, to review suggestions for improving your article.
    Suggestions are provided to help you improve the search engine optimization and accessibility of your article, such as removing multiple **Heading 1** or `<H1>` tags. Suggestions are provided for the heading 1 `<h1>`, anchor `<a>`, and image `<img>` tags.
12. **Optional:** Either add to or modify the article details or publish the article.
    - Add to or modify the article details.

      (Optional) For more information, see Edit a knowledge article.

    - Publish the article by selecting **Publish**.

      A knowledge article is published depending on the workflow setting of its knowledge base:

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- **Knowledge - Instant Publish**: The knowledge article is immediately published unless it's scheduled to be published at a later date.
- **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it's scheduled to be published at a later date.

Note:
With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *glide.knowman.ownership_group.enable_self_approval* property. For more information, see Ownership groups.

For more information, see Schedule a knowledge article for publishing.

If an article is visible to a guest user, a message appears that reads `This article may be visible to unauthenticated users after it is published. Do you still want to proceed?`

When published, the knowledge article appears in the Published and All lists. To view the Published list, navigate to **Knowledge** > **Articles** > **Published**. To view the All list, navigate to **Knowledge** > **Articles** > **All**.

If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

What to do next

After saving the article record, you can add tags to organize the article.
After you create and publish a knowledge article, you can perform the following actions related to the article:

- Request translations for the knowledge article. For more information, see Request missing translations for available languages.
- Retire the knowledge article. Select **Retire** to enable the retirement workflow. For more information, see Retire a knowledge article.
- Translate the knowledge article directly from the knowledge article. For more information, see Translate a knowledge article from a translation task.
- Delete the published knowledge article. Select **Delete**. If the **Delete** button isn't displayed, select the more actions icon (), and then select **Delete**.

Note:
Only users with the admin role can delete a published knowledge article.

Related topics

Map related articles

Predictive Intelligence for Knowledge Management

Edit a knowledge article

Edit knowledge articles within a knowledge base to update information shared across your organization.

Before you begin

Role required: knowledge

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About this task

Users with at least one role can edit knowledge. These users are known as knowledge contributors. Users without any role can read articles and submit feedback, but cannot edit articles.

However, knowledge managers can configure User Criteria to restrict access to certain knowledge bases. For example, only members of the IT department can create or edit knowledge articles in the IT knowledge base, such as desktop support information or articles describing company IT processes.

Note:

- If the article versioning feature is enabled, the author cannot edit the article if it is already checked out by the contributor. If the feature is disabled, any users with contribute access to an article can edit the draft version of the article. An administrator can disable the article versioning feature by setting the *glide.knowman.versioning.enabled* property (from the **System Property** [sys_properties] table) to **false**.
- If an ownership group is associated with a knowledge article, the author or reviser of the article can't contribute to the article after the article is published. An administrator can override this behavior by enabling the *glide.knowman.ownership_group.override* property. For more information, see Ownership groups.
- If the *glide.knowman.translation.enable_translation_task* property is enabled, you can't modify the knowledge base of existing articles.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. Select an article from the **Published** or **Unpublished** category.
3. On the Knowledge form, click **Edit**.

   Note:
   If the knowledge article was created using Microsoft Word, you can edit the article only in Microsoft Word. In this case, select **Open in Word** to open the article in Word Online. For more information, see Edit a knowledge article in Microsoft Word.

   If you want to edit the article using the HTML editor, you can unlink the article from Word. For more information, see Unlink knowledge articles from linked Microsoft Word documents.

4. If the article versioning feature is enabled, click **Checkout** for a published knowledge article. You can only edit the latest version of a knowledge article.
5. Click **Update**.
   When you edit a knowledge article, a default value appears in the **Valid to** field. You can select whether to keep or change the default **Valid to** date.

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Note:
If the article versioning feature is enabled, the default value of the **Valid to** date in the updated article version is automatically set based on the following criteria:

- If the **Article Validity** field in the knowledge base associated with the article is blank, the **Valid to** date value from the earlier version of the article is retained.
- If the **Article Validity** field in the knowledge base associated with the article is not blank, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity).

If you move a knowledge article to another knowledge base, the default value of the **Valid to** date in the updated article is automatically set based on the following criteria:

- If the **Article Validity** field in the selected knowledge base is blank, the earlier **Valid to** date value is retained for the knowledge article.
- If the **Article Validity** field in the selected knowledge base isn't blank, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity).

If the dictionary value of the **Valid to** field is modified, this dictionary value overrides the default value of the **Valid to** field calculated according to the **Article Validity** field. For more information, see Validity of a knowledge article.

The article is saved. If the article versioning feature is enabled, the version of the knowledge article is incremented by 0.01. For more information, see Knowledge article version numbers

6. **Optional:** Select the link in the **For SEO suggestions on this article, click here** message, if available, to review suggestions for improving your article.
Suggestions are provided to help you improve the search engine optimization and accessibility of your article, such as removing multiple **Heading 1** or `<H1>` tags. Suggestions are provided for the heading 1 `<h1>`, anchor `<a>`, and image `<img>` tags.
7. **Optional:** Publish the article by clicking **Publish**.
The knowledge article is published depending on the workflow setting of its knowledge base:
   - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
   - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

   Note:
   - With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *`glide.knowman.ownership_group.enable_self_approval`* property. For more information, see Ownership groups
   - If an article is visible to a guest user, a message appears that reads `This article may be visible to unauthenticated users after it is published. Do you still want to proceed?`

   For more information, see Schedule a knowledge article for publishing.

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When published, the knowledge article appears in the Published and All lists. To view the Published list, navigate to **Knowledge** > **Articles** > **Published**. To view the All list, navigate to **Knowledge** > **Articles** > **All**.

If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

Related topics

Article versioning changes

Editing functions for knowledge articles in the HTML editor

Improve the readability and usefulness of knowledge articles by formatting the article text using the HTML editor.

The HTML editor available in knowledge articles uses the built-in TinyMCE editor. The text formatting is preserved when the content is displayed on a portal.

The HTML toolbar within the HTML editor contains an array of icons that enable you to edit and format the body text of your knowledge article. You can also use the HTML Editor to add images, links, audio, and video to the knowledge article.

Note:
Your administrator can configure the HTML toolbar within the HTML editor. For more information, see Customize TinyMCE attributes.

You can perform the following functions using the HTML editor:

- Spell check as you type in the Article body section of a knowledge article.

  The HTML editor automatically checks spelling as you type and underlines spelling and grammar mistakes in red.

- View the style applied to the selected text and the word count from the bottom pane of the HTML editor.
- Apply formatting.
- Paste without formatting.
- Insert tables and modify cells, rows and columns of a table.
- Include HTML content.
- Insert or edit a code snippet.
- Insert a basic table of contents at the cursor's current position.
- Find and replace text.
- Revert changes that you have made during the current session of content editing.

Managing HTML content in knowledge articles

You can manage HTML content in knowledge articles by using the HTML editor.

You can perform the following functions for HTML content in knowledge articles:

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- Insert a hyperlink by using the insert/edit link icon () available on the HTML toolbar. For more information, see Link to a website in HTML fields.
- Insert an image by using the insert/edit image icon () available on the HTML toolbar. For more information, see Embed images in HTML fields.
- Embed a video from the video library, an attachment, or URL by using the insert/edit video icon () available on the HTML toolbar. You can also add videos to the video library. For more information, see Embed videos in HTML fields.
- Copy content from external sources and paste them as simple text into the editor. For more information, see Paste content into the HTML editor.
- View and edit the HTML source code by using the source code icon () available on the HTML toolbar. For more information, see Extended functions.

Note:
To insert or edit a code snippet, see Format a code snippet automatically in knowledge articles.

- Expand the HTML field to use the full form view for easier editing by using the fullscreen icon (). For more information, see Extended functions.

Formatting options for knowledge articles

You can apply formatting to a knowledge article using the HTML editor.

You can use the icons on the HTML toolbar to apply the following formatting in knowledge article text:

- Change the font or font size of knowledge articles.
- Format text as bold, italicized, underlined, or strikethrough.
- Change the text color and text background color.
- Create bulleted and numbered lists.
- Change paragraph indentation.
- Apply styles to text.
- Identify and resolve accessibility related issues in a knowledge article using the Accessibility checker in the toolbar.

For more information, see Formatting icons for HTML fields.

Paste content without formatting into the knowledge article

Paste content into the body of a knowledge article without copying the content formatting.

Before you begin

Open the knowledge article in which you want to use the HTML editor.

About this task

You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

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Procedure

1. Copy your text from a content source.
2. Click the paste as text icon () on the HTML toolbar.
3. In the Article body section, place your cursor at the point where you want to paste the content, right-click, and select **Paste** from the context menu.

Adding tables to knowledge articles

You can insert tables and modify the cells, rows, and columns of a table in a knowledge article.

You can add tables to your knowledge articles by clicking the table icon () on the HTML toolbar and selecting your desired table options. For example, you can adjust the height and width of rows and column, the spacing between cell text and cell borders, and change the colors of cells.

For more information, see Add a table to the HTML field.

Insert an image in a knowledge article

Insert an image in a knowledge article using the HTML editor.

Before you begin
Role required: user with contribute access

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **All**.
2. Select a knowledge article.
3. On the knowledge article form, in the **Article body** field, place the cursor where you want to insert an image.
4. On the HTML editor toolbar, select the Insert/edit image icon ().
5. On the Insert/Edit Image dialog box, select the Upload icon ().
6. Select an image.
7. Select **Open**.
8. Select **Save**.

Result
The image is included in the knowledge article.

Format a code snippet automatically in knowledge articles

Add syntax highlighting to a code snippet in knowledge articles using the HTML editor.

Before you begin
Open the knowledge article in which you want to use the HTML editor.

Role required: knowledge

About this task
You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

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Procedure

1. In the Article body section, place the cursor where you want to insert the code snippet.
2. Click the insert/edit code sample icon ({;}) on the HTML toolbar.
3. In the Insert/Edit code sample dialog box, select a markup or programming language from the Language list.
4. In the text box after the Language list, enter your code.
   Alternatively, you can copy the code from an external source and paste it.
5. Click **Ok**.
6. **Optional:** Edit the code by clicking the code snippet, and then clicking the insert/edit code sample icon ({;}).

Insert a table of contents in knowledge articles

Insert a hierarchical table of contents (toc) based on the headings in your knowledge article.

Before you begin

Open the knowledge article in which you want to use the HTML editor.

Role required: none

About this task

You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

You can generate a table of contents only if your article uses heading levels from Heading 1 to Heading 3 and is a standard article.

Note:
Use Format select to set heading levels in the article. You can also configure the HTML toolbar using TinyMCE attributes.
For more information, see Customize TinyMCE attributes.



Procedure

1. In the Article body section, place the cursor where you want to insert the table of contents.
2. Click the table of contents icon ( ) on the HTML toolbar.
   If you do not see the table of contents icon on the toolbar, add it using steps available in Customize TinyMCE attributes.
3. **Optional:** Update an existing table of contents by selecting it and then clicking the update icon ( ) on the HTML toolbar.

Result

The HTML editor searches for the headings in your content including their levels (such as Heading 2 or Heading 3). It then automatically generates a table of contents that contains links to

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the heading levels from Heading 1 to Heading 3 only. The links to heading levels are indented to show the heading hierarchy.

Find and replace text in knowledge articles

Make global changes to the content of a knowledge article by finding and replacing specific text using the HTML editor.

Before you begin

Open the knowledge article in which you want to use the HTML editor.

About this task

You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

Procedure

1. In the Article body section, place the cursor anywhere.
2. Click the find and replace icon (🔭) on the HTML toolbar.
3. In the Find and Replace dialog box, in the **Find** field, enter the search term you want to find.
4. Enter replacement text for the search term in the **Replace with** field.
   If you want to delete repeated occurrences of the search text, leave the **Replace with** field blank.
5. **Optional:** Refine the scope of the search.
   - To limit the search to text that exactly matches the case of the search term, select the **Match case** check box.
   - To limit the search to text that matches one or more complete words only, select the **Whole words** check box.
6. Find or replace the search term.

Result

When no more occurrences of the term can be found or if the search term is not found at all in the content, a message appears indicating that the specified string wasn't found.

Undo or redo typing actions or formatting while authoring knowledge articles

Quickly revert typing actions or formatting that you made during the current session of editing a knowledge article using the HTML editor.

Before you begin

Open the knowledge article in which you want to use the HTML editor.

About this task

You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

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Procedure

1. Place the cursor in the Article body section.
2. Undo or redo a typing action or format change.
   - To undo the previous change, click the undo icon ( ).
   - To redo a change that has been undone, click the redo icon ( ).

Note:
The undo ( ) and redo ( ) icons are available based on the number of actions that are saved to be undone or certain actions that can't be undone.

Map related articles

Discover similar information across articles on a topic while viewing an article. You can manually map related articles or have the application automatically present related articles using machine learning (ML) algorithms.

Before you begin

Role required: knowledge
To edit the article, you must have knowledge contributor access for the associated Knowledge Base.

About this task

If you have manually mapped related articles when editing an article, those articles are listed in the Related Articles section on the knowledge article view page before the related articles that are predicted thorough the Knowledge Management similarity solution.

Note:
An administrator can train the solution definition for Knowledge Management within the Predictive Intelligence feature to find related articles. For more information, see Train the similarity solution for Knowledge Management to find related articles.

This task provides steps to manually map related articles when editing an article.

Procedure

1. On the ServiceNow AI Platform, open the knowledge article for which you want to map related articles.
2. On the Knowledge form, click the Related Articles related list.
3. Click **Edit**.
4. On the Edit Members form, move the desired articles from the available articles in the **Collection** column to the **Related Articles List** column.
5. Click the up or down icon to arrange the articles in the order in which you want them to appear in the Related Articles section on the article view page, and then click **Save**.

Note:
Knowledge administrators can configure the number of articles shown in the Related Articles section using the instance options.

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Related topics

- Edit a knowledge article
- Train the similarity solution for Knowledge Management to find related articles
- Configure knowledge related articles widget instance options

Map catalog items related to an article

Manually map catalog items related to a knowledge article to enable employees to request the related product or service.

Before you begin

Role required: knowledge
To edit the article, you must have knowledge contributor access for the associated Knowledge Base.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **All**.
2. Open the knowledge article for which you want to map related catalog items.
3. On the Knowledge form, click the Related Catalog Items related list.
4. Click **Edit**.
5. On the Edit Members form, move the desired catalog items from the available catalog items in the **Collection** column to the **Related Catalog Items List** column.
6. Click the up or down icon to arrange the articles in the order in which you want them to appear in the Related Items section on the article view page, and then click **Save**.

Note:
Knowledge administrators can configure the number of catalog items shown in the Related Items section using the instance options.

Related topics

- Edit a knowledge article
- Service Catalog items
- Configure related catalog item widget instance options

Schedule a knowledge article for publishing

Set a specific time and day for a knowledge article to be published automatically.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to schedule for publishing.
Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. For more information, see Activate the Knowledge Management Advanced plugin.
- The article versioning feature is enabled. For more information, see Article versioning.

Role required: knowledge

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Procedure

1. Navigate to **All** > **Knowledge** > **Articles** and click **Unpublished**.
2. Select an article link.
3. In the **Scheduled publish date** field, click the select date and time icon.

   You may need to configure the knowledge block form to include the **Scheduled publish date** field. Click the form context menu icon ( ) and navigate to **Configure** > **Form Layout**. Use slushbucket to add the Scheduled publish date field.

   Important:
   You must set the **Scheduled publish date** at least 24 hours from the current date. To publish the article earlier than 24 hours, click **Publish article** available in the form.

4. Select any future date from the calendar.
5. In the **Time** field, enter a time in the format hh:mm:ss.
6. Select the save (enter) icon.
7. Select **Publish** to enable the publishing workflow.
   The article is available in the All list. Go to **Knowledge** > **Articles** > **All**.

   Tip:
   If you want to cancel an article's scheduled publication and move the article back to the Draft state, click **Recall**.

Result

The knowledge article is published on the scheduled publish date depending on the following workflow settings of its knowledge base:

- If the knowledge base workflow is set to **Knowledge - Instant Publish**, the knowledge article is automatically published on the scheduled publish date. The **Workflow** field on the Knowledge form of the article is updated to **Scheduled for publish**.
- If the knowledge base workflow is set to **Knowledge - Approval Publish**, the knowledge article is published on approval completion. The **Workflow** field on the Knowledge form of the article is updated to **Review**.

  The approval completion affects the scheduled publishing as follows:

  - If the approvals are completed before the scheduled publish date, the **Workflow** field on the Knowledge form of the article is updated to **Scheduled for publish** and the article is published on the scheduled publish date.
  - If the approvals are completed after the scheduled publish date, the article is published immediately on the approval completion.

Related topics

Edit a knowledge article

Recall an article that is being reviewed

Recall an article that is being reviewed to make additional changes.

About this task

If ownership groups is not enabled, only the author of the article, knowledge administrators, or system administrators can recall the article.

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If ownership groups is enabled, the author of the article, the ownership group manager, ownership group members, knowledge administrators, or system administrators can recall an article.

Recalling an article in the **Review** state results in a minor version increment.

When a revised article is in **Review** state, only the corresponding versions reviser can recall the article to make additional changes.

Procedure

1. Navigate to **Knowledge** > **Articles** > **All**.
2. Open an article in the **Review** state.
3. Click **Recall** in the Knowledge form header.
   The system returns the state of the article to **Draft**, increments the version number by 0.01, and displays a message to the user.

Approve an article that is being reviewed

Approve an article that is being reviewed and create a new published version.

Before you begin
Role required: Owner and knowledge manager

About this task
When an article is in the **Review** state, only those users who are included in the **Approvals** related list can modify the article.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Unpublished**.
2. Open an article in the **Review** state and review the text.
3. In the **Approvals** related list, click **Requested** in the **State** column to display the Approval form for the article.
4. Click **Approve**.

Result
The system displays the Knowledge form. The version number of the article increments to the next whole number (for example, from 2.02 to 3.0) and the state changes to **Published**. The new published version of the article is added to the Knowledge list and to the **Article Versions** related list on the Knowledge form.

Retire a knowledge article

Initiate the retirement workflow to retire a knowledge article. Knowledge base owners and managers can view articles after they are retired but cannot search for retired articles on the Knowledge homepage and portal.

A knowledge article has an associated retirement workflow, similar to the publishing workflow. This allows administrators to configure these workflows, defining an approval and review process for retiring knowledge if appropriate.

When editing an article, click **Retire** to launch the retirement workflow associated with that article. Only knowledge administrator, knowledge manager, and the latest publisher of the versioned knowledge article (not available for kcs_candidate or kcs_contributor) can retire a knowledge article. For more information, see Retire a versioned article. If the article requires approval prior to retirement, the article goes to a pending approval state, and the workflow

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either finishes upon approval or cancels if rejected by a required approver. The article number associated with the retired article is not available for reuse. For information on the status of a knowledge article see Knowledge article states.

Note:

- Only administrators and knowledge administrators can view the retired knowledge articles. To reuse a retired article, administrators and knowledge administrators can republish the article. For more information, see Republish a retired article.
- An article and its translations have a parent-child relationship. Retiring a parent article does not automatically retire all its translated child articles.

Beginning with the San Diego release, you can provide a replacement article while retiring a knowledge article. When the retired article is accessed, the user will automatically be redirected to the replacement article with a display message `The article KBxxx is retired and has been replaced with the knowledge article KBxxx`. If no replacement article is available, the page displays the message `Knowledge record not found`. The retire with replacement feature is not supported on classic workspace.

Note:

- Article with replacement returns a 301 code.
- Article without any replacement returns a 404 code.
- By default, the *`glide.knowman.enable_article_replacement_on_retire`* system property is set to `true` to provide a replacement article for a retired article.
- The retire action on classic workspace will just retire the article and not provide a replacement irrespective of the setting of *`glide.knowman.enable_article_replacement_on_retire`*.

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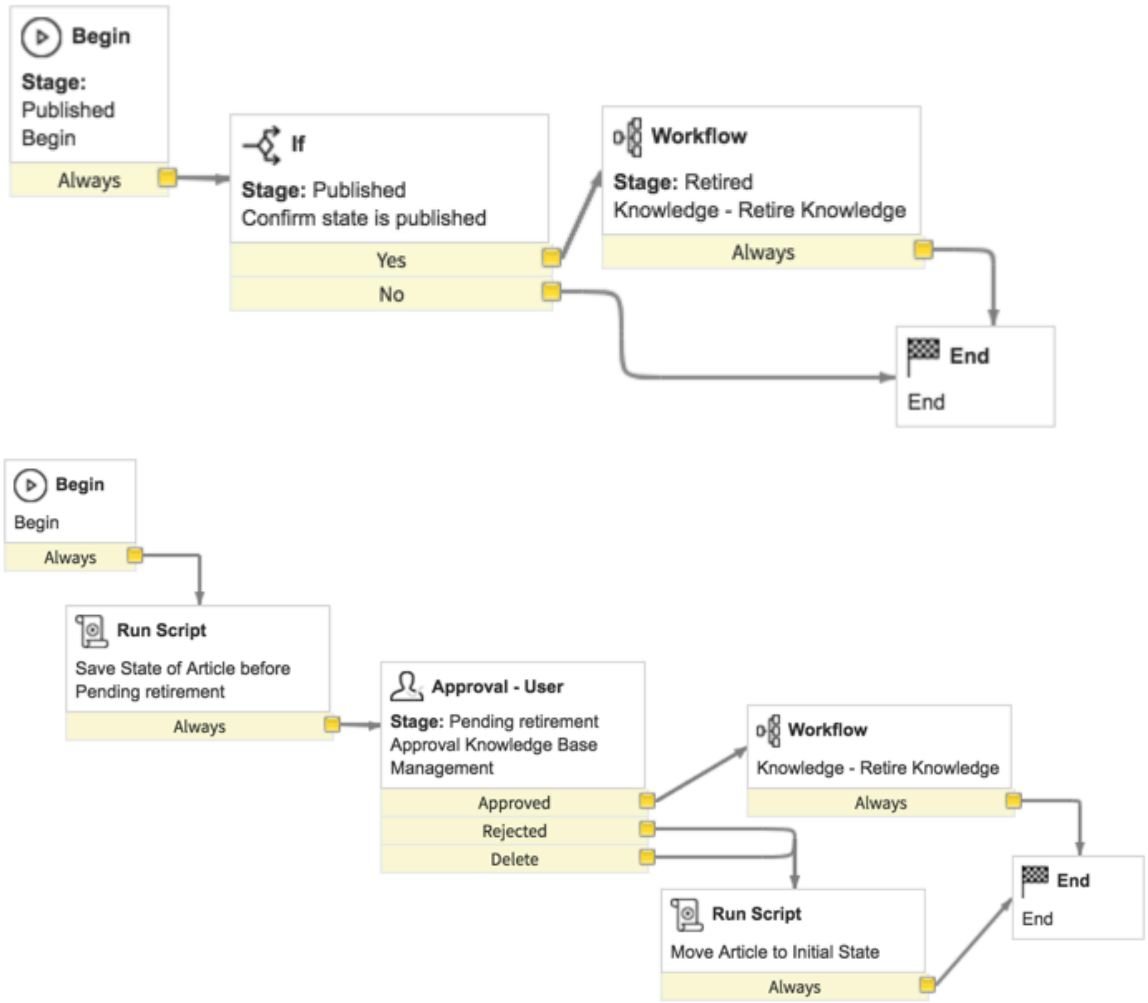
Instant retire and Approval retire workflows



Republish a retired article

Instantly republish a retired article.

Before you begin

You must activate the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin.

Role required: admin or knowledge admin

Note:
You need a scoped admin role to republish a retired article in the Scoped knowledge bases.

About this task

There may be cases where you will need to republish a retired article. For example, an admin may want to temporarily retire an article when its information doesn't currently apply, but will at a later date. An administrator or knowledge administrator who can view retired articles can instantly republish these without having to go through an approval workflow.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Retired**.
2. Select a retired article and click **Republish**.

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Result
The article is instantly published as the previous last published version.

Move a knowledge article

You can move articles between knowledge bases.

Before you begin
Role required: User must have contributor access to the knowledge base.

Note:

- When versioning is enabled, and you move an article from one knowledge base to another, the latest version of an article is moved to the new knowledge base. However, the previous versions of the article remain in the old knowledge base. It is recommended to retire the article from the old knowledge base. For more information, see Retire a knowledge article.
- Although you can move an article from one knowledge base to another consider creating an article in new knowledge base.

Procedure

1. Edit a knowledge article.
2. Change the **Knowledge Base** field value.
   After moving an article, the Apply Default Values dialog box prompts you to populate certain fields in the article with default values from the new knowledge base. If the new knowledge base has no default values, the dialog box does not appear.
3. Click **OK** to overwrite fields with the default values, or **Cancel** to leave all fields unchanged.

   A knowledge manager can define default values for articles in knowledge bases you manage using the **Set default knowledge field values** field on the Knowledge Base form.
4. Click **Update**.

Comment on a knowledge article

Comment on a knowledge article or reply to a comment.

Before you begin
You must activate the Knowledge Management V3 plugin (com.snc.knowledge3).

Role required: User with Can Read access. Unauthenticated users and users with only the snc_external role can't add or view attachments for comments.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to the Knowledge Management Service Portal.
2. Click the article you want to comment or reply to a comment on.

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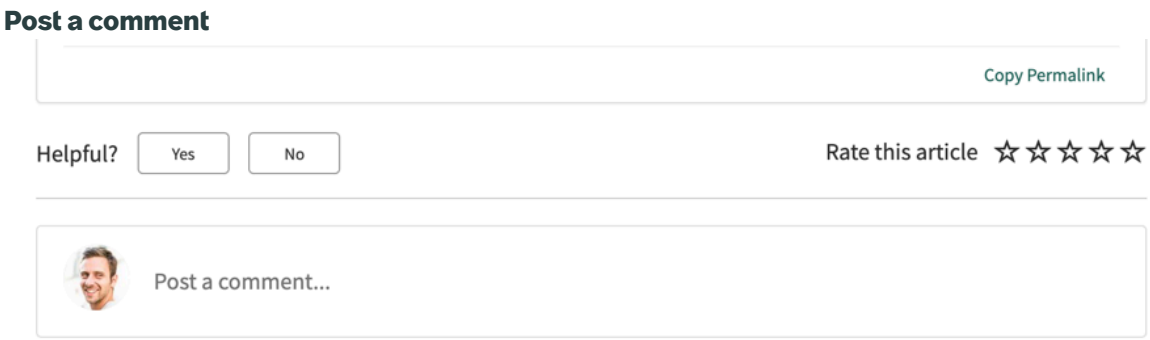
3. Select **Post a comment**.
   If you want to reply to an existing comment, select **Reply**



4. Enter your comment or reply and add links, images, and attachments as required.

> **Note:**
> Attachments to comments posted in the Knowledge Management Service Portal are not displayed in the Live Feed. If attachments to comments are posted in Live Feed, they are displayed in the Knowledge Management Service Portal.
>
> If antivirus protection is enabled, all attachments are automatically scanned for viruses once the comment is posted. Attachments are only displayed once the scan is finished and successful.
>
> If you are the author of the comment, you can delete it. All comments and replies underneath are automatically deleted.

5. Click **Submit**.

> **Note:**
> When the Use Live Feed for Knowledge Feedback property is enabled, you can only view comments in the Live Feed. By default, it is set to inactive.
>
> Comments posted in Live Feed before upgrading to release version New York are not shown hierarchically in the Knowledge Management Service Portal. Comments posted in Live Feed after upgrading to release version New York are shown hierarchically in the Knowledge Service Portal.

The following table illustrates how comments and replies to comments are displayed depending on where you are viewing them.

Display of comments and replies to comments

Viewing from	HTML formatting	Hierarchy	Attachments
Knowledge Management Service Portal	Yes	Yes	Yes
Live Feed	No	Yes	Yes
Knowledge Management v3	No	No	No

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Create knowledge from incident or problem

Create a knowledge article, so the next time the issue comes up the resolution is easy to find.

Before you begin

Role required: knowledge

About this task

To create a knowledge article from an incident, see Create a knowledge article from an incident.

To create a knowledge article from problem, see Create a known error article.

Depending on the value of the *glide.knowman.submission.workflow* property, knowledge created from an incident or problem may require additional approval. When this property is true, a submission record is created instead of a knowledge article. A user with the knowledge role must approve the submission to create a knowledge article.

Procedure

1. Open a resolved incident or problem.
2. Select the **Knowledge** check box on the form.
   You may need to configure the form to include the **Languages** field. Click the form context menu icon ( ) and navigate to **Configure** > **Form layout**. Use slushbucket to add the Languages field.
3. Close the incident or problem.
   A new draft knowledge article is created.
4. If additional approval is required, navigate to **Knowledge** > **Articles** > **Open Submissions**.
5. Select a submission record.
6. Review the submission to ensure the content and settings are correct.
7. Click **Create Article**.
   A new draft knowledge article is created. Articles created this way are added to the knowledge base specified in the property *glide.knowman.task_kb*.

Create an article version by importing a Word document

Import a Word document to a knowledge article to create a new version.

Before you begin

- Ensure that the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is installed.
- You can only upload new versions to articles that are in **Draft** or **Published** state.
- You cannot upload new versions to articles that are created using an article template or if the article type is **Wiki**.

Role required: admin

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. Click an article.
3. Click the **Upload New Version** related link.

Note:
Any text written in TinyMCE is overwritten once the file is imported.

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4. Add the file you want to import.
5. **Optional:** Select the **Copy Attachments** check box to copy all attachments to the knowledge article.

   Note:
   If the article is published, the attachments are added to a new article version. If the article is in draft, the attachments are added to the existing knowledge article. The draft article does not appear in the knowledge base (KB) for users until it is reviewed and published.

6. Click **Import**.
   A draft version is created and sent to approvers to approve or reject. Once the article is approved, it is displayed in the **Article Versions** related list.

Using human readable URLs for the Knowledge article page

Human readable URLs include more readable keywords to the URL structure.

Human readable URLs are short and simple web addresses that use relevant keywords from the knowledge article page that are easier to understand. Users have a better idea of what they will find when they access the link.

The benefits of using human readable URLs rather than technical URLs include:

- Improves the readability of the URL to make it easier for a human to understand
- Improves search engine optimization (SEO) rankings and the click-through rate

Enable Human Readable URLs for the Knowledge Article View page

Update a human readable URL structure in the Knowledge Article View page to improve search ranking and click-through rates.

Before you begin
Role required: admin, sp_admin

About this task
If you are upgrading from a release earlier than the Washington DC release, you must enable the Human Readable URLs feature for the Knowledge Article View page. Beginning with the Washington DC release, this feature is enabled by default.

Note:
To disable the Human Readable URLs feature, change the *`glide.service_portal.enable_human_readable_urls`* system property value to false.

Procedure

1. Navigate to **All** > **Service Portal** > **Pages**.
2. On the Pages form, search for the ID `kb_article_view` and select it.
3. In the information message on the Page form indicating that you have to change the current application to edit the record, select the word **here**.
4. On the Knowledge Article View form, in the **Human readable url structure** field enter the `%short_descr` variable.

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Note:
You can also create a variable to add information from various data sources. For more information, see Add human readable keywords to page URLs.

5. Select **Update**.

Result
The *%short_descr* variable is added to the URL structure and will enable simpler, non-technical words in the URL.

Example: Knowledge Article View page with human readable keywords in the URL

The following sample URL shows the keywords from the Knowledge article KB0000007. The URL considers *en* as the preferred language and displays the Knowledge article content in the English language.

```
https://<instance>.com/kb/en/faq/what-is-a-cookie?id=kb_article_
view&sysparm_article=KB0000007
```

This article URL contains the field variables, and keywords in the following table.

Field variables in the URL structure

Field	Variable	Keywords
Category	%category	`faq`
Short description	%short_descr	`What is a cookie?`

Select a knowledge article category

Knowledge articles within a knowledge base are grouped by category. These groups can help you define the knowledge base taxonomy, and can help users find articles within that knowledge base.

Before you begin
Role required:

About this task
As a knowledge contributor, when editing a knowledge article you can select categories using the Category picker, and add or edit categories if enabled for the knowledge base.

Procedure

1. Click the reference lookup icon beside the **Category** field.
2. Select an existing category, or click the add category icon (+) to add a new category.
   After you select a category, you can click the pen icon to rename that category. Press the enter key or click outside the selected category to save the change.

   Note:
   Clicking **Cancel** while selecting a category cancels selecting a new category, but does not revert any changes you make to the categories such as renaming or adding new categories.

3. Fill in the fields on the form, as appropriate.

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4. **Optional:** Select or add a subcategory.
5. Click **OK**.

Associate a knowledge article with a taxonomy category

Associate a knowledge article with a taxonomy topics to create a uniform classification structure across different kinds of content.

Before you begin

You must have contribute access to the knowledge base that contains the knowledge article.

Role required: knowledge

About this task

The taxonomy feature enables you to link an article to one or more topics from multiple taxonomies. It helps you maintain a unified content categorization across content types such as catalog items, knowledge articles, and community posts. For more information, see Unified taxonomy for Employee Center

Note:
You can associate only articles in the Draft, Review, or Published state.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. On the article page, click the article you want to associate to a taxonomy topic.
3. In the Assigned Topics related list, click **Add**.

   Note:
   As an admin, you may need to configure the form to include the Connected Content → Knowledge in the related list. Click the form context menu icon and navigate to **Configure** > **Related Lists**. Using slushbucket, add the Connected Content → Knowledge.

4. Select a Taxonomy category from the list in the topic picker dialog box.

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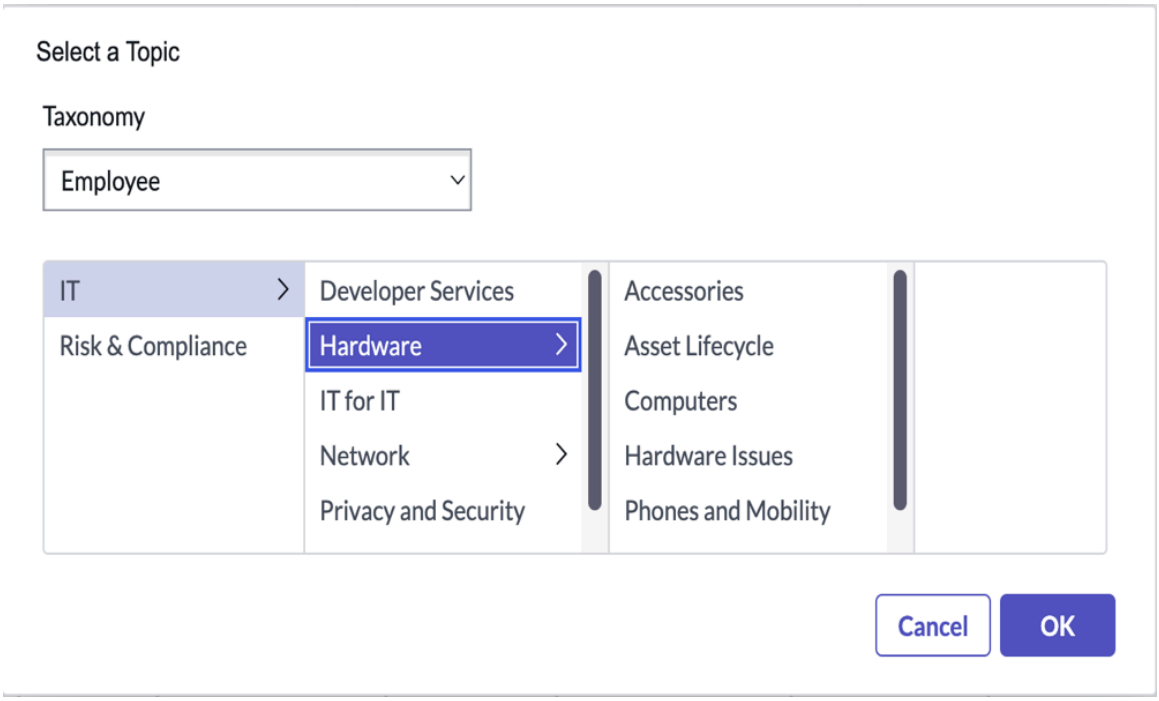

5. Select a topic from a topic picker list and click **OK**.

Result
The selected article is associated with a taxonomy category for better content browsing.

Authoring a knowledge article in Agent Workspace

Complete your job efficiently by creating, editing, and publishing knowledge articles in Agent Workspace.

Knowledge Management features specific to agents and authors are available in Workspace. Perform any knowledge administration-related tasks such as creating a knowledge base, managing access to knowledge articles, enabling an article template, and so on using the ServiceNow AI Platform interface.

You can perform the following Knowledge-related tasks in Workspace:

- Create a knowledge article using a default or custom article template.
- Manage all unpublished and published knowledge articles authored by you.
- Address feedback tasks assigned to you.
- Compare two knowledge article versions.
- Request translations for published untranslated knowledge articles.
- Complete translation tasks assigned to you.
- Map related articles and related catalog items to a knowledge article.
- Add affected products to a knowledge article.
- Use Agent assist to avoid creating knowledge articles with duplicate content.

The authoring experience for knowledge articles in Workspace is similar to the one in ServiceNow AI Platform with the following exceptions:

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- Knowledge blocks can't be created or associated with knowledge articles. However, you can view articles containing knowledge blocks.
- Knowledge articles of type Wiki aren't supported.
- Knowledge article categories can't be created.

Activation Information

The Knowledge list in Workspace is available with the activation of the Agent Workspace plugin (com.glide.core-ui-components). When you install and activate the Agent Workspace plugin, the sn-component-workspace-knowledge plugin for using Knowledge Management in Workspace is also installed and activated.

Related topics

View a knowledge article in Agent Workspace

Create a knowledge article in Agent Workspace

Edit a knowledge article in Agent Workspace

Schedule a knowledge article for publishing in Agent Workspace

Work on a feedback task in Agent Workspace

Compare knowledge article versions in Agent Workspace

Request translations for missing languages in Agent Workspace

View a knowledge article in Agent Workspace

View a knowledge article in Agent Workspace, including the article number, short description, and article content.

Before you begin
You must have read access to the knowledge article.
Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. View knowledge articles authored by you or by other people.
   - View all articles by navigating to **Lists** > **Knowledge** > **All Articles**.
   - View articles authored by you by navigating to either **Lists** > **Knowledge** > **My Articles - Published** or **Lists** > **Knowledge** > **My Articles - Unpublished**.
3. Click the link to the knowledge article that you want to view.
4. **Optional:** View the knowledge article in another language by selecting a language in the Language list.

   Note:
   The Language list is populated based on the available translated versions of the article.

5. **Optional:** Copy the link to the knowledge article to your clipboard by clicking the more actions icon (···) and then clicking **Copy link**.
6. **Optional:** Download the article as a Microsoft Word document to your computer by selecting the more actions icon (···) and then selecting **Download as Word**.

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Note:
This option appears only when the article was originally created using Microsoft Word and the administrator has enabled the *sn_km_word.glide.knowman.enable_document_download* property.

7. **Optional:** View another version of the knowledge article by selecting the version of the knowledge article in the Version list.

Note:
The Version list appears only when the article versioning feature is enabled.

Result

The selected version of the article opens in a knowledge article view page displayed in another tab within Agent Workspace. The tab name includes the knowledge article number and its version number.

Related topics

- Viewing knowledge article details in Agent Workspace
- Managing access to knowledge bases and knowledge articles
- Provide feedback for a knowledge article in Agent Workspace
- Edit a knowledge article in Agent Workspace

Viewing knowledge article details in Agent Workspace

View the details of a knowledge article in Agent Workspace.

The knowledge article view page in Agent Workspace provides several details about a displayed article.

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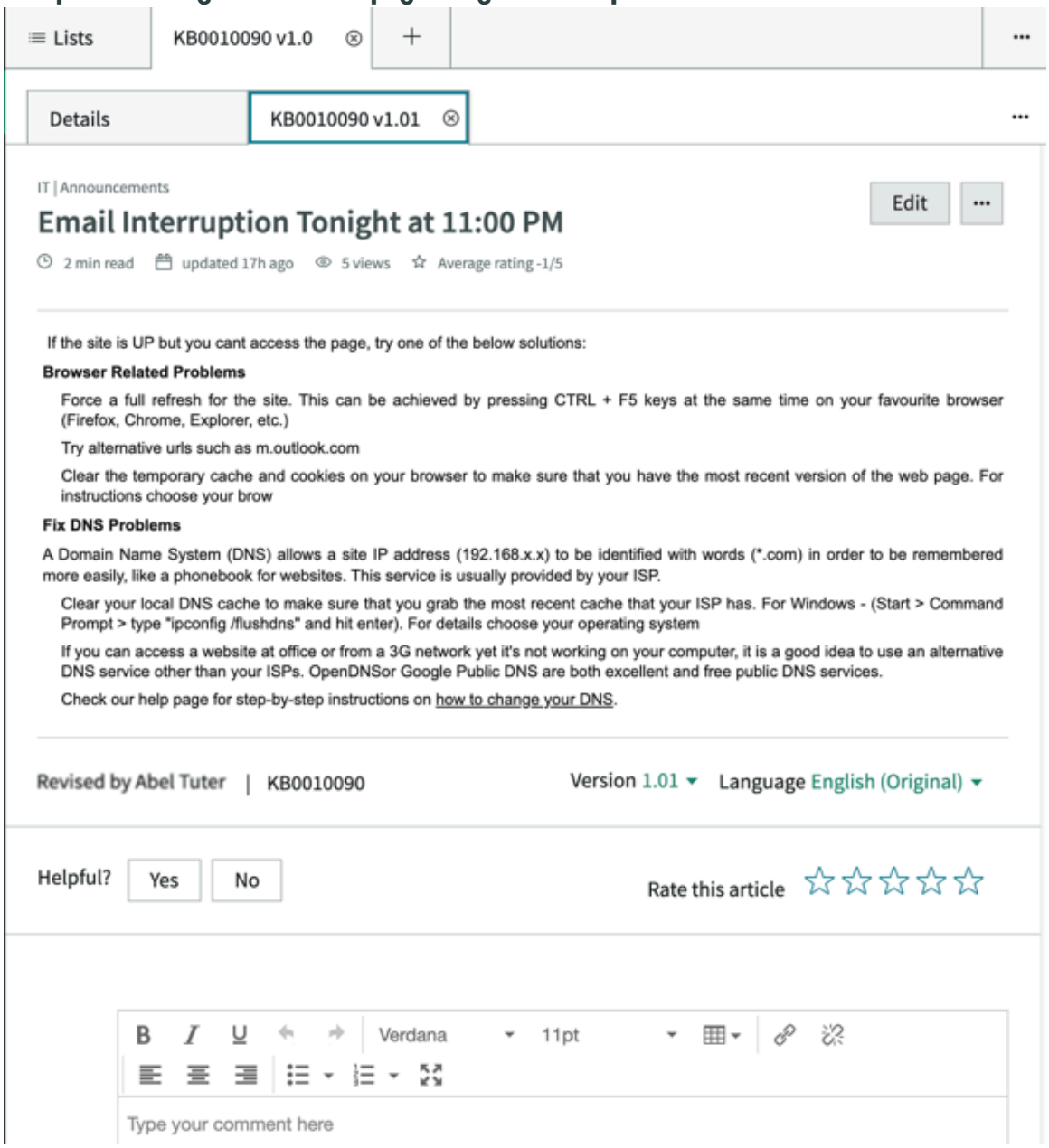
Sample knowledge article view page in Agent Workspace



Article information displayed on the knowledge article view page in Agent Workspace

Details	Description
Knowledge base	Knowledge base that stores the knowledge article and the article category. In the figure, IT is the knowledge base and Announcements is the knowledge article category.
Read time	Average time to read the knowledge article, which can help you can decide whether you have time to read the article. The read time is calculated based on an average reading speed of 200 words per minute. For articles in languages such as Chinese, Japanese, and Korean, the read time is calculated based on an average speed of 500 characters per minute. If images are present in an article, the read time is calculated using the following rules:

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Article information displayed on the knowledge article view page in Agent Workspace (continued)

Details	Description
	• For the first image add 12 seconds, for the second image add 11 seconds, and so on. • If there are more than 10 images, after the tenth image add 3 seconds for each image.
Last updated time	Last time the knowledge article was updated in number of days for the current week, number of weeks, or number of years.
Number of views	Number of times the knowledge article was viewed in the past number of days set by your system administrator in the *glide.knowman.view_age.days* property. For more information on this property, see Knowledge portal properties.
Average rating	Result of the weighted average rating of the knowledge article based on numeric 1 through 5 ratings. The average rating is carried on the next version of the article.
Knowledge article content	Text and images of the knowledge article.
Authored by	Author of the knowledge article. This field appears only in the first version of a knowledge article.
Revised by	User who revised the article. This field appears if a knowledge article was later edited.
Article number	Unique number automatically assigned to the knowledge article. In the figure, KB0010090 is the article number.
Version	Selected version of the knowledge article. This field appears when the article versioning feature is enabled. In the figure, 1.01 is the selected version of the article.
Language	Language of the selected article. This field appears if the translations of the knowledge article in other languages are available.
Attachments	List of article attachments. This field appears if the knowledge administrator has enabled it to be displayed on the knowledge article view page.

Related topics

View a knowledge article in Agent Workspace

Create a knowledge article in Agent Workspace

Edit a knowledge article in Agent Workspace

Publish a knowledge article in Agent Workspace

Provide feedback for a knowledge article in Agent Workspace

Provide feedback on a knowledge article by rating the article, marking the article as helpful or not helpful, and posting and replying to comments for the article in Agent Workspace.

Before you begin

You must have read access to the knowledge article.

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Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All articles**.
3. Click the link to the knowledge article that you want to view.
4. Provide feedback for the article.

Related topics

View a knowledge article in Agent Workspace

Work on a feedback task in Agent Workspace

Create a knowledge article in Agent Workspace

Create a knowledge article in Agent Workspace to share information across your organization.

Before you begin

You must have contribute access to the knowledge base within which you want to create the knowledge article.
Role required: agent_workspace_user

About this task

You can also create a knowledge article when adding a knowledge block. For more information, see Add a knowledge block to a knowledge article in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. **Optional:** Check whether a knowledge article on this subject is already available by going to **Lists** > **Knowledge** > **All Articles** and setting a filter to search for possible matching articles.
3. Click **New**.
4. Create the knowledge article by either selecting an article template or using the default template.

Option	Description
Selected article template	Select an article template to create a knowl edge article using defined fields and values. In the Create Article dialog box: **a.** From the Knowledge Base list, select a knowledge base. **b.** From the Article Template list, select the de sired article template. **Note:** The Article Template list is populated based on the article templates config ured for the selected knowledge base. **c.** Select **Create Article**.

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Option	Description
	The Create Article dialog box is available if the article versioning and the Knowledge Article Templates features are enabled. For more information, see Article versioning and Knowledge article templates.
Default Standard template	Create a knowledge article using the default Standard template.

5. On the form, fill in the fields.

Note:
If you're using an article template, the available fields will vary.

Knowledge form

Field	Description
Knowledge base	Knowledge base in which the knowledge article is stored. You can associate a knowledge article with one knowledge base only. If you're using an article template, you can modify this value only if the template is available in the other knowledge base.
Category	Category for the knowledge article. This value helps users find the article within a selected category. You can select only categories available within the selected knowledge base. Articles without a category appear in the (empty) category.
Ownership Group	Ownership group for the knowledge article. An ownership group consists of a group of members and a manager who are responsible for approvals and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they're associated with. **Note:** This field is available only if the *glide.knowman.ownership_group.enabled* property is enabled. If no ownership group is assigned and approvals are required to publish a knowledge article, it's automatically submitted for approval to the knowledge administrator and knowledge manager. For more information, see Ownership groups.
Version	Automatically generated article version number. This number is incremented when changes are made to a published article. **Note:** This field is available if the article versioning feature has been enabled.
Workflow	Publishing workflow state of the knowledge article, such as **Draft**, **In Review**, or **Published**. For a new article, the workflow state is set to **Draft**.
Language	The language in which you're creating the knowledge article. The list is populated based on the languages enabled for the selected knowledge base. This field appears only when the I18N:Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated. For more information, see I18N - Knowledge internationalization.

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Field	Description
Short description	Title of the knowledge article. This title appears when browsing and searching for knowledge article, and at the top of the article. You can enter up to 100 characters in this field. **Note:** Knowledge articles similar to the short description text will appear in Agent assist.
Article body	Content for the knowledge article. Use the editing functions in the HTML editor to create content. For more information, see Editing functions for knowledge articles in the HTML editor.
Source Task	Task this knowledge article was created from. This field is set automatically when you create the knowledge article from a task, such as an incident or a customer service case, or from a submission record.
Scheduled publish date	Future date when the knowledge article will be published automatically. For more information, see Schedule a knowledge article for publishing in Agent Workspace.
Valid to	The date this knowledge article expires. Articles don't appear in search results after the **Valid to** date or if the **Valid to** date is empty. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date that the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is empty, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. For more information, see Validity of a knowledge article. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management. **Note:** If the system date format or user preferences is set to use `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Confidence	Maturity of an article based on its completeness and reusability.
Article type	Type of the article, which is automatically set to HTML. This field is available in the Standard template only. **Note:** The Wiki article type isn't supported in Agent Workspace.

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Field	Description
Display attachments	Option to display attachments in the knowledge article. If the article has attachments, they're listed below the text of a knowledge article on the knowledge article view page.
Attachment link	Option to automatically download an attached article when a user accesses it instead of opening the article. The Attachment link option applies to articles accessed from search links only. **Note:** Although you may attach multiple files, most web browsers permit users to download only the first attachment. To ensure download of all the files, bundle them into an archive and attach the archive. Articles accessed as links within other knowledge articles will not replicate this behavior.
Governance	An attribute of an article that enables you to control sensitive, critical, or regulated information. Not all articles have the same requirement for compliance reviews. Some articles are based on the collective experience of the people who use the articles (experience-based). Other articles have policy or legal information that require tight control (compliance-based).
Issue	Brief description about an issue. **Note:** This field is available in the KCS Article template only.
Environment	Details of the environment in place when the issue occurred. **Note:** This field is available in the KCS Article template only.
Cause	The cause of the issue. **Note:** This field is available in the KCS Article template only.
Resolution	Method used to resolve the issue. **Note:** This field is available in the KCS Article template only.
Question	Text to display as a question. **Note:** This field is available in the FAQ template only.
Answer	Text to display as an answer to an included question. **Note:** This field is available in the FAQ template only.
Introduction	Introduction to the topic.

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Field	Description
	Note: This field is available in the How To and What Is templates only.
Instructions	Instructions for a how-to topic. **Note:** This field is available in the How To template only.
Explanation	Explanation of a what-is topic. **Note:** This field is available in the What Is template only.

Note:
The **Confidence** and **Governance** fields appear when the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) is activated. For more information, see Managing the KCS article state.

6. **Optional:** Research for content related to knowledge article you're authoring using Agent assist.

   a. In the contextual side panel, select the agent assist icon ( ).
   The search results in Agent assist display default content based on the text-based search.

   b. Click the select a search resource icon ( ), and then select a search resource.
   For example, to view knowledge articles, select **Knowledge Articles**.

   c. **Optional:** In the search results, you can click a resource item, such as a knowledge article, to view its content in Agent assist.

   Tip:
   For better readability, you can resize the contextual side panel for Agent assist. For a full view of the selected resource item content, select **Full View**. The resource item content opens in another tab within the Agent Workspace.

7. **Optional:** Check whether your content matches the content in an existing article.

   a. Enter your search text in the text box available in Agent assist or retain the default text, which is the short description of the knowledge article.

   b. Select the lookup icon ( ).

   c. Select a search resource by clicking the Select a search resource icon ( ).

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- To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

  Note:
  This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management to find related articles. For more information, see Train the similarity solution for Knowledge Management to find related articles.

- To find knowledge articles that match the entered search text, choose **Knowledge Articles**.

8. **Optional:** Attach a file with supporting information by clicking the attachments icon ( ) in the contextual side panel and selecting the file.
9. **Optional:** Add a knowledge block.
   For more information, see Add a knowledge block to a knowledge article in Agent Workspace.
10. Click **Save**.
    The article is saved and appears in the My Articles - Unpublished list and additional functionality becomes available on the form.
11. **Optional:** Either add to or modify the article details or publish the article.
    - Add to or modify the article details.

      (Optional) For more information, see Edit a knowledge article in Agent Workspace.

    - Publish the article by clicking **Publish**.

      A knowledge article is published depending on the workflow setting of its knowledge base:

      - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
      - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

        Note:
        With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the `glide.knowman.ownership_group.enable_self_approval` property. For more information, see Ownership groups.

      For more information, see Schedule a knowledge article for publishing in Agent Workspace.

      When published, your knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version number of the knowledge article is updated. For more information, see Knowledge article version numbers.

What to do next

After you create and publish a knowledge article, you can perform the following actions related to the article:

- Request translations for the knowledge article. For more information, see Request translations for missing languages in Agent Workspace.
- Retire the knowledge article. Click **Retire** to enable the retirement workflow. For more information, see Retire a knowledge article.

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- Translate the knowledge article directly from the knowledge article. For more information, see Translate a knowledge article in Agent Workspace.
- Delete the published knowledge article. Click **Delete**. If the **Delete** button isn't displayed, click the more actions icon (), and then click **Delete**.

Note:
Only users with the admin role can delete a published knowledge article.

Related topics

View a knowledge article in Agent Workspace

Edit a knowledge article in Agent Workspace

Work on a feedback task in Agent Workspace

Provide feedback for a knowledge article in Agent Workspace

Managing access to knowledge bases and knowledge articles

Knowledge workflows

Knowledge article templates

Using Agent Assist in Agent Workspace

Create knowledge from incident or problem

Publish a knowledge article in Agent Workspace

Publish a knowledge article to make it available to users.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to publish.
Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **My Articles - Unpublished**.
3. Click a knowledge article link.
4. On the Knowledge form, click **Publish**.

Result

A knowledge article is published depending on the workflow setting of its knowledge base:

- **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
- **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

Note:
With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *glide.knowman.ownership_group.enable_self_approval* property. For more information, see Ownership groups.

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For more information, see Schedule a knowledge article for publishing in Agent Workspace.

When published, your knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version of the article is incremented based on the version number pattern.

Related topics

- Create a knowledge article in Agent Workspace
- Edit a knowledge article in Agent Workspace
- Knowledge workflows

Edit a knowledge article in Agent Workspace

Edit knowledge articles within a knowledge base in Agent Workspace to update information shared across your organization.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to edit.

Note:

- If the article versioning feature is enabled, only the knowledge administrator, knowledge managers, and author can edit the checked-out version of an article. If the feature is disabled, any users with contribute access to an article can edit the draft version of the article. An administrator can disable the article versioning feature by setting the *glide.knowman.versioning.enabled* property (from the **System Property** [sys_properties] table) to **false**.
- If an ownership group is associated with a knowledge article, the author or reviser of the article can't contribute to the article after the article is published. An administrator can override this behavior by enabling the *glide.knowman.ownership_group.override* property. For more information, see Ownership groups.
- If the *glide.knowman.translation.enable_translation_task* property is enabled, you can't modify the knowledge base of existing articles.

Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All Articles**.
3. Click a knowledge article link.
4. On the Knowledge form, click **Edit**.

   Note:
   If the knowledge article was created using Microsoft Word, you can edit the article only in Microsoft Word. In this case, select **Open in Word** to open the article in Word Online. For more information, see Edit a knowledge article in Microsoft Word.

   If you want to edit the article using the HTML editor, you can unlink the article from Word. For more information, see Unlink knowledge articles from linked Microsoft Word documents.

5. If the article versioning feature is enabled, click **Checkout** for a published knowledge article. You can only edit the latest version of a knowledge article.

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6. Access the relevant related lists to modify the information.

Knowledge form related lists

Related list	Description
Details	Knowledge article content and its metadata. **Note:** If the article versioning feature is enabled, the default value of the **Valid to** date in the updated article version is automatically set based on the following criteria: ○ If the **Article Validity** field in the knowledge base associated with the article is empty, the **Valid to** date value from the earlier version of the article is retained. ○ If the **Article Validity** field in the knowledge base associated with the article isn't empty, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity). If you move a knowledge article to another knowledge base, the default value of the **Valid to** date in the updated article is automatically set based on the following criteria: ○ If the **Article Validity** field in the selected knowledge base is empty, the earlier **Valid to** date value is retained for the knowledge article. ○ If the **Article Validity** field in the selected knowledge base isn't empty, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity). If the dictionary value of the **Valid to** field is modified, this dictionary value overrides the default value of the **Valid to** field calculated according to the **Article Validity** field. For more information, see Validity of a knowledge article.
Feedback	Feedback received on the published versions of the article. To view more details about the feedback, in the **Comments** column, select a link for the desired version of an article.
Feedback Tasks	Details about the feedback task created for a knowledge article version.
Approvals	Approval history of the knowledge article.
Article Versions	Version history of the knowledge article.
Translated Versions	Translated versions of the knowledge article. This related list appears only when the translation management feature is enabled. To translate a knowledge article, select **New**. The **New** button on this related list appears when the *glide.knowman.translation.enable_translation_task* property is inactive.
Translation Tasks	Tasks submitted for translating the article.

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Related list	Description
	This related list appears when the Translation Management feature and the *glide.knowman.translation.enable_translation_task* property to enable creation of translation tasks are enabled. For more information, see Knowledge Management properties.
Related Articles	Related articles mapped to the knowledge article. For more information, see Map a related article in Agent Workspace.
Related Catalog Items	Related catalog items mapped to the knowledge article. For more information, see Map a related item in Agent Workspace.
Affected Products	Products mapped to the knowledge article. For more information, see Add an affected product to a knowledge article in Agent Workspace.

7. **Optional:** Research for content related to knowledge article you're authoring using Agent assist.

   a. In the contextual side panel, select the agent assist icon ( ).
   The search results in Agent assist display default content based on the text-based search.

   b. Click the select a search resource icon ( ), and then select a search resource.
   For example, to view knowledge articles, select **Knowledge Articles**.

   c. **Optional:** In the search results, you can click a resource item, such as a knowledge article, to view its content in Agent assist.

   Tip:
   For better readability, you can resize the contextual side panel for Agent assist. For a full view of the selected resource item content, select **Full View**. The resource item content opens in another tab within the Agent Workspace.

8. **Optional:** Check whether your content matches the content in an existing article.

   a. Enter your search text in the text box available in Agent assist or retain the default text, which is the short description of the knowledge article.

   b. Select the lookup icon ( ).

   c. Select a search resource by clicking the Select a search resource icon ( ).

   - To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

     Note:
     This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management. For more information, see Train the similarity solution for Knowledge Management to find related articles.

   - To find knowledge articles that match the entered search text, choose **Knowledge Articles**.

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9. **Optional:** Work with attachments.
   - Attach a file with supporting information by clicking the attachments icon ( ) in the contextual side panel and selecting the file.
   - Download, remove, or rename an existing attachment by clicking the menu icon ( ) displayed for the attachment.
10. Click **Save**.
    The article is saved and appears in the My Articles - Unpublished list. If the article versioning feature is enabled, the version of the knowledge article is incremented by 0.01. For more information, see Knowledge article version numbers.
11. **Optional:** Publish the article by clicking **Publish**.
    The knowledge article is published depending on the workflow setting of its knowledge base:
    - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
    - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

      Note:
      With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the `glide.knowman.ownership_group.enable_self_approval` property. For more information, see Ownership groups.

    For more information, see Schedule a knowledge article for publishing in Agent Workspace.

    When published, the knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

Related topics

Create a knowledge article in Agent Workspace

View a knowledge article in Agent Workspace

Using Agent Assist in Agent Workspace

Create knowledge from incident or problem

Map a related article in Agent Workspace

Discover similar information across articles on a topic while viewing a knowledge article. You can manually map related articles or have the application automatically present related articles using machine learning (ML) algorithms.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article for which you want to add related articles.
Role required: agent_workspace_user

About this task

If you have manually mapped related articles when editing an article in Agent Workspace, those articles are listed in the Related Articles section on the knowledge article view page in the Knowledge Management Service Portal before the related articles that are predicted thorough the Knowledge Management similarity solution.

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Note:
An administrator can train the solution definition for Knowledge Management within the Predictive Intelligence feature to find related articles. For more information, see Train the similarity solution for Knowledge Management to find related articles.

This task provides steps to manually map related articles when editing an article in Agent Workspace. You can also manually map related articles when editing an article from the Knowledge Management application in the ServiceNow AI Platform interface. For more information, see Map related articles.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All Articles**.
3. Click the link to the knowledge article for which you want to map related articles.
4. In the Related Articles related list, click **New**.
5. On the Related Articles form, fill in the fields.

Related Articles form

Field	Description
Active	Option to enable the mapping to the related knowledge article.
Related knowledge article	Knowledge article that contains related information. You can click the search for record icon (), to access the list of available knowledge articles.
Knowledge article	Number of the knowledge article for which you are adding the related knowledge article.
Order	Order in which you want the article to appear in the Related Articles section on the Knowledge Management article view page. A lower value means that a knowledge article has the greater priority to appear in the Related Articles section. The default value is 100.

6. Click **Save**.

Result

The mapped articles are available in the Related Articles section on the Knowledge Management article view page in the Knowledge Management Service Portal. See Knowledge Management Service Portal article view page features.

Note:
Because system administrators can configure the number of knowledge articles shown in the Related Articles section, not all mapped related articles might appear in the Related Articles section. For more information, see Configure knowledge related articles widget instance options.

Related topics

Edit a knowledge article in Agent Workspace

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Map a related item in Agent Workspace

Manually map catalog items related to a knowledge article in Agent Workspace to enable employees to request the related catalog item.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article for which you want to add related articles.
Role required: agent_workspace_user

About this task

This task provides steps to map related catalog items when editing an article in Agent Workspace. You can also map related catalog items when editing an article from the Knowledge Management application in the ServiceNow AI Platform interface. For more information, see Map catalog items related to an article.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **Published** for a published article or **Lists** > **Knowledge** > **Unpublished** for an unpublished article.
3. Click the link to the knowledge article for which you want to map a related item.
4. On the Knowledge form, click the Related Catalog Items related list.
5. Click **New**.
6. On the Related Catalog Items form, fill in the fields.

Related Items form

Field	Description
Active	Option to enable the mapping to the related catalog item.
Catalog item	Catalog item related to the knowledge article. You can click the search for record icon (🔍) to access a list of available catalog items.
Knowledge article	Number of the knowledge article for which you are adding the related catalog item.
Order	Order in which you want the catalog item to appear in the Related Items section on the Knowledge Management article view page. A lower value means that a catalog item has the greater priority to appear in the Related Items section. The default value is 100.

7. Click **Save**.

Result

The mapped catalog items are listed in the Related Items section on the Knowledge Management article view page in Knowledge Management Service Portal.

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Note:
Because system administrators can configure the number of catalog items shown in the Related Items section, not all mapped related catalog items might appear in the Related Items section. For more information, see Configure related catalog item widget instance options.

Related topics

Edit a knowledge article in Agent Workspace

Service Catalog items

Add an affected product to a knowledge article in Agent Workspace

Add affected products to a knowledge article to view the products associated with the knowledge article

Before you begin

The Knowledge Product Entitlements plugin (com.snc.kb_product_entitlements) must be activated to use the Knowledge Product Entitlements application. Installing this plugin adds the Affected Products related list to the Knowledge form. For more information, see Knowledge product entitlements.

You must have contribute access to the knowledge base that stores the knowledge article for which you want to add affected products.

Role required: agent_workspace_user

About this task

This task provides steps to add affected products to a knowledge article in Agent Workspace. You can also add affected products to a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface. For more information, see Add a related product to a knowledge base or knowledge article.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All Articles**.
3. Click the link to the knowledge article for which you want to add a related product.
4. On the Knowledge form, in the Affected Products related list, click **New**.
5. On the Knowledge Related to Products form, in the **Configuration item** field, click the search for record icon ( ).
6. In the Configuration item dialog box, click the related product.
7. Click **Save**.

Related topics

Edit a knowledge article in Agent Workspace

Schedule a knowledge article for publishing in Agent Workspace

Set a specific time and day for a knowledge article to be published in Agent Workspace automatically.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to schedule for publishing.
Ensure that the system administrator verifies the following settings:

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- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. For more information, see Activate the Knowledge Management Advanced plugin.
- The article versioning feature is enabled. For more information, see Article versioning.

Note:
You can also schedule a knowledge article for publishing from the Knowledge Management application in the ServiceNow AI Platform interface. For more information, see Schedule a knowledge article for publishing.

Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **My Articles - Unpublished Articles**.
3. Click an article link.
4. In the **Scheduled publish date** field, click the show calendar icon ().
5. Select any future date in the calendar.
6. In the **Select Time** field, enter a time in the format hh:mm:ss.
7. Click **OK**.
8. Click **Publish** to enable the publishing workflow.

Tip:
If you want to cancel an article's scheduled publication and move the article back to the Draft state, click **Recall**.

Result

The knowledge article is published on the scheduled publish date depending on the following workflow settings of its knowledge base:

- If the knowledge base workflow is set to **Knowledge - Instant Publish**, the knowledge article is automatically published on the scheduled publish date. The **Workflow** field on the Knowledge form of the article is updated to **Scheduled for publish**.
- If the knowledge base workflow is set to **Knowledge - Approval Publish**, the knowledge article is published on approval completion. The **Workflow** field on the Knowledge form of the article is updated to **Review**.

  The approval completion affects the scheduled publishing as follows:

  - If the approvals are completed before the scheduled publish date, the **Workflow** field on the Knowledge form of the article is updated to **Scheduled for publish** and the article is published on the scheduled publish date.
  - If the approvals are completed after the scheduled publish date, the article is published immediately on the approval completion.

Related topics

Edit a knowledge article in Agent Workspace

Knowledge workflows

Work on a feedback task in Agent Workspace

Start working on a feedback task, request clarifications, and resolve or close the feedback task in Agent Workspace. You can view all feedback tasks assigned to you or your ownership group.

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Before you begin
You must have contribute access to the knowledge base that stores the knowledge article you want to work on.
Role required: agent_workspace_user

About this task
A feedback task is created based on the following types of feedback sources.

Source	Description
User feedback	Knowledge article was marked as not helpful or given low ratings.
Internal feedback	Knowledge article was flagged.
Knowledge gap	Knowledge gap feedback task was created for one or more tasks using the Knowledge Demand Insights feature.
Knowledge gap - manual	Knowledge gap feedback task was created manually from a task, such as a customer service case or an incident.
Unsuccessful search	Knowledge gap feedback task was created from the Unsuccessful Searches report in the Self-Service Analytics for Customer Service dashboard.
Other	Feedback for a knowledge article from other sources. **Note:** When you upgrade your instance, for any existing records that don't have any feedback task type set or don't match with supported types, the feedback task type is automatically set to **Other**.

Procedure
1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **My Tasks - Feedback**.
3. Click the link to a feedback task number.
4. On the Knowledge Feedback Task form, review the feedback given by the submitter.
5. Work on the feedback task.
6. **Optional:** In the Compose section, enter comments, which all viewers can see, or work notes, which only internal users can see.
7. **Optional:** Track the time spent on each state for a feedback task by clicking the **Knowledge Feedback Task Metrics** tab and then clicking a link to the state in the **Value** column.
8. Click **Save**.

Result
The feedback task is updated.

Related topics
View a knowledge article in Agent Workspace

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Create a knowledge article from a feedback task in Agent Workspace

When working on a knowledge article feedback task, if the current knowledge article doesn't address the issue, you can create another knowledge article from within the task. A feedback task is created for a knowledge article when the article is flagged, marked as not helpful, or rated low, or a knowledge gap feedback task is created on a topic.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article.
Role required: agent_workspace_user

About this task

A feedback task is created in the following ways:

- When a user provides a feedback for the knowledge article. For more information, see Provide feedback for a knowledge article in Agent Workspace.
- When knowledge gap feedback tasks are created on a topic from a demand insights dashboard. For more information, see Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to your tasks list.
   - For feedback tasks created through knowledge gaps or if a knowledge article was marked as not helpful or rated low, go to **Knowledge** > **My Tasks - Feedback**.
   - For tasks created when an article was flagged, go to **Knowledge** > **My Tasks - Flagged**.
3. In the **Number** column, click the link to a feedback task assigned to you or your ownership group.
4. Click **Create Article**.
5. Create the knowledge article by either selecting an article template or using the default template.

Option	Description
Selected article template	Select an article template to create a knowl edge article using defined fields and values. In the Create Article dialog box: **a.** From the Knowledge Base list, select a knowledge base. **b.** From the Article Template list, select the de sired article template. **Note:** The Article Template list is populated based on the article templates config ured for the selected knowledge base. **c.** Select **Create Article**. The Create Article dialog box is available if the article versioning and the Knowledge Arti cle Templates features are enabled. For more

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Option	Description
	information, see Article versioning and Knowledge article templates.
Default Standard template	Create a knowledge article using the default Standard template.

6. On the form, fill in the fields.

Note:
If you're using an article template, the available fields will vary.

Knowledge form

Field	Description
Knowledge base	Knowledge base in which the knowledge article is stored. You can associate a knowledge article with one knowledge base only. If you're using an article template, you can modify this value only if the template is available in the other knowledge base.
Category	Category for the knowledge article. This value helps users find the article within a selected category. You can select only categories available within the selected knowledge base. Articles without a category appear in the (empty) category.
Ownership Group	Ownership group for the knowledge article. An ownership group consists of a group of members and a manager who are responsible for approvals and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they're associated with. **Note:** This field is available only if the *glide.knowman.ownership_group.enabled* property is enabled. If no ownership group is assigned and approvals are required to publish a knowledge article, it's automatically submitted for approval to the knowledge administrator and knowledge manager. For more information, see Ownership groups.
Version	Automatically generated article version number. This number is incremented when changes are made to a published article. **Note:** This field is available if the article versioning feature has been enabled.
Workflow	Publishing workflow state of the knowledge article, such as **Draft**, **In Review**, or **Published**. For a new article, the workflow state is set to **Draft**.
Language	The language in which you're creating the knowledge article. The list is populated based on the languages enabled for the selected knowledge base. This field appears only when the I18N:Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated. For more information, see I18N - Knowledge internationalization.
Short description	Title of the knowledge article. This title appears when browsing and searching for knowledge article, and at the top of the article.

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Field	Description
	You can enter up to 100 characters in this field. **Note:** Knowledge articles similar to the short description text will appear in Agent assist.
Article body	Content for the knowledge article. Use the editing functions in the HTML editor to create content. For more information, see Editing functions for knowledge articles in the HTML editor.
Source Task	Task this knowledge article was created from. This field is set automatically when you create the knowledge article from a task, such as an incident or a customer service case, or from a submission record.
Scheduled publish date	Future date when the knowledge article will be published automatically. For more information, see Schedule a knowledge article for publishing in Agent Workspace.
Valid to	The date this knowledge article expires. Articles don't appear in search results after the **Valid to** date or if the **Valid to** date is empty. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date that the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is empty, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. For more information, see Validity of a knowledge article. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management. **Note:** If the system date format or user preferences is set to use `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Confidence	Maturity of an article based on its completeness and reusability.
Article type	Type of the article, which is automatically set to HTML. This field is available in the Standard template only. **Note:** The Wiki article type isn't supported in Agent Workspace.

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Field	Description
Display attachments	Option to display attachments in the knowledge article. If the article has attachments, they're listed below the text of a knowledge article on the knowledge article view page.
Attachment link	Option to automatically download an attached article when a user accesses it instead of opening the article. The Attachment link option applies to articles accessed from search links only. **Note:** Although you may attach multiple files, most web browsers permit users to download only the first attachment. To ensure download of all the files, bundle them into an archive and attach the archive. Articles accessed as links within other knowledge articles will not replicate this behavior.
Governance	An attribute of an article that enables you to control sensitive, critical, or regulated information. Not all articles have the same requirement for compliance reviews. Some articles are based on the collective experience of the people who use the articles (experience-based). Other articles have policy or legal information that require tight control (compliance-based).
Issue	Brief description about an issue. **Note:** This field is available in the KCS Article template only.
Environment	Details of the environment in place when the issue occurred. **Note:** This field is available in the KCS Article template only.
Cause	The cause of the issue. **Note:** This field is available in the KCS Article template only.
Resolution	Method used to resolve the issue. **Note:** This field is available in the KCS Article template only.
Question	Text to display as a question. **Note:** This field is available in the FAQ template only.
Answer	Text to display as an answer to an included question. **Note:** This field is available in the FAQ template only.
Introduction	Introduction to the topic.

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Field	Description
	Note: This field is available in the How To and What Is templates only.
Instructions	Instructions for a how-to topic. **Note:** This field is available in the How To template only.
Explanation	Explanation of a what-is topic. **Note:** This field is available in the What Is template only.

Note:
The **Confidence** and **Governance** fields appear when the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) is activated. For more information, see Managing the KCS article state.

7. **Optional:** Research for content related to knowledge article you're authoring using Agent assist.

   a. In the contextual side panel, select the agent assist icon ().
   The search results in Agent assist display default content based on the text-based search.

   b. Click the select a search resource icon (), and then select a search resource.
   For example, to view knowledge articles, select **Knowledge Articles**.

   c. **Optional:** In the search results, you can click a resource item, such as a knowledge article, to view its content in Agent assist.

   Tip:
   For better readability, you can resize the contextual side panel for Agent assist. For a full view of the selected resource item content, select **Full View**. The resource item content opens in another tab within the Agent Workspace.

8. **Optional:** Check whether your content matches the content in an existing article.

   a. Enter your search text in the text box available in Agent assist or retain the default text, which is the short description of the knowledge article.

   b. Select the lookup icon ().

   c. Select a search resource by clicking the Select a search resource icon ().

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- To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

  Note:
  This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management to find related articles. For more information, see Train the similarity solution for Knowledge Management to find related articles.

- To find knowledge articles that match the entered search text, choose **Knowledge Articles**.

9. Click **Save**.
   The article is saved and appears in the My Articles - Unpublished list and additional functionality becomes available on the form.
10. **Optional:** Either add to or modify the article details or publish the article.
    - Add to or modify the article details.

      (Optional) For more information, see Edit a knowledge article in Agent Workspace.

    - Publish the article by clicking **Publish**.

      A knowledge article is published depending on the workflow setting of its knowledge base:

      - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
      - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

        Note:
        With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *glide.knowman.ownership_group.enable_self_approval* property. For more information, see Ownership groups.

      For more information, see Schedule a knowledge article for publishing in Agent Workspace.

      When published, your knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version number of the knowledge article is updated. For more information, see Knowledge article version numbers.

What to do next

After you create and publish a knowledge article, you can perform the following actions related to the article:

- Request translations for the knowledge article. For more information, see Request translations for missing languages in Agent Workspace.
- Retire the knowledge article. Click **Retire** to enable the retirement workflow. For more information, see Retire a knowledge article.
- Translate the knowledge article directly from the knowledge article. For more information, see Translate a knowledge article in Agent Workspace.

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- Delete the published knowledge article. Click **Delete**. If the **Delete** button isn't displayed, click the more actions icon ( ), and then click **Delete**.

Note:
Only users with the admin role can delete a published knowledge article.

Related topics

View a knowledge article in Agent Workspace

Finding solutions using Agent assist

Edit a knowledge article from a feedback task in Agent Workspace

When working on a knowledge article task, you can edit the knowledge article from within the task. A feedback task is created for a knowledge article when the article is flagged, marked as not helpful, or rated low, or a knowledge gap feedback task is created on a topic.

Before you begin

Role required: You must have contribute access to the knowledge base that stores the knowledge article.

Note:
If the article versioning feature is enabled, only the knowledge administrator, knowledge managers, and author can edit the checked-out version of an article. If the feature is disabled, any users with contribute access to an article can edit the draft version of the article. An administrator can disable the article versioning feature by setting the *glide.knowman.versioning.enabled* property (from the **System Property** [sys_properties] table) to **false**.

Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to your tasks list.
   - For feedback tasks created through knowledge gaps or if a knowledge article was marked as not helpful or rated low, go to **Knowledge** > **My Tasks - Feedback**.
   - For tasks created when an article was flagged, go to **Knowledge** > **My Tasks - Flagged**.
3. In the **Number** column, click the link to a feedback task assigned to you or your ownership group.
4. Click **Edit Article**.
5. If the article versioning feature is enabled, click **Checkout** for a published knowledge article. You can only edit the latest version of a knowledge article.
6. Access the relevant related lists to modify the information.

Knowledge form related lists

Related list	Description
Details	Knowledge article content and its metadata.

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Related list	Description
	Note: If the article versioning feature is enabled, the default value of the **Valid to** date in the updated article version is automatically set based on the following criteria: ○ If the **Article Validity** field in the knowledge base associated with the article is empty, the **Valid to** date value from the earlier version of the article is retained. ○ If the **Article Validity** field in the knowledge base associated with the article isn't empty, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity). If you move a knowledge article to another knowledge base, the default value of the **Valid to** date in the updated article is automatically set based on the following criteria: ○ If the **Article Validity** field in the selected knowledge base is empty, the earlier **Valid to** date value is retained for the knowledge article. ○ If the **Article Validity** field in the selected knowledge base isn't empty, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity). If the dictionary value of the **Valid to** field is modified, this dictionary value overrides the default value of the **Valid to** field calculated according to the **Article Validity** field. For more information, see Validity of a knowledge article.
Feedback	Feedback received on the published versions of the article. To view more details about the feedback, in the **Comments** column, select a link for the desired version of an article.
Feedback Tasks	Details about the feedback task created for a knowledge article version.
Approvals	Approval history of the knowledge article.
Article Versions	Version history of the knowledge article.
Translated Versions	Translated versions of the knowledge article. This related list appears only when the translation management feature is enabled. To translate a knowledge article, select **New**. The **New** button on this related list appears when the *glide.knowman.translation.enable_translation_task* property is inactive.
Translation Tasks	Tasks submitted for translating the article. This related list appears when the Translation Management feature and the *glide.knowman.translation.enable_translation_task* property to enable creation of translation tasks are enabled. For more information, see Knowledge Management properties.

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Related list	Description
Related Articles	Related articles mapped to the knowledge article. For more information, see Map a related article in Agent Workspace.
Related Catalog Items	Related catalog items mapped to the knowledge article. For more information, see Map a related item in Agent Workspace.
Affected Products	Products mapped to the knowledge article. For more information, see Add an affected product to a knowledge article in Agent Workspace.

7. **Optional:** Research for content related to knowledge article you're authoring using Agent assist.

   a. In the contextual side panel, select the agent assist icon ( ).
   The search results in Agent assist display default content based on the text-based search.

   b. Click the select a search resource icon ( ), and then select a search resource.
   For example, to view knowledge articles, select **Knowledge Articles**.

   c. **Optional:** In the search results, you can click a resource item, such as a knowledge article, to view its content in Agent assist.

   Tip:
   For better readability, you can resize the contextual side panel for Agent assist. For a full view of the selected resource item content, select **Full View**. The resource item content opens in another tab within the Agent Workspace.

8. **Optional:** Check whether your content matches the content in an existing article.

   a. Enter your search text in the text box available in Agent assist or retain the default text, which is the short description of the knowledge article.

   b. Select the lookup icon ( ).

   c. Select a search resource by clicking the Select a search resource icon ( ).

   - To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

     Note:
     This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management. For more information, see Train the similarity solution for Knowledge Management to find related articles.

   - To find knowledge articles that match the entered search text, choose **Knowledge Articles**.

9. Click **Save**.
   The article is saved and appears in the My Articles - Unpublished list. If the article versioning feature is enabled, the version of the knowledge article is incremented by 0.01. For more information, see Knowledge article version numbers.

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10. **Optional:** Publish the article by clicking **Publish**.
    The knowledge article is published depending on the workflow setting of its knowledge base:
    - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
    - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

    Note:
    With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *glide.knowman.ownership_group.enable_self_approval* property. For more information, see Ownership groups.

    For more information, see Schedule a knowledge article for publishing in Agent Workspace.

    When published, the knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

Related topics

Work on a feedback task in Agent Workspace

Create a knowledge article from a feedback task in Agent Workspace

View a knowledge article in Agent Workspace

Provide feedback for a knowledge article in Agent Workspace

Using Agent Assist in Agent Workspace

Compare knowledge article versions in Agent Workspace

Select and compare two versions of a knowledge article in Agent Workspace to view the differences between them.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article.
Role required: agent_workspace_user

Note:
For comparison of the knowledge article versions in the Next Experience UI, see Compare two versions of an article.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **All Articles**.
3. Click the link to a knowledge article for which you want to compare two versions.
4. Click **Edit** to open the Knowledge article form.
5. In the Article Versions related list, select the two versions of the article to compare.
6. Click **Compare**.

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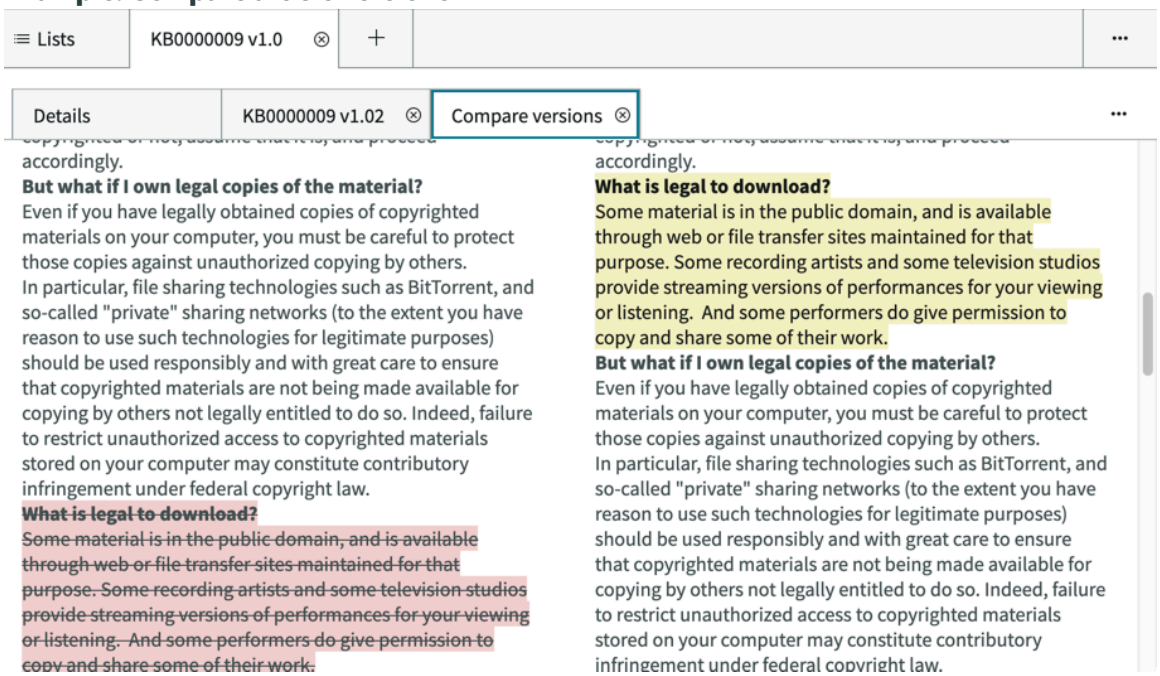
Result

The **Compare versions** tab opens within Agent Workspace and lists the fields for the selected versions in a side-by-side format. Any differences between the two versions are highlighted as shown in the following example image.

Example: Compare article versions



Related topics

Article versioning

Recall an article that is being reviewed in Agent Workspace

Recall an article that is being reviewed to stop the approval process.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to recall.
Ensure that the article versioning feature is enabled. For more information, see Article versioning.

Role required: agent_workspace_user

About this task

The author of a knowledge article, knowledge administrators, and system administrators can recall the article. If an ownership group is assigned to a knowledge article, the ownership group manager and ownership group members can also recall the knowledge article.

If a version of a knowledge article is in the **Review** workflow state, you can recall only the corresponding version to make additional changes. Recalling the article results in a minor version increment.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All Articles**.
3. Click the link to the article in **Review** workflow state that you want to recall.
4. On the Knowledge form, click **Recall**.

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Result
The article opens in edit mode and the workflow state of the article is changed to **Draft**. The version number of the article increments by 0.01.

Related topics

Edit a knowledge article in Agent Workspace

Knowledge workflows

Approve a knowledge article in Agent Workspace

Approve a knowledge article that is awaiting your review in Agent Workspace.

Before you begin
Role required: agent_workspace_user

About this task
If the article versioning feature is enabled, only users who are assigned as approvers can modify a knowledge article that is in the **Review** state. If you are not an approver but need to modify the article, consider recalling the article. For more information, see Recall an article that is being reviewed in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **My Articles - Unpublished**.
3. Click an article link in **Review** workflow state.
4. Click **Edit**.
5. In the Approvals related list, in the **State** column, click **Requested**.
   The Approval form opens in another tab within Agent Workspace.
6. From the State list, select **Approved**.
7. Click **Save**.
   The approved knowledge article is published immediately or on the scheduled publish date, if the article is scheduled for publishing. If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). On the Knowledge form of the article, the workflow state changes to **Published**. The new published version of the article is added to the Article Versions related list on the Knowledge form. The version is also available in the All Articles list in Agent Workspace, go to **Knowledge** > **All Articles**.

Related topics

View a knowledge article in Agent Workspace

Request translations for missing languages in Agent Workspace

Request to translate a published knowledge article in available languages by creating a translation task in Agent Workspace.

Before you begin
You must have contribute access to the knowledge base that stores the knowledge article. Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated.
- I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated.

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Note:
The 18N: Internationalization plugin (com.glide.i18n) activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

- The *glide.knowman.translation.enable_translation_task* property is set to `true` in the ServiceNow AI Platform interface. For more information, see Knowledge Management properties.

Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **All Articles**.
3. Click the link to a knowledge article for which you want to create a translation task.
4. On the Knowledge form, click **Edit**.
5. Click **Request translations**.
6. In the Request translation dialog box, select one or more available languages in the Select languages list.
   If a language appears grayed out, a translation is already in progress or has been completed for that language. Some languages might not be available if the system administrator has configured only specific languages for the knowledge base in which the article is contained.
7. Click **Submit**.

Result
The translation task is created for the article in the selected languages and assigned to a group or user based on assignment rules, if configured.

Related topics

Create translation assignments for knowledge articles

Translate a knowledge article from a translation task in Agent Workspace

Translate a knowledge article in Agent Workspace

Translate published knowledge articles to make them available in other languages.

Before you begin
You must have contribute access to the knowledge base that stores the knowledge article. Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated.
- I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated.

Note:
The 18N: Internationalization plugin (com.glide.i18n) activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

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- The *glide.knowman.translation.enable_translation_task* property is set to `true` in the ServiceNow AI Platform interface. For more information, see Knowledge Management properties.

  Note:
  When the *glide.knowman.translation.enable_translation_task* property is set to `false`, translate the knowledge article by clicking **New** in the Translated version related list of a Knowledge form. The Knowledge form that is displayed to translate the article is based on the article template of the source knowledge article. You can enter your translation content in the Knowledge form. For more information about the Knowledge form, see Create a knowledge article in Agent Workspace.

Role required: agent_workspace_user

About this task

If you have contribute access to a knowledge article, you can translate a knowledge article directly from the knowledge form.
If your system administrator has configured languages for the knowledge base, you can translate into those languages only. For more information, see Create a knowledge base.

Note:
The translation management feature isn't available for knowledge blocks in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **All Articles**.
3. In the **Number** column, click the link to a knowledge article that you want to translate.
4. Click **Edit**.
5. Click **Translate**.

   Note:
   The **Translate** button is not available if the *glide.knowman.translation.enable_translation_task* property is disabled, translations of the knowledge article are available in all available languages, or a translation task has already been created for all the available languages.

   The Original language and Translated language sections appear side by side for easy viewing, as shown in the following figure. The text in the Translated language section still appears in the original language content.

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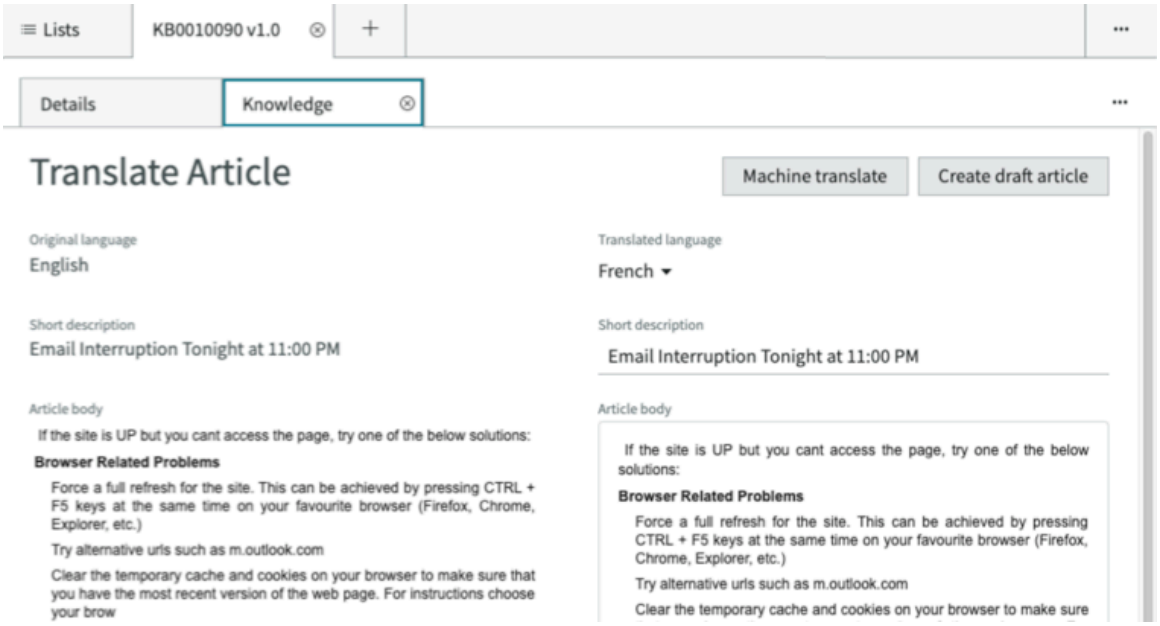

6. Provide the translation in the Translated language section.
   - If dynamic translation is enabled, click **Machine translate** to automatically replace the draft content in the Translated language section with machine-translated content in the targeted language.

     Note:
     A default translator configuration should be available. For configuring the translation API, see Dynamic translation.

     When you click **Machine translate**, any draft content in the Translated language section is automatically replaced with the machine-translated content.

   - If dynamic translation is not available, replace the draft content in the Translated language section with your translated text.
7. Click **Create draft article** to create a draft version of the translated article.
8. Click **Publish**.

Result

When the translated version of the knowledge article is published, a new knowledge number is assigned to the translated version. The translated version is available in the All Articles list in Agent Workspace. Also, the Translated Versions related list on the Knowledge form of the original and translated knowledge article is updated with all the translated versions.

Related topics

Request translations for missing languages in Agent Workspace

Translation management

Translate a knowledge article from a translation task in Agent Workspace

Translate a published knowledge article for which you have been assigned a translation task.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article. Ensure that the system administrator verifies the following settings:

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- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated.
- I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated.

  Note:
  The 18N: Internationalization plugin (com.glide.i18n) activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

- The *glide.knowman.translation.enable_translation_task* property is set to `true` in the ServiceNow AI Platform interface. For more information, see Knowledge Management properties.

Role required: agent_workspace_user

About this task

A translation task is created for a knowledge article when a request for translation is submitted or its knowledge base is configured to automatically create translation tasks. For more information, see Request translations for missing languages in Agent Workspace and Create a knowledge base.

Note:
The translation management feature isn't available for knowledge blocks in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **My Tasks - Translation**.
3. In the **Number** column, click the link to a translation task.
4. Click **Translate**.

   Note:
   The **Translate** button is not available if the *glide.knowman.translation.enable_translation_task* property is disabled, translations of the knowledge article are available in all available languages, or a translation task has already been created for all the available languages.

   The Original language and Translated language sections appear side by side for easy viewing, as shown in the following figure. By default, the Translated language section includes the original language content.

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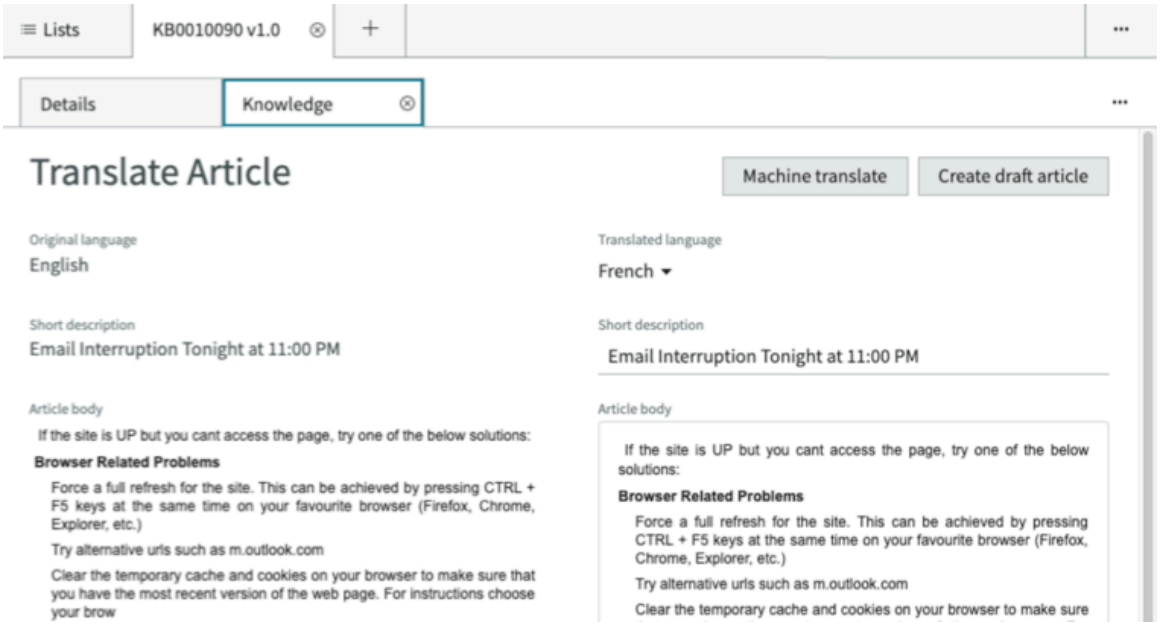

5. Provide the translation in the Translated language section.
   - If dynamic translation is enabled, click **Machine translate** to automatically replace the draft content in the Translated language section with machine-translated content in the targeted language.

     Note:
     A default translator configuration should be available. For configuring the translation API, see Dynamic translation.

     When you click **Machine translate**, any draft content in the Translated language section is automatically replaced with the machine-translated content.

   - If dynamic translation is not available, replace the draft content in the Translated language section with your translated text.
6. Click **Create draft article** to create a draft version of the translated article.
7. Click **Publish**.

Result

When the translated version of the knowledge article is published, a new knowledge number is assigned to the translated version. The translated version is available in the All Articles list in Agent Workspace. Also, the Translated Versions related list on the Knowledge form of the original and translated knowledge article is updated with all the translated versions.

Related topics

Request translations for missing languages in Agent Workspace

Translation management

Authoring a knowledge article in Microsoft Word

Author and access knowledge articles in Microsoft Word by deploying the Knowledge Management - Add-in for Microsoft Word.

User with contribute access to a knowledge base can open, create, edit, publish, and search for knowledge articles from within the Knowledge Management pane in Microsoft Word. A user

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with read access to a knowledge base, can view the article in Microsoft Word. The Knowledge Management - Add-in for Microsoft Word is available in the online version of Microsoft Word only.

The Knowledge Management - Add-in for Microsoft Word works with applications that are integrated with the online version of Microsoft Word such as Microsoft SharePoint and Microsoft OneDrive.

Consider the following points when using the Knowledge Management - Add-in for Microsoft Word to maintain knowledge articles:

- The URL is automatically generated for Word documents created in Microsoft SharePoint and Microsoft OneDrive with business accounts only.

  For other applications and account types, you must manually enter the URL in the **Document URL** field on the Knowledge form in Microsoft Word. For more information, see Create a knowledge article in Microsoft Word.

- The conversion time of a knowledge article from a Microsoft Word document depends on the document size.
- Headers and footers corresponding to pages in the Microsoft Word document appear as is in the knowledge article. You can remove headers and footers in the Microsoft word document before creating or updating the knowledge article.

Note:
As an admin, you must create a Restricted Caller Access Privileges record for the Microsoft Word add-in to publish a knowledge article content in scoped knowledge bases. For more information, see Restricted caller access privilege settings.

Activation information

Activate the Knowledge Management - Add-in for Microsoft Word plugin (com.snc.knowledge.ms_word) to access knowledge articles from within the Microsoft Word online application. For more information, see Activate Knowledge Management - Add-in for Microsoft Word.

Related topics

View a knowledge article in Microsoft Word

Create a knowledge article in Microsoft Word

Edit a knowledge article in Microsoft Word

Publish a knowledge article in Microsoft Word

Configure Knowledge Management - Add-in for Microsoft Word

Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word

Author and collaborate on knowledge articles in Microsoft Word by logging in to your ServiceNow instance from the Word Online application.

Before you begin
You must have contribute access to the knowledge base within which you want to create the knowledge article.
The system administrator and Office 365 administrator have configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)

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About this task

You need to authenticate with your ServiceNow instance credentials for accessing and creating knowledge articles using Microsoft Word. You might also need to re-authenticate if your session has expired.

Procedure

1. Sign in to your Office 365 account.
2. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
3. In the New section, click **New blank document**, or open any existing Microsoft Word document.
4. On the Home tab, click the Knowledge icon ( ).
5. In the Knowledge Management pane of the Word document, click **Log in to ServiceNow**. The ServiceNow login page opens in a separate tab of your browser.
6. On the ServiceNow login page, enter your ServiceNow credentials.

Result

After successful authentication, the ServiceNow instance browser tab closes and you are redirected to the Microsoft Word browser tab. On the Microsoft Word document, the Knowledge Management pane displays the welcome screen.

View a knowledge article in Microsoft Word

View a knowledge article in Microsoft Word, including the article number, short description, and article content.

Before you begin

- Ensure that the administrator has configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have read access to the knowledge article.
- You must have signed in to your Office 365 account.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. Access the article in the Knowledge Management pane of the Word document.

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- In the Knowledge Management pane, in the **Search** box, enter the knowledge article number or description.
- In the Knowledge Management pane, click a knowledge base to view a list of knowledge articles within the knowledge base. All knowledge bases and associated knowledge articles for which you have contribute or read access appear in the Knowledge Management pane

5. In the Knowledge Management pane, click the link to the knowledge article that you want to view.

Tip:
To go back to the previous view in the Knowledge Management pane, click the left caret icon (). To go back to the landing screen, click the home icon ().

Result
If a knowledge article was created from the Knowledge Management application in the ServiceNow AI Platform interface, the article content appears in the Document pane and the article details appear in the Knowledge Management pane of the Microsoft Word document.

If a knowledge article was created using another Word document, the document opens in a new browser tab with the content in the Document pane and the article details in the Knowledge Management pane of that document.

Note:
If the article uses a template, the article opens in the ServiceNow AI Platform interface in a new browser tab. You can't edit articles with templates in Microsoft Word.

The following article details appear in the Knowledge Management pane.

Knowledge form

Field	Description
Number	Automatically generated knowledge article number.
Knowledge base	Knowledge base in which the knowledge article is stored. You can associate a knowledge article with one knowledge base only.
Category	Category for the knowledge article. This value helps users find the article within a selected category. You can select only categories available within the selected knowledge base. Articles without a category appear in the (empty) category.
Ownership Group	Ownership group for the knowledge article. An ownership group consists of a group of members and a manager who are responsible for approvals and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they are associated with. **Note:** This field is available only if the *glide.knowman.ownership_group.enabled* property is enabled. If no ownership group is assigned and approvals are required to publish a knowledge article, it is automatically submitted for approval to the knowledge administrator and knowledge manager. For more information, see Ownership groups.
Workflow	Publishing workflow state of the knowledge article, such as **Draft**, **In Review**, or **Published**. For a new article, the workflow state is set to **Draft**.

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Knowledge form (continued)

Field	Description
Short description	Title of the knowledge article. This title appears when browsing and searching for knowledge article, and at the top of the article. You can enter up to 100 characters in this field.
Document URL	URL of the article for accessing the online version in Microsoft Word. The URL is automatically generated for Word documents created in Microsoft SharePoint and Microsoft OneDrive with business accounts only. For other applications and account types, you must manually enter the URL in the **Document URL** field. **Note:** Avoid copy-pasting the browser URL, because it might not always work. Depending on the collaboration tool for your Word document use the URL generated specifically for sharing with other users. When manually entering the URL: • For Microsoft SharePoint, use the URL generated by the Word Online application for specific users you want to have access to the document. • For Box, use the Box Shared Link. For more information, see Creating Shared Links.
Version	Automatically generated article version number. This number is incremented when changes are made to a published article. **Note:** This field is available if the article versioning feature has been enabled.
Valid to	The date this knowledge article expires. Articles do not appear in search results after the **Valid to** date or if the **Valid to** date is blank. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is blank, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are about to expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management.

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Knowledge form (continued)

Field	Description
	Note: If the system date format or user preferences are set to use the `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your system administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Scheduled publish date	Future date when the knowledge article will be published automatically. For more information, see Schedule a knowledge article for publishing in Microsoft Word.

Related topics

Create a knowledge article in Microsoft Word

Edit a knowledge article in Microsoft Word

Create a knowledge article in Microsoft Word

Create a knowledge article in Microsoft Word to author and collaborate on content using Word.

Before you begin

- Ensure that the administrator has configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have contribute access to the knowledge base within which you want to create the knowledge article.
- You must have signed in to your Office 365 account.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app from your Office 365 account and open a Word document.
   For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. In the Knowledge Management pane of the Word document, click **Create Article**.
5. On the Knowledge form, fill in the fields.

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Knowledge form

Field	Description
Number	Automatically generated knowledge article number.
Knowledge base	Knowledge base in which the knowledge article is stored. You can associate a knowledge article with one knowledge base only.
Category	Category for the knowledge article. This value helps users find the article within a selected category. You can select only categories available within the selected knowledge base. Articles without a category appear in the (empty) category.
Ownership Group	Ownership group for the knowledge article. An ownership group consists of a group of members and a manager who are responsible for approvals and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they are associated with. **Note:** This field is available only if the *glide.knowman.ownership_group.enabled* property is enabled. If no ownership group is assigned and approvals are required to publish a knowledge article, it is automatically submitted for approval to the knowledge administrator and knowledge manager. For more information, see Ownership groups.
Workflow	Publishing workflow state of the knowledge article, such as **Draft**, **In Review**, or **Published**. For a new article, the workflow state is set to **Draft**.
Short description	Title of the knowledge article. This title appears when browsing and searching for knowledge article, and at the top of the article. You can enter up to 100 characters in this field.
Document URL	URL of the article for accessing the online version in Microsoft Word. The URL is automatically generated for Word documents created in Microsoft SharePoint and Microsoft OneDrive with business accounts only. For other applications and account types, you must manually enter the URL in the **Document URL** field. **Note:** Avoid copy-pasting the browser URL, because it might not always work. Depending on the collaboration tool for your Word document use the URL generated specifically for sharing with other users. When manually entering the URL: ○ For Microsoft SharePoint, use the URL generated by the Word Online application for specific users you want to have access to the document. ○ For Box, use the Box Shared Link. For more information, see Creating Shared Links.
Version	Automatically generated article version number. This number is incremented when changes are made to a published article.

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Field	Description
	Note: This field is available if the article versioning feature has been enabled.
Valid to	The date this knowledge article expires. Articles do not appear in search results after the **Valid to** date or if the **Valid to** date is blank. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is blank, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are about to expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management. **Note:** If the system date format or user preferences are set to use the `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your system administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Scheduled publish date	Future date when the knowledge article will be published automatically. For more information, see Schedule a knowledge article for publishing in Microsoft Word.

6. In the Document pane of the Word document, enter the article content.
7. In the Knowledge Management pane of the Word document, click **Submit**.
8. **Optional:** Publish the article by clicking **Publish**.

   (Optional) A knowledge article is published depending on the workflow setting of its knowledge base:

   - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
   - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

   For more information, see Schedule a knowledge article for publishing in Microsoft Word.

   If the article versioning feature is enabled, the version number of the knowledge article is updated. For more information, see Knowledge article version numbers.

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What to do next

You can share the document URL so that users can co-author the document. For more information, see Document collaboration and co-authoring.

Edit a knowledge article in Microsoft Word

Use Microsoft Word to edit a knowledge article originally created in Microsoft Word.

Before you begin

- Ensure that the administrator has configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have contribute access to the knowledge article.
- You must have signed in to your Office 365 account.

About this task

Note:
You can't edit a knowledge article that uses an article template in Word.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. Access the article in the Knowledge Management pane of the Word document.
   - In the Knowledge Management pane, in the **Search** box, enter the knowledge article number or description.
   - In the Knowledge Management pane, click a knowledge base to view a list of knowledge articles within the knowledge base. All knowledge bases and associated knowledge articles for which you have contribute or read access appear in the Knowledge Management pane. However, you can edit knowledge articles for which you have contribute access.
5. In the Knowledge Management pane, click the link to the knowledge article that you want to edit.
6. If the Document pane of the Word document contains any content, retain or replace the content.
   - To overwrite the existing content in the Word document with content from the article you selected, click **Replace**.
   - To keep the existing content in the Word document, click **Retain**.

   Note:
   When you save the article, the Word document content will replace the article content.

7. If the article versioning feature is enabled, click **Checkout** for a published knowledge article. You can edit only the latest version of a knowledge article.

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8. Edit the content of the article in Microsoft Word.
   - Edit the article content online using Microsoft Word in your browser.
   - Edit the article content using the Word Desktop app on your computer. In this case, after you complete editing the desktop version of the article content, you must return to the online version in your browser to save the article content in your ServiceNow instance.

   Tip:
   If multiple people with contribute access to the knowledge article need to co-author the same document, you can share the document URL. For more information, see Document collaboration and co-authoring.

9. In the Knowledge Management pane, click **Save**.
10. **Optional:** Publish the article by clicking **Publish** in the Knowledge Management pane.
    The knowledge article is published depending on the workflow setting of its knowledge base.
    - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
    - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

    For more information, see Schedule a knowledge article for publishing in Microsoft Word.

    If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

Unlink knowledge articles from linked Microsoft Word documents

Unlink a knowledge article from a linked Microsoft Word document to edit the article directly from the Knowledge form in the ServiceNow AI Platform.

Before you begin
Ensure that the article was created using the Knowledge Management - Add-in for Microsoft Word.
Role required: admin

About this task
If a knowledge article is created using the Knowledge Management - Add-in for Microsoft Word, you can edit the article using only the linked Word document in the Word Online application. However, if you delete or move the linked Word document, the URL to the Word document and article is broken. Therefore, you will no longer be able to edit the article using the linked Word document. To continue editing such articles:

- Manually enter the new document URL for the Word document in the **Document URL** field on the Knowledge form in Microsoft Word. For more information about the field, see Create a knowledge article in Microsoft Word.
- Unlink the article from its linked Word document by following the steps in this procedure.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. Select an article from the **Published** or **Unpublished** category.

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3. On the Knowledge form, click the **Unlink from Word** related link.

> **Important:**
>
> When you unlink an article from Microsoft Word, it may affect the HTML formatting in the editor. This formatting change can impact how knowledge articles appear and function during editing and display.

Publish a knowledge article in Microsoft Word

Use the Word Online application to publish a knowledge article originally created in Microsoft Word to make it available to users.

Before you begin

- Ensure that the administrator has configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have contribute access to the knowledge base within which you want to publish the knowledge article.
- You must have signed in to your Office 365 account.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. Access the article in the Knowledge Management pane of the Word document.
   - In the Knowledge Management pane, in the **Search** box, enter the knowledge article number or description.
   - In the Knowledge Management pane, click the knowledge base to view a list of knowledge articles within the knowledge base.
5. In the Knowledge Management pane, click the link to the knowledge article that you want to publish.
6. On the Knowledge form, click **Publish**.

Result

A knowledge article is published depending on the workflow setting of its knowledge base:

- **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
- **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

For more information, see Schedule a knowledge article for publishing in Microsoft Word.

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If the article versioning feature is enabled, the version of the article is incremented based on the version number pattern.

Schedule a knowledge article for publishing in Microsoft Word

Set a specific time and day for the draft version of a knowledge article created in Microsoft Word to be published automatically.

Before you begin

- You must have contribute access to the knowledge base that stores the knowledge article you want to schedule for publishing.
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have signed in to your Office 365 account.

Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. For more information, see Activate the Knowledge Management Advanced plugin.
- The article versioning feature is enabled. For more information, see Article versioning.
- The Knowledge Management - Add-in for Microsoft Word is enabled. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. In the Knowledge Management pane of the Word document, in the **Search** box, enter the knowledge article short description.
5. Click the link to the knowledge article in the Draft state that you want to schedule for publishing.

   Note:
   The knowledge article must have been originally created using Microsoft Word.

6. In the **Scheduled publish date** field, click the show calendar icon .
7. Select any future date from the calendar.
8. In the **Select Time** field, enter a time in the format hh:mm:ss.
9. Click **OK**.
10. Click **Publish** to enable the publishing workflow.

    Tip:
    If you want to cancel an article's scheduled publication and move the article back to the Draft state, click **Recall**.

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Result

If approvals are disabled, the state of the knowledge article is changed to **Scheduled for Publish** and the article is automatically published on the scheduled publish date.

If approvals are enabled, the state of the knowledge article is changed to Review. If the article is approved, the state of the article is changed to Scheduled for Publish. If the article was approved after the scheduled publish date, the article is published immediately.

The version number of the knowledge article increments based on the publishing workflow. For more information, see Knowledge article version numbers.

Related topics

Knowledge workflows

Approve an article that is being reviewed

Recall an article that is being reviewed in Microsoft Word

Recall a knowledge article that is being reviewed and created using Microsoft Word to stop the approval process.

Before you begin

- You must have contribute access to the knowledge base that stores the knowledge article you want to recall.
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have signed in to your Office 365 account.

Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. For more information, see Activate the Knowledge Management Advanced plugin.
- The article versioning feature is enabled. For more information, see Article versioning.
- The Knowledge Management - Add-in for Microsoft Word is enabled. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)

About this task

The author of a knowledge article, knowledge administrators, and system administrators can recall an article. If an ownership group is assigned to a knowledge article, the ownership group manager and ownership group members can also recall the knowledge article.
If a version of a knowledge article is in the Review state, you can recall only the corresponding version to make additional changes. Recalling the article results in a minor version increment.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. In the Knowledge Management pane of the Word document, in the **Search** box, enter the knowledge article title or description.

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5. Click the link to the article in Review state that you want to recall.
6. On the Knowledge form, click **Recall**.

Result

The article opens in edit mode and the state of the article is changed to Draft. The version number of the article increments by 0.01.

Create a knowledge article from a customer service case

Reuse information from a customer service case by creating knowledge articles from cases.

Before you begin

Your administrator must enable creation of articles from customer service cases.

Role required: sn_customerservice_agent or knowledge

Procedure

1. Navigate to **Customer Service** > **Cases** > **All**.
2. Select a case from which you want to create a knowledge article.
3. Click **Create Knowledge**.
   The relevant fields are automatically copied from the case to the record that opens.
4. In the **Knowledge base** field, enter the name of the knowledge base in which you want this article to display.
5. Click **Submit**.

Provide feedback on knowledge articles

You can view and contribute to feedback on knowledge articles.

Feedback options

You can submit feedback for knowledge articles in these ways:

- Flag an article as incorrect or inappropriate.
- Provide a rating value for the article.
- Mark an article as helpful or not helpful.
- View comments, add a new comment, or reply to existing comments.

Users can view comments directly on the article. Knowledge managers can view the other types of feedback by navigating to **Knowledge** > **Feedback**.

Note:
To know more about Knowledge article view properties and rating options that appear with articles, see Knowledge article view properties.

Administrators and knowledge managers can disable some feedback options using fields on the Knowledge Base form. Administrators can configure feedback options using properties.

Flagging articles

You can flag an article for incorrect or inappropriate content. Click **Flag Article** in the article header to open a new window, allowing you to enter suggested changes.

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- Flagged comments do not appear on the Article View page. Users with the admin, knowledge_admin, and knowledge_manager roles can access flagged articles by navigating to **All** > **Knowledge** > **Articles** > **All Flagged**. Users with the knowledge role can access their flagged articles by navigating to **All** > **Knowledge** > **Feedback Management** > **My Flagged**.
- If disabled, the author of the article and users with the admin, knowledge_admin, and knowledge_manager roles can see all flagged comments. Other users can see only their own flagged comments.

Note:

- You cannot disable flagging for an article until you have disabled the flagging for all feedback comments for that article.
- If Disable Suggesting is checked at the Knowledge Base level, the **Flag Article** button does not appear for any knowledge article

Flagged comments are stored in the Knowledge Feedback (kb_feedback) table but not the Live Feed Messages (live_message) table.

Rating articles

The five stars below the article title allow you to indicate the article's effectiveness on a scale of 1 to 5.

Note:
If the **Disable rating** is checked at the Knowledge Base level, the Rating Article button does not appear for any knowledge article.

Marking articles

The question Helpful? at the bottom of the article allows you to indicate the usefulness of the article with a simple **Yes** or **No** answer. The **Yes** and **No** options are always available on the knowledge article view page even when you had selected an option earlier.

Note:
If the **Disable Mark as helpful** is checked at the Knowledge Base level, the Marking Article button does not appear for any knowledge article.

Comments

Knowledge comments at the bottom of the article use live feed to enable a conversation around a knowledge article. For example, you can post replies to comments, add attachments, or Like comments. The *glide.knowman.use_live_feed* property controls the display of knowledge article comments. If enabled, the system uses live feed to manage and display feedback on knowledge articles.

Note:
Unauthenticated users and users with only the snc_external role can't add or view attachments for comments.

Related topics

Automating feedback management to improve content

Request a knowledge base

Create a knowledge article from an incident in ITSM Agent Workspace

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Knowledge Management reference

Reference topics provide additional information that you can use to configure and administer Knowledge Management.

Domain separation and Knowledge Management

Domain separation is supported in Knowledge Management. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Overview

Domain separation works differently at different access levels of an application. In Knowledge Management, data, requester, and fulfiller access to knowledge bases are domain separated.

How domain separation works in Knowledge Management

In Knowledge Management, the following rules apply:

Data: At the data level of domain separation, data visibility is separated from one domain to another. Knowledge bases, user criteria, articles, categories, article feedback, article versions, article templates, and external sources are domain separated in the base system.

Note:
The data in one domain cannot be seen in any other domain. For example, if you create a Knowledge Management article in a domain A using an article template which is not in domain A, the article will not be visible in domain A. Similarly, if you create a Knowledge Management article in the global domain using a template that is not in global, the article might not be visible in all the domains.

Requester: Requester activities are supported within tenant domains. Users can search; view; comment; and rate articles of their domain, any child domain, and global domains, if feedback is enabled and the knowledge base settings grant them read access to articles.

- Users in the global domain can access articles in all the domains if read access is granted at knowledge base and/or article level.
- Users in the parent domain can access articles in that domain, global, and all its child domains if read access is granted at knowledge base and/or article level.
- Users in the child domain can access articles in that domain and the global domain if read access is granted at knowledge base and/or article level.

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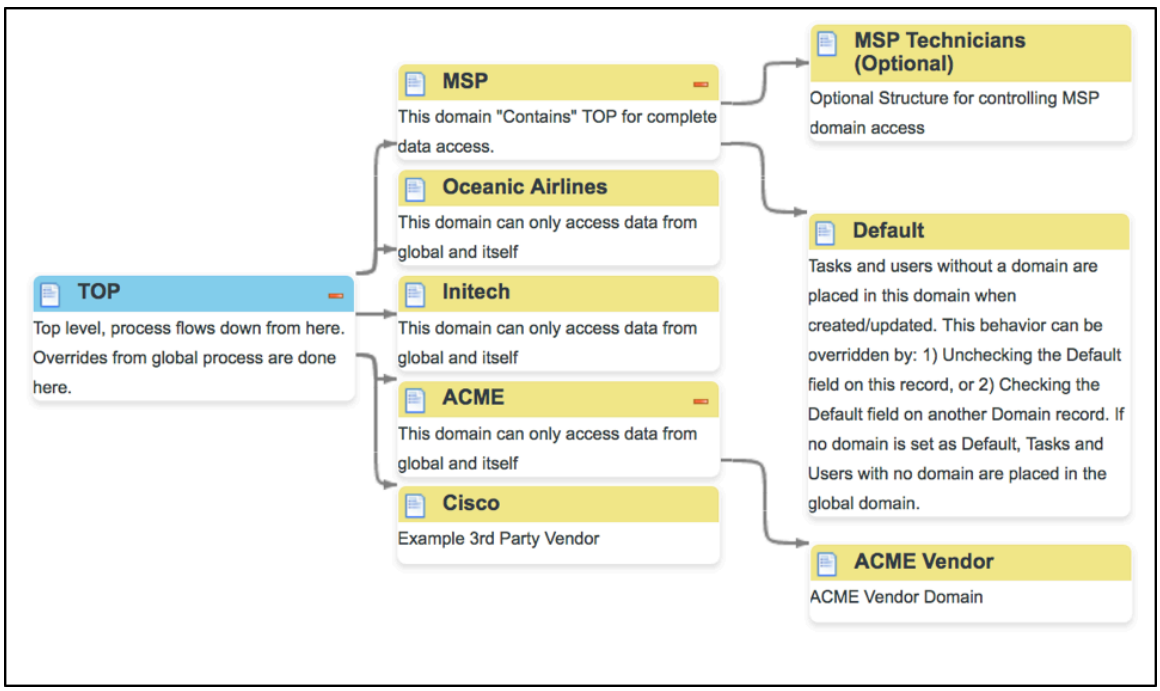
Fulfiller: The application can be used by the Fulfiller within the tenant domains as a tenant domain-owned application. Users are allowed to author articles in knowledge bases of their domain, any child domain, and the global domain if the knowledge base has user criteria set up to grant contribute access.

- Articles are automatically saved to the user's current domain when the article is created.
- If the `glide.knowman.allow_edit_global_articles` system property is enabled, users from a domain other than the global domain can check out and edit global articles. Otherwise, system administrators and users from a domain other than the global domain cannot check out global articles and are shown a warning message to that effect. Depending on their access, users can change their domain to the global domain to check out and edit the global articles.
- Domains of versioned articles will be maintained as per the latest article version's domain. This includes updating the domain for kb_version, kb_knowledge, kb_feedback, and sys_attachment tables.
- If domains contain another domain: If Domain A contains Domain B, users with access to Domain A can author articles in Domain B by toggling the domain scope. To learn more about toggling domain scope, see Visibility domains and Contains domains.

See Managing access to knowledge bases and knowledge articles to learn how to control contribute and read access to knowledge bases and knowledge articles.

Use cases

This image demonstrates a basic domain hierarchy that is available in the base system.



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Requester use cases

User domain	Knowledge base domain	Read user criteria domain	Article domain	Result
Global	Global	Global	Global	Can view, comment, rate articles.
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	
Parent domain (TOP)	Global	Global	Global	
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	
Child domain (TOP/ACME)	Global	Global	Global	Can view, comment, rate articles.
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	

Fulfiller use cases

User domain	Knowledge base domain	Contribute user criteria domain	Article domain	Result
Global	Global	Global	Global	Can author, update, view, comment, rate articles.
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	
Parent domain (TOP)	Global	Global	Global	
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	

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User domain	Knowledge base domain	Contribute user criteria domain	Article domain	Result
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	
Child domain (TOP/ACME)	Global	Global	Global	Can author, update, view, comment, rate articles.
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	

Known Issues

- The following AQI tables are not domain separated:
  - AQI Checklist [kb_quality_checklist]
  - Checklist Question [kb_checklist_question]
  - Article Checklist Answer [kb_article_checklist_answer]

  Note:
  The Article Checklist Answer table does not contain the Order field. The application shows the list in a random order.

- Comment provided by a user on an article is stored in article's domain instead of user domain.

Related topics

Domain separation for service providers

Additional plugins for Knowledge Management

After Knowledge Management is activated, you can activate additional plugins that provide access to various additional Knowledge Management features.

You must have the admin role to activate these additional plugins. For details, see Activate a plugin.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Plugin	Description
Knowledge Management Core (com.glideapp.knowledge)	Installs the core Knowledge Management items used to allow other Knowledge-related plugins to work, such as Knowledge V3, Knowledge Advanced, and Knowledge Service Portal. This plugin is activated by default.

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Plugin	Description
Knowledge Management Advanced Installer (com.snc.knowledge_advanced.installer)	Installs the Knowledge Management Advanced plugin. Activating/upgrading to this plugin validates the knowledge articles and knowledge bases to make sure that the Knowledge Advanced plugin can be successfully installed. If validation fails, check the Plugin Activation logs and follow instructions given to fix any errors. Once you fix all the issues, re-run this plugin.
Knowledge Management Advanced (com.snc.knowledge_advanced)	Adds advanced features to Knowledge Management such as version control and subscriptions. This plugin requires that all knowledge bases are version Knowledge V3. Use the Knowledge Management Advanced Installer plugin to activate this plugin.
Predictive Intelligence for Knowledge Management (com.snc.knowledge_ml)	Provides various Knowledge Management capabilities driven by machine-learning solutions. For example, capabilities such as similar articles and knowledge demand insights. Activation of this plugin on production instances may require a separate license. Contact ServiceNow for details. **Note:** When you install and activate the Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml), the Predictive Intelligence for Contextual Search plugin (com.snc.contextual_search_ml) is also activated.
Performance Analytics - Content Pack - Knowledge Management (com.snc.pa.knowledge_v2)	Enables the Performance Analytics content pack for the Analytics and Reporting Knowledge Management Solution. Activation of this plugin on production instances might require a separate Performance Analytics license. Contact ServiceNow for details.
Knowledge Management V3 (com.snc.knowledge3)	Enables support for Knowledge Management V3. Activate this plugin when you upgrade from Eureka or earlier versions.
I18N: Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2)	Helps create and maintain translations of an article in various languages in a way that is easy to manage translations while authoring as well as viewing articles. Activating internationalization plugins for any of the available languages automatically activates this plugin.
Knowledge Document (com.snc.knowledge_document)	Adds knowledge-based functionalities to the Managed Documents plugin. You can create a knowledge article from a document or update a knowledge document to a newer revision.
Knowledge Management - External Content Integration (com.snc.knowledge.external_integrations)	Adds external content search capabilities to the Knowledge Management application. Once configured, this feature creates a copy of the external content on ServiceNow as knowledge articles, and then indexes the articles through Zing Search. You must have appropriate reuse and copy privileges before you configure an external source to be searchable using this feature.

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Plugin	Description
Knowledge Management Wiki Support (com.glideapp.knowledge2.wiki)	Enables support to save Knowledge articles in wiki type field instead of html type field.
Knowledge Management KCS Capabilities (com.snc.knowledge_kcs_capabilities)	Enables the use of KCS roles (kcs_contributor, kcs_publisher, and kcs_candidate) and use the metadata fields for the KCS article state (governance and confidence).
Knowledge Management - Add-in for Microsoft Word (com.snc.knowledge.ms_word)	Enables authoring content in Microsoft Word and publishing it as a knowledge article using a Word add-in.
Knowledge Blocks (com.snc.knowledge_blocks)	Enables you to create re-usable content blocks that can be included in existing knowledge articles. This feature is capable to display only pieces of an article to specific users.
Knowledge Overview (com.sn_knowledge_overview)	Enables you to generate reports to provide an overview of knowledge base and article data.

Components installed with Knowledge Management Core

Several types of components are installed with activation of the Knowledge Management Core plugin (com.glideapp.knowledge) including user roles and tables.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available.

Roles installed

Role	Description	Contains roles
Knowledge [knowledge]	Users with the knowledge role can contribute to the default knowledge base and access the Knowledge application menu. The knowledge role is a fulfiller role and not a requester role.	None.
Knowledge administrator [knowledge_admin]	Knowledge administrator can create new knowledge bases and manage all knowledge bases.	Knowledge administrator contains the knowledge role.
Knowledge manager [knowledge_manager]	Knowledge managers perform administrative functions for knowledge bases they manage such as defining categories, pinning important articles, and approving changes to articles. Users selected as managers of a knowledge base receive this role automatically.	Knowledge manager contains the knowledge administrator role.

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Tables installed

Table	Description
CSM Table Map [csm_table_map]	Stores information about the mapping source and target table. For example, while creating a knowledge article from a customer service case, the source table would be customer service case [sn_customerservice_case] and the target table would be Knowledge [kb_knowledge].
CSM Field Map [csm_field_map]	Stores information about the fields that are mapped from the source table to the target table in a given table map (CSM Table Map). For example, when creating a knowledge article from a customer service case [sn_customerservice_case], the source field value would be case.short description and the target field value would be knowledge.short description.
Related Articles [kb_2_kb]	Stores information about related knowledge articles.
Related Catalog Items [kb_2_sc]	Stores information about related catalog items.
Knowledge Category [kb_category]	Stores the category of a knowledge article.
Knowledge Feedback Task [kb_feedback_task]	Stores information about the feedback task on a knowledge article.
Knowledge Feedback [kb_feedback]	Stores information about flagged comments on a knowledge article.
Knowledge Keyword [kb_keyword]	Stores information about keywords associated with the featured knowledge articles on the homepage of the Knowledge Management Service Portal.
Knowledge Base [kb_knowledge_base]	Stores information about knowledge bases that store knowledge articles.
Knowledge keyword [kb_knowledge_keyword]	Stores information related to mapping between knowledge articles and keywords.
Knowledge [kb_knowledge]	Stores knowledge articles organized by knowledge base and category, as well as featured content and popular articles.
Who Can Contribute To Knowledge Base [kb_uc_can_contribute_mtom]	Stores information about who can read and write to a knowledge base.

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Table	Description
Who Can Read Knowledge Base [kb_uc_can_read_mtom]	Stores information about who can read a knowledge base.
Who Cannot Contribute To Knowledge Base [kb_uc_cannot_contribute_mtom]	Stores information about who cannot read and write to a knowledge base.
Who Cannot Read Knowledge Base [kb_uc_cannot_read_mtom]	Stores information about who cannot read a knowledge base.
Knowledge Use [kb_use]	Stores information about the number of times articles are viewed and the number of times knowledge articles are used in an incident, problem, or case.
Knowledge Related to Products [m2m_kb_ci]	Stores information about the products related to knowledge articles.
Knowledge Comment Likes [m2m_kb_feedback_likes]	Stores information about users who like a comment in knowledge feedback.
Knowledge Applied to Tasks [m2m_kb_task]	Stores information about articles attached to tasks (incident, case, or problem).

Components installed with knowledge blocks

Several types of components are installed with activation of the knowledge blocks plugin, including tables.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Tables installed

Table	Description
Knowledge Block [kb_knowledge_block]	Knowledge blocks table. **Note:** This table extends the Knowledge [kb_knowledge] table.
KB Knowledge to Block [m2m_kb_knowledge_to_block]	KB knowledge to block table.
KB Knowledge to Block History	KB knowledge to block history table.

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Table	Description
[m2m_kb_to_block_history]	

For further information on table administration and how to manage data, see Table administration.

Knowledge Management roles

Certain roles are required to use Knowledge Management functionality.

Note:
The user criteria determine the access to knowledge articles. For more information, see Managing access to knowledge bases and knowledge articles.

The kcs_candidate, kcs_contributor, and kcs_publisher roles also include the knowledge role. For more information about these KCS-related roles, see KCS v6 Practices Guide.

Knowledge [knowledge]

Users with the knowledge role can contribute to the default knowledge base and access the Knowledge application menu. The knowledge role is a fulfiller role and not a requester role. Requesters can view, comment, and give feedback to the knowledge articles. However, a requester cannot create or edit articles.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Knowledge manager [knowledge_manager]

Knowledge managers perform administrative functions for the knowledge bases they manage defining categories, pinning important articles, and approving changes to articles. Users selected as managers of a knowledge base receive this role automatically. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

None.

Knowledge administrator [knowledge_admin]

Knowledge administrator can perform all the administrative tasks associated with maintaining the Knowledge Management system. User selected as a knowledge admin can make changes to all the knowledge bases except the scoped knowledge base. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Knowledge coach [knowledge_coach]

Knowledge coaches can perform Article Quality Index (AQI) surveys on articles, write, edit and review knowledge articles, and coach the team on best practices. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Knowledge domain expert [knowledge_domain_expert]

Knowledge domain experts perform AQI surveys on articles and can write, edit and review knowledge management articles. A knowledge domain expert keeps track of the health of knowledge base. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

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None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Administrator [admin]

Administrators can configure knowledge workflows, set knowledge properties, and manage knowledge forms and dashboards.

Contains Roles

List of roles contained within the role.

- sn_templated_snip.template_snippet_admin
- sn_employee.admin
- taxonomy_admin
- sn_ace.ace_user

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Knowledge group manager [knowledge_group_manager]

Knowledge group managers can add or remove members in ownership groups managed by them. They cannot change the manager assigned in their groups. The manager can only be reassigned by the knowledge administrator. Knowledge group managers are assigned feedback tasks by default. They can reassign tasks to another group member, or group members can assign a feedback task to themselves. Knowledge_group_member role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

None.

Knowledge group member [knowledge_group_member]

Knowledge group members are part of an ownership group that can be associated to knowledge articles. They can approve knowledge articles, assign feedback tasks to themselves and work on them as well as edit any knowledge articles that their ownership group is assigned to. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

KCS candidate [kcs_candidate]

Knowledge-Centered Service (KCS) candidates understand the basics of Knowledge-Centered Service (KCS). Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

KCS contributor [kcs_contributor]

Knowledge-Centered Service (KCS) contributors can create or validate knowledge articles in their product areas without being reviewed by a knowledge coach. They may also author and approve articles for broad audience visibility. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

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Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

KCS publisher [kcs_publisher]

Knowledge-Centered Service (KCS) publishers are authors who are well versed in KCS standards and create more external-facing articles. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Knowledge Management properties

As an administrator, you can configure the look and functionality of many knowledge base features with Knowledge Management properties.

You can access Knowledge Management properties by navigating to **Knowledge** > **Administration** > **Properties**.

Knowledge portal properties

Knowledge portal properties control the look and functionality of the legacy portal page. This portal page lists recent knowledge articles and their publishing dates, organized by topic.

Property	Description
Number of columns on Knowledge portal pages (*glide.knowman.columns*)	Set the number of columns topics on the knowledge po **Note:** This property applies o Knowledge Manageme This property is not sup Knowledge Manageme
Maximum number of articles per content block on the home page (*glide.knowman.content_block_limit*)	Enter the maximum number display in the Most Useful a sections of the knowledge h

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Property	Description
	Note: This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Omit empty Knowledge topics and categories (*glide.knowman.show_only_populated*)	Select the check box to disp sections only if there are art topic. Clear the check box t sections, even those with n articles. **Note:** This property does not New category. This property applies o default knowledge base legacy knowledge porta Management v3 articles a topic. Therefore, this p applies only to Knowled This property is not sup Knowledge Managemer
Show Knowledge section descriptions (*glide.knowman.show_descriptions*)	Select the check box to disp descriptions in the knowled enter these descriptions: 1. Edit an existing knowledg 2. Right-click the Topic field Show Choice List. 3. Open the record for the to enter the description into Clear the check box to omit descriptions from the knowl **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Number of Knowledge Base items to preview in a section (*glide.knowman.section_limit*)	Set the maximum number o topic for the knowledge port articles shown depends on section sort field property se

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Property	Description
	Note: This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Knowledge section sort field (*glide.knowman.section_sort*)	Select the default order for a each topic section on the kn • Published: uses the date • View count: uses the num articles have been viewed period specified in the Nu used when summing artic property (applicable only Management v2.) • Alphabetically: uses the fi article title (Short descript **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Knowledge Base section sort direction (*glide.knowman.section_sort_direction*)	Select the order, ascending in which articles are listed w section on the knowledge p used for sorting is set in the section sort field property. **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Show unpublished articles in Knowledge Base portal and topic lists (*glide.knowman.show_unpublished*)	Select the check box to allo unpublished articles in the k portal and knowledge searc the subsequent List of roles designated which users can in various unpublished state selected, users with approp access unpublished articles modules of the Knowledge B
List of roles (comma separated) that can see articles in the Review workflow state in the Knowledge portal and Topic list (*glide.knowman.section.view_roles.review*)	Enter role names exactly as in **User Administration** > **Ro** unpublished articles in Know portal and topic lists is selec with these roles see articles workflow state in the knowle

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Property	Description
	topic list that appears when title on the portal, and in kn results.
List of roles (comma separated) that can see articles in the Draft workflow state in the Knowledge portal and Topic list (*glide.knowman.section.view_roles.draft*)	Enter role names exactly as in **User Administration** > **Ro** unpublished articles in Kno portal and topic lists is sele these roles see articles in th state in the knowledge porta that appears when they clic the portal, and in knowledge
Define roles that can view articles in other/custom workflow states (*glide.knowman.section.view_roles.stagesAndRoles*)	Enter role names exactly as in **User Administration** > **Ro** unpublished articles in Kno portal and topic lists is sele the custom field and role as `state:[roles];`. The us roles see articles in the cust state on the knowledge port The property is not applicab knowledge articles. Only us knowledge_admin role can articles.
The number of articles that are asynchronously loaded when scrolling down in the new search results page (*glide.knowman.search.articles_per_page*)	Enter the number of articles during a search. **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Show only Knowledge topic titles on portal page (no article links) (*glide.knowman.home_titlesonly*)	Select the check box to omi from the knowledge portal a topic names. Users can clic see the list of related article **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Number of days (integer, default 30) used when summing article views (*glide.knowman.view_age.days*)	Enter a number of days to c calculating view count. The field in the Knowledge form periodically to reflect the vie on this property. For exampl 60, the view count is the tot views in the past 60 days. E ServiceNow consider all vie date.

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Property	Description
	Note: If you edit this property, Knowledge Use schedu the changes immediate the Count Knowledge U job runs daily and upda counts on the knowledg view the scheduled job, **System Scheduler** > **Sc Scheduled Jobs**. New customers as of the Pa will not have access to the V property and Count Knowle job. Existing customers prio release can continue to use scheduled job. If you set the property value • The Count Knowledge sch not run. • The View count of an artic a rolling count, the existin gets incremented for ever **Note:** Beginning Vancouver re *glide.knowman.vi* and Count Knowledge s job is deprecated. So, s *glide.knowman.vi* to zero and do not use i
Automatically place cursor in Knowledge portal search box (*glide.knowman.portal_search_focus*)	Select the check box to have place the cursor in the searc user opens the knowledge p check box to have users clic field before entering a searc **Note:** This property applies o Knowledge Managemen This property is not sup Knowledge Managemen
Session level cache in "Most useful article" (*glide.knowman.use_session_cache_for_most_useful_articles*)	Set the property to True to e level cache in 'Most useful A widget. • Type: true | false • Default value: true • Location: System Properti

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Property	Description
Enable SEO for selected portal for article view page. (*glide.knowman.serviceportal.seo_portals*)	Value contains a comma-se of service portal record sys_ indexing of knowledge artic on the portals mentioned in blocked by the noindex met portals. If at least one portal suggestions display when u edit knowledge articles. • Type: string • Default value: none • Location: System Properti **Note:** If the property value is e indexing is enabled for
Comma-separated list of service portal record sys_ids (*glide.knowman.serviceportal.use_numbered_url.portals*)	Configure the property value sys_id of any portal so that a in portal widgets (for examp Useful, Featured, Most viewe related article) and search re sysparm_number paramete sys_kb_id parameter. • Type: string • Default value: None • Location: System Properti **Note:** If there are multiple por their sys_ids by comma
View article as another user (*glide.knowman.enable_view_as_user*)	Set the property to `true` to an article as another authori • Type: true | false • Default value: false • Location: System Properti
(*glide.knowman.serviceportal.seo_user_agent*)	This property contains the b patterns, which are used to whether the user-agent is a bot. • Type: string • Default value: None • Location: System Properti

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Knowledge search properties

Knowledge search properties give you control over the search options available to users and the presentation of search results.

Note:
Knowledge search properties is only applicable to Zing search. To configure AI search implementation, see Configuring AI Search.

Property	Description
Knowledge search result order (*glide.knowman.order.search*)	Select the order for displaying search results: • **Number of Views**: orders search results based **of days used when summing article views** pro • **Relevancy**: orders search results based on co to the search term. • **Last Modified**: orders search results based on date. This property is applicable for search within the I Management application and not the ServiceNow global search.
Search method to find Knowledge articles from a task or directly in the Knowledge Base (*glide.knowman.search.operator*)	Select the search approach to use when the sea multiple words. • **OR query**: returns articles that contain at least search term. • **AND then OR query**: first searches for articles words in the search term (an AND query). If no found, an OR query is performed.
Show author in knowledge search results (*glide.knowman.search.show_author*)	Select the check box to include the author of eac knowledge search results. If the article versioning feature is enabled, article number less than or equal to 1.0 display **Authore** articles with a version number greater than 1.0 di **<name>**.
Show last modified date and time in knowledge search results (*glide.knowman.search.show_last_modified*)	Select the check box to show the date and time a edited in knowledge search results.
Show publish date in knowledge search results (*glide.knowman.search.show_published*)	Select the check box to show the date article was knowledge search results.
Show category in knowledge search results (*glide.knowman.search.show_category*)	Select the check box to show the category breac article in knowledge search results.
Show number of views in knowledge search results (*glide.knowman.search.show_view_count*)	Select the check box to include the number of tir was viewed in knowledge search results.
How to display attachments in Knowledge Search Results (*glide.knowman.search.attachment*)	Select the behavior of how the attachments are s search results:

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Property	Description
	• **Do not show attachment** • **Show only link for attachment** (default) • **Show attachment with text snippet** For best performance, select **Do not show attac** **only link for attachment**. **Note:** Starting with the San Diego release, **Show o** **attachment** is activated by default. For existi prior to the San Diego release, the default se **attachment with text snippet**.
Show relevancy in knowledge search results (*glide.knowman.search.show_relevancy*)	Select the check box to show how relevant each based on the search string. **Relevancy** value is only shown when knowledge order property is set to **Relevancy**.
Show number of knowledge blocks in the knowledge block search results when creating or updating a knowledge article (*glide.knowman.add_blocks.search_results*	Define how many search results can be displaye knowledge block is searched for. By default, the 6 and the maximum is 25.
Enable instant search results for knowledge (*glide.knowman.search.instant_results*)	Select the check box to enable instant search fo The default value is set to **No**.
Show Knowledge Base name in Knowledge search results (*glide.knowman.search.show_knowledgebase*)	Select the check box to display the knowledge b knowledge article belongs. For example, **IT**.
Show average rating from knowledge search results (*glide.knowman.search.show_rating*)	Select the check box to display the average star knowledge base articles. This property is applicable to the search results articles that appear on the Knowledge Managem Portal search results page and service portal wid Knowledge Featured Articles and Knowledge Mo For more information, see Knowledge Manageme search results page features and Configure the h instance options.
Show article number in knowledge search results (*glide.knowman.search.show_article_number*)	Select the check box to display the article numbe in the search result. If the article versioning feature is enabled, the ar the version number are displayed for each article result.
Specify default language for searching articles (*glide.knowman.search.default_language*)	Set the property to the default language for searc • Type: String • Default value: user-specified • Location: System Properties

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Property	Description
	Note: If the *glide.knowman.enable_multi_lan* property is set to **True**, then the multi-langua capability overrides the default language se
Enable multi-language search (*glide.knowman.enable_multi_language_search*)	Set the property to **True** to enable search for mul simultaneously. • Type: true | false • Default value: false • Location: System Properties **Note:** If this property is set to **True**, it overrides the the *glide.knowman.search.defaul* property.
Disable Knowledge blocks feature (*glide.knowman.blocks.enable*)	Allows you to disable Knowledge blocks feature • Type: true | false • Default value: true • Location: System Properties **Note:** If the property is set to **True** and **Enable Bloc** selected: • You can create new blocks in the Knowled • You can add blocks to an article in the Kno If the property is set to **False**: • You cannot create new blocks. • You cannot add blocks to new or existing a • **Enable Blocks** field is inactive on the Know form. • Any existing articles with block content wil show the content.

Knowledge article view properties

Article view properties give you control over the meta data and rating options that appear with articles. They also enable you to grant access to individual feedback options based on user role.

Property	Description
Show tasks to which an article has been recently attached (*glide.knowman.recent_tasks.display*)	Select the check box to have article view include a list of tasks associated with the

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Property	Description
	article. The list of associated tasks appears on the Most Recent Tasks widget on the article view page. The widget appears only when a task is attached to the article and this property is set to **Yes**. Knowledge articles can be attached to a task by clicking the **Attach to Task** button after searching from a form.
Number of attached tasks to display when viewing an article (*glide.knowman.recent_tasks*)	Specify the maximum number of tasks to list in article view.
Show article rating section, which may optionally include yes/no rating, star rating, and flagging options (*glide.knowman.show_rating_options*)	Select the check box to display the rating options for users with specific roles. Clear this check box to omit the rating section for all users, regardless of role. The **Feedback** field is always displayed for all users.
List of roles (comma separated) that can see an article's rating section, which may optionally include yes/no rating, star rating, and flagging option (*glide.knowman.show_rating_options.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If **Show article rating section** is selected, users with the roles listed here see the yes/no rating, star rating, and flagging options, according to related property settings. Be sure to include all roles that should be permitted to see any of these rating options. Separate properties enable you to identify specific roles for each option separately. All roles in those properties must also be listed here.
Show the "Was this article helpful?" yes/no rating option. (*glide.knowman.show_yn_rating*)	Select the check box to display the "Was this article helpful?" rating to users with roles set in the associated property. This appears only if the **Show article rating section** property is selected.
List of roles (comma separated) that can see yes/no "Was this article helpful?" rating option. (*glide.knowman.show_yn_rating.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If both **Show article rating section** and **Show the "Was this article helpful?"** properties are

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Property	Description
	selected, users with the roles listed here see the "Was this article helpful?" rating in article view. All roles listed here must also be listed in the **List of roles that can see an article's rating section** property.
Show "Create Incident" link (*glide.knowman.create_incident_link.display*)	Select the **Yes** check box to display the **Create Incident** link.
URL used for the "Create Incident" link (*glide.knowman.create_incident_link*)	Enter the URL for the page where users can create an incident only if the **Show "Create Incident" link"** property is selected. To find the URL, open the appropriate page, then right-click the header bar and choose **Copy URL**. Highlight the URL that appears and use the browser's copy and paste feature to place it into this property field.
Show five-star rating option (*glide.knowman.show_star_rating*)	Select the check box to display the five-star rating to users with roles set in the associated property. This appears only if the **Show article rating section** property is selected. This property is applicable to the knowledge article view page in the Knowledge Management Service Portal. For more information, see Knowledge Management Service Portal article view page features.
List of roles (comma separated) that can see five-star rating option (*glide.knowman.show_star_rating.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If both **Show article rating section** and **Show five-star rating option** properties are selected, users with the roles listed here see the five-star rating option in article view.

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Property	Description
	All roles listed here must also be listed in the **List of roles that can see an article's rating section** property.
Show "Flag Article" option to identify incomplete/inaccurate articles (*glide.knowman.show_flag*)	Select the check box to display the flag article option to users with roles set in the associated property. This appears only if the **Show article rating section** property is selected.
List of roles (comma separated) that can flag incomplete/inaccurate articles (*glide.knowman.show_flag.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If both the **Show article rating section** and **Show "Flag Article" option** properties are selected, users with the roles listed here see the flag article option in article view. All roles listed here must also be listed in the **List of roles that can see an article's rating section** property.
Show user comments on knowledge articles (*glide.knowman.show_user_feedback*)	Select an option for showing user comments **When article loads**, **When user clicks link to show comments**, or **Never** for users with roles set in the associated property.
List of roles (comma separated) that can see user comments on an article (*glide.knowman.show_user_feedback.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If the **Show user comments on knowledge articles** property is selected, users with the roles listed here can add and view user comments in article view.
Maximum number of user comments displayed on a knowledge article (*glide.knowman.feedback.display_threshold*)	Set the maximum number of user comments to display. If no value is set, all comments are displayed. This property does not apply to live feed comments on the article view page.
Use Live Feed for Knowledge feedback (*glide.knowman.use_live_feed*)	Set the property to **True** to use live feed to manage and display feedback on knowledge articles.

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Property	Description
	• Type: true|false • Default value: false • Location: System Properties
Determines the maximum number of knowledge article feedbacks that user can post per day (*glide.knowman.max_comments_per_user_daily*).	Enter the value to define the maximum feedbacks per day. • Type: integer • Default value: • Location: System Properties **Note:** If no value is defined, then no restrictions are applied to the number of feedbacks.

Knowledge homepage properties

Knowledge homepage properties control the featured content on the knowledge homepage.

Table title

Property	Description
Display or hide the count of articles and questions in the Knowledge Homepage (*glide.knowman.show_number_on_homepage*)	Select to display or hide the count of knowledge articles and questions on the Knowledge homepage.
Default keyword for getting pinned articles (*glide.knowman.default_keyword*)	Enter a default keyword for pinned articles. Articles pinned with the specified keyword appear in the Featured Content section of the knowledge homepage.
Display or hide the count of articles and questions in the category and child categories (*glide.knowman.show_number_on_categories*)	Select to display the count of articles and questions within each category, including subcategories, when browsing or searching knowledge bases.

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Table title (continued)

Property	Description
Show Knowledge Home page when user has access to only one Knowledge Base (*glide.knowman.show_home_if_one_kb*)	Select to display the Knowledge homepage when the current user has access to only one knowledge base.
Default header title for the pinned articles section on knowledge home pages (*glide.knowman.default_pinned_section_header_title*)	Enter a title for the Featured Content section of the knowledge homepage.

Other knowledge properties

Other knowledge properties let you control general knowledge management features.

Property	Description
When attaching an article to an incident, copy the content into this field (*glide.knowman.attach.fields*)	When a user searches knowled or change) and clicks the **Attac** article number and content into field is generally a journal field Use dot walking to copy the art does not exist, that field is igno If the property has no value, co
Displays a read-only article view page when articles are viewed from contextual search (*glide.knowman.contextual_search.show_read_only_article*)	Displays a read-only article vie contextual search. • Type: true|false • Default value: true **Note:** The *glide.knowman.cont* property is activated by de and set its value to **true** to the contextual search. For
Knowledge Management logo to display if running out of the ServiceNow frames (*glide.knowman.frameless_logo*)	Click the reference lookup tool knowledge pages that are used example, the logo image select System site that includes know image stored in the database t **Note:** This property applies only supported on Knowledge v

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Property	Description
Hide the 'Import' functionality (button and drag-n-drop) for all users (*glide.knowman.import.hide_import_functionality*)	Select **Yes** to hide the **Import A** If you have not yet migrated to you can configure the visibility importing articles to knowledge
Show publish check box on the knowledge import pop-up (*glide.knowman.import.show_publish_checkbox*)	Select **No** to remove the **Publis** article cannot be published as
Use submission workflow (*glide.knowman.submission.workflow*)	Select the **Yes** check box to us standard knowledge workflow. knowledge from an incident or record instead of a draft article follows a specific workflow.
The sys_id of the knowledge base when creating knowledge from task records (*glide.knowman.task_kb*)	Enter the sys_id of the knowled tasks in.
Before displaying the text of the article in search results or the article view, check field-level ACLs on appropriate field: kb_knowledge.text (HTML article) or kb_knowledge.wiki (wiki text article) (*glide.knowman.text.check_can_read*)	Select this check box if users m the Knowledge [kb_knowledge results.
Defines the number of results to be considered when building the search filters (*glide.knowman.search.facet_depth*)	Define maximum number of kn for populating search filters. • Type: string • Default value: 300 • Location: System Properties
Send notification to approvers and authors in article approval workflow (*glide.knowman.enable_approval_notification*)	Select this check box to send a enabled.
Allow articles in the global domain to be checked out or edited by users in another domain (*glide.knowman.allow_edit_global_articles*)	Enter the value as `true` to ena from a domain other than the g • Type: true | false • Default value: true • Location: System Properties
When showing a list of articles through the Knowledge portal (using the kb_list UI Page), remove articles the user cannot see before building the list (*glide.knowman.list.filter*)	Enter the value as `true` to ena building the articles list in the k • Type: true | false • Default value: false • Location: System Properties If you have large number of arti `true` will negatively impact pe
Create translation task when an article is published (*glide.knowman.translation.enable_translation_task*)	Enter the value as `true` to ena • Type: true | false • Default value: false • Location: System Properties

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Property	Description
	Note: When you enable this prop existing articles.
Deny access to a knowledge base when either Can Read or Can Contribute user criteria list for the knowledge base isn't specified (*glide.knowman.block_access_with_no_user_criteria*)	Enter the value as `true` to den Contribute or Can Read user cr • Type: true | false • Default value: true • Location: System Properties
Override contribute access based on Can Read and Cannot Read user criteria at article level (*glide.knowman.apply_article_read_criteria*)	Enter the value as `true` to ove on Can Read and Cannot Read • Type: true | false • Default value: false • Location: System Properties
Send email notifications on the first day of each month for articles expiring in the next month (*glide.knowman.enable_article_expiry_notification*)	Enter the value as `true` to sen articles expiring next month on depends on the ownership gro information, see Knowledge su • Type: true | false • Default value: false • Location: System Properties
Determines whether to apply ACLs on the search results (*glide.knowman.search.apply_acls*)	Enter the value as `true` to app results. • Type: true | false • Default value: true • Location: System Properties **Note:** If the *glide.knowman.* base without any articles p Knowledge Field Facet wh see Configure filter facet w
Comma separated list of all domains of office365 online sites, in which the Knowledge management Word add-in will be available (*sn_km_word.glide.knowman.word.xframe*)	Enter a list of all the parent dom which Knowledge Managemen multiple entries, separate the d • Type: string • Default value: None • Location: System Properties
Download the original Word document from the article view page in a portal and Workspace. Enabling the	Enter the value as `true` to dow knowledge article view page in

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Property	Description
property might affect the search relevancy of the article (*sn_km_word.glide.knowman.enable_document_download*)	• Type: true | false • Default value: false • Location: System Properties
Determines the duration required to capture the metrics (Article Views, Portal page views, and Portal searches). *glide.knowman.usage_metrics_duration*	Enter the value to change the d • Type: integer • Default value: 60 • Location: System Properties
Translate a knowledge article from a translation task (*glide.knowman.translation.enable_translation_task*)	Enter the value as `true` to ena • Type: true|false • Default value: true
Default language for searching Knowledge Articles (*glide.knowman.search.default_language*)	Enables you to set the default l logged-in language. • Type: string • Default value: None • Location: System Properties Following are the two characte • en - English US • fr - Francais • es - Español • it - Italiano • de - Deutsch To enable search for different la **Knowledge** > **Administration** > select the check box. **Note:** If the *glide.knowman.* inactive, you can search on can search for multiple lan
Provides replacement article for a retired article (*glide.knowman.enable_article_replacement_on_retire*)	Enables you to provide a replac default, the property value is se • Type: true | false • Default value: true • Location: System Properties
Retire the knowledge block attached to an article (*glide.knowman.allow_retire_block*)	Enter the value as `true` to reti

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Property	Description
	• Type: true | false • Default value: true • Location: System Properties **Note:** If you set the (*glide.kn* as true and if: • An article is associated `There are article want to retire th` • No article is associated `Are you sure you`
Determines the recommended document size (*glide.knowman.import.max_document_size*)	Enables you to set the recomm document. By default, the valu • Type: integer • Default value: 30 • Location: System Properties

Article versioning properties

The knowledge administrator can set knowledge properties that enable users to edit specific fields on published articles without creating new versions.

The article versioning feature requires the Knowledge Management Advanced plugin (com.snc.knowledge_advanced). For more information, see Activate the Knowledge Management Advanced plugin and Article versioning.

Property	Description
Enable article versioning feature (*glide.knowman.versioning.enabled*)	Select the check box to enable the article versioning feature. • Type: true | false • Default value: true • Location: **Knowledge** > **Administration** > **Properties**
Enable minor edits to a published article without creating a new version (*glide.knowman.versioning.enable_minor_edits*)	Select the check box to enable minor edits to published articles and associated attachments without creating a new version. • Type: true | false • Default value: false

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Property	Description
	• Location: **Knowledge** > **Administration** > **Properties** **Note:** To perform the minor edits to the published articles, the user must be the knowledge base owner or the knowledge administrator or the knowledge base manager.
A comma-separated list of fields that can be edited on published articles without creating a new version (*glide.knowman.versioning.minor_edit_fields*)	Enter the fields in a comma-separated list that can be edited on published articles without creating a new version. • Type: String • Default value: valid_to • Location: **Knowledge** > **Administration** > **Properties** You can also enter the property value `attachments` to add or remove any attachments associated with a knowledge article without checking out the article.

Knowledge subscription properties

The knowledge administrator can set configuration properties that enable users to subscribe to knowledge bases and knowledge articles.

Property	Description
Enable subscribe feature for KM (*glide.knowman.enable_km_subscription*)	Select the check box to enable the Knowledge subscription feature. • Type: true | false • Default value: true • Location: **Knowledge** > **Administration** > **Properties**

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Property	Description
List of roles (comma-separated) who can have subscription feature (*glide.knowman.enable_km_subscription.roles*)	Enter the roles in a comma-separated list that can use the Knowledge subscription feature. • Type: String • Default value: knowledge • Location: **Knowledge** > **Administration** > **Properties**
List of workflow states (comma-separated) that can have subscription feature (*glide.knowman.enable_km_subscription.workflow_state*)	Enter the workflow states for knowledge articles in a comma-separated list that users can subscribe to. • Type: String • Default value: draft,review,published • Location: **Knowledge** > **Administration** > **Properties**

Article quality index properties

The knowledge administrator can set the pass score for AQI reviews using the knowledge properties page.

Properties for Article Quality Index

Property	Description
Pass score for AQI reviews (*glide.knowman.aqi_pass_score*)	Set the pass score for AQI reviews. • Type: Integer • Default value: 70 • Range of values possible: 1-100
List of article workflow states to perform AQI reviews (*glide.knowman.aqi.article_workflow_states*)	Enter the article workflow states, in a comma-separated list, where users can perform AQI reviews. • Type: String • Default value: draft,review,published

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External Content Integration Properties

Administrators can configure the properties to add allowed content types and change the UI label for the external content integration feature.

Properties for External Content Integration

Property	Description
Maximum limit for total size of external content in Knowledge Management (in GB) (*sn_km_intg.glide.knowman.external.max_content_size*) **Note:** This is a read-only field.	• Type: Integer • Default value: 2
Maximum size of an external article including its attachments (in MB) (*sn_km_intg.glide.knowman.external.max_article_size*) **Note:** This is a read-only field.	• Type: Integer • Default value: 8
An editable, comma-separated list of allowed content types to be processed from the source system (*sn_km_intg.glide.knowman.external.allow_content_types*)	• Type: Comma s • Default value:ap msword,applica officedocumen vnd.ms-excel,a officedocumen vnd.ms-powerp officedocumen pdf,text/plain,te • Other possible audio/mpeg
List of content types not allowed to be processed from the source system (*sn_km_intg.glide.knowman.external.reject_content_types*) **Note:** This property is read-only and takes precedence over allowed content types.	• Type: Comma-s • Default value: a apple-diskimag executable
UI Label for indicating external articles in Search Results and Article View Pages (*sn_km_intg.glide.knowman.external.ui_label_for_external_content*)	• Type: String • Default value: E

Actionable Knowledge Feedback Properties

The Knowledge administrator can set configuration properties that would create actionable feedback tasks.

Properties for Actionable Knowledge Feedback

Property	Description
Create actionable feedback task when an article is flagged.	Select the check box to enable

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Properties for Actionable Knowledge Feedback (continued)

Property	Description
(*glide.knowman.feedback.enable_actionable_feedback_for_flag*)	actionable feedback task generation when an article is flagged for incorrect or inappropriate content. • Type: true|false • Default value: true • Location: **Knowledge** > **Administration** > **Properties**
Create actionable feedback task when an article is marked as not helpful (*glide.knowman.feedback.enable_actionable_feedback_for_helpful*)	Select the check box to enable actionable feedback task generation when an article is marked as not helpful. • Type: true|false • Default value: false • Location: **Knowledge** > **Administration** > **Properties**
Create actionable feedback task when an article is rated at or lower than this value. 0 or no value indicates that actionable feedback tasks are not enabled for Rating type feedback (*glide.knowman.feedback.enable_actionable_feedback_for_rating*)	An actionable feedback task is created when an article is rated at or lower than this value. The article is rated on a scale of 1-5. • Type: Integer • Default value: none

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Properties for Actionable Knowledge Feedback (continued)

Property	Description
	• Location: **Knowledge** > **Administration** > **Properties**
Create actionable feedback task only when feedback details are provided for the negative feedback (*glide.knowman.feedback.enable_explicit_feedback*)	Select the check box to enable actionable feedback task generation for the negative feedback. • Type: true|false • Default value: false • Location: **Knowledge** > **Administration** > **Properties** **Note:** Set the property to **True** to deactivate feedback task generation if: • The feedback dialog box is close or cancel • Other option is chosen and no reason provided

Group ownership properties

The knowledge administrator can set group ownership properties that enable the use of ownership groups for knowledge articles and decide who can edit and approve a published knowledge article.

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Property	Description
Enable ownership group for Knowledge articles (*glide.knowman.ownership_group.enabled*)	Select the check box to enable associating ownership groups with knowledge articles. **Note:** Once you have set this property to **true**, try not to change it to **false**. Before setting this property back to **false**, manually reassign all knowledge articles associated with any ownership group, close all article approvals sent to ownership groups, and resolve all open feedback tasks assigned to ownership groups. • Type: true | false • Default value: false • Location: **Knowledge** > **Administration** > **Properties**
Retain contribute access for author or reviser of knowledge article linked to ownership group (*glide.knowman.ownership_group.override*)	Select the check box to enable the author and reviser of a knowledge article to retain contribute access to the article even when an ownership group is associated with the article.

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Property	Description
	• Type: true | false • Default value: false • Location: **Knowledge** > **Administration** > **Properties**
Allow approval of self-authored article as ownership group member (*glide.knowman.ownership_group.allow_self_approval*)	Select the check box to allow ownership group members to approve self-authored articles for publication. • Type: true | false • Default value: true • Location: **Knowledge** > **Administration** > **Properties**

Quick start tests for Knowledge Management

Validate that Knowledge Management still works after you make any configuration change, such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Knowledge Management quick start tests require activating the Knowledge Management Core plugin (com.glideapp.knowledge), the Knowledge Management Advanced Installer plugin (com.snc.knowledge_advanced.installer), the Knowledge Blocks plugin (com.snc.knowledge_blocks), and the Customer Service Management Demo Data plugin (com.snc.customerservice.demo).

KM: Knowledge Management test suite

Test	Description	Release version
KM : Create KCS Template Article with Approval Publish workflow	Verify the creation of a KCS template article with approval publish workflow. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Madrid
KM: Create MultiVersioned standard Article with approval publish workflow	Verify the creation of a multi-versioned standard article with approval publish workflow.	Madrid

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Note: Requires the Knowledge Management Advanced Installer plugin.	
KM: Article level subscription	Verify that users can subscribe to a knowledge article. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: User criteria covering canRead and canContribute for KnowledgeBase and canRead at Article level	Verify the creation of canRead and canContribute user criteria for knowledge base and canRead user criteria for article. **Note:** Requires the Knowledge Management Core plugin.	Madrid
KM: Create a KCS article from a case	Verify the creation of a KCS article from a case. **Note:** Requires the Knowledge Management Advanced Installer and Customer Service Management Demo Data plugins.	Madrid
KM: Knowledge Base Level Subscriptions	Verify that users can subscribe to a Knowledge Base. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: AQI	Verify the creation, assignment, and review of an AQI checklist.	New York

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Note: Requires the Knowledge Management Advanced Installer plugin.	
KM: Requestor performs search, view the article, provide feedback (Helpful No with Feedback Task)	Verify the search request, review, provision of feedback as not helpful, and creation of a feedback task for an article on the Knowledge Management Service Portal. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: Create and edit an article from Feedback Task form	Confirm the availability of the **Create Article** and **Edit Article** buttons on a Knowledge Feedback Task form. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: Search for pinned articles and checking the highest click rank	Verify the search request and that the click rank value of a pinned article was added to the Knowledge Searches (ts_query_kb) table. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: Create an Ownership Group and check edit permissions and subscriptions	Verify the assignment of an article to an ownership group, that all members of the ownership group are subscribed to the article, and have permission to edit.	New York

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Note: Requires the Knowledge Management Advanced Installer plugin.	
KM: Create, search for, and view knowledge articles with knowledge blocks	Verify the creation of a knowledge block and its addition to a knowledge article. Also, verify that the knowledge block content is searchable. **Note:** Requires the Knowledge Blocks plugin.	Orlando
KM: Validate the Knowledge - Approval Retire workflow	Verify the success of Knowledge - Approval Retire workflow by retiring a published knowledge article. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate feedback task assignment to the ownership group manager	Verify the assignment of a feedback task to the ownership group manager of a knowledge article. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate that the article template selector includes knowledge bases and article templates	Verify that the article template selector includes all knowledge bases with contribute access and article templates applicable to each knowledge base. **Note:** Requires Knowledge Management Advanced Installer.	Orlando
KM: Validate the Knowledge - Approval Publish workflow	Verify the success of a Knowledge - Approval	Orlando

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Publish workflow by recalling, rejecting, and then approving a knowledge article through the approval process. **Note:** Requires the Knowledge Management Advanced Installer plugin.	
KM: Make an outdated version of an article the latest version	Verify that an outdated version of a knowledge article is made the latest version. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate that the mapped related articles appear in the Related articles widget	Verify that the related articles mapped to a knowledge article appear in the Related articles widget on the knowledge article view page. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate that the mapped related catalog items appear in the Related items widget	Verify that the related catalog items mapped to a knowledge article appear in the Related items widget on the knowledge article view page. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate that a versioned article is created, published, checked out, and retired	Verify the success of UI actions on a versioned knowledge article by creating, publishing, updating, and retiring the knowledge article in Agent Workspace.	Quebec

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Note: Requires the Knowledge Management Advanced Installer plugin.	
KM: Verify the scheduled publish feature for knowledge articles	Verify the scheduled publish feature for knowledge articles by creating an article in approval publish workflow, putting it for scheduled for publish and observing the change in workflow state from the**Scheduled for publish** state to the **Published** state. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Quebec
KM: Validate the Knowledge - Approval Publish workflow in Agent Workspace	Verify the success of a Knowledge - Approval Publish workflow by recalling and then approving a knowledge article through the approval process in Agent Workspace. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Quebec

Related topics

Quick start tests

Understanding access to the Knowledge knowledge base

User criteria are available to manage access to the Knowledge knowledge base.

The Knowledge knowledge base is provided as a demo example in the Knowledge Management application. Starting from the Paris release, user criteria were added to the Knowledge knowledge base to enable you to control access for guest (unauthenticated) users:

- Any User user criteria in Can Read, which enables any user to read articles in the Knowledge knowledge base.
- Guest User in Cannot Read, which prevents guest or unauthenticated users from reading articles in the Knowledge knowledge base.

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Note:
If you are on a release version prior to the Paris release, see Configure access to knowledge bases for unauthenticated users for information about managing access without any user criteria.

Although you can continue to use the Knowledge knowledge base consider creating your own knowledge base to store, share, and manage content. You can configure access to your knowledge bases through user criteria. For more information, see Create a knowledge base.

Knowledge workflows

The publishing and retirement processes for a knowledge article are controlled by workflows defined for the knowledge base that the article belongs to.

You can assign different workflows to each Knowledge Base .

You can use one of the default workflows, or create your own workflows to define custom publishing and retirement processes for different types of knowledge.

For the workflows that require approval, you can configure which users can approve or reject by editing the *`getApprovers()`* function in the *`KBWorkflow`* script include.

Default knowledge workflows

Workflow	Description
Knowledge - Approval Publish	Requests approval from a manager of the knowledge base. Articles in approval are In Review state before moving to Published state once approved or to Scheduled for publish if set to publish later. If the manager rejects the request, the workflow is canceled and the article remains in Draft state. If ownership groups is enabled, email notifications with a link to the article are sent to the ownership group members for approval. If ownership groups is not enabled, email notifications with a link to the article are sent to knowledge base managers for approval. A notification is also sent to authors or revisers of articles to inform them that their article has been approved or rejected. To turn on approval email notifications, set the *`glide.knowman.enable_approval_notification`* property to `true`. **Note:** Only the active user receives the notifications.
Knowledge - Approval Retire	Requests approval from a manager of the knowledge base before moving the article to the retired state. The workflow is canceled and the article remains in the published state if any manager rejects the request.

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Default knowledge workflows (continued)

Workflow	Description
	If ownership groups is enabled, email notifications with a link to the article are sent to the ownership group members for approval. If ownership groups is not enabled, email notifications with a link to the article are sent to knowledge base managers for approval.
Knowledge - Instant Publish	Immediately publishes a draft article without requiring an approval, or publishes on the scheduled publish date if set to publish later.
Knowledge - Instant Retire	Immediately retires a published article without requiring an approval.
Knowledge - Publish Knowledge	A subflow that moves the knowledge article to the published state. You can use this subflow when defining your own workflow.
Knowledge - Retire Knowledge	A subflow that moves the knowledge article to the retired state. You can use this subflow when defining your own workflow.

Note:

- Only administrators and knowledge administrators can view the retired knowledge articles. To reuse a retired article, administrators and knowledge administrators can republish the article. For more information, see Republish a retired article.
- An article and its translations have a parent-child relationship. Retiring a parent article does not automatically retire all its translated child articles.

Email notifications for approval workflows

You can send email notifications for approval workflows.

- Notify approvers about knowledge articles submitted for their approvals.
- Notify authors about the approval status of their knowledge articles.

To send email notifications for approval workflows, enable the **Send notification to approvers and authors in article approval workflow** property (*glide.knowman.enable_approval_notification*). Beginning with New York, the property is enabled by default. Existing customers on release versions prior to New York can enable this property to send email notifications. Disable any custom notifications for article approvals before enabling this property. If the *glide.knowman.enable_approval_notification* property is not available, an administrator can create the property and set its value to `true`. For more information, see Knowledge Management properties.

Related topics

Knowledge article states

Approve an article that is being reviewed

Retire a versioned article

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Knowledge Management Service Portal properties

Knowledge Management Service Portal properties determine how information is displayed on the Knowledge portal. You must have the admin role to set configuration properties.

The following system properties are set to direct users to the Knowledge Management Service Portal homepage, and to specify the URL suffix for the homepage.

Property	Description
sn_km_portal.glide.knowman.serviceportal.enable_redirect	Directs users to the desired Knowledge homepage. • Type: true|false • Default value: false Set to **true** to redirect users navigating to v2 or v3 pages to the Knowledge Management Service Portal homepage. **Note:** This property is not honored for the following use cases: • Contextual search in the Incident form • Connect • Global search
sn_km_portal.glide.knowman.serviceportal.portal_url	The URL suffix for the Knowledge Management Service Portal. The default is **kb**.

The Knowledge Management Service Portal supports the Knowledge Management V3 properties. Configuring widget instance options on the portal pages can override these properties.

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Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Knowledge Management v3 homepage and Knowledge Management Service Portal comparison

A comparison of the features available on the Knowledge Management v3 homepage and the Knowledge Management Service Portal.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Page		Component	V3 Homepage	Knowledge Management Service Portal
Home page		Create an article	Y	Y
		Import an article	Y	N
		Knowledge bases	Y	Y
		Featured content	Y	Y
		Most useful	Y	Y
		Most viewed	Y	Y
		Language selection menu	Y	N
		Search text box	Y	Y
Search results page		Create an article	Y	N
		Import an article	Y	N
		Search box with language selection	Y	Y
	Sort by	Relevancy	Y	Y
		Last updated (newest)	Y	Y
		Views	Y	Y
		Alphabetical	N	Y
	Filter by	Knowledge bases	Y	Y

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Page		Component	V3 Homepage	Knowledge Management Service Portal
		Categories	Y	Y
		Authors	Y	Y
		Tags	N	Y
		Resource	N	Y
		Rating	N	Y
		View count	N	Y
	Article meta data	Authored by	Y	Y
		Article number	Y	Y
		Last modified	Y	Y
		Category	Y	Y
		Number of views	Y	Y
		Star rating	Y	Y
		Relevancy rank	Y	Y
		Tags	Y	N
		Attachments	Y	Y
Article view page		Back button	Y	N
		Create Favorite icon	Y	N
		Navigation hierarchy path	Y	Y
		Article meta data • Article number • Article version • Authored by • Last modified • Number of views • Star rating	Y	Y
		Subscribe option	Y	Y
		Flag article option	Y	Y
		Create incident option	Y	Y
		Edit option	Y	Y
		Article language selection option	Y	Y

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Page		Component	V3 Homepage	Knowledge Management Service Portal
		Helpful yes/no option	Y	Y
		Star rating	Y	Y
		Text box for comments	Y	Y
		Live feed comment	Y	N
		Copy permalink	Y	Y
		Most Recent Tasks widget	N	Y
		Affected Products widget	N	Y
		Most Viewed widget	N	Y
		Most Useful widget	N	Y

The *sn_km_portal.glide.knowman.serviceportal.enable_redirect* property is not honored for the following use cases:

- Contextual search in the Incident form
- Connect

Related topics

Import a Word document to a knowledge base

Import a Word document to a knowledge base using Knowledge Management v3

SEO for canonical URLs and localized versions of knowledge articles

Improve the searchability of knowledge articles by adding tags for canonical URLs and *hreflang* tags for translated knowledge articles.

You can add the default tags for canonical URLs and *hreflang* tags by selecting the **Use SEO script** check box on the Knowledge Article View [kb_article_view] page record. For more information, see Enable SEO for canonical URLs and localized versions of a portal page.

When the **Use SEO script** option is selected:

- The canonical URLs for a knowledge article are added to the knowledge article view page.

  Example canonical URL: `https://<instance name>.servicenow-com/csp?id=kb_article_view&sysparm_article=<article number>`

- The *hreflang* tags for the translated versions of a knowledge article are added to the knowledge article view page.

  Example URL with an *hreflang* tag: `<link rel="alternate" href="https://<instance name>.servicenow-com/csp/fr?`

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```
id=kb_article_view&sysparm_article=<article number>"
hreflang="fr"/>
```

Note:
A self-referencing *hreflang* URL is also added for the language of current knowledge article.

For example, an English knowledge article is viewed by visiting a URL with the following format:

```
https://<instance name>.servicenow-com/csp/?
id=kb_article_view&sys_kb_id=<sys_id>
```

In addition to the *hreflang* tags added for translations, the English language self-referencing *hreflang* tag is added:

```
<link rel="alternate" href="https://
<instance name>.servicenow-com/csp/?
id=kb_article_view&sys_kb_id=<sys_id>" hreflang="en"/>
```

Script includes for canonical URLs and hreflang tags

By default, the knowledge article view page uses the *SPSEOHeaderTagsArticleViewSNC* script include to add the SEO tags for canonical URLs and *hreflang* tags.

The following table describes the script includes for adding canonical URLs and *hreflang* tags to Service Portal pages, including the knowledge article view page.

Script includes for canonical URLs and hreflang tags

Script include	Description
SPSEOHeaderTagsSNC	Includes the default implementation for the canonical URLs and *hreflang* tags for Service Portal pages. This script include is read-only. For more information, see Enable SEO for canonical URLs and localized versions of a portal page.
SPSEOHeaderTags	Facilitates overriding the default implementation in the *SPSEOHeaderTagsSNC* script include for Service Portal pages. The *SPSEOHeaderTags* script include extends the #*SPSEOHeaderTagsSNC* script include.
#SPSEOHeaderTagsArticleViewSNC	Overrides the *generateHrefLangArray* and *generateCanonicalURL* functions for the knowledge article view page configured in the *SPSEOHeaderTags* script include. The *SPSEOHeaderTagsArticleViewSNC* script include is read-only and extends the #*SPSEOHeaderTags* script include.

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Script includes for canonical URLs and hreflang tags (continued)

Script include	Description
SPSEOHeaderTagsArticleView	Facilitates overriding the default implementation in the *SPSEOHeaderTagsArticleViewSNC* script include for the knowledge article view page. The *SPSEOHeaderTagsArticleView* extends the *SPSEOHeaderTagsArticleViewSNC* script include.

As an administrator, you can add canonical URLs, *hreflang* tags, and any custom headers for knowledge articles by updating the *SPSEOHeaderTagsArticleView* script include. For more information, see Configure custom SEO tags for canonical URLs and localized knowledge articles.

Article versioning changes

Article versioning introduces new actions that allow knowledge users to create and revise versions of existing articles. It also introduces new fields and related lists to the Knowledge form, new columns to the Knowledge list, and updates to Knowledge dashboard reports.

New user actions

As part of creating article versions, users can:

- Check out a published article and create another version by clicking **Checkout** on the Knowledge form.

  Note:
  Only the author, knowledge base owner, and users with the knowledge_admin role can edit an article in the Draft state.

- Recall an article that is being reviewed or scheduled for publish by clicking **Recall** on the Knowledge form.
- Select a previously published article in the Outdated state and make it the current published version by clicking **Make this current**in the Knowledge form header.

Note:
To edit a published article without having to create a new version, make sure the *glide.knowman.versioning.enable_minor_edits* property is enabled.

Changes to the Knowledge list

The article versioning feature adds the following to the Knowledge list:

- The **Version** column displays the article version number. The Knowledge list displays multiple versions of an article.
- The **Workflow** column includes the new **Outdated** state.

Changes to the Knowledge form

The article versioning feature adds the following to the Knowledge form:

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- The **Version** field displays the article version number.
- The **Display number** field displays a combination of the article number and the version number. For example, KB0010004 v1.02. All references to a knowledge article use this display number.
- The **Base Version** field displays the knowledge article number and version on which the current article is based.
- The **Revised By** field displays the name of the user who checked out a published article and created a new version.
- The **Article Versions** related list displays a list of all versions for an article. From this list,you can:
  - Click the **Version** to view a specific version of an article.
  - Click the **View Article** related link to see the article page view.

Note:
If necessary, configure the form to display the fields and the related list.

Changes to Knowledge modules

The article versioning feature introduces the following Knowledge module changes:

- **My Knowledge Articles**
  - For a knowledge user, this module includes records for the articles authored by the user as well as records for each article revised by the user.
  - For a knowledge reviser, this module includes records for the articles published by the user as well as records for each article revised by the user.
- **My Flagged**
  - For a knowledge user, this module includes records for each revision made to articles authored by the user.
  - For a knowledge reviser, this module includes records for each article revised by the user.

Note:
Users that have customized these modules do not see these changes.

Changes to Knowledge Management dashboard reports

The Knowledge Management Overview dashboard reports have been updated to include article versioning-related changes when the Knowledge Management Advanced plugin is activated.

- Articles Flagged in the Last 30 Days
- Articles Marked Not Useful in the Last 30 Days
- Articles Used per Month
- Knowledge use
- Knowledge view
- Knowledge updated in past 30 days
- Knowledge flagged in past 30 days
- Knowledge by Workflow state
- Knowledge created by Author
- Knowledge created in past 30 days

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- New Knowledge Articles Created in the Last 30 Days
- Knowledge Ratings for past 30 days

Versioning information available in the Knowledge Management Service Portal

Knowledge search results show the article number and the version number for each article.

Note:

To display the article version number next to the article number in the search results, enable the *glide.knowman.search.show_article_number* property in the Knowledge Search Properties section of the Knowledge Management Properties page.

If you are accessing an article from the base system or knowledge service portals using the URL to a KB article, you must also include the article version number in the URL. For example, to access the KB0000005 knowledge article, instead of using the `https://<instance name>/sp?id=kb_article&sys_id=KB0000005` as the URL, you must use `https://<instance name>/sp?id=kb_article&sys_id=KB0000005%20V1.0` to view the article.

The article view page shows a version history section for articles that have been updated. This section includes the version numbers, date updated, and the name of the author or reviser.

- Click **Latest version** or the version number and current state to expand the version history section.
- Click the version number to open that particular version of the article.
- When viewing an outdated article, a message informs the user that a newer updated version is available. The message includes a link to the latest version.

Feedback on article versions

With the article versioning feature, users can view and contribute to feedback on the current versions of knowledge articles.

For more information about feedback options, see Knowledge feedback.

Feedback option	How this option works with article versioning
Rating an article	The average rating for an article is carried over to the checked out version. The average rating calculation updates and displays on the current version of the article.
Marking an article as helpful	The helpfulness percentage of a previous version of an article is also considered for a new version when displayed in the helpfulness column on the homepage.
Comments	The Comments section at the bottom of an article displays comments from previous versions unless Live Feed is enabled. Live Feed only shows comments for the current version.

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(continued)

Feedback option	How this option works with article versioning
Flagging an article	Checking out an article or setting a previous version to the current version resets the flagged value to false.
View count	The view count is carried over to the checked out article. Any view of a version of an article increments the view count of all the subsequent published versions. Views to a newer version of an article do not affect the view count of previous versions. When a draft article is published, the total view count shows sum of previous published article view count and its own standalone view count.
Use count	The use count is carried over to the checked out article. Any use of a version of an article increments the use count of all subsequent versions. Any use of a newer version of an article does not affect the use count of previous versions.

Knowledge article version numbers

Knowledge article version numbers follow a specific pattern. Increments to the version number depend on the revision type.

Article version numbers follow this pattern: <major release number.minor release number>.

The type of revision being made to an article determines the increment. A minor revision increments the version number by 0.01. A major revision, such as publishing an article, increments the version to the next whole number, for example, from version 2.02 to 3.0.

The following example illustrates the life cycle of a versioned article and the changes to the version number.

User action	Article state	Version number
Knowledge author creates a new article	Draft	0.01
Knowledge author makes a change and updates the article.	Draft	0.01
Knowledge author submits the article for review.	Review	0.02
Knowledge author recalls the article to make another change.	Draft	0.03
Knowledge article submits the article for review	Review	0.04
Approver rejects the article and requests a change.	Draft	0.05

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User action	Article state	Version number
Knowledge author makes the change and submits the article for review.	Review	0.06
Approver approves the article	Scheduled for publish	0.07
Article is published	Published	1.0
Knowledge author checks out the published article.	Draft	1.01
Knowledge author submits the article for review.	Review	1.02
Approver approves the article	Scheduled for publish	1.03
Article is published When the version 2.0 article is published, the state of the version 1.0 article changes to **Outdated**.	Published	2.0

Any change to the state of an article results in a version increment, except to and from the **Pending retirement**, **Retired**, and **Outdated** states.

Note:
To know more about minor version edits, see Article versioning changes.

Knowledge article version information

Users can view version information for a knowledge article from the Knowledge view page.

The knowledge article number and the version number appear at the top of the article, just below the title. Clicking the version number expands the version history section, which includes a list of the available article versions. User roles determine what is included in this list:

- Users with read access to a knowledge base can see the latest published version and previous major versions.
- Users with read and contribute access to a knowledge base can see the latest published version, previous major versions, and any draft or review versions.

You can view any of the previous versions of an article by clicking the version number in the list. When you view a previous version, a message at the top of the article indicates that an updated version is available.

At the bottom of a knowledge article, you can see additional information about an article, including the name of the author or revisor and the date that the article was last modified.

Validity of a knowledge article

Knowledge article validity is the date a knowledge article expires. Articles do not appear in search results after the **Valid to** date or if the **Valid to** date is blank.

Decide when to expire a knowledge article by using the **Valid to** field in the Knowledge form. The Knowledge form is available when creating or editing a knowledge article.

When you create or edit a knowledge article, a default value appears in the **Valid to** field. As an article author or editor, you can select whether to keep or change the default **Valid to** date.

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Note:
If the system date format or user preferences is set to use `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your system administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.

Default article validity when creating a knowledge article

The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is blank, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100.

Default article validity when editing a knowledge article

If the article versioning feature is enabled, the default value of the **Valid to** date in the updated article version is automatically set as described in the following table.

Valid to date in the updated article version

Article Validity value in the associated knowledge base	Valid to default value	Notes
Blank	Earlier version **Valid to** date value	If the **Article Validity** field in the knowledge base associated with the article is blank, the **Valid to** date value from the earlier version of the article is retained.
Is not blank	Article updated date + article validity	If the **Article Validity** field in the knowledge base associated with the article is not blank, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field.

If you move a knowledge article to another knowledge base, the default value of the **Valid to** date in the updated article is automatically set as described in the following table.

Valid to date when moving a knowledge article to another knowledge base

Article Validity value in the updated knowledge base	Valid to default value	Notes
Blank	Earlier **Valid to** date value	If the **Article Validity** field in the selected knowledge base is blank, the earlier **Valid to** date value is retained for the knowledge article.
Is not blank	Article updated	If the **Article Validity** field in the selected knowledge base isn't blank, the **Valid to** date is automatically updated to start from the

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Valid to date when moving a knowledge article to another knowledge base (continued)

Article Validity value in the updated knowledge base	Valid to default value	Notes
	date + article validity	date the article was updated until the number of days specified in the **Article Validity** field.

Note:
If the dictionary value of the **Valid to** field is modified, this dictionary value overrides the default value of the **Valid to** field calculated according to the **Article Validity** field.

Email notifications for expiring knowledge articles

On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are about to expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management.

Knowledge article states

Knowledge article versions can be in one of several states as it progresses through the creation cycle.

Note:
You need to activate the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) and set the *glide.knowman.versioning.enabled* system property to `true`. For more information, Activate the Knowledge Management Advanced plugin and Article versioning properties.

State	Description
Draft	The article is in the process of being created. **Note:** A versioned knowledge article in the **Draft** state can be modified only by the author or reviser with the contribute access to the knowledge base, owner of a knowledge base, users with the admin and knowledge_admin role, and ownership group members, if ownership group is added to the article.
Review	The draft version of the article is sent to reviewers to approve or reject.
Scheduled for publish	The draft version of a knowledge article is scheduled for publishing on a future date.
Published	The article is approved and published. When the state of an article changes to **Published**,

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State	Description
	the state of any previous published versions of that article changes to **Outdated**. **Note:** After a knowledge article with an ownership group is approved, only the owner of a knowledge base and ownership group members have contribute access to the article.
Pending retirement	The published article is selected for retirement, pending approval.
Retired	The published article is retired. Retired knowledge articles cannot be searched for by external users or customers. To reuse a retired article, create a new article with the same content, which is published once approved.
Outdated	A more recent version of the article has been published. End users can read published articles as well as the outdated versions.

Related topics

Knowledge access controls

Knowledge subscription email notification templates

The knowledge subscription feature uses email notification templates to send subscription notifications to knowledge users.

Email template	Subscription type
KM Subscription: Article published	Knowledge base
KM Subscription: Article revised in KB	Knowledge base
KM Subscription: Article checked out	Knowledge article
KM Subscription: Article revised	Knowledge article
KM Subscription: Article commented	Knowledge article

Users with the admin or knowledge_admin role can customize these email notification templates. To locate the template, navigate to **System Notifications** > **Email** > **Notifications**. For more information about customizing a template, see Create an email notification.

Subscription notifications include a link at the bottom of the email to the user's Notification Preferences page.

Analytics and Reporting Solutions for Knowledge Management

The following topics provide information on Platform Analytics Solutions and Demand Insights dashboards for Knowledge Management.

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Knowledge Management Platform Analytics Solutions

Platform Analytics Solutions contain preconfigured dashboards. These dashboards contain actionable data visualizations that help you improve your business processes and practices.

Platform Analytics Solutions

Platform Analytics data visualizations use Performance Analytics indicator data to show you data over time, helping you analyze your business processes and identify areas of improvement. With Platform Analytics Solutions, you can get value from Performance Analytics for your application with minimal setup. You can always create your own objects as well.

Important:
Set up and test Platform Analytics Solutions on a non-production instance before enabling them in production.

To enable the solution for Knowledge Management, an admin can navigate to **Performance Analytics** > **Guided Setup**. Click **Get Started** then scroll to the section for Knowledge Management. The guided setup takes you through the entire setup and configuration process.

Note:
You must Activate the Knowledge Management Advanced plugin.

Domain separation and 'Run As' user

In some solutions, System Administrator is the **Run As** user for data collection jobs in the Platform Analytics Solutions. In other solutions, the **Run As** user for data collection jobs is left blank. Verify that the **Run As** user exists on the instance, and that this user has the appropriate level of access. An inappropriate **Run As** user can cause errors or limit the data that is collected. This setting only has an effect if domain separation is enabled.

New and deprecated versions of this solution

In London , this Solution was replaced with a new version, `com.snc.pa.knowledge_v2`. If you activated an earlier version of the Solution and then upgraded your instance, you still have and can still use the earlier Solution. You can also activate the newer version without losing data from existing indicators and breakdowns. If you activate the newer version, run a historical data collection job to populate any new indicators and breakdowns.

Add Self-Service Analytics to Knowledge Management dashboards

If you have Self-Service Analytics activated on an instance, you can add Self-Service analytics widgets to your Performance Analytics dashboards or a Service Portal. To obtain a ready-made set of indicators and breakdowns, activate the Self-Service Analytics PA (*`com.snc.pa.self_service_analytics`*) plugin. Find the Self-Service indicators through the Performance Analytics Admin Console, then create widgets and add them to your dashboard or portal. Also activate the [SSA] Self-Service Analytics data collection job.

Related topics

Platform Analytics Solutions

Activate your Performance Analytics subscription

Knowledge Management dashboard

The Knowledge Management dashboard helps knowledge content owners and managers to determine the usage and quality of their knowledge content and confirm that the proper processes and procedures are being followed for content creation.

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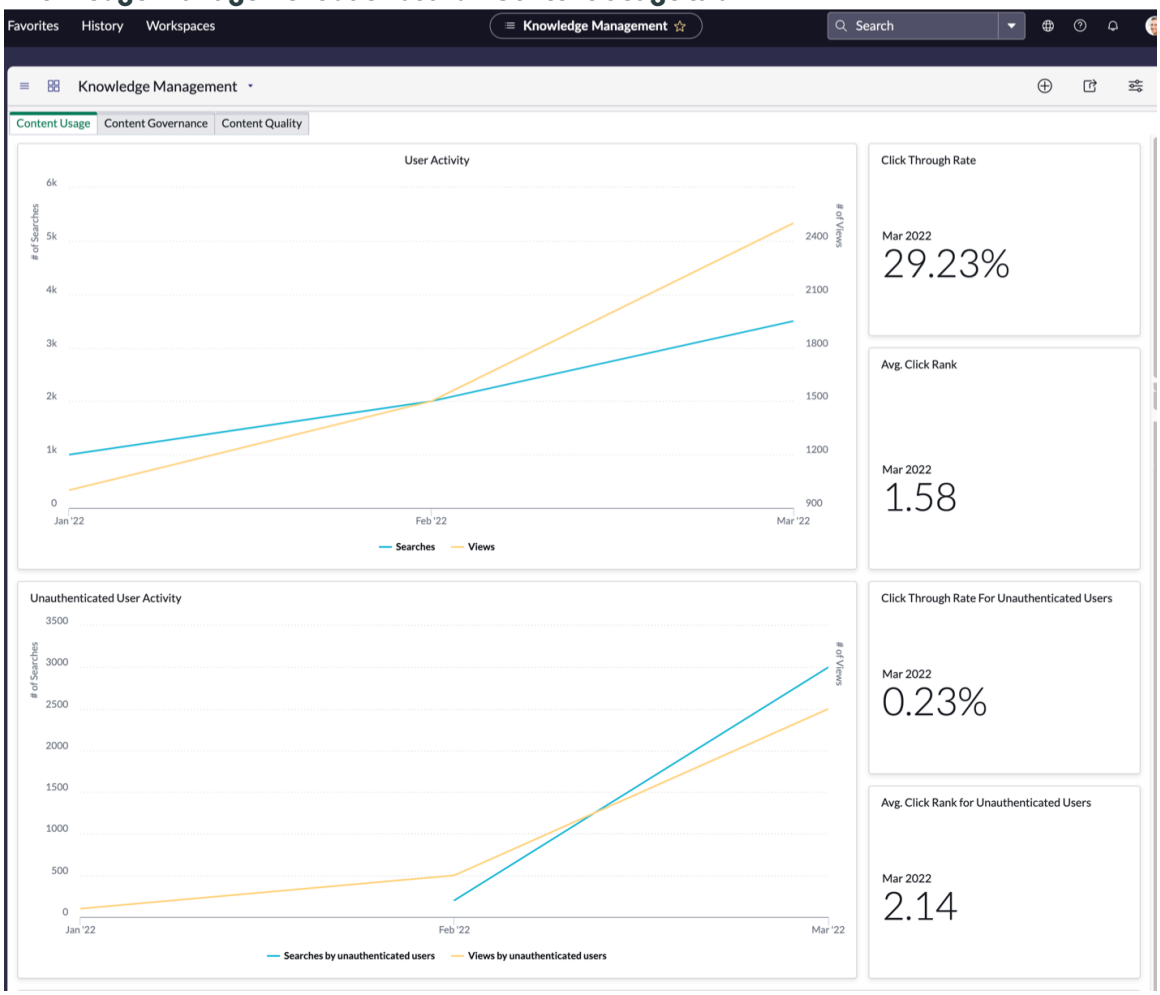
Note:

- This documentation refers to the Performance Analytics Content Pack for Knowledge Management v2, introduced in London. It does not refer to the older, deprecated version.
- To enable the solution for Knowledge Management, an admin can navigate to **Performance Analytics** > **Guided Setup**. Click Get Started then scroll to the section for Knowledge Management. The guided setup takes you through the entire setup and configuration process.
- To access the Knowledge Management dashboard, navigate to **All** > **Self-Service** > **Dashboard**. In the **Search dashboard** field, search for the Knowledge Management dashboard.

Knowledge Management dashboard - Content Usage tab



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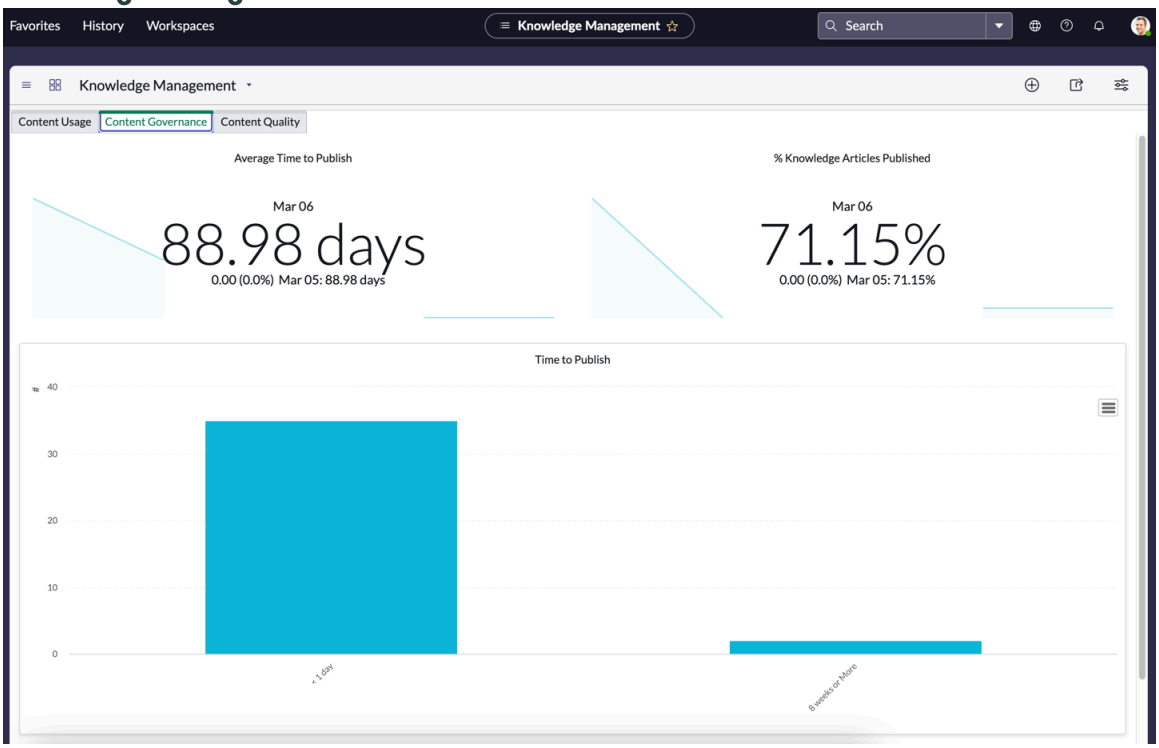
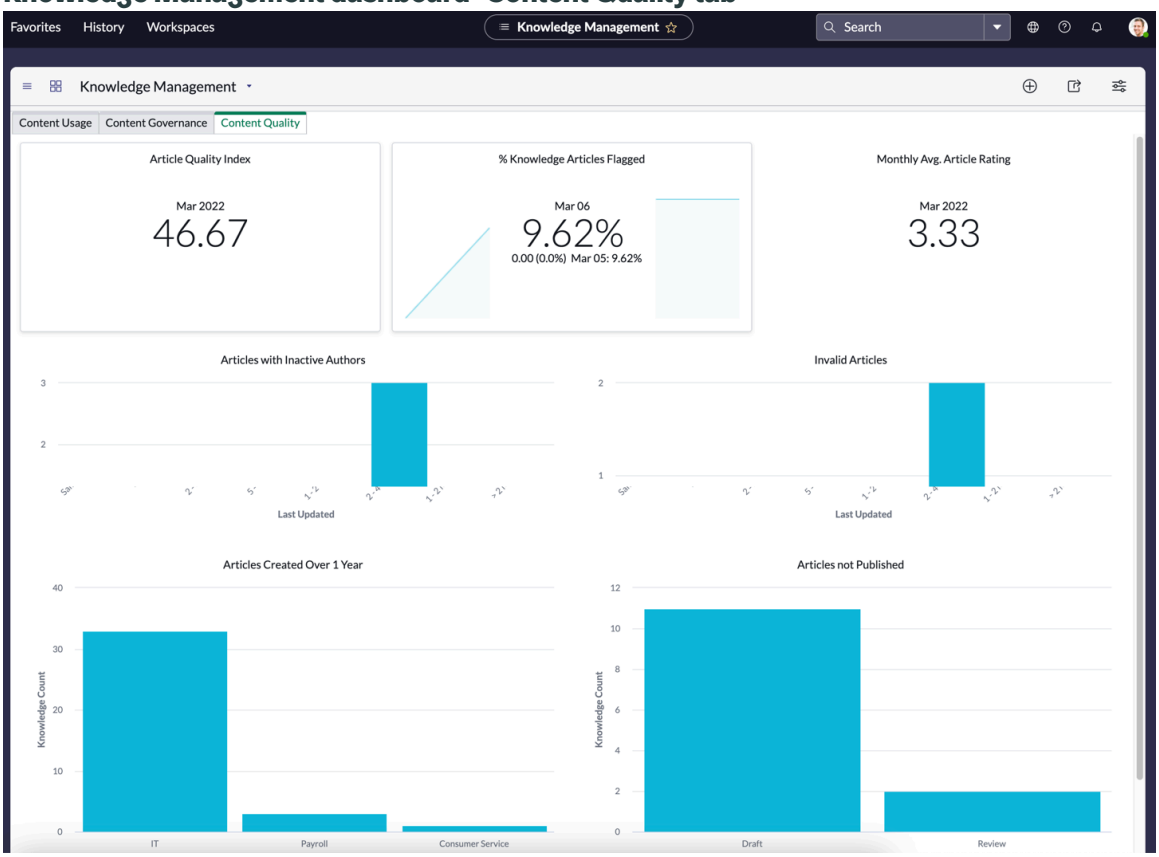
Knowledge Management dashboard - Content Governance tab



Knowledge Management dashboard -Content Quality tab



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End users and roles

End user and goal	Required role	Benefits
Knowledge Manager: Needs to identify areas of concern and direct resources optimally.	knowledge_manager	Can review the velocity of content publication and see what content customers are searching for, to direct the efforts of content owners more efficiently.
Knowledge Administrator: Needs clear visibility into the usage and quality of knowledge content.	knowledge_admin	Can plan and direct content creation.
Content creator: Needs to see the usage of content they own and areas for improvement	pa_viewer	Can see what content in their subject area that customers are looking for.

CSM Knowledge Management dashboard indicators

The CSM Knowledge Management dashboard provides three views, into content usage, content governance, and content quality.

The Knowledge Management dashboard presents the following key performance indicators:

% of Knowledge Articles Published

A daily calculation using the formula `[[Number of knowledge articles published]] / [[Number of knowledge articles active]]`

Monthly Average Article Rating

A monthly calculation of the sum of all article ratings for the month divided by the number of knowledge articles rated for the month.

Average Click Rank

A monthly calculation using the formula `[[Sum of knowledge search ranks]] / Number of knowledge searches with rank]]`

Click Through Rate

A monthly calculation using the formula `Number of knowledge searches with rank]] / [[Number of knowledge searches]]`

Average Time to Publish

The average time to publish is recalculated daily, as a number of days. The goal of the indicator is for scores to minimize.

Number of Active Users Who Performed Searches - Monthly

The number of authenticated users who performed at least one search of the knowledge base in the preceding month. The goal is for the number to maximize.

Number of Active Users Who Viewed Articles - Monthly

The number of authenticated users who viewed at least one knowledge article in the preceding month. The goal is for the number to maximize.

Number of Knowledge Searches with Rank - Monthly

The number of knowledge searches in a month where the Highest Click Rank has a value higher than zero. The goal is for the number to maximize.

Number of Knowledge Searches - Monthly

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The number of knowledge searches in a month. The goal is for the number to maximize.

Number of Knowledge Articles Rated - Monthly

The number of knowledge feedback records created in a month, excluding records where the Rating field is empty. The goal is for the number to maximize.

Number of Knowledge Articles Published

A daily count of the total number of knowledge articles that have entered the Published state. The goal is for the number to maximize.

Number of Knowledge Articles Active

A daily count of the number of active knowledge articles with up-to-date workflows. The goal is for the number to maximize.

Sum of Knowledge Article Rating - Monthly

The monthly sum of all knowledge article ratings. This indicator is used only to calculate the average monthly article rating.

Sum of Knowledge Search Ranks - Monthly

The sum of feedback rankings of knowledge searches made in a month, excluding empty Highest Click Rank values. The goal is for the number to maximize.

Average Click Rank for Unauthenticated Users

A monthly calculation of the average click rank for the unauthenticated user activity. The score is calculated according to the formula `[[Sum of Knowledge Search Ranks by Unauthenticated Users - Monthly]]/[[Number of Knowledge Searches by Unauthenticated user with Rank - Monthly]]`. A lower value is better.

Click Through Rate for Unauthenticated Users

A monthly calculation of the percentage of click through rate for the unauthenticated user activity. The score is calculated according to the formula `[[Number of Knowledge Searches by Unauthenticated user with Rank - Monthly]]/[[Number of Knowledge Searches by Unauthenticated user - Monthly]] * 100`. A higher value is better.

Number of Knowledge Searches by Unauthenticated Users - Monthly

A monthly count of the knowledge searches by unauthenticated users.

Number of Article Views by Unauthenticated Users - Monthly

A monthly count of the knowledge articles viewed by unauthenticated users.

Sum of Knowledge Search Ranks by Unauthenticated Users - Monthly

A monthly sum of the knowledge search ranks for the unauthenticated user activity.

Number of Knowledge Searches with Rank for Unauthenticated Users - Monthly

A monthly count of the knowledge searches with click rank for the unauthenticated user activity.

Breakdowns

The following breakdowns apply to the indicators on the dashboard:

- Time to Publish Groups
- Knowledge Base
- Knowledge Category

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Data visualizations

The dashboards include the following visualizations:

Title	Type	Description
Articles with Inactive Authors	Column	Active = true and Author.Active = False
Invalid Articles	Column	Active = true and Workflow is one of Draft, Review, Published, or Pending Retirement and Valid to is before today and latest = true
Articles Created Over 1 Year	Column	Active = true and Created = before 1 year ago
Articles not Published	Column	Active = true and Workflow is Draft or Review

Related topics

Dashboards

Knowledge Management Overview dashboard

The Knowledge Management Overview dashboard provides an overview of various usage metrics associated with knowledge articles. You can view and track knowledge usage and views and direct the efforts of content owners more efficiently.

Note:

If you are upgrading from a previous release, you must activate the Knowledge Overview (com.sn_knowledge_overview) plugin to enable the Knowledge Management Overview dashboard. You also need to update the navigation path. For more information, see Update the navigation path for the Knowledge Management Overview dashboard.

Enable the responsive dashboard to optimize analytics by setting the *glide.cms.enable.responsive_grid_layout* system property to true

To access the Knowledge Management Overview dashboard, navigate to **All** > **Knowledge** > **Administration** > **Overview**. By default, the **Article Lifecycle** tab is shown when you first visit the dashboard.

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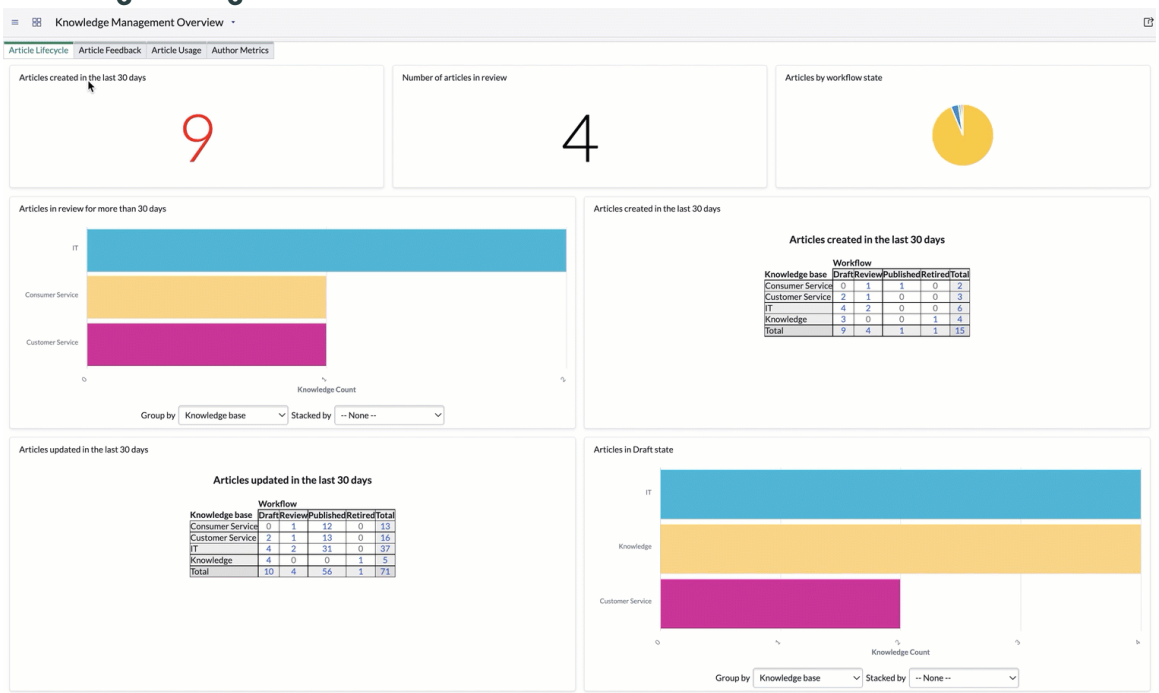
Knowledge Management Overview dashboard



End user and roles

End user and goal	Required role	Benefits
Knowledge Manager: Identify areas of concern and direct resources optimally.	knowledge_manager	Can review the velocity of content publication and see what content customers are searching for.
Knowledge Administrator: Needs clear visibility into the usage and quality of knowledge content.	knowledge_admin	Can plan and direct content creation.

Reports

The Knowledge Management Overview dashboards include various reports.

Title	Type	Description
Article Lifecycle		
Articles created in the last 30 days	Single score (42)	Total number of articles created in the last 30 days.
Number of articles in review	Single score (42)	Total number of articles in the review state.
Articles by workflow state	Pie ( )	Displays articles by their workflow state.

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Title	Type	Description
Articles in review for more than 30 days	Horizontal bar ()	Shows the articles that have been in the review state for more than 30 days.
Articles created in the last 30 days	Pivot table ()	Shows the articles created in the last 30 days and the knowledge bases and workflows associated with the articles.
Articles updated in the last 30 days	Pivot table ()	Shows the articles updated in the last 30 days and the knowledge bases and workflows associated with the articles.
Articles in Draft state	Horizontal bar ()	Shows the articles in the draft state.
Article Feedback		
Articles flagged in the last 30 days	Single score ()	Total number of articles flagged in the last 30 days.
Articles marked Not Helpful in the last 30 days	Single score ()	Total number of articles marked as not helpful in the last 30 days.
Comments added in the last 30 days	Single score ()	Total number of articles that have received comments in the last 30 days.
Article ratings in the last 30 days	Pivot table ()	Displays the ratings for articles that are in different workflow states. It also shows the average rating of articles from different knowledge bases.
Average article rating	Single score ()	Shows the average rating of articles that have been rated.
Article Usage		
Knowledge use	Vertical bar ()	Shows the count of articles used as attachments.
Article views	Vertical bar ()	Shows the count of articles viewed by knowledge base.
Knowledge use trended by month	Line ()	Shows the count of articles used as attachments trended by month.
Article view count trended by month	Line ()	Shows the count of viewed articles trended by month.
Author Metrics		
Monthly knowledge use by author	Trend ()	Shows the count of articles used as attachments trended by month with respect to the author.

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Title	Type	Description
Monthly knowledge views by author	Trend ()	Shows the count of viewed articles trended by month per author.
Articles created by author	Trend ()	Shows articles created per knowledge author trended by month.

Update the navigation path for the Knowledge Management Overview dashboard

Update the navigation path to access the Knowledge Management Overview dashboard.

Before you begin

- Activate the knowledge overview (com.sn_knowledge_overview) plugin.
- If you are upgrading from a previous release, you must update the knowledge overview entry in the Modules (sys_app_module) table.

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Modules**.
2. On the Modules page, in the **Title** field, enter `overview`.
3. In the **Application menu** field, enter `knowledge`.
4. Open the **Overview** module.
5. In the Module Overview page, click **Link Type**.
6. In the **Link type** field, select **URL (from Arguments)** from the list.
7. In the **Arguments** field, enter `$pa_dashboard.do?sysparm_dashboard=bcaa1278c30101107b15f97c9840ddf7`.
8. Select **Update**.

Result

The navigation path for the Knowledge Management dashboard is updated to **All** > **Knowledge** > **Administration** > **Overview**.

Pareto chart for Knowledge Demand Insights

The Pareto chart for Knowledge Demand Insights enables you to visualize candidate knowledge gaps and prioritize the order in which knowledge gaps should be resolved.

The following information is available in the Pareto chart for Knowledge Demand Insights:

- The left Y axis is the count of tasks with no or insufficient knowledge coverage.
- The right Y axis is the cumulative percentage of the total number of tasks evaluated.
- Each bar represents a collections of similar tasks that don't have good knowledge coverage. The bars are arranged in a descending order such that the collection with most number of tasks appears in the left. This order enables you to resolve the largest collection first. When you point to a bar, you view the number of tasks included within the bar and the cumulative percentage.

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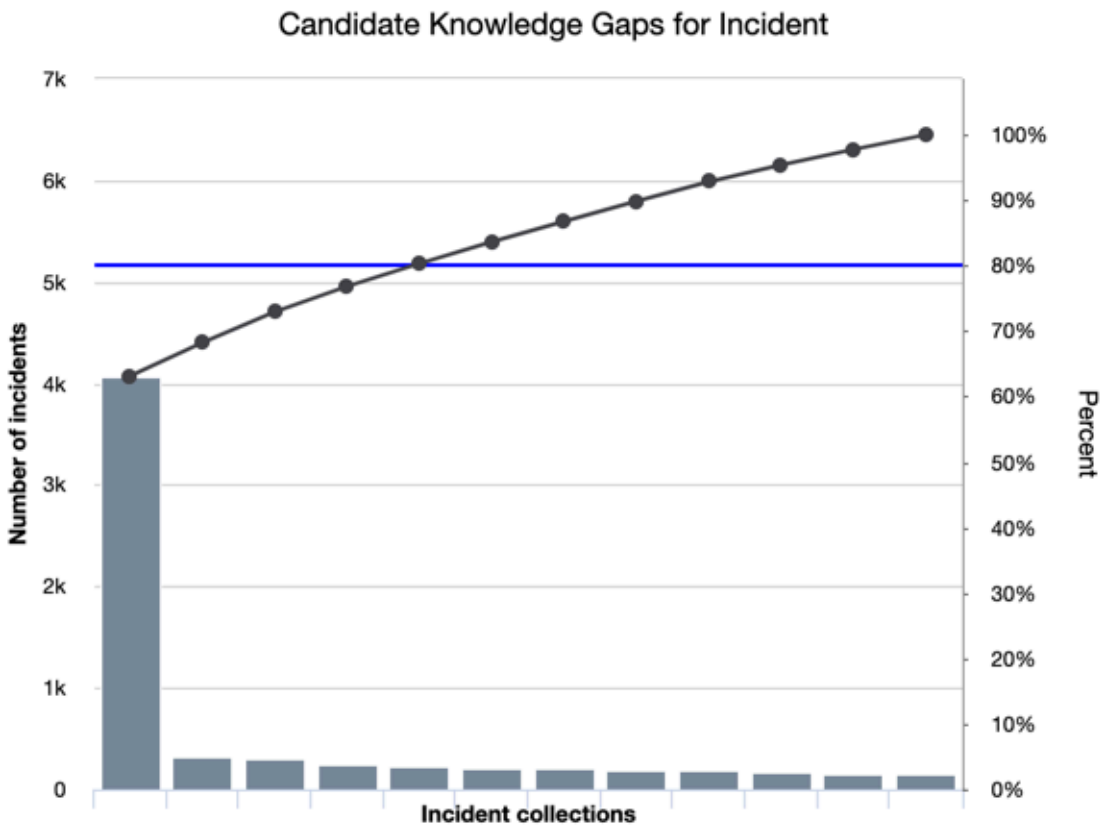
- The line graph shows the cumulative percentage of tasks that are included in each collection.
- The blue line indicates the 80% of total number of tasks that have no or insufficient knowledge coverage. The intersection of the blue line and the line graph indicates the minimum number of collections that need to be resolved so that 80% of tasks can be covered.

Example: Pareto chart for demand insights

The following figure displays a Pareto chart for identifying candidate knowledge gaps for incidents.



Related topics

Demand Insights for Cases dashboard

Demand Insights for Incidents dashboard

Demand Insights for HR Cases dashboard

Knowledge demand insights

Demand Insights for Cases dashboard

The Demand Insights for Cases dashboard enables you as a customer service case manager to identify which cases have no or insufficient knowledge coverage. You can then create feedback tasks for knowledge gaps to deflect such cases.

The Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml) includes the Demand Insights for Cases dashboard. For more information, see Predictive Intelligence for Knowledge Management and Additional plugins for Knowledge Management.

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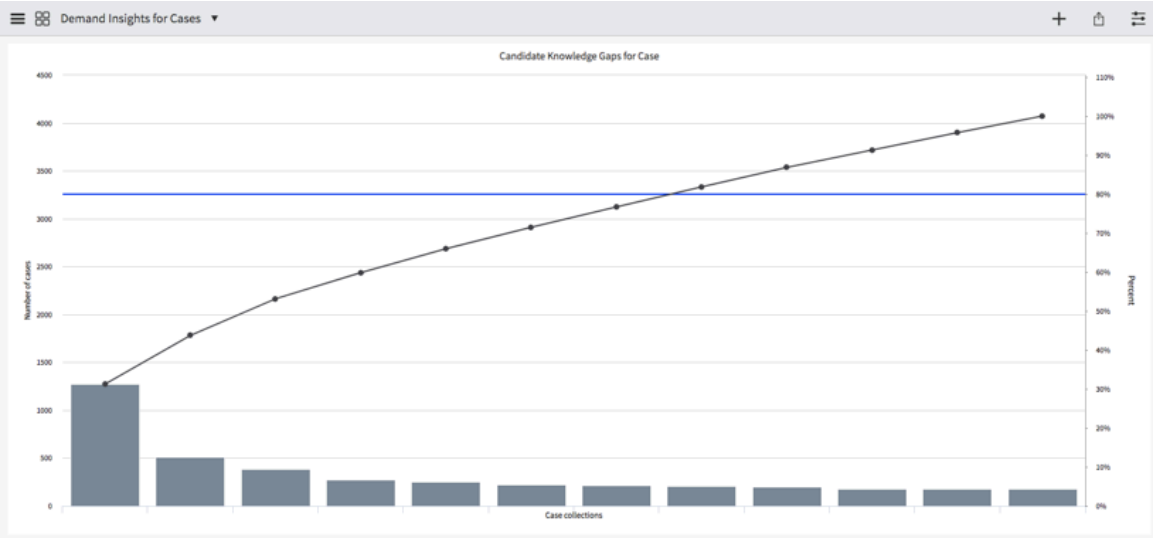
Demand Insights for Cases dashboard



End user and roles

End user and goal	Required roles
Customer service case manager: Needs to identify which cases don't have good knowledge coverage.	sn_km_ml.knowledge_curation_user and sn_customerservice_manager

Reports

Title	Type	Description
Candidate Knowledge Gaps for Case	Pareto Chart	Displays data from the Knowledge Curation Task [kb_curation_task_cluster] table with the following conditions: Curation configuration = sn_customerservice_case AND Solution.Active = true

Related topics

- Pareto chart for Knowledge Demand Insights
- Knowledge demand insights

Demand Insights for Incidents dashboard

The Demand Insights for Incidents dashboard enables you as an incident manager to identify which incidents have no or insufficient knowledge coverage. You can then create feedback tasks for knowledge gaps to deflect such incidents.

The Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml) includes the Demand Insights for Incidents dashboard. For more information, see Predictive Intelligence for Knowledge Management and Additional plugins for Knowledge Management.

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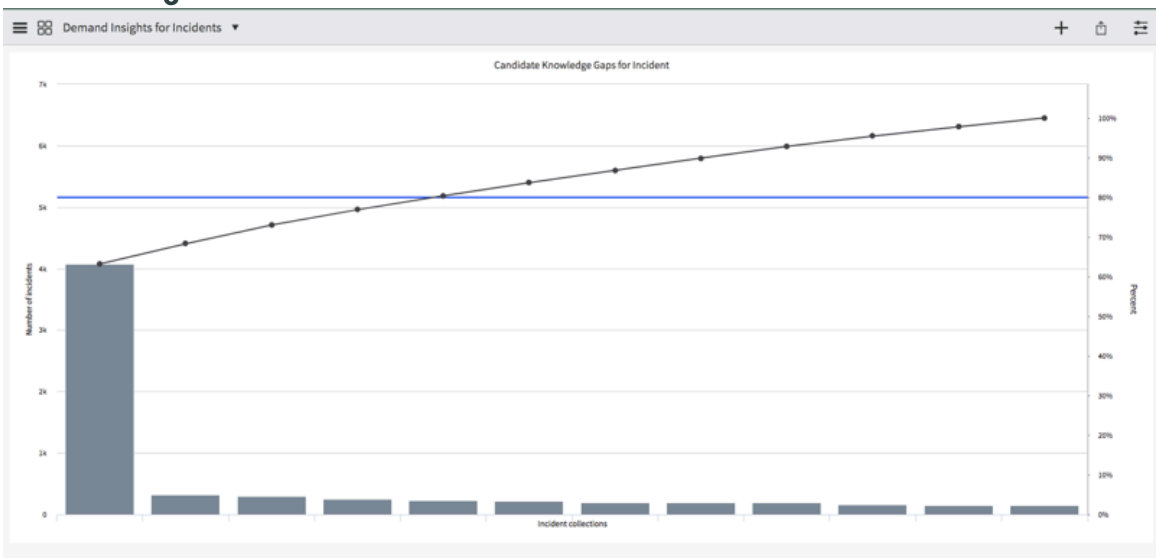
Demand Insights for Incidents dashboard



End user and roles

End user and goal	Required role
Incident manager: Needs to identify which incidents don't have good knowledge coverage.	sn_km_ml.knowledge_curation_user and incident_manager

Reports

Title	Type	Description
Candidate Knowledge Gaps for Incident	Pareto Chart	Displays data from the Knowledge Curation Task [kb_curation_task_cluster] table with the following conditions: Curation configuration = incident AND Solution.Active = true

Related topics

- Pareto chart for Knowledge Demand Insights
- Knowledge demand insights

Demand Insights for HR Cases dashboard

The Demand Insights for HR cases dashboard enables you as an HR agent to identify which HR cases have no or insufficient knowledge coverage. You can then create feedback tasks for knowledge gaps to deflect such HR cases.

Note:
For Demand Insights for HR cases dashboard, activate the Human Resources Scoped App: Core plugin [com.sn_hr_core] and Predictive Intelligence for Knowledge Management plugin [com.snc.knowledge_ml].

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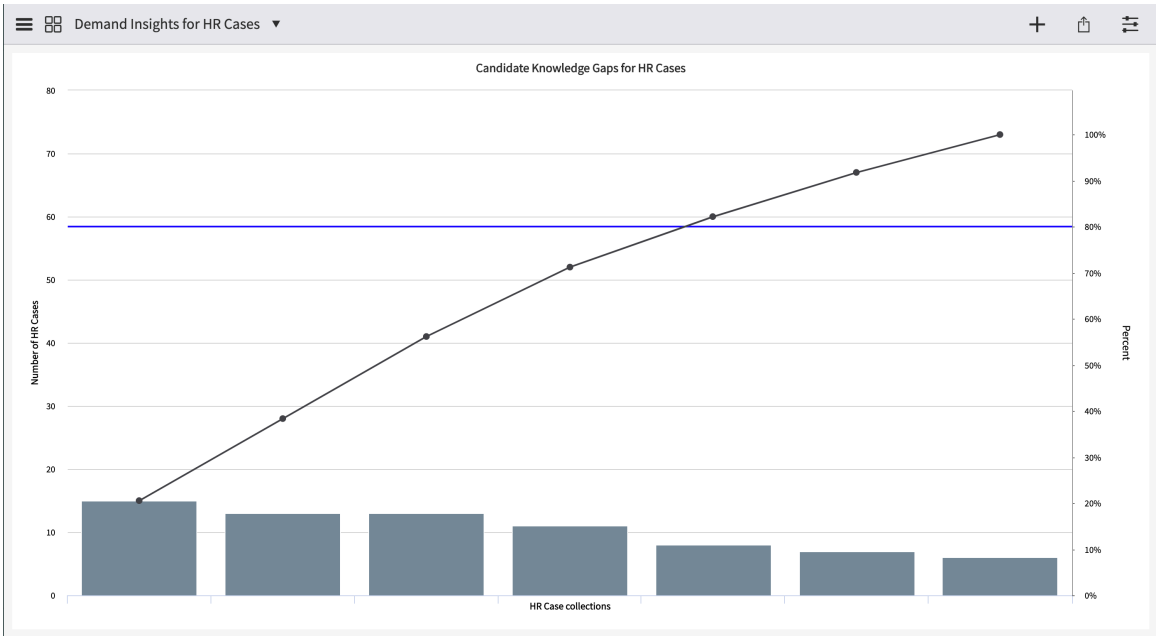
Demand Insights for HR Cases dashboard



End user and roles

End user and goal	Required role
HR agent: Needs to identify which HR cases don't have good knowledge coverage.	sn_km_ml.knowledge_curation_user and sn_hr_core.admin

Reports

Title	Type	Description
Candidate Knowledge Gaps for HR cases	Pareto Chart	Candidate Knowledge Gaps for HR cases.

Now Assist in Knowledge Management

Use ServiceNow Now Assist in Knowledge Management to generate a new knowledge article for a case or incident via the Now Assist panel, classic environment, or the respective configurable workspace. Agents can use these articles to propose quicker resolutions to customers.

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Get started

Explore	Configure	Use
 Learn about the generative AI skills available in Now Assist in Knowledge Management.	 Activate Now Assist in Knowledge Management and configure the generative AI skills .	 Generate new articles with Now Assist in Knowledge Management.

Troubleshoot and get help

- Knowledge Management community forum
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring Now Assist in Knowledge Management

Use the Now Assist in Knowledge Management application to help agents generate a new knowledge article for a case or incident via the Now Assist panel, classic environment, and configurable workspace.

Now Assist in Knowledge Management Overview

Once activated and configured, Now Assist in Knowledge Management makes the following generative AI capabilities available to an agent:

- Agents can generate articles from the Now Assist panel.
- Agents can generate articles from their respective configurable workspace.
- Agents can also edit and publish articles in the knowledge base.

Now Assist in Knowledge Management Skills

The Now Assist in Knowledge Management application includes the KB generation skill that enables agents to generate knowledge articles when working on a case or incident. Agents can document the resolutions and relay them to customers, providing quick resolutions to their queries and issues.

Now Assist panel

Agents can use the Now Assist panel available in their workspace. This conversational interface enables agents to generate a new knowledge article related to a case or incident. For more information about the Now Assist panel, see Now Assist panel.

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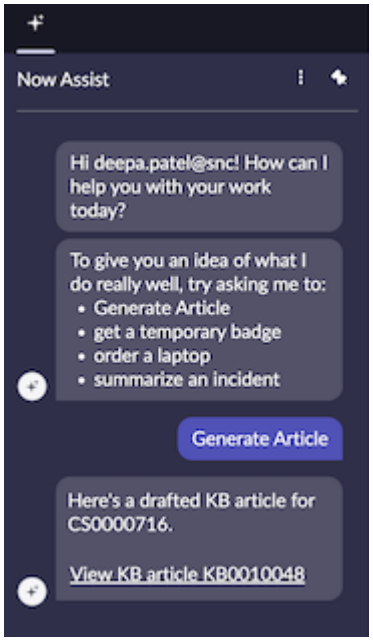

Related topics

- Generate a knowledge article from the CSM Configurable Workspace and classic environment with Now Assist
- Generate a knowledge article from the Service Operations Workspace for ITSM and classic environment with Now Assist
- Generate a knowledge article from Now Assist for HR Service Delivery (HRSD)
- Generate a Knowledge article from the classic environment with Now Assist

Configuring Now Assist in Knowledge Management

If you have the admin role, you can configure the Now Assist in the Knowledge Management application, enabling agents to use its generative AI skills within their application workspace and the classic environment.

Configuration overview

Configure how agents use generative AI capabilities to generate new knowledge articles.

Configuring the KB generation skill

Configure the KB generation skill that agents can use to draft a knowledge article with Now Assist.

Before you begin

Before configuring the KB generation skill, the following applications and their respective plugins must be installed.

- The latest Now Assist in Knowledge Management and Knowledge Capabilities in UI Builder store apps must be installed prior to the following configuration steps.
- For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: admin

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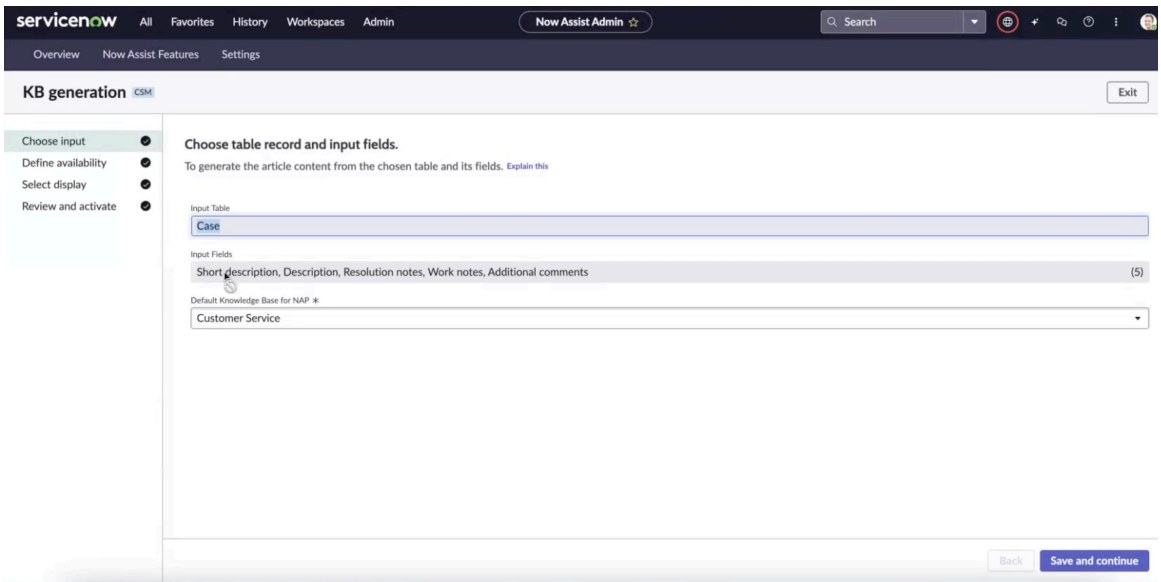
Procedure

1. Navigate to **All** > **Now Assist Admin** > **Features**.
2. Select the application that you want to configure the KB generation skills for.
3. On the **Knowledge** feature card, select **View details**.
4. In the Activate Skills section, select the more actions icon ( ), then select **Edit** to open the skill configuration window for KB generation.
5. Review the values in the Choose input window, then select **Save and Continue**.
   Review the read-only fields for more information.
   - **Input Table**: The record type used for KB generation. For example, the value is **case** for Now Assist for CSM.
   - **Input Fields**: The fields from which information is gathered to draft the Knowledge article. Based on the Input Table, the Input Fields can be configured. Together, they serve as an input to Now LLM Service from the case or incident where the article is created.
   - **Default Knowledge Base for NAP**: The Knowledge Base in which the Now Assist panel generates the article.



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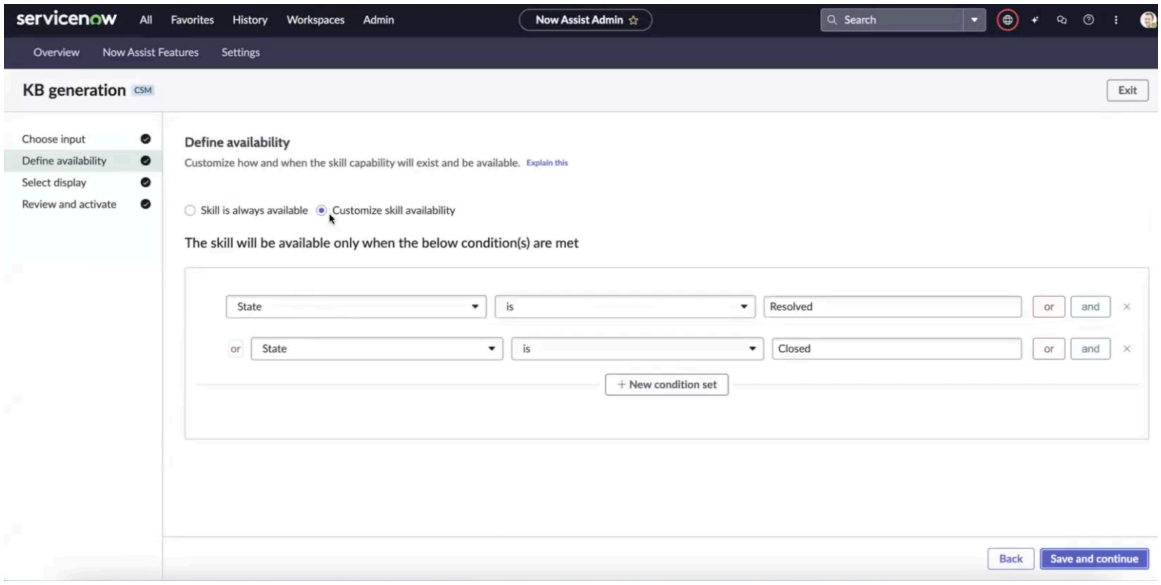
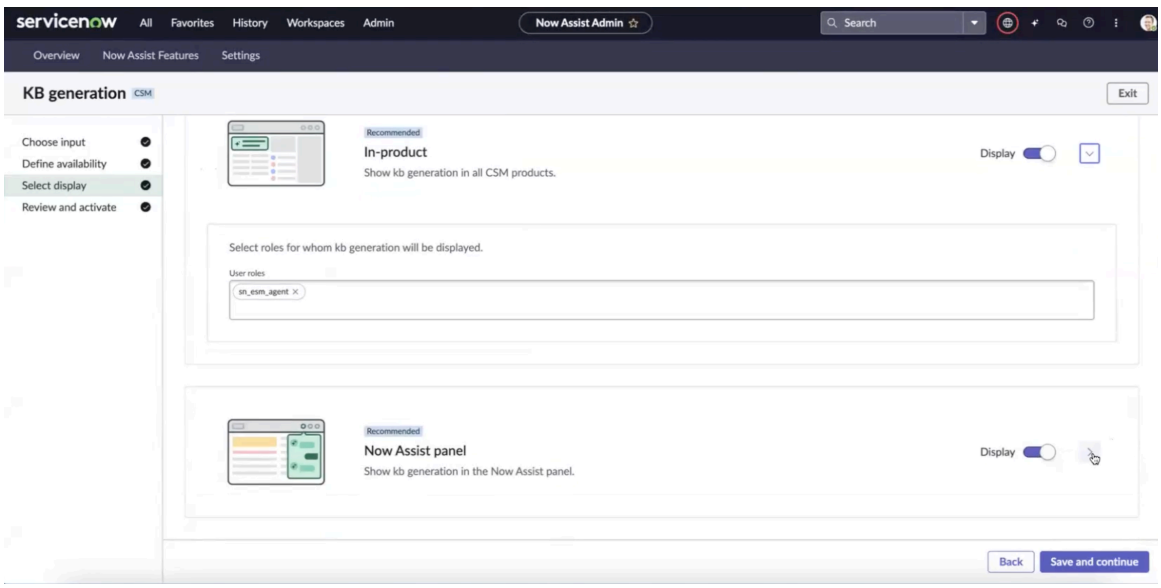
6. Configure whether the KB generation skill should always be available or available based on a set of conditions.



7. Select where you want to display the KB generation skill. You can select In-product, Now Assist panel, or both.
   - **In-product**: When selected, Now Assist skills are displayed on forms and workspaces. Select the arrow next to the toggle switch to define the roles that can use this skill in-product.
   - **Now Assist panel**: When selected, Now Assist skills are available in the Now Assist panel. Select the arrow next to the toggle switch to define roles that can use this skill in the Now Assist panel.



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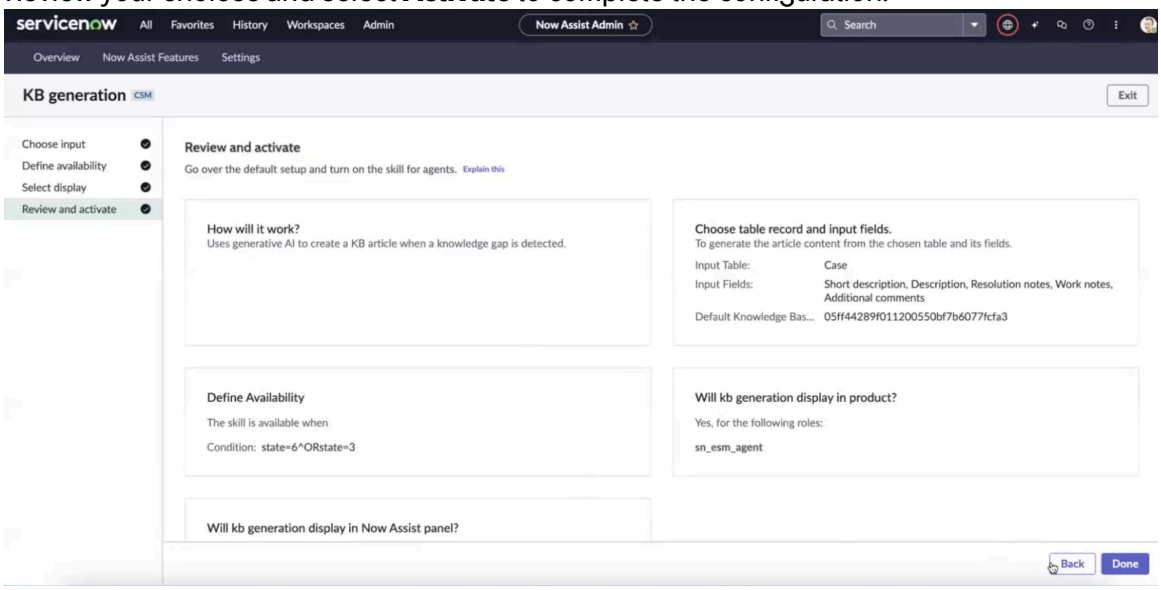
8. Select **Save and continue** to go to the next step.
9. Review your choices and select **Activate** to complete the configuration.



Result
Your skill is configured.

Related topics

- Skill inputs and triggers for Now Assist for Customer Service Management (CSM)
- Skill inputs and triggers for Now Assist for IT Service Management (ITSM)
- Skill inputs and triggers for Now Assist for HR Service Delivery (HRSD)

Using Now Assist in Knowledge Management

Now Assist in Knowledge Management enhances the agent experience by using artificial intelligence (AI) to generate a new knowledge article based on the resolution provided to a case or an incident.

Generating knowledge articles

You can generate knowledge articles in Now Assist for Customer Service Management (CSM), Now Assist for IT Service Management (ITSM), and Now Assist for HR Service Delivery (HRSD) in several ways:

- To generate knowledge articles based on cases in CSM Configurable Workspace, see Generate a knowledge article from the CSM Configurable Workspace and classic environment with Now Assist.
- To generate knowledge articles based on incidents in Service Operations Workspace for ITSM, see Generate a knowledge article from the Service Operations Workspace for ITSM and classic environment with Now Assist.
- To generate knowledge articles based on cases in Agent Workspace for HR Case Management, see Generate a knowledge article from Now Assist for HR Service Delivery (HRSD).
- To generate knowledge articles based on cases or incidents from the Now Assist panel, see Generate a Knowledge article from the Now Assist panel.
- To generate knowledge articles based on cases or incidents in the classic environment, see Generate a Knowledge article from the classic environment with Now Assist.

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Generate a Knowledge article from the Now Assist panel

Generate a new knowledge article for a case or an incident from the Now Assist panel.

Before you begin

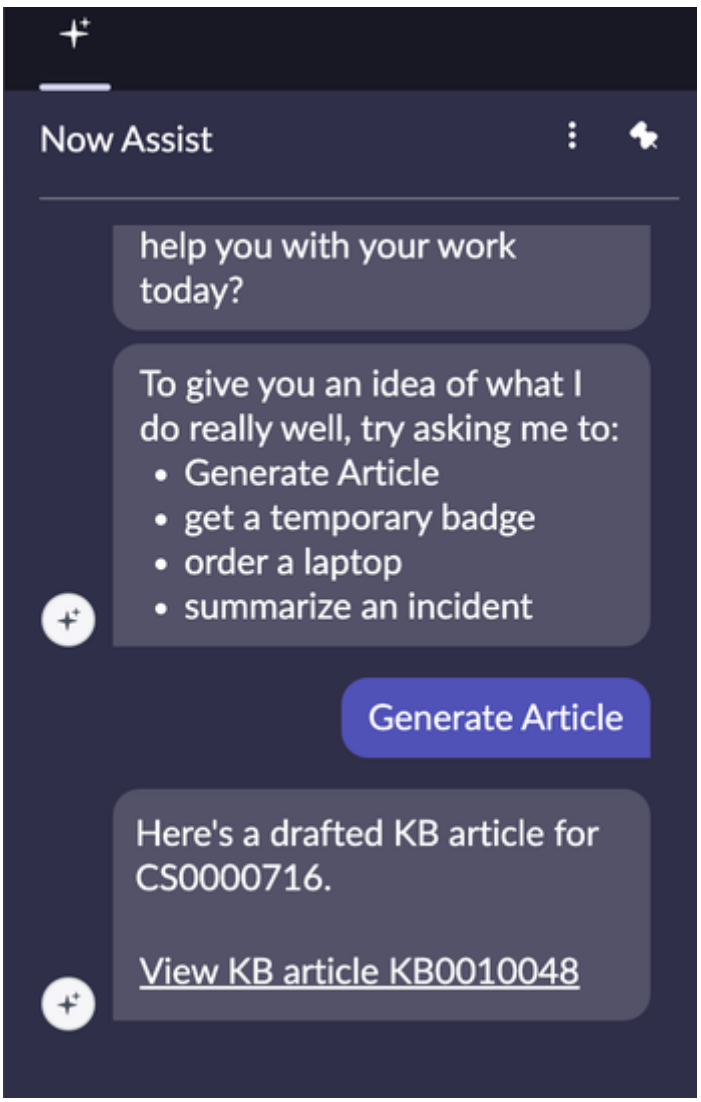
For Now Assist for HR Service Delivery (HRSD), Knowledge articles are only supported on the HR case record (sn_hr_core_case), not on the record from extended tables.

Role required: agent

Procedure

1. Open a case or an incident that is assigned to you.
2. Open the Now Assist panel by selecting the Now Assist icon ( ).
3. In the Now Assist panel, select or enter **Generate Article**.

   Now Assist generates a Knowledge (KB) article.



4. View the draft article by selecting the **View KB article** link in the chat window.
   The article appears in a new tab, with a unique ID number for the article.
5. Review the article and edit it if necessary.
6. View, edit, and publish the article by using the respective buttons on the screen.

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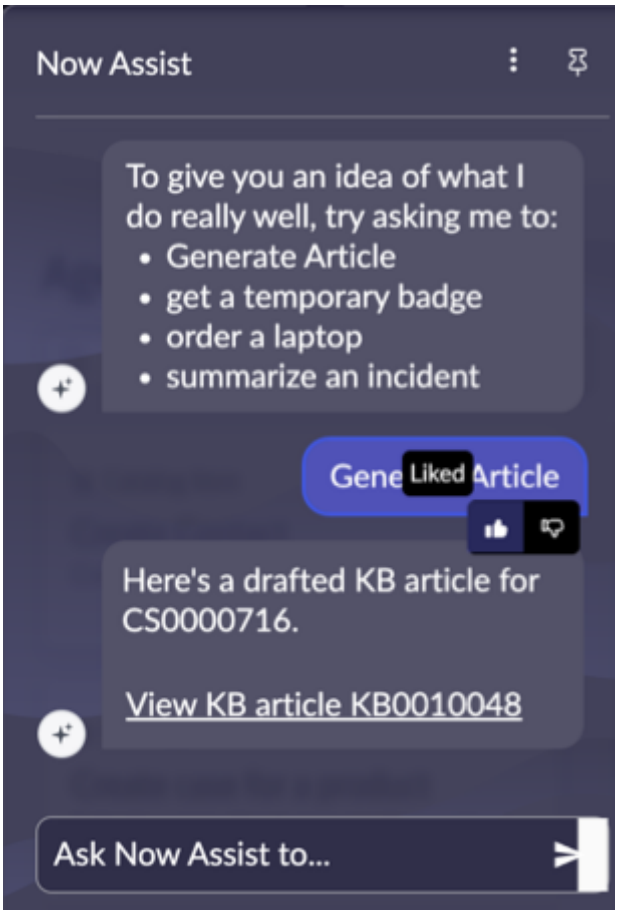
7. **Optional:** Provide feedback on whether the article is helpful or not by selecting the liked icon (👍) or the not liked icon (👎).



Note:
Feedback plays a vital role in improving the generative AI performance. Consider giving feedback every time you use Now Assist to help improve responses.

Generate a Knowledge article from the classic environment with Now Assist

Generate a new knowledge article using Now Assist on cases and incidents within the classic environment.

Before you begin

To see the Now Assist experience on the Create Article page, the following KB generation criteria should be configured:

- Confirm that the KB generation skills are installed.
- In Now Assist Admin confirm with your admin that the following criteria are in place:
  - The table record and input fields must be specified.
  - The conditions for skill availability must be specified from the list of attributes.
  - The display of the KB generation feature In-product or Now Assist panel must be specified.

Role required: agent

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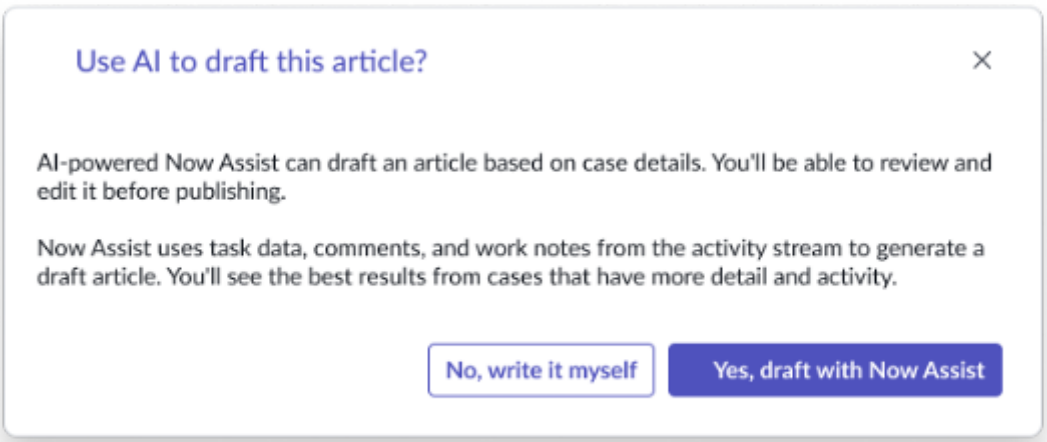
Procedure

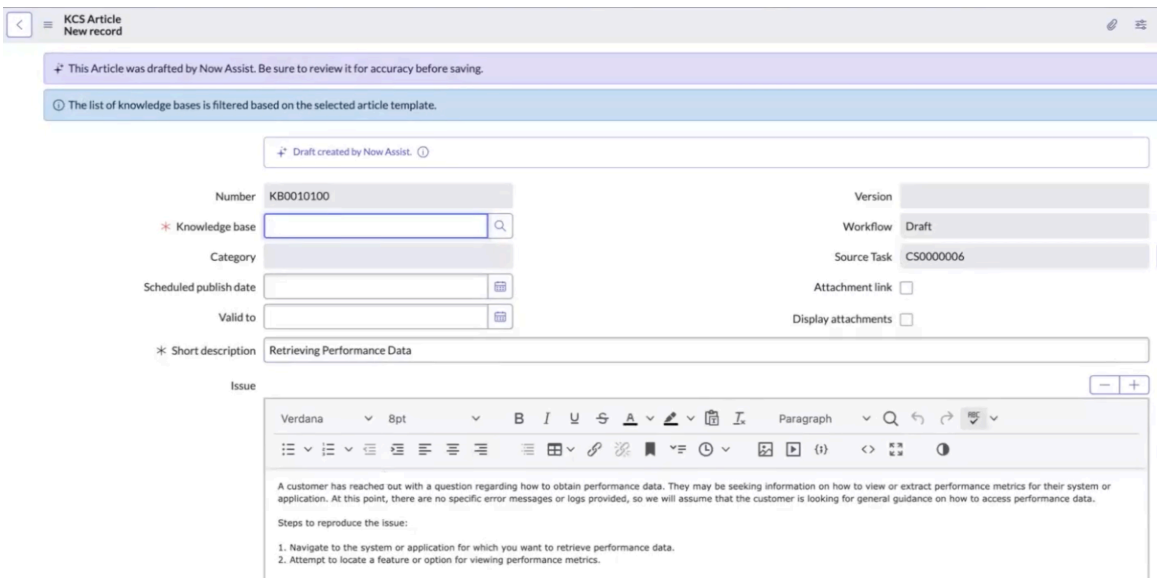
1. Open a case or an incident that is assigned to you.
2. Generate an article by using the UI actions that appear in the record.

> **Note:**
> Based on the template selection made by your admin during the configuration of the Knowledge Management system properties, you can apply one of the following supported templates to the article: KCS article, Incident KCS HTML, or Standard template.

3. In the Use AI to draft this article? dialog box, select **Yes, draft with Now Assist**.



The completed article is displayed in the chosen template, along with a success message: `This article was drafted by Now Assist. Be sure to review it for accuracy before saving.`



> **Note:**
> After you select **Yes, draft with Now Assist**, the article generation can't be stopped. Now Assist continues to generate the article even if you close the dialog box.

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4. Review the Now Assist generated article and select **Save** or **Publish**.

Note:
After you save or publish the article, the message indicating that it was authored by Now Assist is removed.

Related topics

Generate a knowledge article from the Service Operations Workspace for ITSM and classic environment with Now Assist

Generate a knowledge article from the CSM Configurable Workspace and classic environment with Now Assist

Generate a knowledge article from Now Assist for HR Service Delivery (HRSD)

Response templates

Resolve cases or support issues faster and more efficiently with response templates. Response templates (formerly known as templated snippets) are reusable messages that can be copied to case or task forms to provide quick and consistent messages to users, or to display standard chat response messages to requesters in Agent Chat.

Note:
Response templates are available only for existing records.

Assign response template roles

The following roles are installed when you activate the response templates plugin.

Response template role	Description
Response template administrator [sn_templated_snip.template_snippet_admin]	Grants access to scoped administration of the response templates feature.
Response template writer [sn_templated_snip.template_snippet_writer]	Grants access to create, read, update, and delete (CRUD) response template content.
Response template reader [sn_templated_snip.template_snippet_reader]	Grants access to read response template content.
System Administrator [admin]	Response template administrator [sn_templated_snip.template_snippet_admin]

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Response template role	Description
	Note: Admin inherits this role by default. When the Templated Responses [com.sn_templated_snip] plugin is activated without activating related HR applications, you can still use response templates. • Admin can reassign this role to other users. • Admin can also remove the Contained Role [sys_user_role_contains] table so Admin users do not inherit this role by default. Or: 1. Enter **sys_store_app_list.do** in the Filter navigator search bar of an instance, or **https://YOUR_INSTANCE/sys_store_app_list.do** from a web browser. 2. Search for and select **Templated Snippets**. 3. Scroll down to **Related Links**. 4. Click **Remove from the role contained by admin**.

Before you begin using response templates, you must assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

For example,

- In the HR Service Delivery application, users with the HR administrator role are assigned the response template administrator role, users with the HR manager role are assigned the response template writer role, and users with the HR case writer role are assigned the response template reader role.
- In the Customer Service Management application, users with the customer service manager role (sn_customerservice_manager) inherit the response template writer role. Users with the customer service agent role (sn_customerservice_agent) inherit the response template reader role and can access response templates assigned to all groups to which they belong.

How to use response templates

Users with the response template writer [sn_templated_snip.template_snippet_writer] role can create response templates. Each template is associated with a table that is an extension of the Task [task] or Interaction [interaction] table. Response templates include a short name for specifying a shortcut that can be used to identify the message. For chat response templates used in Agent Workspace, agents use the slash command with a short name to present the standard message during a chat. You can also configure the template to

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- Include variables pulled from a table
- Specify a condition builder to specify the conditions that must be met for the template to be available for use, such as for a specific HR service

For more information, see Create or modify a response template.

Users with the response template reader [sn_templated_snip.template_snippet_reader] role can then copy response template content and use it in their responses to users when working on case or task forms that meet the specified conditions. For example, a response template for payroll discrepancy cases enables HR agents to use a standardized message when responding to that case type. See Copy a response template to an HR case for an HR-specific example.

Example: Response template to escalate payroll discrepancy cases

You are part of an enterprise HR organization using the HR Service Delivery application. You want your HR agents to respond to and, when necessary, escalate payroll discrepancy cases quickly and consistently. Create a response template so that HR agents have a reusable message to use when responding to employees about that case type.

One of your HR managers with the response template writer role is responsible for creating the template to escalate payroll discrepancy cases. The template is associated with the HR Payroll Case [sn_hr_core_case_payroll] table, and a condition filters on cases that match the appropriate HR service called Payroll Discrepancy. In the template body, the response text appears with variables, such as the subject person name in the salutation.

HR case writers with the response template reader role can copy the response template content and use it in their responses to employees when working on cases. Response templates provide a faster and efficient way to resolve cases.

Activation information

To use response templates in your application, you must activate response templates. For information on what components are installed with the feature, see Components installed with response templates.

Activate response templates

You can activate response templates (formerly known as templated snippets) [com.sn_templated_snip] if you have the admin role. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin

Role required: admin

Note:
If you are using Agent Chat, the Agent Chat (com.glide.interaction.awa) plugin automatically activates response templates.

About this task

Response templates activate these related plugins if they are not already active.

Plugins for response templates

Plugin	Description
Scoped Application Restricted Caller Access	Allows scoped applications to restrict access to public tables and script includes.

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Plugins for response templates (continued)

Plugin	Description
[com.glide.scope.access.restricted_caller]	

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins (Madrid)

Components installed with response templates

Several types of components are installed with activation of the Templated Responses (com.sn_templated_snip) plugin, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Roles installed

By default, the following HR roles contain the following response template roles.

Note:
The Templated Responses [com.sn_templated_snip] plugin activates the sn_templated_snip.min_admin_count system property [sys_properties.list]. This property prevents you from deleting your only Response Template admin user by requiring a minimum number (default is two) of active users with this role.

Roles installed with response templates

Role title [name]	Description	Contains roles
Response templates administrator	Grants access to	sn_templated_snip.template_snippet_writer

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Roles installed with response templates (continued)

Role title [name]	Description	Contains roles
[sn_templated_snip.template_snippet_admin]	scoped administration of the response templates feature.	
Response templates writer [sn_templated_snip.template_snippet_writer]	Grants access to create, read, update, and delete (CRUD) response template content.	sn_templated_snip.template_snippet_reader
Response templates reader [sn_templated_snip.template_snippet_reader]	Grants access to read response template content.	None

You can assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

For further information on user administration and how to manage users, see User administration.

Tables installed

Tables installed with response templates

Table	Description
Response Template [sn_templated_snip_note_template]	Stores response template information. Response templates are reusable messages that can be copied to case or task forms. Response templates provide quick and consistent messages to users, or display standard chat response messages to requesters in Agent Chat.
M2M Response Template to Channel [m2m_response_template_to_channel]	Maps channels to response templates.
Response Template Channel [sn_templated_snip_channel]	Stores information about response template channels.

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Tables installed with response templates (continued)

Table	Description
Note Template for Table [sn_m2m_note_template_for_table]	Maps notes to response templates.

For further information on table administration and how to manage data, see Table administration.

Create or modify a response template

Create or modify a response template (formerly known as a templated snippet) to define a reusable message that can be copied to case or task forms or used in Agent Chat sessions to provide quick and consistent messages to users.

Before you begin

Role required: sn_templated_snip.template_snippet_writer

About this task

Each response template is associated with a table that is an extension of the Task [task] table or, if using Agent Workspace, the Interaction [interaction] table. The template can be configured to include variables pulled from that table. You can also use a condition builder to specify the conditions that a case must meet for the template to be available for use, such as for a specific HR service or for chat. For chat response templates, you specify a short name (shortcut) that is used with the slash command as a quick way to present the response message to a user.

Procedure

1. Navigate to **All** > **System Definition** > **Response template configuration**.
2. Select **New** to create a response template.
   Or, select an existing response template to modify from the list.
3. Fill in the fields on the form.

Response template form

Field	Description
Name	Name of the response template.
Short Name	Short description that identifies the response template when using chat in Agent Workspace. Use the short name with a quick command (/) to show the text from the template body of the response template while in chat. This feature provides a fast and consistent way to populate text while in chat. For example, the short name `gm` identifies the chat response template for a Good Morning greeting. Enter **/gm** in a chat window to show the text from this response template.
Table	Name of the table that the response template is associated with.

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Field	Description
	If you are creating a response template for Agent Workspace chat, the associated table is the Interaction [interaction] table. For other response templates, the table must be an extension of the Task [task] table. **Note:** Creating custom COE tables do not allow you to add the Copy to Clipboard UI action. Users can still use the copy and paste function.
Condition	Conditions that determine when the response template is available for use. When defining conditions like case sensitivity or null values, see APIGlideFilter - Scoped, Global. **Note:** The conditions available depend on the table you select. For chat response templates, specify the condition: **[Type] [is] [Chat]**
Application	The application that created the response template.
Group visibility	Indicates what groups have access to the response template. Adding groups filters who can view the response template. **Note:** Leaving this field empty makes the response template available to all groups.
Template body	Text of the response template providing instructions to the agent on how to respond to a specific case or task. You can reference field values by selecting variables from the variables list based on the table you select. You can manually enter custom variable references: ○ Current user: `${current_user}` ○ Current date: `${Date}` Or, place your mouse where you want the custom variable reference to appear and

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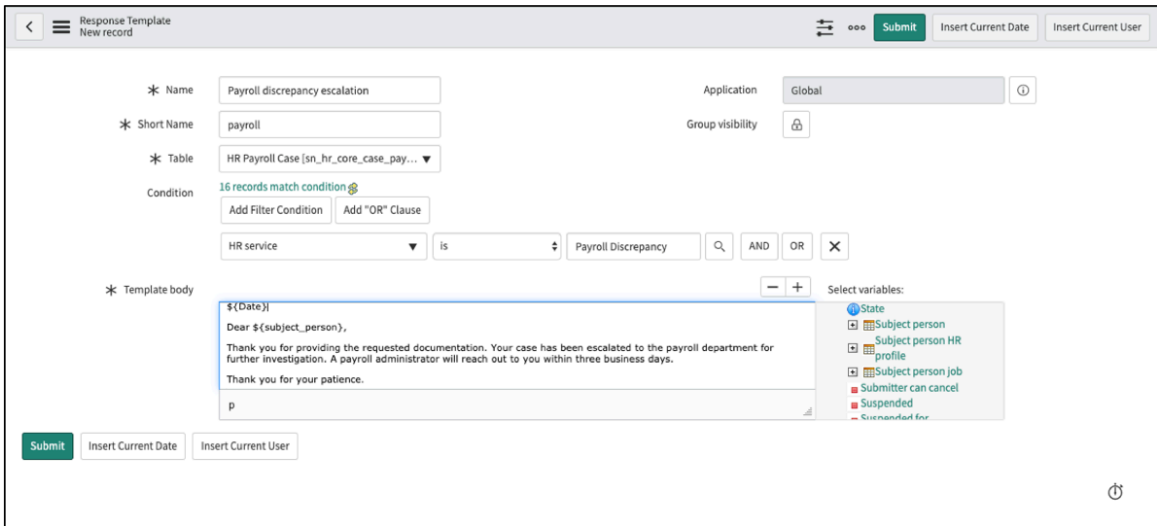
Field	Description
	select the **Insert Current User** or **Insert Current Date** buttons. **Note:** Response templates do not support rich text.
Select variables	Variables you can add to the template body. For example, if you choose the HR Case (sn_hr_core_case) table, you can select the Subject person variable to appear in the Template body and it will replace the variable with the actual name of the subject person when the response template is used. **Note:** The variables available depend on the table you select.

Example

The following GIF shows an example of an HR manager in the HR Service Delivery application creating a response template to escalate payroll discrepancy cases. The template is associated with the HR Payroll Case [sn_hr_core_case_payroll] table, and a condition is set to filter on cases that match the Payroll Discrepancy HR service. The template text is pasted into the body, and then a variable for the subject person is added to the salutation.



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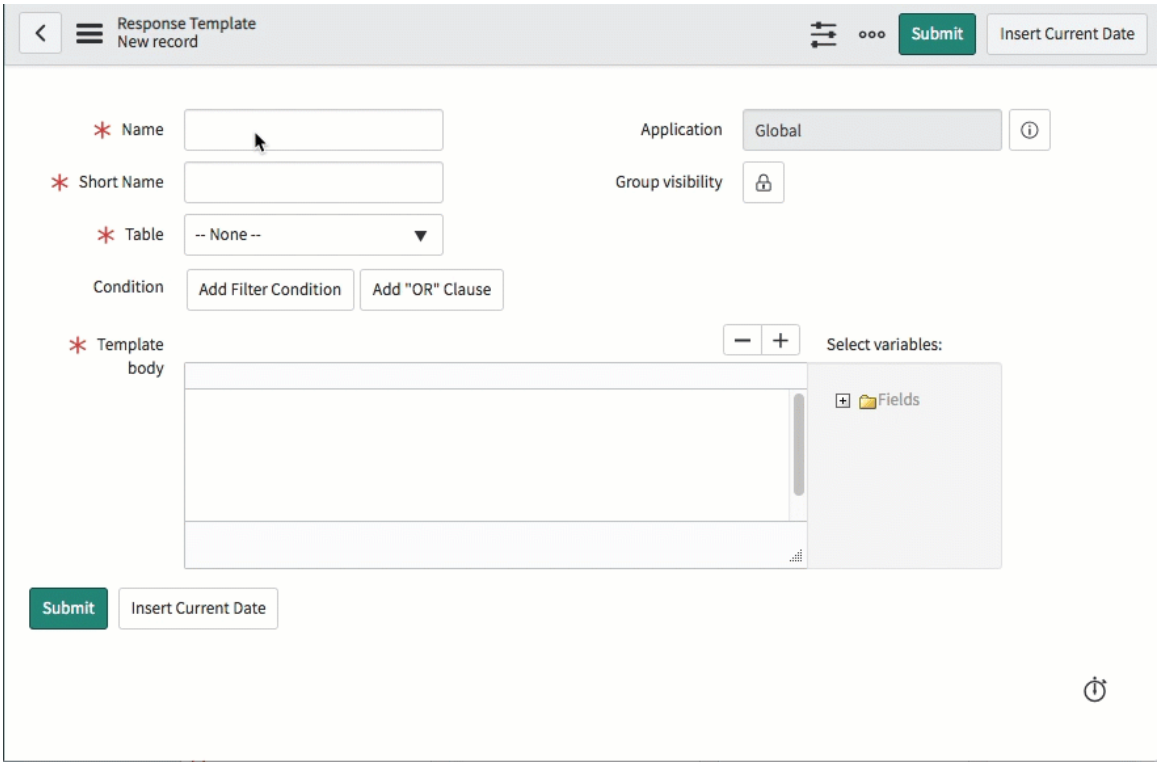

4. Click **Submit** or **Update**.
   Channels limit the response template to only the channels you add. If you leave this blank, the response template is available to no channels. This feature allows you to have different messages for chats, emails, or form. For more information, see Create a response template channel.
   The Channels related list appears.

What to do next

You can copy response template content to any field on a form that meets the specified conditions.

The following GIF shows an example of an HR case writer in the HR Service Delivery application opening a payroll discrepancy case and copying a payroll discrepancy escalation template to the comments field in the HR case form for the employee to read.

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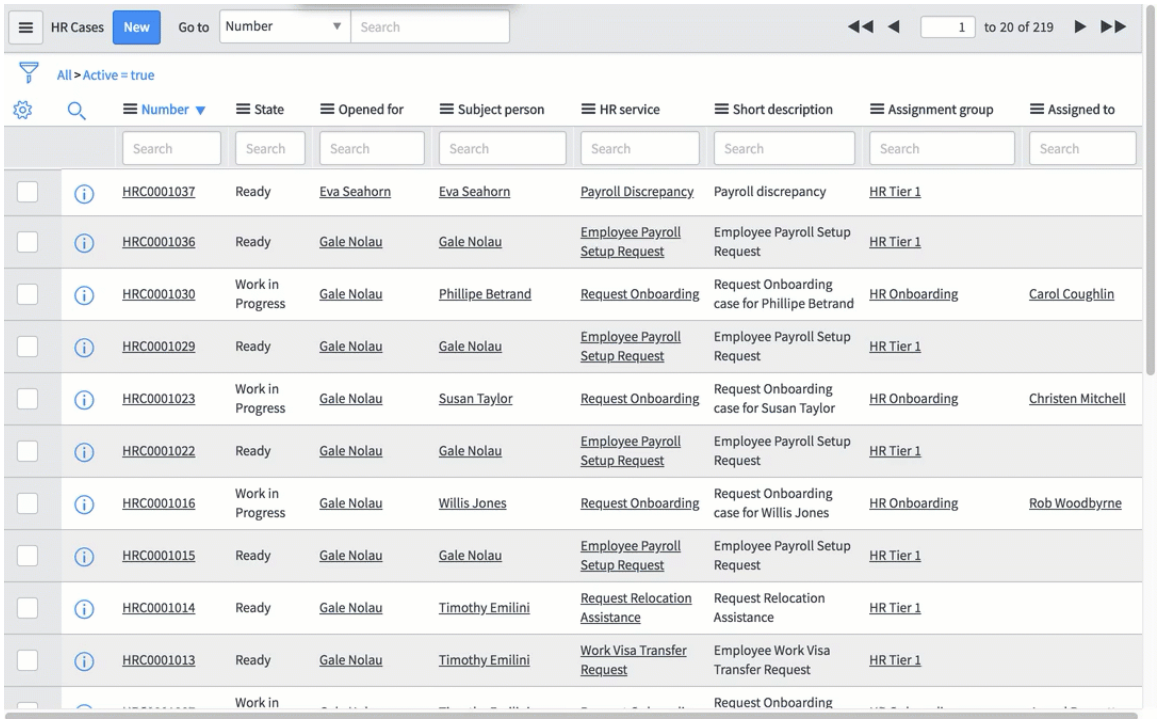

Manage service capabilities

Give your customers tailored catalogs for products, and create portals for service requests, using the ServiceNow® Service Catalog app.

Self-service	Service administration	Service Catalog
Design an efficient front-end for your organization's IT support.	Control settings in all the support services for your business apps on the ServiceNow AI Platform.	Create and manage catalogs to give your customers self-service options.

Self-service

Make use of various common actions and catalog requests with Self-service. The ServiceNow AI Platform gives you access to homepages, knowledge articles, and catalogs, along with handling incidents and surveys. Go even farther with Service Delegation, and select other users to work with your approvals, tasks, and communications.

Service administration

Give tailored support to your business infrastructure with Service Administration. Use Assessments and Surveys to collect data from recipients or assess data from tables in your system. Track tasks with Approvals, and assign authorizing roles to users or groups. Customize

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data changes with State Flows, and create system work triggers based on those transitions. Give your team efficient travel routes and travel times with Geolocation.

Service Catalog management

Give your customers tailored self-service options, using the ServiceNow® Service Catalog app. Develop, test, and deploy catalogs with various products and services. The portals provide a quick and easy means to make those requests. With standardized fulfillment and inventory tracking, your catalog offerings stay accurate and efficient.

Password Reset

Maintain login security and user verification with the ServiceNow® Password Reset system. Give users self-service and agent-assisted options for handling their passwords, along with multiple verification and authentication types, and enrollments for various reset programs.

Self-service

The Self-Service application gives supported end users a clean, simple front end to their IT support organization.

Get started

Explore Self-service



The Self-Service application gives supported end users a clean, simple front end to their IT support organization.

Configure Self-Service



Use ServiceNow's web-based interface to add new items to a request.

Explore Service Delegation



Service delegation is the ability to designate other users to view and interact with approvals sent or tasks assigned to you

Configure Service Delegation



Learn how to delegate approvals and tasks to another user, configure your user profile form to display the Delegates related list.

Exploring Self-service

The Self-Service application gives supported end users a clean, simple front end to their IT support organization.

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By default, the Self-Service application provides access to common actions, such as viewing your homepage, accessing the Service Catalog, viewing knowledge articles, working with incidents, and taking surveys.

Service catalog requests

This page contains links to content on service catalog requests.

Add new request items

Use ServiceNow's web-based interface to add new items to a request.

Before you begin

Roles required: Only an administrator or a user with the catalog_admin role can add a new item to a submitted request.

About this task

Modifying a request does not resubmit it to the approval process.

Procedure

1. Navigate to **All** > **Service Catalog** > **Open Records** > **Requests** and open an existing request.
2. Click **Add New Item**.

   Note:
   The Add New Item button appears only if the current **Request state** is **Pending Approval**. After the request is approved, this button is no longer available and you will not be able to add new items.

3. In the dialog box that appears, choose an item and a quantity to add.
4. Click **OK**.

Amazon EC2 instance request from the Service Catalog

Users can request the provisioning and deletion of virtual computers (Linux or Windows) in the Amazon EC2 virtual computing environment through the ServiceNow Service Catalog.

The Amazon EC2 offering requires the purchase and activation of ServiceNow Orchestration Automaton.

Request an instance

Request the provisioning of a new Amazon EC2 instance through the service catalog.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Self-Service** > **Service Catalog**.
2. Select **Amazon EC2 Instance** from the **Request Application Infrastructure** category.

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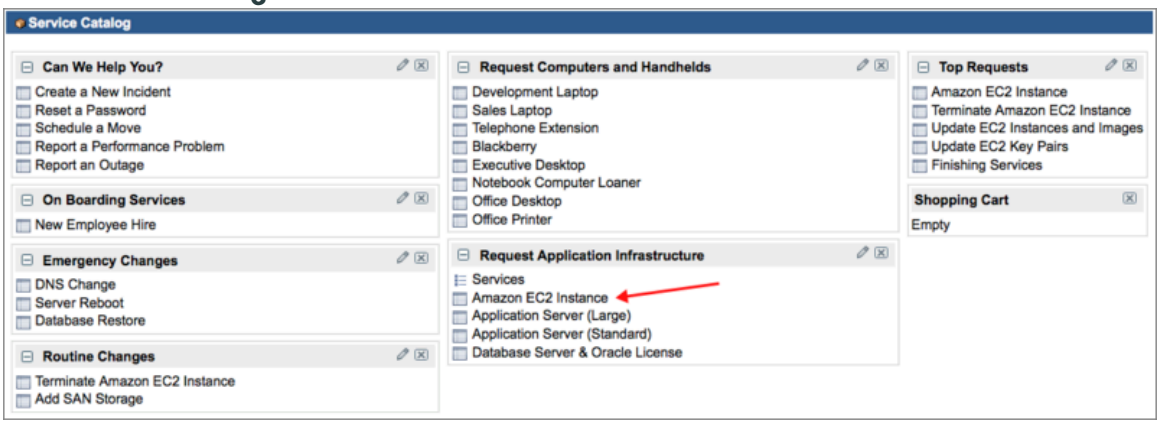
EC2 Service Catalog 2

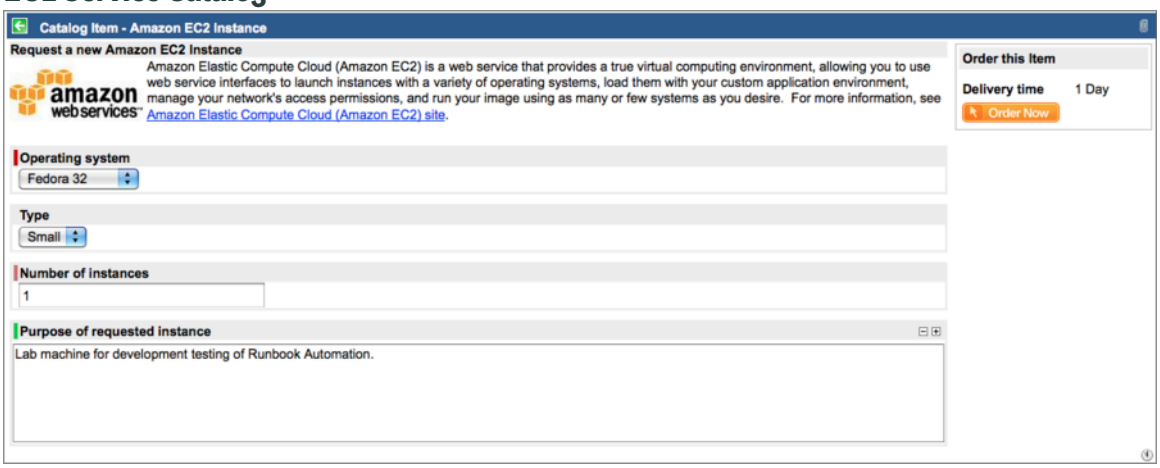


3. Select the operating system, the type of instance (Large or Small), and the number of instances requested.

   See the specifications for Large and Small instances in Amazon EC2 Instance Types.

4. Type a reason for the request.

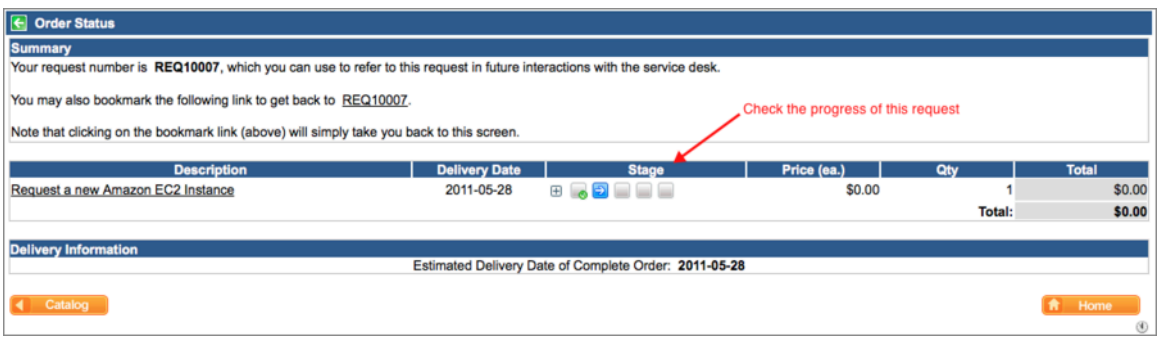
EC2 Service Catalog



5. Click **Order Now** to order the instance.

   The Order Status form appears, summarizing the request. A status bar tracks the progress of the approval and provisioning of the EC2 instance.

EC2 Order Status



Upon successful creation of the instance, you receive an email containing the instance ID, IP address, and the public DNS for the instances created.

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Terminate an instance

Shut down an Amazon EC2 instance through the service catalog.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Routine Changes** > **Terminate Amazon EC2 Instance**.

   A list appears displaying the instances that are assigned to you.

2. Select an instance from the list and click **Order**.

   This list does not support multi-line selection, and there is no **undo** feature.

Check-out redirect property

A property called One-step checkout redirect (*glide.vm.checkout_redirect*) controls the view presented to virtual machine requesters in the service catalog.

By default, this property is set to **false**, which redirects the view to the Order Status form when the requester clicks **Order Now**. When this property is set to **true**, ServiceNow redirects the requester to their My Virtual Assets portal. This property is located in **Cloud Management** > **Administration** > **Properties**.

Delete request items

Use ServiceNow's web-based interface to delete items from a request.

Before you begin
Role required: admin

About this task
All users can delete items from their own requests any time prior to delivery. Modifying a request does not resubmit it to the approval process.

Procedure

1. Navigate to **All** > **Service Catalog** > **Open Records** > **Requests** and open an existing request.
2. In the **Requested Items** related list, select the check box beside the item to delete.
3. In the **Actions** choice list, select *Delete*.

   ServiceNow recalculates the price and delivery date for the order.

Place a request

Use ServiceNow's web-based interface for ordering predefined goods and services.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Self-Service** > **Service Catalog**.

   The default catalog view organizes items in categories and subcategories.

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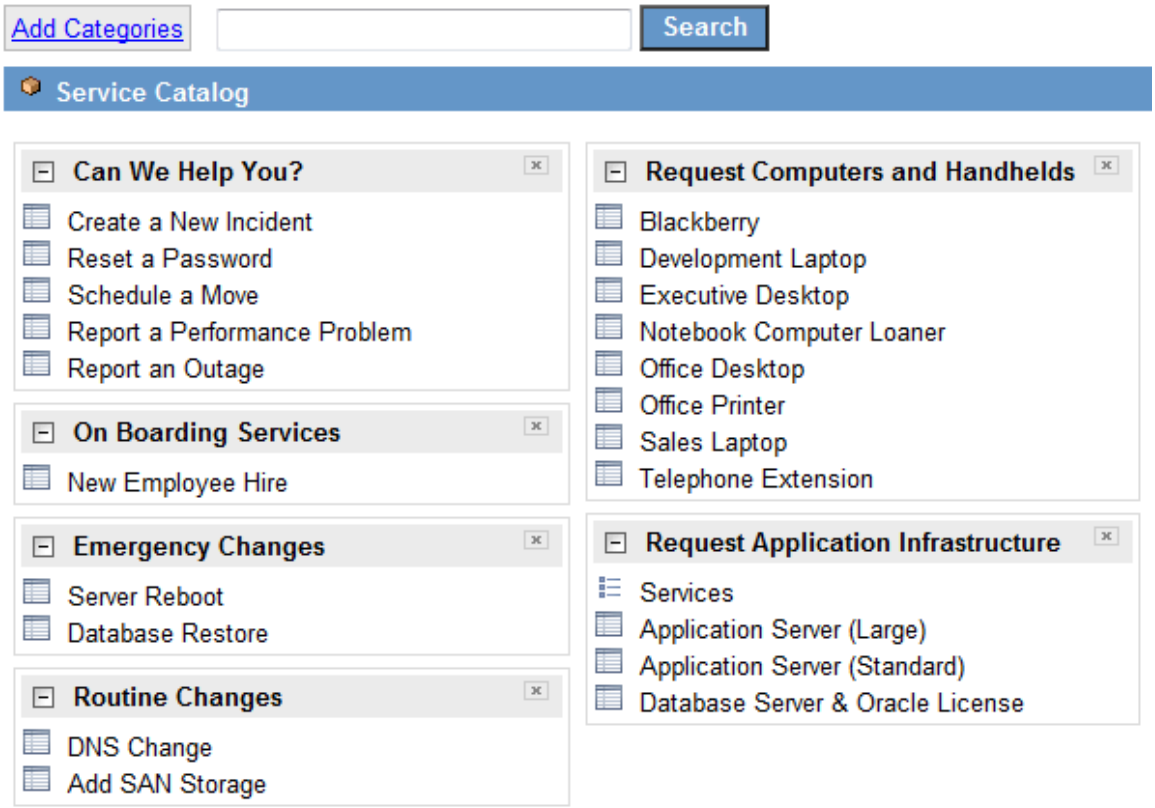
Default catalog view

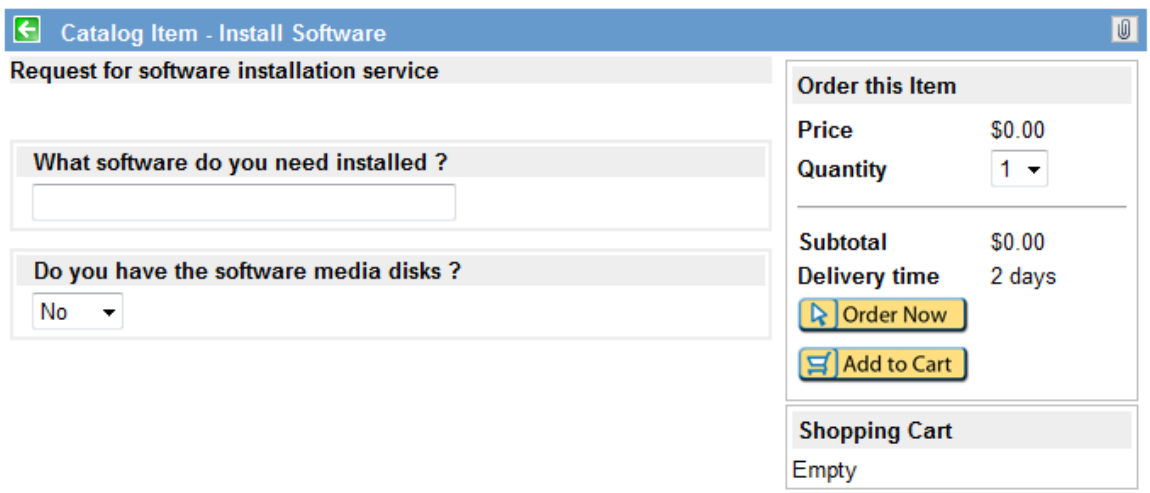


2. Select an item to order.

> **Note:**
> Some items are order guides, which combine related items for easier ordering. For example, an order guide called New Employee Hire presents a list of items that new employees typically receive (desk, phone, computer, email account). After you select the items you want to order, the order guide requests the information required and shows a separate time to delivery for each item ordered.

The order screen requests any additional information that's needed, such as the requester's name or location and the date the item is needed. It also displays the item's delivery time after approval.

Delivery time



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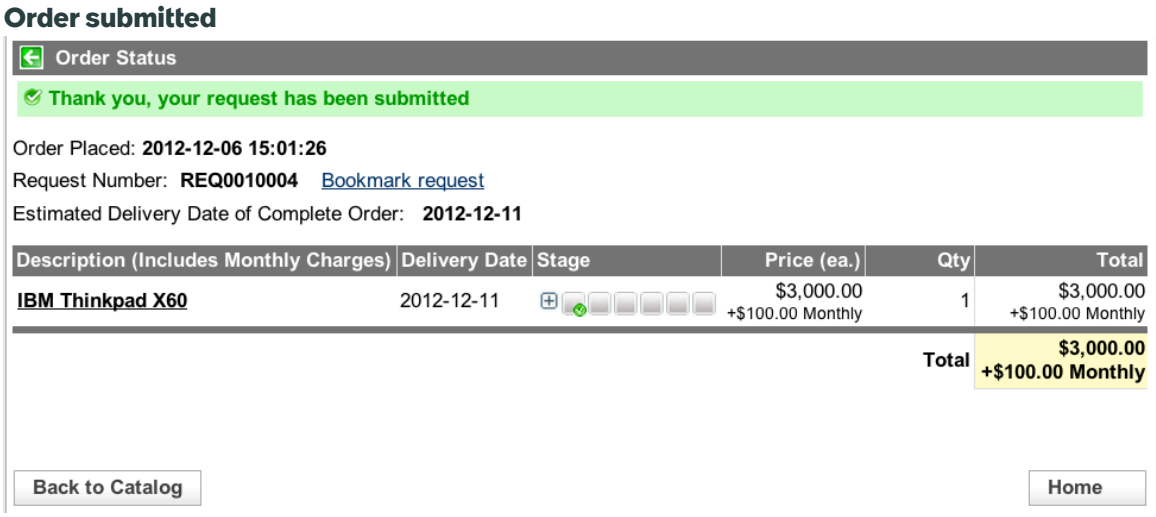
3. Enter complete and accurate information to expedite your order.
4. Order any other items required.
5. Click **Order Now** when the order is complete.

   ServiceNow displays a confirmation screen for your order:



   You can view the order's progress in the **Stage** column.

   Note:
   It may be useful to note the order number for future reference.

   ServiceNow automatically notifies the approvers if approval is required and creates work orders to fulfill the order according to your organization's process. For example, if you order a new notebook computer, the purchasing group might receive a work order to order the computer, and the desktop services group might receive a work order to configure the new computer and deliver it to your office after it arrives.

Create incidents and change requests from a requested item

You can quickly open an incident or a change request from a requested item. It also maintains a relationship between the requested item, and its associated incidents or change requests.

Before you begin

The administrator must enable the **Create Change** and **Create Incident** UI actions for the Requested Item [sc_req_item] table. The administrator must set the **Active** field to `true` when editing these UI actions .

Role required: itil

Procedure

1. Navigate to **All** > **Self-Service** > **Requested Items**.
2. Open a requested item.
3. Click the Additional actions menu icon and select **Create Change** or **Create Incident**

Related topics

Record Producer

Service catalog requests

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View request status

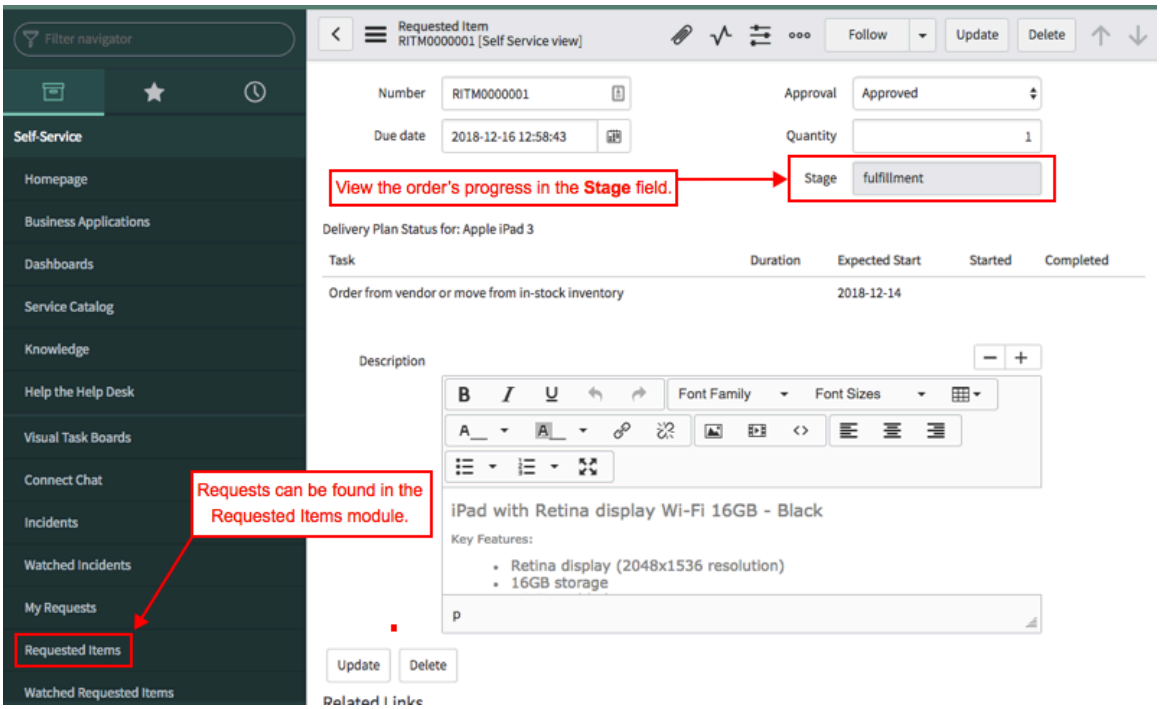
View the status of a request to see its progress, and determine when it may be fulfilled.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Self-Service** > **Requested Items**.
2. Click your order number to view details.
3. View the order's progress in the **Stage** field.



4. Check the **Backordered** field, and if the item is backordered, review comments for information about its return to stock.

Service Delegation

Service delegation is the ability to designate other users to view and interact with approvals sent or tasks assigned to you, and to receive copies of all email notifications sent to you.

Note:
Users to whom you delegate responsibility see all pending tasks and approvals regardless of the delegation period.

Note:
Delegation does not cascade. When a user acts as a delegate for another user, the delegate cannot in turn delegate to a third party. The original delegate is the only user who receives assignments and notifications. Delegation does not grant the delegate access to tasks where the caller or requester is the user for whom the delegate was created.

Add the Delegates related list to a user profile

To delegate approvals and tasks to another user, configure your user profile form to display the Delegates related list.

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Before you begin
Role required: personalize_form or admin

Procedure
1. Navigate to **All** > **Self-Service** > **My Profile**.
2. On the form context menu, navigate to **Configure** > **Related Lists**, and then add the **Delegate->User** related list.

Result
The Delegates related list displays at the bottom of the user profile form.

Delegate approvals and tasks to another user

If you're out of the office, you can delegate responsibilities to another active user for a period of time.

Before you begin
Role required: none

Procedure
1. Navigate to **All** > **Self Service** > **My Profile**.
2. In the **Delegates** related list, click **New**.

   If the Delegates related list is not visible, do one of the following:

   - Select a different view, such as the ITIL or Default view, by selecting the **Additional actions menu** > **View** > **(name of view)**.



   - Configure the form to add the Delegates related list. For more information, see Configuring the form layout.
3. Select an active user as your Delegate.
4. Select date values from the **Starts** and **Ends** fields to set the period of time during which a delegate can work on your behalf.
5. Specify the responsibilities the delegate will assume by selecting the following check boxes. You can delegate:
   - **Approvals**: The delegate can approve items on your behalf.
   - **Assignments**: The delegate can view and work on tasks assigned to you.

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- **All notifications**: The delegate receives a copy of email notifications sent to you, except those marked as Meeting Invitation.

  Note:

  - If the **Approvals** check box is selected but **All notifications** is not, the delegate does not receive approvals.
  - If your delegate gets email notifications, they will be the same email notifications sent to you. The delegate may be confused to see "Incident assigned to you" emails, so make sure they know they are a delegate.

- **Meeting invitations**: The delegate receives a copy of email notifications sent of the type Meeting Invitation.

Service Administration

Give tailored support to your business infrastructure with Service Administration.

Service Administration applications

Assessments and Surveys  Assessments and Surveys application helps you create, send, and collect responses for surveys. It also helps you evaluate, score, and rank records from any table in the system.	Classic approvals  Classic approvals are a legacy process to require authorization on tasks before the work is done.
State Flows  State flows enable an administrator to customize transitions from one state to another and configure the system to perform work during transitions to specific states.	Geolocation  The geolocation feature uses Google Maps to track users, plan efficient routes between locations, and assist in finding accurate travel times for applications that require this information, such as Work Management.

Exploring Service Administration

Configure settings for services that support business applications or the platform.

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Assessments and Surveys

The Assessments and Surveys application helps you create, send, and collect responses for surveys. The application also helps you evaluate, score, and rank records from any table in the system.

The difference between assessments, surveys, and quizzes, and when to use each; also provides a quick look at the three stages in the survey process: designing, sharing, and evaluating.

Get started

Explore  Learn about Assessments and Surveys concepts and features.	
Use surveys  Learn how you can use surveys.	Surveys reference  Get details about surveys, such as fields and properties.
Use assessments  Learn how you can use assessments.	Assessments reference  Get details about assessments, such as fields and properties.
Use quizzes  Learn how you can use assessments.	Quizzes reference  Get details about quizzes, such as fields and properties.

Troubleshoot and get help

- Ask or answer questions in the IT Service Management forum
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

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Exploring Assessments and Surveys

The Assessments and Surveys application helps you create, send, and collect responses for surveys. The application also helps you evaluate, score, and rank records from any table in the system. Create questionnaires that you can assign to one or more users to assess their knowledge of any subject.

Create basic surveys to obtain collective data for analysis

You can create, send, and collect responses for basic surveys. If installed, you can also use a survey widget to set up a survey on Service Portal.

Evaluate, rank, and score the data to provide summarized results using Assessments

You can assess projects that executives want to evaluate for effective management, or rate and compare a vendor's goods and services. Use assessments to send custom questionnaires to selected users or write scripts that query the database directly.

Use quizzes to test user knowledge

The quiz functionality is built on the assessment engine and provides many of the same features as assessments and surveys.

Surveys

With Surveys, you can create, send, and collect responses for basic surveys. If installed, you can also use the Survey widget to set up a survey within Service Portal.

Two versions of the application are supported, Surveys, which is the latest version, and Legacy Surveys. Survey improves the user interface and extends the capabilities of the Legacy Surveys application.

Surveys | Getting started

Configuring surveys

There are many options for advanced configuration in Surveys:

- Create a survey, add questions, and choose recipients, all in one interface.
- Create conditional questions, which appear only when users answer other questions a certain way.
- Restrict a survey so only specific survey users can take it, and send invitations to those users simultaneously. Alternatively, make the survey a public survey so that any user can take the survey, even anonymous users (users who have not logged in to the ServiceNow system).

  Tip:
  The assessment_take2 UI page should be public for public surveys. If that page is not public, anonymous users do not have access to the page and public surveys do not work.

- Set a schedule to automatically assign a survey to users and to limit how often the same user can take a survey.
- Customize the look and feel of survey questionnaires.
- Save anonymous survey responses.
- Convert survey responses to numerical scores and view them on scorecards.
- Deactivate a survey for maintenance or to retire it without deleting it.

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Note:
Because surveys use the same tables and other back-end components as assessments, you may see assessment elements such as table and field names in certain places throughout the survey feature.

Legacy Surveys

Survey administrators can continue to use legacy survey functionality and data, however, it is recommended that you migrate legacy surveys to the Surveys application. Concurrent use of both survey applications can cause confusion and redundancy.

Survey wizards are not impacted and cannot be migrated.

Note:
The Legacy Surveys application is not described in the documentation that you are viewing. It is documented on the ServiceNow wiki.

Version comparison

Capability	Surveys	Legacy Surveys
Surveys in Service Portal.	✔	
Save new survey responses each time a user takes the same survey.	✔	
Create question templates to reuse sets of answer options.	✔	
Categorize survey questions and report on category results.	✔	
Deactivate a survey without deleting it.	✔	
Create conditional questions.	✔	
Send surveys automatically based on a schedule.	✔	
Customize survey questionnaire color scheme.	✔	
Save anonymous survey responses for logged-in users.	✔	
View survey responses on graphical scorecards.	✔	
Save surveys in a draft state until they are ready to publish.	✔	
Create and send surveys from one page.	✔	
Allow only specific users to access a survey.	✔	
Send surveys based on conditions.	✔	✔
Send survey email notifications.	✔	✔
Limit how often a user can take the same survey.	✔	✔
Add introduction and end note text.	✔	✔
Create survey modules.	✔	✔
Public survey: Allow persons to take a survey without logging in.	✔	✔
Use update sets to track changes.	✔	✔

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Related topics

- Legacy survey migration
- Survey designer
- Survey roles
- Surveys in Service Portal and the Now Mobile app
- Service Portal

Using surveys

Survey administrators—users with the survey_admin role—create and maintain surveys and configure how they are distributed and published. Surveys on Service Portal are also supported.

Survey questionnaires

All surveys that are assigned to you appear in your personal assessment and survey queue.

No special role is required to complete a survey but you must be logged in and the survey must be assigned to you. When you submit a survey, the system stores your responses.

Survey notification

If the system is configured to send email, it sends you a notification when a survey is assigned to you. The message contains a link to the survey and instructions for viewing the assessment and survey queue.

Take a survey

Take an assigned survey that appears in your assessment and survey queue.

Before you begin

Role required: none

About this task

Each assessment or survey appears as a clickable card in the queue, which can be launched by clicking the card. The card includes helpful information, including the survey name, state, and due date. You must answer every required question, indicated by a red asterisk, before you can submit the survey. If you start to take a survey but can't complete it, save your responses and return to it later. When you've answered all the questions and you're happy with the responses, submit the survey.

Note:
If you've signed in as a user who doesn't have access to the trigger record, and you access a survey using the URI parameters, the associated record number isn't displayed. You can still take the survey.

Procedure

1. Navigate to **All** > **Self-Service** > **My Assessments & Surveys**.
   Users with the assessment_admin role, including survey administrators, can display other users' assessments and surveys in addition to their own. Use the **Show all** and **Show assigned to me** related links at the bottom of the queue to show and hide assessments and surveys. Click a card assigned to another user to open the associated metric type or survey definition.
2. Click the survey card to open the questionnaire.
   If there is more than one survey category, click the collapse icon ( ) or expand icon ( ) to hide or show the questions in the category.
3. Answer each question to the best of your ability.

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If you're unsure of how to respond to a question or if a question doesn't apply to a particular record, select **Not Applicable**, if available.

4. Complete one of the following steps.

Option	Description
Save your responses without submitting them	Click **Save**. You can close the questionnaire and access it later from your queue. **Note:** The system doesn't save the survey when there are invalid responses, such as a letter in a date field. You must enter valid responses or remove invalid responses before you can save the survey.
Submit the survey after answering all questions	Click **Submit**. You can't return to the questionnaire after submitting. **Note:** If there's an unanswered required question or an invalid response, an error message appears and the problematic questions are temporarily highlighted.

Survey responses and results

There is a metric result record for each user response to each question on every survey instance. Survey results for each question and category are calculated automatically based on the metric result records.

If you use survey result calculations for results and scorecards, ensure that the positive indicator field for the question is set appropriately, based on the answer options. To have any results, a category must contain scored questions.

Survey responses

Survey responses are stored in the Metric Result [asmt_metric_result] table and display the recipients' answers to each question in a category. To view general results, navigate to **Survey > Survey Responses**. To view results for a particular criterion, use a filter on the Metric Result [asmt_metric_result] table. For example, to view results based on the assignment group, apply a filter condition for assignment group.

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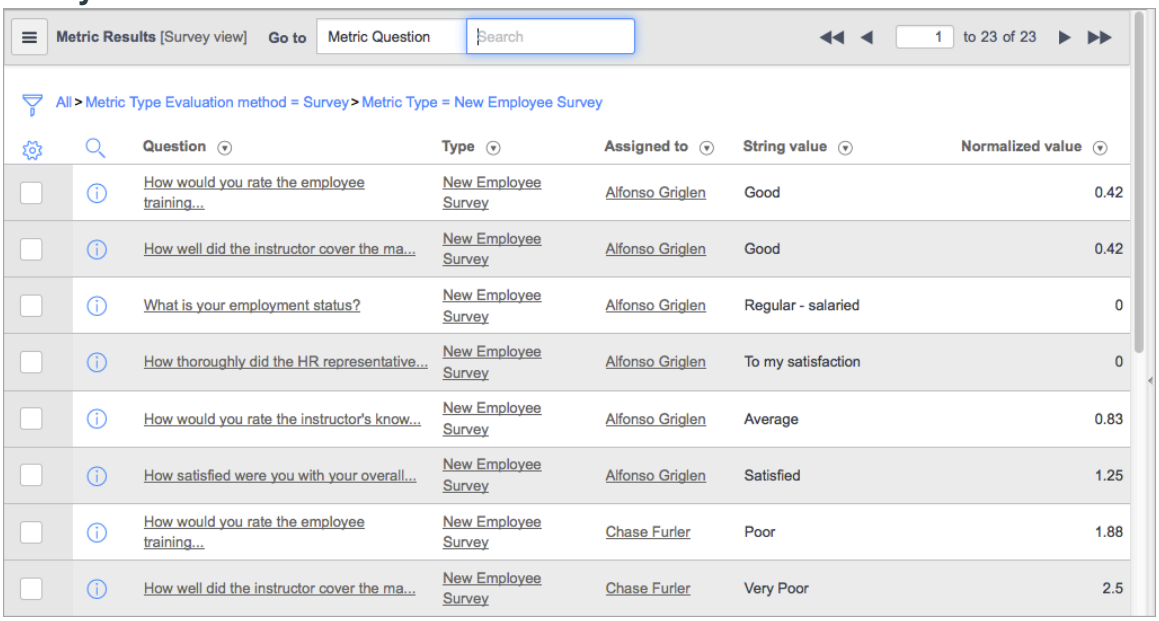
Survey metric results

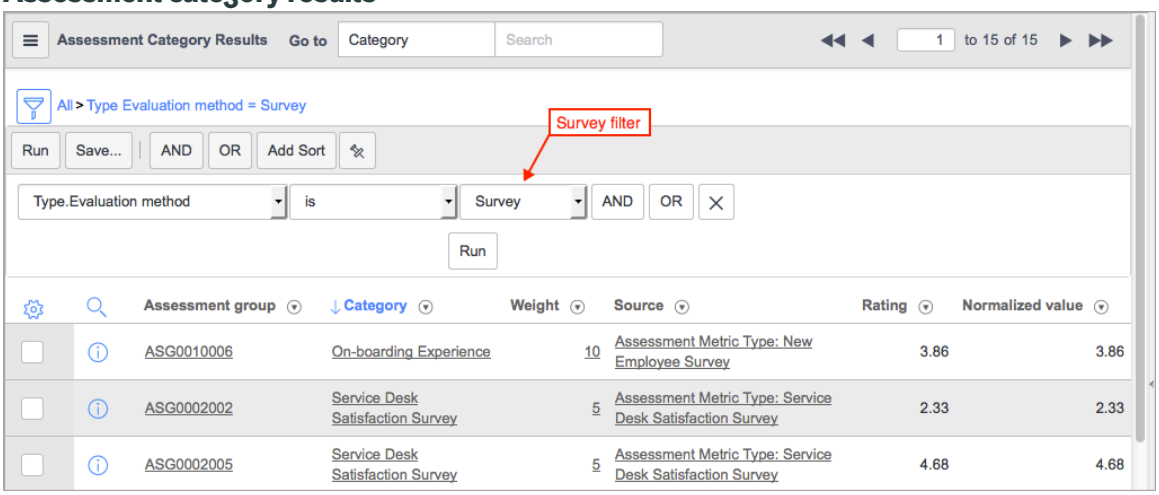


Question	Type	Assigned to	String value	Normalized value
How would you rate the employee training...	New Employee Survey	Alfonso Griglen	Good	0.42
How well did the instructor cover the ma...	New Employee Survey	Alfonso Griglen	Good	0.42
What is your employment status?	New Employee Survey	Alfonso Griglen	Regular - salaried	0
How thoroughly did the HR representative...	New Employee Survey	Alfonso Griglen	To my satisfaction	0
How would you rate the instructor's know...	New Employee Survey	Alfonso Griglen	Average	0.83
How satisfied were you with your overall...	New Employee Survey	Alfonso Griglen	Satisfied	1.25
How would you rate the employee training...	New Employee Survey	Chase Furler	Poor	1.88
How well did the instructor cover the ma...	New Employee Survey	Chase Furler	Very Poor	2.5

Category results

Category results are stored in the Assessment Category Result [asmt_category_result] table and display the overall ratings for each category based on the weighted value for each scored question. To view these results, navigate to **Assessments** > **Results** > **Category results** and filter the results using the **[Type.Evaluation method] [is] [Survey]** condition.

Assessment category results



Assessment group	Category	Weight	Source	Rating	Normalized value
ASG0010006	On-boarding Experience	10	Assessment Metric Type: New Employee Survey	3.86	3.86
ASG0002002	Service Desk Satisfaction Survey	5	Assessment Metric Type: Service Desk Satisfaction Survey	2.33	2.33
ASG0002005	Service Desk Satisfaction Survey	5	Assessment Metric Type: Service Desk Satisfaction Survey	4.68	4.68

Survey scorecards

A scorecard provides a visual breakdown of survey responses, based on the way questions were answered, by category. To access a scorecard, see View a survey scorecard.

Related topics

- View a survey scorecard
- Survey designer elements
- Configure category weights for a survey

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View results for all surveys

You can view the survey responses that are stored on the Metric Result [asmt_metric_result] table.

Before you begin

Role required: survey_admin or survey_reader

Procedure

1. Navigate to **All** > **Survey** > **Survey Responses**.
   Do not confuse this module with **Survey** > **Legacy Surveys** > **Survey Responses**, which displays legacy survey responses.

   The **Type** column displays the survey definition each response is associated with.
2. Select a response to view its details.

View the results for a survey

You can view the responses for one survey definition. Survey results are stored on the Metric Result [asmt_metric_result] table.

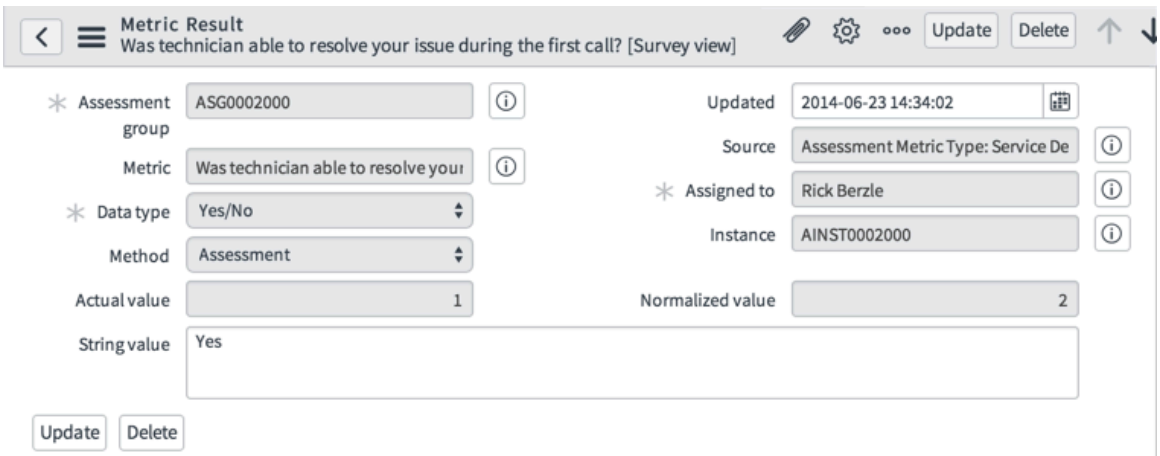
Before you begin

Role required: survey_admin or survey_reader

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. Under **Related Links**, click **View Responses**, which is available only if there are results.
   The results are grouped by metric, which is what questions are called in assessments.
4. Open a metric result to view more detail.
   The metric result contains the user's response and calculated values of interest to advanced survey administrators. Because the Metric Result table is also used by the assessment feature, many field names are not clear in the context of surveys.

   Example



   For a description of the field values, see .

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View a survey scorecard

A survey scorecard provides a visual breakdown of survey responses by category, based on the way questions were answered.

Before you begin

Role required: survey_admin or survey_reader

About this task

A scorecard displays charts for survey results, in which category and question responses are analyzed and current ratings are compared with previous ratings. Users can examine ratings over time, compare question ratings, or compare the ratings of all categories. All ratings are averages for the time range selected. The system dynamically updates a scorecard each time you view it, so the ratings reflect recently completed surveys.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. Select the **View Scorecard** related link.

   Note:
   The **View Scorecard** related link is available only if there are survey results to report.

   The interactive scorecard displays the following filters:

   - Question Results: Displays the result of all questions or an individual question.
   - Category Results: Displays the results of all questions associated with an individual category or all categories.
   - Average Ratings: Displays the result of weighted average rating for each survey question in an individual category or all categories.
   - History: Displays the result of all questions in comparison with their history (by calendar year or quarters).
   - Sentiment Analysis Results: Displays the results of sentiment analysis for the survey.

Survey scorecard category results

The Category Results view is a stacked bar chart showing survey results for all questions in an individual category or all categories by respondent count.

Select a category from the list to display the questions from that category in the chart.

This view displays responses that use the following data types:

- Checkbox
- Choice
- Likert Scale
- Number
- Template
- Yes/No
- Multiple selection

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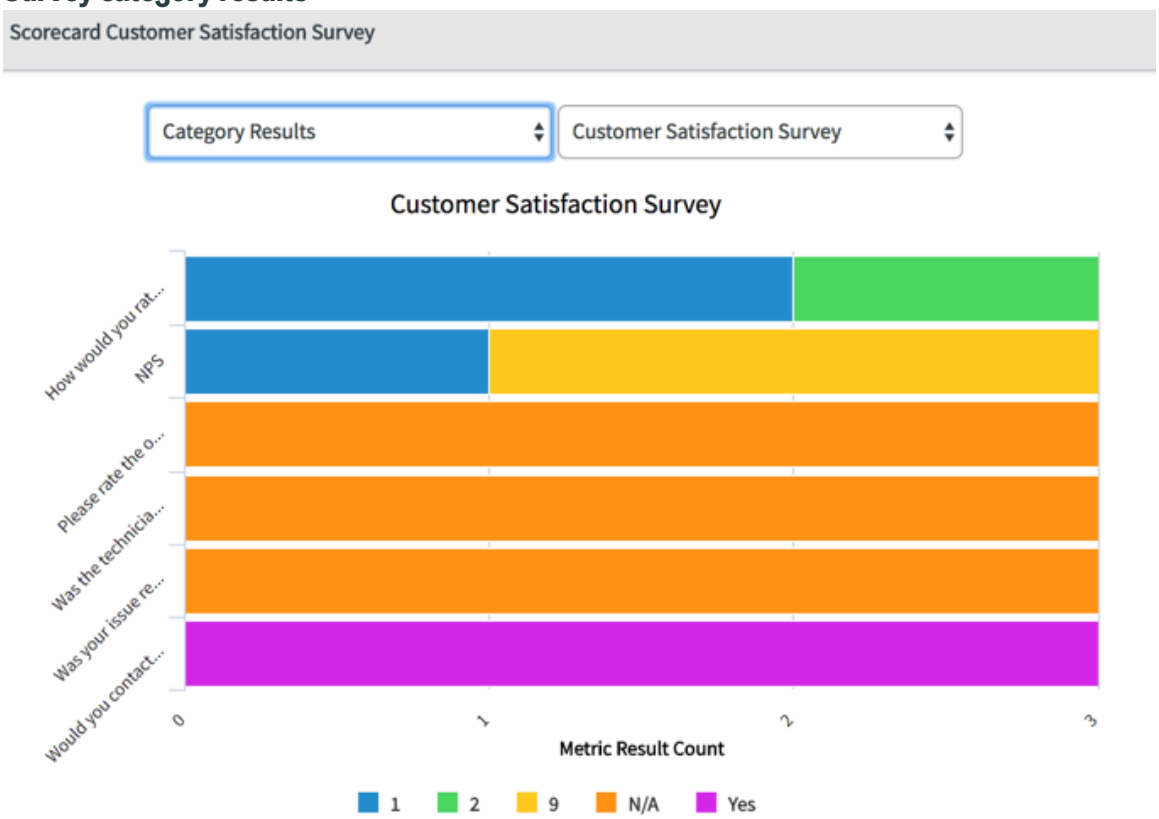
- Image Scale
- Numeric Scale

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Survey Designer

Survey category results



To view details about a specific response, point to the colored bar to display the response, the number of responses, and the percentage it represents of all the responses to that question.

Survey scorecard category results detail



Survey scorecard question results

The Question Results filter displays the result of all questions or an individual question using charts or lists. For the String, Attachment, Date, Date/time, Reference, and Ranking data types, the results are displayed in the list view. The results of all other data types are displayed in the pie chart view.

Pie chart

The pie chart shows question results for all data types other than those that are displayed in the list view. See Survey question data types.

- Checkbox.
- Boolean.

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- Choice.
- Likert Scale.
- Number.
- Percentage.
- Yes/No.
- Image Scale.
- Multiple Selection.
- Template. The question result shows the aggregated net promoter score (NPS) with promoters, detractors, and passives.

Net promoter score categories

Question score	NPS category
9 or 10	Promoter
7 or 8	Passive or Neutral
0 to 6	Detractor

The result is calculated as:

- %Promoters = Number of promoters / Sample size
- %Detractors = Number of detractors / Sample size
- %Passives = Number of passives / Sample size
- NPS = %Promoters - %Detractors

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the survey designer.

When a user submits a survey, three records (one for each Timeframe) will be created/ updated- **Year**, **Quarter**, and **Monthly** in the **asmt_nps_result** table. For example, if a user submits a survey on November month of 2023, which falls under Quarter 3. Then three records are generated for the dates.

- Year: 2023-01-01
- Quarter: 2023-10-01
- Monthly: 2023-11-01

Now if a second user submits in December month of 2023, which falls under same Quarter 3, as above scenario. Then only a single record is created for Monthly Time frame.

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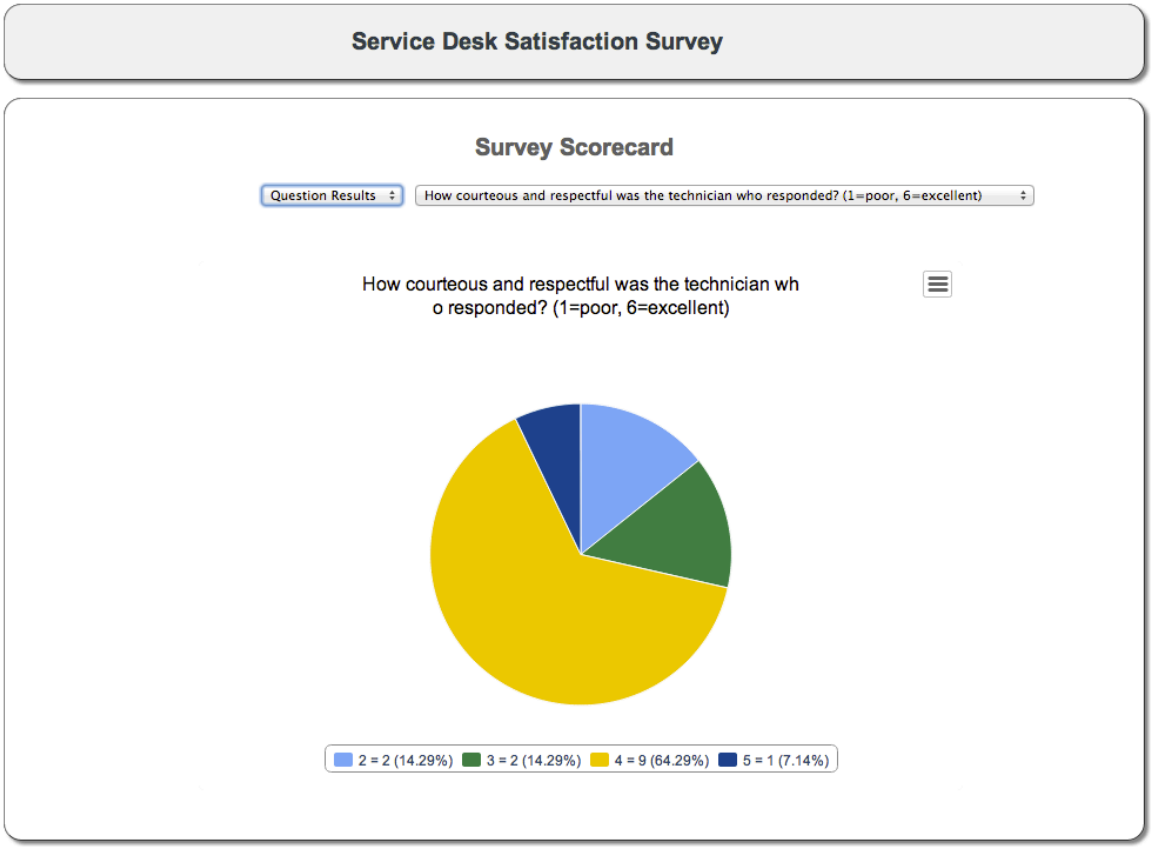
Survey scorecard question results - pie chart



Survey scorecard average ratings

The Average Ratings view displays the weighted average rating for each survey question in an individual category or all categories.

Use this view to learn how individual questions affect the overall rating for the category. Select a survey category from the choice list to display the chart for that category.

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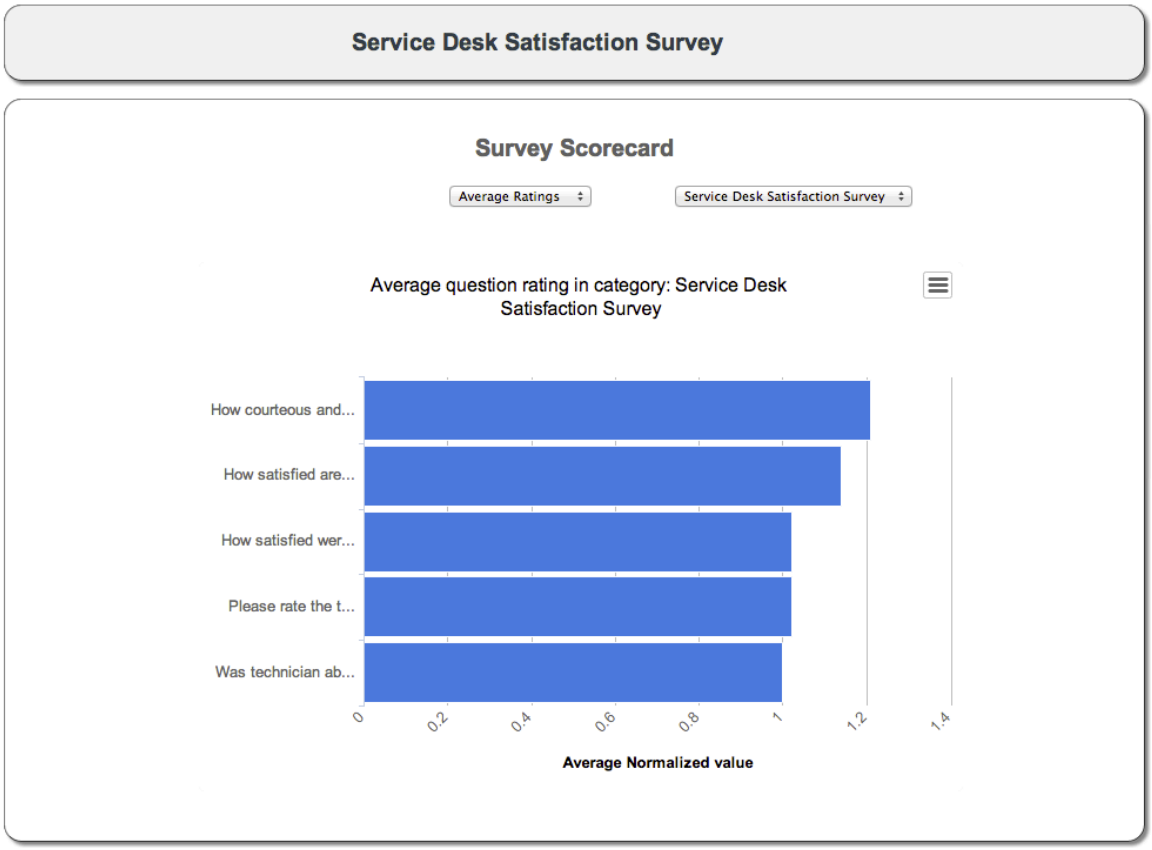
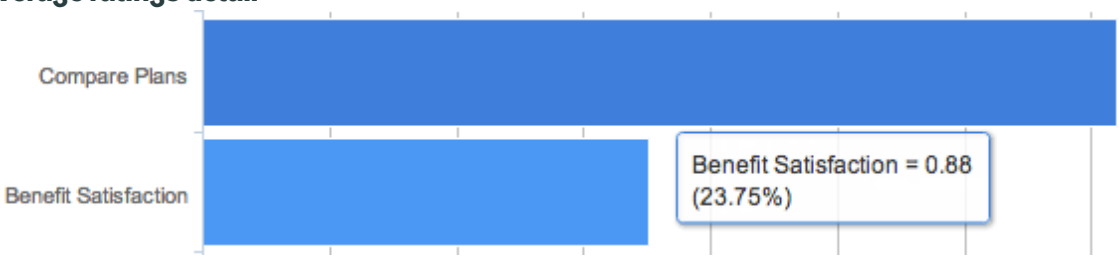
Survey scorecard average ratings



To view the effect of each question's ratings on the entire category's ratings, point to the colored bar. The pop-up box shows the percentage of the total ratings represented by each individual question's weighted average.

Average ratings detail



Survey scorecard history

The History view compares the current ratings for the categories and their questions with ratings from the previous three years or four quarters.

Ratings that have declined are highlighted in red and display negative numbers. Ratings that have improved are highlighted in green with positive numbers. Arrow icons beside the values in the **Diff** column indicate the trend of the current survey against the previous survey.

Point to a category to display a line chart that shows the rating trend for that category. Click a category to view the Survey Category form containing the survey questions.

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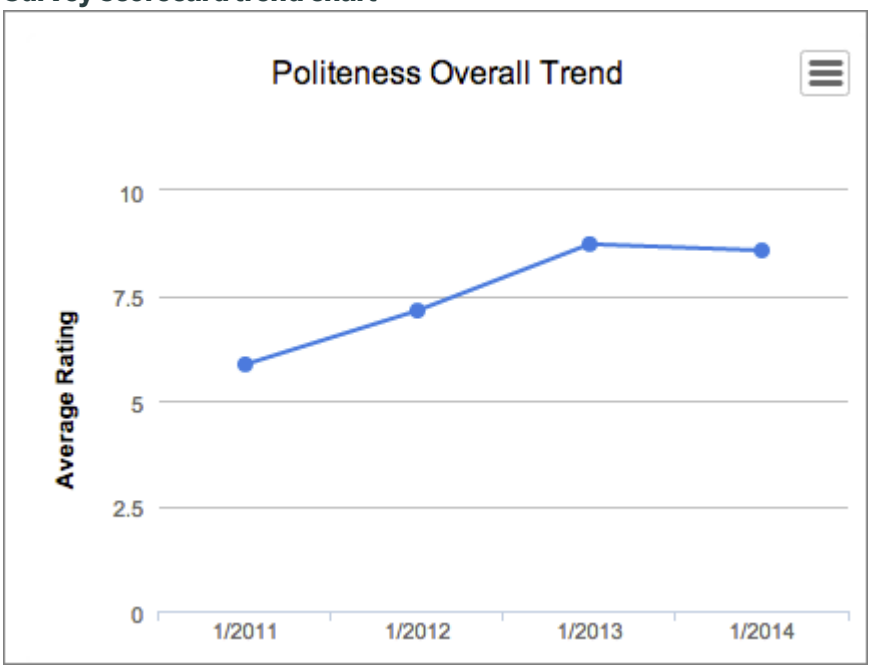
Survey scorecard trend chart



3 years

To calculate the current ratings, the system averages the ratings from the trailing twelve month (TTM) period. The **Diff** column shows the discrepancy between the current ratings and the previous calendar year's ratings.

Survey scorecard history - 3 years

Service Desk Satisfaction Survey

Survey Scorecard

History: 3 Years

	Current	Diff	2013	2012	2011
Overall Rating	5.40	0.00	5.40	0.00	0.00
Service Desk Satisfaction Survey	5.40	0.00	5.40	0.00	0.00
How satisfied were you with the response time to your incident? (1=not at all, 6=completely)	0.00	-1.02	1.02	0.00	0.00
How courteous and respectful was the technician who responded? (1=poor, 6=excellent)	0.00	-1.21	1.21	0.00	0.00
Please rate the technical competency of the technician serving you (1=poor, 6=excellent)	0.00	-1.02	1.02	0.00	0.00
Was technician able to resolve your issue during the first call?	0.00	-1.00	1.00	0.00	0.00
How satisfied are you with your overall service experience? (1=not at all, 6=completely)	0.00	-1.14	1.14	0.00	0.00

4 quarters

Quarterly surveys compare the average rating for each question and category in the current quarter against the average ratings from the previous four quarters. The **Diff** column shows the discrepancy between the current ratings and the previous quarter's ratings. The column labels

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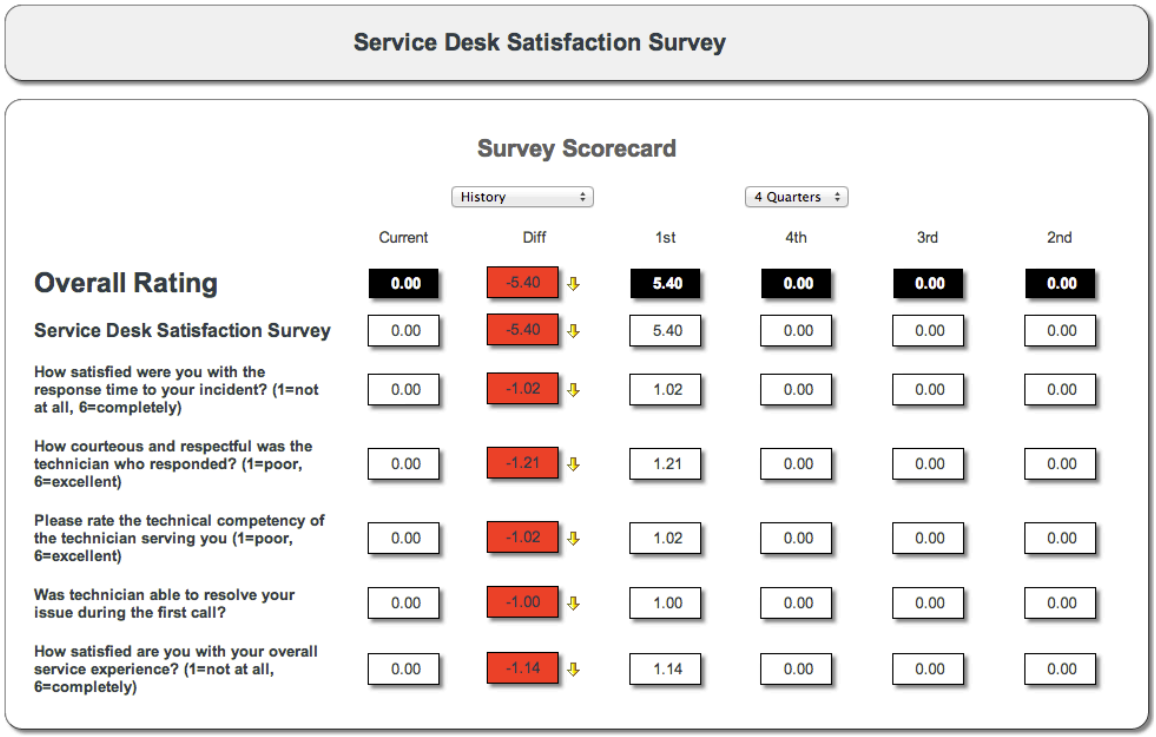
count backward, by quarter from the current quarter. For example, if the current quarter is the **3rd** quarter of 2015, then the previous quarters appear as **2nd** [2015], **1st** [2015], **4th** [2014], and **3rd** [2014]. All four of the previous quarters appear, whether or not there was any data for those quarters.

Survey scorecard history - 4 quarters



Export a survey scorecard as an image

You can export a scorecard as an image to use in presentations or other documents.

Before you begin

Role required: admin or survey_admin

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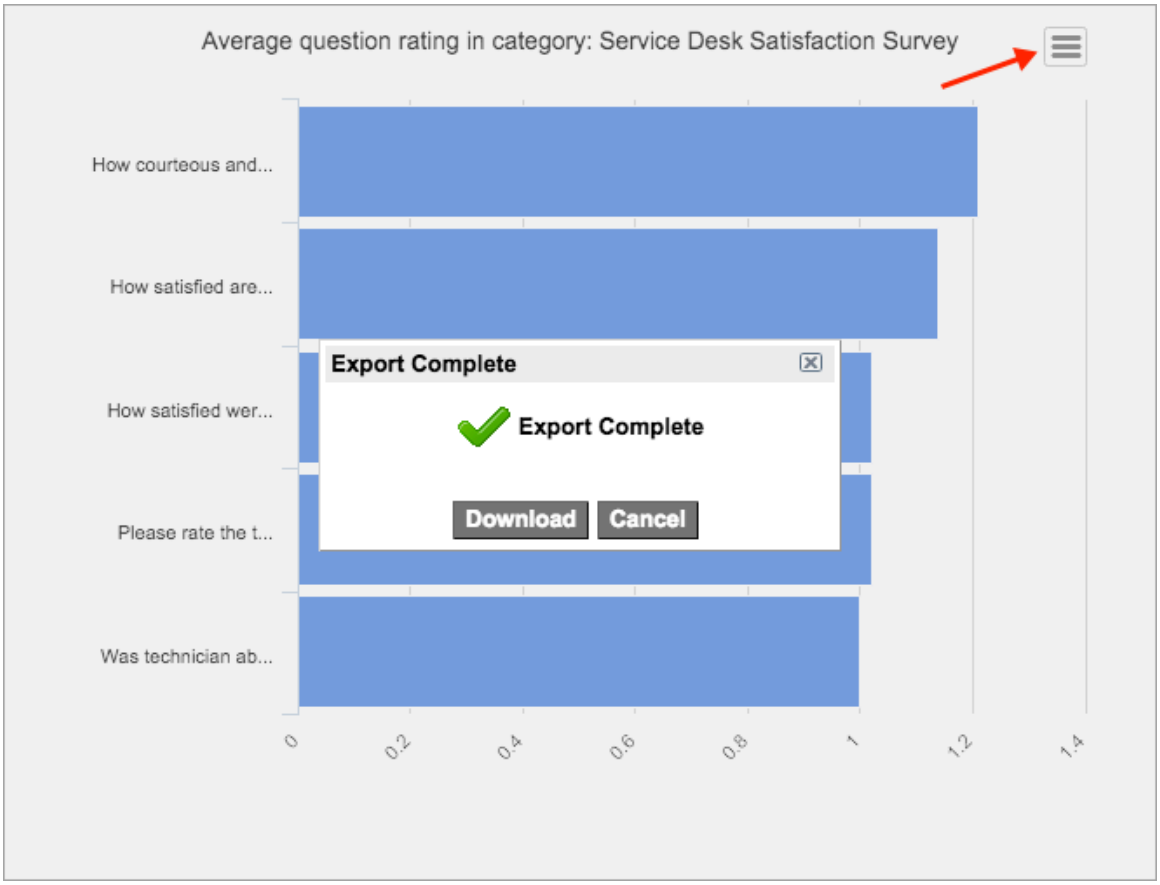
Procedure

1. Click the menu icon ( ) and select **Save as PNG** or **Save as JPEG** and wait for the export to complete.

   Example



2. Click **Download** and save the scorecard image to a storage location.

Export a quiz scorecard as an image

You can export scorecards as images.

Before you begin

Role required: assessment_admin or admin

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Procedure

1. Click the menu icon and select **Save as PNG** or **Save as JPEG** as the download format.
2. When the export is complete, select **Download** to save the scorecard image to a storage location.



Request translations for surveys

Request translations for surveys to localize them into one or more languages. Localization requested items that are created for the selected surveys in all the selected languages.

Before you begin

Role required: localization_requestor

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Select one or more surveys that you want to translate.
3. From the **Actions on selected rows** list, select **Request Translations**.
4. In the **Request Translations** dialog box, select the languages.
5. Click **Submit**.

   Localization requested items are created for the selected surveys in all the selected languages. A success message with a link to the list of requested surveys is displayed. You can click the link to see the list.

Edit translations for surveys

Edit the translations for surveys, and after you make the changes, you can publish the translation.

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Before you begin

You must install the Localization Framework Installer plugin (com.glide.localization_framework.installer) before you begin to edit the translations for a survey. To know more, see Localization Framework.

Role required: localization_editor

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey for which you want to edit translations.
3. Click **Edit Translations**.

   You can do the following actions while editing translations:

   - Edit translations manually.
   - Use machine translation (if you have configured in Localization Framework settings) to translate the fields, which are not translated. For more information about machine translation, see Create a translator configuration.
   - Export files for translation. To export files, click **Export Source File**, choose the file type, and then click **Export File**.
   - Import translated files to update the translations. To import files, from the **Export Source File** list, select **Import Translated File**.
4. After your changes are completed, click **Publish Translations**.

   After survey translations are published, they are made available to any user who takes a survey.

Survey responses in a database view

You can view survey responses in a database view for reporting purposes. For each survey instance, you can view the instance as a single row and the answers to each survey question (metric) in the corresponding columns. Analyze the responses easily and, if you want, export the survey responses.

You can create a database view on the Survey Definition form. After the database view is created, you can either export the survey response using the standard capabilities of the ServiceNow® platform or choose to create a report of the survey responses using the Reporting module.

Use the **View Responses in Rows** related link on the Survey Definition form to view each survey instance response in a separate row and each survey question as the name of the corresponding column. The answer to the question is displayed in that column. To export the survey response in a tabular form, in the context menu, click **Export**.

The first three columns of the form show the number of the survey instance (instance ID), who the survey is assigned to, and the task. A maximum of five active metrics are displayed in the view by default. The Survey Definition form doesn't show the **View Responses in Rows** related link when the following conditions occur.

- There are more than five active metrics.
- There are no responses to the survey instance.
- There are more than 100 K responses for that particular survey. To view this database view of the survey responses, the number of responses must be less than or equal to 100 K. But, the database view is still accessible for more than 100 K responses when it's already open in a new tab.

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The database view can show the start date, due date, expiry date, and completed date, but this information is not available by default. If the survey instance is triggered, then the trigger record is displayed in the Task column. The total number of survey responses isn't displayed in the database view. For the ranking and multiple-choice metrics, based on user survey responses, multiple records are displayed instead of one record per survey instance.

Note:
Any change or update to survey configuration or metadata (For example, addition or deletion of a new metric or category) might affect the database view. In such cases, an event (survey.results_view.updated) is generated so that users can take necessary actions to synchronize the data.

Survey administration

Survey administrators—users with the survey_admin role—create and maintain surveys and configure how they are distributed and published. Surveys on Service Portal are also supported.

Survey administration includes the following procedures.

- Create, customize, and publish surveys.
- Write and maintain survey questions.
- Define trigger conditions for when surveys are sent to users, such as when an incident closes.
- Maintain surveys and survey questions as the organization's needs change.

To set up surveys in Service Portal, you must first install Service Portal and then Create and edit a page using the Service Portal Designer on the page. The base system includes the Survey widget.

View survey reports

Use the Survey Overview dashboard to view various survey reports, such as Surveys by Metric Type and State.

Before you begin
Role required: survey_admin, survey_reader, or admin

About this task
The dashboard displays your survey reports arranged in widgets. You can add new widgets to the dashboard.

Procedure

1. Navigate to **All** > **Survey** > **Overview**.
2. Click the elements within the reports to view more information.

   For more information about working with dashboards, see Dashboards.

Survey designer

Users with the survey_admin role can use the survey designer. The survey designer lets you create survey categories and questions, configure the details, and publish the survey to specific users or groups.

You can assign a survey to individual users or groups who receive all the questions from all the categories. You can also customize each question and make it dependent on the response to another question. The following describes the procedures you follow to create and publish a survey.

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- Create survey categories.
- Create questions within each category.
- Configure survey details, such as introductory and closing remarks and time limit.
- Select recipients for the survey.
- Publish the survey to the selected users or groups.

Note:
The survey designer replaces the survey creator in the Legacy Surveys application. If you are using Internet Explorer version 8 or earlier, the system redirects you to the survey creator.

Related topics

Create a survey designer template question

Select recipients for a survey in the Survey Designer

Publish a survey in the Survey Designer

Survey designer elements

The survey designer is accessible from **Survey** > **Survey Designer**.

The survey designer contains the **Controls** tab, the **Questions** tab, the **Categories** tab,a header bar, and the design canvas.

Controls tab

To create a question, drag the appropriate data type control from the **Controls** palette and drop it onto the designer canvas.

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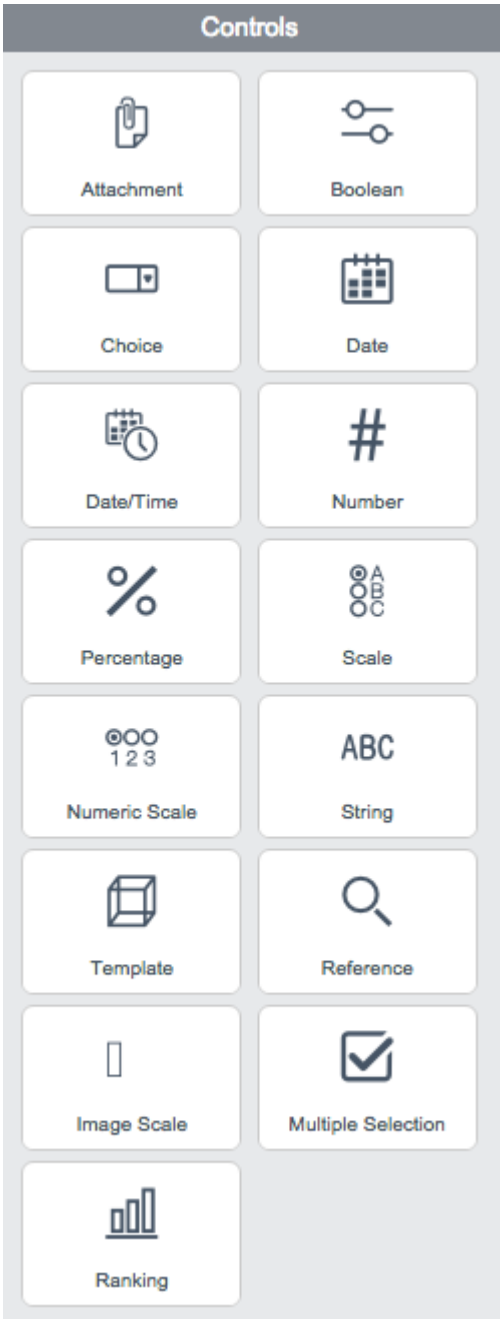
Controls



The assessment engine provides a built-in result calculation feature that converts responses to scored question data types to a score from 0 through 10.

Question data types

Data type	Scored	Description
Attachment	No	Question with a Manage Attachments icon that allows users to attach one or more files.
Boolean	Yes	Question with a check box or *Yes* and *No* choices for user responses.
Choice	Yes	List of predefined options. For more information, see the definition of the **Choices** field in Create a question in the survey designer.
Date	No	Date field.

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Question data types (continued)

Data type	Scored	Description
Date/Time	No	Date and time field.
Number	No	Number field with predefined minimum and maximum values. The default is 1-10.
Percentage	No	Percentage field with a prescribed range.
Scale	Yes	Predefined Likert scale. Answer options appear as radio buttons.
Numeric Scale	Yes	Selectable number scale. The default is 1-5. Answer options appear as radio buttons.
String	No	Single or multi-line text field.
Template	Yes	Choice list of templates that provide a predefined scale of options. For details, see Quiz scorecards.
Reference	No	Choice list of fields from a specified reference table. This data type does not support reference qualifiers. For example, a user could select a user name if you specify sys_user as the reference table.
Image Scale	Yes	Question with a choice of images that can be selected. A template can be used to apply the same images to multiple questions.
Multiple Selection	Yes	Question with multiple check boxes that can be selected.
Ranking		Question with an order number to be selected for each option. One order number cannot be selected twice. This question can be mandatory and it can also be dependent on a parent question, but not vice versa.

Questions tab

This tab displays all metrics added to the question bank for surveys. Use the **Filter** field to search for questions. Each metric is displayed with its name and type.

Categories tab

This tab displays all metric categories added to the question bank for surveys. All metrics in the question bank are group under the corresponding metric category. Use the **Filter** field to search for categories or questions.

Header bar

The tabs on the header bar display views and a menu of functions. Click a tab to change the view on the canvas:

- **Design**: Add and configure the properties of categories and questions. This is the default view.
- **Configuration**: Create introductions and end notes for surveys and select a signature.
- **Availability**: Select the recipients for each category in the survey.

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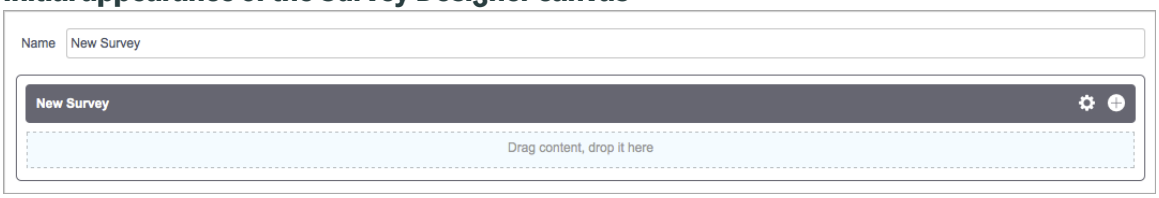
Point to the menu icon ( ) to select an option. The list of options depends on the currently open survey.

- **Save**: Save the current survey without changing its state.
- **Preview**: Display a preview of the survey as it appears to recipients.
- **Publish**: Distribute the survey to the selected recipients.
- **Save and Publish**: Save the survey to the **Draft** state and distribute the survey in one step.
- **New Survey**: Open a fresh canvas for a new survey.
- **Load Survey**: View the list of existing surveys.
- **Copy Survey**: Copy the current survey.

Design canvas

New surveys open in the canvas of the **Design** view. The survey **Name** field appears above first category in the canvas. A blank question field appears in the category container.

Initial appearance of the Survey Designer canvas



Configure a survey in the survey designer

Configuration settings apply to the entire survey.

Before you begin

Role required: survey_creator, survey_admin, or admin

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition in Survey Designer.
3. Select the **Configuration** tab.
4. On the Survey Designer Configuration form, fill in the fields.
   For a description of the field values, see Survey Designer Configuration form.
5. Select the **Availability** tab and complete the form.

Related topics

View a survey scorecard

Create a survey designer template question

Select recipients for a survey in the Survey Designer

Publish a survey in the Survey Designer

Event scheduling

Create an assessment signature

Survey categories

Survey categories provide a way to group questions of a similar theme for a given survey.

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There must be at least one survey category per survey definition and every survey question must be associated with a category. When you create a survey, the system generates one category, which all the questions belong to.

For simple surveys, one category is usually enough. Consider creating additional categories if you want to accomplish any of the following tasks.

- Separate groups of questions into collapsible sections by category on the survey questionnaire.
- Report on category scores, which are calculated based on responses for all questions within each category.

Create a category in the survey designer

A category represents a theme for evaluating a specific element of the survey topic and contains questions pertaining to that theme.

Before you begin
Role required: admin or survey_admin

About this task
When you create a survey, the system creates a default category, using the name of the survey. You can use this category, modify it, and create additional categories as needed. To have any results, a category must contain scored questions.

Procedure

1. Navigate to **All** > **Survey** > **Survey Designer**.
2. Enter the name of the survey in the **Name** field.
   The system uses this name as the name of the survey and of the first category.
3. To configure the category, click the gear icon in its title bar and complete the following steps in the Properties dialog box.
   a. Enter a new name and a description for the category.
   b. Enter text in the **Details** field that introduces or explains the category to recipients.
   c. Click the **X** icon to close the Properties dialog box and save your settings.
4. To add a new category, click the **+** icon in the title bar of an existing category.
   The new category appears below the category that you selected to create it. You can click the **X** icon in a category header to delete a category that you added in error.

Create a survey category in a survey

You can modify an existing survey to add one or more survey categories.

Before you begin
Role required: admin or survey_admin

About this task
Only one category is required for each survey, but you can add additional categories as needed.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. In the **Metric Categories** related list, open a category or click **New**.

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Each survey category is stored as a record on the Metric Category [asmt_metric_category] table with a modified view for survey use.

4. Enter the survey category name and description.
   The category name appears on questionnaires when either of the following is true.
   - There is more than one category for the survey.
   - There is only one category and its name is different from the survey definition name. If you create a survey using the survey creator, the category name is the same as the survey definition name.
5. Right-click the form header and click **Save**.
   The **Assessment Metrics** and **Users** related lists appear.
6. Click **Update**.

Create a question in the survey designer

You can create multiple questions for each category in the survey designer, but each question can only be associated with one category.

Before you begin

Role required: admin or survey_admin

About this task

The data type that you select for each question determines how it can be answered by survey recipients.

Procedure

1. In the Design view, drag a data type icon from the Controls palette and drop it into a category container.
2. To configure the question, click the gear icon in its title bar.
   The Properties dialog box opens.
3. On the Properties form, fill in the fields.
   For a description of the field values, see Properties form.
4. To create any special conditions that must be met before the question appears on the survey, click the Dependency tab.
   The question must have a data type of **Boolean**, **Choice**, **Scale**, or **Template**.

   For example, the question, "How many states have you visited in India", is a dependent question for the current question "Have you visited any other state in India?". The dependent question appears exactly below the current question only if your answer satisfies the condition in the current question. If not, the dependent question does not appear anywhere in the survey.

5. Select a question in the **Displayed when** field.
   The system selects the appropriate operator and displays the possible answers for the selected question.
6. Select the answer that satisfies the condition.
   You can select more than one answer. Selected answers are indicated by a check mark.

   The system prevents recursive dependencies between questions. For example, if Question A depends on Question B, Question B cannot depend on Question A.

7. Click the **X** icon to close the question properties dialog box and save your settings.
8. To add a question with the same data type as an existing question in the category, click the **+** icon in the title bar of the existing question.

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9. Drag and drop questions to change their order within a category or move them between categories.
10. To delete a question, click the **X** icon in its title bar.

Related topics

Survey question template

Create a survey designer template question

Survey question data types

You must choose a data type for each survey question. The data type determines the format of the question and the kind of data that is collected on survey questionnaires.

The following data types are available for surveys:

Attachment data type

On questionnaires, users can attach one or more files to a question.

Users click the Manage Attachments icon and select one or more files in the Attachments pop-up window to attach to the question. From this window, users can:

- View a list of the attached files.
- View an attached file in a separate window.
- Rename an attached file.
- Add or delete files

Once a survey has been submitted, attachments cannot be updated or deleted.

Any type of file supported by the platform can be attached to a question. One or more files can be attached a question while taking a survey or completing an assessment.

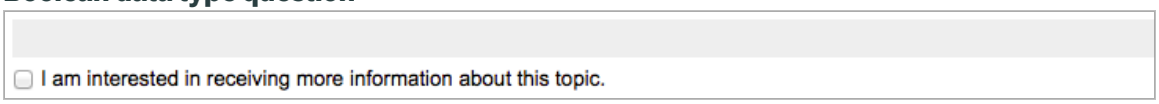
The assessment administrator can see the attachments associated with an individual question as well as those associated with the survey.

See Administering attachments for more information.

Boolean data type

On questionnaires, users select a check box beside a statement or leave it cleared.

Boolean data type question



If you select **Boolean**, you must fill in the **Scale definition** field. Select **High** if it is best when users select the check box.

Choice data type

On questionnaires, users select a value from a list of choices.

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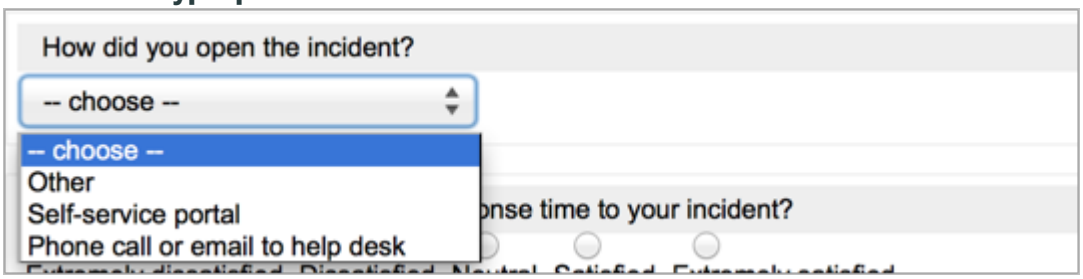
Choice data type question



If you select **Choice**, you must fill in the **Scale definition** field and create answer options. Select **High** for the scale definition if the answer option with the largest metric definition **Value** is best.

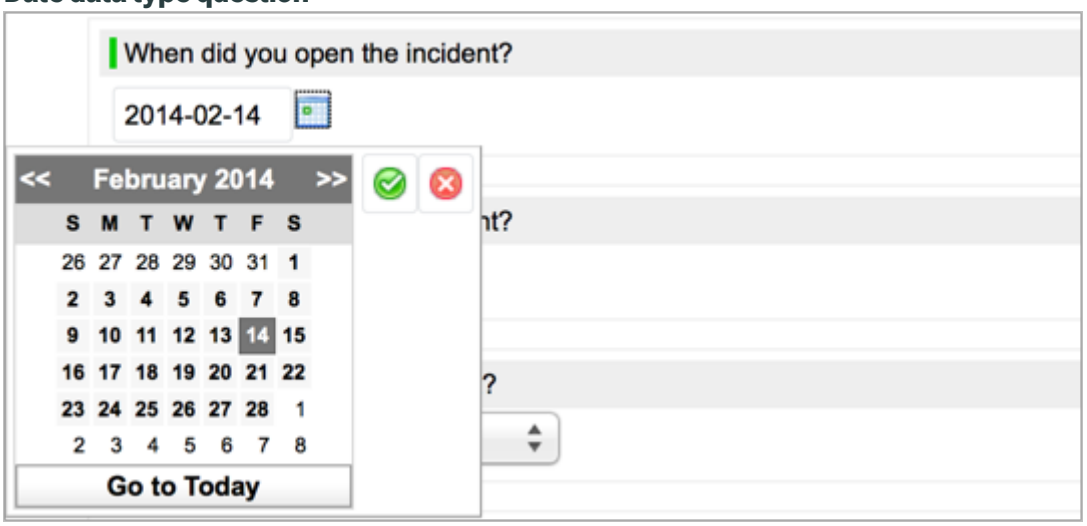
Note:
The system sets the **Min** and **Max** fields automatically based on the **Value** settings for the associated metric definitions.

Date and Date/Time data types

The **Date** and **Date/Time** data types are similar.

- **Date:** On questionnaires, users select a date.

Date data type question



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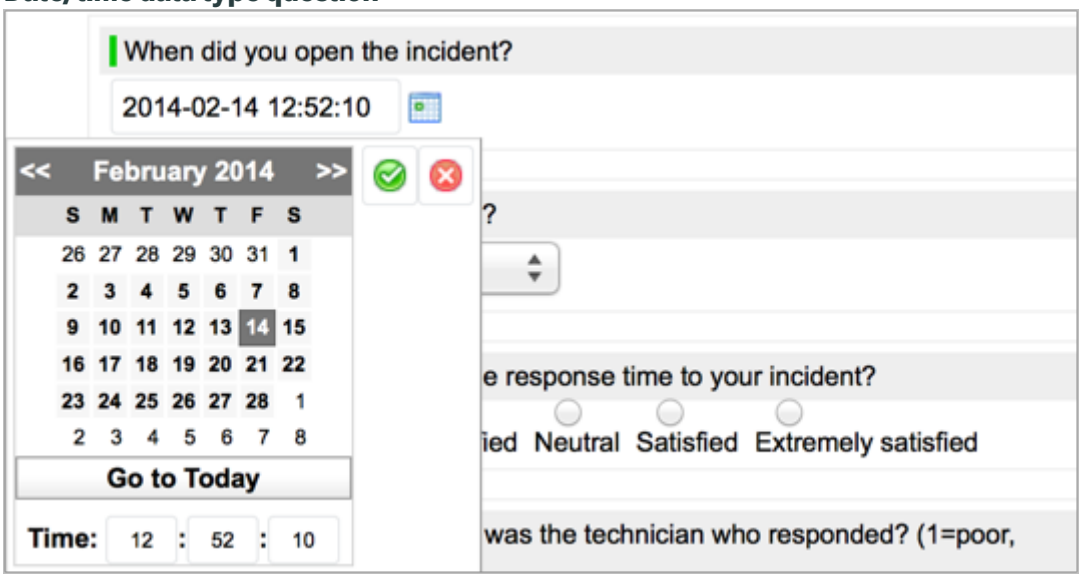
- **Date/Time:** On questionnaires, users select a date and time.

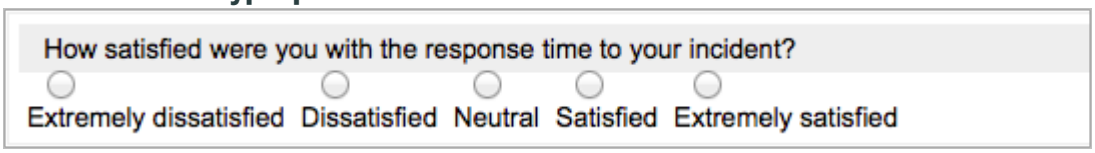
Date/time data type question



Likert Scale data type

On questionnaires, users select a multiple choice value from a custom Likert scale. Each answer option is represented by a radio button on the scale. A Likert scale question that evaluates an application's ease of use might have the answer options **Easy**, **Average**, and **Difficult**.

Likert scale data type question



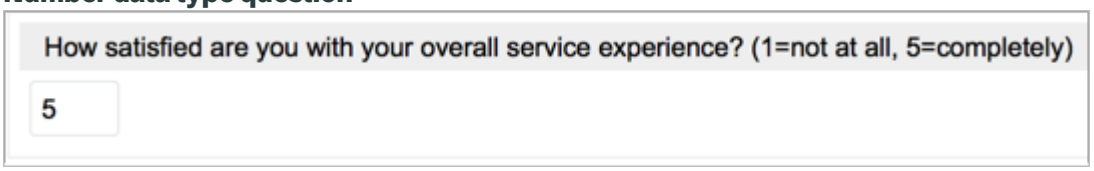
If you select **Likert Scale**, you must fill in the **Scale definition** field and create answer options. Select **High** for the scale definition if the answer option with the largest metric definition **Value** is best.

Note:
The system sets the **Min** and **Max** fields automatically based on the **Value** settings for the associated metric definitions.

Number data type

On questionnaires, users enter a number.

Number data type question



If you select **Number**, you must fill in these additional fields:

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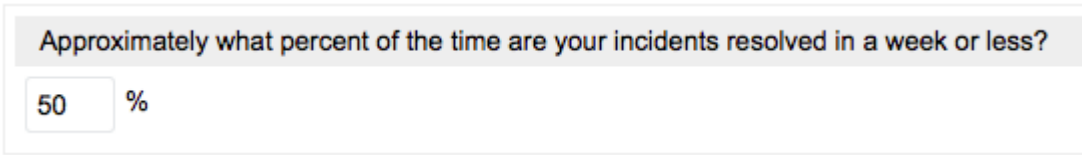
- **Scale definition**: Select **High** if a larger number is better, such as for a question that measures the number of sales made in a quarter.
- **Min** and **Max**: Enter the smallest and largest numbers users can enter. State the range of acceptable answers in the question text.

Percentage data type

On questionnaires, users enter a number.

Percentage data type question



If you select **Percentage**, you must fill in these additional fields:

- **Scale definition**: Select **High** if a larger percentage is better, such as for a question that measures the percentage of work an agent has completed.
- **Min** and **Max:** Enter the smallest and largest numbers users can enter. Generally **0** and **100** are appropriate minimum and maximum values. If you choose values other than **0** and **100**, it is usually best to state the range of acceptable answers in the question text.

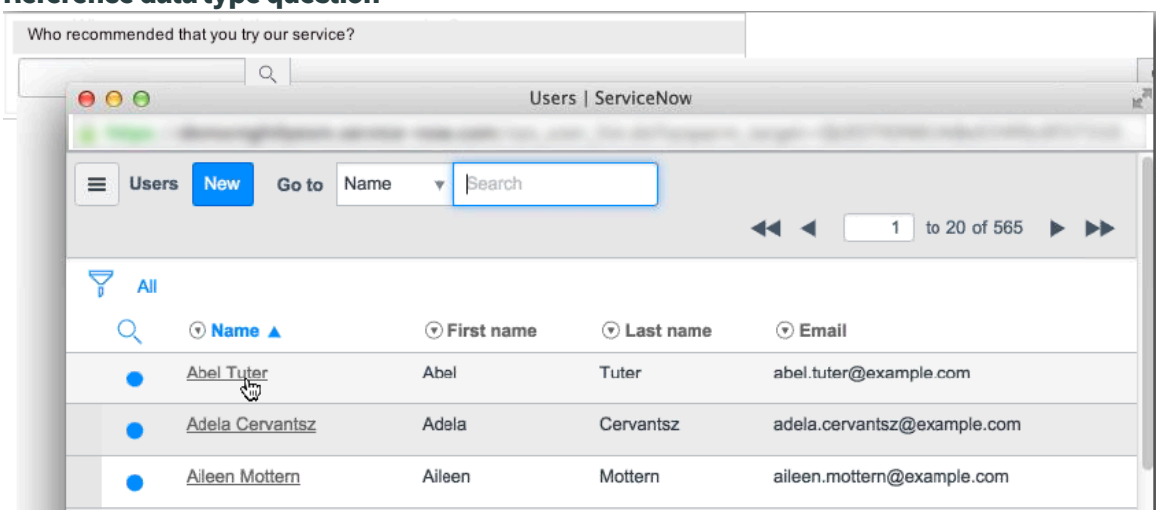
Reference data type

On questionnaires, users select a value from a list that is generated from a specified reference table. The response field supports auto-completion.

Note:
Reference qualifiers are not supported.

For example, a user could select a user name in response to a question if you specify User [sys_user] as the reference table.

Reference data type question



String data type

On questionnaires, users enter text. When you select **String**, the **String option** field appears. Select one of the following options to determine how the string field appears on questionnaires:

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- **Single line**



- **Single line wide**



- **Multiline**



Template data type

On questionnaires, users select a value from a predefined series of answer options. To use this data type, a question template must be defined.

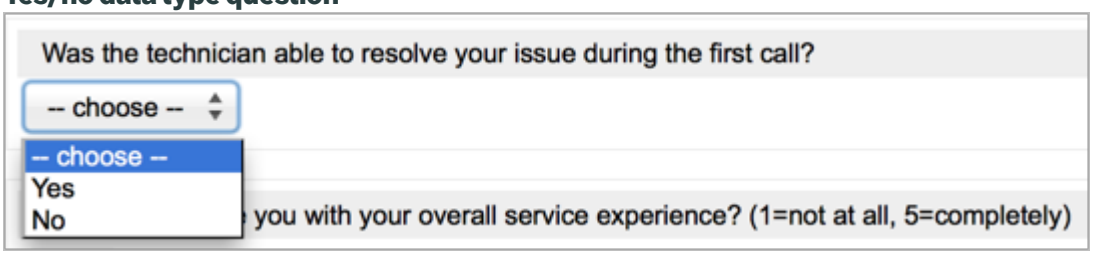
If you select **Template**, you must fill in these additional fields:

- **Template**: Select a template.
- **Scale definition**: Select **High** if the answer option with the largest template definition **Value** is best.

Yes/No data type

On questionnaires, users select **Yes** or **No** from a list.

Yes/no data type question



If you select **Yes/No**, you must fill in the **Scale definition** field. Select **High** if **Yes** is the best answer.

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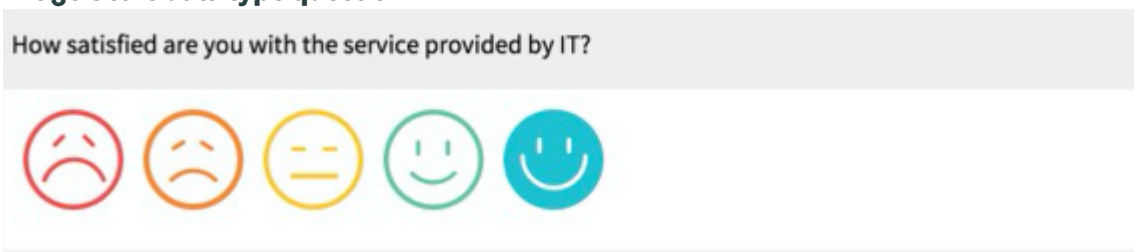
Image Scale data type

On questionnaires, users select an image from a predefined set of images as their response. Image scale questions can also be used in a template for better performance with surveys that have the same type of answer options.

Five emojis, similar to the Likert scale (very dissatisfied to very satisfied) are provided. However, you can upload additional images in JPG, PNG, or GIF format. Two images can be uploaded, one for selected case and another for unselected case. For example, the selected image can be  , and the unselected image can be  . Larger size images are reduced to 64 x 64 pixels.

Image Scale data type question



The result behavior depends on the presence of uploaded images. If no selected image is uploaded, then the question shows up blank.

Selected image	Unselected image	Result
Yes	Yes	Unselected image loads. Clicking the image changes it to the selected image.
Yes	No	Selected image loads with 50% opacity. Clicking the image changes the opacity to 100%.
No	Yes	A blank placeholder box is displayed.
No	No	A blank placeholder box is displayed.

Note:

- N/A option is not supported for image scale type question.
- For an image scale type question, an empty string is saved as an answer for a hidden and dependent question of an unselected image.

Multiple selection data type

On questionnaires, users can select multiple check boxes indicating all answers that apply. For instance, a user can be instructed to "Select all that apply" in a multiple selection question.

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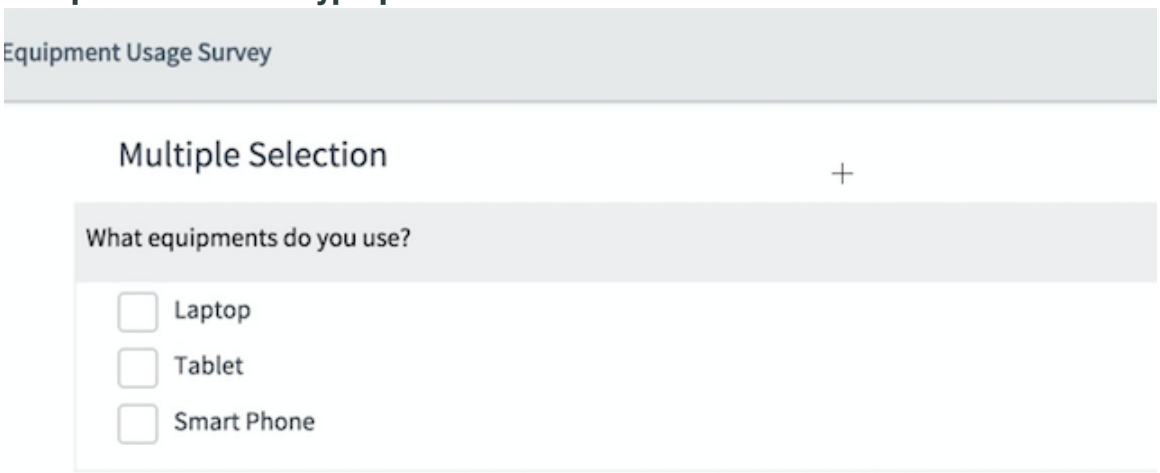
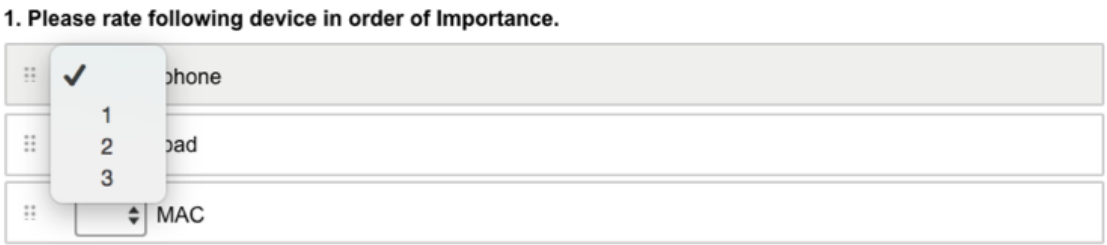
Multiple Selection data type question



Ranking data type

On questionnaires, users can select a different order number for each option to rank them. Drag-and-drop functionality is also supported, which allows a user to either fill in the number, or simply drag an option.

Setting the order of the options



One order number cannot be selected twice. This question can be mandatory and it can also be dependent on a parent question, but not vice versa.

Related topics

Survey question template

Create custom metric type

Create your own custom metric type if you don't find the metric type that you want in Survey Designer while designing surveys.

Before you begin

Role required: survey_admin, survey_creator, or admin

About this task

You can use the Custom Metric Type module for surveys to create the custom metric type. If you set the custom metric type using the Now Mobile app, ensure that the widgets support the current theme of Mobile Employee Service Portal.

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **Custom Metric Type**.
2. On the Custom Metrics page, click **New**.

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3. On the Custom Metric form, fill in the fields.
   For a description of the field values, see Custom Metric form.
4. Select **Submit**.

Note:

- Updating or deleting existing values in the **Macro**, **Widget**, and **Result type** fields might cause inconsistent effects.
- The custom metric type that you created doesn't appear for the public surveys. To make it visible for the public surveys, open the Service Portal configuration and configure your survey widget to make it public. For more information about configuring widget security, see Configure widget security.
- If the custom metric type is inactive or deleted, the question is not rendered on the survey form.
- If the value in the **Macro** or **Widget** field is updated, the updated value is used to render a survey form even if an instance was created before updating the values for macros or widgets.

Edit a survey in the survey designer

You can modify surveys using the survey designer.

Before you begin

Role required: admin or survey_admin

About this task

You can edit a survey even after it has been distributed, with the following results.

- Added questions are available only on surveys that are distributed after this change.
- Changes to existing questions are immediately available to users before the survey is submitted or during the retake period. This includes changes to the answers, such as additional choices or changes to the data type.
- Deleted questions are also deleted from the distributed surveys in user queues.

Note:
You can only edit a survey that has the same application scope as that of your current session.

Procedure

1. Navigate to **All** > **Survey** > **Survey Designer**.
2. Point to the menu icon in the survey header bar, and select **Load Survey**.
3. Select a survey from the list and modify it as needed.
4. Point to the menu icon in the survey header bar, and select **Save** or **Save and Publish**.
   When you publish the edited survey, the system generates survey instances for any associated survey users.

Configure category weights for a survey

You can assign a weight to each category in a survey. The system calculates results from the weight that you configure.

Before you begin

Configure the Survey Category form to display the **Weight** field.

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Role required: admin or survey_admin

About this task

Weights are set to a value of **10** by default but can be changed.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys** and select a survey from the list.
2. In the Survey Definition form, select a category from the **Metric Categories** related list.
3. Edit the default weight value.
4. Click **Update**.

View a survey instance

A survey instance represents one questionnaire assigned to one user. You view an instance to verify that survey instances were created, to check the state of a survey instance, or to reassign a survey instance.

Before you begin

Role required: admin or survey_admin

Procedure

1. Navigate to **All** > **Survey** > **Survey Instances**.

   The following sub-modules are available based on the state of the instances:

   - **Ready to take**: Displays survey instances that are ready to be taken by the user. By default, these instances are sorted in ascending order by the **Number** field.
   - **In progress**: Displays survey instances that are in progress. By default, these instances are sorted in ascending order by the **Number** field.
   - **Completed**: Displays survey instances that are complete. By default, these instances are sorted in descending order by the **Taken on** field.
   - **Cancelled**: Displays survey instances that are cancelled. By default, these instances are sorted in ascending order by the **Number** field.
   - **All**: Displays survey instances in all states. By default, these instances are sorted in ascending order by the **Number** field.

2. Open a survey instance from the required sub-module.

   By default, the following fields are displayed in the Survey Instance form for all sub-modules other than **Completed**.

   Note:

   - When you open an instance in the **Completed** sub-module, you are redirected to the User's Response page.
   - Each survey instance is stored as a record on the Assessment Instance [asmt_assessment_instance] table with a modified view for survey use.

   For a description of the field values, see Survey Instance form.

Related topics

Schedule periods

Event scheduling

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Survey users and groups

Survey users and survey user groups help survey administrators control who can take a survey.

Survey administrators can restrict a survey so that only specified users can access it unless a survey administrator manually assigns the survey to a different user. Survey user groups provide a way to quickly designate multiple survey users.

Administering survey users

The list of survey users for a survey is visible on the Survey Definition and Survey Category forms. You can add or remove users from the list of survey users at any point. Note that designating a survey user does not automatically generate a survey instance for that user unless both of the following conditions are true:

- The survey definition **Schedule** period is set to **Daily**, **Weekly**, **Monthly**, or **Yearly**. In this case the system assigns a new survey instance to each survey user at the beginning of each schedule period.
- The user has no instances of the survey that are incomplete or that have not yet reached their expiration date.

You can designate survey users from the Survey Designer, the Survey Definition form, or the Survey Category form.

Note:
If there are trigger conditions for a survey, do not create survey users. Instead, use the Trigger Conditions form to assign users.

Related topics

Send survey invitations to users

Survey trigger conditions

Survey categories

Survey definitions

Create a survey user group

Survey user groups are groups that have the **Type** field set to survey and display only the information most relevant to surveys. You can assign survey groups or any user group to surveys.

Before you begin
Role required: admin or user_admin

About this task
Though it is possible to designate members of any group as survey users, one reason to create a survey group is to view it conveniently in the survey **User Groups** module.

By default, the Survey Creators user group is available. When you add a user to this group, the user will be assigned the survey_creator role to create surveys, quizzes, or assessments and view only those surveys, quizzes, or assignments created by the user.

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **User Groups**.
2. Click **New**.
3. Complete the Group form.
4. Right-click the form header and click **Save**.

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The **Group Members** and **Groups** related lists appear.

5. To add group members, complete the following steps.
   a. In the **Group Members** related list, click **Edit**.
   b. Select users from the list on the left and add them to the **Group Members List** on the right.
   c. Click **Save**.

Related topics

Create a group

Select recipients for a survey in the Survey Designer

You can assign survey users while designing or modifying the survey.

Before you begin
Role required: admin or survey_admin

Procedure

1. In the Survey Designer, click the **Availability** tab.
2. Under **Accessible by:**, select the **Specific users** option, then select users.
3. If desired, select the **Survey groups only** check box, then select survey user groups or other groups.
4. Click **Save**.

Designate a survey user

You can designate one survey user at a time from the Survey Definition form.

Before you begin
Role required: admin or survey_admin

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
   There must be at least one category.
3. In the **Survey Users** related list, click **New**.
4. Select a **User**.
5. Click **Submit**.
   The Survey Definition form reopens.
6. **Optional:** To remove survey users, in the **Survey Users** related list, select the check box beside the user, and then select **Delete** from the action list below the list.

Designate or remove multiple survey users at one time

Use the Survey Category form to designate or remove multiple survey users at a time.

Before you begin
Role required: admin or survey_admin

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Procedure

1. Open a survey definition.
2. In the **Metric Categories** related list, open a category.
   You can choose any category. The system applies survey user changes to all the survey's categories automatically.
3. In the **Users** related list, click **Edit**.
4. Use the slushbucket to add or remove survey users.
5. Click **Save** to return to the survey category.
   The changes are also reflected in the **Survey Users** related list on the survey definition.

Allow recipients to retake a survey

You can configure a survey to allow recipients to resubmit their answers as many times as they like, up to the survey's due date.

Before you begin

Configure the Survey Definition form to display the **Allow retake** field. For more information, see

Configure the form .

Role required: admin or survey_admin

About this task

Results are not calculated for the survey until the configured duration has elapsed. The card in the user's queue remains visible until the due date of the survey, and a button is displayed to allow retakes.

Procedure

1. Navigate to **All** > **Surveys** > **View Surveys**.
2. Select a survey from the list.
3. Select the **Allow retake** check box.
4. Click **Update**.

Copy a survey

Create a copy of a survey with at least one category to reduce the effort of creating another survey with similar data.

Before you begin

Role required: survey_admin or admin

About this task

All associated questions (type), configurations, categories, metrics, domain separation rules, and role-based categories are copied. Assigned users, category users, instances, and trigger conditions are not copied.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. Perform any of the following steps.

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Publish a survey

You must publish a survey to enable people to receive and complete survey instances.

Before you begin
Role required: admin or survey_admin

About this task
The **State** field on the Survey Definition form indicates whether the survey is in the **Draft** or **Published** state.

> **Note:**
> You cannot return a survey to the **Draft** state after it has been published. You do have the option to deactivate a survey by clearing the **Active** check box.

Procedure

1. Navigate to **Survey View Surveys** and select a survey to publish.
2. Click **Publish**.
   When you publish a survey, the system generates survey instances for any associated survey users. You can assign the survey to other users manually.

Publish a survey in the Survey Designer

You must save changes to a survey before you can publish it to the specified recipients or groups.

Before you begin
Role required: admin or survey_admin

Procedure

1. In the Survey Designer, point to the menu and select **Load Survey**.
2. Select a survey to publish.
3. To preview the survey as a user, point to the menu icon and click **Preview**.
4. When you are satisfied with the survey, click either **Save and Publish** or **Publish** to distribute it.
   When you publish a survey, the system sends email notifications to the recipients and to their managers. The system displays a link to the survey on a card in each recipient's My Assessments & Surveys portal.

Customize the appearance of a survey

As an assessment and survey administrator, set properties to customize the color of various elements on the questionnaires.

Before you begin
Role required: survey_admin or admin

About this task
For color properties, enter either an HTML color name or hexadecimal (hex) value. For hex values, the # character is required. Values aren't case-sensitive.

For example, if all the following formats are valid: `LightGray`, `lightgray`, and `#D3D3D3`, a preview of the color appears next to the field.

The customizations that you make apply to all assessments and surveys.

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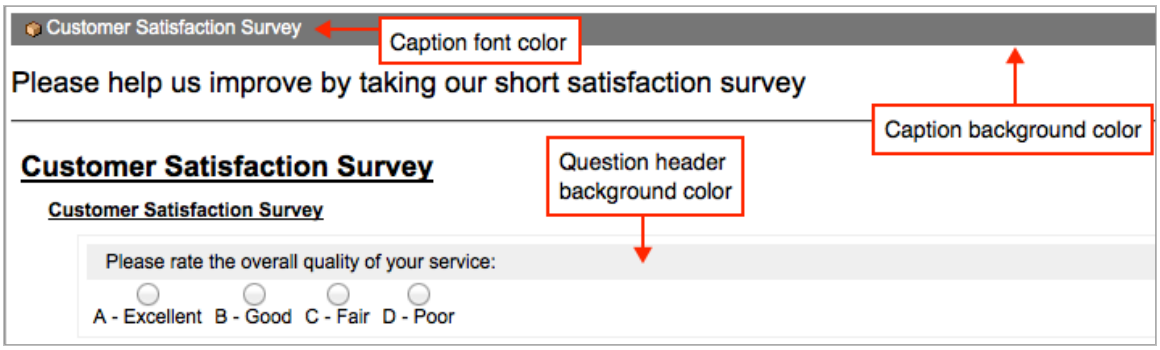
Procedure

1. Navigate to either of the following modules.
   - **Assessments** > **Admin** > **Assessment Properties**
   - **Survey** > **Administration** > **Properties**

   For a description of the properties, see .
2. On the Properties page, edit the properties as needed.
   Refer to the following screenshot to see which parts of the assessment questionnaires are controlled by the properties.

Note:
You can customize the **Caption font color**, **Caption background color**, and **Question header background color** only if Next Experience is turned off.



3. Click **Save**.
   Clear the browser's cache to see updates.

Survey definitions

A survey definition is the root record upon which a survey is built.

The survey designer generates a survey definition automatically when you save or publish the survey. Survey administrators may want to modify the survey definition to configure additional options for the survey, or to publish the survey when it is ready for distribution.

Survey administrators and survey readers can also send survey invitations directly to users from the survey definition.

Related topics

Send survey invitations to users

Modify a survey definition

You can configure additional options for a survey definition.

Before you begin

Role required: admin, survey_creator, or survey_admin

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
   Each survey definition is stored as a record on the Assessment Metric Type `[asmt_metric_type]` table with a modified view for survey use.
2. Open a survey definition.

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The **Response Trend** chart with the weekly trend of the survey instance count, and the **Survey Summary** chart with the overall summary response based on instance states are displayed.

3. Modify the fields on the Survey Definition form.

> **Note:**
> You can only edit a survey that has the same application scope as that of your current session.

Survey Definition form

Field	Description
Name	Name of the survey which appears on the questionnaire.
Description	Helpful information about the survey.
Active	Check box to activate the survey definition. When the **Active** check box is cleared, new survey instances cannot be generated and users cannot complete existing survey instances. Use the **Active** check box to deactivate or activate a published survey.
Owners	Owners of the survey. You can add a user with the survey_creator, survey_admin, or assessment_admin role.
Anonymize responses	Check box to ensure that all responses for this survey are stored without the submitting user names. When a user submits a survey, the system clears the **Assigned to** field for the associated survey instance. Also, survey responses for anonymous surveys do not contain **Assigned to** values. **Note:** The **Assigned to** field is cleared. However, each response record includes the **Created By** and **Updated By** fields that are accessible to users with the survey_admin role.
State	Status of the survey: **Draft** or **Published**.
Allow retake	Check box that allows users to modify their answers to a completed survey. Users can resubmit a survey as many times as they want until the due date. After that date, the system removes the survey from the user's My Assessments & Surveys page.
Scheduled job	Scheduled job that the system creates for this survey definition when the schedule period is a repeating interval. The system sets the scheduled job to run according to the selected schedule period. ○ If you change the schedule period and save the survey definition, the system deletes the old scheduled job. ○ If you selected a recurring schedule period, a new scheduled job is created. For example, if you change the schedule period from **Daily** to **Weekly** and save the record: ○ The system deletes the daily scheduled job. ○ Creates a weekly one set to run a week from the current date. This field is visible to administrators only if the schedule period is **Daily**, **Weekly**, **Monthly**, or **Yearly**.
Assessment duration	The length of time to complete assigned survey instances, starting from the time the survey instance is generated. The assessment duration sets the Due

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Field	Description
	date for each survey instance. The default duration is 14 days. Configure the form to view this field.
Send notifications	Sends notifications to the assigned users when the survey is published if there is an active notifications setup. Configure the form to see the field.
Other Options	
Sample Metric	A metric of the current survey that you can include as an image in the email or invitation sent to a survey user. When the survey user clicks the image in the email or while previewing the HTML body, the entire survey is available to be taken. **Note:** You cannot edit or delete a metric that is selected in this field.
Signature	Acknowledgement by a survey recipient of requirements, admonitions, or policies related to the survey. The signature may require the recipient to select a check box or to type in a full signature to verify having read these assertions. You can display assertions without requiring a signature. Select an existing signature from the list or click **New** to create a new one. The signature form contains these fields: ○ **Name**: Descriptive name for this signature. ○ **Signature type**: Type of signature required. The selections are **Check box**, **Full name**, or **Assertion only**. If **Assertion only** is selected, no signature is required to submit the survey. ○ **Assertion**: Text you want to display to recipients. By default, a property called **Require authentication for user signature** (*com.snc.assessment.signature_authentication*) requires users to authenticate when providing a full name signature.
Schedule period	Option that determines how often a user can take the same survey and whether the system generates survey instances on a schedule. **Note:** If you use a trigger condition for a survey, ensure the schedule period is set to **No Limit**. Trigger conditions use a different method to regulate how often users can receive survey instances.
Do not show survey introduction notes	Check box to skip the introduction notes when a survey is launched. This functionality is applicable in both the ServiceNow AI Platform and Service Portal product versions.
Pagination setting for Service Portal view	The setting on which the pagination is based for desktop or tablet view in Service Portal. ○ Category: default ○ Question: 1 question per page (automatic for mobile) ○ None: no pagination **Note:** This field is displayed only when Service Portal is installed.

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Field	Description
One Click Survey	Enables a One Click survey in Service Portal. **Note:** This option can be selected if the **Pagination setting for Service Portal view** is set to `None`.
Source Table	Table whose field is used as a dynamic value for a question in a triggered survey. **Note:** When you select a source table, ensure that its relevant field is selected as **Source Field** value of a metric.
Chat Survey	Option to validate if survey questions are supported in a chat survey. Enables conversational questionnaires (pre-chat and post-chat surveys) in the chat client. Also enables you to map chat context variables to survey questions. For information on a chat survey in ITSM Virtual Agent, see Surveys in ITSM Virtual Agent. **Note:** This field is available only when the Glide Conversation Server plugin (com.glide.cs) is activated.
Outlook Actionable Message	Includes an embedded survey in the survey email notification. After you select this check box and save the survey, a validation is run to ensure all survey questions are supported. **Note:** This field is available only when the Outlook Actionable Messages(sn_ms_oam) plugin is installed.
Allow Sentiment Analysis	Enables sentiment analysis for this survey.
Introduction & End Notes	
Introduction	Introductory content to display on survey questionnaires. Consider adding a company logo, a welcome message, background information about the survey, or instructions.
End note	End note that appears when someone submits a survey questionnaire. Consider adding a thank you message, follow-up instructions, or other applicable information.
Related Links	
Enable Public Access Remove Public Access	Link that enables/disables the survey as a public survey. No login is required to take a public survey (including a survey with a trigger condition) and users or non-users can respond anonymously. For completed public surveys, the **Assigned to** field value is Guest. **Note:** You can use the **View Survey URL** related link to share the URL with users.

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Field	Description
View Responses	Link that opens the list of responses for this survey. This related link is available only if there are results for the survey.
View Scorecard	Link that opens the scorecard for this survey. This related link is available only if there are results for the survey.
View Survey URL	Link that opens a dialog box that displays a URL for this survey. The URL is useful for sharing a public survey. This related link is available only if the **Active** check box is selected. The URL does not work until the survey definition is published.
Show Benchmarks	Opens the Benchmarks Dashboard that provides visibility into your key performance indicators (KPIs) and trends. **Note:** ○ This related link is available only for survey_admin, assessment_admin and survey_reader with bm_viewer role. ○ You must opt in to Benchmarks to view the dashboard. See Enable Benchmarks ○ This is applicable only for a published survey.
Create Improvement Initiative	Opens the Improvement Initiative window to create an improvement initiative record that helps in improving the performance of the survey. **Note:** ○ This related link is available only for the survey_admin and assessment_admin role. A survey_reader can only view the created improvement initiative records. ○ You should activate the Continual Improvement Management plugin (com.sn_cim).
Retry Sentiment Analysis	Checks all survey instances of this survey that do not have sentiment analysis data and sends them for analysis.
Related Lists	
Trigger Condition	Displays all the trigger conditions associated with the survey.
Survey Responses	Displays all the responses associated with the survey.
Metric Categories	All survey categories for this survey.
Survey Users	All survey users who are authorized to take this survey. If no users are listed, any user can take this survey.
Assessment Instances	All survey instances for this survey. Configure the form to add this related list to see it.

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Field	Description
	Note: If you add a related list to the form, use list control to omit the **New** button. The system generates survey instances to produce functional surveys.
Improvement Initiatives	Displays improvement initiatives associated with the survey. **Note:** This related list is available only when there is at least one improvement initiative record.
Survey Recipients Lists	Recipients lists that are added to the survey.

4. Save the record.

Related topics

Survey trigger conditions

Publish a survey

Event scheduling

Schedule periods

The available schedule periods are **Only Once**, **No Limit**, **Daily**, **Weekly**, **Monthly**, and **Yearly**.

The default schedule period is **No Limit**. When you set the schedule period to anything except **Only Once** or **No Limit**, the system creates a corresponding scheduled job. The scheduled job performs the following actions.

- Ensures that a user can take one survey instance of the same survey per schedule period.
- Generates a new survey instance for each survey user at the beginning of the new schedule period, as long as the survey user does not have an incomplete instance of that survey. A survey instance is incomplete if the state is not **Complete**.

For example, if you set the schedule period to **Monthly** and someone attempts to send survey invitations twice in the same day, the system generates survey instances for the survey users the first time only. At the beginning of the next schedule period, the system generates another survey instance for each survey user who completed the previous one.

Schedule periods are enforced by the **Expiration date** field on the survey instance. As long as the survey instance expiration date has not passed, the assigned user cannot receive a new survey instance. When the system generates a survey instance and the schedule period is anything except **No Limit**, the **Expiration date** field is automatically set to the appropriate date. For example, if the schedule period is **Weekly**, the expiration date is a week after the survey instance is generated.

If you change the schedule period, the scheduled job updates automatically to the correct schedule. However, users who have survey instances for the survey cannot receive new survey instances until their existing survey instances expire, regardless of the new schedule period.

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Consider the following example: Sal Pindell receives a survey instance when the schedule period is **Weekly**. The next day, a survey administrator changes the schedule period to **No Limit**. Sal cannot receive another survey instance until one of the following actions occurs.

- Seven days pass from the time Sal's survey instance was generated.
- A survey administrator deletes Sal's survey instance.

After one of these actions occurs, Sal can receive a new survey instance anytime, as long as he has no incomplete instances of the survey.

Note:
If you use a trigger condition for a survey, ensure the schedule period is set to **No Limit**. Trigger conditions use a different method to regulate how often users can receive survey instances.

Related topics

Publish a survey

Survey trigger conditions

Create a survey designer template question

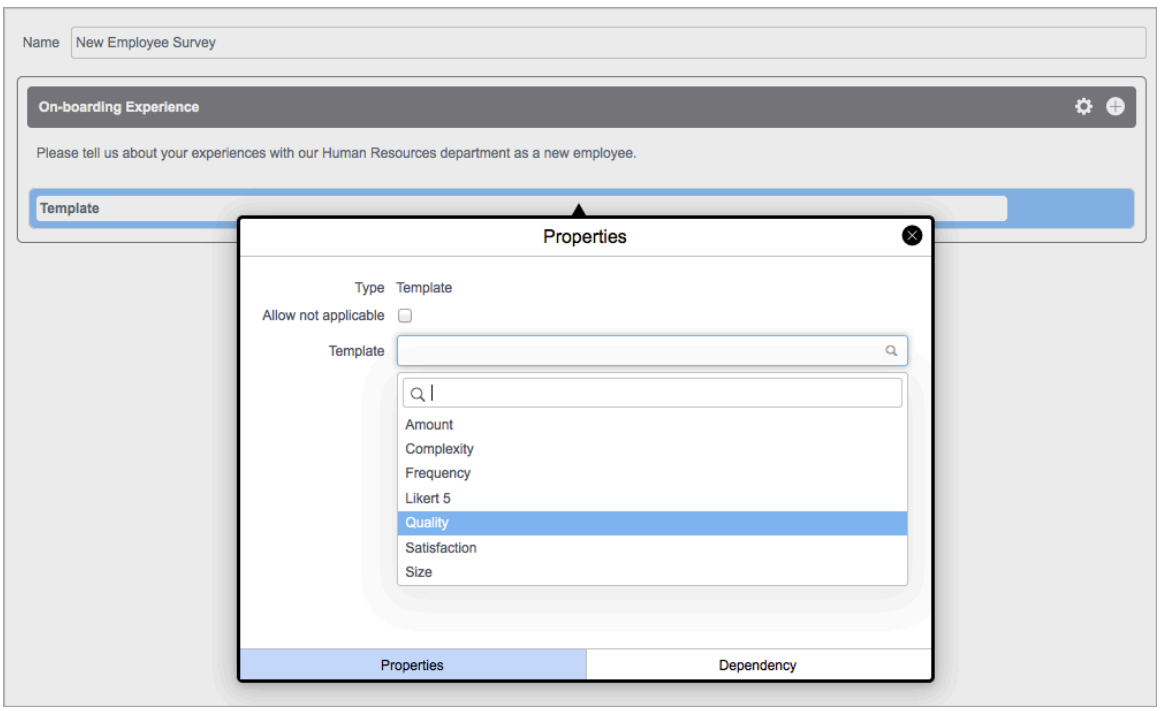
You can create a question that uses choice lists from a template.

Before you begin

Role required: admin or survey_admin

Procedure

1. Navigate to **All** > **Survey** > **Survey Designer** and load a survey or create a new survey.
2. Drag the **Template** data type icon into a category container.
3. Click the gear icon in the question title bar to open the template properties dialog box.
4. Select a predefined scale from the list.



Question entry fields appear for that template.

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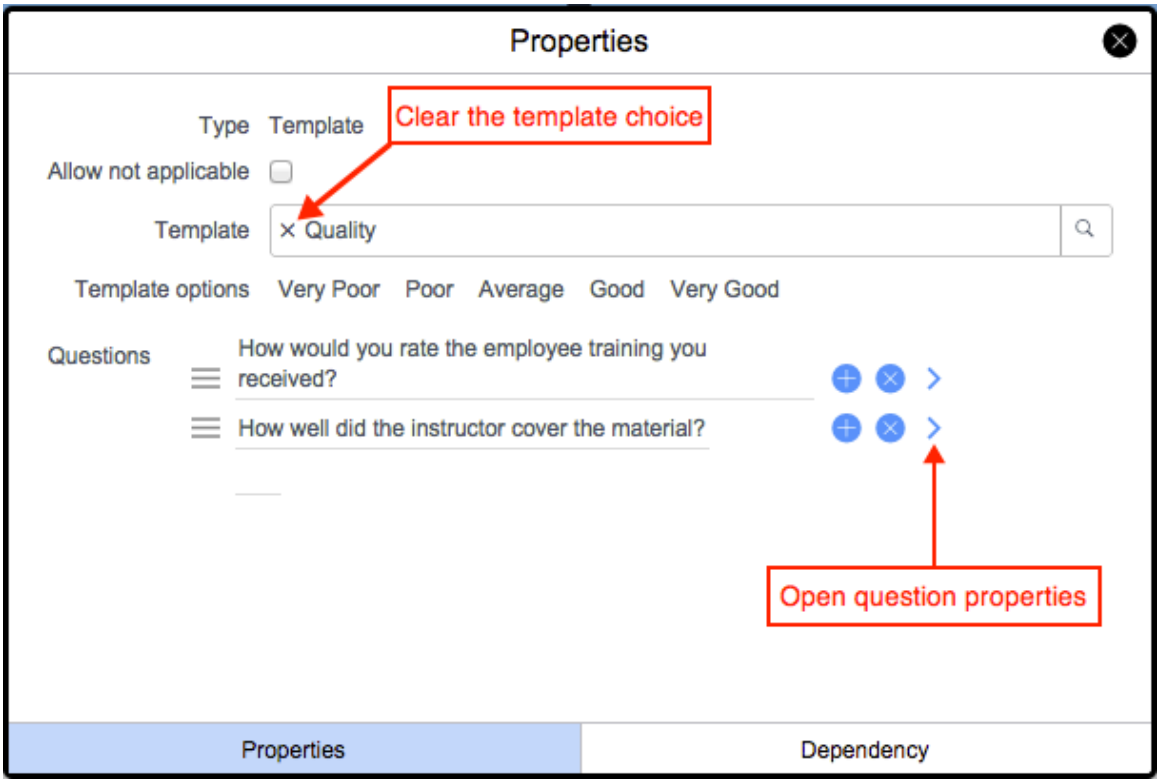
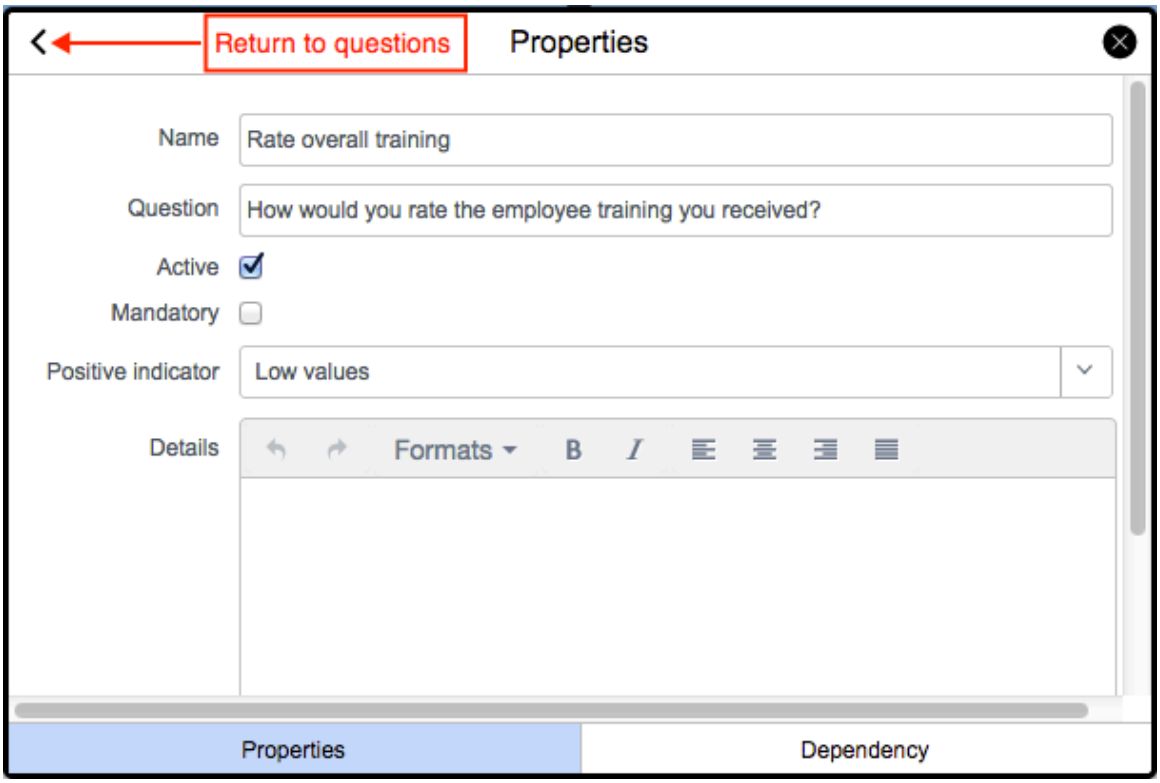
5. Enter one or more questions that are appropriate for the template.



6. Click the arrow to the right of a question to configure its properties.
You must provide a name for each question.



7. Click the back arrow to return to the template properties dialog box.

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8. Configure the properties for the remaining questions.
9. Click the **X** icon to close the template properties dialog box and save your settings.

Related topics

Survey designer elements

Survey designer

Edit a survey in the survey designer

Survey questions

Survey questions appear on survey questionnaires for the associated survey definition.

The survey creator generates questions and answer options automatically. However, it provides only the basic configuration options for questions, such as the question text and the data type. You may want to create additional questions or set advanced configuration options for the questions, including making a question appear conditionally or making a question mandatory. You can also use question templates to define reusable sets of answer options.

Survey questions are available from **Survey** > **Questions**. The list displays information about each question, including the associated survey definition listed in the **Type** column, and the data type. Survey administrators can modify these questions.

Create or modify survey questions

You can create and administer survey questions.

Before you begin
Role required: admin or survey_admin

About this task
Changes to a survey, such as the addition of questions or the modification of question templates, do not apply immediately to the existing survey instances. However, the changes apply immediately to any new survey instances that are created after the changes are saved.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. In the **Metric Categories** related list, open a category.
4. In the **Assessment Metrics** related list, open an existing question or click **New**.
   Each survey question is stored as a record on the Assessment Metric [asmt_metric] table with a modified view for survey use.
5. On the Survey Question form, fill in the fields.
   The fields that appear depend on the selected **Data type**.

   For a description of the field values, see Survey Question form.
6. Save the record.

Note:

- Be sure to create answer options if you select the **Choice** or **Likert Scale** data type.
- You cannot delete a survey question (metric) with user responses. To delete a survey question with user responses, you should delete the responses, and then delete the survey question.

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Related topics

- Survey question template
- Trigger condition example
- Survey trigger conditions

Survey question data types

You must choose a data type for each survey question. The data type determines the format of the question and the kind of data that is collected on survey questionnaires.

The following data types are available for surveys:

Attachment data type

On questionnaires, users can attach one or more files to a question.

Users click the Manage Attachments icon and select one or more files in the Attachments pop-up window to attach to the question. From this window, users can:

- View a list of the attached files.
- View an attached file in a separate window.
- Rename an attached file.
- Add or delete files

Once a survey has been submitted, attachments cannot be updated or deleted.

Any type of file supported by the platform can be attached to a question. One or more files can be attached a question while taking a survey or completing an assessment.

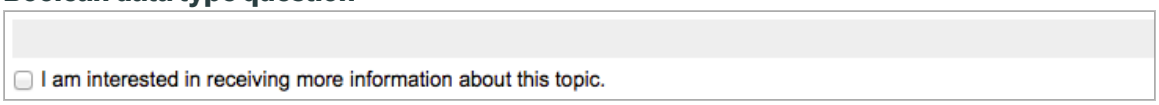
The assessment administrator can see the attachments associated with an individual question as well as those associated with the survey.

See Administering attachments for more information.

Boolean data type

On questionnaires, users select a check box beside a statement or leave it cleared.

Boolean data type question



If you select **Boolean**, you must fill in the **Scale definition** field. Select **High** if it is best when users select the check box.

Choice data type

On questionnaires, users select a value from a list of choices.

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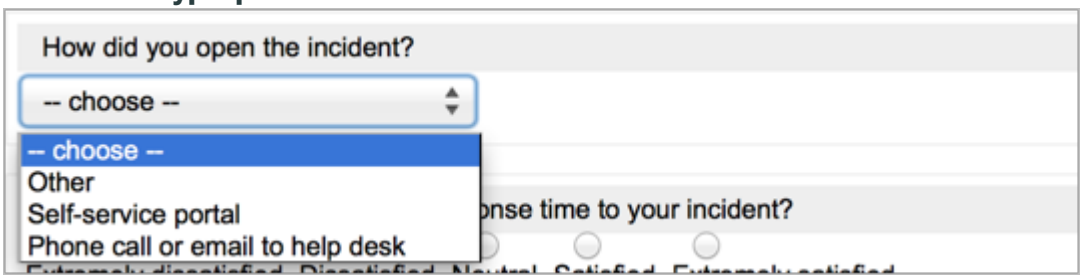
Choice data type question



If you select **Choice**, you must fill in the **Scale definition** field and create answer options. Select **High** for the scale definition if the answer option with the largest metric definition **Value** is best.

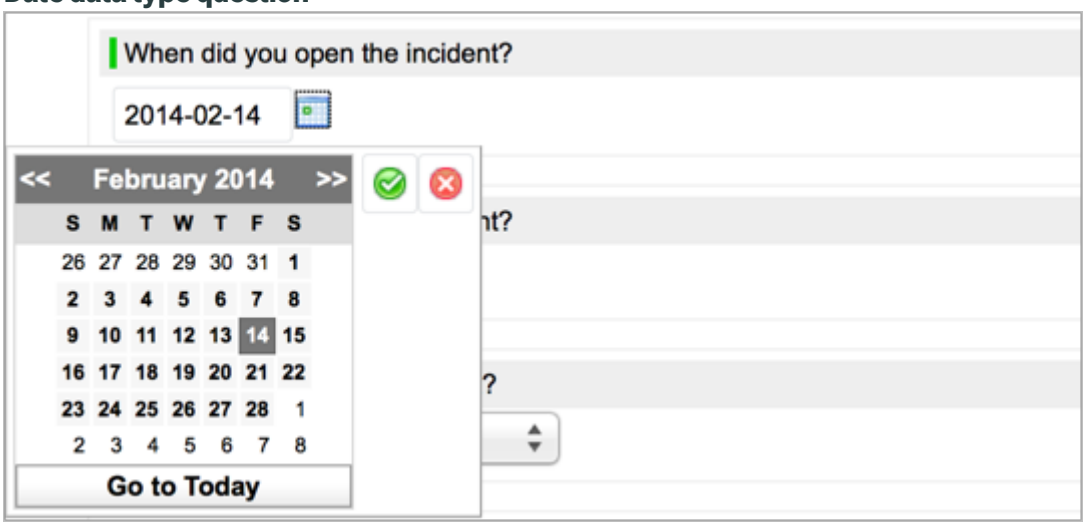
Note:
The system sets the **Min** and **Max** fields automatically based on the **Value** settings for the associated metric definitions.

Date and Date/Time data types

The **Date** and **Date/Time** data types are similar.

- **Date:** On questionnaires, users select a date.

Date data type question



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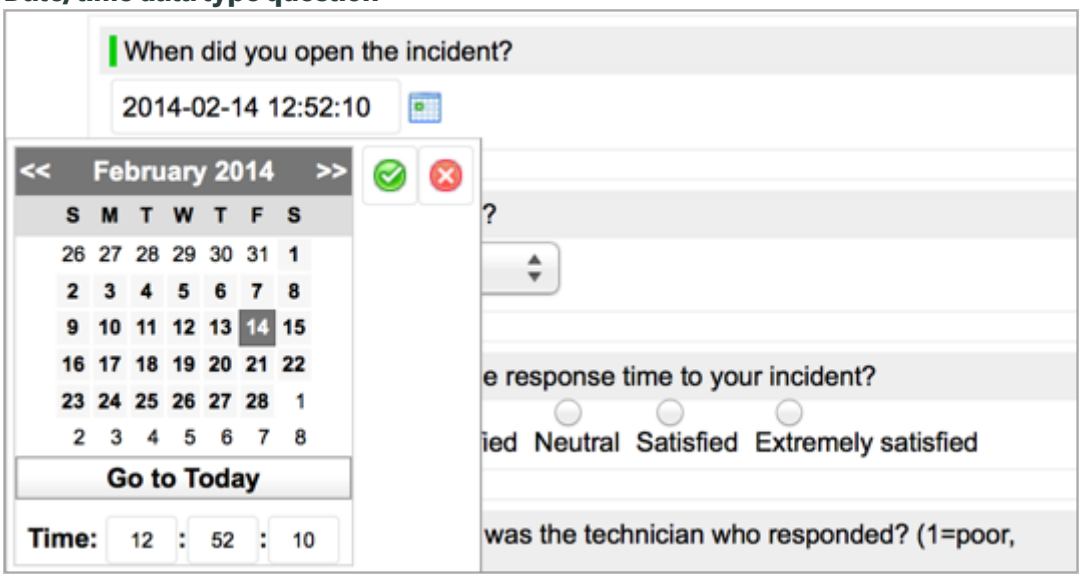
- **Date/Time:** On questionnaires, users select a date and time.

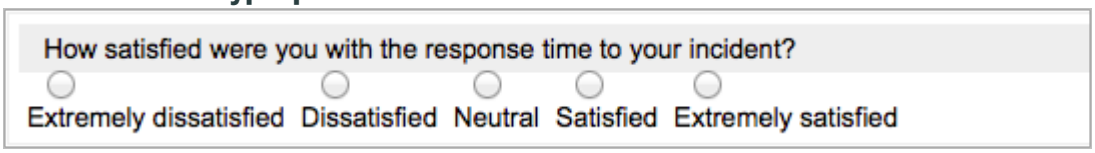
Date/time data type question



Likert Scale data type

On questionnaires, users select a multiple choice value from a custom Likert scale. Each answer option is represented by a radio button on the scale. A Likert scale question that evaluates an application's ease of use might have the answer options **Easy**, **Average**, and **Difficult**.

Likert scale data type question



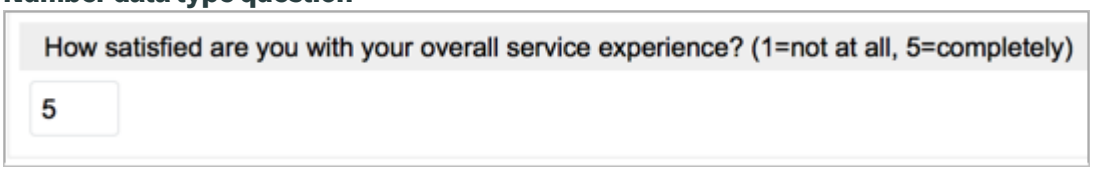
If you select **Likert Scale**, you must fill in the **Scale definition** field and create answer options. Select **High** for the scale definition if the answer option with the largest metric definition **Value** is best.

Note:
The system sets the **Min** and **Max** fields automatically based on the **Value** settings for the associated metric definitions.

Number data type

On questionnaires, users enter a number.

Number data type question



If you select **Number**, you must fill in these additional fields:

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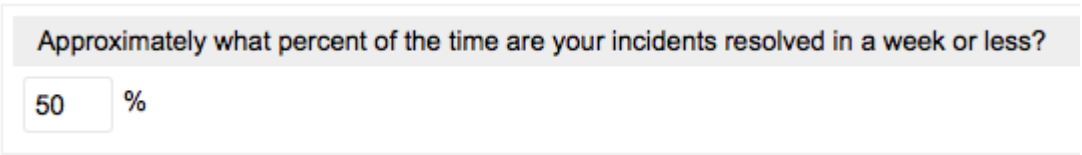
- **Scale definition**: Select **High** if a larger number is better, such as for a question that measures the number of sales made in a quarter.
- **Min** and **Max**: Enter the smallest and largest numbers users can enter. State the range of acceptable answers in the question text.

Percentage data type

On questionnaires, users enter a number.

Percentage data type question



If you select **Percentage**, you must fill in these additional fields:

- **Scale definition**: Select **High** if a larger percentage is better, such as for a question that measures the percentage of work an agent has completed.
- **Min** and **Max:** Enter the smallest and largest numbers users can enter. Generally **0** and **100** are appropriate minimum and maximum values. If you choose values other than **0** and **100**, it is usually best to state the range of acceptable answers in the question text.

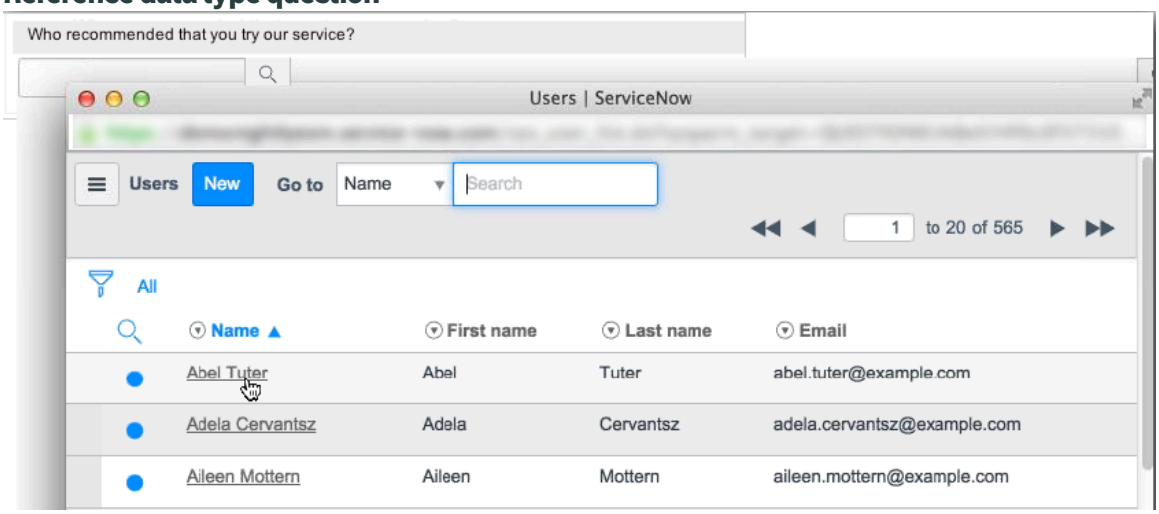
Reference data type

On questionnaires, users select a value from a list that is generated from a specified reference table. The response field supports auto-completion.

Note:
Reference qualifiers are not supported.

For example, a user could select a user name in response to a question if you specify User [sys_user] as the reference table.

Reference data type question



String data type

On questionnaires, users enter text. When you select **String**, the **String option** field appears. Select one of the following options to determine how the string field appears on questionnaires:

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- **Single line**



- **Single line wide**



- **Multiline**



Template data type

On questionnaires, users select a value from a predefined series of answer options. To use this data type, a question template must be defined.

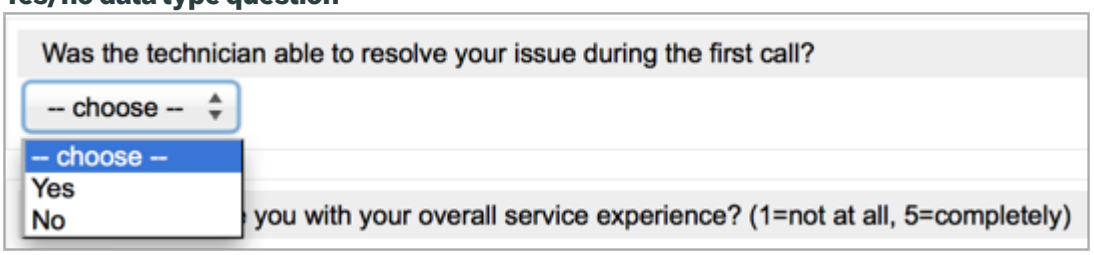
If you select **Template**, you must fill in these additional fields:

- **Template**: Select a template.
- **Scale definition**: Select **High** if the answer option with the largest template definition **Value** is best.

Yes/No data type

On questionnaires, users select **Yes** or **No** from a list.

Yes/no data type question



If you select **Yes/No**, you must fill in the **Scale definition** field. Select **High** if **Yes** is the best answer.

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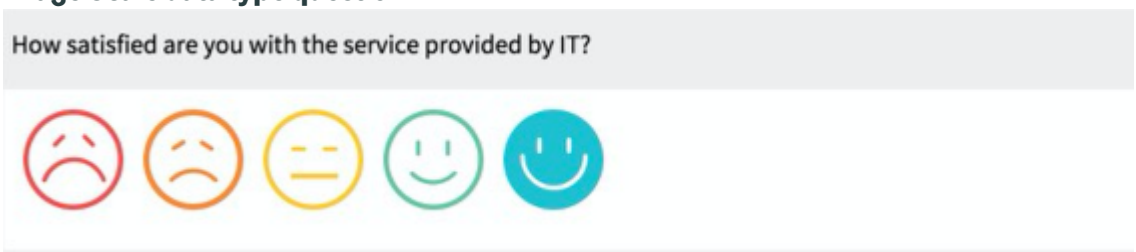
Image Scale data type

On questionnaires, users select an image from a predefined set of images as their response. Image scale questions can also be used in a template for better performance with surveys that have the same type of answer options.

Five emojis, similar to the Likert scale (very dissatisfied to very satisfied) are provided. However, you can upload additional images in JPG, PNG, or GIF format. Two images can be uploaded, one for selected case and another for unselected case. For example, the selected image can be  , and the unselected image can be  . Larger size images are reduced to 64 x 64 pixels.

Image Scale data type question



The result behavior depends on the presence of uploaded images. If no selected image is uploaded, then the question shows up blank.

Selected image	Unselected image	Result
Yes	Yes	Unselected image loads. Clicking the image changes it to the selected image.
Yes	No	Selected image loads with 50% opacity. Clicking the image changes the opacity to 100%.
No	Yes	A blank placeholder box is displayed.
No	No	A blank placeholder box is displayed.

Note:

- N/A option is not supported for image scale type question.
- For an image scale type question, an empty string is saved as an answer for a hidden and dependent question of an unselected image.

Multiple selection data type

On questionnaires, users can select multiple check boxes indicating all answers that apply. For instance, a user can be instructed to "Select all that apply" in a multiple selection question.

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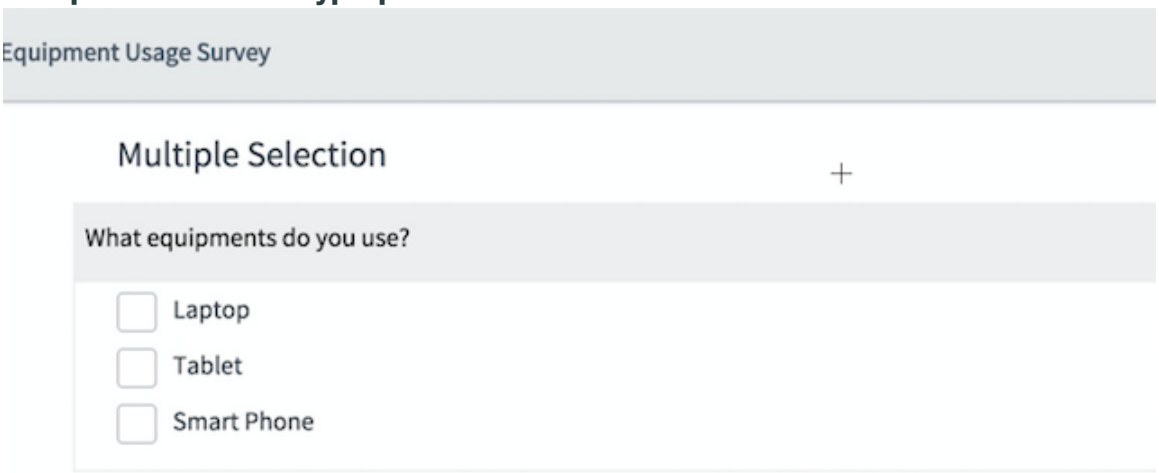
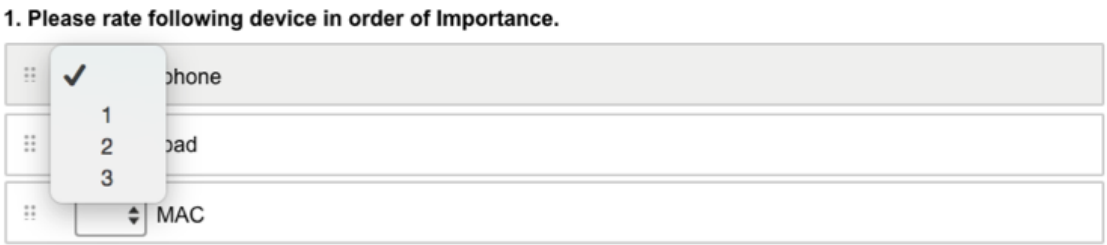
Multiple Selection data type question



Ranking data type

On questionnaires, users can select a different order number for each option to rank them. Drag-and-drop functionality is also supported, which allows a user to either fill in the number, or simply drag an option.

Setting the order of the options



One order number cannot be selected twice. This question can be mandatory and it can also be dependent on a parent question, but not vice versa.

Related topics

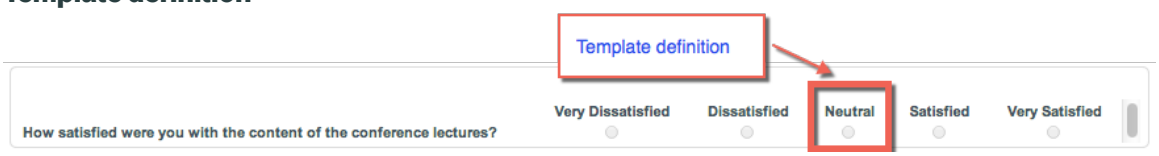
Survey question template

Survey question template

Question templates define reusable sets of answer options for survey questions.

Question templates define reusable rating scales for answering questions, where each answer option on the scale is a template definition. For example, the template named **Satisfaction** represents a satisfaction scale and contains the following template definitions: **Very Satisfied**, **Satisfied**, **Neutral**, **Dissatisfied**, and **Very Dissatisfied**.

Template definition



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Templates are available for survey questions that have **Data type** set to **Template**. The following question templates are available in the base system. You can create or update a template as described in Create a survey question template.

Default question templates

Name	Template definitions
Amount	None, Few or little, Average amount, Many, Quite a lot
Complexity	Very Complex, Complex, Moderate, Simple, Very Simple
Frequency	Never, Seldom, Sometimes, Most of the time, All of the time
Likert 5	Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree
Quality	Very Poor, Poor, Average, Good, Very Good
Satisfaction	Very Dissatisfied, Dissatisfied, Neutral, Satisfied, Very Satisfied
Size	Very Small, Small, Average, Large, Very Large

Create a survey question template

You can create and administer question templates.

Before you begin

Role required: admin or survey_admin

About this task

Changes to a survey, such as the modification of question templates, apply to existing survey instances immediately. Templates that you create are available for use with both surveys and assessments.

Procedure

1. Navigate to **All** > **Survey** > **Templates**.
   Each template is stored as a record on the Assessment Metric Template [asmt_template] table.
2. Click **New**.
3. Enter a **Name**.
4. Right-click the form header and click **Save**.
5. In the **Assessment Template Definitions** related list, click **New**.
   Create a template definition for each answer option you want to appear on a question.
6. Complete the form.

Field	Description
Display	Enter the text to appear as the answer option.
Value	Enter a numeric value, greater than or equal to zero, to which the answer option equates. Values are used in results calculations. When you view questions that use templates, answer options appear in order from smallest to largest **Value**. Each template definition for a given template must have a unique **Value**.

7. Click **Update**.

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Update min and max values to match templates

If you use survey result calculation data, ensure that the **Min** and **Max** values for a question that uses a template are equal to the smallest and largest template definition **Value**.

Before you begin
Role required: admin or survey_admin

About this task
When you create a question of the **Template** data type, the system sets the **Min** and **Max** fields based on the template definition values. The fields for existing questions are not updated if you add a new template definition to a template or if you update the **Value** of an existing template. If the new **Value** is less than the minimum value or greater than the maximum value of any questions that use the template, update the questions accordingly.

Procedure

1. Navigate to **All** > **Survey** > **Questions**.
2. Configure the list to show the **Min** and **Max** columns.
3. Add the following list filter condition: **[Template] [is] [<select the template you updated>]**.
4. Ensure the **Min** and **Max** values match the smallest and largest template definition **Value** for the selected template.
   If the values do not match, edit the **Min** and **Max** values directly from the list.

> **Note:**
> When the data type is **Template**, a UI policy prevents the editing of **Min** and **Max** from the form.

Add a metric category and metric in the question bank for surveys

Reuse the question categories (metric categories) and questions (metrics) added in the question bank for surveys. You can add metric categories or metrics from the question bank to a survey, or from the survey to a question bank.

Before you begin
Role required: admin or survey_admin
Activate the Survey Question Bank Sample Data plugin (com.snc.question_bank_data) to access the demo data for the question bank.

Procedure

1. Navigate to **All** > **Survey** > **Question Bank**.
2. Click **New**.
3. On the Metric Category form, fill in the fields.

Metric Category fields

Field	Description
Name	Name of the metric category.
Description	Description of the metric category.
Total metrics	Total number of metrics in the metric category. This number is automatically updated when you add or delete metrics from the category.

4. Right-click on the title bar and click **Save**.

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5. In the Assessment Metrics related list, click **New**.
6. In the Survey Question form, fill the fields.
   For information on these fields, see Create or modify survey questions.
7. Click **Submit**.

Configure metric categories or metrics for a survey using the question bank

Reuse question categories (metric categories) and questions (metrics) from the **Question Bank** module while creating or updating a survey.

Before you begin

Role required: admin or survey_admin
Activate the Survey Question Bank Sample Data plugin (com.snc.question_bank_data) to access the demo data for the question bank.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. **Optional:** To add metric categories to a survey from the question bank in Platform, perform the following steps.

   a. In the Metric Categories related list, click **New Category from Bank**.
   The New Category from Bank dialog box is displayed with a list of all metric categories added in the question bank.

   b. Select the required categories and click **Add Selected**.
   A copy of the metric category and the corresponding metric definitions is created in the Metric Categories related list.

4. **Optional:** To add metrics to a survey from the question bank in Platform, perform the following steps.

   a. In the Metric Categories related list, open a metric category definition.

   b. In the Assessment Metrics related list, click **New Metric from Bank**.
   The New Metric from Bank dialog box is displayed with a list of questions available in the question bank.

   c. Select the required metrics and click **Add Selected**.
   A copy of the metric and the corresponding metric definitions is created in the Assessment Metrics related list of the category.

5. **Optional:** To add a metric category to the question bank from a survey in Platform, perform the following steps.

   a. In the Metric Categories related list, open a metric category definition.

   b. Click **Add to question Bank**.
   A copy of the category is created along with its metrics and metric definitions in the question bank.

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6. **Optional:** To add a metric to the question bank from a survey in Platform, perform the following steps.

   a. In the Metric Categories related list, open a metric category definition.

   b. In the Assessment Metrics related list, open the required metric definition.

   c. Click **Add to Question Bank**.
   The Add to Question Bank dialog box is displayed.

   d. In the **Choose a question bank to add this question/metric** field, select a metric category that you want to add this metric to, and click **OK**.
   A copy of the metric and the corresponding metric definitions is created for the selected category in the question bank.

7. **Optional:** To add a metric category or metric to a survey from the question bank in Survey designer, perform the following steps.

   a. Open the survey in Survey Designer.

   b. **Optional:** To add a metric category from the question bank, from the **Categories** tab in the left panel, drag the required category banner and drop in the **Design** tab.

   c. **Optional:** To add a metric from the question bank, drag and drop the required metric from the **Questions** tab or the **Categories** tab.

   Note:

   - When you drag and drop a metric category, all dependencies within the category are also added to the survey.
   - From the **Categories** tab, you can drag and drop an individual metric within a metric category.
   - When you drag and drop a parent metric, all dependent questions are also added to the metric category.
   - When you drag and drop a child metric, only the child question is added to the metric category.

Create or modify answer options

You must create answer options, called metric definitions, for survey questions that have **Data type** set to **Choice** or **Likert Scale**.

Before you begin

Role required: admin or survey_admin

About this task

Changes to a survey, such as the addition or modification of answer options, apply to existing survey instances immediately.

Procedure

1. Navigate to **All** > **Survey** > **Questions**.
2. Open a choice or Likert scale survey question.
3. In the **Assessment Metric Definitions** related list, open a metric definition or click **New**.
   Each answer option is stored as a record on the Assessment Metric Definition [asmt_metric_definition] table.

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4. Complete the Assessment Metric Definition form.

Assessment Metric Definition fields

Field	Description
Display	Text to appear as the answer option.
Value	Numeric value, greater than or equal to zero, to which the answer option equates. Values determine the order in which answer options appear. See the example below. Values are also used to calculate survey results. Each metric definition for a given question must have a different **Value**.

5. Click **Submit**.

Example:

On survey questionnaires, the answer options for a question appear in order from smallest to largest **Value**. For example, consider the survey question **How do you feel?** with the answer options **Good**, **Neutral**, and **Bad**. The following table shows the answer option order based on the **Value**.

Answer option order based on value

Answer option	Value	Order
Good	1	First
Neutral	3	Second
Bad	5	Third

If you use survey result calculations, ensure the question **Scale definition** is set appropriately based on the answer options. In the previous example, if you want the answer option **Good** to earn the highest score, the scale definition should be **Low** because **Good** has the smallest value.

Change the order of survey questions

You can easily reorder survey questions at the category level or the question level.

Before you begin

Role required: admin or survey_admin

About this task

You can change the order in which the questions in one category appear relative to those in other categories for the same survey definition. If you add a new question manually after you create other questions, you may want to change the order of questions.

When you create questions using the survey creator, the system sets the **Order** field for the first question to **101**, the second to **102**, and so on. After you create a new question outside of the survey creator, the **Order** is set to **100** by default, which means it appears before all questions generated by the survey creator.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys** and open the appropriate survey definition.
2. In the **Metric Categories** related list, edit the values in the **Order** column.

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3. To change the order of questions within a category, complete the following steps.
   a. Open the **Assessment Metrics** related list.
   b. Edit the values in the **Order** column.
4. Click **Update**.

Survey trigger conditions

Trigger conditions specify when to send a particular survey and the persons to send it to.

Survey administrators can use trigger conditions to configure the system to generate a survey instance each time a specified action occurs on a specified table, for example, when an incident or change request closes. The system sends the survey to users that are related to the triggering record, for example, incident callers or change request assignees. You can choose to send a survey every time the condition is met, or you can set a probability for the system to send a survey at random when the condition is met.

Trigger conditions are ideal for sending transactional surveys. Transactional surveys generally measure satisfaction with a recent experience, such as closing an incident or purchasing an item.

Note:
Trigger conditions are comparable to survey conditions in legacy surveys. If you migrate a legacy survey that has survey conditions, ensure that the survey conditions are deactivated before you recreate them as trigger conditions.

Configure a trigger condition for a survey

Configure trigger conditions to specify when to send a particular survey and the persons to send it to.

Before you begin

Role required: admin or survey_admin or survey_creator

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **Trigger Conditions**.
2. Click **New**.

   Note:
   Do not specify particular users for a triggered survey because only the specified users are allowed to take the survey.

3. On the Trigger Condition form, fill in the fields.

   For a description of the field values, see Trigger Condition form for surveys.

   You can also create a trigger condition directly from the survey creator. If you select **Certain users can take this survey, based on conditions** in the Survey User Access section, the Trigger Condition form opens automatically when you click **Save as Draft** or **Publish**.

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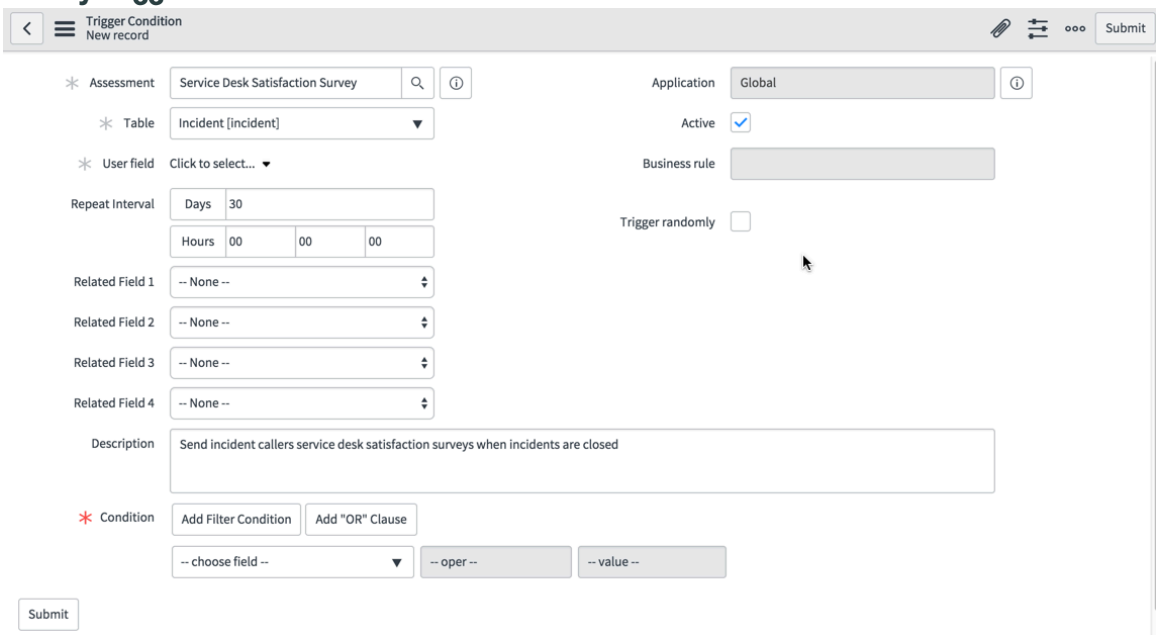
Example:

Survey Trigger Condition form



Related topics

Schedule periods

Trigger condition example

You can send out auto-triggered surveys when an incident is closed or resolved.

A trigger condition is configured as follows:

- **Assessment**: Service Desk Satisfaction Survey
- **Table**: Incident [incident]
- **User field**: Caller
- **Repeat interval**: 30 days
- **Active**: true
- **Trigger randomly**: false
- **Related Field 1**: Assigned to
- **Related Field 2**: Problem
- **Condition**: [State] [is] [Closed] [or] [State] [is] [Resolved]

C is the caller on incident INC00004305 that is assigned to B, a service desk technician. B creates PRB010101 based on C's complaint and closes the incident. The system creates a survey instance assigned to C so C can rate satisfaction with the incident experience.

Because two related fields were selected as part of the trigger condition, the survey instance stores the following information from the incident:

- User (Related Field 1): **Boris Catino**
- Problem (Related Field 2): **PRB010101**
- Task (automatically created): **INC00004305**

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Because the task field is automatically populated, UI-based filtering by dot-walking on incidents (or any task-based table) is supported when creating a report on survey results. For example, you can query all survey instances related to incidents assigned to a group (survey reports on all incidents assigned to `networking` group, for instance).

Even though the trigger condition is set to be triggered each time that the conditions are met, the **Repeat interval** setting ensures that C does not receive another survey for another of its incidents closes within 30 days of the first incident.

Survey report example based on task field

One of the most common use cases for Surveys is to send out an auto-triggered survey when an incident, request, or task is closed. Once you get the survey results back, you can filter the results by users and groups related to the ticket, such as Assignment Group, or Assignee.

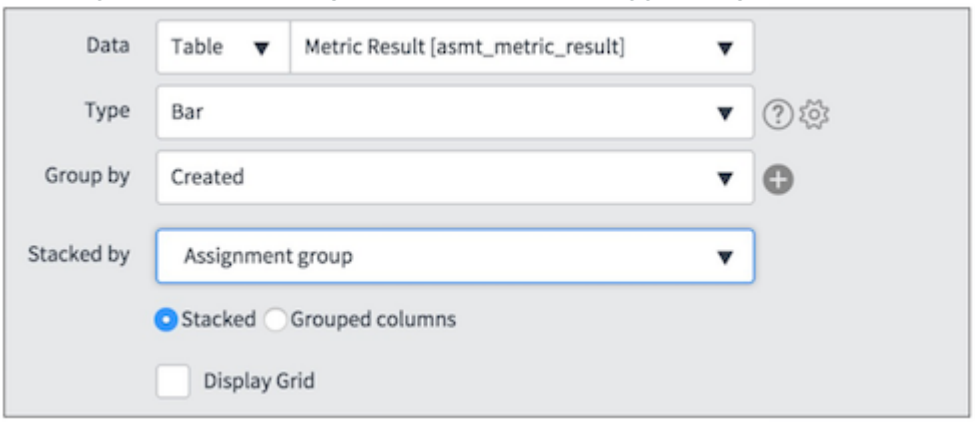
Filtering the survey results provides more detail on how people and teams are performing based on ticket data. Since this information is automatically captured, you can dot-walk while filtering the data (instead of utilizing a related field on the Survey trigger condition form, as previously required).

Using the Task as a filter for survey results

Number ▼	Metric type	Due date	State	Assigned to	Trigger table	Trigger ID	Task
AINST0010011	Customer Satisfaction Survey	2016-09-20	Ready to take	System Administrator	Incident [incident]	Incident: INC0010008	INC0010008

To create a report on incident-triggered survey responses by Assignment group, set up the report on the Task Assessment Details by navigating to **Reports View/Run** and clicking **Create a report**.

Defining a report on survey responses that are triggered by an incident



Survey distribution

There are several ways for survey administrators to distribute surveys to users.

Surveys are distributed using any of the following methods.

- Send survey invitations to users.
- Share a survey URL that opens the survey directly.
- Create a module that opens a survey.

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Email notifications for surveys

When an administrator creates a survey and assigns it to a user, an email notification is sent to the user. Selecting the survey link in the email notification redirects the user to the survey page, where the user can take the survey. This type of survey is called a non-triggered survey.

Triggered surveys are the surveys that users get when the trigger condition is met. For a triggered survey, an event is inserted in the event queue. The event can be configured for specific teams to determine whether an email notification should be sent to users. If the event is configured to send an email notification, an automated email is sent when the trigger condition is met. For more information about configuring the trigger condition, see Configure a trigger condition for a survey.

Note:
You can includes an embedded survey in the survey email notification by using the **Outlook Actionable Message** check box. After you select this check box and save the survey, a validation is run to ensure all survey questions are supported. This field is available only when the Outlook Actionable Messages (sn_ms_oam) plugin is installed. For more information, see Outlook Actionable Messages.

Send survey invitations to users

You can send survey invitations using the **Assign Survey** or **Send Invitations** buttons on the Survey Definition form.

Before you begin
Role required: admin or survey_admin

About this task
Use the **Send Invitations** button to immediately assign survey instances to each survey user that is listed in the survey definition. Use the **Assign Survey** button to assign a survey instance to any one user at a time.

Each of the buttons generates survey instances assigned to the appropriate users. In addition, if the instance is configured to send email, the system generates survey notifications. For either button to be available, the survey definition must meet all of the following conditions.

- **Active** check box is selected.
- **State** is **Published**.
- Survey is associated with at least one question.

Note:
You (or a trigger) can send more than one instance of a survey to a user at any time.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Select an active, published survey.
3. Complete one of the following actions.

Option	Description
Assign a survey to users listed in the Survey Users related list	Click **Send invitations**.

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Option	Description
Assign a survey to any user	Click **Assign Survey** and select one or more users, and then click **OK**.

The system creates a survey instance assigned to the user or users, assuming the user is eligible to receive a new survey instance. When you use the **Assign Survey** button, the selected user is not saved as a survey user.

Define a recipients list for surveys

Use a recipients list to define targeted set of users for whom the survey invite can be sent. You can use a recipients list for multiple surveys.

Before you begin

Role required: admin or survey_admin or survey_creator

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **Recipients Lists**.
2. Click **New**.
3. On the Recipients List form, fill in the fields:
   For a description of the field values, see Recipients List form.
4. Click **Submit**.
   For recipients lists created by the file upload, clicking **Submit** validates the records in the Excel file. Following validation, the system displays a pop-up window with the upload results, including valid and invalid user records.
5. **Optional:** To get the updated user list, navigate to the recipient list and click **Refresh Recipient List**.

Add a recipients list to a survey

Send the survey invites to targeted sets of users by adding a recipients list to a survey.

Before you begin

Role required: admin or survey_admin
Recipients lists should be pre-defined in the Recipients Lists submodule. For more information on defining recipients lists, see Define a recipients list for surveys.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. Perform any of the following steps.

4. To send survey invites to all survey users and recipients lists, click **Send Invitations**.

Note:

- The **Send Invitations** UI action is available when there is at least one recipients list or survey user for the survey.
- If a user is available in the **Survey Users** related list and multiple recipients lists, the survey invite is sent only once to the user.

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Embed a survey within the Outlook email client

Embed an interactive survey in the email notification sent to a user. The user can answer the survey questions and submit the survey from the email client instead of opening the survey in a new browser tab.

Before you begin

Role required: admin or survey_admin
The Outlook Actionable Messages plugin (sn_ms_oam) should be activated.

Note:

- The Outlook Actionable Messages (OAM) feature is not supported in all Microsoft mail products and versions. To verify whether your version of Outlook supports OAM, refer to the Microsoft website.
- Actionable messages are supported only for emails sent from the @service-now.com email address. If you are sending an email from a customized email address, you should register as a new service in the Microsoft website setting the scope as **Organization**. Specify the provider ID value in the *sn_ms_oam.outlookactionable.originator* property.
- Actionable messages are based on the Sender Policy Framework (SPF)/DomainKeys Identified Mail (DKIM) validation for the email sender verification. If an email recipient receives email via an external provider, emails may not be rendered as adaptive cards.
- You cannot customize the default actionable message templates.

Procedure

1. Navigate to **All** > **System Notification** > **Email** > **Notifications**.
2. For the **Survey Invitation** notification, in the **What it will contain** tab, add the following script in the **Message** field in addition to the existing information.

   ```
   ${mail_script:include_survey_actionable}
   ```

   This script includes the Outlook actionable message in the email notification sent to the user.
3. Navigate to **Survey** > **View Surveys**, and open a survey.
4. To send an email notification to the survey user, select the **Send notifications** check box.
5. Select the **Outlook Actionable Message** check box and save the survey.

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Note:

- The Image Scale type question is supported only if there is a single question in the survey.
- Template type question with image option is supported only if there is a single question in the survey.
- Date/Time type question is supported in web client of Outlook and not in desktop client as Microsoft doesn't support Date/Time for Outlook desktop client.
- Two duplicate choice display values should not be used as the internal value may not be submitted incorrectly.
- The answer for String type question can be validated based on the option selected in the Field Validation field. For example, if you select the option as email address, then the answer entered can only be in the email-id format. Answers in any other format will not be accepted.
- The version of Microsoft Outlook does not support the following question types to create an embedded survey:
  - Attachment
  - Reference
  - Ranking
- Dependent questions are not supported.
- Signature is not supported.
- Mandatory questions are supported.

In both the Platform UI and Survey Designer, a validation is run to ensure all survey questions are supported.

6. Click **Assign Survey** and assign the survey to a user.
   An email notification with the embedded survey is sent to the user. The user can take the survey and submit it from the email client instead of opening the survey in a new browser tab.

Enable localization for a survey

Enable a survey user to take a survey in multiple languages.

Before you begin

Role required: admin or survey_admin
The plugin for the language that you want the survey to be available in should be installed.

Note:
Localization is applicable only for public surveys.

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **Properties**.
2. Enable the **Enable/Disable whether to show language picker when a public survey is taken** (*show_lang_picker_for_publicsurveys*) property.
3. In the System Settings window, from the **Language** list, select the language that you want the survey to be available in.

Note:
The **Language** list is available only when a language plugin is installed.

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4. Navigate to **Survey** > **View Surveys** and open a public survey.
5. Enter the translated text for the survey title, questions, and answers.
6. Save and publish the survey.

Note:
The localization is also applicable in Service Portal if the **Assessment Properties** **Allow survey link from email to open in service portal view (applies only for surveys)** (*sn_portal_surveys.sp_survey.email_redirection*) property is enabled.

   - The survey is available for survey users in the translated language.
   - Users can change the language of the survey using the language picker.

Survey URLs

You can distribute a survey by giving survey users a survey URL.

Survey administrators can obtain one of the following types of URLs.

- A general URL for a survey, which users can open to take the survey questionnaire. The following process occurs.
  - When someone opens the URL, the system ensures that the person is logged in. It then searches for an instance of the associated survey that is assigned to the logged-in user.
  - If a survey instance is found, the appropriate action occurs based on the **State** of the survey instance (see table). If there are multiple active survey instances (**Ready to take** or **In progress**), the instance with the earliest due date opens.
  - If no survey instance is found, the system creates a new instance for the survey, assigns it to the user, and opens the survey questionnaire.
- A URL for a specific survey instance, which the assigned user can open to take the survey questionnaire. The following process occurs.
  - When someone opens the URL, the system ensures the person is logged in as the user the survey instance is assigned to. Only the assigned user can access the survey questionnaire.
  - The appropriate action occurs, depending on the **State** of the survey instance (see table).

Survey states

Survey instance state	Action upon opening URL
Ready to take: User has not saved any responses.	The survey questionnaire appears for the user to begin. The user can save or submit responses.
In progress: User has saved at least one response.	The survey questionnaire appears for the user to continue. Any previously saved responses are displayed. The user can save or submit responses.
Complete: User has submitted all required responses.	If the schedule period is **No Limit** or if the period restriction has expired, the survey questionnaire for a new survey instance appears for the user to begin. If the schedule period restricts the number of times a user can take the same survey, and the period restriction has not expired since the user last completed survey, an error message appears.

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If someone opens a URL for an unpublished or deactivated survey, an error message appears.

Obtain and distribute a general survey URL

You can distribute a general survey URL to allow any eligible user to open a survey questionnaire.

Before you begin
Role required: admin or survey_admin

About this task
The general URL is available on the Survey Definition form and on the survey creator. You can also email the URL for a public survey that is published.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition from the Assessment Metric Types list.
3. To view or copy the URL, click the **View Survey URL** related link.
   This related link is visible only if the survey definition is **Active**.
4. To distribute the URL to users, paste the copied URL as desired, or click the **Email** button to send via email.
   The **Email** button is visible only for a public survey that is published.

What to do next
When a survey user clicks the general survey URL, the system creates a survey instance for the survey user as long as the user does not have an instance in the **Ready to take** state. The system is configured by default to send an email notification when a survey instance is generated.

As a result, the survey user receives a second notification in addition to the notification that you sent with the general survey URL. This may confuse the survey user. To avoid this issue, you can deactivate auto-notification.

Deactivate auto-notification for surveys

Deactivate an auto-notification to avoid a problem that causes a second system-generated email notification being sent to a user.

Before you begin
Role required: admin or survey_admin

About this task
When a survey is assigned to a user, an email notification containing a general survey URL is sent to the user. But sometimes, the user might receive a second system-generated notification.

Procedure

1. Navigate to **All** > **System Notification** > **Email** > **Notifications**.
2. Open the **Survey Invitation** notification.
3. Configure the form to add the **Send to event creator** option to the Who will receive section.
   The **Send to event creator** option is selected by default.
4. Clear the **Send to event creator** check box.
   The system no longer sends auto-notification messages to survey users.

Obtain a survey instance URL

You can distribute a survey instance URL to allow the assigned user to open a survey questionnaire.

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Before you begin
Role required: admin or survey_admin

About this task
The survey instance URL is available on the survey instance record.

Procedure
1. Navigate to **All** > **Survey** > **Survey Instances**.
2. Open the instance for the survey.
3. To view or copy the URL, click **View Instance URL** related link.
   The related link is available only when the survey instance **State** is **Ready to take** or **In progress** and the associated survey definition is **Active**.
4. In the dialog box, select and copy the URL then click **OK** or **Cancel**.
5. Distribute the URL to the assigned user.

Test a survey URL

When there are survey users associated with a survey, the survey is restricted so only those users can use the survey URL. You can test the survey URL to ensure it is restricted.

Before you begin
Role required: admin or survey_admin

Procedure
1. Navigate to **All** > **Survey** > **View Surveys** and open a survey for which you are not a survey user.
2. Under **Related Links**, click **View Survey URL**.
3. Copy the URL and click **OK** or **Cancel**.
4. Navigate to the URL.
   You see a message that you are not authorized to take the survey.

Create a survey module

You can create a module that opens a survey.

Before you begin
Role required: admin or survey_admin

About this task
When a user clicks a survey module, the system performs one of the following actions, depending on the configuration options for the survey and other factors.

- Creates a new survey instance
- Opens an existing survey instance
- Displays an error message.

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Procedure

1. Perform the appropriate action for your version of the UI:
   - **Core UI**: Point to the application menu that contains the module to which you want to add the survey module and click the edit application (pencil) icon.
   - **UI15**: Right-click the application menu you want to add the module to and select **Edit Application Menu**
2. In the **Modules** related list, click **New**.
3. Complete the following fields.
   - **Link type**: Assessment

     Do not select **Survey**, which is used for legacy surveys only.
   - **Assessment**: Select the survey you want the module to open.
4. Complete and save the form.

Sharing surveys

You can export a survey and then import it to a different ServiceNow instance.

> **Note:**
> Update sets are available in the Helsinki release and should be used to move data from one instance to another. For information about update sets, see System update sets.

The system exports a single XML file that contains a survey definition [asmt_metric_type] and the associated records, including the following.

- Assessment Metric Template [asmt_template]
- Assessment Template Definition [asmt_template_definition]
- Metric definitions [asmt_metric_definition] (survey question answer options)
- Scheduled Jobs associated with the Survey [sys_trigger]
- Survey categories [asmt_metric_category]
- Survey questions [asmt_metric]
- Survey users [asmt_m2m_category_user]
- Trigger Condition [asmt_condition]

Export a survey

You can export a survey and then import it to another instance.

Before you begin

Role required: admin, survey_reader, or survey_admin
For information about update sets, see System update sets.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Right-click the name of a record to show the context menu.
3. Select **Export Assessment**.
4. If applicable, follow the prompt in your browser to save the XML file.

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Import a survey

You can import a survey that has been exported as an XML file. The exported XML file does not contain result data.

Before you begin

Role required: admin or survey_admin

Note:
Update sets are available in the Helsinki release and should be used to move data from one instance to another. For information about update sets, see System update sets.

About this task

Procedure

1. Verify that the target instance has assessments enabled.
2. Import the assessment.

Use update sets for surveys and assessments

Use an update set to capture changes to surveys and assessments.

Before you begin

Role required: admin or survey_admin

Procedure

Create an update set and use it to make changes on a development instance.

Note:
For more information, see System update sets.

When developing surveys and assessments, use an update set to capture the changes and move them from a development instance to a production instance. Once an update set is created and marked current, all of the updates to the following tables are recorded in the update set.

The following tables are now update set enabled and also extend the application file:

- Assessment Metric Templates [asmt_template]
- Assessment metric type [asmt_metric_type]
- Assessment Template Definitions [asmt_template_definition]
- Assessment Metric Definitions [asmt_metric_definition]: survey question answer options
- Schedule [sys_trigger]: scheduled jobs associated with the survey
- Assessment Metric Categories [asmt_metric_category]: survey categories
- Assessment Metrics [asmt_metric]: survey questions
- Assessment Category Users [asmt_m2m_category_user]: survey users
- Trigger Conditions [asmt_condition]

Configure a survey in the Connect chat support

Enable a user to take a survey after chatting with a support agent.

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Before you begin

Role required: admin or survey_admin

Note:
The Connect Support plugin (com.glide.connect.support) should be activated.

Procedure

1. Navigate to **All** > **Connect Support** > **Support Administration** > **Chat Survey**.
2. Click **New**.
3. In the Chat Survey form, fill the fields.

Chat Survey form fields

Field	Description
Survey	Survey whose instance should be available in Connect Support.
Type	Type of chat where the survey is available. Connect: Survey is available in Connect Support.
Chat queue	Chat queue where the survey is available.
Active	Specifies if the chat survey configuration is active.
Description	Description of the chat survey configuration.

4. Click **Submit**.
   When a support agent of the assignment group associated with the chat queue ends a chat with a user, the survey instance is available in the chat window for the users.

Note:
The survey URL displayed after a connect chat is not a clickable link in the Virtual Agent web client. Copy and paste the URL to access the survey.

Related topics

Monitor incoming Connect Support conversations

Outlook Actionable Messages

Outlook actionable messages plugin enables users to respond to the survey from within the Microsoft Outlook application.

Install Outlook Actionable Messages plugin

Install Outlook Actionable Messages(sn_ms_oam) plugin to configure actionable messages.

Before you begin

Role required: oam_admin

Procedure

1. Navigate to **System Application** > **All Available Applications** > **All**.
2. In the search field, enter `Outlook Actionable messages`.
   You can search for the application by its name or ID. If you cannot find an application, you may have to request it from ServiceNow store. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative

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release note information for all released apps, see the ServiceNow Store version history release notes.

3. Click **Install**.

Customize fields for the approval message

Customize the body message for a request, change, and request item approval sent in Microsoft Outlook.

Customize fields in the approval message for request

Customize the body message for a request and request item sent in Microsoft Outlook.

Before you begin

Role required: oam_admin

Procedure

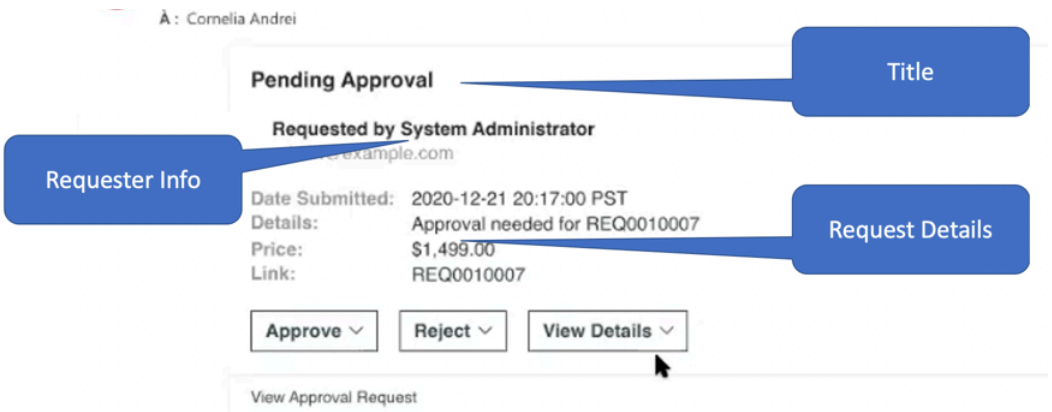
1. Navigate to **All** > **Actionable Messages** > **OAM Definition**.
2. Choose one of the following:

OAM definition

Option	Action
Request	Click **OAM Request Approval**
Request Item	Click **OAM RITM Approval**

3. In the OAM Container section, customize the following fields as required:
   a. **Title**: Title of the Outlook approval notification.
   b. **Requester info**: User who created the request.
   c. **Request Details**: This field can be customized. You can also add additional fields as per the requirement.
4. Click **Update**.

The approval message is displayed in Microsoft Outlook as shown below. Click **View Details** button to view the request in ServiceNow instance.



Customize fields in the approval message for change request

Customize the body message for a change request approval sent in Microsoft Outlook.

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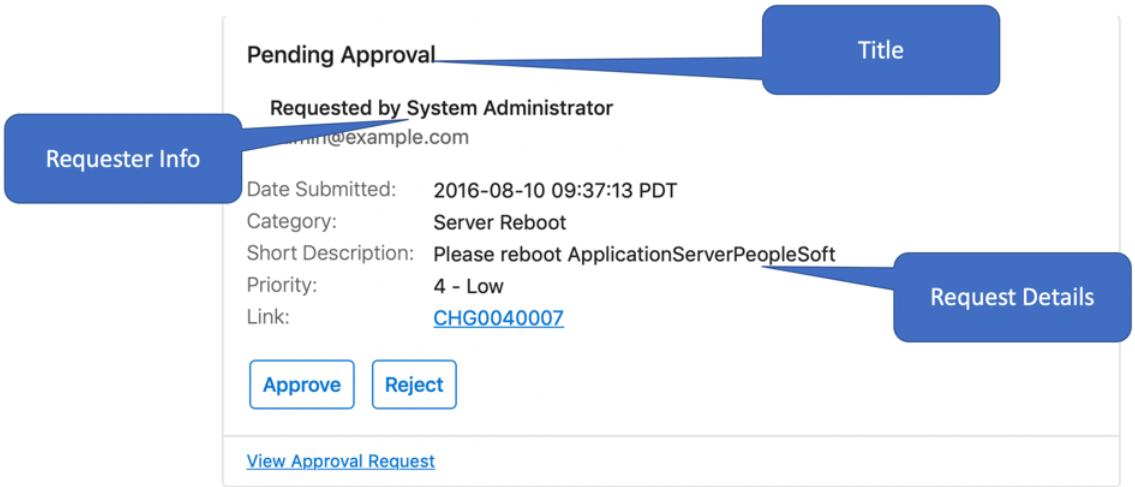
Before you begin
Role required: oam_admin

Procedure
1. Navigate to **All** > **Actionable Messages** > **OAM Definition**.
2. Click **OAM Change Approval**.
3. In the OAM Container section, customize the following fields as required:
   a. **Title**: Title of the Outlook approval notification.
   b. **Requester info**: User who created the request.
   c. **Request Details**: This field can be customized. You can also add additional fields as per the requirement.
4. Click **Update**.

   The approval message is displayed in Microsoft Outlook as shown below. Click **View Approval Request** to view the request in ServiceNow instance.



Enable Advanced view for Outlook Actionable Message definition

Enable the advanced view to customize the actionable message as per the requirement for Microsoft Outlook.

Before you begin
Role required: oam_admin

Procedure
1. Navigate to **All** > **Actionable Messages** > **OAM Definition**.
2. Choose one of the following:

OAM definition

Option	Action
Request	Click **OAM Request Approval**
Request Item	Click **OAM RITM Approval**
Change	Click **OAM Change Approval**

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3. Click **Advanced OAM** under **Related Links**.
4. In the OAM Definition form, perform the following actions:
   a. Modify the script as required.
   b. Click **Update**.

Sentiment analysis for surveys

You can use sentiment analysis to determine whether user responses for a survey are considered positive, negative, or neutral.

Activate the Sentiment Analysis (com.snc.sentiment_analysis) plugin.

For a survey, you can select questions that should be used for analysis. The survey responses of these questions are sent to the thirdparty platforms for analysis through the specified connector configurations.

Note:
You can only use string type questions for sentiment analysis.

The sentiment analysis results are displayed under **Survey** > **Question Sentiment Results**. The sentiment label is based on the normalized score:

Sentiment label

Normalized score	Sentiment label
-1 to 0	Negative
0	Neutral
0 to 1	Positive

Configure a sentiment connector

Specify the service URL and other configuration information for third party APIs that are used for sentiment analysis.

Before you begin

Role required: admin

Procedure

1. Change the scope of the current session to **Sentiment Analysis**.
2. Navigate to **Sentiment Analysis** > **Sentiment Connector Configurations**.
3. Add or edit the connector configuration for a third party vendor such as Google, IBMWatson, and MSAzure.

Note:
By default, placeholders are available for configuring connectors for Google, IBMWatson, and MSAzure.

Sentiment connector fields

Field	Description
Name	Name of the sentiment analysis connector configuration.

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Field	Description
Active	Check box to activate the connector configuration.
Credential Alias	Credential alias associated with the connector configuration. It has a reference to the system level table (sys_alias_list).
Default	Check box to make this as the default connector configuration.
Description	Description of the connector configuration.
Script	Script to call the Sentiment Analysis API and the normalize the values.

4. Configure the connector credentials

   a. Open the record referred in the **Credential Alias** field.

   b. Under the **Connections** tab, select the connection.

   c. In the **Connection URL** field, enter the value.

   d. Open the record referred in the **Credentials** field.

   e. Enter the credential information.

   Note:

   - You should obtain the connection credentials from the respective third-party vendors.
   - If the credential is an API key, specify its value. If the credential is basic authentication, that is, user name and password, specify the corresponding information.

   f. Select the **Active** check box and click **Update**.

5. Select the **Active** check box for the connector configuration and click **Update**.

Sentiment analysis property

You can use the sentiment analysis property to customize the **Sentiment Analysis** module.

Sentiment analysis property

Name	Description
Response time for the outbound call of Sentiment Analysis API (*sn_nlp_sentiment.glide.sentiment.transaction.timeout*)	Maximum time (milliseconds) expected for executing the outbound call for Sentiment Analysis API before it's timeout.

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Related topics

Sentiment analysis for surveys

Sentiment analysis results

The sentiment analysis results view contains a bar chart that displays the percentage of positive, negative, and neutral results, along with the instance count for each category.

Color indicators

Following are the color indicators in the bar chart:

- Green: Positive
- Red: Negative
- Blue: Neutral

Surveys in Service Portal and the Now Mobile app

If you've installed Service Portal, you can use the My Assessments and Surveys widget in Service Portal. Users can view surveys in Service Portal. Service Portal also supports surveys for users on mobile devices that have the Now Mobile app installed. The My Assessments and Surveys widget is available by default on the Service Portal home page.

Surveys in Service Portal

To create an intuitive interface for your users, you can set up surveys in Service Portal . Activate Service Portal to view the My Assessments and Surveys widget, which appears on the Service Portal home page.

To learn more about activating Service Portal, see Activate Service Portal .

To learn more about configuring a widget, see configure widget instances .

To configure a survey widget on a Service Portal page, press the CTRL key, right-click the widget heading, and select **Instance Options**.

Instance options (properties) for the survey widget on Service Portal

Property	Description
Max records	Maximum number of surveys to list in the widget on the Service Portal home page. Click the **View all** link to view all surveys. Default: **5**
Title of the widget	Text that appears in the title bar of the surveys widget. Default: **My Assessments and Surveys**

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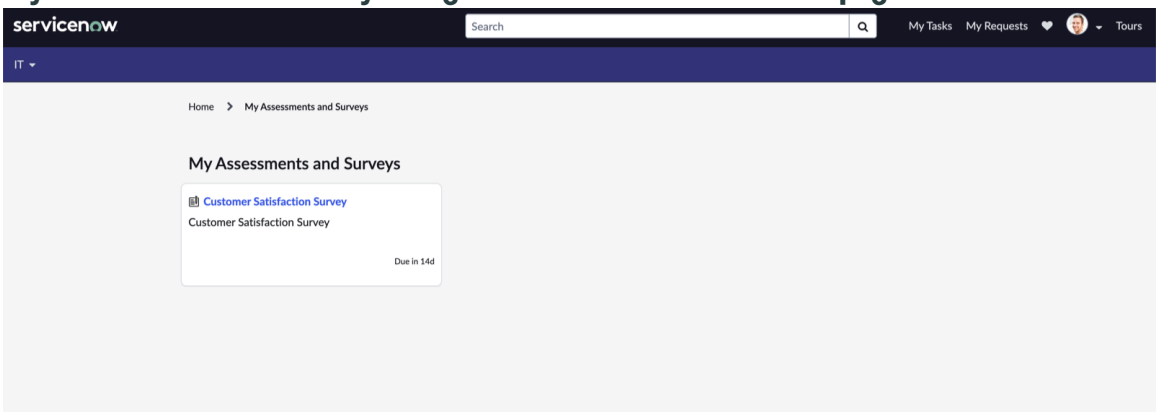
My Assessments and Surveys widget on the Service Portal home page



Surveys in the Now Mobile app

Users can view and take the surveys on mobile devices using the My Assessments and Surveys applet launcher that is available by default in the Now Mobile app.

When you assign a survey to a user an email notification about taking the survey is sent to the user. If users have installed the Now Mobile app, a mobile push notification is also sent on mobile devices. Tapping the notification opens an introduction page for a survey in the Mobile Employee Service Portal in the Now Mobile app. The page shows a **Get started** link. The introduction page and the **Get started** link are available only if the related settings are enabled. Users can tap the link to view and take the survey. You can activate push notifications by setting the *glide.sg.universal_links.enabled* system property to **true**.

Note:
A push notification doesn't apply for a triggered survey. For a triggered survey, an event is inserted in the event queue. The event can be configured to determine whether to send a notification or not.

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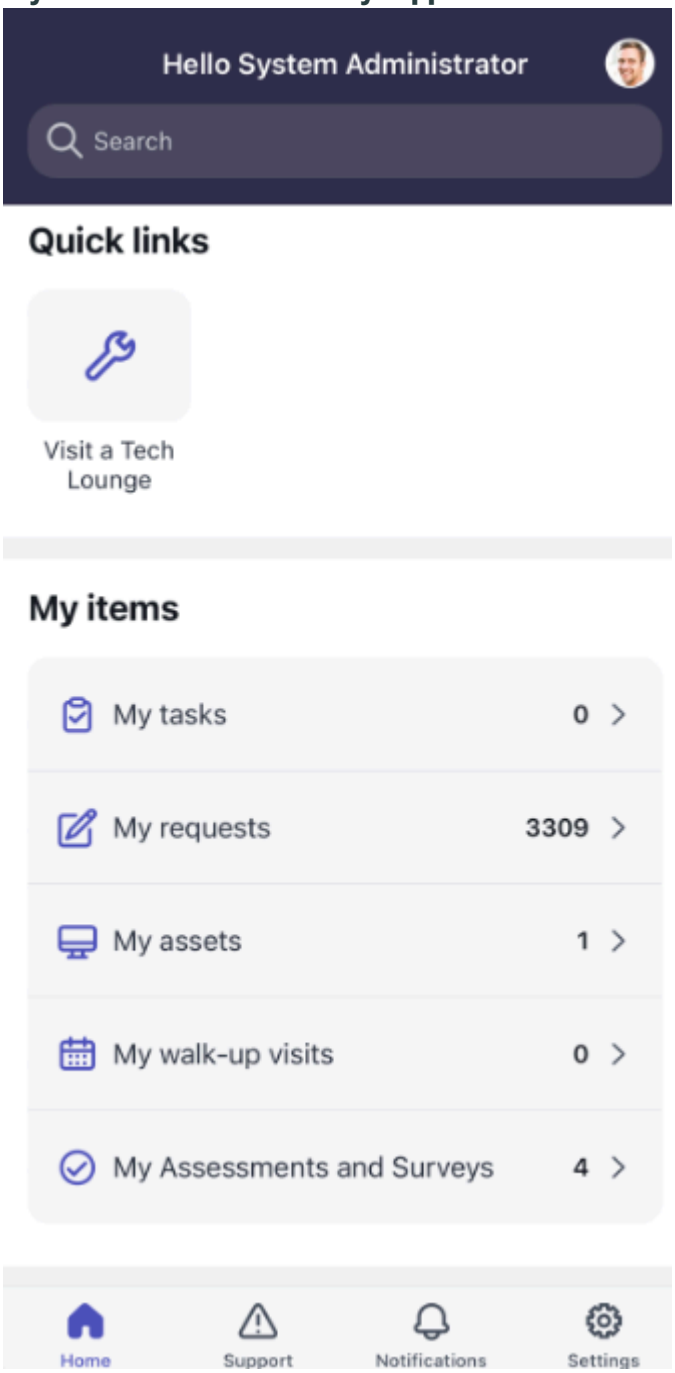
My Assessments and Surveys applet on a mobile device



Note:
In the Washington DC version, you now see the assessments and surveys assigned in the card view instead of the item view. If you customize the styles of the legacy card item views in older versions of Assessments and Surveys, the card continues to appear in the item view even after you upgrade to Washington DC. You can view the new card view in Washington DC only if no customizations were made to the legacy cards.

When users open a survey either in Service Portal or the Now Mobile app, the surveys provide the following features:

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- A survey page shows breadcrumb navigation on the Service Portal. Users can click the links in the breadcrumb to navigate to previous pages or a home page. For example, clicking the **My Surveys** link in the breadcrumb navigates users to a page, which shows a list of all the surveys.
- When the survey is in progress, the progress bar, which is available on each page of the survey, shows the progress in percentage. The percentage of completion is based on the pages on the survey. For example, suppose that there are three pages of a survey. The third page shows 66% completion of the survey. But giving a response to one of the questions on the third page opens a new question on a separate page, which is the fourth page. The fourth page shows the progress of the survey as 75% completed, which affects the overall progress and page indicators. Users can see the pagination (total number of pages) for the entire survey as well as the current page that the users are on. To hide or show this progress bar, you can use the *sn_portal_surveys.sp_survey.show_progress_bar* property.
- Each user response is saved automatically when users move to the next page in the survey. If users don't answer the required survey questions before clicking **Next**, the page shows an error message at the top for all required and unanswered questions. This error message helps users find the exact location of the unanswered and required question. Any question that is not required and is not responded to before clicking **Next** is considered answered. The question is counted as completed.
- When the details of a survey question contain more than four or five lines of text, the text after these lines disappears. In such cases, users can see the complete details by clicking the **Show more** link. Users can go back to the default behavior by clicking the **Show less** link.
- For a question that has the answer options of **Yes**, **No**, and **Not Applicable**, the **Not Applicable** option appears last in the list of options. The **Not Applicable** option can be configured while creating a question.
- When the survey users leave the survey without submitting it, they can start the survey later from the same page where they left off in the previous session.

Note:
For mobile users, the pagination is always by question for surveys. For more information about pagination settings, see Configure a survey in the survey designer.

One Click survey

A One Click survey has no introduction page in Service Portal. This survey doesn't have the **Submit** and **Cancel** buttons in the desktop and iPad view.

Note:

- The One Click Survey is not supported in the mobile device view.
- The **One Click Survey** field should be selected in the survey definition.
- When the public access is enabled for a One Click survey, a user can submit the survey without having to log in.
- When the public access is enabled for a survey, you can't configure a signature or an attachment for the survey.
- For a published public survey, the Signature field is hidden and you can't add an attachment.

A kiosk survey is a One Click survey with only one question of any of the following types:

- Image Scale
- Choice

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- Likert Scale
- Numeric Scale
- Yes/No

When users click the answer for the kiosk survey question in Service Portal, the survey is submitted, and the end note is displayed on the same page that contains the survey questions. The kiosk survey becomes read-only after it's clicked.

Note:

- A kiosk survey doesn't have any **Submit** or **Cancel** buttons.
- A kiosk survey can't have a signature, dependent questions, or additional information.
- A kiosk survey doesn't display introduction notes.

URI parameters for One Click survey

Pass these URI parameters through the *createAssessment()* API to store their values in the asmt_assessment_instance table for both platform view and Service Portal view.

URI parameters

Parameter	Description
sysparm_refresh_interval	Refresh the time, in seconds, after the survey submission to create another instance. For example, sysparm_refresh_interval=5.
sysparm_trigger_table	Location that is stored as the **Trigger Table** field in the asmt_assessment_instance table. For example, sysparm_trigger_table=incident.
sysparm_trigger_id	Location sys_id that is stored as the **Trigger ID** field in the asmt_assessment_instance table. For example, sysparm_trigger_id=1c741bd70b2322007518478d83673af3.
sysparm_kiosk	When set to **true**, both the sysparm_trigger_table and sysparm_trigger_id parameters should be specified. This parameter is required for kiosk requests. For example, sysparm_kiosk=true.

Related topics

Service Portal

Create and edit a page using the Service Portal Designer

Survey designer

Configure a survey in the survey designer

Surveys in ITSM Virtual Agent

You can use surveys in ITSM Virtual Agent to collect survey responses from users through conversational questionnaires (pre-chat and post-chat surveys) in the chat client.

A chat survey is available in ITSM Virtual Agent through the Provide Virtual Agent Feedback topic. The logic that renders the survey dynamically is called from the re-usable Survey topic block. It is common to use the Provide Virtual Agent Feedback topic as the survey setup topic in the general

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definitions of ITSM Virtual Agent, so that users automatically receive a survey at the end of their conversations. For information about the Survey topic block, see ITSM Virtual Agent.

When you select the **Chat Survey** check box for a survey, the following conditions are validated for surveys on ITSM Virtual Agent.

- Survey should contain only one metric category.
- Survey can contain only these metric types.
  - Attachment
  - Boolean
  - Check box
  - Choice
  - Date
  - Date/Time
  - Image scale
  - Number
  - Numeric scale
  - Percentage
  - Scale
  - String

For information on configuring a survey, see Modify a survey definition and Configure a survey in the survey designer.

The following capabilities are supported for the survey:

- Dependent survey fields
- Introduction and end notes

Association between a survey and Virtual Agent chat

After a survey is submitted in a Virtual Agent conversation, a survey instance is created. This instance displays the following information:

- Trigger ID, which is the sys_id of the associated interaction ID created in the Virtual Agent chat
- Trigger table, which is the interaction table

Related topics

ITSM Virtual Agent

Legacy survey migration

Users with the survey_admin role can migrate legacy survey data to create copies of legacy surveys and their related records in assessment tables. The Survey Management application, which is built on the assessment engine, is available as an alternative to legacy surveys.

The following legacy survey components are migrated:

- Survey masters
- Supported survey questions and question choices

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- Survey instances
- Survey responses

Legacy survey conditions are not migrated and must be recreated as trigger conditions.

Note:

- The **Legacy Surveys** and **Legacy Administration** modules are available on instances upgraded from a previous release but not available for new instances. Customers using legacy survey or survey wizard should plan to migrate to the Survey Management application to create modern and high quality surveys for their users.
- The following legacy survey plugins are inactive by default, and are available upon request:
  - Best Practice - Task Survey Management (ID: com.snc.bestpractice.task_survey)
  - Survey Management (ID: com.glideapp.survey)
  - Assessment Components (ID: com.snc.assessment)
  - Survey Wizard (ID: com.glideapp.survey_wizard)
- Survey wizards cannot be migrated.

Migrate a legacy survey

Migrate a legacy survey and its related records to take advantage of a more powerful feature set.

Before you begin

Role required: admin or survey_admin

About this task

To avoid timing out for very large surveys, you can disable the transaction quota. See Transaction quotas.

Procedure

1. Navigate to **All** > **Survey** > **Legacy Surveys** > **Masters**.

   The list of legacy survey masters appears. By default, the list shows only survey masters that have not been migrated. To show all survey masters, remove the **Assessment is empty** breadcrumb.

2. Open a survey and click the **Migrate to New Survey Management** related link or **Migrate to New Survey Management** in the title bar.
   A dialog box describes what happens when you migrate the survey. Note that certain types of survey questions cannot be migrated.
3. Click **OK**.

   The system generates records on assessment tables based on the survey master, eligible questions and choices, results, and other related survey components. The original survey components are unaffected.

   System messages may appear at the top of the Survey form to notify you of questions that could not be migrated and to advise you to review migrated **Multiple Choice** questions.

4. **Optional:** Click the reference icon beside the **Assessment** field to view the new survey definition.

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5. **Optional:** Remove survey users from the assessment survey if you want all users to be able to take it.
   When you migrate a survey, any users who have taken it are automatically associated with the assessment survey and become survey users. When there are survey users associated with an assessment survey, only those users can take it.
6. Deactivate any survey conditions associated with the survey by completing the following steps.
   a. Navigate to **Survey** > **Legacy Administration** > **Survey Conditions**.
   b. In the **Active** column, ensure the value is false for any survey conditions that reference the migrated survey.
7. Navigate to **Survey** > **Administration** > **Trigger Conditions** to create new trigger conditions for the migrated survey.

Result

The **Migrate to Assessment** related link on the legacy survey record becomes unavailable after the migration. However, if you delete the record referenced in the **Assessment** field, the related link reappears and you can migrate the legacy survey again.

Survey question migration

Before you migrate a legacy survey, understand that some legacy survey questions cannot be migrated due to incompatible question types.

Legacy survey questions are migrated from the Survey Question [survey_question_new] table to the Assessment Metric [asmt_metric] table. In legacy surveys, the **Type** field on the Survey Question table determines how the question renders on the survey questionnaire. In assessment surveys, the **Data type** field on the Assessment Metric table serves a similar purpose. Certain legacy survey types are not supported in assessment surveys.

The following table shows the conversion path for each legacy survey question type to an assessment data type, if there is one.

Survey question migration

Legacy survey type	Assessment data type
Break	Not available
CheckBox	Checkbox
Date	Date
Date/Time	Date/Time
HTML	Not available
Label	Not available
List Collector	Not available
Lookup Multiple Choice	Not available
Lookup Select Box	Not available
Macro	Not available
Macro with Label	Not available
Multi Line Text	String (**String** option set to **Multiline**)

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Survey question migration (continued)

Legacy survey type	Assessment data type
Multiple Choice	Likert Scale
Numeric Scale	Number
Reference	Not available
Select Box	Choice
Single Line Text	String (**String** option set to **Single line**)
UI Page	Not available
Wide Single Line Text	String (**String** option set to **Single line wide**)
Yes / No	Yes/No

Migrated components

When you migrate a survey, the system maps records from survey tables to assessment tables.

To create a functional survey on the assessment framework, the system converts survey records to the most logical equivalent assessment survey records. This may mean multiple assessment survey records represent one legacy survey record.

Migrated components

Survey component	Assessment survey components
Survey master [survey_master]	• Survey definition [asmt_metric_type] • Assessable record [asmt_assessable_record], for system use only • Survey category [asmt_metric_category]
Survey question [survey_question_new]	Survey question [asmt_metric]
Question choice [question_choice]	Assessment metric definition [asmt_metric_definition]
Survey instance [survey_instance]	• Assessment group [asmt_assessment], for system use only • Survey instance [asmt_assessment_instance]
Survey response [survey_response]	• Survey instance question [asmt_assessment_instance_question] • Survey response [asmt_metric_result] • Category result [asmt_category_result], for system use only

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Migrated question review

To maintain accurate result calculations, you may need to make minor adjustments to some of the migrated survey records to ensure results are calculated correctly.

Note:
The assessment engine provides a built-in result calculation feature that converts each survey response to a score between 0 and 10. The configuration required to maintain accurate result calculations is advanced and is not recommended for basic survey implementations. If you do not plan to use result calculation data, ignore the information in this section.

For each legacy question migrated, the system creates a survey question record on the Assessment Metric [asmt_metric] table. For legacy questions of the **Multiple Choice** and **Select Box** types, the system also creates a metric definition record, on the Assessment Metric Definition [asmt_metric_definition] table, for each legacy question choice.

Comparable metric definitions and survey question choices

Survey question choice field	Related metric definition field
Text	Display
Value (can be any string value)	Value (must be a numerical value)
Order	Value (metric definition with smallest **Value** is first)

When the system migrates legacy survey question choices, it uses the legacy **Order** to set each metric definition **Value**. For the legacy question choice with the smallest **Order**, the corresponding metric definition **Value** is set to **1**. For the legacy question choice with the next smallest **Order**, the metric definition **Value** is **2**, and so on.

The **Scale definition** field on the migrated Survey Question form determines whether smaller or bigger metric definition values equate to a good score in survey result calculations. By default, the scale definition is set to **High**, meaning bigger values are good. When you migrate a legacy survey, check that the default scale definition makes sense for each question.

For example, the following tables depict a sample migrated question and the metric definitions automatically created for it. Recall that the system uses the order of the legacy survey question choices to set the metric definition value. **Excellent** has the lowest **Order** value, so when the system creates a metric definition for this question choice, the **Value** is set to **1**. In this case the default scale definition value, **High**, does not make sense, as the system will calculate the worst scores for responses of **Excellent**.

Legacy question: Please rate the overall quality of your service

Question choice text	Question choice vlue	Question choice order
Excellent	A	100
Good	B	200
Fair	C	300
Poor	D	400

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Migrated question: Please rate the overall quality of your service

Metric definition display	Metric definition value
Excellent	1
Good	2
Fair	3
Poor	4

If there are no **Order** values for the legacy survey question choices, the system sets each corresponding metric definition **Value** based on the alphanumeric order of the legacy **Text** value.

Migrated question: Please rate the overall quality of your service

Metric definition display	Metric definition value
Excellent	1
Good	2
Fair	3
Poor	4

You may also need to change the **Scale definition** setting for other migrated questions. For details, see the scale definition recommendations for each survey question data type.

Surveys reference

Reference topics provide additional information about the forms, fields, and properties you use while working with surveys.

Survey roles

The Survey application uses the following roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

No role is required to take assigned survey questionnaires.

Survey administrator [survey_admin]

Create and administer surveys. Survey administrators know what types of surveys are necessary, when to send a survey, and to whom. Survey administrators can use all modules in the Survey application menu.

Contains Roles

List of roles contained within the role.

- survey_reader
- assessment_admin

Groups

List of groups this role is assigned to by default.

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None.

Special considerations

None.

Survey reader [survey_reader]

View surveys and related information, such as survey responses, survey groups, scorecards, and reports.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Survey creator [survey_creator]

Create a survey and assign it to the user who can take the survey and submit it. A survey creator can also create assessments.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Key survey terms

These survey terms are used throughout the documentation to describe survey management functions and capabilities.

Key survey terms

Term	Description
Survey definition	Root record on which a survey is built. A survey definition contains information such as the survey name, state, and distribution schedule. Each survey definition has its own categories and questions.

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Key survey terms (continued)

Term	Description
	Survey definitions are comparable to legacy survey masters.
Public survey	Any user can take a public survey, even users who have not logged in to the ServiceNow system. For a completed survey, the **Assigned to** field value is Guest.
Survey category	Represents a theme for survey questions. Categories contain one or more questions. The system creates one category per survey by default. Additional categories are optional.
Survey question	A question that appears on a survey questionnaire for the associated survey definition. Survey questions are comparable to legacy survey questions.
Survey user	User who is authorized to receive invitations for a restricted survey.
Survey instance	Represents one survey questionnaire assigned to one user. Survey instances are comparable to legacy survey instances.
Trigger condition	Defines a rule that enables the system to send a survey when an action occurs on a table, such as when an incident closes. Trigger conditions are comparable to legacy survey conditions.
Scorecard	Visual representation of survey responses. Scorecards display a variety of data summaries for one survey definition.

Survey Overview dashboard

The Survey Overview dashboard displays various survey reports, such as Surveys by Metric Type and State.

Survey Overview dashboard reports

Report	Table
Assignment Group Customer Satisfaction 90 Day Average	Metric Results [asmt_metric_result]
Service Desk Survey 'Timely Response' 90 Days	Metric Results [asmt_metric_result]
Surveys by Metric Type and State	Assessment Instances [asmt_assessment_instance]
Service Desk Survey 'Overall Experience' 60 Days	Metric Results [asmt_metric_result]
Service Desk Survey 'Tech Courteous' 90 Days	Metric Results [asmt_metric_result]
Service Desk Survey 'First Call Resolve' 60 Days	Metric Results [asmt_metric_result]
Service Desk Survey 'Tech Competence' 60 Days	Metric Results [asmt_metric_result]

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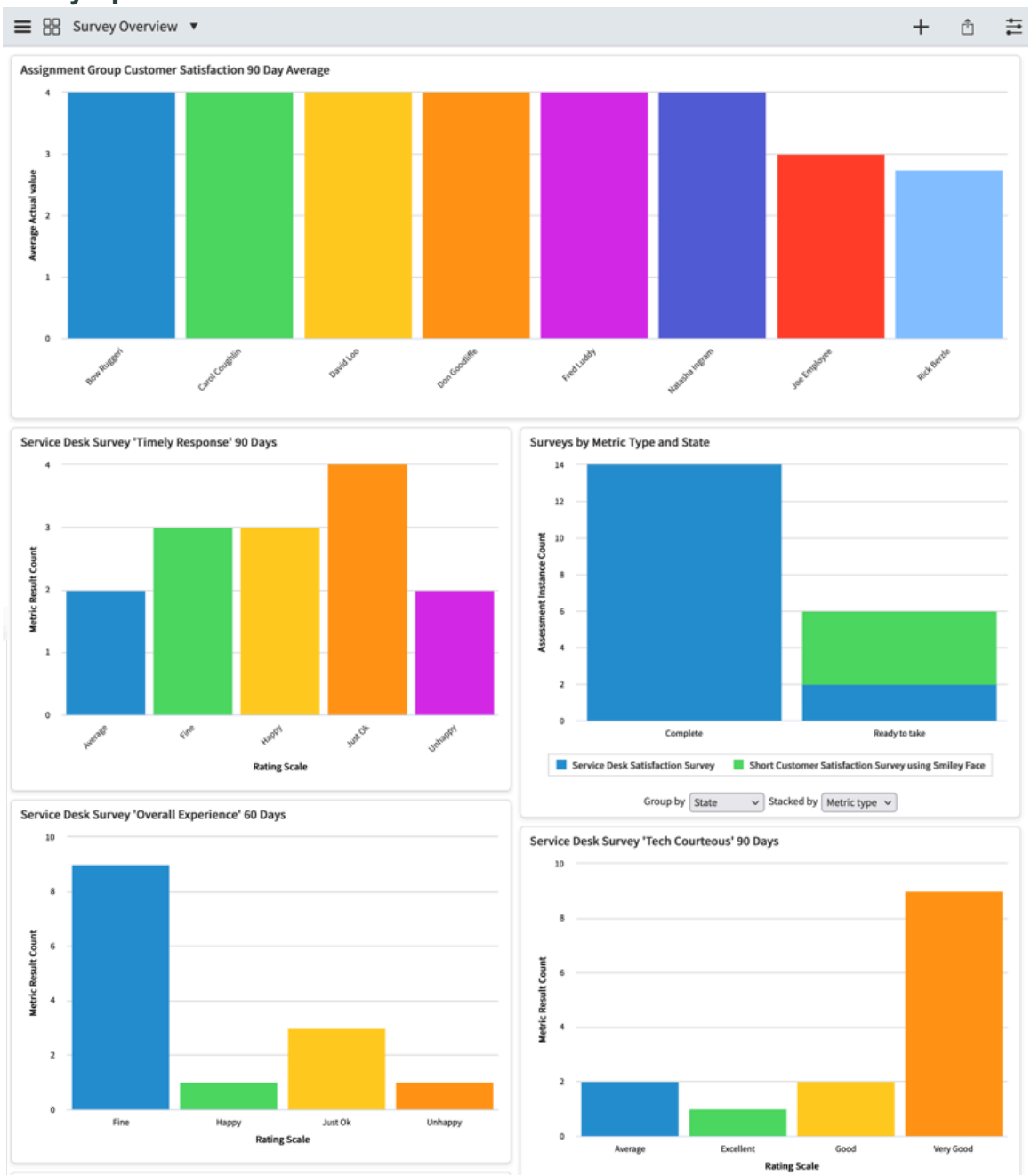
Survey report



Metric Result form

Description of the field values for the Metric Result form.

Metric Result form

Field	Description
Assessment group	Assessment group to which the metric result belongs. An assessment group is a container for survey instances and results generated in a single occurrence. The system generates an assessment group every time at least one survey instance is created. If multiple survey instances are created at once, such as when a survey administrator sends invitations to a list of survey users, they are all stored in the same assessment group.
Metric	Question that the user answered.

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Metric Result form (continued)

Field	Description
Data type	Data type of the question the user answered.
Method	Assessment method. Always **Assessment** for surveys.
Updated	Date and time the metric result was last updated.
Source	Survey definition from which the associated survey instance was generated.
Assigned to	User who completed the survey questionnaire.
Instance	Survey instance completed by the **Assigned to** user.
Actual value	Value obtained from the user response to the question. The actual value is determined by the question data type: • **Checkbox:** The actual value is *0* if the check box is cleared and *1* if it is selected. • **Choice** or **Likert Scale:** The actual value is equal to the **Value** of the metric definition associated with the chosen answer option. • **Date**, **Date/Time**, or **String:** The actual value is *-1* to indicate that these data types do not contribute to category result calculations. • **Template:** The actual value is equal to the **Value** of the template definition associated with the chosen answer option. • **Yes/No:** The actual value is *0* if the response is **No** and *1* if it is **Yes**.
Normalized value	Adjusted value that accounts for the **Scale definition** setting, minimum and maximum values, and other factors. The equation that generates the value and an example calculation appear in Normalized value for an assessment.
String value	Value that displays the response as it appears on a questionnaire. In some cases this is the same as the **Actual value**, such as when the question data type is **Percentage**. The string value is N/A for unanswered questions of certain data types.

Normalized value for an assessment

The normalized value is calculated based on a linear equation and the scale definition of the metric. This value can be used for risk assessment.

Normalized value for any metric

The normalized value is directly proportional to the scale definition of the metric. If the scale definition is low, that is, the lower scale values are better, then `Normalized value = 1.0 - Normalized value`.

For the reporting purpose, use the Metric Result [asmt_metric_result] table.

```
Normalized value = (Input Value - Min value defined in metric) /
(Max value defined in metric - Min value defined in metric) *
```

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`(current metric weight * bias / (sum of all metric weight in the metric category)) * scale_factor`

Bias is the ratio of total metric weight in the category and the sum of valid metric weight in the metric category. While calculating bias, the scripted metrics are excluded.

Note:

- If a metric is skipped when taking the assessment, its weight is excluded when calculating `sum of valid metric weight in the metric category`.
- The following metric types are excluded in the normalized value calculation:
  - String
  - Date
  - Date/Time
  - Reference
  - Attachment
  - Ranking

For example, consider the following scenario.

Calculate the normalized value for the **Please rate the competency of the technician** metric.

Values of the metric	
Input value	3
Minimum value	1
Maximum value	6
Current metric weight	10
Number of metrics in the metric category	6 • 4 of type=number • 1 of type=yes/no • 1 of type=string (invalid data type; value cannot be calculated)
Valid metric weight of each response	10
Scale factor	10

`Normalized value = (3 - 1) / (6 - 1) * (10 / (10 + 10 + 10 + 10 + 10)) * 10 = 0.8`

Normalized value for a multiple selection metric

The normalized value for a multiple selection metric is calculated by using the weight of the metric and the score for each choice of the metric.

In a multiple selection metric, for each choice that should be used for the normalization calculation, define the normalization input value.

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`Normalized value = (Score of all choices) * (current metric weight / (sum of valid metric weight in the metric category)) * scale_factor`

Here, score of all choices of the metric is the sum of individual scores of each choice.

- `Score of each choice in a multiple selection metric= Normalization input of the choice / max value of the metric`
- `max value of the metric = Sum of the normalization input for all choices of the metric`
- `min value of the metric is always 0`

For example, consider the following scenario.

Calculate the normalized value for the multiple selection metric, **Please rate the competency of the technician**, with three choices, A, B, and C.

Values of the metric

Choice A	Normalization input is 1
Choice B	Normalization input is 1
Choice C	Normalization input is 2
Minimum value	0
Maximum value	4
Current metric weight	10
Number of metrics in the metric category	5
Valid metric weight of each metric	10
Scale factor	10

If Choice A and B are selected, `Normalized value = ((1 / 4) + (1 / 4)) * (10 / (10 + 10 + 10 + 10 + 10)) * 10 = 1`

Weighted value for a risk assessment

For a risk assessment, the weighted value from metric results table is calculated as following.

```
weighted_value = metric.weight * result.actual_value
```

Domain separation and Surveys

Domain separation is supported in Surveys. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

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- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

Overview

As a survey creator, survey_admin can create surveys in the assigned domain. A Global domain survey_admin can create or edit survey in any domain.

As a survey taker, a user can access the survey record and take the survey based on the domain of the survey record and user. Global domain users can take a survey in any domain.

How domain separation works in Surveys

There are several main areas to consider in how domain separation works in Surveys.

Surveys in domain-separated instances

The following domains are available by default after activating the Domain Support-Domain Extensions Installer [com.glide.domain.msp_extensions.installer] plugin. Only ServiceNow employees can activate this plugin.

- Global
- Acme
- Cisco

Access to surveys in domain-separated instances

Based on the domain of the survey record and users, users can access the survey record and take the survey.

Global domain users can access survey records in any domain. Users in any other domain can access records in their domain and Global domain. For example, users in the Acme domain can access records in the Acme domain and the Global domain.

Global domain users can take a survey in any domain. Users in any other domain can take surveys in their domain as well as the Global domain. For example, users in Acme domain can take surveys in the Acme domain and the Global domain.

Location of the survey record	**Users who can access and take the survey**		
N/A	Global	Acme	Cisco
Global	Yes	Yes	Yes
Acme	Yes	Yes	No
Cisco	Yes	No	Yes

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Any domain user can assign a survey in that domain to the same domain user or a Global domain user. For example, an Acme domain user can assign a survey to a Global domain user or an Acme domain user. Users from other domains are not visible to the Acme domain user.

Although the Global domain user can view a survey from other domains, this user cannot assign the survey of one domain to a user from a different domain. For example, a Global domain user can assign a survey from the Acme domain to another Global domain user or an Acme domain user, but not to a Cisco domain user.

Note:
When a task is closed in a child domain and the assigned survey is either in the child domain or the global domain, the user from the child domain can then take the survey.

Trigger conditions in domain-separated instances

A Global domain user can create a triggered condition for a survey from any domain. The Global domain user can create an incident and trigger the survey by selecting a user from the other domain in the **User field** under **Caller**. However, the Global user cannot assign the survey to the user of different domain.

A user can assign a trigger condition to a survey if the user belongs to the Global domain or the Survey domain.

If there is no domain path for a trigger condition, users from any domain can view the trigger condition. For example, in the `asmt_condition` table that has no column for the domain path, users from the Acme domain can view the trigger condition created by the Cisco domain users.

Related topics

Domain separation for service providers

Survey Designer Configuration form

Description of the field values for the Survey Designer Configuration form.

Configuration tab fields

Field	Description
Active	Select the check box to enable the distribution of this survey to recipients.
Survey Owners	Owners of the survey. You can add a user with the survey_creator, survey_admin, or assessment_admin role.
Anonymize responses	Select the check box to collect survey responses anonymously. Recipients are not listed with survey results. When a user submits a survey, the system clears the **Assigned to** field for the associated survey instance. Also, survey responses for anonymous surveys do not contain Assigned to values. **Note:** The **Assigned to** field is cleared. However, each response record includes the **Created By** and **Updated By** fields that are accessible to users with the survey_admin role.
Description	Description of this configuration or the survey to which it is attached.
Do not show survey	Check box to skip the introduction notes when a survey is launched. This functionality is applicable in both the ServiceNow AI Platform and Service Portal product versions.

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Configuration tab fields (continued)

Field	Description
introduction notes	
Introduction	Introductory content to display on surveys. You can add a welcome message or background information about the survey.
Signature	Acknowledgement by a survey recipient of requirements, admonitions, or expectations related to a survey.
Return URL	Destination address of a web page that is presented to users after they submit a completed survey. When a return URL is configured, the **End note** content does not appear.
End note	Content that is displayed to recipients after they submit a completed survey. You can add a thank you message, follow-up instructions, or other applicable information. End notes are not displayed if a **Return URL** is specified.
Public Survey	Enables public access to the survey. No login is required to take a public survey and users or non-users can respond anonymously. For completed public surveys, the **Assigned to** field value is Guest. **Note:** This check box is available only after you save the survey.
Survey Publish URL	Specifies a URL of the survey that can be shared with users. **Note:** This field is available only after you publish the survey.
Pagination setting for Service Portal view	Specify how the user will see pages on the desktop or tablet view in Service Portal. • **Category**: Display each category on a separate page. • **Question**: Display each question on a separate page. This happens for mobile regardless of this setting. • **None**: All items on a single page—no pagination Default: **Category** **Note:** This field appears only when Service Portal is installed.
Chat Survey	Option to validate if survey questions are supported in a chat survey. Enables conversational questionnaires (pre-chat and post-chat surveys) in the chat client. Also enables you to map chat context variables to survey questions. For information on a chat survey in ITSM Virtual Agent, see Surveys in ITSM Virtual Agent **Note:** This field is available only when the Glide Conversation Server plugin (com.glide.cs) is activated.

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Configuration tab fields (continued)

Field	Description
One Click Survey	Enables a One Click survey in Service Portal. **Note:** This option can be selected if the **Pagination setting for Service Portal view** is set to `None`.
Source Table	Table whose field is used as a dynamic value for a question in a triggered survey. **Note:** When you select a source table, ensure that its relevant field is selected as **Source Field** value of a metric.
Allow Sentiment Analysis	Enables sentiment analysis for this survey.
Duration	Amount of time that recipients are given to complete this survey, starting from the time that the survey is generated. The default duration is 14 days.
Outlook Actionable Message	Includes an embedded survey in the survey email notification. After you select this check box and save the survey, a validation is run to ensure all survey questions are supported.

Availability tab fields

Accessible by	Defines who can access the survey. Possible values are • Anyone: Accessible by anyone with the survey link. • Specific users: Accessible by specified users.
Survey groups only	If selected, a survey is available for survey groups only. **Note:** This field is displayed only if the **Accessible by** is `Specific users`.
Add group users	Group users for whom the survey is available. **Note:** This field is displayed only if the **Accessible by** is `Specific users`.
Add users	Users for whom the survey is available. **Note:** This field is displayed only if the **Accessible by** is `Specific users`.
Add recipients lists	Recipients lists for whom the survey is available.

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Availability tab fields (continued)

	Note: This field is displayed only if the **Accessible by** is `Specific users`.

Properties form

Description of the field values for the Properties form of survey designer.

Question property fields

Field	Description
Name	Concise name of the question. The system uses this value to identify the question in Assessment Metric lists and in scorecard charts.
Question	Text to display as the question on surveys. Enter a clear, straightforward question that is easy to understand.
Type	Data type selected for this question. See the table in Controls for the available data types.
Active	Check box that determines whether this question is available on a survey. A question does not appear on surveys that are generated after the question becomes inactive.
Mandatory	Check box to require users to answer the question. Mandatory questions are denoted by a red field status indicator and must be answered before the survey can be submitted. This field is available when the question does not have a dependency and the question type is not **Boolean** with a check box option.
Allow Additional Information	If selected, the **Additional Information Label** field is enabled. The **Additional Information Label** field value is displayed as a field on the survey response page to provide additional information for a question. **Note:** This is not applicable for the String and Template data types.
Boolean option	Whether a check box or a **Yes/No** list appears as the option for a Boolean question.
String option	Setting for the appearance of a string field in a question. This field is available when the question type is **String**. The string options include the following. • **Single line**: Single-line text field 40 characters in length that allows strings of any length. • **String line wide**: Full page width text field that allows a single-line entry of any length. • **Multiline**: Full page width multiline text field that allows word wrap and returns

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Question property fields (continued)

Field	Description
Min	Lowest positive whole number that users can enter or select to answer the question. This field is available when the question type is **Number**, **Percentage**, or **Numeric Scale**.
Max	Highest positive whole number that users can enter or select to answer the question. This field is available when the question type is **Number**, **Percentage**, or **Numeric Scale**.
Allow not applicable	Check box for including **Not Applicable** as an option for this question. Users can select **Not Applicable** if they do not have sufficient information to respond to a question. User responses of **Not Applicable** are excluded from results calculations. This field is available when the question does not have a dependency and the question type is not **Boolean** with a check box option.
Randomize answers	Check box for displaying answer options in a random order. Answer preference is sometimes influenced by the order in which options appear, which can result in biased results. Randomizing options can help prevent this bias. **Note:** Randomizing options for certain questions may make those questions confusing for users. In general, only randomize options that do not follow a logical order.
Positive indicator	Setting that determines whether smaller or larger numerical values equate to a good score in result calculations. Select **Low values** if smaller numerical values are better, such as for a question that measures the number of incidents for a vendor. Select **High values** if larger numerical values are better, such as for a question that measures user satisfaction on a scale of one to five.
Source Field	Source table field that appears as a dynamic value for the question in a triggered survey. When this field value is selected, a *`${param}`* placeholder is added at the end of the question label. **Note:** You can move this placeholder anywhere in the question label. When a user takes the survey, the question with dynamic value is included in the survey instance and *`${param}`* placeholder is replaced with the source field value. If the record table specified in the trigger condition does not match the source table specified for the survey, or if the system fails to get the dynamic value from the source record, the *`${param}`* placeholder is not replaced by any value and is displayed as is in the question. For example, if the survey is triggered from a **PRB** record and the survey question is configured with a dynamic value from **Incident**, the *`${param}`* placeholder in the survey question label is not replaced by any dynamic value and is displayed as is. When survey questions are translated to other languages by a survey admin, the *`${param}`* placeholder should not be translated.

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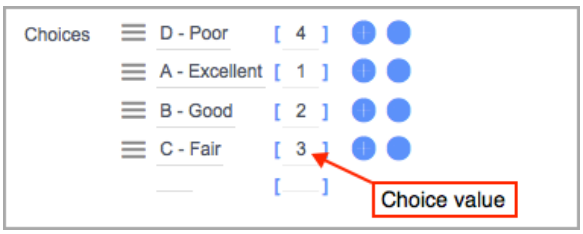
Question property fields (continued)

Field	Description
Allow Sentiment Analysis	Includes this question for the sentiment analysis of a survey. **Note:** This field is available only for String type questions.
Details	Information about the question that is displayed on the survey. Include details that help users understand how to answer the question.
Choices	Options for a question with a data type of **Choice** or **Scale**. The system automatically adds text and values that you can edit for each option. You must have at least two options, and each option must have a unique value. Click the **+** icon to add an option, or click the **X** icon to delete an option. By default, the system arranges options in the order established by their values. To change the order, drag and drop the options. **Note:** Value numbers also contribute to the calculations of survey response scores, which can be used by advanced survey administrators. 

Custom Metric form

Description of the field values for the Custom Metric form.

Custom Metric form

Field	Description
Name	Name of your custom metric type. The name appears on the Custom Metrics page.
Application	Name of the application that you are creating the custom metric type for.
Icon	An icon for the custom metric type. The custom metric type appears as the selected icon in Survey Designer.
Active	Option to enable or disable the custom metric type. If selected, the Survey Designer shows the custom metric type.
Macro	A macro that is used to render the custom metric type.

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Custom Metric form (continued)

Field	Description
	Note: • If the **Macro** field is empty, the question is not rendered on the platform form. • The macro record that you select must contain an input element with the following attributes. This input element holds the value for the metric. ◦ `datatype="custom"` ◦ `name= "${jvar_question_name}"` • Value parameters can be accessed in a macro using the *`${jvar_value_params}`* object.
Widget	The widget is used to render the custom metric. **Note:** • If the **Widget** field is empty, the question is not rendered on the portal form. • The widget record that you select must contain an input element with the following attributes. This input element holds the value for the metric. ◦ `ng-model="page.fieldValue"` ◦ `ng-model-options="{getterSetter: true}"` • The client script must have *`$scope`* as one of the parameters in the function definition. The value parameters can be accessed using the *`$scope.page.field.value_params`* object.
Result type	Result type for the custom metric type. If a value is changed, the new results are stored as per the new value and the previous results remain unchanged. If a value is changed from string to number, the reports might not show the charts properly. If a value is changed from number to string, the scorecard is shown in a list view.
Value parameters	Value pairs that are passed to the custom metric type renderers. For example, in star ratings, you can pass a value as 5 for 5 stars or 10 for 10 stars.

Survey Instance form

Description of the field values for the on the Survey Instance form.

Survey Instance form

Field	Description
Number	Automatically generated record number.
Metric type	Survey definition this survey instance was created from. Survey definitions are stored on the Assessment Instance table, and the field label on that table is **Metric type**.

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Survey Instance form (continued)

Field	Description
Due date	Date by which the survey instance should be completed. The system populates the due date based on the **Assessment duration** of the associated survey definition, which is set to 14 days by default. The survey due date is not enforced in the base system. If you want to enforce the due date, consider using a workflow or other mechanism to send survey recipients reminders when a survey is overdue. **Note:** By default, the system runs the *Cancel Expired Assessments* script every 30 days to cancel expired survey, assessment, and quiz instances that are in the Work in progress or Ready to take states.
State	State of the survey instance.
Assigned to	User this survey instance is assigned to. This field becomes read-only when the state is In progress, Complete, or Canceled.
Domain	Domain associated with the instance.
Expiration date	Date on which the assigned user can receive a new instance of the same survey definition. The system automatically populates the expiration date based on the **Schedule period** of the associated survey definition.
Related Link	
View User's Response	Shows a read-only version of the survey responses completed by the user.
Retry Sentiment Analysis	Sends the survey instances for sentiment analysis. **Note:** This link is available only if any sentiment analysis result is not available for this instance under **Survey** > **Question Sentiment Results**
Related List	
Assessment Instance Questions	All instance question records, which store user response values for each question on the survey questionnaire. The following columns are relevant to surveys: • **Category**: Displays the survey categories the questions belong to. • **Metric**: Displays the survey questions.

Related topics

View a survey instance

Survey Question form

Description of the field values for the Survey Question form.

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Survey Question form

Field	Description
Name	Name of the question. When you create a survey, the question name is the same as the text in the **Question** field.
Question	Text to use for the question, which appears on survey questionnaires.
Data type	Data type of the question. The fields for the response depend on the data type. **Note:** If another question depends on this question, you cannot change the data type.
Template	Question template to use for the answer options. This field is visible and required only if the data type is **Template**. **Note:** If another question depends on this question, you cannot change the template.
Scale definition	Setting that determines whether smaller or larger numerical values equate to a good score in result calculations. Select **Low** if smaller numerical values are better, such as for a question that measures the number of incidents for a vendor. Select **High** if larger numerical values are better, such as for a question that measures user satisfaction on a scale of one to five. This field is visible and required only when certain data types are selected.
Randomize answers	Check box that determines whether to present the answer options for this question in a random order each time a user opens the survey. Answer preference is sometimes influenced by the order in which answer options appear, which can result in biased results. Randomize answer options to help prevent this bias. This field is visible only if the data type is **Choice** or **Likert Scale**. **Note:** Randomizing answer options may make a question confusing. In general, only randomize answer options that do not follow a logical order.
Mandatory	Check box that makes the question mandatory (selected) or optional (cleared) on survey questionnaires. Users cannot submit questionnaires until they provide valid responses to all mandatory questions, which are denoted by a red field status indicator. This field is visible only when the **Depends on** field is empty and the data type is not **Checkbox**. Questions that depend on other questions and check box questions cannot be mandatory.
Allow not applicable	Check box that determines whether to include a **Not Applicable** answer option for this question on survey questionnaires. User responses of **Not Applicable** are excluded from results calculations.

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Survey Question form (continued)

Field	Description
	This field is visible only if the data type is **Choice**, **Likert Scale**, **Template**, or **Yes/No**.
Allow Additional Information	If selected, the **Additional Information Label** field is enabled. The **Additional Information Label** field value is displayed as a field on the survey response page to provide additional information for a question. **Note:** This is not applicable for the String and Template data types.
Depends on	Setting used to make this a conditional question, meaning that it only appears when users answer another question a certain way. To make a question depend on another question, select an existing question from the list, which displays **Checkbox**, **Choice**, **Template**, and **Yes/No** questions of the same category as this question. Then, use the **Displayed when** field to set the conditions that cause this question to appear on surveys. The system prevents the creation of recursive dependencies between questions. For example, if Question A depends on Question B, Question B cannot depend on Question A.
Displayed when	Answer options for the selected **Depends on** question which, when chosen on surveys, display this question. This field is visible and required only when the **Depends on** field is set.
Min	Smallest numerical value to be used as an answer option for this question. This field is visible and required only if the data type is **Choice**, **Likert Scale**, **Number**, or **Percentage**.
Max	Largest numerical value to be used as an answer option for this question. This field is visible and required only if the data type is **Choice**, **Likert Scale**, **Number**, or **Percentage**.
String option	Selection that determines what kind of response text box appears for this question on survey questionnaires. This field is visible and required only if the data type is **String**.
Source Field	Source table field that appears as a dynamic value for the question in a triggered survey. When this field value is selected, a *${param}* placeholder is added at the end of the question label. **Note:** You can move this placeholder anywhere in the question label. When a user takes the survey, the question with dynamic value is included in the survey instance and *${param}* placeholder is replaced with the source field value. If the record table specified in the trigger condition does not match the source table specified for the survey, or if the system fails to get the dynamic value from the source record, the *${param}* placeholder is not replaced by any value and is displayed as is in the question. For example, if the survey is triggered from a **PRB** record and the survey question is configured with a dynamic value from **Incident**, the *${param}* placeholder in

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Survey Question form (continued)

Field	Description
	the survey question label is not replaced by any dynamic value and is displayed as is. When survey questions are translated to other languages by a survey admin, the *${param}* placeholder should not be translated.
Allow Sentiment Analysis	Includes this question for the sentiment analysis of a survey. **Note:** This field is available only for String type questions.
Condition	Condition to filter the reference records from the table specified in the **Reference** field. **Note:** This field appears only for the Reference metric type.
Field validation	Validate the value entered for a String type metric of a survey. Possible validations are: • Email • IP Address(IPV4,IPV6) • Phone Number (E.164) • URL **Note:** This field appears only for the String metric type.
Related Lists	
Assessment Metric Definitions	Answer options for this question. This related list is available only if the **Data type** is **Choice** or **Likert Scale**.

Related topics

Create or modify survey questions

Trigger Condition form for surveys

Description of the field values for the Trigger Condition form for surveys.

Trigger Condition form

Field	Description
Assessment	Survey to send.
Table	Table to run the trigger condition on. You can select only tables in the current application scope. For example, to send a survey whenever an incident closes, select the Incident [incident] table.

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Trigger Condition form (continued)

Field	Description
User field	Field that stores the users you want to send the survey. You can select any field, on the selected table or on a referenced table, that references the User [sys_user] table. Use the tree picker to select a field. **Note:** To avoid requiring users to log in to take a survey with a trigger condition, set the survey to **Public**.
Repeat interval	Minimum period that must pass before the trigger condition can resend the survey to the same user. For example, assume the repeat interval is set to 30 days. Even if the same user qualifies for multiple surveys from this trigger condition, the system can send only one survey every 30 days. **Note:** • Ensure that the Schedule period of the selected survey definition is set to **No Limit**. If the schedule period is set to a different value, it prevents the trigger condition from sending surveys as expected. • Trigger condition creates a survey instance irrespective of the repeat interval if the survey is set as anonymous.
Application	[Admin only] Application is set to Core.
Active	Check box that determines whether this trigger condition is active (selected).
Business rule	[Admin only] Business rule the system creates to monitor the selected table. When the condition is met, the business rule sends the survey to the correct user. No configuration is necessary for this business rule.
Trigger randomly	Check box that determines whether to send the survey to the appropriate user every time the condition is met (cleared) or only a percentage of the time (selected).
Probability (%)	Approximate probability that the survey is sent each time the condition is met. For example, if the probability is set to 50, the system sends the survey approximately 50% of the time the conditions are met. There are no repeat interval restrictions is assumed. This field is visible and required only when *Trigger randomly* is selected.
Related Field 1- 4	Field that contains a value you want to store for reporting purposes. You can pick any reference field on the selected table. When the trigger condition generates a survey instance, the system stores the value from the triggering record. Specify up to four fields. For example, select the Incident table, **Assigned to** and **Problem** as related fields. The system stores the assigned user and problem associated with the incident as Related record 1 and Related record 2 in the survey instance record. To view the fields, configure the form for any survey instance. **Note:** You cannot use a related field for the ticket number because you cannot select the Number column. You can, however, use the trigger_id column of the table.
Description	Summary information to identify the trigger condition.

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Trigger Condition form (continued)

Field	Description
	Note: For a triggered record, the table title is used for the survey description.
Condition	Condition builder that defines the criteria that must be true to send the survey. For example, to send a survey whenever an incident closes, create the condition **[State] [is] [Closed]**. **Note:** When defining conditions like case sensitivity or null values, see APIGlideFilter - Scoped, Global.

Related topics

Configure a trigger condition for a survey

Recipients List form

Description of the field values for the Recipients List form.

Recipients List form

Field	Description
Name	Name of the recipients list.
Type	Type of users to include in the list. Possible values are: • Contacts • Internal Users The selection of each type changes the dynamic conditions. For example, if you select **Internal Users**, the **Table** field displays the value as **User [sys_user]**.
State	State of the recipients list. • **New**: List has not yet been generated. • **In Progress**: List is currently being generated. (You can see this state only when generating a very large list of recipients.) • **Complete**: List is generated.
Setup	
Method	Method used to generate the recipients list. Possible values are: • `Upload File`: Upload an Excel file with the recipients list using the specified template. • `Dynamic Condition`: Run a script or condition builder to create the recipients list.

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Recipients List form (continued)

Field	Description
	Note: When the **Method** is `Dynamic Condition`, you can either use a script or a condition builder to create the recipients list.
Choose File	Allows you to download an Excel template, and then upload the Excel file with user information using the specified template. **Note:** • This field is available only if the **Method** is `Upload File`. • The templates vary based on the entity selected in the **Type** field. For accounts, the template includes columns for sys_id and account number values. For contacts, consumers, and internal users, the template includes columns for sys_id and email values.
Show Script	If selected, displays the script to create the recipients list. **Note:** This field is available only if the **Method** is `Dynamic Condition`.
Script	Script to create the recipients list. **Note:** This field is available only if the **Method** is `Dynamic Condition` and the **Show Script** check box is selected.
Table	Table that stores the user information. The table is selected based on the **Type** field. **Note:** This field is available only if the **Method** is `Dynamic Condition`.
User Field	Table field that refers to users. **Note:** This field is available only if the **Method** is `Dynamic Condition`.
Conditions	Condition builder to create the recipients list based on the specified table and user field. A condition is made up of a selected field, an operator, and a value. Add conditions using the AND and OR buttons. Delete conditions by clicking the Delete button to the right of a condition. **Note:** This field is available only if the **Method** is `Dynamic Condition`.

Related topics

Define a recipients list for surveys

Create a recipients list

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Assessments

Use assessments to evaluate, score, and rank records from any table in the system.

You can assess projects that executives want to evaluate for effective management, or rate and compare a vendor's goods and services. Use assessments to send custom questionnaires to selected users or write scripts that query the database directly. You can then compare assessment results for the records using unique graphical views designed to highlight key performance information. Share an assessment between ServiceNow instances by using update sets, which is the recommended way to move assessment data from one instance to another.

The Assessments plugin is enabled by default.

You can only edit an assessment that has the same application scope as that of your current session.

The difference between assessments, surveys, and quizzes, and when to use each; also provides a quick look at the three stages in the survey process: designing, sharing, and evaluating.

Using assessments

Before you create assessments, assign the assessment_admin role to the appropriate users in your organization and determine your objectives for the assessment.

Assessment administrator tasks

Before you create assessments, assign the assessment_admin role to the appropriate users in your organization and determine your objectives for the assessment.

Decide which sets of records in the system to assess, which themes you are interested in, and which traits to measure. Consider your organization's options for obtaining the data to compare. If you intend to use assessment questionnaires, consider which people can answer the questions.

Assessment terminology

Assessment admins use several terms when working with assessments.

Term	Description
Metric type	A metric type defines a set of records to evaluate, such as vendors, projects, or employees.
Assessable record	An assessable record links a record to evaluate, such as the company record for Amazon or the user record for a sales representative, to a metric type, such as vendors or employees. You define sets of assessable records when you create metric types.
Metric category	A metric category represents a theme for evaluating assessable records. Categories contain one or more individual metrics, which define specific traits or values that comprise the theme. Examples of categories include overall vendor performance or quality of delivery services. You can also set filter conditions that control which assessable records to evaluate for the metrics in a category.
Metric	A metric is a trait or value used to evaluate assessable records. A metric can measure subjective values in an assessment questionnaire, or gather objective values in a database query run by a script. Examples of metrics include perceived courtesy of sales representatives or number of incidents per vendor.

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Term	Description
Category user	A category user is a person who knows about a specific category. One person can be a category user for multiple categories. Examples of category users include a vendor manager who oversees all purchasing operations or a supervisor of a sales team.
Stakeholder	A stakeholder is a category user who knows about a specific assessable record. Examples of stakeholders include a vendor manager who coordinates purchases from Amazon or a supervisor of a sales team who manages a specific employee.
Assessment instance	An assessment instance represents one assessment questionnaire assigned to one user. The system generates a new assessment instance for each assigned user when: • The assessment generation scheduled job runs. • An assessment administrator creates an on-demand assessment.
Scorecard	A scorecard provides a visual illustration of an assessable record's performance, based on assessment results. Use scorecards to view a variety of data summaries for one assessable record and to compare the ratings with other assessable records.
Decision matrix	A decision matrix is a graph with two axes that plots the assessment results for multiple assessable records. Use decision matrixes to determine the relative standing of assessable records in selected categories.
Bubble chart	A bubble chart is a graph with three axes that plots the assessment results for multiple assessable records. Use bubble charts to determine the relative standing of assessable records in selected categories, with an emphasis on one category.

Assessment roles

The Assessments application requires certain roles to perform assessment tasks. No role is required to take assessment questionnaires that are assigned to you.

Role Title	Role Name	Description
Assessment administrator	assessment_admin	Assessment administrators set up assessments. They know which records to evaluate, the criteria on which to evaluate the records, and who to assign assessments to. **Note:** By default, users with the assessment_admin role have limited system rights and might not have access to all source records to assess. When planning assessments, grant additional roles to assessment administrators as needed. For example, to create and manage vendor assessments, the assessment administrator must also have the vendor_manager role, which grants access to the Company table and other relevant tables.
ITIL user	Base system roles	ITIL users perform basic technician operations in the system. In the Assessments application, they have read access to the Assessable Record table.

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Role Title	Role Name	Description
Administrator	Base system roles	Administrators have access to all aspects of the assessment process. Only administrators can set up assessment schedules.

Assessment methods

The available methods are **Assessment**, for non-scripted metrics, and **Script**, for scripted metrics. Each method serves a different function and can be used with certain data types.

Use the **Method** field to specify how to use the metric.

Assessment method

Metrics with the Method set to Assessment are called non-scripted metrics. Use each non-scripted metric to define a question for assessment questionnaires. Non-scripted metrics are useful if you want to obtain subjective data like personal opinions.

You can use the Assessment method with these *Data type* values:

- Attachment
- Checkbox
- Choice
- Date
- Date/Time
- Likert Scale
- Number
- Percentage
- String
- Template
- Yes/No

Script method

Metrics with the Method set to Script are called scripted metrics. Use each scripted metric to define a custom script for database queries. Scripted metrics are useful if your system contains reliable data for the traits you want to evaluate.

You can use the Script method with these *Data type* values:

- Duration
- Number
- Percentage

Use the Script field to write JavaScript code. By default, the field contains information about available variables and an example, which you can use as the basis of your script or replace entirely:

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Metric form script field

```
Script:
 1 // The following variables are available:
 2 // - primary: contains the sys_id of the assessable object to be evaluated
 3 // - actual_result: the script sets the actual value for this metric to    this variable
 4 // - scaled_result: the script sets the scaled value (used in calculations) for this metric to this variable
 5 //
 6 // For example:
 7 // var gr = new GlideRecord('cmdb_ci');
 8 // gr.addQuery('manufacturer', primary);
 9 // gr.query();
10 // actual_result = gr.getRowCount();
11 // if (actual_result > 100) scaled_result = 5;
12 // else scaled_result = 1;
```

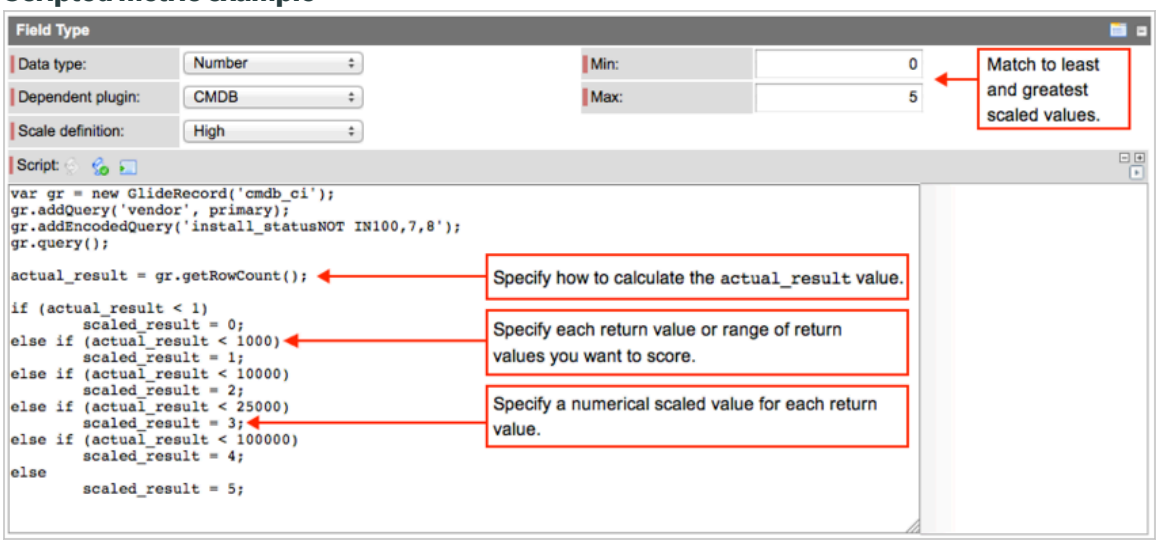
You must use the following variables in your script:

- *primary*: Input variable used to access the sys_id of the record being assessed.
- *actual_result*: Output variable that contains the actual value for this metric. The system uses this variable to populate the Actual value field on the Metric Result form. For each *actual_result,* you must specify a corresponding **scaled_result** value.
- *scaled_result*: Output variable that contains a numerical scaled value to represent an actual value. The system uses this variable to populate the **Scaled value** field on the **Metric Result** form. Ensure the scaled values you specify are between or equal to the **Min** and **Max** values for the metric. The **Scale definition** field determines how the system uses the scaled value. A scale definition of **Low** means smaller numbers are better, such as for a metric that measures the number of incidents for a vendor. **High** means larger numbers are better, such as for a metric that measures user satisfaction on a scale of one to five.

Script example

The metric Number of active devices uses the script pictured below. The *primary* variable is used to find CIs that are associated to the vendor record being assessed. The script retrieves the actual_result, the number of CIs associated to the vendor, then calculates the correct scaled_result. The script uses a series of scaled values, from the **Min** to the **Max** value, to represent actual values. Because the **Scale definition** is set to **High**, the greatest scaled values are best, meaning a vendor associated to the most CIs scores highest. The system stores the actual and scaled values in a metric result record for the vendor.

Scripted metric example



Related topics

Assessment metrics

Create an assessment metric for a category

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Create an assessment metric definition

Update a metric minimum and maximum value to match a template

Configure an assessment

You can create a new assessment on a selected assessable records to evaluate, score, and rank records from any table in the system. Then create a metric category and assessment metrics for the assessment, publish the assessment, and assign it to the selected users.

Before you begin

Role required: admin, survey_creator, or assessment_admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Click **New**.
3. On the Assessment Metric form, fill in the fields.
   For a description of the field values, see Assessment Metric form.
4. Create a new assessment and assign it to the assessors.
   Do the following in the Assessment Metric form.
   a. Add a condition: In the **Condition** tab, add a condition to define the assessable records on which the assessment is created.
   b. Add decision matrix fields: In the **Decision Matrix** tab, add the required filter field to identify filter menu choices on decision matrices and scorecard averages for this type. For more information, see Decision matrixes .
   c. Select the Assessors: In the **Assessors** tab, select the users to whom the assessment will be assigned.
   d. Generate Assessable records: When you save the assessment and click **Generate Assessable Records**, an assessable record is created for each unique user of the user field.

      Note:
      - You must generate the assessable records, each time you update the condition.
      - You can generate the assessable records only after updating the condition.

      A new assessment is created. You must now create metric category and add assessment metrics to each metric category. Then publish the assessment and assign the assessment to the selected users.

   e. Create a metric category: To create a metric category, do the following:
      i. Open the assessment you just created and click **New** in the **Metric Categories** tab. Fill the form.

         For more information about form fields, see Metric Category formform.

         Tip:
         To know how to create metric category alternatively, see Create a category for assessable records.

      ii. Open a metric category, add a condition, and click **Assessable records** tab. The assessable records appear based on the selection made in the metric category form.
      iii. Open a metric category, click **Assessment Metric** tab to add the questions. Click **New**.

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For more information about form fields, see Assessment Metric form for a category.

Tip:
To know how to create assessment metric category alternatively, see Create an assessment metric for a category.

f. Click **Publish**, to publish the assessment. For more information, see Publish a metric type.

g. Assign the Assessment to the required users. Do the following:

i. For an on-demand Assessments, click either the **Assign Assessment** or **Assign to Assessors** link to assign the assessment. For more information, see Generate an on-demand assessment for multiple assessable records.

ii. For a scheduled Assessment, click the **Generate Assessments** link to trigger the scheduled job immediately. For more information, see Generate a scheduled assessment manually.

Assessment generation

In the Assessments application, administrators or assessment administrators can trigger the system to generate scheduled assessments or on-demand assessments when all the prerequisite steps are completed.

An assessment administrator must publish the metric type to enable assessment generation.

The system performs these tasks when it generates assessments:

- Creates assessment questionnaires from non-scripted metrics and assigns the questionnaires to users. When users complete their assigned questionnaires, the system uses their responses to calculate assessment results.
- Runs scripted metrics from each category to query the database and calculate assessment results.

Each time the system generates assessments, it creates some or all of the following components. Consider having an administrator set a schedule for recurring data cleanup, as the system can potentially generate a considerable amount of assessment data.

- Assessment group
- Assessment instances
- Assessment results

Assessment groups

An assessment group is a container for assessment instances and assessment results generated in a single occurrence.

The system generates an assessment group every time the scheduled job runs or the API is called, when there is at least one assessable record associated to a category in the type. You can find assessment group records in **Assessments** > **Assessment Groups**.

The Assessment Group form displays the group **Number**, the associated **Metric type**, and these related lists:

- **Assessment Instances**: Lists all assessment instances within this group. There may be no records in this related list. The system does not generate assessment instances if there are only scripted metrics for the type.
- **Metric Results**: Lists all metric results for this group. There may be no records in this related list initially. The system generates metric results immediately for scripted metrics, but not for

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non-scripted metrics, which appear as questions on assessments and require user response. The system dynamically updates the records in this list as users complete assessment questionnaires.

- **Assessment Category Results**: Lists all category results for this group. There may be no records in this related list initially. The system generates category results immediately if there are only scripted metrics in a category. Otherwise, the system does not calculate category results until a user completes an assessment questionnaire that contains questions from the category.

Note:
To prevent the loss of important assessment data, you cannot delete an assessment group if it contains any assessment instances, metric results, or category results.

View an assessment metric category

View assessment metric categories that are used with assessment metric types and assessment metrics in generating the bubble charts on the Demand Workbench. The bubble charts help the demand managers to visually assess the demands.

Before you begin
Role required: it_pps_admin

About this task
The Demand Management application comes with an assessment metric type named **Demand**, five default assessment metric categories, and assessment metrics.

Procedure

1. Navigate to **All** > **Project Administration** > **Settings** > **Assessments Metric Categories**.
2. Open an assessment metric category to review it.
   The following default assessment metric categories are available with the Demand Management.

Demand assessment metric categories

Assessment metric category	Data source	Description
Size	**T-Shirt size** field on the Demand form.	Assesses demand size relative to the size of other demands.
Strategic Alignment	View an assessment category result field in the assessment category result for the Strategic Alignment metric category.	Assesses how closely the demand aligns with strategic goals of the organization compared to other demands.
Risk	**Rating** field in the assessment category result for the Risk metric category.	Assesses demand risks compared to other demands.
ROI	**Impact** and **Financial return** fields on the Demand form.	Assesses demand return on investment compared to other demands.
Cost	**Labor costs**, **Capital expense**, and **Operating expense** fields on the Demand form.	Assesses demand cost compared to other demands.

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Assessment metric categories

In the Assessments application, a metric category represents a theme for evaluating assessable records in a given metric type.

Each category has a numeric weight value to indicate its importance relative to other categories. Within a category, records called metrics are the traits or values used to evaluate assessable records. For example, there are many categories within the **Vendor** metric type, including Support Rating, which contains metrics that measure the quality of vendors' customer support services. Assessable records must be associated to categories to be eligible for evaluation. Assessment administrators create categories and manage which assessable records each category is associated to.

Weight categories and metrics

When you create a metric category or metric, you must specify a weight, a numeric value that indicates the importance of the category or metric relative to other categories and metrics.

The greater the weight value, the more important the item is. The system uses weight values in assessment result calculations. Consider these recommendations when choosing weight values.

- Determine a weighting scale and use it consistently. In general, use a scale with a small numeric range. A standard 1-10 scale is usually appropriate, where 1 is least and 10 most important. Understand that increasing the maximum value of a weighting scale impacts all related result calculations.
- Use the same weighting scale for metric categories and metrics. Though there is no limitation, consider using the same or very similar weighting scales for both categories and metrics to make it easier to remember which values to use. A scale of 1-10 is an effective and simple weighting system, but may not be suitable for all organizations.

Note:
If you do not want to use weighting, set the same weight value for all categories and metrics. The default weight value is 10.

Related topics

Assessment metrics

Create an assessment metric for a category

Create an assessment metric definition

Metric templates

Update a metric minimum and maximum value to match a template

Create a category for assessable records

After you create a metric type and generate assessable records, create categories for the themes you are interested in using to evaluate the assessable records.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.
2. Click **New** to create a new metric category.
3. On the Metric Category form, fill in the fields.
   For a description of the field values, see Metric Category form.

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Related topics

- Assessment metrics
- Assessment metric categories
- Assessable record associations

Assessable record associations

Only the assessable records associated to a category can be evaluated using metrics in that category. Manage which assessable records you evaluate for each category by creating and removing the associations.

Only the assessable records associated to a category can be evaluated using metrics in that category. Manage which assessable records you evaluate for each category by creating and removing the associations.

Note:
You can also manage which categories an assessable record is associated to using the Assessable Record form.

Related topics

- Assessment metrics
- Create a category for assessable records

Manage an assessable record automatically

Define at least one filter condition in the Metric Category form to automatically associate assessable records with the category.

Before you begin
Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.
2. Open a category.
3. In the **Filter** field, create a condition statement that defines the records you want to associate to this category.

   The available fields are from the table defined for the metric type. For example, for a category in the **Vendor** type, you might create the condition **[Country] [is] [Germany]**. Metrics in the category will be used only to evaluate vendors that are located in Germany.
4. Save the record.

   The system associates this category to all assessable records that match the filter condition. As the system generates new assessable records that match the condition, it associates them to this category. If you change the filter condition, the system removes and creates assessable record associations, as appropriate.

   Note the following:

   - The system does not remove assessable record associations created manually, even if the assessable records do not match the filter conditions.
   - The system deletes any related stakeholders, if applicable, when it disassociates assessable records from a category.

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- The system does not create or remove assessable record associations if the related source records change. For example, consider the previous example in which all assessable records for vendors based in Germany were associated to a particular category. Assume that a user changes the **Country** of one of the vendor records from **Germany** to **Canada**. The system does not disassociate the related assessable record from the category, even though it no longer matches the filter condition.

Note:
To configure the system to automatically associate all assessable records from a metric type to a category, use the same category condition as the metric type condition. For example, if the **Vendor** metric type has the condition **[Vendor] [is] [true]**, create the same condition for the category. If the metric type does not have a condition specified, you can use the category condition **[Sys ID] [is not empty]**, which includes all records from any table.

Related topics

Assessment metrics

Create a category for assessable records

Manage an assessable record manually

You can manually create and remove assessable record associations for a category using a related list on the Metric Category form.

Before you begin
Role required: assessment_admin or admin

About this task
Keep in mind that when you disassociate an assessable record from a category, the system deletes any related stakeholders, if applicable, and you can no longer evaluate the assessable record using metrics in that category.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.
2. Open a category.
3. In the **Assessable records** related list, click **Edit** and use the slushbucket to add or remove one or more assessable records.

   Only assessable records associated to this category's metric type are available for selection.

Related topics

Assessment metrics

Create a category for assessable records

Delete a category

When you delete a category, the system also deletes the associated category users and stakeholders.

Before you begin
Role required: assessment_admin or admin

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Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.

   Alternatively, navigate to a record that contains a related list for categories.

2. Open a record from the list.
3. On the Metric Category form, click **Delete**.
4. Click **OK** when asked to confirm the action.

   The system displays messages at the top of the form describing the actions taken.

Related topics

Assessment metrics

Create a category for assessable records

Assessment metrics

In the Assessments application, a metric is a trait or value used to evaluate assessable records.

Depending on the metric method, a metric can be used as either of the following:

- A question on assessment questionnaires, to obtain a subjective value such as how much people enjoy using each cell phone offered in the service catalog.
- A script that queries the database, to obtain an objective value such as the number of incidents related to each cell phone.

Each metric is associated to one metric category and can be used to evaluate assessable records for that category only. For example, the Support Rating category contains metrics that measure the quality of vendors' customer support services. One metric addresses the quality of product documentation. Others address the strength of the user community, self-service options, online training, and other support services. Each metric has a numeric weight value to indicate its importance relative to other metrics in the same category.

Assessment administrators can create and administer metrics and metric templates, which define reusable sets of answer options for metrics used as assessment questions. If you decide to use metric templates, you may want to create them before you create metrics.

Note:
Changes to assessment metrics and metric templates are reflected in assessment questionnaires and results, even if users have saved responses already. If possible, avoid changing the original meaning of a metric question, the data type, or any metric templates in use by existing assessments.

Related topics

Update a metric minimum and maximum value to match a template

Create an assessment metric for a category

After you create a category, create metrics you can use to evaluate the assessable records for that category.

Before you begin

Role required: assessment_admin or admin

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About this task

When you create metrics, consider the focus of the category and what characteristics you want to measure for the items you will assess.

Procedure

1. Navigate in one of the following ways.

Option	Description
Assessments > **Metric Definition** > **Categories**	Open a category, and locate the **Assessment Metrics** related list. This is the suggested navigation path, as the system links metrics to the category from which they are created.
Assessments > **Metric Definition** > **Metrics**	

2. Click **New**.
3. On the Assessment Metric form, fill in the fields.
   For a description of the field values, see Assessment Metric form for a category.
4. Save the record.
   When you create a **Choice** or **Likert Scale** question, reopen the Assessment Metric form after you submit it to create a metric definition. If you distribute a questionnaire without creating the answers for questions with these data types, recipients are unable to answer the quesitons. If the questions are mandatory, the recipients are unable to submit their questionnaires.

Related topics

Assessment metrics

Create an assessment metric definition

Update a metric minimum and maximum value to match a template

Create an assessment metric definition

Metrics with Choice or Likert Scale data types must have metric definitions defined to represent answer options on questionnaires.

Before you begin

Role required: assessment_admin or admin

About this task

Each metric definition appears as one answer option for a question on an assessment questionnaire. For example, a metric for the question "How satisfied are you with the quality of this vendor?" has three metric definitions to create these answer options: **Very satisfied**, **Somewhat satisfied**, and **Not at all satisfied**.

Procedure

1. Open the metric record you want to edit.
2. In the **Assessment Metric Definitions** related list, click **New** to create a new metric definition.
3. Fill in the fields:

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- **Display:** Enter the text you want to appear as the answer option.
- **Value:** Enter the numeric value, greater than or equal to zero, to which the answer option equates. Values are used to calculate metric results. When you view assessment questions, metric definitions appear in order from least to greatest value.
  - The system sets the minimum and maximum values according to the metric definition values.
  - To prevent reporting confusion, no two metric definitions for a given metric should have the same Value.

4. Click **Submit**.

Related topics

Assessment metrics

Metric templates

Change the order of an answer

By default, the order of answer options is established when a question is created with a data type of **Choice** or **Likert Scale**.

Before you begin

Role required: assessment_admin or admin

About this task

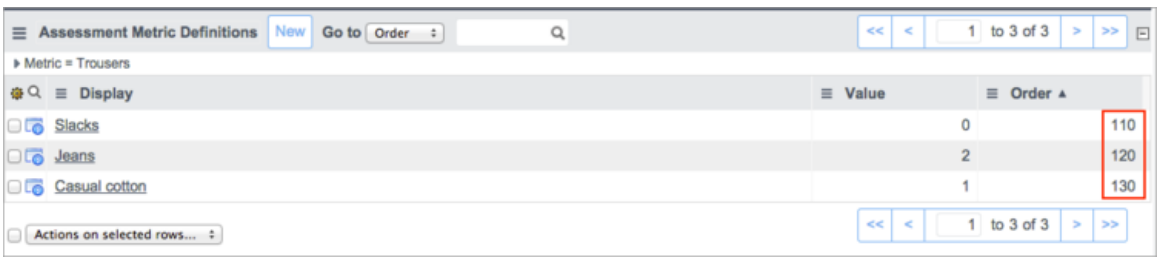
The system creates an Order value for each choice based on where it appears in the original list when you submit it. This order corresponds to the **Value** setting you give the answer. The choice with the lowest order number appears first, and the choice with the highest order number appears last. If you want to reconfigure the order of the answer options, you must do so by editing the **Order** field and not the **Value** field.

The **Order** column is hidden in the base system.

Procedure

1. Access the question record.
2. Configure the Assessment Metric Definitions related list to display the **Order** column.
3. Edit the order number in the list.

Note:
The **Value** setting remain the same for each answer option after reorganization.



Related topics

Assessment metrics

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Metric types and assessable records

In the Assessments application, assessment administrators create and administer metric types and assessable records.

A metric type defines a set of records an organization wants to evaluate, such as vendors, projects, or employees. For each type, the system generates unique assessable records that link the type to records that need to be evaluated, such as the individual records for the vendors Amazon and Intel. There may be multiple assessable records for the same source record if the source record meets the criteria for more than one type. For example, you might want to evaluate a record on the Company table, such as Intel, as a vendor and as a manufacturer, with different categories and metrics.

For configuration suggestions, see Assessment administrator tasks.

Assessable records

An assessable record links a source record you want to evaluate, such as the company record for Amazon or the user record for a sales representative, to a metric type, such as vendors or employees.

You use assessments to evaluate the assessable record. The system generates assessable records from the source records that match the table and conditions set on the Assessment Metric Type form. You evaluate the assessable records with metric categories and metrics, which define traits and values to assess. For metric types with the **On demand** schedule type, you can generate on-demand assessments from the Assessable Record form. This method of assessment generation makes it easy to create and preview short questionnaires or to quickly obtain assessment results for specific assessable records.

You can set up an assessment description that includes information from multiple fields on an assessable record and is displayed on multiple lines. This set up provides the user who is taking the assessment with a more detailed and understandable description of the information being requested on the assessment questionnaire. Create a multi-line description using table titles, which can be defined to use one or more fields from the selected table.

Related topics

- Use update sets for surveys and assessments
- Metric types and assessable records
- View an assessable record

Create metric types and generate assessable records

Create a metric type, which sets a table and filter conditions that define a set of records to evaluate.

Before you begin

Role required: assessment_admin or admin

About this task

For example, the Vendor Performance application provides the **Vendor** metric type, which defines an assessable record for each source record in the Company [core_company] table that has the **Vendor** field selected. Create a metric type for each set of records you want to evaluate, such as vendors, users within an organization, or projects.

In addition to defining assessable records, metric types also determine how to filter decision matrix data and set the schedule type, which determines whether assessments are on-demand or scheduled.

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Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Click **New**.
3. On the form, fill in the fields.

Metric types form

Field	Description
Name	[Required] Name of the type. It may be practical to give the type a name that indicates which records it defines.
Assessment duration	Amount of time assessors have to complete their assigned questionnaires, starting from the time the assessment is generated. The assessment duration sets the **Due date** that appears on assessment instances. Changes made to the duration of an attestation in the GRC Control Test Definition form are updated dynamically in this field. The default duration is 14 days.
Live feed	Check box that determines whether to enable (selected) or disable (cleared) the Live Feed view in scorecards for all assessable records created from this type.
Notify manager if overdue	Check box that determines whether to send (selected) email notifications a user's manager when that user fails to submit an assigned questionnaire on time.
Assessment manager	Manager for this assessment metric type. These users are responsible only for managing the assessment process and not the results. The system notifies the assessment manager when an assessment for this metric type is past due.
Scoring type	Scoring method to use for questions with a data type of attestation. The possible selections are: ○ **Percent**: Attestation score as a weighted percentage of correct answers for scored questions. When you select this scoring type, categories can be scored as **Percent** or **All or nothing**. ○ **All or nothing**: Requires all answers for attestation type questions to be correct, or the score is zero for the entire attestation. When you select this scoring type, all categories are scored automatically as **All or nothing**.
Scale factor	[Required] Number to represent the best possible score for assessment results. All results for assessments of this type are scaled to this number. 10 is generally a good scale factor. **Note:** This field becomes read-only when it contains a value and you save the metric type. Choose a scale factor you are satisfied with before you save the metric type.
Pagination setting for Service Portal view	Specify how the user will see pages on the desktop or tablet view in Service Portal.

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Field	Description
	○ **Category**: Display each category on a separate page. The categories appear in the following order: ▪ Each category appears in sequence on a separate page for the first assessable record ▪ Then each category appears in sequence on a separate page for the next assessable record ▪ and so on ○ **Question**: Display each question on a separate page. Questions appear on separate pages for mobile devices regardless of this setting. Each question appears for each category as described for the **Category** setting. ○ **None**: All items on a single page—no pagination Default: **Category** **Note:** This field appears only when Service Portal is installed.
Roles	Additional user roles that can view the results and access records associated with this type. Users with the specified roles have read access to this type record as well as to associated categories, metrics, assessable records and scorecards, category users, stakeholders, and decision matrixes. **Note:** Users with these roles do not have access to Assessments modules unless they are also assessment administrators. Users with these roles can navigate to the records by other means, such as from reference fields on assessment instances. This field provides the option to easily grant certain users access to specific assessment data in special cases. For example, the **Vendor** metric type provides access to users with the vendor_manager role so they can view results and compare assessable records when they open scorecards or decision matrixes in the Vendor Performance application.
Signature	[Optional] Acknowledgement by a survey recipient of requirements, admonitions, or expectations related to an assessment. For more information, see Create an assessment signature.
Return URL	Destination address of a web page that is presented to users after they submit an assessment for this metric type. When a return URL is configured, the end note content does not appear.
State	[Read-Only] Status of the assessment: **Draft** or **Published**.
Business rule	[Admin only] Business rule the system creates to monitor the specified table. When a new record is added to the table that meets the metric type conditions, the business rule generates a corresponding assessable record. If someone changes the table or conditions of the metric type, the system updates the business rule to reflect the changes. Existing assessable records associated with the metric type are not affected.
Schedule type	Setting that determines which assessment process to use. Select **On demand** or **Scheduled**.

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Field	Description
Scheduled job	[Admin only] Scheduled job the system creates to generate assessments for this metric type. This field is populated the first time you save the record. The scheduled job name follows the format <type name> Assessment Creation. Administrators can configure a recurring assessment generation schedule for the metric type. This field is visible only when the schedule type is **Scheduled**. **Note:** If you change the schedule type from **Scheduled** to **On demand**, the system deletes the scheduled job. If you change the schedule type back to **Scheduled**, the system creates a new scheduled job. The previous assessment generation schedule is not saved, but can be reconfigured if desired.
Evaluation method	[Admin only] Indicates the evaluation method for this metric type. The system sets this field based on how the metric type is created. The possible evaluation methods are: ○ **Assessment**: Default filter value for metric types. Only this evaluation method uses assessable records, conditions, and stakeholders. ○ **Attestation**: For details, see Attestations - Legacy. ○ **Survey**: For details, see Survey definitions.
Scale factor	[Required] Number to represent the best possible score for assessment results. All results for assessments of this type are scaled to this number. **10** is generally a good scale factor. **Note:** This field becomes read-only when it contains a value and you save the metric type. Choose a scale factor that you are satisfied with before you save the metric type.
Allow retake	Check box that allows users to modify their answers to a completed assessment, quiz, survey, or attestation. After the due date, the system removes the assessment from the user's My Assessments and Surveys page.
Active	Check box that determines whether the metric type is active. When the metric type is inactive (cleared), assessment generation is disabled and users cannot take existing assessments.
Description	Helpful information about this type. Enter a clear description of the type and its purpose.
Introduction	Introductory content to display on assessment questionnaires. Consider adding a company logo, a welcome message, background information about the survey, or instructions. You may need to configure the form to see this field.
End note	Content to display on the screen that appears when someone submits an assessment questionnaire. Consider adding a thank you message, followup instructions, or other applicable information. You may need to configure the form to see this field. End notes are not displayed if a **Return URL** is specified.
Send notifications	Select the check box to send notifications for this assessment, survey, or attestation. You may need to configure the form to see this field.

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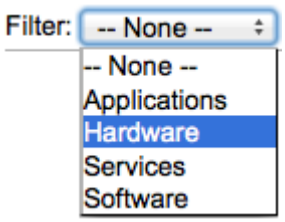
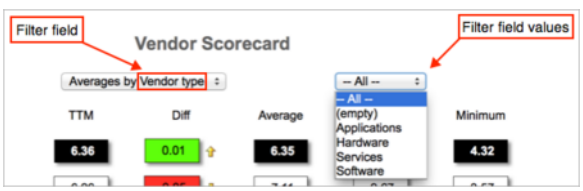
Field	Description
Condition section	
Table	[Required] Table that contains the records you want to evaluate. The system creates assessable records for records on this table that meet the conditions you specify, if any. The number of matching records appears as a link by the **Condition** field. The link dynamically updates if you change the table selection. Click the link to open the list of matching records in a new tab or window. **Note:** Additional roles are required to view the records on certain tables. If you select a table that you do not have access to, a warning message appears by the **Condition** field where the number of matching records would be. You cannot generate assessable records for tables you do not have sufficient roles for.
Enforce condition	Check box that determines what happens to assessable records when you change the selected table or conditions.
Condition	Condition builder that defines specific records to assess from the selected table. If you do not specify any conditions, the system creates assessable records for all records on the selected table. Click the refresh icon to update the adjacent record count.  **Note:** If you change the table or conditions, you must click **Generate Assessable Records** to create new assessable records.
Decision Matrix section	
Filter field	[Required] Field on the selected table that can be used to filter results on decision matrixes and scorecards. For example, if the selected table is **Company** `[core_company]` and you choose **Vendor type** as the filter field: ○ When you view decision matrixes for this type, the decision matrix menu to filter plotted items lists vendor types: **Applications**, **Hardware**, **Services**, and **Software**.  ○ On scorecards for this type, the Averages view displays ratings by vendor type. 

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Field	Description
Filter condition	Condition builder that defines which records from the table are available as choices on the filter menu. For example, if the filter field is **Vendor type** and you create the filter condition **[Name] [does not contain] [Hardware]**, only records with vendor types of **Applications**, **Services**, and **Software** are possible choices as decision matrix filters.
Default matrix filter	Record to use as the default filter choice on decision matrixes and scorecards. The selected **Filter field** and **Filter condition** control the available record choices. To see the records, if any, click the refresh icon next to the field. Consider the case that the filter field is **Vendor type** and you select **Applications** as the default matrix filter. The filter choice on decision matrixes for this type is set to **Applications** by default. If you change the value of the **Table** or **Filter condition** field, you must click the refresh icon to view the updated **Default matrix filter** choices. If you do not, the system selects the first available choice from the updated field choices when you save the record.
Related Lists	
Metric Categories	All metric categories associated with the type.
Assessable Records	All assessable records associated with the type. This related list is hidden in the Attestation view of this form.

The **Generate Assessments** button is visible to administrators in certain cases for scheduled assessments. Do not click the button until after completing the prerequisite tasks.

4. When you are satisfied with the type settings, click **Generate Assessable Records** to save the record and create assessable records.
   You must click **Generate Assessable Records** to create the initial set of assessable records based on the table and conditions specified on the type record. After that, the system creates an assessable record each time a new matching record is created. **Generate Assessable Records** is located under **Related Links**.

   Note:
   Clicking **Generate Assessable Records** can trigger the deletion of existing assessable records under certain circumstances. For more information, see Enforce a condition to delete an assessable record.

   The page redirects to the list of assessable records created.

Related topics

Assessment scorecard averages

Schedule an assessment

Schedule types

Set an assessment generation schedule

On-demand assessments

Enforce a condition to delete an assessable record

Metric types and assessable records

Configuring the form layout

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Delete a metric type

Deleting a metric type entails deleting many related records.

Before you begin
Role required: assessment_admin or admin

About this task
You must delete some of these records manually before deleting the type, while the system deletes others automatically with the type.

Procedure

1. Delete the records associated with the type to delete:
   - Assessment results (metric and category results)
   - Assessment instance (questions and assessment instances, in that order)
   - Assessment groups
2. Delete the type.

   A confirmation dialog box appears and alerts you that certain records associated with the type will also be deleted.
3. Click **OK** to delete the type and these related records:
   - Scheduled job for assessment generation
   - Business rule for assessable record generation
   - Assessable records
   - Metric categories
   - Category users
   - Stakeholders
   - Metrics
   - Metric definitions
   - Decision matrixes

Related topics

Metric types and assessable records

Export an assessment

You can share assessments between ServiceNow instances by exporting an assessment and then importing the assessment on another instance.

Before you begin
Role required: assessment_admin or admin

Note:
Update sets are available in the Helsinki release and should be used to move data from one instance to another. For information about update sets, see System update sets.

About this task
Note:
The system exports a single XML file that does not contain result data.

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The XML file contains a metric type [asmt_metric_type] and the following records that are associated with the type:

- Assessable records [asmt_assessable_record]
- Metric categories [asmt_metric_category]
- Metrics [asmt_metric]
- Metric definitions [asmt_metric_definition]
- Category users [asmt_m2m_category_user]
- Stakeholders [asmt_m2m_stakeholder]
- Decision matrixes [asmt_decision_matrix], [asmt_m2m_xcategory_matrix], and [asmt_m2m_ycategory_matrix]

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Right-click the record and select **Export Assessment**.
3. Save the XML file.

Related topics

Import an assessment

Metric types and assessable records

Import an assessment

Share assessments between ServiceNow instances by importing a previously exported assessment.

Before you begin

Role required: admin

Note:
Update sets are available in the Helsinki release and should be used to move data from one instance to another. For information about update sets, see System update sets.

Procedure

1. Ensure that the target instance has assessments enabled.
2. Import the assessment.

Related topics

Export an assessment

Use update sets for surveys and assessments

Use an update set to capture changes to surveys and assessments.

Before you begin

Role required: admin or survey_admin

Procedure

Create an update set and use it to make changes on a development instance.

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Note:
For more information, see System update sets.

When developing surveys and assessments, use an update set to capture the changes and move them from a development instance to a production instance. Once an update set is created and marked current, all of the updates to the following tables are recorded in the update set.

The following tables are now update set enabled and also extend the application file:

- Assessment Metric Templates [asmt_template]
- Assessment metric type [asmt_metric_type]
- Assessment Template Definitions [asmt_template_definition]
- Assessment Metric Definitions [asmt_metric_definition]: survey question answer options
- Schedule [sys_trigger]: scheduled jobs associated with the survey
- Assessment Metric Categories [asmt_metric_category]: survey categories
- Assessment Metrics [asmt_metric]: survey questions
- Assessment Category Users [asmt_m2m_category_user]: survey users
- Trigger Conditions [asmt_condition]

Create an assessment signature

A signature on an assessment questionnaire contains assertions that can communicate directions, a legal statement, or any text that you want the recipient to consider.

Before you begin

Role required: assessment_admin or admin

About this task

You can require the recipient to select a check box or provide a full signature to acknowledge acceptance of the assertion before submitting the form. You can display assertions without requiring a signature. An assessment property called **Require authentication for user signature** allows you to require users to provide their user name and password when an assessment asks for a full name signature.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Signatures**.

   All signatures in the system appear in this list.

2. Click **New**.
3. Complete and submit the form using the fields in the table.

Assessment signature fields

Field	Description
Name	Descriptive name for this signature
Signature type	Type of signature required. The selections are **Checkbox**, **Full name**, or **Assertion only**. If **Assertion only** is selected, no signature is required to submit the questionnaire. By default, the system requires user authentication for a full name entry.
Assertion	Text to present to recipients that requires acknowledgement.

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Assessable records

An assessable record links a source record you want to evaluate, such as the company record for Amazon or the user record for a sales representative, to a metric type, such as vendors or employees.

You use assessments to evaluate the assessable record. The system generates assessable records from the source records that match the table and conditions set on the Assessment Metric Type form. You evaluate the assessable records with metric categories and metrics, which define traits and values to assess. For metric types with the **On demand** schedule type, you can generate on-demand assessments from the Assessable Record form. This method of assessment generation makes it easy to create and preview short questionnaires or to quickly obtain assessment results for specific assessable records.

You can set up an assessment description that includes information from multiple fields on an assessable record and is displayed on multiple lines. This provides the user who is taking the assessment with a more detailed and understandable description of the information being requested on the assessment questionnaire. Create a multi-line description using table titles, which can be defined to use one or more fields from the selected table.

Related topics

Metric types and assessable records

View an assessable record

View an assessable record

View the Assessable Record form to edit preferences and perform various actions.

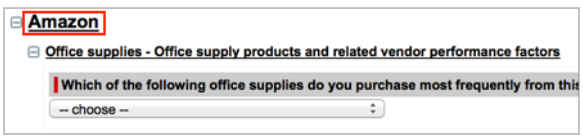
Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open a record from the list.
   By default, the list displays only assessable records with **Active** metric types.
3. On the Assessable Record form, edit fields and perform other actions as necessary (see table).

Viewing Assessable Records

Field	Description
Name	[Read-Only] Assessable record name based on the Select a field as the table display value of the source record. The name appears on assessment questionnaires. 
Source	[Read-Only] Source record the assessable record is linked to. The **Source** reflects the table name and source record display value. For example, if the **Name** field is the display value for the Company table, the assessable record for a company record named **Amazon** has the **Source** value **Company: Amazon**.
Live feed	Check box that, when selected, creates a live feed group for the assessable record, which appears on the scorecard. If you clear the check box after a live

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Field	Description
	feed group has been created, the system deletes the live feed group and all its messages.
Type	[Read-Only] Metric type from which the assessable record was generated.
Decision matrix	Check box that, when selected, enables this assessable record's results data to appear on decision matrixes of the same metric type. Decision matrixes are graphs that plot the assessment results for multiple assessable records. If you clear the check box, the assessable record still appears on the default decision matrixes if you click the **View Matrix** related link on the assessable record's scorecard.
Live feed group	[Read-Only] Live feed group for this assessable record. When you select the **Live feed** check box and save the record, the system populates this field.
Related Links	
View Scorecard	Opens the scorecard for the assessable record.
Related Lists	
Category	All metric categories associated with the assessable record. An assessable record must be associated to a category to be evaluated. Click **Edit** to add or remove category associations. Note that it is often more efficient to associate assessable records to categories using the Metric Category form.
Category users	All stakeholders who can take assessment questionnaires about this assessable record. Click **Edit** to create and delete stakeholders. For more information about this and other methods of creating stakeholders, see Stakeholders. This related list is available only when the associated metric type has the **Scheduled** schedule type.

Related topics

Metric types and assessable records

Enforce a condition to delete an assessable record

By default, the system does not delete assessable records, even if you change the table or conditions for the type and the existing assessable records no longer match.

Before you begin

Role required: assessment_admin or admin

About this task

The system can be configured so you can trigger the deletion of assessable records that do not match the type table and conditions.

Procedure

1. On the Assessment Metric Type form, select the **Enforce condition** check box to enable deletion of existing assessable records of this type that do not match the table or conditions specified.

   When the check box is cleared, the system retains existing assessable records of this type, even if they do not match the table and conditions specified.

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2. Click **Generate Assessable Records** to delete all assessable records associated with the type that do not match the current table and conditions.

   The system does not automatically delete assessable records, even if the **Enforce condition** check box is selected. You must click **Generate Assessable Records** with the check box selected every time you want the system to delete non-matching assessable records.

Related topics

Metric types and assessable records

Delete an assessable record

When you delete an assessable record, the system deletes any stakeholders for the record.

Before you begin
Role required: assessment_admin or admin

About this task

Note:
If a source record is deleted, the system deletes the associated assessable record. To delete the source record, you must first delete all associated metric results and category results.

Procedure

Delete the assessable record:

- To delete a single record, open the record and click **Delete**.
- To delete multiple records, use the Assessable Records list.

Related topics

Metric types and assessable records

Add a metric category and metric in the question bank for assessments

Reuse the question categories (metric categories) and questions (metrics) added in the question bank for assessments. You can add metric categories or metrics from the question bank to an assessment, or from the assessment to a question bank.

Before you begin
Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Assessments** > **Question Bank**.
2. Click **New**.
3. In the Metric Category form, fill in the fields.

Metric Category fields

Field	Description
Name	Name of the metric category.
Description	Description of the metric category.

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Field	Description
Total metrics	Total number of metrics in the metric category. This number is automatically updated when you add or delete metrics from the category.

4. Right-click on the title bar and click **Save**.
5. In the Assessment Metrics related list, click **New**.
6. In the Assessment Metric form, fill the fields.
   For more information on assessment metric fields, refer to .
7. Click **Submit**.

Configure metric categories or metrics for an assessment using the question bank

Reuse question categories (metric categories) and questions (metrics) from the **Question Bank** module while creating or updating an assessment.

Before you begin

Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definitions** > **Types**.
2. Open an assessment definition.
3. **Optional:** To add metric categories to an assessment from the question bank in Platform, perform the following steps.

   a. In the Metric Categories related list, click **New Category from Bank**.
   The New Category from Bank dialog box is displayed with a list of all metric categories added in the question bank.

   b. Select the required categories and click **Add Selected**.
   A copy of the metric category and the corresponding metrics is created in the Metric Categories related list.

4. **Optional:** To add metrics to an assessment from the question bank in Platform, perform the following steps.

   a. In the Metric Categories related list, open a metric category definition.

   b. In the Assessment Metrics related list, click **New Metric from Bank**.
   The New Metric from Bank dialog box is displayed with a list of questions available in the question bank.

   c. Select the required metrics and click **Add Selected**.
   A copy of the metric and the corresponding metric definitions is created in the Assessment Metrics related list of the category.

5. **Optional:** To add a metric category to the question bank from an assessment in Platform, perform the following steps.

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a. In the Metric Categories related list, open a metric category definition.

b. Click **Add to Question Bank**.
A copy of the category is created along with its metrics and metric definitions in the question bank.

6. **Optional:** To add a metric to the question bank from an assessment in Platform, perform the following steps.

a. In the Metric Categories related list, open a metric category definition.

b. In the Assessment Metrics related list, open the required metric definition.

c. Click **Add to Question Bank**.
The Add to Question Bank dialog box is displayed.

d. In the **Choose a question bank to add this question/metric** field, select a metric category that you want to add this metric to, and click **OK**.
A copy of the metric and the corresponding metric definitions is created for the selected category in the question bank.

Copy an assessment

Create a copy of an assessment with at least one category to reduce the effort of creating another assessment with similar data.

Before you begin
Role required: assessment_admin or admin

About this task
All associated questions (type), configurations, categories, metrics, domain separation rules, and role-based categories are copied. Assigned users, category users, instances, and trigger conditions are not copied.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Select an assessment metric type.
3. In the title bar, click **Copy**, or click the menu icon, and select **Copy**.

Create a metric template

Create a metric template to define reusable rating scales for evaluating non-scripted metrics.

Before you begin
Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Templates**.
2. Click **New**.
3. Fill in the **Name** field on the Assessment Metric Template form.
4. To use images for template choices, such as for image scale questions, select **Allow Image**.

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5. Click **Submit**.
6. Under the **Assessment Template Definitions** related list, click **New**.
   Create a template definition for each answer option you want to appear on an assessment question.
7. Fill in the following fields:
   - **Display:** Enter the text to appear as the answer option.
   - **Value:** Enter a numeric value, equal to or greater than zero, that you want the answer option to equate to. Values are used in results calculations.
   - **Selected Image**: Click to add the image to use for selected state.
   - **Unselected Image**: Click to add the image to use for unselected state.

   When you view assessment questions that use templates, answer options appear in order from least to greatest Value.

   Tip:
   To prevent reporting confusion, no two template definitions for a given template should have the same Value.

8. Click **Update**.

Related topics

Assessment metrics

Create an assessment metric for a category

Create an assessment metric definition

Metric templates

Metric templates define reusable rating scales for evaluating non-scripted metrics.

Each answer option on the scale is defined as a template definition, much like a metric definition. For example, the metric template named Satisfaction contains the template definitions: **Very Satisfied**, **Satisfied**, **Neutral**, **Dissatisfied**, and **Very Dissatisfied**.

Metric templates are available for metrics that have **Template** as the Data type. The following metric templates are available by default.

Default metric templates

Name	Assessment template definition
Likert 5	Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree
Satisfaction	Very Dissatisfied, Dissatisfied, Neutral, Satisfied, Very Satisfied
Frequency	Never, Seldom, Sometimes, Most of the time, All of the time
Amount	None, Few or little, Average amount, Many, Quite a lot
Size	Very Small, Small, Average, Large, Very Large
Quality	Very Poor, Poor, Average, Good, Very Good
Complexity	Very Complex, Complex, Moderate, Simple, Very Simple

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Related topics

- Assessment metrics
- Create an assessment metric definition

Update a metric minimum and maximum value to match a template

For assessment results to be properly calculated, the Min and Max values of a metric that uses a template must be equal to the smallest and largest template definition Value, respectively.

Before you begin

Role required: assessment_admin or admin

About this task

The system sets the **Min** and **Max** fields automatically when you create a metric of the Template data type, based on the template definition values. However, the system does not update these fields for existing metrics if you add a new template definition to a template or if you update the Value of an existing template definition. If the new Value is less than the minimum value of any metrics that use the template or greater than the maximum value, update the metrics accordingly.

To edit the minimum and maximum values for a question that has the Template data type:

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Metrics**.
2. Configure the Configure the list layout to show the **Min** and **Max** columns.
3. Run the following list filter condition: `[Template] [is] [<select the template you updated>]`
4. Ensure the Min and Max values match the smallest and largest template definition Value for the selected template, respectively.

   If the values do not match, edit the Min and Max directly from the list.

   Note:
   When the data type is Template, a UI policy prevents the editing of Min and Max from the form.

Related topics

- Assessment metrics
- Create an assessment metric for a category
- Create an assessment metric definition

Category users and stakeholders

Users who take assessments are individuals in your organization who have specific knowledge of the assessment categories and the records being assessed.

A person who is qualified to answer assessment questions from metrics in a specific category becomes a category user when associated to that category. A category user then becomes a stakeholder when associated to a specific assessable record.

The system determines which assessable records and questions a user receives by looking at the metric categories and assessable records for which those users are stakeholders. Assessment administrators can create and manage category users and stakeholders.

Note:
Category users and stakeholders are used only for scheduled assessments.

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Category users

Category users are users who can potentially answer assessment questions about a particular metric category for scheduled assessments. Category users should have special knowledge of the categories and the metrics those categories contain. A category user becomes a stakeholder when associated to an assessable record. Create at least one category user for each category you want to use for assessment questionnaires. There is no need for category users if the category contains only scripted metrics.

Stakeholders

A stakeholder is a category user with specific product or service knowledge, who is associated to an assessable record. A stakeholder is familiar with the assessable record and all the metrics within a specific category. The same category user can be associated to multiple assessable records, in which case the system creates a stakeholder record for each association.

There are multiple ways to create stakeholders:

- Configure the system to create stakeholders automatically.
- Associate multiple category users to multiple assessable records.
- Associate multiple category users to one assessable record.
- Associate one category user to one assessable record.

Note:
Ensure you establish the desired user and assessable record associations to categories before attempting to creating stakeholders.

Related topics

Create a category user

Associate multiple category users to multiple assessable records

Associate multiple category users to one assessable record

Associate one category user to one assessable record

Delete a stakeholder for multiple assessable records

Delete a stakeholder for one assessable record

Create a category user

Create category users by associating users in the system to metric categories.

Before you begin

Role required: assessment_admin or admin

About this task

When you create category users, choose users who are knowledgeable and can answer questions from that category. For example, a purchasing agent is a good category user for metrics that evaluate a vendor's discount practices.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definitions** > **Categories**.
2. Open a category record.

Note:
The category must be associated to a metric type that has the **Schedule type** set to **Scheduled**.

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3. In the **Users** related list, click **Edit**.
4. Select the appropriate users for this category.

Related topics

- Category users and stakeholders
- Associate multiple category users to multiple assessable records
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record
- Delete a stakeholder for multiple assessable records
- Delete a stakeholder for one assessable record

Create stakeholders automatically

You can configure the system to create stakeholders automatically from all category users and assessable records associated with a category using the **Create stakeholders** check box on the Metric Category form.

Before you begin

Role required: assessment_admin or admin

About this task

If you associate a user to the category, the system makes the resulting category user a stakeholder for all the assessable records associated to the category. Similarly, if you associate a new assessable record to the category, the system makes all category users stakeholders for that record if they are not already stakeholders.

Note:
Use the **Create stakeholders** check box with caution. You can end up with more stakeholders than you want and a large amount of unnecessary assessment data. Automatic stakeholder creation is best suited to assessment implementations in which category users are knowledgeable about all or most of the assessable records associated to each category.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.
2. Select a category.
3. Associate category users and assessable records to the category.
4. Select the **Create stakeholders** check box.
5. Click **Update**.
   All the category users are associated to all the assessable records as stakeholders.
6. In the **Assessable Records** related list, click **Edit**.
7. Using the slushbucket, associate an assessable record to the category.

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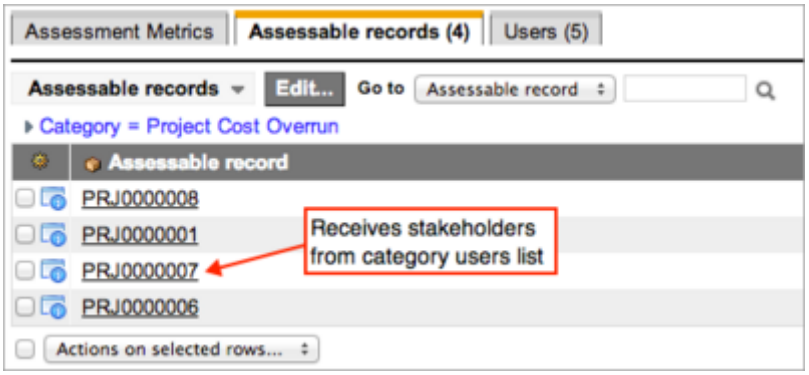
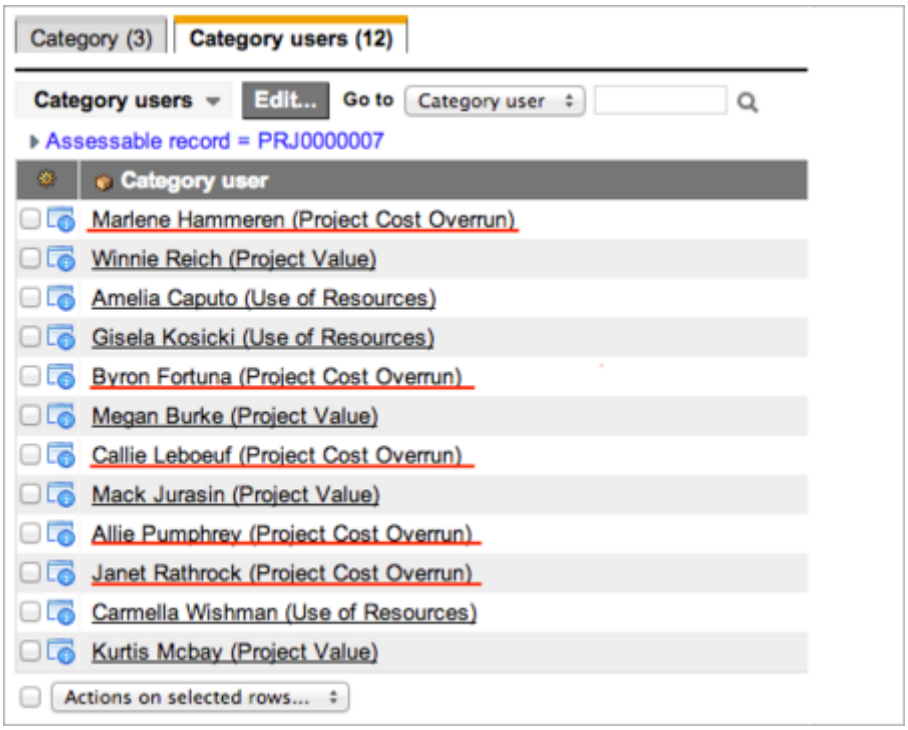


8. Click **Save**.
   The system makes all category users stakeholders for the new assessable record.



9. Delete stakeholders as needed.

Related topics

- Category users and stakeholders
- Create a category user
- Associate multiple category users to multiple assessable records
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record
- Delete a stakeholder for multiple assessable records
- Delete a stakeholder for one assessable record

Associate multiple category users to multiple assessable records

The stakeholder list helper in the create stakeholders module is the most efficient way to associate multiple category users to multiple assessable records in a single interface.

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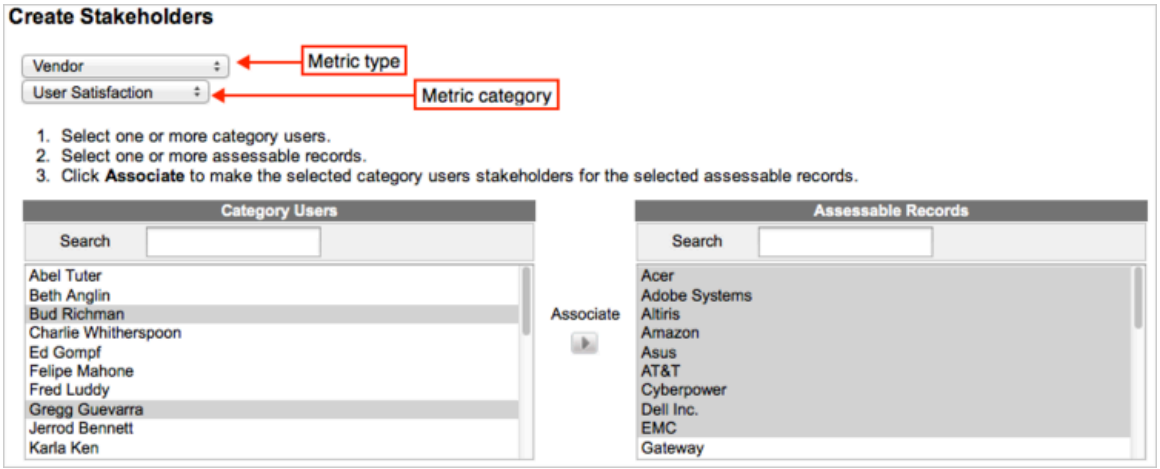
Before you begin
Role required: assessment_admin or admin

About this task
You can select category users from one category at a time.

Note:
You cannot edit or delete stakeholders using the list helper.

Procedure
1. Navigate to **All** > **Assessments** > **Advanced** > **Create Stakeholders**.
   The stakeholder list helper appears.



2. Select a metric type from the list of available types.

   Note:
   Only metric types for scheduled assessments are available. On-demand assessments do not use category users or stakeholders.

3. Select a category from the list of available categories.

   Note:
   Only categories within the selected metric type are available.

   The system populates the **Category User** and **Assessable Records** lists with category users and assessable records associated to the selected category.
4. Select one or more category users from the **Category Users** list.
5. Select one or more assessable records from the **Assessable Records** list.
6. Click the **Associate** arrow between the lists to complete the association.
   A message above the list helper advises you that the selected category users are now stakeholders for the selected assessable records.

Related topics
- Category users and stakeholders
- Create a category user
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record

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Delete a stakeholder for multiple assessable records

Delete a stakeholder for one assessable record

Delete a stakeholder for multiple assessable records

You can delete stakeholders for multiple assessable records.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Advanced** > **Assessment Stakeholders**.
2. Sort the list by **Assessable Record** or **Category User** depending on the perspective you want.
3. Select the check box for each stakeholder you want to delete.
4. Select **Delete** in the **Actions** choice list.
5. Click **OK** to confirm the action.
   The system deletes the stakeholders.

Related topics

Category users and stakeholders

Create a category user

Associate multiple category users to multiple assessable records

Associate multiple category users to one assessable record

Associate one category user to one assessable record

Delete a stakeholder for one assessable record

Associate one category user to one assessable record

Create a single stakeholder using the list in the Assessment Stakeholders module.

Before you begin

Role required: assessment_admin or admin

About this task

Associate any category user to any assessable record.

Procedure

1. Navigate to **All** > **Assessments** > **Advanced** > **Assessment Stakeholders**.
2. Click **New**.
3. On the Assessment Stakeholders form, fill in these fields:
   - **Category user**: Select a category user.
   - **Assessable record**: Select an assessable record.
4. Click **Submit**.

Result

The selected category user becomes a stakeholder for the selected assessable record. To verify the association, navigate to the assessable record and note that the selected category user is on the Category users related list.

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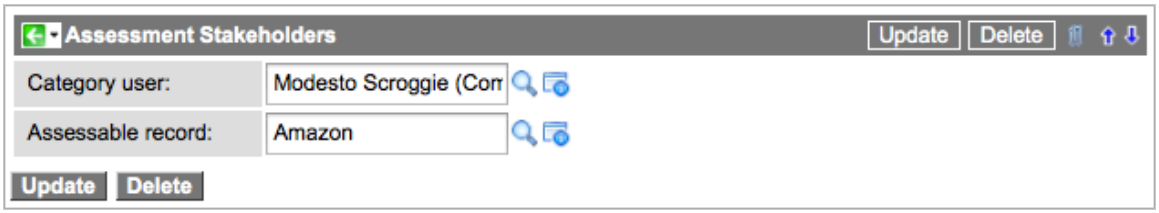

Note:
Do not create stakeholders from category users and assessable records of different metric types.

Related topics

- Category users and stakeholders
- Create a category user
- Associate multiple category users to one assessable record
- Associate multiple category users to multiple assessable records
- Delete a stakeholder for multiple assessable records
- Delete a stakeholder for one assessable record

Associate multiple category users to one assessable record

Create many stakeholders for a single assessable record from the Assessable Record form.

Before you begin
Role required: assessment_admin or admin

About this task
You can also edit or delete stakeholders from the form.

Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open a record from the list.
3. In the **Category users** related list, click **Edit**.
   These category users are the stakeholders for this assessable record.

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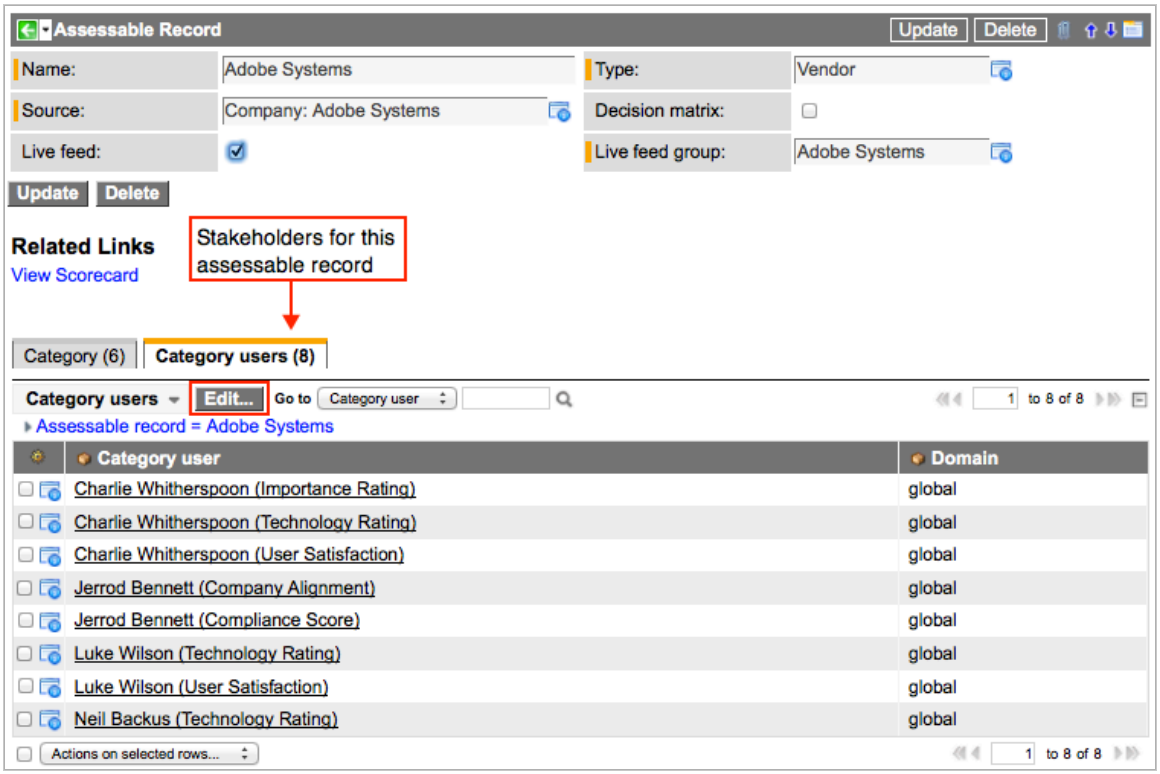

4. Add category users to create stakeholders or remove category users to delete stakeholders. The system shows only category users for categories associated to the assessable record. For example, if an assessable record is associated only to the Compliance Score and Support Rating categories, User Satisfaction category users will not be listed.

Related topics

- Category users and stakeholders
- Create a category user
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record
- Delete a stakeholder for multiple assessable records
- Delete a stakeholder for one assessable record

Delete a stakeholder for one assessable record

You can delete stakeholders for one assessable record.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open an assessable record.
3. In the **Category Users** related list, select the check box for each stakeholder you want to delete.
4. Select **Delete** in the **Actions** choice list.

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5. Click **OK** to confirm the action.
   The system deletes the stakeholders.

Related topics

- Category users and stakeholders
- Create a category user
- Associate multiple category users to multiple assessable records
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record
- Delete a stakeholder for multiple assessable records

On-demand assessments

On-demand assessments can be generated for metric types with the *Schedule type* field set to *On demand*.

For the system to properly generate on-demand assessments, the metric type must be active and published. The metric type must also be associated to at least one metric category. That metric category must be associated to one or more of each of the following items:

- Assessable record
- Metric

By default, an assessment administrator can generate an on-demand assessment for one assessable record or multiple assessable records.

Related topics

- Assessment generation
- Scheduled assessments
- Generate an on-demand assessment for multiple assessable records
- View an assessment instance
- Clean up assessment data

Generate an on-demand assessment

Use on-demand assessments to familiarize yourself with the basic assessment process and test your questionnaires using minimal configuration.

Before you begin

Role required: assessment_admin or admin

About this task

Select the assessable records to evaluate, create the categories and questions, and then assign an assessment to a user in the system. Pre-configured stakeholders are not used for on-demand assessments.

Procedure

1. Create a metric type and set the **Schedule type** to **On demand** to allow for testing of your assessment configuration.
2. Generate the assessable records for the metric type you created.
3. Create the metric categories required to evaluate the assessable records selected.

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4. Create one or more assessment questions, or metrics, for each category.
5. Publish the assessment.
6. Perform an on-demand assessment to test your categories and metrics.
7. Analyze the assessment ratings in an assessment scorecard or decision matrix.

Related topics

Assessments

Generate an on-demand assessment for one assessable record

When you generate an on-demand assessment from the Assessable Record form, the resulting assessment contains questions from the categories associated to the assessable record.

Before you begin

Role required: assessment_admin or admin

Publish the assessment.

Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open an assessable record associated to a metric type that has the **On demand** schedule type.
3. To assign the assessment to users configured in the **Assessors** tab of the assessment, and other specified users, perform these steps.
   a. On the Assessment Metric Type form, click **Assign Assessment**.
   b. Select a user from the Recent Assessors list or select a different user.
   c. Click **OK**.
4. To assign the assessment to users configured in the **Assessors** tab of the assessment, click **Assign to Assessors**.

Result

The system generates an assessment instance assigned to the selected users.

Related topics

Assessment generation

Scheduled assessments

Clean up assessment data

Generate an on-demand assessment for multiple assessable records

When you generate an on-demand assessment from the Assessment Metric Type form, the resulting assessment contains questions from all categories associated to any assessable records for the metric type.

Before you begin

Role required: assessment_admin or admin
Publish the assessment.

About this task

For example, if there are 15 assessable records associated to at least one category with assessment metrics, the assessment contains questions for all 15 assessable records.

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Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open a metric type that has the **On demand** schedule type.
3. To assign the assessment to users configured in the **Assessors** tab of the assessment, and other specified users, perform these steps.
   a. On the Assessment Metric Type form, click **Assign Assessment**.
   b. Select a user from the Recent Assessors list or select a different user.
   c. Click **OK**.
4. To assign the assessment to users configured in the **Assessors** tab of the assessment, click **Assign to Assessors**.

Result

The system generates an assessment instance assigned to the selected users.

Related topics

Assessment generation

Generate a scheduled assessment manually

Assessment groups

Clean up assessment data

Generate an assessment with the on-demand API

The Assign Assessment buttons call an API to generate on-demand assessments.

Before you begin

Role required: assessment_admin or admin

About this task

Procedure

1. To generate an assessment, call the AssessmentCreation API from any script in the system, such as a business rule or client script.
2. Use the sys_ids of these items:
   - An assessable record to evaluate. The assessable record must be associated with an on-demand type and at least one category that contains non-scripted metrics.
   - One or more users who should perform the assessment. The API generates a questionnaire about the specified assessable record for each user.

Related topics

Assessment generation

Scheduled assessments

Generate a scheduled assessment manually

Generate a vendor type assessment manually

Set an assessment generation schedule

Assessment instances

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View an assessment instance

Clean up assessment data

Scheduled assessments

The system generates a unique scheduled job for each metric type with the **Schedule type** field set to **Scheduled**.

The system generates a unique scheduled job for each metric type with the **Schedule type** field set to **Scheduled**. Each scheduled job generates assessment components for the related metric type. By default, the scheduled job runs when an administrator executes it manually, but administrators can set a schedule to generate assessments automatically on a recurring basis.

For the system to properly generate scheduled assessments, the metric type must be active and published. The metric type must also be associated to at least one metric category. That metric category must be associated to one or more of each of the following items:

- Assessable record
- Stakeholder associated to one of the assessable records
- Metric

Related topics

Assessment metrics

Schedule an assessment

After you have evaluated your questionnaires using on-demand assessments, edit your categories and metrics as needed, reset your metric type record, and select the users who are qualified to evaluate the assessable records.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Open the metric type you created for the on-demand assessment and set the **Schedule type** to **Scheduled**.
2. Make sure the categories and metrics you created for the on-demand assessment are correct.
3. Create category users who have special knowledge of your categories.
4. Create stakeholders by associating category users to specific assessable records.
5. Set a schedule for automatic assessment generation or generate the assessment manually.

   Note:
   This procedure must be done by a system administrator.

6. Configure email notifications to remind users of their assigned assessments and to report to managers when an employee misses an assessment deadline.
7. Analyze the assessment ratings in an assessment scorecard or decision matrix.

Related topics

Assessments

Schedule types

You can schedule assessments for preconfigured users or send them to any user on demand.

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On-demand assessments require less setup. Scheduled assessments define users, or stakeholders, who have specific knowledge of the records being evaluated, and automatically send out assessment questionnaires to those users at scheduled intervals. The best practice is to configure an on-demand assessment first to familiarize yourself with the process and test your questionnaires. When you are satisfied with your categories and questions, reconfigure for a scheduled assessment. These configuration paths are the easiest for both assessment types. Refer to Key Terms for definitions of the terms used in these procedures.

Related topics

Assessments

Set an assessment generation schedule

You can set assessment generation schedules. You must set a schedule for each metric type individually.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open the appropriate metric type record.
3. Click the reference icon next to the **Scheduled job** field to open the Schedule Item record.
4. Locate the **Trigger type** field and set a recurring schedule for the scheduled job.

   For example, if you want to generate assessment components each month, select the **Interval** or **Repeat** trigger type and specify a **Repeat** value of 30 days. Alternatively, select **Day in Month** and specify a Run time and Run day of month.

   The optimal frequency of assessment generation is subjective. When you set the schedule, keep in mind the number of records to evaluate, how often your organization requires updated assessment results, the time and effort required of users to complete assessments, and other relevant factors.

Publish a metric type

Before it is possible to generate assessments, an assessment administrator must publish the associated metric type.

Before you begin

Role required: assessment_admin or admin

About this task

The **State** field on the Assessment Metric Type form indicates whether the type is published. The default state is **Draft**, which disables the system from generating assessments.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open a metric type record, and click **Publish**.

   The **Publish** button is available only if the state is **Draft** and there is at least one metric associated with the type.

Note:
A metric type cannot be moved back to the **Draft** state after it has been published.

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Generate a scheduled assessment manually

Administrators can generate scheduled assessments manually.

Before you begin
Role required: assessment_admin or admin

About this task
Use this option, for example, if you have set a schedule but want to generate assessments before the next scheduled run date.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open the appropriate metric type record.
3. Click **Generate Assessments** to trigger the scheduled job immediately.

> **Note:**
> Be careful to click **Generate Assessments**, not **Generate Assessable Records**.

Generate a vendor type assessment manually

The Vendor Performance feature provides a direct method of generating assessments for the Vendor metric type.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Vendor Performance** > **Admin** > **Generate Assessments**.
2. Click **Generate Assessments** to execute the scheduled job for the **Vendor** type.

Clean up assessment data

The assessment process generates a considerable amount of data, some of which is not useful after a short time.

Before you begin
Role required: assessment_admin or admin

About this task
The assessment process generates a considerable amount of data, some of which is not useful after a short time. Assessments include a scheduled job called *`Remove Old Assessment Data`* that is available to administrators only. The scheduled job removes these items if they are more than a year old:

- Assessment instance questions
- Assessment instances
- Metric results

By default, the scheduled job is executed manually. Administrators can configure the scheduled job to run automatically on a recurring schedule.

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Procedure

1. Navigate to **All** > **System Scheduler** > **Scheduled Jobs** > **Scheduled Jobs**.
2. Open the **Remove Old Assessment Data** record.
3. On the Schedule Item form, set the **Trigger type** field to run the scheduled job on a recurring schedule.

   It is recommended to set the scheduled job to run on a weekly or monthly basis.
4. **Optional:** Click **Execute Now** to run the scheduled job.

Assessment instances

An assessment instance represents one occurrence of a questionnaire assigned to one user.

The system generates assessment instances only when the required conditions are met, as described in Scheduled assessments and On-demand assessments, and there are non-scripted metrics in at least one category.

When the system generates scheduled assessments for a metric type, each assessment instance contains questions about assessable records and categories related to the stakeholder to which it is assigned.

Example:

Recall that there can be multiple stakeholder records associated with one user record. Minh Leclare is a stakeholder for these items related to the **Vendor** metric type:

Assessable records

Assessable record	Category
Amazon	User Satisfaction
Acme	User Satisfaction
Acme	Reliability
Cisco	Reliability

When the system generates a scheduled assessment, Minh is assigned one assessment instance to evaluate Amazon, Acme, and Cisco by answering questions from the categories as a stakeholder. Assuming that there are three questions in the User Satisfaction category and six questions in Reliability, Minh's questionnaire contains three questions about Amazon, nine questions about Acme, and six questions about Cisco.

When the system generates an on-demand assessment for a specific assessable record, the assessment instance contains questions about that assessable record and all its associated categories. When the system generates an on-demand assessment for a metric type, the assessment instance contains questions about all that metric type's assessable records and their associated categories.

View an assessment instance

An assessment instance represents one occurrence of a questionnaire assigned to one user.

Before you begin

Role required: survey_admin, assessment_admin, or admin

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Procedure

1. Navigate to **All** > **Assessments** > **Assessment Instances**.
   The following sub-modules are available based on the state of the instances:
   - **Ready to take**: Displays assessment instances that are ready to be taken by the user. By default, these instances are sorted in ascending order by the **Number** field.
   - **In progress**: Displays assessment instances that are in progress. By default, these instances are sorted in ascending order by the **Number** field.
   - **Completed**: Displays assessment instances that are complete. By default, these instances are sorted in descending order by the **Taken on** field.
   - **Cancelled**: Displays assessment instances that are cancelled. By default, these instances are sorted in ascending order by the **Number** field.
   - **All**: Displays assessment instances in all states. By default, these instances are sorted in ascending order by the **Number** field.
2. Open the record from the required sub-module by clicking an assessment instance number.

   By default, the fields in the following table are displayed in the Assessment Instance form for all sub-modules other than **Completed**.

   Note:
   When you open an instance in the **Completed** sub-module, you are redirected to the User's Response page.

Field	Description
Number	Auto-generated record number.
Metric type	Metric type of this assessment.
Assessment group	Assessment group to which this assessment belongs.
Due date	Date by which the assessment instance must be completed. The system populates the due date from the value in the metric type **Assessment duration** field. The system generates email notifications related to the due date. **Note:** By default, the system runs the *Cancel Expired Assessments* script every 30 days to cancel expired survey, assessment, and quiz instances that are in the Work in progress or Ready to take states.
State	State of the assessment.
Domain	Domain associated with the instance.
Assigned to	User this assessment is assigned to. This field becomes read-only when the state is **In progress**, **Complete**, or **Canceled**.
Signature	Name of the signature record attached to this assessment. A signature requires that assessment recipients acknowledge that they have read any assertions attached to a questionnaire.
Signature result	Verification provided by the recipient when a signature is required. This value is either the recipient's full name from the User [sys_user] table or **checked**, indicating that the recipient acknowledged reading the assertion by selecting a check box.

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3. Click **Take assessment** to open the questionnaire.
   For more information, see Take an assessment.

   This button is available if all the following conditions are true for the assessment instance:

   - It is **Assigned to** you.
   - The **State** is **Ready to take** or **In progress**.
   - The associated metric type is **Active**.

Related topics

Assessment generation

Generate a scheduled assessment manually

Event scheduling

Configure trigger conditions for an assessment

Trigger conditions specify when to send a particular assessment and who to send the assessment to.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Admin** > **Trigger Conditions**.
2. On the Trigger Condition form, fill in the fields.
   For a description of the field values, see Trigger Condition form for assessments.

Related topics

Survey trigger conditions

Assessable records

Assessment trigger conditions

A trigger condition tells the system who to send a designated assessment to and when, based on specific conditions.

With trigger conditions, assessment administrators can configure the system to generate assessments each time a specific action occurs, such as when an incident or change request closes. The trigger condition sends the assessment to specified users who are related to the triggering record, such as incident callers or change request assignees. You can choose to send the assessment every time the condition is met, or set a probability for the system to send the assessment at random when the condition is met.

For a description of the field values in Trigger Condition form, see Trigger Condition form for assessments.

Trigger condition configuration

Assessment	Vendor
Table	Incident `[incident]`
User field	Assigned to

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Trigger condition configuration (continued)

Repeat Interval	30 days
Active	true
Trigger randomly	false
Assessable Record Field	Vendor This is a field in the table that is selected from the **Table** field. The reference record selected in the field specified must have an assessable record. **Note:** The values in this field must have assessable records of the selected metric type. If this condition is met, then only the assessment is triggered.
Related Field 1	Caller
Related Field 2	Vendor
Condition	[State] [is] [Closed] and [Vendor] [is not empty]

Trigger condition example

Modesto Scroggie is the caller on an incident that is assigned to Boris Catino, a service desk technician. Boris contacts a vendor to resolve Modesto's issue and sets the **Vendor** field to **Microsoft**. When the incident closes, the system creates an assessment instance assigned to Boris so Boris can evaluate Microsoft as a vendor.

Because two related fields were selected as part of the trigger condition, the assessment instance stores the following information from the incident:

- **Related record 1:** User: Modesto Scroggie
- **Related record 2:** Company: Microsoft

Note:
Even though the trigger condition is set to be triggered every time the conditions are met, the **Repeat Interval** setting ensures that Boris does not receive another assessment if another vendor incident assigned to him closes within 30 days of the first one.

Enable manager notifications

Users with the assessment_admin role can enable the Notify manager assessment is overdue email notification.

Before you begin
Role required: assessment_admin or admin

About this task
This notification sends emails to assessors' managers when assessors do not complete their assigned assessments on time. For more information, see the table of assessment notifications. You must enable or disable this email notification separately for each metric type.

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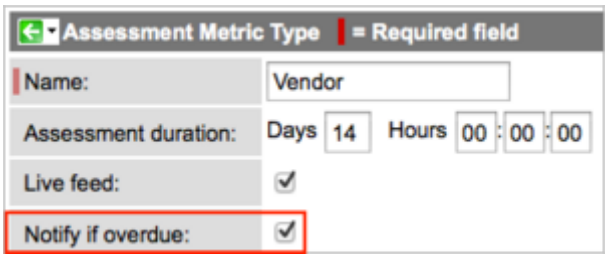
Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open a metric type.
3. Select the **Notify if overdue** check box.



To disable manager notifications, clear the check box.

4. Save the record.

Note:
The assessor's user record must have a manager specified in the **Manager** field to use this notification. You might need to configure the form to use this field.

Assessment notifications

You can configure the system to send email notifications for assessments.

You can configure any of the following types of notification during the process of generating assessable records:

- Notify assessment user: This messages notifies you of an assigned an assessment and includes the type, the due date, and basic instructions. The message also contains a link to the record where you take the assessment.

  Note:
  If a user has a pending assessment, then the system will not generate another instance of the same assessment.

- Remind assessment user: This message reminds you of the due date if half the time passes and you have not completed the assessment. The message content is the same as the first notification.
- Notify manager assessment is overdue: If you do not complete an assessment by the due date, the system may send a notification to your manager, depending on configuration.

Note:
By default, the system runs a script every 30 days to cancel expired assessment and survey instances that are in the **Work in progress** or **Ready to take** states.

Related topics

Create metric types and generate assessable records

Event scheduling

Assessment notification workflow

The system sends assessment notifications according to the Notify assessment user workflow. Users with the workflow_admin, workflow_creator, or workflow_publisher roles can view workflows.

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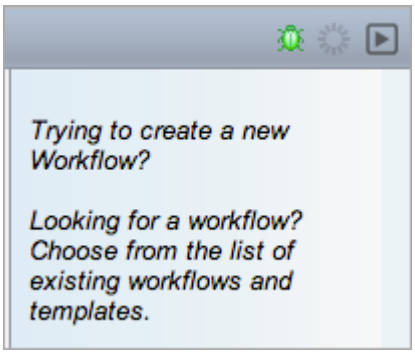
1. To open the graphical Workflow Editor, navigate to **Workflow** > **Workflow Editor**.
2. In the activity menu, click the link to choose an existing workflow.

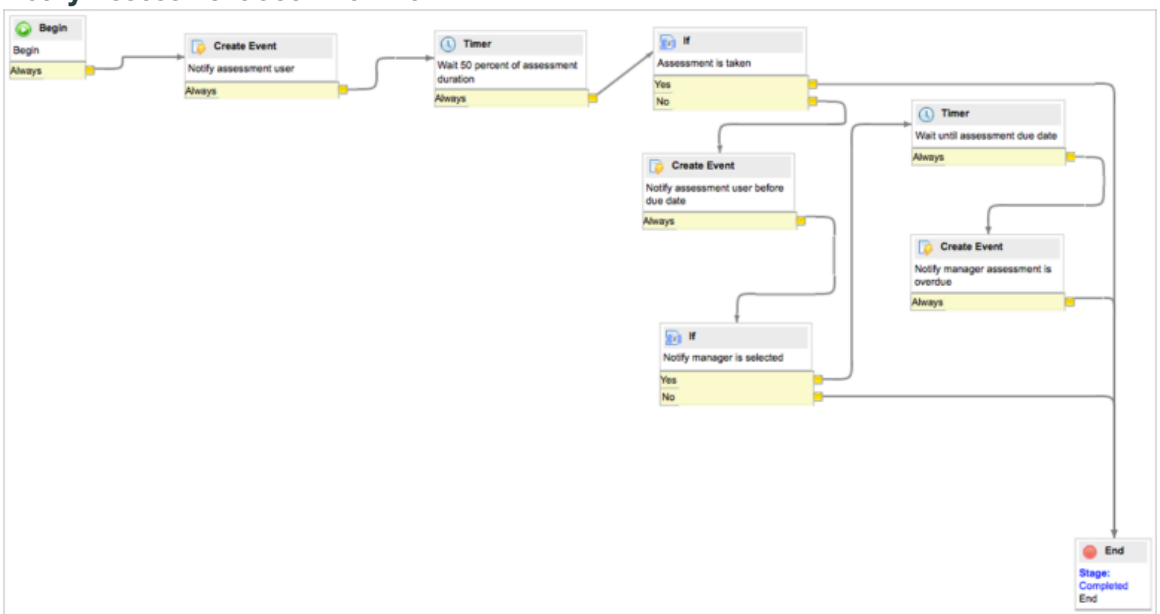
Workflow Window



3. Select **Notify assessment user** from the Workflow Versions list.

   The workflow appears.

Notify Assessment User Workflow



Related topics

Assessment notifications

View a metric result

Metric results contain values that represent an evaluated record's performance for a specific metric, based on a single evaluation from one user or from the execution of a script. Metric results contain actual values as well as calculated values. The system uses values from metric results to calculate category results.

Before you begin

Role required: assessment_admin or admin

About this task

If there is an active scripted metric when the assessment is generated, the system automatically produces a metric result for each associated assessable record. The system produces

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an additional metric result for each question a user answers on a completed assessment questionnaire. If multiple users complete questionnaires with the same questions on the same assessable records, the system produces metric results for each user's responses. For example, three users complete questionnaires that contain the same four questions about the Acme Corporation record. The system produces 12 metric results: one per user for each question.

Procedure

1. Navigate to **All** > **Assessments** > **Results** > **Metric Results**.
2. Open the metric result record you want to view.
   All fields on the form except **Updated** and **String value** are read-only.

Metric Result form fields

Field	Description
Assessment group	Assessment group to which the metric result is associated.
Metric	Name of the metric to which these metric result values apply.
Data type	Data type of the metric.
Method	method of the metric.
Updated	Date and time the metric result was last updated.
Source	Source record of the assessable record evaluated.
Assigned to	User who completed the assessment questionnaire. This field is blank when the method is **Script**.
Instance	Assessment instance completed by the **Assigned to** user. This field is blank when the method is **Script**.
Actual value	Unscaled value from a user response or script, depending on the method: ○ **Assessment**: Value obtained from the user response to the assessment instance question. The actual value is determined by the metric data type: ▪ **Checkbox**: The actual value is 0 if the check box is cleared and 1 if it is selected. ▪ **Choice** or **Likert Scale**: The actual value is equal to the Value of the metric definition associated with the chosen answer option. ▪ **Date**, **Date/Time,** or **String**: The actual value is -1 to indicate that these data types do not contribute to category result calculations. ▪ **Template**: The actual value is equal to the **Value** of the template definition associated with the chosen answer option. ▪ **Yes/No**: The actual value is 0 if the response is **No** and 1 if it is **Yes**. ○ **Script**: Value the script placed in the `actual_result` variable. This field is hidden and left blank when the data type is **Duration**.
Duration value	Specific kind of actual value that is only applicable if the data type is **Duration**. The duration value is the value obtained by the script query from the `actual_result` parameter, such as the average duration of outages for a vendor.

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Field	Description

Scaled value	Appropriate value from the *scaled_result* variable in the associated metric script. The code in a scripted metric defines a scaling scheme for the actual values it obtains. For example, a scripted metric queries the CMDB to return the number of configuration items (CIs) for a vendor. The code includes this scaling scheme, where *actual_result* is the number of CIs, and *scaled_result* is a representation of the quantity of CIs:
	`if (actual_result < 1)`
	`  scaled_result = 0;`
	`else if (actual_result < 1000)`
	`  scaled_result = 1;`
	`else if (actual_result < 10000)`
	`  scaled_result = 2;`
	`else if (actual_result < 25000)`
	`  scaled_result = 3;`
	`else if (actual_result < 100000)`
	`  scaled_result = 4;`
	`else`
	`  scaled_result = 5;`
	If the script detects 315 CIs for the vendor, the *Actual value* is 315 and the *Scaled value* is 1 for this metric result.
	Note:
	Although this field is visible only when the method is **Script**, the system populates the field with the *Actual value* when the method is **Assessment**, as the scaled value is used in the **Normalized value** calculation.

Normalized value	Adjusted value that accounts for weights, scale definition, minimum and maximum values, and other factors that impact the metric (like the survey responses or the input value—the actual value given by the user). See the example for **Normalized value** in View an assessment category result.
String value	Value that displays the response as it appears on a questionnaire. In some cases this is the same as the *Actual value*, such as when the metric data type is **Percentage**. The string value is **N/A** for unanswered questions of certain data types. For the **Attachment** data type, the names of the attached files are displayed as comma-separated values.

Assessment results

In the Assessments application, when the system processes completed questionnaires or gathers values returned from scripted metric queries, it generates assessment result records called metric and category results.

Assessment administrators can view assessment results.

The system calculates metric results first, normalizes the scores, and then calculates category results. Each metric and category result record stores data from one assessment group, for a particular category and source record evaluated. Specifically:

- Metric results: store data calculated from one evaluation of one metric.
- Category results: store data calculated from a weighted average of all metrics in the category.

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Note:
Although results data is available to view in the form of metric and category result records, the most meaningful way to view results is in scorecards and decision matrixes. These tools display only the most pertinent data in graphical, comparative formats.

Excluded Responses

The system creates metric results for responses but does not include them in category result calculations if any of the following are true:

- The user selects the **Not Applicable** answer option on a questionnaire.
- The user does not answer the question and the data type is not *Checkbox*.
- The question data type is one of the following: *Date*, *Date/Time*, or *String*.
- The metric result **Actual value**, **Scaled value**, and **Normalized value** fields are set to *-1*.

Metric Attachments

After a survey or assessment is submitted, any attachments that have been added by a user are moved to the metric result record. The names of the attached files are added to the **String value** field on the Metric Result form.

Note:
You cannot add or remove attachments from a metric result.

Assessment Overview dashboard

The Assessment Overview dashboard displays various assessment reports, such as Assessable Records by Type, Total Metrics by Metric Type, and Assessments by State.

The dashboard might not show all these reports. If you want to view a particular report, you can add that report to the dashboard.

Assessment Overview dashboard reports

Report	Table
Assessable Records by Type	Assessable Records [asmt_assessable_record]
Assessment Instances by Assessment Group	Assessment Instances [asmt_assessment_instance]
Assessments by State	Assessment Instances [asmt_assessment_instance]
Answered Questions by Assigned User	Assessment Instance Questions [asmt_assessment_instance_question]
Average Rating by Type	Assessment Category Results [asmt_category_result]
Category Result Ratings by Category	Assessment Category Results [asmt_category_result]
Metrics by Data Type	Assessment Metrics [asmt_metric]
Stakeholders per Category	Assessment Stakeholders [asmt_m2m_stakeholder]
Top Rated Items	Metric Results [asmt_metric_result]
Total Metrics by Metric Type	Assessment Metrics [asmt_metric]]
Unanswered Questions by Assigned User	Assessment Instance Questions [asmt_assessment_instance_question]

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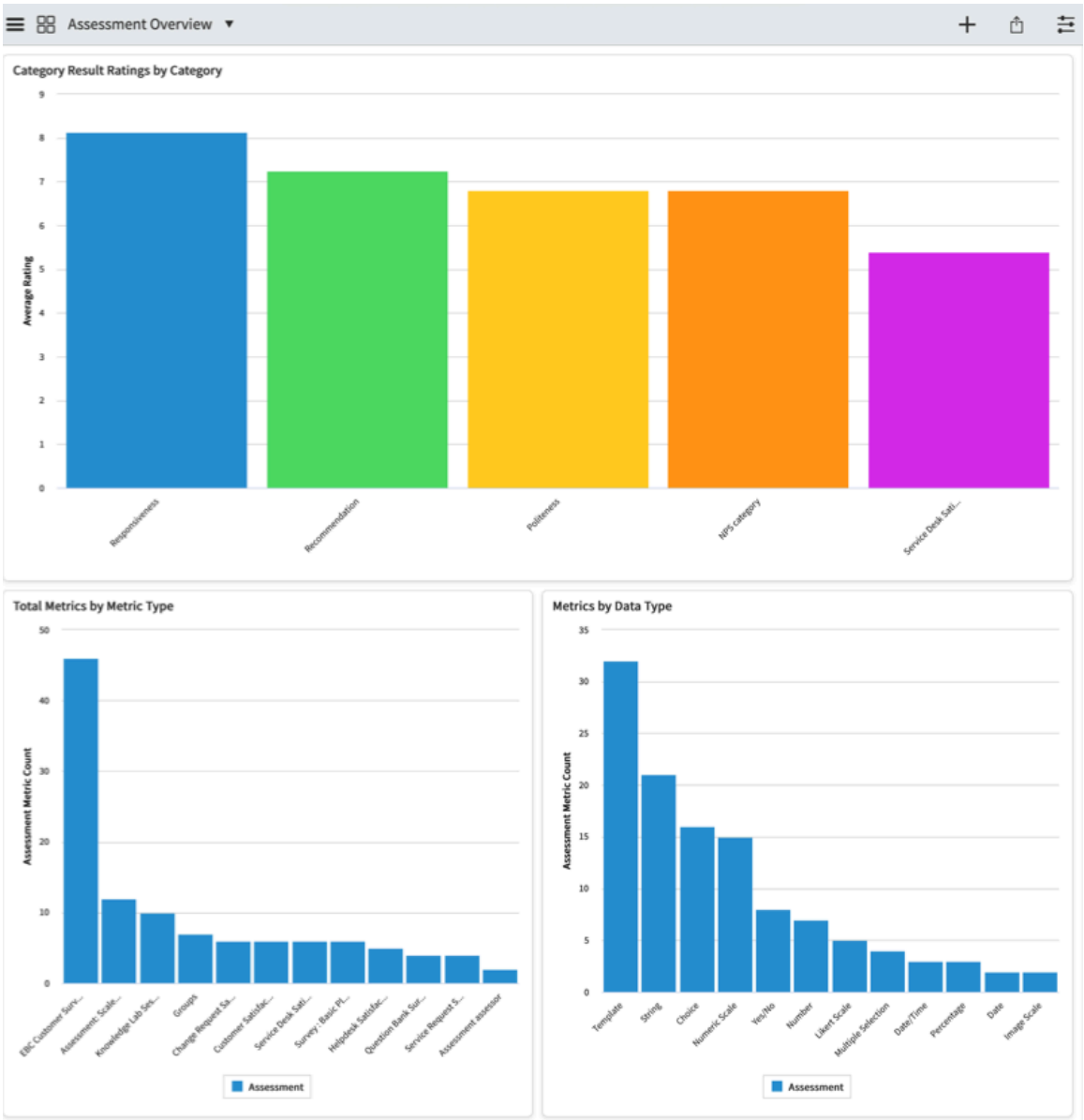
Assessment Overview dashboard



View assessment reports

Use the Assessment Overview dashboard to view your assessment reports.

Before you begin

Role required: assessment_admin or admin

About this task

The dashboard displays reports arranged in widgets. You can add new widgets to the dashboard.

Procedure

1. Navigate to **All** > **Assessments** > **Overview**.
2. Click the elements within the reports to view more information.

   For more information about working with dashboards, see Dashboards.

Assessment results calculation

For every assessment group, there are assessment results.

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Data calculated from an evaluation of one metric is classified as a metric result. Data calculated from the weighted average of all metric results in a category is classified as a category result. The system calculates some assessment results when the assessment is generated, and others when users complete questionnaires.

Related topics

- Generate a scheduled assessment manually
- Generate a vendor type assessment manually
- Assessment groups

View a bubble chart for assessments

Assessment administrators can view bubble charts to compare the relative standing of assessable records in three metric categories.

Before you begin
Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Admin** > **Bubble Charts**.
2. Click a **Name** to open the bubble chart record.
3. Under **Related Links**, click **View Bubble Chart**.

> **Note:**
> Demand managers and vendor managers can view bubble charts through the Demand Management and Vendor Performance applications. See Project Portfolio Suite for more information.

Bubble charts for assessments

A bubble chart is a dynamically updated graph that plots assessment results for multiple assessable records.

Assessment administrators can create and use bubble charts to compare the relative standing of assessable records in three metric categories. The X- and Y-axes each represent a different category. Assessable records are plotted on the chart as circular markers, or bubbles, which vary in size according to scores for the third category.

Create a bubble chart

Assessment administrators can create bubble charts to compare the relative standing of assessable records in three metric categories.

To create a bubble chart, navigate to **Assessments** > **Admin** > **Bubble Charts** and create a record (see table for field descriptions).

> **Note:**
> For color fields, either HTML color names or hexadecimal (hex) values are acceptable. For hex values, the # character is optional. Values are not case-sensitive. For example, all of the following values are valid: LightGray, lightgray, #D3D3D3, d3d3d3.

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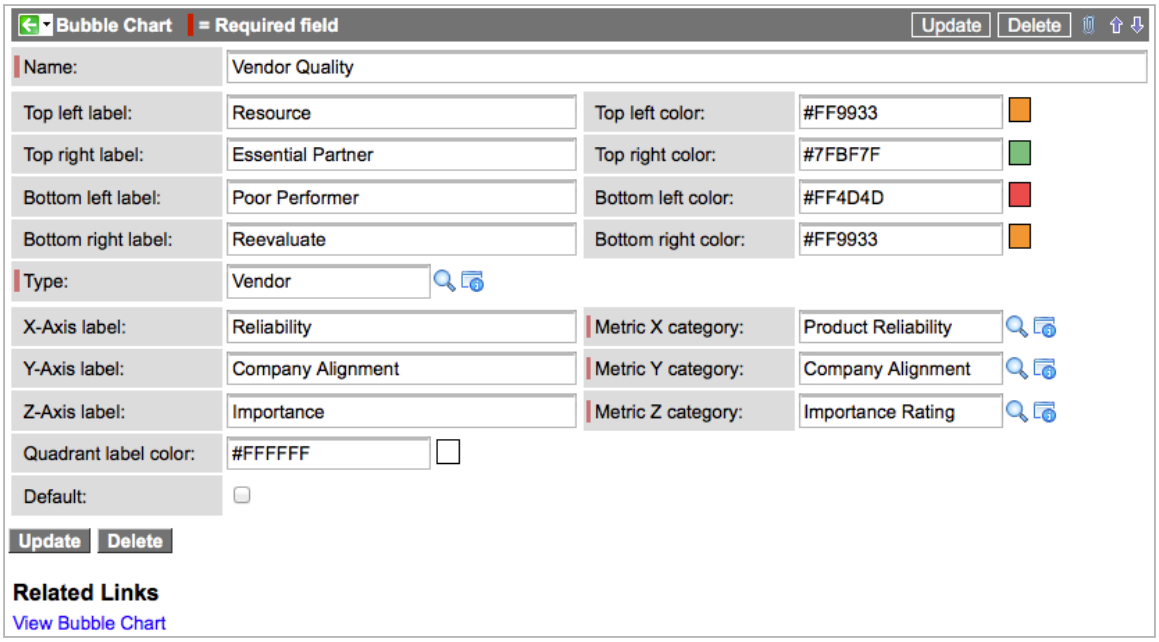
Bubble Chart form



Bubble Chart form fields

Field	Description
Name	Descriptive name for the bubble chart. **Bubble Chart** is appended to the name when you view the bubble chart.
• Top left label • Top right label • Bottom left label • Bottom right label	Label text for the top left, top right, bottom left, and bottom right quadrants, respectively. Choose labels that help interpret results. For example, a bubble chart that displays vendor assessment results might have the following quadrant labels, where vendors in the top right quadrant have the best scores: • **Top left label**: Resource • **Top right label**: Essential Partner • **Bottom left label**: Poor Performer • **Bottom right label**: Reevaluate
• Top left color • Top right color • Bottom left color • Bottom right color	Border colors for the top left, top right, bottom left, and bottom right quadrants, respectively. Bubbles are the color of the quadrant they are in.
Type	Metric type associated with this bubble chart. Only results for assessable records of the selected metric type are plotted on the bubble chart.

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Bubble Chart form fields (continued)

Field	Description
• X-Axis label • Y-Axis label • Z-Axis label	Label text for the X-, Y-, and Z-axis categories of the bubble chart. These labels appear along the X- and Y-axes, if applicable, and in bubble score summary windows. The metric category name is usually a good label. If these fields are left empty, the bubble chart automatically displays the selected category names as the labels.
• Metric X category • Metric Y category • Metric Z category	Metric category each axis represents. Results for the Z-axis category determine the size of each bubble. The Z-axis should generally represent the most important category out of the three.
Quadrant label color	Color of the label text for the quadrant borders.
Default	Check box that enables (selected) or disables (cleared) the bubble chart as the default. There can be only one default bubble chart per metric type.

Bubble chart components

The X- and Y-axes each represent a different metric category. Assessable records are plotted on the chart as circular markers, or bubbles, which vary in size according to scores for the third category.

The bubble chart page has these components:

- **Bubble Chart**
  - **X- and Y-axes**: Each axis represents a metric category.
  - **Bubbles**: Each labeled bubble represents an average of category result data for an assessable record. Point to a bubble to view an assessable record score summary. Click a bubble or bubble label to view the scorecard for the assessable record.
- **Source record list**: List of all records defined by the **Table** and **Condition** fields for the associated metric type. Note that the bubble chart only plots records for which there are assessment results. The assessment results are actually associated with the assessable records for each of the listed source records.

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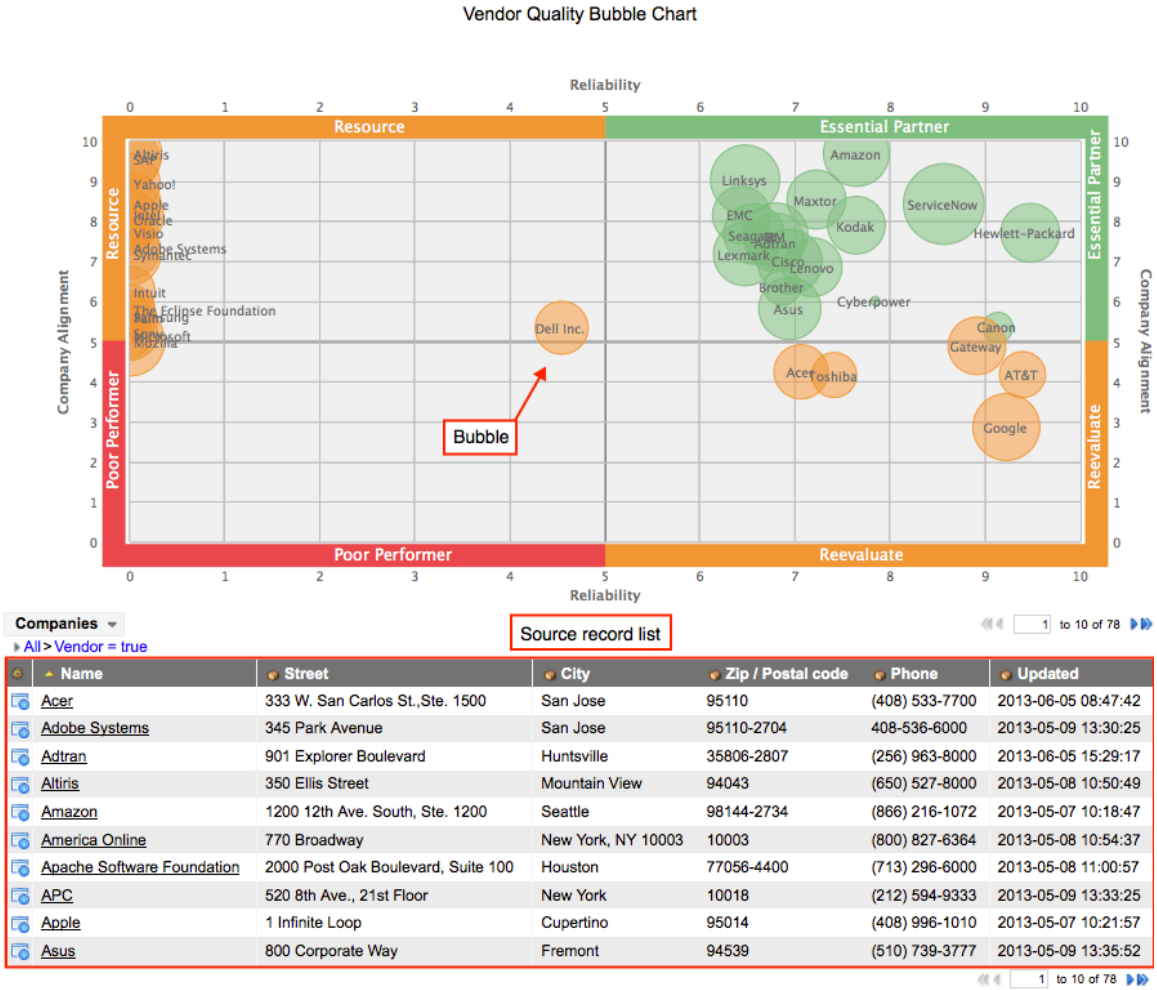
Bubble chart



Companies
All > Vendor = true

1 to 10 of 78

Name	Street	City	Zip / Postal code	Phone	Updated
Acer	333 W. San Carlos St.,Ste. 1500	San Jose	95110	(408) 533-7700	2013-06-05 08:47:42
Adobe Systems	345 Park Avenue	San Jose	95110-2704	408-536-6000	2013-05-09 13:30:25
Adtran	901 Explorer Boulevard	Huntsville	35806-2807	(256) 963-8000	2013-06-05 15:29:17
Altiris	350 Ellis Street	Mountain View	94043	(650) 527-8000	2013-05-08 10:50:49
Amazon	1200 12th Ave. South, Ste. 1200	Seattle	98144-2734	(866) 216-1072	2013-05-07 10:18:47
America Online	770 Broadway	New York, NY 10003	10003	(800) 827-6364	2013-05-08 10:54:37
Apache Software Foundation	2000 Post Oak Boulevard, Suite 100	Houston	77056-4400	(713) 296-6000	2013-05-08 11:00:57
APC	520 8th Ave., 21st Floor	New York	10018	(212) 594-9333	2013-05-09 13:33:25
Apple	1 Infinite Loop	Cupertino	95014	(408) 996-1010	2013-05-07 10:21:57
Asus	800 Corporate Way	Fremont	94539	(510) 739-3777	2013-05-09 13:35:52

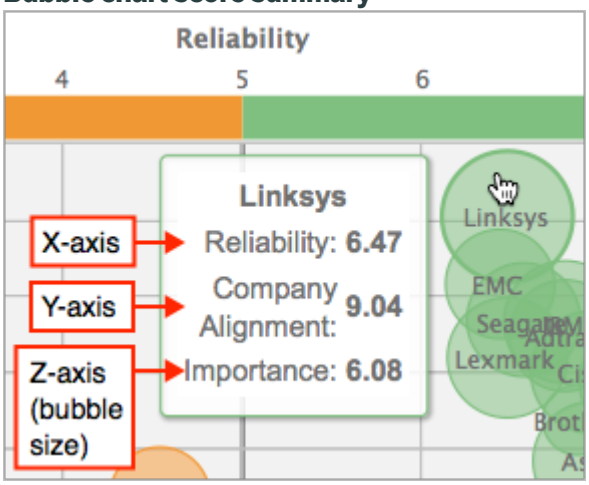
1 to 10 of 78

Assessable record score summaries

Point to a bubble to display a score summary for the assessable record the bubble represents.

The summary displays the assessable record's average score for each category in the following order: X-axis category, Y-axis category, Z-axis category. The scores are based on data from the last 12 months.

Bubble chart score summary



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View an assessment scorecard

The Assessments application prepares printable scorecards. A scorecard displays easy-to-interpret assessment results, in which the current calculated ratings for an assessable record are compared to previous ratings or to the ratings of other records.

Before you begin
Role required: assessment_admin or admin

About this task
Users can examine ratings over time, compare ratings for one assessable record with all assessable records in a table, or compare the ratings of two assessable records. All ratings are averages for the time range selected. The system dynamically updates a scorecard each time you view it, so the ratings reflect recently completed assessments and scripted metrics.

Administrators can display a scorecard for any table by creating a **Related Link** on assessable records. The system provides this link on the Company form by default when Vendor Performance is active.

The Vendor Performance application provides an enhanced scorecard view for vendors.

See Vendor Performance in . Project Portfolio Suite.

Procedure
1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open a record.
3. Under **Related Links**, click **View Scorecard**.

Create a link to a scorecard

Users with the admin role can create UI actions that allow users to view scorecards from tables.

Before you begin
Role required: assessment_admin or admin

Procedure
1. Generate assessable records you want to evaluate.
   For example, you might create a metric type called **Project** to assess project management records.
2. Navigate to **System Definition** > **UI Actions**.
3. Open the View Scorecard record.
4. Right-click the header bar and select **Insert and Stay** from the context menu to create a duplicate record.
5. Change the **Table** name to the table on which you want the UI action to appear.
   For example, you might select Project [pm_project].

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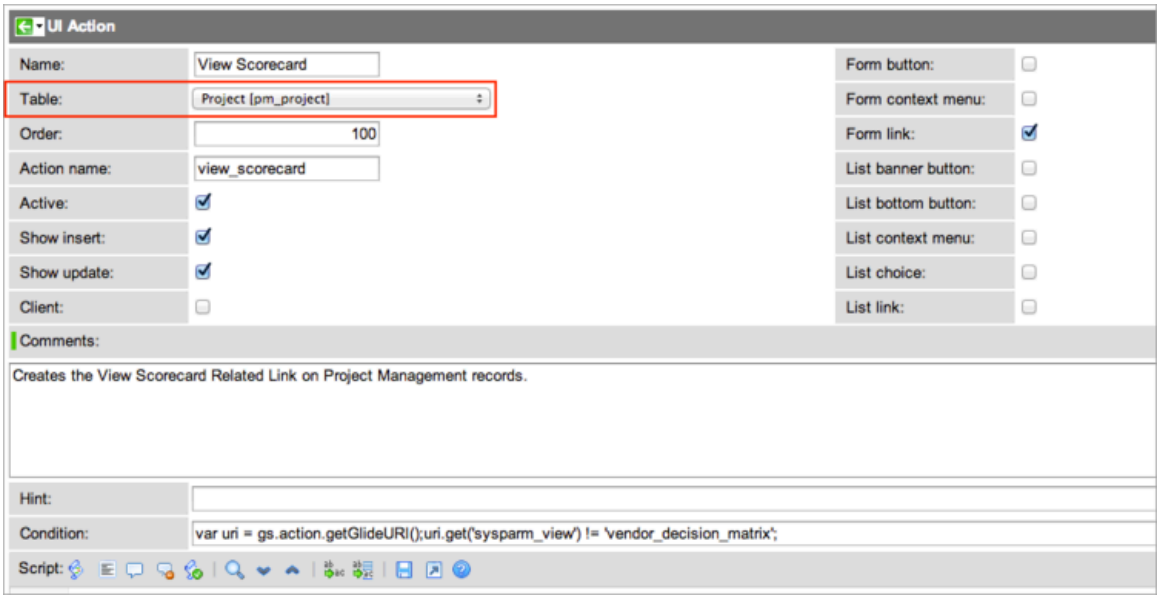

6. Do not edit the **Action name** field or the **Condition** script.
7. Save the record.
8. Navigate to the table on which you created the UI action and open an assessable record.
   a. In this example, navigate to **Project** > **Projects** > **All**.
   b. Open any record in the list.
   c. Click **View Scorecard** under **Related Links** to open the scorecard for that assessable record. The scorecard appears with the title in the form of **<table display name> Scorecard**. For example, a scorecard for an assessable record in the Project `[pm_project]` table is named **Project Scorecard**.

   Note:
   Content does not appear in the scorecard unless the associated assessable record has assessment results or related live feed conversations.

9. Insert a new **View Scorecard** UI action record for each table where you want the related link to appear.

Assessment scorecard averages

The Averages view compares the current ratings for an assessable record in each metric category with the average, minimum, and maximum values from all assessable records in the filter. All ratings are from assessments generated over the trailing twelve months (TTM).

Select a filter option to compare the current record against all assessable records in that filter. An assessment administrator configures these options in the **Filter field** field in the Assessment Metric Type form.

Rating variances are highlighted as follows:

- **Red**: Ratings are below average in this category. The **Diff** value displays a negative number.
- **Green**: Ratings are above average in this category. The **Diff** value displays a positive number.
- **White**: Ratings are average in this category. The **Diff** value is 0.0.

In the following example, the ratings of the current group are compared against other groups for which Don Goodliffe is the manager.

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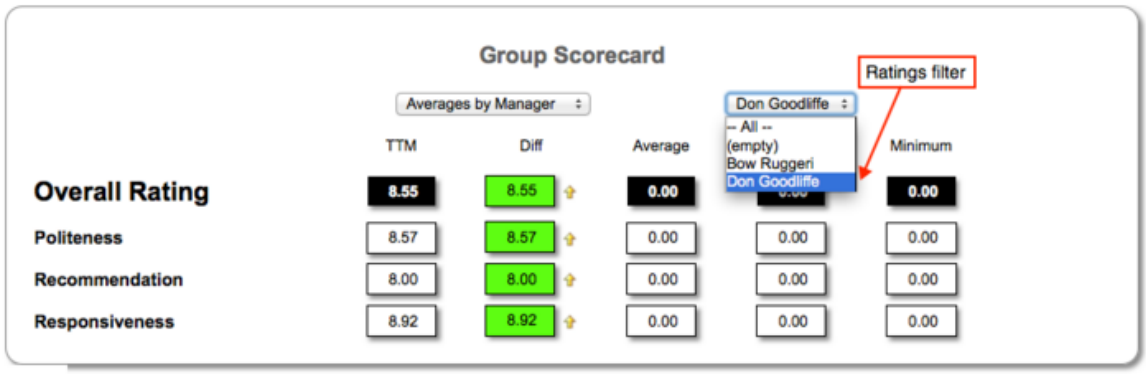
Group scorecard with ratings filter



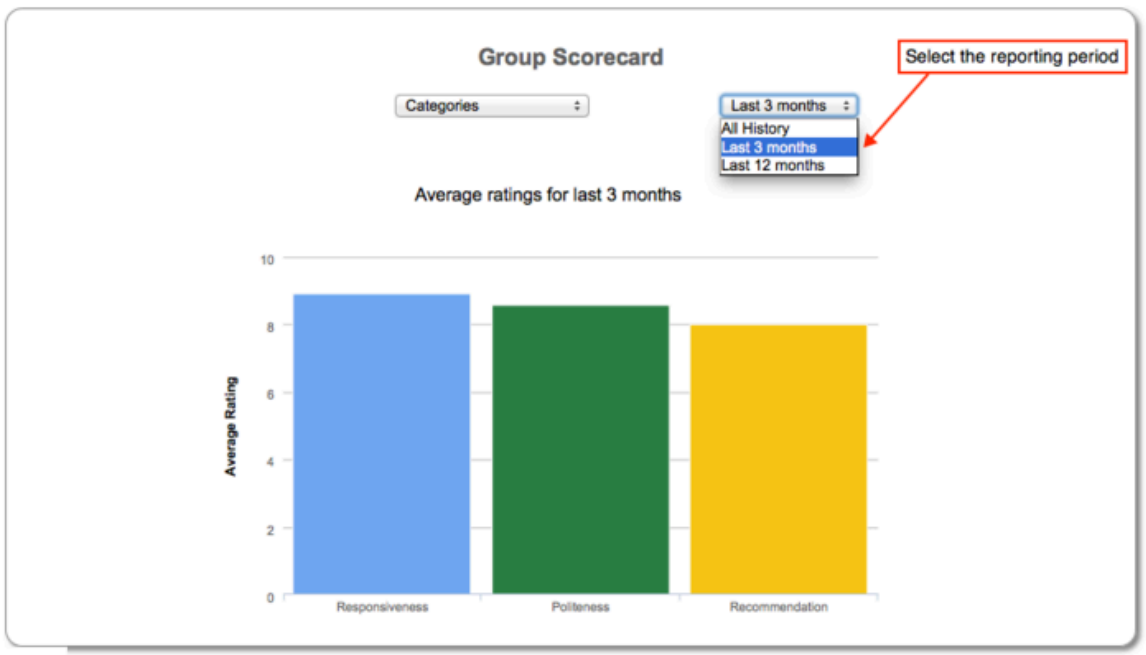
Assessment scorecard categories

The Categories view displays a bar chart showing the average ratings for each category in the selected time interval.

Select from these reporting periods:

- All History
- Last 3 Months
- Last 12 Months

Scorecard categories



Assessment scorecard category metrics

The Category Metrics view displays the weighted average results for each metric within a category. Use this view to learn how individual metrics affect the overall rating for the category.

Select a metric category from the choice list to display the chart.

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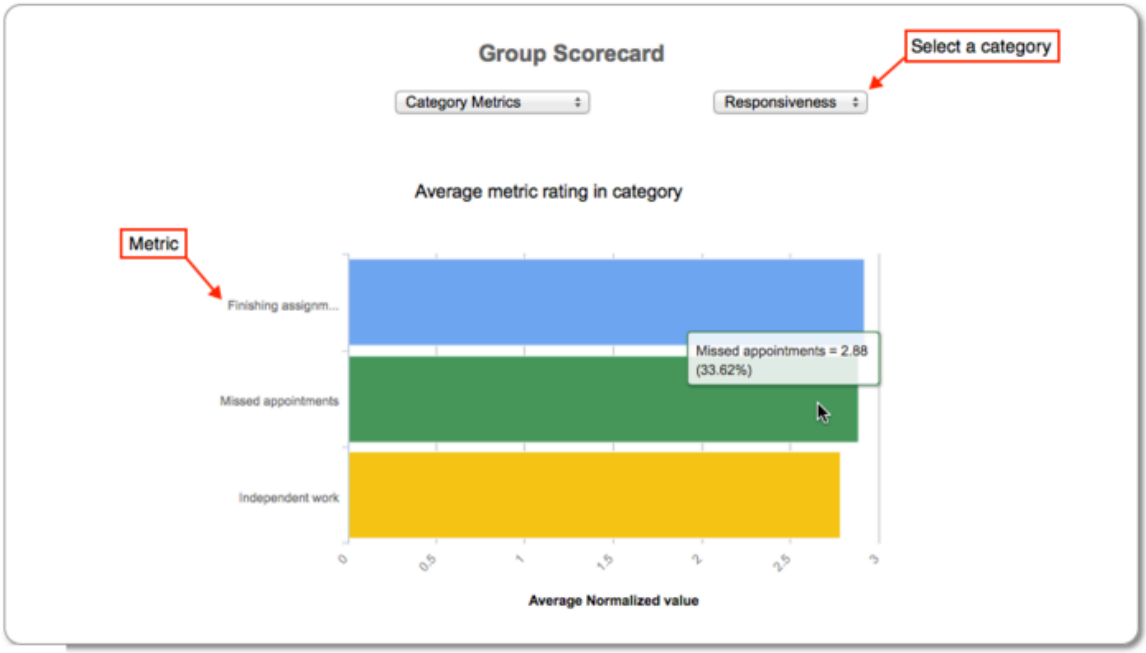
Scorecard category metrics



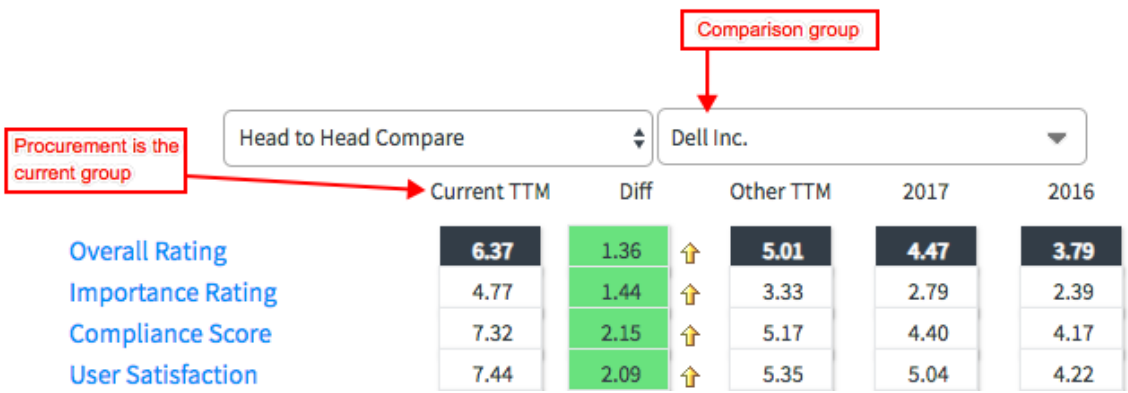
Assessment scorecard head-to-head compare view

The Head to Head Compare view allows you to compare the ratings of two assessable records of the same type. Select an assessable record from the choice list to compare against the current record's trailing twelve month (TTM) ratings.

Head to head compare

The Diff column displays the difference between each assessable record's most recent TTM ratings. By default, the system selects the first assessable record in the list when you open this view. The scorecard displays three years of ratings for the comparison record. All ratings are expressed as averages.

Scorecard head to head compare



Overall Rating

The Overall Rating is calculated as:

```
(sum of normalized values in category result) / (number of
 assessment groups)
```

In the following example, the calculation is

```
(2.13 + 2.86 + 3.79 + 1.43 + 2.39 + 3.7) / 2 = 8.15
```

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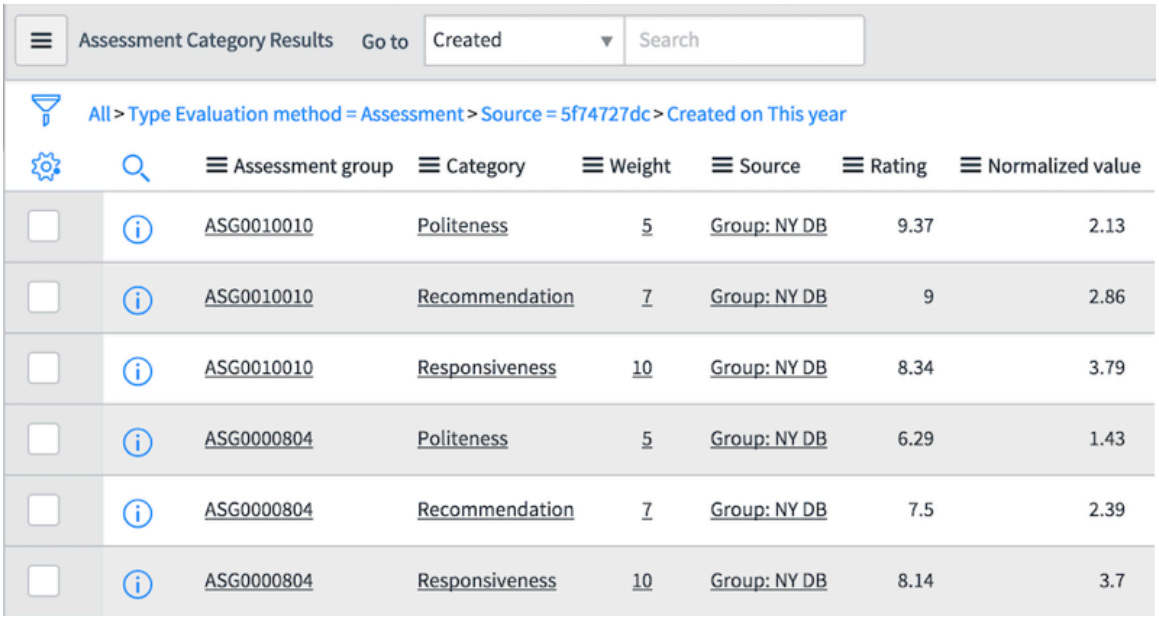
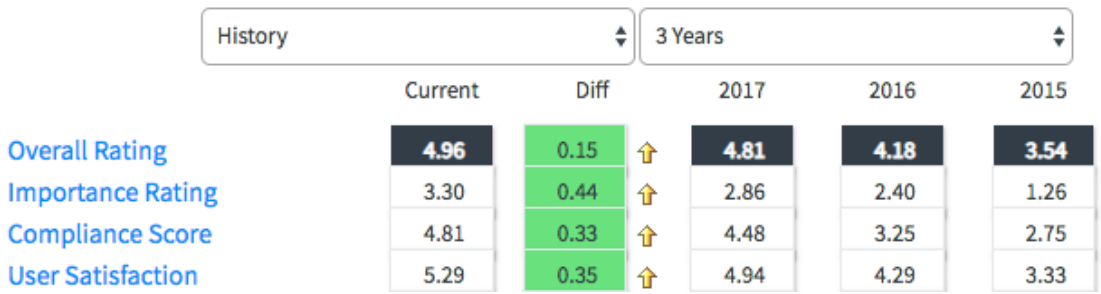
Normalized values



Assessment group	Category	Weight	Source	Rating	Normalized value
ASG0010010	Politeness	5	Group: NY DB	9.37	2.13
ASG0010010	Recommendation	7	Group: NY DB	9	2.86
ASG0010010	Responsiveness	10	Group: NY DB	8.34	3.79
ASG0000804	Politeness	5	Group: NY DB	6.29	1.43
ASG0000804	Recommendation	7	Group: NY DB	7.5	2.39
ASG0000804	Responsiveness	10	Group: NY DB	8.14	3.7

Overall Rating on the group scorecard



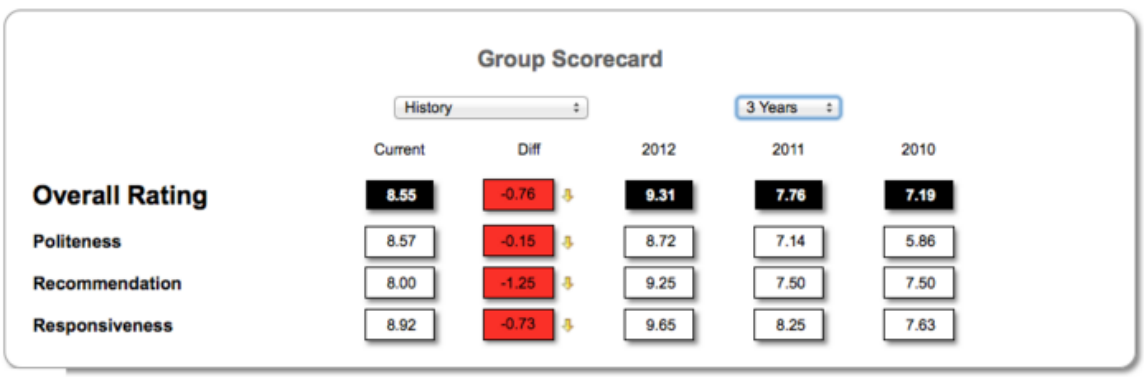
Assessment scorecard history

The History view compares the current ratings for each category with ratings from the previous three years or four quarters.

Ratings that have declined are highlighted in red and display negative numbers. Ratings that have improved are highlighted in green with positive numbers. Arrow icons beside the values in the **Diff** column indicate the trend of the current assessment against the previous assessment.

- **3 Years**: To calculate the current ratings, the system averages the ratings from the trailing twelve month (TTM) period. The **Diff** column shows the discrepancy between the current ratings and the previous calendar year's ratings.

Scorecard history - 3 years



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- **4 Quarters**: Quarterly assessments compare the average rating for each category in the current quarter against the average ratings from the previous four quarters. The **Diff** column shows the discrepancy between the current ratings and the previous quarter's ratings. The column labels count backward, by quarter from the current quarter. For example, if the current quarter is the **3rd** quarter of 2013, then the previous quarters appear as **2nd** [2013], **1st** [2013], **4th** [2012], and **3rd** [2012]. All four of the previous quarters appear, whether or not there was any data for those quarters.

Scorecard history - 4 quarters



Live feed view of assessable records

The live feed view displays live feed conversations that apply to the assessable record. Users can view the group feed, including tagged comments, and add comments of their own.

To configure a live feed view, an assessment administrator selects the **Live feed** check box on the Assessable Record form. Live feed is available on the scorecard even if there are no category results for the other views.

The live feed view provides these viewing options:

- **My Feed**: Displays the user's My Feed preferences.
- **Company**: Displays the user's company feed.
- **Groups**: Displays all available groups and gives the logged in user the option to leave or join a group. Select a group to display that group's conversations.
- **Tags**: Displays all the tags found in live feed comments. Click a tag to display the conversations containing that tag.

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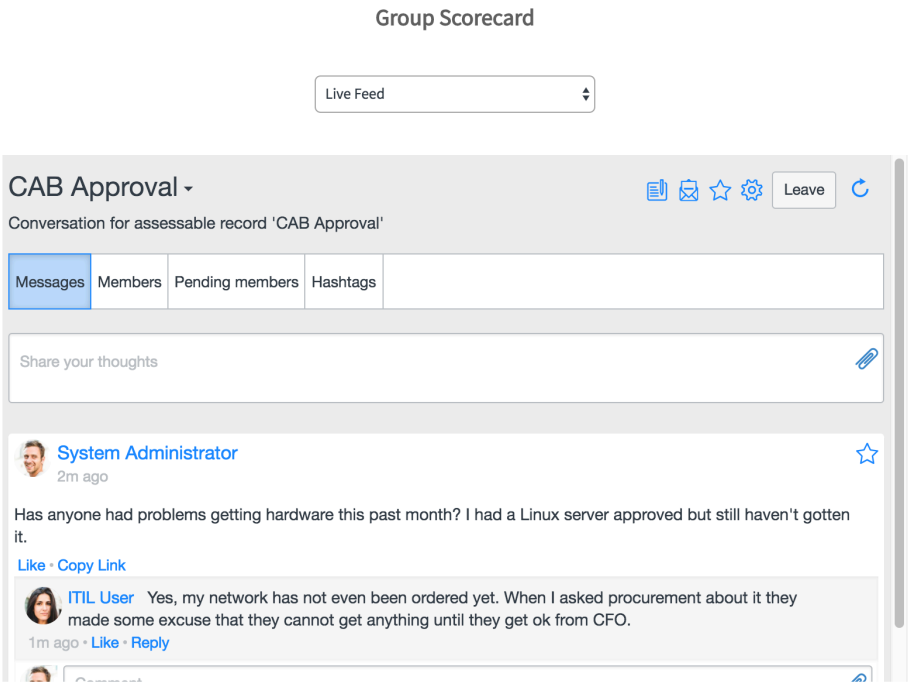
Live Feed group scorecard



Assessment scorecard ratings

The scorecard ratings section displays various ratings for the assessable record.

Select one of several views that present different ratings:

- Averages
- Categories
- Category Metrics
- Head to Head Compare
- History
- Live Feed

Some views display an overall rating column, which lists categories used to evaluate the assessable record. Only categories in which the assessable record has been evaluated appear on the scorecard. If the ratings section does not display any data, the assessable record or category results associated to the assessable record have been deleted.

Click a category to view the category record. Point to a category to display a line chart that shows the rating trend for that category.

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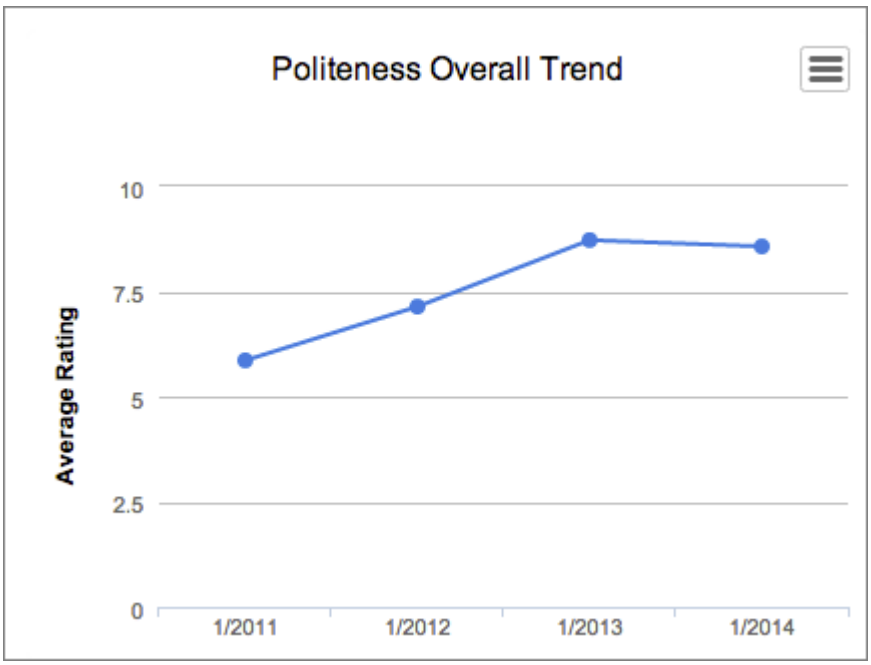
Vendor scorecard trend chart



Create a decision matrix

The name and labels on a decision matrix are closely linked to the categories you choose for the axes. For that reason, first select the metric type and define the X and Y axes before you fill in other fields on the Decision Matrix form.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Admin** > **Decision Matrixes**.
2. Click **New**.
3. Select the metric **Type** to plot results for.
4. Right-click the form header and select **Save**.
   The X Axis and Y Axis related lists appear.
5. Define which metric categories the axes represent.
   Each axis can represent a single category or multiple categories. You must specify at least one category per axis in order for the decision matrix to render properly. The available categories are limited to those associated to the metric type selected. To avoid confusion, always update the text for the axis and quadrant labels after editing or adding metric categories to an axis.

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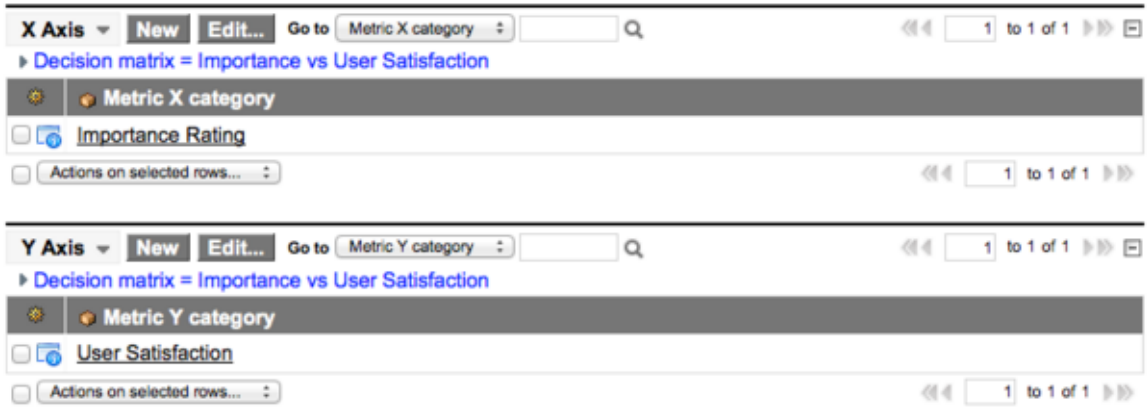
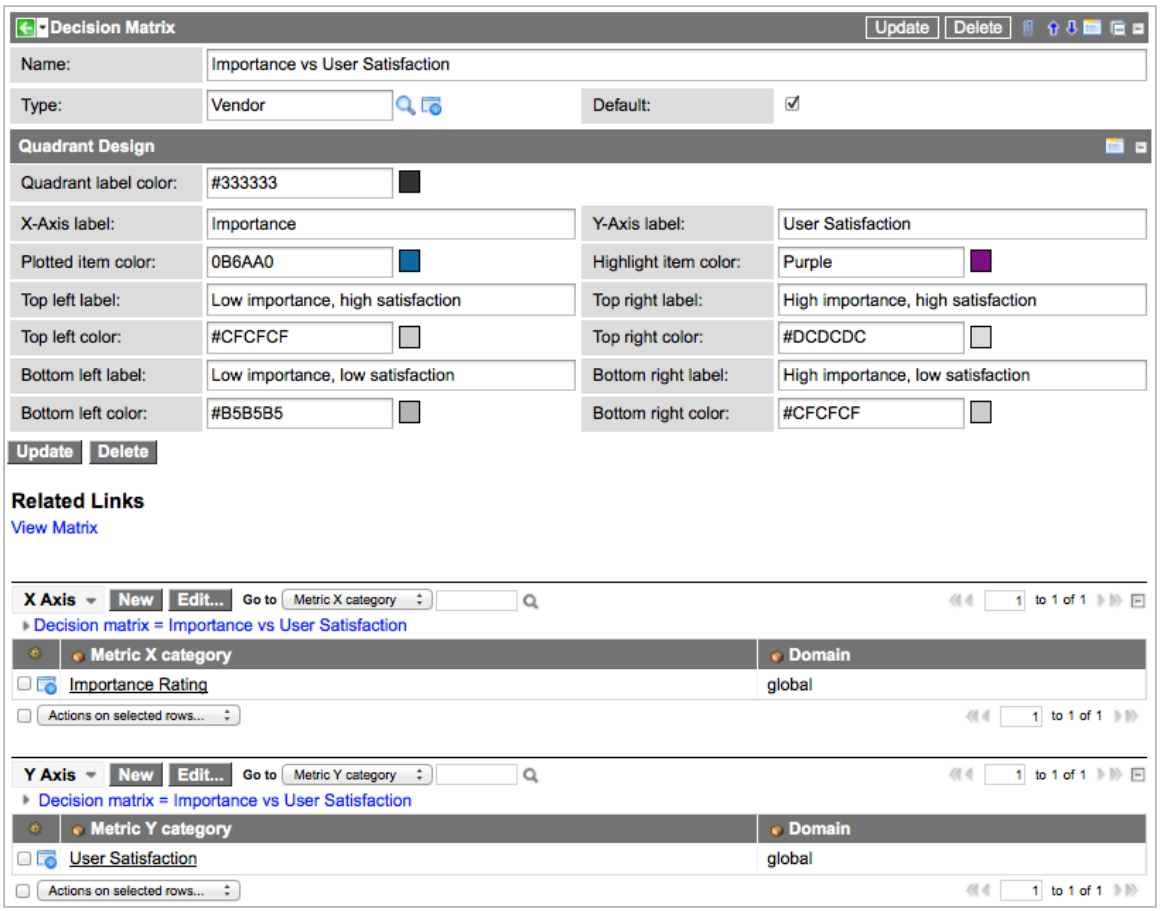
Decision matrix axes



6. Fill in the remaining fields on the Decision Matrix form and save the record.



Note:
For color fields, either HTML color names or hexidecimal (hex) values are acceptable. For hex values, the # character is optional. Values are not case-sensitive. For example, all of the following values are valid: LightGray, lightgray, #D3D3D3, d3d3d3.

Decision Matrix form

Field	Description
Name	Name of the decision matrix, which appears as the title on the decision matrix page. It is recommended to include the axis categories in the name. For example,

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Field	Description
	if you selected **Importance Rating** as the X-axis and **User Satisfaction** as the Y-axis, you might name the matrix **Importance vs. User Satisfaction**.
Type	Metric type associated with this decision matrix. Only results for assessable records of the selected metric type are plotted on the decision matrix.
Default	Determines whether or not this is the default decision matrix. The default decision matrix opens when you click **View Matrix** on a scorecard. Select the check box to set the matrix as the default decision matrix. The system prevents you from creating more than one default decision matrix per metric type. If there is already a default decision matrix for the type and you try to save a different matrix with the check box selected, an error message appears. The maximum values for the default decision matrix are controlled by the **Maximum number of items to show for a decision matrix field filter** property *(com.snc.assessment.decision_matrix_filter_max_entries)*, which has a default value of 1000.
Quadrant Design Section	
Quadrant label color	Color of the label text for the quadrants. Each quadrant label displays in the center of the quadrant. You can enter an HTML color name or hex value for this and the other color fields.
X-Axis label	Label text for the X-axis of the decision matrix. It is recommended to include the metric category name in the label text. For example, for an X-axis category of **Importance Rating**, the X-axis label is **Importance**.
Plotted item color	Color used to display plotted items.
Top left label	Label text for the top left quadrant. For an X-axis labeled **Importance** and Y-axis labeled **Support**, you might label the top left quadrant **Low importance, high support**.
Top left color	Fill color for the top left quadrant.
Bottom left label	Label text for the bottom left quadrant.
Bottom left color	Fill color for the bottom left quadrant.
Bottom left label	Label text for the bottom left quadrant.
Bottom left color	Fill color for the bottom left quadrant.
Y-Axis label	Label text for the Y-axis of the decision matrix.
Highlight item color	Color of highlighted plotted items. When you view a decision matrix from an assessable record's scorecard, the assessable record plotted item appears in the highlight color. Specify a highlight color that is different than the **Plotted item color**.

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Field	Description
	
Top right label	Label text for the top right quadrant.
Top right color	Fill color for the top right quadrant.
Bottom right label	Label text for the bottom right quadrant.
Bottom right color	Fill color for the bottom right quadrant.
Related Lists	
X Axis	Lists categories that define the X-axis of the decision matrix.
Y Axis	Lists categories that define the Y-axis of the decision matrix.

Decision matrixes

Assessment results obtained by questionnaires and scripted metrics can be mapped to decision matrixes.

Assessment administrators can view and create these dynamically updated graphs, which make it possible to compare assessable records by category. Decision matrixes display data from a trailing twelve month (TTM) period.

Note:
Assessment administrators can access decision matrixes through the Assessment application and vendor managers can access them through the Vendor Management Workspace application.

Decision matrix components

The decision matrix page has these components:

Component	Description
Options	
Filter	Select the subset of assessable records you want to view. The filter options available vary by metric type, based on the **Filter** field and **Filter condition** field settings for each type.

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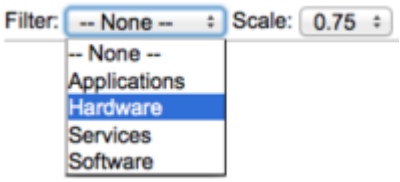
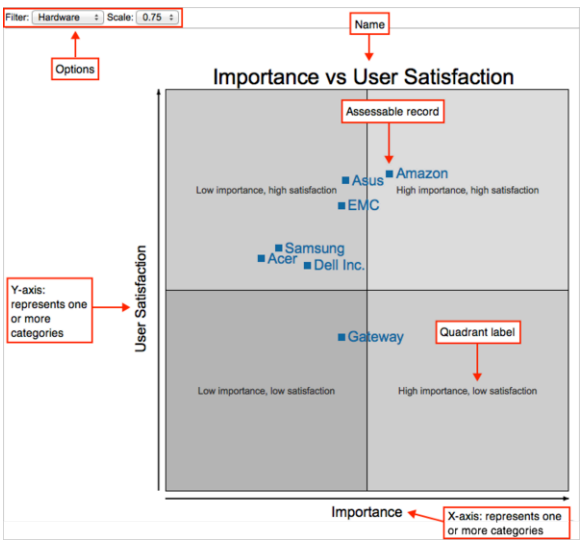
Component	Description
	Decision matrix components  The maximum values in the filter are controlled by the **Maximum number of items to show for a decision matrix field filter** property *(com.snc.assessment.decision_matrix_filter_max_entries)*, which has a default value of 1000.
Scale	Select the scale for the decision matrix. The greater the scale, the larger the decision matrix appears.
Decision matrix	
X- and Y-axes	Each axis represents one or more metric categories. If multiple categories are used for an axis, their respectiveweights determine the positioning of the plotted items.
Plotted items	The labeled points you see on a decision matrix, called plotted items, represent averages of category result data for assessable records. Point to a plotted item label to view a rating summary for that assessable record. Click a plotted item label to view the scorecard for the assessable record. **Vendor decision matrix** 

Plotted item rating summaries

If you point to a plotted item label on a decision matrix, a rating summary appears. The summary displays the assessable record's average ratings for each axis. If an axis represents one metric category, the ratings are calculated averages from results for that category. If an axis represents multiple categories, the ratings are calculated averages from weighted results for all of the categories.

The summary shows:

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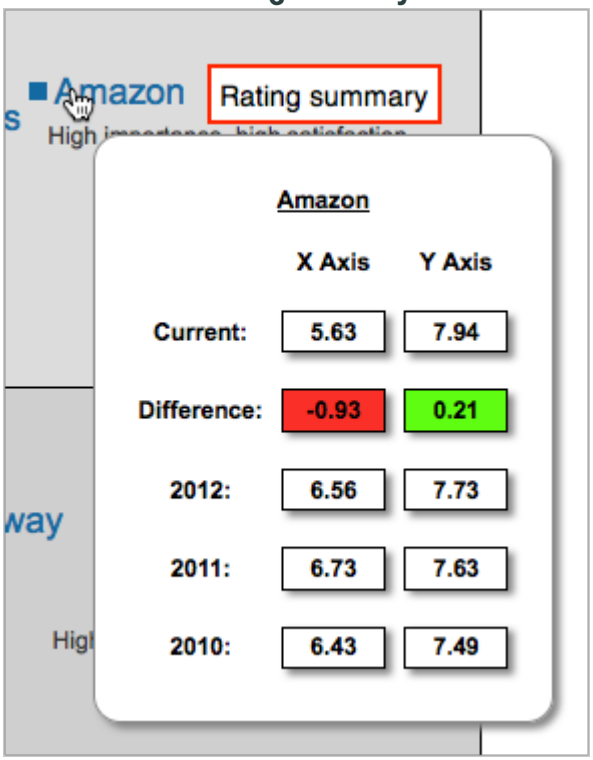
- Current rating
- Difference between the current rating and the rating from the previous year
- Ratings from each previous year, going back three years

Decision matrix rating summary



Take an assessment

Take the assessments assigned to you from the assessment and survey queue.

Before you begin

Role required: none

About this task

An assessment card displays the assessment name, state, due date, and associated incident number. Click the card to take the assessment when you're ready.

You must answer every required question, indicated by a red asterisk, before you can submit the assessment as complete. If you start to take an assessment but can't complete it, save your responses and return to it later. When you've answered all the questions and you're happy with the responses, submit the assessment.

Note:
The expired assessments and surveys no longer appear in the **My surveys** widget and the **My Assessments and Surveys list** page.

By default, you can't modify your answers to an assessment after submission. However, if the administrator has configured an assessment to allow retakes, you can edit your answers and resubmit the questionnaire. Completed assessments configured for retake remain in the queue until their due date and display Modify Assessment at the top of the card. Click the card to modify the assessment.

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Note:
If you don't have access to the assessable record for which an assessment is created, the associated record number isn't displayed. You can still take the assessment.

Procedure

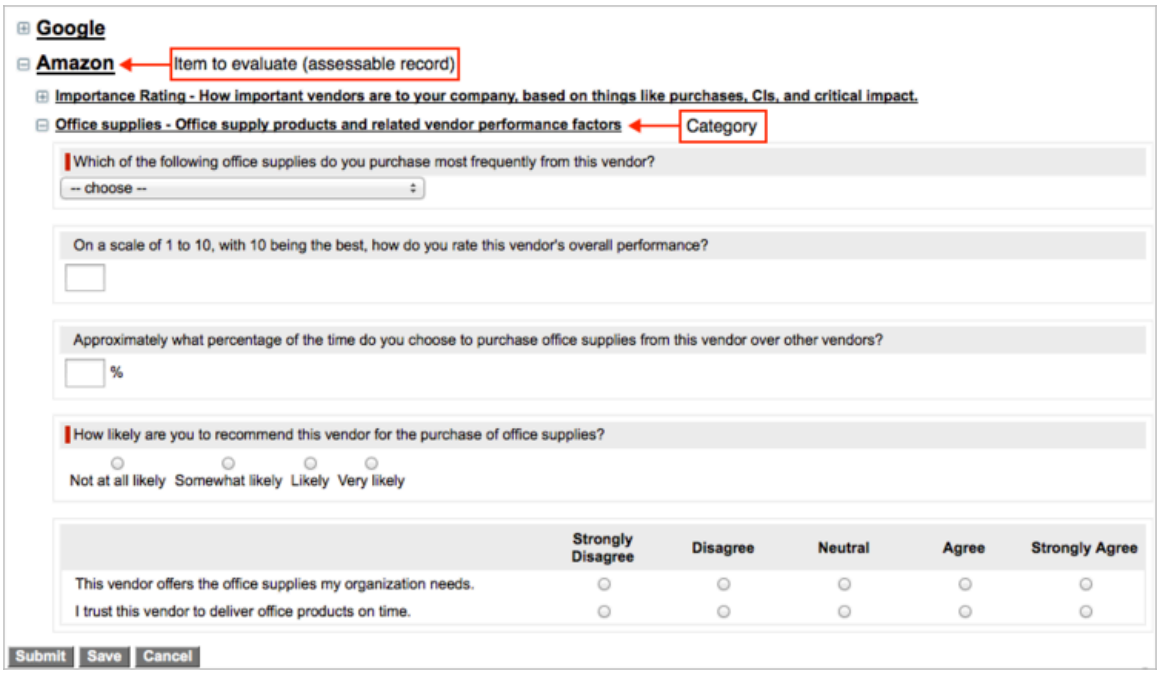
1. Navigate to **All** > **Self-Service** > **My Assessments & Surveys**.

   Note:
   Users with the assessment_admin role can display other users' assessments and surveys in addition to their own. Use the **Show all** and **Show assigned to me** related links to show and hide assessments and surveys. Click a card assigned to another user to open the associated metric type or survey definition.

2. On the assessment card, note the due date.

   Note:
   Depending on the configuration, you may receive email notifications to remind you of the due date.

3. Click the card to open the questionnaire.
   Assessment questionnaires are arranged in sections: first by record, then by category. Each record appears as a section title. Questions for the record appear underneath the record, grouped by category. Each category appears as a subsection underneath the record name.
   Click the collapse icon (⊟) or expand icon (⊞) to hide or show the questions in a category, or all the categories and questions for a record. Colored bars indicate the status of each question.



4. Answer each question to the best of your ability.
   Point to a question for more information.

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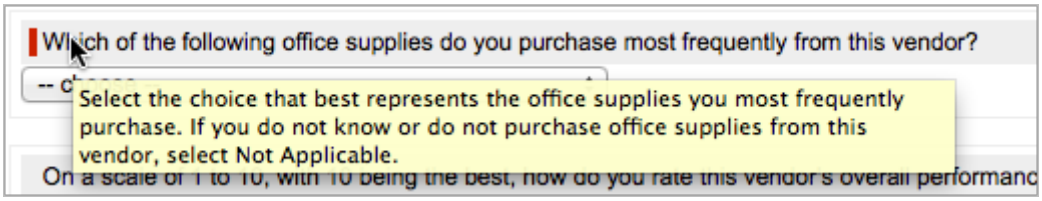


If you're unsure of how to respond to a question or if a question doesn't apply to a particular record, select **Not Applicable**, if available.

5. Read any assertions present at the end of the assessment and acknowledge with a signature, if required.

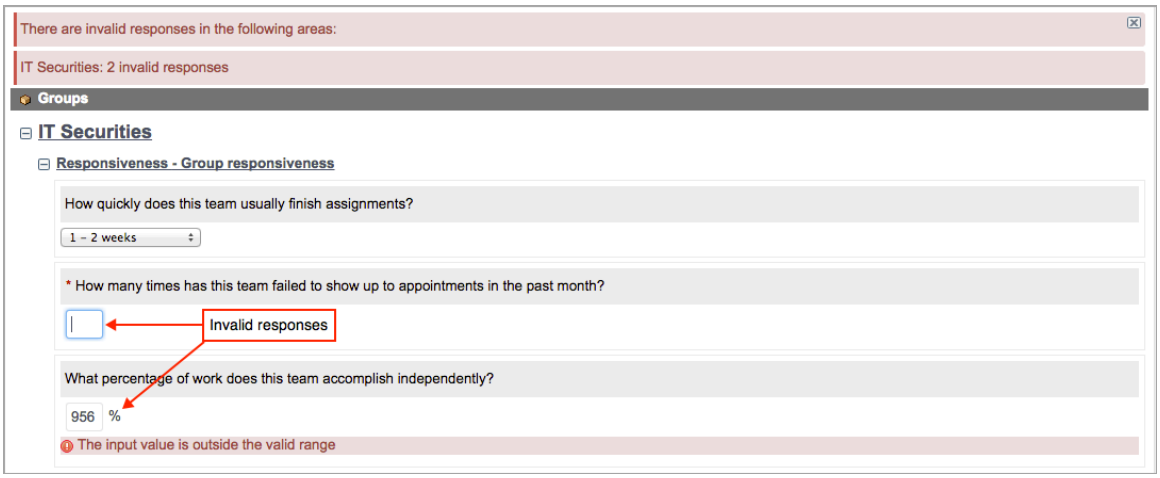
   A signature can require you to select a check box or authenticate your full name, which the system displays in a read-only field. You can't submit your answers to the assessment until you provide the required signature.

6. Save or submit the assessment.

   - **Save**: Saves your responses without submitting them. You can close the questionnaire and access it later from your queue.
   - **Submit**: Submits the completed assessment when you're finished.

7. If prompted, enter your user name and password to verify your full name signature.

   If all the questions are answered with valid values, a `success` message appears. If the system detects an unanswered required question or invalid response, the assessment isn't submitted, and a message appears at the top of the questionnaire explaining the error. Questions with problems are temporarily highlighted.



8. You can modify your responses to the assessment until its due date.
   To update your answers and resubmit an assessment that permits retakes, click the card to modify it.

Related topics

Metric types and assessable records

Survey definitions

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Assessments in Service Portal and the Now Mobile app

If you've installed Service Portal, you can use the My Assessments and Surveys widget in Service Portal. Users can view and take assessments in Service Portal. Service Portal also supports assessments for users on mobile devices that have the Now Mobile app installed. The My Assessments and Surveys widget is available by default on the Service Portal home page.

Assessments in Service Portal

To create an intuitive interface for your users, you can set up assessments in Service Portal. Activate Service Portal to view the My Assessments and Surveys widget, which appears on the Service Portal home page.

To learn more about activating Service Portal, see Activate Service Portal .

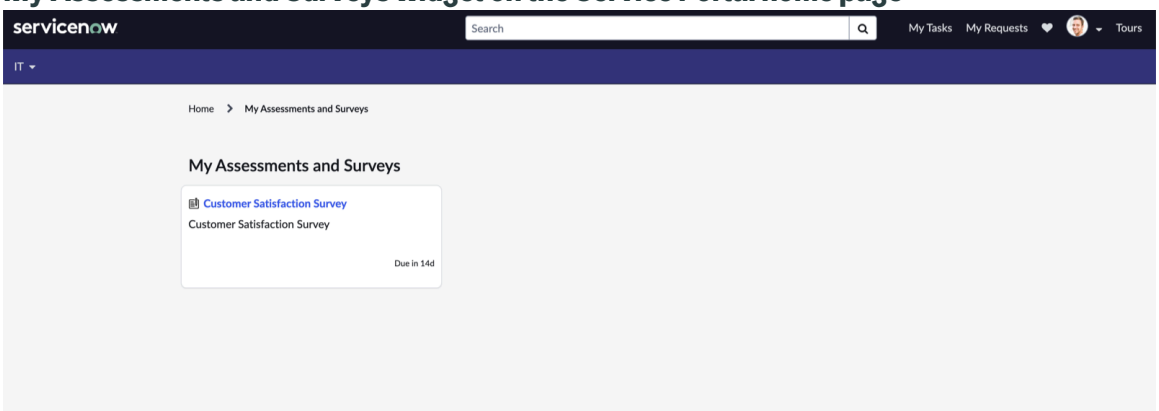
To learn more about configuring a widget, see configure widget instances .

To configure an Assessments and Surveys widget on a Service Portal home page, press the CTRL key, right-click the widget heading, and select **Instance Options**.

Instance options (properties) for the assessments and surveys widget on Service Portal

Property	Description
Max records	Maximum number of assessments to list in the widget on the Service Portal home page. Users can click the **View all** link to view all assessments. Default number of assessments: **5**
Title of the widget	Text that appears in the title bar of the survey widget. Default title: **My Assessments and Surveys**

My Assessments and Surveys widget on the Service Portal home page



Assessments in the Now Mobile app

Your users can view and take the assessments on mobile devices using the My Assessments and Surveys applet launcher that is available by default in the Now Mobile app.

When you assign an assessment to a user, an email notification about taking the assessment is sent to the user. If users installed the Now Mobile app, a mobile push notification is also sent on mobile devices. Tapping the notification opens an introduction page for an assessment in the Mobile Employee Service Portal in the Now Mobile app. The page displays a **Get started** link. The

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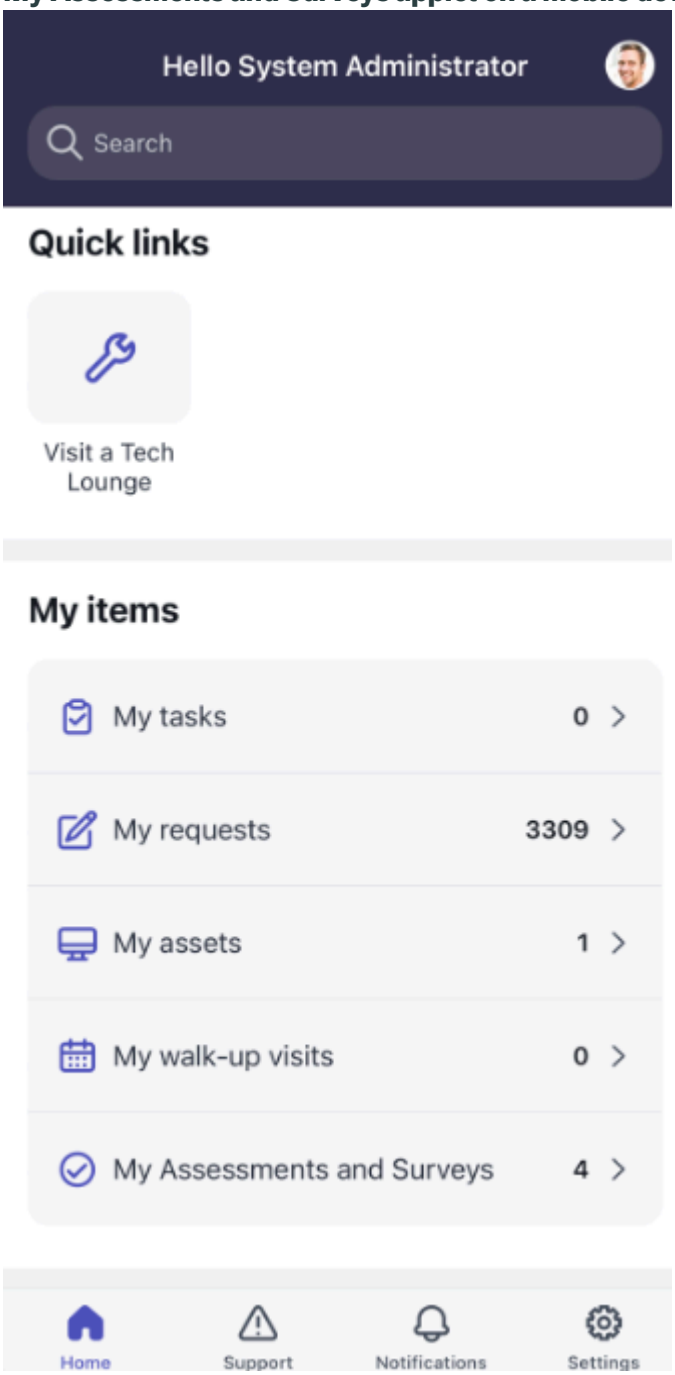
introduction page and the **Get started** link are available only if the related settings are enabled. Users can tap the link to view and take the assessment. You can activate push notifications by setting the *glide.sg.universal_links.enabled* system property to **true**.

My Assessments and Surveys applet on a mobile device



Note:
In the Washington DC release, you now see the assessments and surveys assigned in the card view instead of the item view. If you customize the styles of the legacy card item views in older versions of Assessments and Surveys, the card continues to appear in the item view even after you upgrade to Washington DC. You can view the new card view in Washington DC only if no customizations were made to the legacy cards.

When users open an assessment either in Service Portal or the Now Mobile app, the assessment provides the following features:

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- An assessment page shows breadcrumb navigation on the Service Portal. Users can click the links in the breadcrumb to navigate to previous pages or a home page. For example, clicking the **My Surveys** link in the breadcrumb navigates users to a page, which shows a list of all the assessments.
- When the assessment is in progress, the progress bar, available on each page of the assessment, shows the progress in percentage. The percentage of completion is based on the number of pages in the assessment. For example, suppose that there are three pages in the assessment. The third page shows 66% completion of the assessment. But giving a response to one of the questions on the third page opens a new question on a separate page, which is the fourth page. The fourth page shows the progress of the assessment as 75% completed, which affects overall progress and page indicators. Users can see the pagination - total number of pages - for the entire assessment as well as the current page that the users are on. To hide or show this progress bar, you can use the *sn_portal_surveys.sp_survey.show_progress_bar* property.
- Each user response is saved automatically when users move to the next page in the assessment. If users don't answer the required assessment questions before clicking **Next**, the page shows an error message at the top for all required and unanswered questions. This error message helps users find the exact location of the unanswered and required question. Any question that is not required and is not responded to before clicking **Next** is considered answered. The question is counted as completed.
- When the details of an assessment question contains more than four or five lines of text, the text after these lines disappears. In such cases, users can see the complete details by clicking the **Show more** link. Users can go back to the default behavior by clicking the **Show less** link.
- For a question that has the answer options of **Yes**, **No**, and **Not Applicable**, the **Not Applicable** option appears last in the list of options. The **Not Applicable** option can be configured while creating a question.
- Your users can take assessments for multiple incident records generated. For example, suppose that users have two incident records generated. The user can take an assessment for both the incident records generated using the same assessment instance.
- When the assessment users leave the assessment without submitting it, they can start the assessment later from the same page where they left off in the previous session.

Note:
For mobile users, the pagination is always by question for assessments.

Related topics

Activate Service Portal

Assessment questionnaires

In the assessment process, users complete assessment questionnaires on topics of interest to provide subjective data for future business decisions.

No special role is required to complete an assessment. You are eligible to complete assessments that are assigned to you. For example, you might be expected to evaluate vendors your organization works with, based on traits related to customer service. The system stores your responses so decision makers can compare the performance of the items you evaluate. You and your manager may receive email notifications as reminders of important assessment information.

Related topics

Assessment notifications

Take an assessment

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Metric types and assessable records

In the Assessments application, assessment administrators create and administer metric types and assessable records.

A metric type defines a set of records an organization wants to evaluate, such as vendors, projects, or employees. For each type, the system generates unique assessable records that link the type to records that need to be evaluated, such as the individual records for the vendors Amazon and Intel. There may be multiple assessable records for the same source record if the source record meets the criteria for more than one type. For example, you might want to evaluate a record on the Company table, such as Intel, as a vendor and as a manufacturer, with different categories and metrics.

For configuration suggestions, see Assessment administrator tasks.

Assessable records

An assessable record links a source record you want to evaluate, such as the company record for Amazon or the user record for a sales representative, to a metric type, such as vendors or employees.

You use assessments to evaluate the assessable record. The system generates assessable records from the source records that match the table and conditions set on the Assessment Metric Type form. You evaluate the assessable records with metric categories and metrics, which define traits and values to assess. For metric types with the **On demand** schedule type, you can generate on-demand assessments from the Assessable Record form. This method of assessment generation makes it easy to create and preview short questionnaires or to quickly obtain assessment results for specific assessable records.

You can set up an assessment description that includes information from multiple fields on an assessable record and is displayed on multiple lines. This set up provides the user who is taking the assessment with a more detailed and understandable description of the information being requested on the assessment questionnaire. Create a multi-line description using table titles, which can be defined to use one or more fields from the selected table.

Related topics

- Use update sets for surveys and assessments
- Metric types and assessable records
- View an assessable record

Delete an assessable record

When you delete an assessable record, the system deletes any stakeholders for the record.

Before you begin

Role required: assessment_admin or admin

About this task

Note:
If a source record is deleted, the system deletes the associated assessable record. To delete the source record, you must first delete all associated metric results and category results.

Procedure

Delete the assessable record:

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- To delete a single record, open the record and click **Delete**.
- To delete multiple records, use the Assessable Records list.

Related topics

Metric types and assessable records

View an assessable record

View the Assessable Record form to edit preferences and perform various actions.

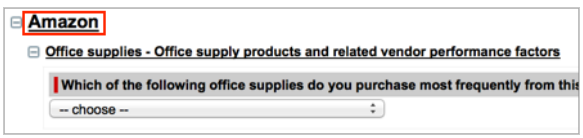
Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open a record from the list.
   By default, the list displays only assessable records with **Active** metric types.
3. On the Assessable Record form, edit fields and perform other actions as necessary (see table).

Viewing Assessable Records

Field	Description
Name	[Read-Only] Assessable record name based on the Select a field as the table display value of the source record. The name appears on assessment questionnaires. 
Source	[Read-Only] Source record the assessable record is linked to. The **Source** reflects the table name and source record display value. For example, if the **Name** field is the display value for the Company table, the assessable record for a company record named **Amazon** has the **Source** value **Company: Amazon**.
Live feed	Check box that, when selected, creates a live feed group for the assessable record, which appears on the scorecard. If you clear the check box after a live feed group has been created, the system deletes the live feed group and all its messages.
Type	[Read-Only] Metric type from which the assessable record was generated.
Decision matrix	Check box that, when selected, enables this assessable record's results data to appear on decision matrixes of the same metric type. Decision matrixes are graphs that plot the assessment results for multiple assessable records. If you clear the check box, the assessable record still appears on the default decision matrixes if you click the **View Matrix** related link on the assessable record's scorecard.
Live feed group	[Read-Only] Live feed group for this assessable record. When you select the **Live feed** check box and save the record, the system populates this field.
Related Links	

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Field	Description
View Scorecard	Opens the scorecard for the assessable record.
Related Lists	
Category	All metric categories associated with the assessable record. An assessable record must be associated to a category to be evaluated. Click **Edit** to add or remove category associations. Note that it is often more efficient to associate assessable records to categories using the Metric Category form.
Category users	All stakeholders who can take assessment questionnaires about this assessable record. Click **Edit** to create and delete stakeholders. For more information about this and other methods of creating stakeholders, see Stakeholders. This related list is available only when the associated metric type has the **Scheduled** schedule type.

Related topics

Metric types and assessable records

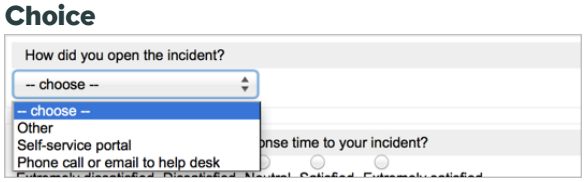
Assessments reference

Reference topics provide additional information about the forms, fields, and properties you use while working with assessments.

Data types for assessments

Metric data types have functions that depend on the method that you select.

Assessment data types

Data type	Compatible methods	Description
Attachment	Assessment	On questionnaires, users attach one or more files to a question.
Checkbox	Assessment	On questionnaires, users select a check box next to a statement or leave it cleared. **Check box**  Set the **Scale definition** field to **High** if a selected check box equates to a good score.
Choice	Assessment	On questionnaires, users select a value from a list of custom answer options. Create a metric definition for each answer option. **Choice** 

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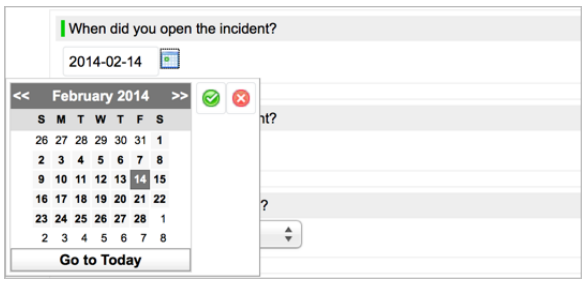
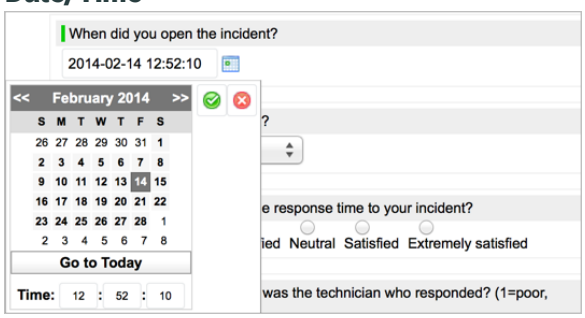
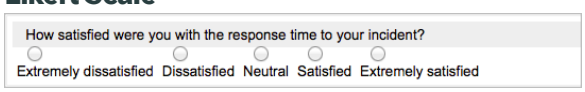
Assessment data types (continued)

Data type	Compatible methods	Description
Date	Assessment	On questionnaires, users select a date. **Date** 
Date/Time	Assessment	On questionnaires, users select a date and time. **Date/Time** 
Duration	Script	When the script runs, the system populates the **Duration value** and **Scaled value** fields on the Metric Result form with the appropriate values from the *`actual_result`* and *`scaled_result`* variables in the metric script.
Likert Scale	Assessment	On questionnaires, users select a value from a custom scale of answer options. Create a metric definition for each answer option, which is represented by a radio button on the scale. A Likert scale metric that evaluates an application's ease of use might have the metric definitions **Easy**, **Average**, and **Difficult**. If you want to reuse a series of answer options for multiple metrics, create a metric template and use the Template data type instead of the Likert Scale data type. **Likert Scale** 
Number	Assessment, Script	**Assessment**: On questionnaires, users enter a number. **Number** 

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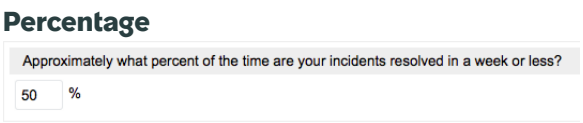
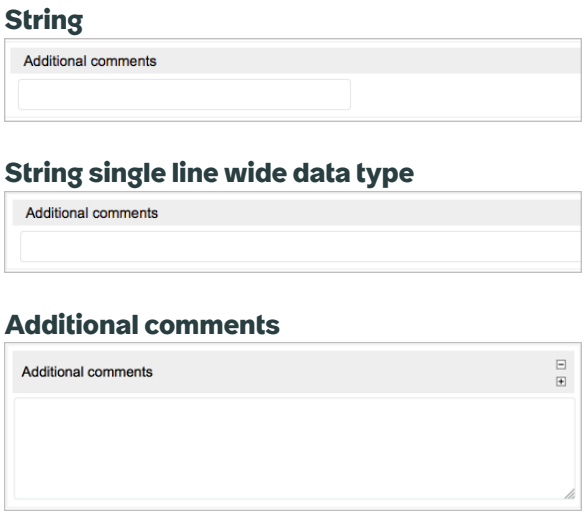
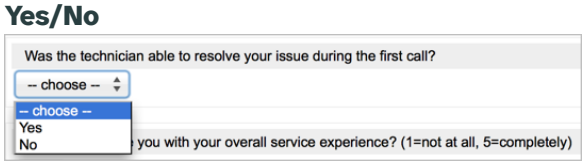
Assessment data types (continued)

Data type	Compatible methods	Description
		Script: When the script runs, the system populates the **Actual value** and **Scaled value** fields on the Metric Result form with the appropriate values from the *actual_result* and *scaled_result* variables in the metric script.
Percentage	Assessment, Script	**Assessment** On questionnaires, users enter a number.  **Script** When the script runs, the system populates the **Actual value** and **Scaled value** fields on the Metric Result form with the appropriate values from the *actual_result* and *scaled_result* variables in the metric script.
String	Assessment	On questionnaires, users enter text. The size of the string field depends on the String option you select: 
Template	Assessment	On questionnaires, users select a value from a predefined series of answer options. There must be at least one template defined to use this data type. For a template, there is a template definition for each answer option, which is represented by a radio button.
Yes/No	Assessment	On questionnaires, users select **Yes** or **No** from a list. 

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Assessment data types (continued)

Data type	Compatible methods	Description
		Set the **Scale definition** field to **High** if selecting **Yes** equates to a better score.

Related topics

- Assessment metrics
- Create an assessment metric definition
- Update a metric minimum and maximum value to match a template

Assessment Metric form

Description of the field values for the Assessment Metric form.

Assessment Metric form

Field	Description
Name	Name of the assessment.
Assessment duration	Allowed duration to complete an assignment after its generation.
Live feed	Checkbox that automatically creates live feed groups for newly generated assessable records of this type.
Notify manager if overdue	Checkbox to send a notification to the manager when the assessment becomes overdue.
Scale factor	Scale value for all assessment results.
Pagination setting for Service Portal view	The setting on which the pagination is based for desktop or tablet view in Service Portal. • Category: default • Question: 1 question per page (automatic for mobile) • None: no pagination **Note:** This field is displayed only when Service Portal is installed.
Business rule	Business rule that is automatically created for assessable record generation.
Schedule type	Scheduled or on-demand assessment type.
Scheduled job	Scheduled job the system creates for this assessment definition when the schedule period is a repeating interval. The system sets the scheduled job to run according to the selected schedule period. • If you change the schedule period and save the survey definition, the system deletes the old scheduled job. • If you selected a recurring schedule period, a new scheduled job is created.

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Assessment Metric form (continued)

Field	Description
	For example, if you change the schedule period from **Daily** to **Weekly** and save the record: • The system deletes the daily scheduled job. • Creates a weekly one set to run a week from the current date. This field is visible to administrators only if the schedule period is **Daily**, **Weekly**, **Monthly**, or **Yearly**.
Evaluation method	Type of assessment.
Roles	Roles with read access for this metric type.
Active	Check box to enable the distribution of this assessment to recipients.
Owners	Owners of the assessment. You can add a user with the survey_creator, survey_admin, or assessment_admin role.
Description	Description of the assessment.
Conditions	
Table	Table that contains records to assess for this type.
Enforce condition	Checkbox to delete the existing assessable records of this type that do not meet the specified conditions.
Condition	Conditions that the assessable records of this type should meet.
Decision Matrix	
Filter field	Field on the Filter table to identify filter menu choices on decision matrices and scorecard averages for this type.
Filter condition	Conditions to filter results on decision matrices and scorecard averages for this type.
Default matrix filter	Default filter menu choice on decision matrix of this type.
Assessors	
User field	User field from the table specified in the **Conditions** tab. The assessment will be assigned to all users of this user field in the table. When you save the assessment and click **Generate Assessable Records**, an assessable record is created for each unique user of the user field. This is applicable for Scheduled and On-demand assessments. For an on-demand assessment, each assessor assesses all assessable records. For a scheduled assessment, each assessor assesses only the corresponding assessable record.
Related Links	
Generate Assessable Records	Creates assessable records for this metric type.

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Assessment Metric form (continued)

Field	Description
Show Benchmarks	Opens the Benchmarks Dashboard that provides visibility into your key performance indicators (KPIs) and trends. **Note:** • This related link is available only for survey_admin, assessment_admin and survey_reader with bm_viewer role. • You must opt in to Benchmarks to view the dashboard. See Enable Benchmarks • This is applicable only for a published survey.
Create Improvement Initiative	Opens the Improvement Initiative window to create an improvement initiative record that helps in improving the performance of the assessment. **Note:** • This related link is available only for the survey_admin and assessment_admin role. A survey_reader can only view the created improvement initiative records. • You should activate the Continual Improvement Management plugin (com.sn_cim).
Related Lists	
Metric Categories	All metric categories for this assessment.
Assessable Records	All assessable records for this assessment.
Improvement Initiatives	Displays improvement initiatives associated with the survey. **Note:** This related list is available only when there is at least one improvement initiative record.

Related topics

Configure an assessment

Metric Category form

Description of the field values for the Metric Category form.

Metric Category form

Field	Description
Name	Name of the metric category. The name appears on assessment questionnaires.

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Metric Category form (continued)

Field	Description
Type	[Required] Metric type this category is used for. Metrics in this category can be used to evaluate assessable records for the type you select. This field becomes read-only after you save the record.
Create stakeholders	Check box that enables (selected) or disables (cleared) automatic stakeholder creation for this category. When the check box is selected, the system makes all associated category users stakeholders for each assessable record associated to this category. This saves the time required to manually create stakeholders. For more information, see Create Stakeholders Automatically. Existing stakeholders are not impacted if you clear the check box.
Table	[Read-Only] Table that contains the records to evaluate with metrics in this category. The system automatically populates this field with the same table as the metric type selected. The table does not appear in the field until you save the form. This field is visible depending on whether a **Type** is selected.
Weight	[Required] Numerical value that represents the importance of this category relative to other categories. A greater value indicates greater importance. For more information, see weight categories and metrics. The default value is 10.
Scoring type	Scoring method for an attestation category. This field appears only when the metric type is an attestation with a **Scoring type** of **Percent**. Use this field to configure different scoring types for specific attestation categories. Possible selections are: • **Percent**: Attestation score as a weighted percentage of correct answers for scored questions. • **All or nothing**: All answers for attestation type questions must be correct or the score is zero for the entire category.
Total metrics	[Read-Only] Number of metrics associated to this category.
Filter	Filter conditions that assessable records must meet to be evaluated using metrics in this category. The filter operates on fields on the selected table. If you specify a filter condition, the system automatically associates matching assessable records to the category when you save the record. If you change the filter conditions, the system removes and creates assessable record associations as needed. The system also deletes stakeholders for assessable records it disassociates. The system does not remove assessable record associations created by users, even if the assessable records do not match the filter conditions. This field is visible only when a **Type** is selected.
Description	Descriptive information about the category that appears on assessment questionnaires.

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Metric Category form (continued)

Field	Description
Roles	Only those users with the specified roles can perform the assessment for this category. If no role is specified, then users with any role can perform the assessment for this category. **Note:** If the **Roles** property does not appear on the form, ask your admin to add the property.
Details	Text field containing an HTML editor. Use this field to present important details about this category to assessment recipients. Details can include formatted lists, images, videos, or links to external websites. You may need to configure the form to see this field.
Related Lists	
Assessment Metrics	All metrics associated to this category. There must be at least one metric associated to the category to use any assessments with the category.
Assessable records	All assessable records associated to this category. There must be at least one assessable record associated to the category to use any assessments with the category. This related list is hidden if the **Evaluation method** is **Attestation**. **Note:** Category users are automatically generated based on the user field is specified in the **Assessors** tab of the assessment after publishing the assessment.
Users	All users associated to this category. There must be at least one category user to create scheduled assessments using metrics in this category. If any user field is specified in the **Assessors** tab of the assessment, the corresponding users are automatically generated after publishing the assignment. This related list is available only when the associated metric type has schedule type set to **Scheduled**. Category users are not a part of the on-demand assessment process.

Related topics

Create a category for assessable records

Assessment Metric form for a category

Description of the field values for the Assessment Metric form. Use the fields when you create an assessment metric for a category.

Assessment Metric form

Field	Description
Name	Name of the metric.

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Assessment Metric form (continued)

Field	Description
Category	Metric category that the metric belongs to. The system automatically populates this category if you create a new metric from the Metric Category form. **Note:** You cannot change the category if the **Depends on** field is set or if another metric depends on this metric

Method	Determines how to use the metric.
	• **Assessment** : Non-scripted metric. Make the metric available as a question on an assessment questionnaire. The **Assessment** method is compatible with all data types except **Duration**.
	• **Script**: Scripted metric. Obtain values by writing a custom script. The **Script** method is compatible with the **Duration**, **Number**, and **Percentage** data types.
	• **Default answer from field**: This option appears only if you have selected an **Assessment Metric Type** that contains a table. The **General** tab adds two fields:
	  ○ **Default answer**: Select the default answer for the question. The list comes from the selected table.
	  ○ **Ask question**: Specifies when to ask the question: always or only if the default answer is empty.
	• **Default answer from script**: The **General** tab adds a field:
	Ask question: Specifies when to ask the question: always or only if the script does not contain a default answer. The script is defined on the **Field Type** tab.
	
	Note:
	If you select a **Data type** that is incompatible with the selected **Method**, the system automatically changes the **Method** to the correct value.

Weight	Numeric value that represents the importance of this metric relative to other metrics in the same category. By default, the weight is 10. For weighting suggestions, see Weight Metrics and Metric Categories. This field is visible and required unless the **Data type** is **Date**, **Date/Time**, or **String**. These data types are not included in results calculations.
Order	Numeric value that determines the order of the metric question on assessment questionnaires, relative to other metric questions in the same category. The metric with the smallest order value appears as the first question in the category section. By default, the order is 100. For more information about questionnaire layout, see Complete Assessment Questionnaires. **Note:** It does not matter which order value you use for metrics with the Script method, as they do not appear on questionnaires.
Active	Check box that determines whether this metric is used to gather assessment results. If a non-scripted metric (Assessment method) is inactive, the question

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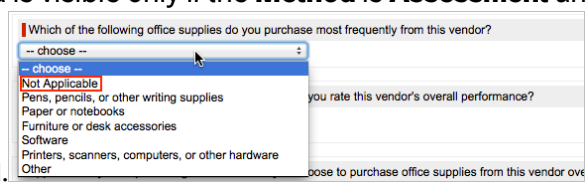
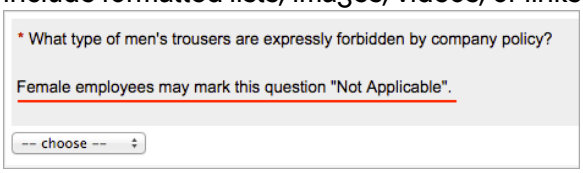
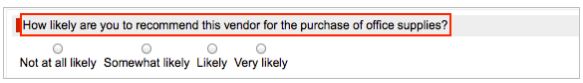
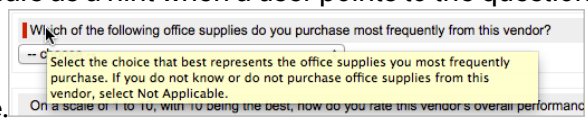
Assessment Metric form (continued)

Field	Description
	does not appear on assessment questionnaires generated after the metric becomes inactive. If a scripted metric (Script method) is inactive, the script does not run.
Mandatory	Check box that makes the metric question mandatory (selected) or optional (cleared) on assessment questionnaires. Users cannot submit questionnaires until they provide valid responses to all mandatory questions, which display a red field status indicator. This field is visible only if the **Method** is **Assessment**, the **Depends on** field is empty, and the data type is not **Checkbox**.
Allow not applicable	Check box that determines whether to include a **Not Applicable** answer option for this metric question on assessment questionnaires. Users can select **Not Applicable** if they do not have sufficient information to respond to a question or if a question does not apply to a particular assessable record. User responses of **Not Applicable** are excluded from results calculations. This field is visible only if the **Method** is **Assessment** and certain data types are selected. 
Additional fields you can add by customizing the form	
Details	Text field containing an HTML editor. Use this field to present important details about this metric to assessment recipients. Details can include formatted lists, images, videos, or links to external websites. 
General Section	
Question	Text to use as the question on assessment questionnaires. Enter a clear, straightforward question that is easy to answer, such as **How likely are you to recommend this vendor for the purchase of office supplies?** 
Description	Information about the metric and what it evaluates. If the **Method** is **Assessment**, include details that help users understand how to answer the question. This text appears as a hint when a user points to the question text on the questionnaire. 

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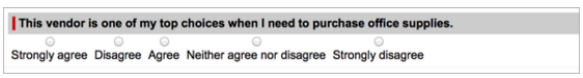
Assessment Metric form (continued)

Field	Description
Depends on	Setting used to make this metric a conditional question. Select an existing metric question from the list, which displays **Checkbox**, **Choice**, **Likert Scale**, **Template**, and **Yes/No** metrics of the same category as this metric. Then, use the **Displayed when** field to set the conditions that display this metric question on questionnaires. The system prevents the creation of recursive dependencies between metrics. For example, if Metric A depends on Metric B, Metric B cannot depend on Metric A. This field is visible only if the Method is Assessment.
Displayed when	Answer options for the selected **Depends on** metric question that, when chosen on questionnaires, display this metric question. This field is visible and required only if the **Depends on** field is set.
Field Type Section	
Data type	[Required] Format of the expected response data. The function of the data type depends on the selected **Method**. If the method is **Assessment**, the data type determines how users answer the corresponding question on questionnaires. If the method is **Script**, the data type determines how the system calculates assessment results. **Note:** If another metric depends on this metric, you cannot change the data type.
Randomize answers	Check box that determines whether to present the answer options for this metric question in a random order. The order of answer options can influence users, which creates biased results. Randomizing answer options can help prevent this bias. This field is visible only if a data type that requires metric definitions is selected. **Note:** Randomizing answer options for certain questions can make those questions confusing for the person answering. In general, only randomize answer options that do not follow a logical order. For example, the following question is confusing when randomization is enabled: 
Template	Metric template to use for the metric question. A metric template is a set of predefined answer options. This field is visible and required only if the **Data type** is **Template**. **Note:** If another metric depends on this metric, you cannot change the template.

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Assessment Metric form (continued)

Field	Description
Dependent plugin	Plugin that contains the tables queried in the script. The system executes the metric script only if the plugin is active. The default available values are **Asset Management**, **CMDB**, **Core**, **Cost Management**, **Procurement**, and **Software Asset Management**. If the **Method** is **Script**, select a plugin. This field is visible only if the **Method** is **Script**. **Note:** An administrator may need to add more Define an option for a choice list of plugins to the field.
Scale definition	Setting that determines whether lesser or greater numerical values equate to a good score in assessment result calculations. Select **Low** if lesser numerical values are better, such as for a metric that measures the number of incidents for a vendor. Select **High** if greater numerical values are better, such as for a metric that measures user satisfaction on a scale of one to five. The default value is **High**. This field is visible and required unless the **Data type** is **Date**, **Date/Time**, or **String**. The results for these data types are not included in results calculations. **Note:** For information about how to set the scale definition for data types that do not require you to set a numerical value, see Data Types.
Min	Lowest numerical value to be used as an answer option on assessments or as a scaled value in a scripted metric. This field is visible and required only if certain data types are selected. If the data type is **Choice** or **Likert Scale**, this field is read-only and is set automatically based on the smallest metric definition **Value**.
Max	Highest numerical value to be used as an answer option or scaled value. This field is visible and required only if certain data types are selected. If the data type is **Choice** or **Likert Scale**, this field is read-only and is set automatically based on the largest metric definition **Value**.
Script	Script that obtains the desired system information. This field is visible and required only if the **Method** is **Script**.
Related List	
Assessment Metric Definitions	Lists all metric definitions, which appear as answer options for questions on assessment questionnaires. Click **New** to create a new metric definition. This related list is available only if the Data type is **Choice** or **Likert Scale**.

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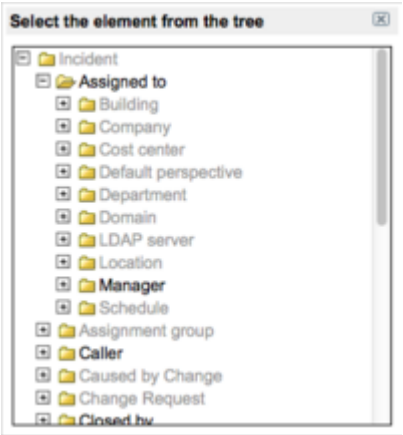
Related topics

Create an assessment metric for a category

Trigger Condition form for assessments

Description of the field values for the Trigger Condition form for assessments.

Trigger Condition form

Field	Description
Assessment	[Required] Metric type to generate assessment instances for. Triggered assessments only work if the metric type is set to the **On demand** schedule type.
Table	[Required] Table to run the trigger condition on. You can select only tables in the current application scope. The table must have a connection to the assessable records for the selected **Assessment**. For example, you might want to send a vendor assessment when incidents close that are related to vendors you assess. In this case, select the Incident [incident] table. After you select a table, ensure there is at least one option for the **Assessable Record Field**. If there is not, select a different table.
User field	[Required] Field that stores the users you want to send the assessment. You can select any field, on the selected **Table** or on a related table, that references the User [sys_user] table. Use the tree picker to select a field. 
Repeat Interval	Minimum period that must pass before the trigger condition can resend the assessment to the same user. For example, assume the repeat interval is set to 30 days. Even if the same user is eligible for multiple assessments from this trigger condition, the system can only send the user one assessment every 30 days.
Active	Check box that determines whether this trigger condition is active (selected).
Business rule	[Admin only] Business rule the system creates to monitor the selected table. When the condition is met, the business rule sends the assessment to the correct user. No configuration is necessary for this business rule.
Trigger randomly	Check box that determines whether to send the assessment to the appropriate user every time the condition is met (cleared) or only a percentage of the time (selected), as specified in the **Probability (%)** field.
Probability (%)	Probability out of 100 that the assessment will be sent each time the condition is met. For example, if the probability is set to 50, the system sends the assessment approximately 50% of the time the conditions are met, assuming there are

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Trigger Condition form (continued)

Field	Description
	no repeat interval restrictions. This field is visible and required only when the **Trigger randomly** check box is selected.
Assessable Record Field	[Required] Field on the selected **Table** that determines which assessable record will be the subject of the assessment. Only appropriate reference fields on the selected **Table** are available to select. If there are no **Assessable Record Field** options available, you must select a different **Table**. If the selected **Assessment** evaluates records on the Company `[core_company]` table and the selected **Table** is Incident, the only **Assessable Record Field** options are fields on the Incident table that reference the Company table. For example, **Company** or, if vendor ticketing is enabled, **Vendor**. If you select **Vendor**, the trigger condition sends an assessment about the **Vendor** for the incident, assuming there is an assessable record for the associated company. The assessment contains questions from all metric categories associated with the assessable record. **Note:** This field is not available if the selected **Assessment** is a metric type used for surveys. See Survey trigger conditions.
Related Field 1 – Related Field 4	Field that contains a value you want to store for reporting purposes. You can pick any reference field on the selected **Table**. When the trigger condition generates an assessment instance, the system stores the value from the triggering record. Select up to four fields. For example, if you select the Incident table, you might select **Caller** and **Vendor** as related fields. That stores the caller and vendor associated with the incident as **Related record 1** and **Related record 2** in the assessment instance record. To view these fields, configure the Assessment Instance form.
Description	Summary information to identify the trigger condition.
Condition	[Required] Condition builder that defines the criteria that must be true to send the assessment. For example, if you want to send an assessment whenever an incident closes, create the condition [State] [is] [Closed].

Related topics

Configure a trigger condition for a survey

Domain separation and Assessments

Domain separation is supported for Assessments. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.

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- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Related topics

Domain separation for service providers

Installed with Assessments and Surveys

Several types of components are installed with the activation of Assessments and Surveys.

- Demo data is available for Assessments and Surveys.
- ServiceNow® Vendor Performance offers an extra set of vendor assessment demo data.

Tables

Table	Description: Assessments	Description: Surveys
Assessable Record [asmt_assessable_record]	Stores all assessable records.	For system use only.
Assessment Category Result [asmt_category_result]	Stores all category results.	For system use only.
Assessment Category User [asmt_m2m_category_user]	Stores associations between users and metric categories that they can evaluate. A user that is associated to a category is a category user.	Stores associations between users and surveys. A user that is associated to a survey is a survey user and is automatically associated to all the survey's categories.
Assessment Group [asmt_assessment]	Stores all assessment groups.	For system use only.
Assessment Instance [asmt_assessment_instance]	Stores all assessment instances.	Stores all survey instances.
Assessment Instance Question [asmt_assessment_instance_question]	Stores all assessment instance questions, each of which represents one question on one assessment instance.	Stores all survey instance questions, each of which represents one question on one survey instance.
Assessment Metric	Stores all metrics.	Stores all survey questions.

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Table	Description: Assessments	Description: Surveys
[asmt_metric]		
Assessment Metric Definition [asmt_metric_definition]	Stores all metric definitions.	Stores all answer options for survey questions.
Assessment Metric Template [asmt_template]	Stores all metric templates.	Stores all question templates.
Assessment Metric Type [asmt_metric_type]	Stores all metric types.	Stores all survey definitions.
Assessment Stakeholders [asmt_m2m_stakeholder]	Stores associations between assessable records and category users. A category user that is associated to an assessable record is a stakeholder.	Not used for surveys.
Assessment Template Definition [asmt_template_definition]	Stores all metric template definitions.	Stores all question template definitions.
Assessment X Category Matrix [asmt_m2m_xcategory_matrix]	Users can specify metric categories as the X axis of a decision matrix.	Not used for surveys.
Assessment Y Category Matrix [asmt_m2m_ycategory_matrix]	Users can specify metric categories as the Y axis of a decision matrix.	Not used for surveys.
Bubble Chart [asmt_bubble_chart]	Stores all bubble chart definitions.	Not used for surveys.
Category Assessable Records [asmt_m2m_category_assessment]	Stores associations between assessable records and metric categories.	For system use only.
Decision Matrix [asmt_decision_matrix]	Stores all decision matrixes.	Not used for surveys.
Metric Category [asmt_metric_category]	Stores all metric categories.	Stores all survey categories.
Metric Result [asmt_metric_result]	Stores all metric results.	Stores all survey responses.
Signature	Stores all signature records for assessments	Stores all signature records forSurveys.

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Table	Description: Assessments	Description: Surveys
[asmt_signature]	and [[Attestations|GRC attestations]].	
Trigger Condition [asmt_condition]	Stores all assessment trigger conditions.	Stores all survey trigger conditions.

Properties

You can configure various properties to customize the appearance of Assessments and Surveys questionnaires, require authentication for user signatures, open surveys in the Service Portal view from emails, and limit the number of items shown in a decision matrix field filter.

Assessments and Surveys installs the following properties. You can find these properties by navigating to the following locations:

- **All** > **Assessments** > **Administration** > **Assessment Properties**
- **All** > **Survey** > **Administration** > **Properties**

Important:
You can customize the css.assessment.question.header.background.color, assessment.caption.background.color, and the css.assessment.caption.font.color fields only if Next Experience is turned off.

Property	Description
sn_portal_surveys.sp_survey.email_redirection	When this property is enabled, users can use a link in an email to open a survey or assessment in Service Portal. • Type: **Yes** or **No** • Default value: **Yes**
com.snc.assessment.signature_authentication	When this property is enabled, an authentication is required by user signature. When **Yes** is selected, this property requires credentials for a full name signature. • Type: **Yes** or **No** • Default value: **Yes** For more information about working with signatures, see Signatures.
com.snc.assessment.collect.stats	List of Assessments for which Recent Sent & Recent Completed stats must be collected in an asmt_assessment_stat table. Comma-separated list of eligible Assessment Metric Type Sys IDs.

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Property	Description
css.assessment.question.header.background.color	Background color of question headers on assessment and survey questionnaires. • Type: **Color** • Default value: **#767676**
sn_portal_surveys.sp_survey.show_progress_bar	Shows or hides a progress bar on the survey pages on Service Portal. • Type: **Yes** or **No** • Default value: **Yes** **Note:** If the Pagination setting is set to **None**, the survey is displayed in a single page, and no progress bar is shown.
show_lang_picker_for_publicsurveys	Enable or disable whether to show language picker when a public survey is taken. • Type: **Yes** or **No** • Default value: **Yes**
css.assessment.caption.background.color	Sets the background color of the caption on assessment and survey questionnaires. • Type: Color • Default value: **#eee**
com.snc.assessment.decision_matrix_filter_max_entries	Maximum number of items to show for a decision matrix field filter. • Type: integer • Default value: **1000**
css.assessment.caption.font.color	Sets the font color of the caption text on assessment and survey questionnaires. • Type: color • Default value: **#ffffff**

For more information about customizing the appearance of a survey, see Customize the appearance of a survey.

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User roles

Role title [name]	Description	Contains roles
assessment administrator [assessment_admin]	Can administer the Assessments application. Can access all the modules of the Assessments application. **Note:** The assessment_admin role is contained by the itil_admin role. This role is also contained by the survey_admin role.	None

Script includes

Name	Description
AssessmentUtils	Core code for assessment functionality.
AssessmentUtilsAJAX	AJAX-based code for displaying scorecard data.
MigrateSurveyToAssessment	Code for migrating legacy surveys to assessment surveys.
RatingUtilsAJAX	Reserved for future use.
SurveyUtils	Core code for survey functionality.

Client scripts

Name	Table	Description
Calculate Assessable Record Field choice list	Trigger Condition [asmt_condition]	Limits the Assessable Record Field choices to those choices that are compatible with the selected assessment.
Check survey schedule period	Trigger Condition [asmt_condition]	Checks the selected survey definition's Schedule period. If Schedule period is set to Only Once, this client script displays a warning message that each user can only take the selected survey once.
Clear display_when when depends changed	Assessment Metric [asmt_metric]	Shows the **Display when** field when the **Depends on** field is set. Clears the **Display when** field when the **Depends on** field changes and the options must change.
Conditionally Set Type for Surveys	Group [sys_user_group]	Sets the user group Type to survey if you create a new group from the User Groups module.
Data type -- Hide choices for surveys	Assessment Metric [asmt_metric]	Ensures only Data type options that are valid for surveys are available on the Survey Question form.

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Name	Table	Description
Data type -- Show/ Hide Not Applicable	Assessment Metric [asmt_metric]	Hides the **Allow not applicable** field and sets its value to **false** if the metric method is Assessment and the data type is **Percentage**, **Checkbox**, **Date**, **Date/Time**, **Number**, or **String**.
Data type defaults to String for surveys	Assessment Metric [asmt_metric]	Sets the default **Data type** field value to **String** on the Survey Question form.
Fetch Min/ Max	Assessment Metric [asmt_metric]	Updates the **Min** and **Max** fields to match the least and greatest metric template definition values if an assessment administrator selects or changes the Template value.
Hide Assessable Record Field	Trigger Condition [asmt_condition]	Hides the **Assessable Record** field unless the evaluation method of the metric type selected in the **Assessment** field is **Assessment**.
Hide Survey Instance Trigger ID if empty	Assessment Instance [asmt_assessment_instance]	Hides the **Trigger ID** field and makes it read-only unless it contains a value.
Hide user lists	Assessable Record [asmt_assessable_record]	Hides the **Category users** related list if the associated metric type schedule type is **On demand**.
Hide user related lists	Metric Category [asmt_metric_category]	Hides the User related list if the associated metric schedule type is **On demand** and the **Evaluation method** isn't **Survey**.
Hide value or String value	Assessment Instance Question [asmt_assessment_instance_question]	Hides the **Value** field and shows the **String value** field if the associated metric data type is **Date**, **Date/Time**, or **String**. Does the opposite if the data type is anything or else.
Live feed deletion warning	Assessable Record [asmt_assessable_record]	Displays a warning message if an assessment administrator clears the **Live feed** check box.
Method -- Show/ Hide Not applicable	Assessment Metric [asmt_metric]	Hides the **Mandatory** and **Allow not applicable** fields and sets both values to **false** if the metric method is Script. Shows the **Mandatory** field if the metric method is Assessment. Shows the **Allow not applicable** field if the method is Assessment, except when the data type is **Percentage**, **Checkbox**, **Date**, **Date/Time**, **Number**, or **String**.

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Name	Table	Description
Min/Max Control	Assessment Metric [asmt_metric]	Makes the **Min** and **Max** fields mandatory except when the data type is **Template**.
Min/Max Read-only	Assessment Metric [asmt_metric]	Makes the **Min** and **Max** fields read-only when the data type is **Choice** or **Likert Scale**.
Populate Groups	Assessment Metric Type [asmt_metric_type]	Populates the available values for the **Filter** field with fields from the selected metric type table.
Read only Type	Metric Category [asmt_metric_category]	Makes the **Type** field read-only when it contains a value.
Reload Decision Matrix Filter Columns	Assessment Metric Type [asmt_metric_type]	Populates the available choices for the **Default matrix** filter as appropriate if the **Filter** field value changes.
Reload default filters	Assessment Metric Type [asmt_metric_type]	Populates the available choices for the **Default filter** as appropriate if the **Display all filters** value changes.
Set scale factor	Assessment Metric Type [asmt_metric_type]	Reserved for future use.
Set table field	Metric Category [asmt_metric_category]	Sets the category Table value to that of the metric type.
Show and Hide Scheduled Job	Assessment Metric Type [asmt_metric_type]	Hides the **Scheduled job** field if the Schedule type is **On demand** and shows the **Scheduled job** field if the Schedule type is **Scheduled**.
Show and Hide Scheduled Job Survey View	Assessment Metric Type [asmt_metric_type]	Shows the **Scheduled job** field on the Survey Definition form if the Schedule period is **Daily**, **Weekly**, **Monthly**, or **Yearly**.
Toggle Metric Definitions (Load)	Assessment Metric [asmt_metric]	Displays the Assessment Metric Definitions related list if the data type is **Choice** or **Likert Scale**.
Toggle Metric Definitions (Update)	Assessment Metric [asmt_metric]	Displays the Assessment Metric Definitions related list if the data type is **Choice** or **Likert Scale**. Sets the **Method** field to the appropriate value if the data type is compatible with one method only.
Update Min And Max	Assessment Metric [asmt_metric]	Sets reasonable default values for the **Min** and **Max** fields, based on the data type.

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Name	Table	Description
Default Values		
Validate Probability	Survey Trigger Condition [asmt_condition]	Ensures that the **Probability (%)** value is a whole number between **1** and **100**.
Verify Max	Assessment Metric [asmt_metric]	Verifies that the **Max** value is greater than the **Min** value and greater than or equal to zero if the metric method is Assessment.
Verify Min	Assessment Metric [asmt_metric]	Verifies that the **Min** value is less than the **Max** value and greater than or equal to zero if the metric method is Assessment.
Verify Value	Assessment Metric Definition [asmt_metric_definition]	Verifies that the Value is greater than or equal to zero.
Verify Value	Assessment Template Definition [asmt_template_definition]	Verifies that the Value is greater than or equal to zero.

Business rules

Business rules for Assessments

Name	Table	Description
Assessable domain matches type	Assessable Record [asmt_assessable_record]	Ensures that all new assessable records are in the same domain as the metric type. This is a special requirement of assessment domain separation, that all records must be in the same domain.
Auto stakeholder creation	Assessment Category User [asmt_m2m_category_user]	Assigns new category users as stakeholders automatically for assessable records if the associated category has the **Create stakeholders** option selected.
Auto stakeholder creation	Category Assessable Records [asmt_m2m_category_assessment]	Creates stakeholders from all of a category's category users automatically for new assessable records if: • The **Create stakeholders** option is selected for the metric category. • The same metric category is associated to the new assessable record.

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Business rules for Assessments (continued)

Name	Table	Description
Auto stakeholder creation	Metric Category [asmt_metric_category]	Assigns all of a category's category users as stakeholders for each assessable record associated to the category when the **Create stakeholders** option is selected for the category.
Calculate category max weight	Assessment Metric [asmt_metric]	Calculates the sum of all metric weights in a category.
Cancel notification workflow	Assessment Instance [asmt_assessment_instance]	Cancels the workflow that generates assessment email notifications when an assessment instance is deleted or changes the state to **Complete** or **Canceled**.
Category domain matches type	Metric Category [asmt_metric_category]	Ensures that all new categories are in the same domain as the metric type. This is a special requirement of assessment domain separation, that all records must be in the same domain.
Check Live Feed Groups	Assessable Record [asmt_assessable_record]	Selects the **Live feed** option if a live feed group is associated with the source record. If the **Live feed** option is selected and no live feed group is associated with the source record, this business rule clears the check box.
Check only one default	Bubble Chart [asmt_bubble_chart]	Ensures that there is only one default bubble chart for a metric type.
Check only one default	Decision Matrix [asmt_decision_matrix]	Ensures that there is only one default decision matrix for a metric type.
Create actual results	Assessment Instance [asmt_assessment_instance]	Generates assessment and category results from the user responses if a user completes an assessment.
Create Business Rule on Remote table	Assessment Metric Type [asmt_metric_type]	Generates the following business rules if an assessment administrator creates or updates a metric type: • Business rule called Auto business rule for Assessments, which monitors the Table selected for the metric type. When someone adds a record that meets the metric type

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Business rules for Assessments (continued)

Name	Table	Description
		conditions, this business rule generates an assessable record. If someone changes the metric type's Table or conditions, the Create Business Rule on Remote table business rule updates the automatic business rule script to reflect the changes. • Business rule called Auto deletion rule for Assessments, which prevents users from deleting a record on the metric type's Table if the record is associated to metric or category results. If the record has no associated results and a user deletes it, this business rule deletes any associated assessable records. The Create Business Rule on Remote table business rule generates automatic business rules only for metric types with Evaluation method set to Assessment.
Create Scheduled Job	Assessment Metric Type [asmt_metric_type]	Assessments: Generates a scheduled job for the creation of assessment components if either of these conditions is met: • Someone creates a new metric type with the schedule type set to **Scheduled**. • The schedule type changes from **On demand** to **Scheduled**. Surveys: Generates a scheduled job for the creation of survey components if the schedule period for a survey definition is set to Daily, Weekly, Monthly, or Yearly.
Create Survey Records	Assessment Metric Type [asmt_metric_type]	Generates various records and populates certain fields on those records when someone creates a new survey definition, which is a metric type with Evaluation method set to Survey. More specifically, this business rule generates a survey category and assessable record,

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Business rules for Assessments (continued)

Name	Table	Description
		both associated to the survey definition.
Create UI Action on Remote table	Assessment Metric Type [asmt_metric_type]	Reserved for future use.
decision_matrix_axis	Global [global]	Limits available categories for X- and Y-axes to those that belong to the type if there is a metric type specified on the Decision Matrix form.
Delete Live Feed Group	Assessable Record [asmt_assessable_record]	Deletes the assessable record's live feed group, if there is one, when an assessment administrator deletes an assessable record.
delete related users	Category Assessable Records [asmt_m2m_category_assessment]	Deletes any stakeholders for the assessable record and category when an assessment administrator disassociates a category from an assessable record.
Do not allow category to change	Assessment Metric [asmt_metric]	Prevents the **Category** field from being changed if there are any conditional question dependencies related to the current record.
Do not allow datatype to change	Assessment Metric [asmt_metric]	Prevents the **Data type** and **Template** fields from being changed if there are any conditional questions that depend on the current record.
Ensure Types Match	Assessment Metric [asmt_metric]	Sets the type of a metric to the type of the associated category.
Ensure types match	Assessment Stakeholders [asmt_m2m_stakeholder]	Ensures that users can only create a stakeholder from a category user and assessable record of the same type.
Ensure types match	Category Assessable Records [asmt_m2m_category_assessment]	Prevents users from associating categories of one type to an assessable record of a different type.
Evaluate filters	Assessable Record [asmt_assessable_record]	Performs the following after the system generates a new assessable record:

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Business rules for Assessments (continued)

Name	Table	Description
		• Checks all filter conditions for categories in the type. • Automatically associates the new assessable record to all categories for which it meets the category filter conditions.
Generate assessment trigger condition	Trigger Condition [asmt_condition]	Generates a business rule that the survey or assessment trigger condition uses to send surveys or assessments.
getStakeholders	Global [global]	Ensures that only category users for categories associated with the assessable record are available on the Assessable Record form when users edit the Category users related list.
Link assessable record and category	Metric Category [asmt_metric_category]	Sets these hidden fields as follows for a newly created survey category: • Table: Assessment Metric Type [asmt_metric_type] • Filter: <sys_id of the survey definition the new survey category is associated with>
Live Feed Group	Assessable Record [asmt_assessable_record]	Creates a live feed group for the assessable record, if one doesn't exist, when the record is saved with the **Live feed** option selected. If the check box is then cleared and the record saved, this business rule deletes an existing live feed group.
Metric domain matches category	Assessment Metric [asmt_metric]	Ensures that all new metrics are in the same domain as the category to which they belong. This rule is a special requirement of assessment domain separation, that all records must be in the same domain.
Notify assessment user	Assessment Instance [asmt_assessment_instance]	Starts a workflow that sends an email notification to the assigned user when an assessment instance changes to the **Ready** state or the user to which it is assigned changes. The workflow generates other assessment email notifications at later stages.

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Business rules for Assessments (continued)

Name	Table	Description
Prevent recursive dependencies	Assessment Metric [asmt_metric]	Prevents the **Depends on** field from being set in a way that creates a recursive conditional question dependency.
Publish Survey	Assessment Metric Type [asmt_metric_type]	Generates survey instances and assigns them to the associated survey users when the survey definition state changes from **Draft** to **Published**.
Remove auto create Business Rules	Assessment Metric Type [asmt_metric_type]	Deletes the automatically created business rule for a metric type when an assessment administrator deletes that metric type.
Remove auto create UI actions	Assessment Metric Type [asmt_metric_type]	Reserved for future use.
Remove auto created business rule	Survey Trigger Condition [asmt_condition]	Deletes the automatically created business rule when someone deletes the survey trigger condition.
Remove Scheduled Job	Assessment Metric Type [asmt_metric_type]	Assessments: Deletes the scheduled job for a metric type if either of these conditions is met: • Someone deletes the metric type. • Someone changes the schedule type from **Scheduled** to **On demand**. Surveys: Deletes the scheduled job for a survey definition if the schedule period is set to Only Once or No Limit.
Reset Min/Max for metric	Assessment Metric Definition [asmt_metric_definition]	Updates the **Min** and **Max** fields for metrics and survey questions based on the metric definition value.
Set Domain for M2M Cat Assessable Recs	Category Assessable Records [asmt_m2m_category_assessment]	Ensures that assessable records are only associated to categories in the same domain. This rule is a special requirement of assessment domain separation, that all records must be in the same domain.
Set Domain for M2M Category Users	Assessment Category User [asmt_m2m_category_user]	Ensures that users are only linked to categories in the same domain. This is a special requirement of

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Business rules for Assessments (continued)

Name	Table	Description
		assessment domain separation, that all records must be in the same domain.
Set Domain for M2M Stakeholders	Assessment Stakeholders [asmt_m2m_stakeholder]	Ensures that assessable records are only linked to category users in the same domain. This is a special requirement of assessment domain separation, that all records must be in the same domain.
Set scratchpad fields	Assessment Metric Type [asmt_metric_type]	Caches field values for use by other scripts that run on the Assessment Metric Type form.
Store view type	Metric Category [asmt_metric_category]	Ensures that the **Type** field only allows users to select metric types used for assessments.
Synchronize category survey users	Assessment Category User [asmt_m2m_category_user]	Ensures that the same users are associated with all of a survey's categories.
Synchronize survey users and stakeholder.	Metric Category [asmt_metric_category]	Adds all users associated with a survey's existing categories to any newly created category for that survey.
Update Category Count	Assessment Metric [asmt_metric]	Updates the value in the **Total metrics** field on the Metric Category form when metrics are added to and deleted from the category.
Update records that match filter	Metric Category [asmt_metric_category]	Automatically performs these tasks when an assessment administrator edits the **Filter** field: • Associates the category to assessable records that meet the filter conditions. • Disassociates the category from assessable records that don't meet the filter conditions. The Assessable records related list reflects these changes when the record is saved.
Update scheduled job on schedule change	Assessment Metric Type [asmt_metric_type]	Updates the survey creation scheduled job to reflect schedule period changes.
Validate mandatory and not applicable	Assessment Metric	Sets the **Mandatory** and **Allow not applicable** fields to **false** if the metric method is Script. If the

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Business rules for Assessments (continued)

Name	Table	Description
	[asmt_metric]	metric data type is Percentage, the business rule sets the **Allow not applicable** field to **false**.
Verify min/max	Assessment Metric [asmt_metric]	Ensures that the Min is greater than or equal to zero and less than the Max. Sets the Min to 0 and the Max to 1 if the data type is **Checkbox** or **Yes/No**.
Verify value	Assessment Template Definition [asmt_template_definition]	Ensures that the metric template definition Value is: • Greater than or equal to zero. • Different from the Value for all other metric template definitions related to the template.
Verify value	Assessment Metric Definition [asmt_metric_definition]	Ensures that users can only enter a metric definition Value greater than or equal to zero. Ensures that the metric definition value is different from the Value for all other metric definitions related to the metric.

Quick start tests for Assessments and Surveys

Validate that Assessments and Surveys still works after you make any configuration change such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Assessments and Surveys quick start tests require activating the Automated Test Framework for Survey plugin (com.glide.automated_testing_impl. Survey).

Note:
In the Washington DC release, all the buttons on the assessments or surveys cards have been removed. To run the Automated Test Framework tests successfully, the **Click the Take Survey button** step must be replaced with **Click the Survey card** for all tests that have this step.

Test Suite for Survey

Name	Description	Release version
Survey: Basic Platform Based Test	Create a survey using Platform UI actions.	Madrid
Survey: Platform test for Dynamic Validation	Validate a survey dynamically.	Madrid
Survey: Clone Action	Clone a survey and validate the records of the original survey and the cloned survey.	New York

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Test Suite for Survey (continued)

Name	Description	Release version
Survey: Question Bank Flow	Verify the addition of a question bank to a survey.	New York
Survey: Survey Creator Work Flow	Survey creator can create a survey and assign to the user who can take the survey and submit it.	New York
Assessment: Assign assessment to assessor	Assign an assessment to an assessor and verify that the instance is created for the assessor.	Orlando
Assessment: Create assessment as survey creator	Create an assignment as a survey creator.	Orlando
Assessment: Scale and Template support	Create, publish, and assign the assessment. Then take the assessment.	Rome
Assessment: Basic test flow	Verify the basic flow of an assessment.	Orlando

Related topics

Quick start tests

Quizzes

Quizzes are questionnaires that you can assign to one or more users to assess their knowledge of any subject. The quiz functionality is built on the assessment engine and provides many of the same features as assessments and surveys.

Each question is scored, and the overall score indicates the percentage of questions the user answered correctly. A quiz may have categories of questions that are assigned only to some users. You can assign weighting values to individual questions or categories of questions that make them more or less important when calculating the overall score. Quizzes require activation by a system administrator.

The difference between assessments, surveys, and quizzes, and when to use each; also provides a quick look at the three stages in the survey process: designing, sharing, and evaluating.

- An administrator can create a quiz for any purpose and assign it to a single user or multiple users.
- A quiz can contain one or more categories of questions. Each category can be assigned to users who answer only the questions in that category.
- The system can send email notifications to these users:
  - *Recipients*: The recipient can receive notification of an assigned quiz, a quiz whose allowed duration is at 50%, and a quiz that is overdue.
  - *Recipient's manager*: The recipient's manager can receive notification when a quiz is overdue.
  - *Quiz manager*: The quiz manager can receive notification of an overdue quiz that is assigned to them.

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- Quizzes can contain questions that are scored or not scored. Unscored questions assess opinions or involve dates and are not counted in the final score. Scored questions specify correct answers and are scored either as 0% or 100%. You can apply a weighting scale to scored questions to establish their relative importance. You can designate questions with these data types as scored questions:
  - Checkbox
  - Choice
  - Duration
  - Likert Scale
  - Numeric Scale
  - Template
  - Yes/No
- A quiz question can be dependent on the response to any scored question. For example, you can create a dependent question requesting additional information that appears only if a recipient answers *No* to a specific question.

Important terms

The quiz application involves several terms.

Terms used in quiz application

Quizzes	A quiz contains information such as duration, state, and notification controls and lists the existing categories. Text fields on the quiz form allow an administrator to create introductory content and end notes that are displayed to the recipient.
Categories	A quiz category represents a theme for quiz questions. Each category contains one or more questions and names the recipients for the questions in that category. By default, the system creates one category with the same name as the quiz. You can create additional categories as needed. Categories can be weighted higher or lower to determine the importance of that category in the overall score.
Questions	A quiz question is a question configured for a category and sent only to the users for that category. Questions have a wide variety of data types and can be individually weighted higher or lower. Questions may be scored or unscored.
Category user	A category user is the recipient of questions for a specific category. You can select different users to answer the questions for each category.
Templates	A template is a question data type that provides reusable rating scales for answers to questions. For example, the answer template named Satisfaction contains a satisfaction scale ranging from Very Satisfied to Very Dissatisfied.

Quiz roles

The Quizzes application uses these roles. No role is required to take quizzes that are assigned to you.

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Quiz roles

Role Title [Name]	Role Description
assessment administrator [assessment_admin]	Can administer the Assessments application and all quiz records. Can access all the modules of the Assessments application. **Note:** The itil_admin role and the survey_admin role contain the assessment_admin role
Administrator [admin]	Can access all aspects of the assessment and survey processes. Only administrators can modify survey notifications, create survey modules, and import surveys.

Related topics

Assessment metrics

Using Quizzes

You can use quizzes.

Set up and administer quizzes

Set up and administer quizzes.

Before you begin

Role required: assessment_admin or admin

The difference between assessments, surveys, and quizzes, and when to use each; also provides a quick look at the three stages in the survey process: designing, sharing, and evaluating.

Procedure

1. **Optional:** Create reusable question templates for quizzes.
2. Create the quiz using the Quiz Designer or with forms accessed from the navigation menu.

   The quiz record includes specifics such as duration, notification preferences, a questionnaire introduction, and ending notes displayed to recipients.
3. Edit the default category or create additional categories as needed.
   The system creates a category with the same name as the quiz.
4. Define users for each category.

   These are the recipients who answer the questions in a category. You can define different users for each category.
5. Create the questions for each category.
6. Create the answers for each question and determine if the questions are scored.

   You can create unique answers or select preconfigured answers from a template.

What to do next

Publish and distribute the quiz. You can send the quiz to a single user or all users in each category.

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Review the results from the submitted quizzes in reports and scorecards.

Related topics

- Create a quiz
- Metric templates

Data types for quizzes

You need to choose a data type for each quiz question. Various data types helps you collect and analyze different kinds of data.

Available data types

Data type	Description
Attachment	Question with a Manage Attachments icon that allows users to attach one or more files.
Boolean	Question with a check box or a **Yes/No** list for user responses.
Choice	List of predefined options. For more information, see the definition for **Choices** in the Create quiz questions topic. Multiple correct answers are supported.
Date	Date field.
Date/Time	Time and date field.
Number	Number field with predefined minimum and maximum values. The default is 1-10.
Percentage	Percentage field with a prescribed range.
Scale	Predefined Likert scale. Answer options appear as radio buttons. Multiple correct answers are supported.
Image Scale	Predefined set of images. Five emojis similar to the Likert scale (very dissatisfied to very satisfied) are provided. However, you can upload additional images in JPG, PNG, or GIF format. Multiple correct answers are supported.
Numeric scale	Selectable number scale. The default is 1-5. Answer options appear as radio buttons. Multiple correct answers are supported.
String	Single or multi-line text field.
Template	Choice list of templates that provide a predefined scale of options. For details, see Configure a template question. Multiple correct answers are supported.
Reference	Choice list of fields from a specified reference table. This data type does not support reference qualifiers.

Related topics

- Create quizzes with forms
- Create a quiz
- Change the order of an answer

Activate the quiz designer

Administrators can activate the Quiz Designer plugin.

Before you begin

Role required: assessment_admin or admin

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

View quiz reports

Use the Quiz Overview dashboard to view various reports on data such as Quizzes by State, Questions by Data Type, and Number of Correct Answers.

Before you begin
Role required: assessment_admin or admin

About this task
You can view the Quiz Overview dashboard to refresh the view and add new widgets.

Procedure

1. Navigate to **All** > **Quizzes** > **Overview**.
2. Click the elements within the reports to view more information.

   The Quiz Overview dashboard displays the following reports.

Quiz Overview dashboard reports

Report	Table
Quizzes by State	Assessment Instances [asmt_assessment_instance]
Total Questions by Quiz	Assessment Metrics [asmt_metric]
Questions by Data Type	Assessment Metrics [asmt_metric]
Correct Answers by Assigned User	Metric Results [asmt_metric_result]
Number of Correct Answers	Metric Results [asmt_metric_result]
Incorrect Answers by Assigned User	Metric Results [asmt_metric_result]
Number of Incorrect Answers	Metric Results [asmt_metric_result]

For more information about working with dashboards, see Dashboards.

Quiz designer

The quiz designer provides a single interface that users with the assessment_admin role can use to create, edit, and distribute quizzes.

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You can also use it to edit existing quizzes and change scoring parameters.

Alternatively, you can use the modules of the assessment engine to create and edit the records that make up a quiz. All quiz records are stored in assessment tables and displayed in Quiz views of those tables. For details, see Create quizzes with forms.

Tools on the Quiz Designer

The quiz designer includes a design canvas, a header bar, and many controls that you can use to create quizzes.

To open the quiz designer, navigate to **Quizzes** > **Quiz Designer**.

The designer contains the following elements:

- Controls tab
- Questions tab
- Categories tab
- Header bar
- Design canvas

Controls tab

Controls for the supported question data types are available in the Controls palette. Drag and drop a control onto the designer canvas to create a question of that type.

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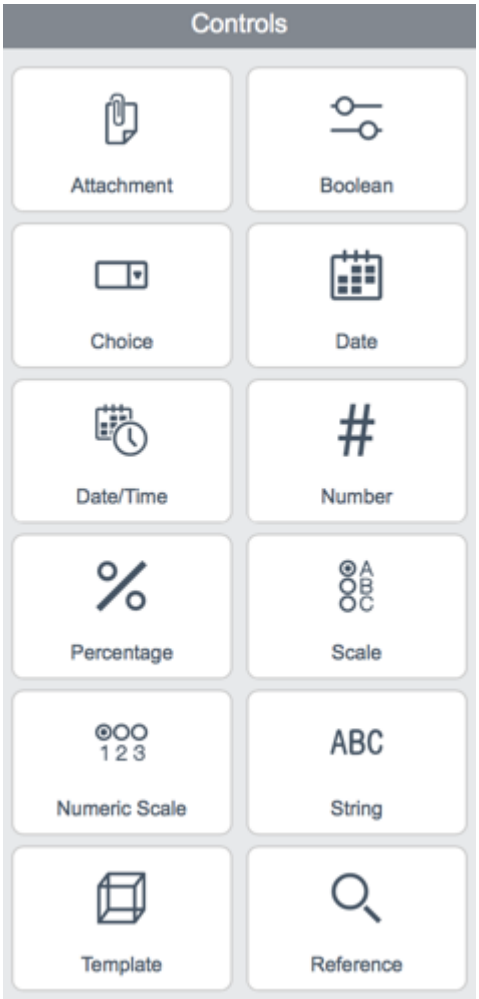
Question controls



Question controls

Data type	Description	Scored
Attachment	Question with a Manage Attachments icon that allows users to attach one or more files.	Y
Boolean	Question with a check box or a **Yes/No** list for user responses.	
Choice	List of predefined options. For more information, see the definition for **Choices** Create quiz questions. Multiple correct answers are supported.	Y
Date	Date field.	N
Date/Time	Date and time field.	N
Number	Number field with predefined minimum and maximum values. The default is 1-10.	N
Percentage	Percentage field with a prescribed range.	N
Scale	Predefined Likert scale. Answer options appear as radio buttons. Multiple correct answers are supported.	Y
Numeric Scale	Selectable number scale. The default is 1-5. Answer options appear as radio buttons. Multiple correct answers are supported.	Y
Image Scale	Predefined set of images. Five emojis similar to the Likert scale (very dissatisfied to very satisfied) are provided. However, you can upload	Y

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Question controls (continued)

Data type	Description	Scored
	additional images in JPG, PNG, or GIF format. Multiple correct answers are supported.	
String	Single or multiline text field.	N
Template	Choice list of templates that provide a predefined scale of options. For details, see Configure a template question. Multiple correct answers are supported.	Y
Reference	Choice list of fields from a specified reference table. This data type does not support reference qualifiers.	

Questions tab

This tab displays all metrics added to the question bank for quizzes. Use the **Filter** field to search for questions. Each metric is displayed with its name and type.

Categories tab

This tab displays all metric categories added to the question bank for quizzes. All metrics in the question bank are group under the corresponding metric category. Use the **Filter** field to search for categories or questions.

Header Bar

The header bar contains tabs that display different views and a menu of various functions.

Click one of the following tabs to change the view in the canvas:

- **Design**: Add categories and questions, and configure the properties of each. This is the default view of the canvas when you open the designer.
- **Configuration**: Create introductions and end notes for quizzes, and select a signature.
- **Availability**: Select the recipients for each category in the quiz.

Point to the menu icon () in the in the upper right of the quiz designer to select the following options:

- **Save**: Saves the current quiz.
- **Preview**: Displays a preview of the quiz as it appears to the recipients.
- **Publish**: Distributes the quiz to the selected recipients.
- **Save and Publish**: Saves and distributes the quiz in one step.
- **New Quiz**: Opens a fresh canvas for a new quiz.
- **Load Quiz**: Opens a list of existing quizzes that you can select and edit.
- **Copy Quiz**: Creates a copy of the quiz.

The availability of each option depends on the status of the quiz that is opened in the quiz designer.

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Design Canvas

New quizzes open in the **Design** view. The quiz **Name** field appears above first category in the canvas. A blank question field appears in the category container.

Related topics

- View an assessment category result
- View a quiz scorecard
- Create a quiz
- Edit a quiz

Create a quiz

When you create a quiz, you can create one or more categories and then add questions to each category.

Before you begin

Role required: assessment_admin or admin

About this task

Each category can be assigned to a different user or the same users. You can also customize each question and make it dependent on the response to another question.

Procedure

Create a quiz using these procedures.

Create quiz categories

Create quiz categories, which represent a theme for evaluating a specific element of the quiz topic and contain questions pertaining to that theme.

Before you begin

Role required: assessment_admin or admin

About this task

When you create a quiz, the system creates a default category using the name of the quiz. You can use this category, modify it, or create additional categories as needed. To have any results, a category must contain scored questions.

Procedure

1. Navigate either **Quizzes** > **Quiz Designer** or **Quizzes** > **Quizzes** and click **Quiz Designer** in the list header.
2. Enter the name of the quiz in the **Name** field.
   The system uses this name as the name of the quiz and the first category.
3. Configure the category.
   a. Click the gear icon in its title bar.
   b. In the **Properties** dialog box, set or modify the properties.

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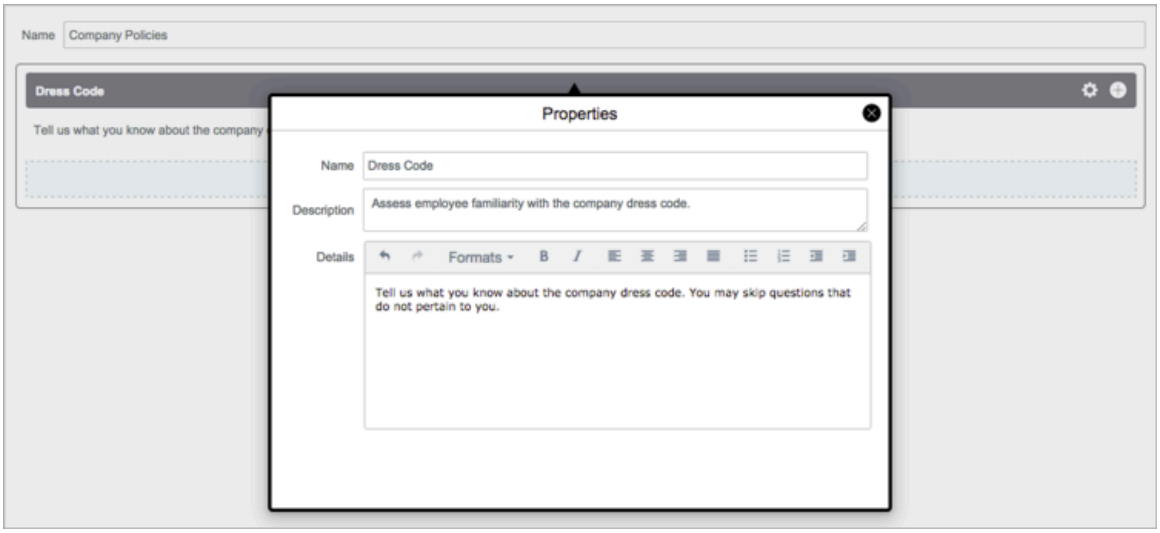
You can change the name of the category, add a description for it, and enter text in the **Details** field that introduces or explains the category to the recipients. The system updates the category as you type.

c. Click the X icon to close the category properties dialog box and save your settings.



4. **Optional:** Add a new category by clicking the **+** icon in the title bar of an existing category.

Related topics

Quiz designer

Create a quiz

Create quiz questions

Create multiple questions for each category. Each question can be associated with only one category.

Before you begin

Role required: assessment_admin or admin

About this task

The data type that you select for each question determines how it can be answered by quiz recipients.

You can designate questions to be scored. Only scored questions are shown in the quiz results and considered when calculating the category results. You must also specify a correct answer for scored questions.

Note:

To designate a question as scored, you must use Assessment forms. For instructions, see Configure a scored question.

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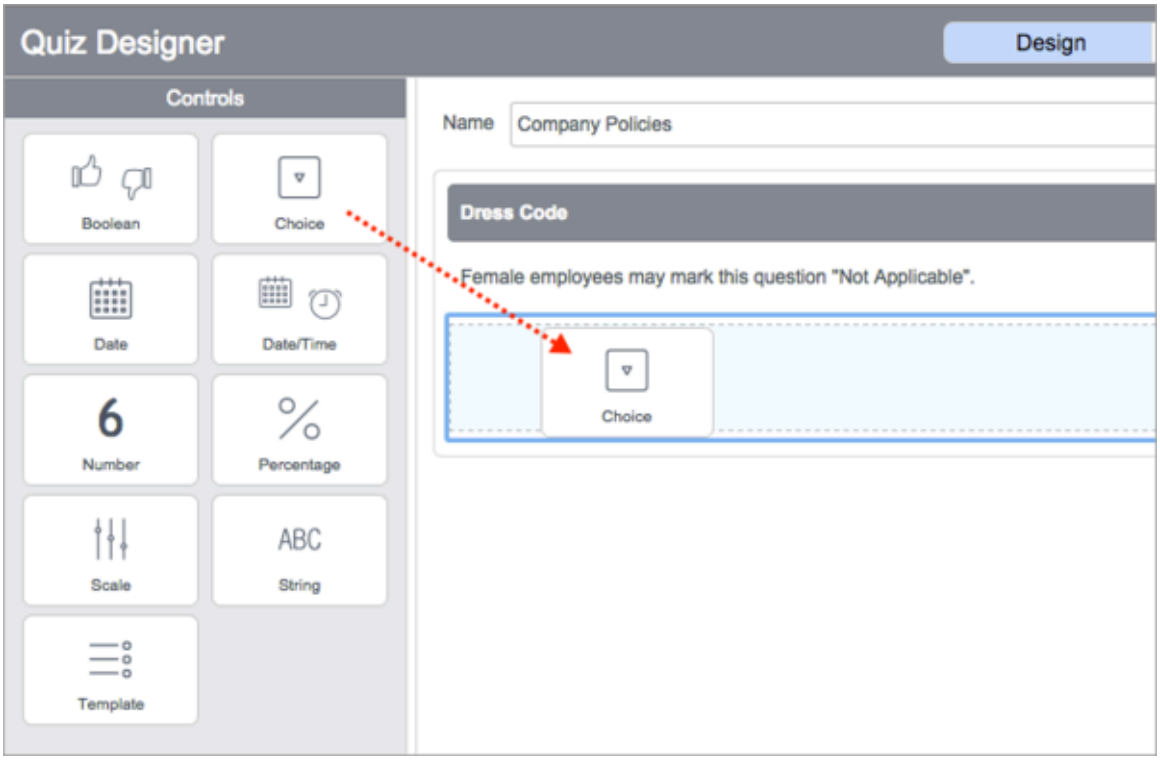
Procedure

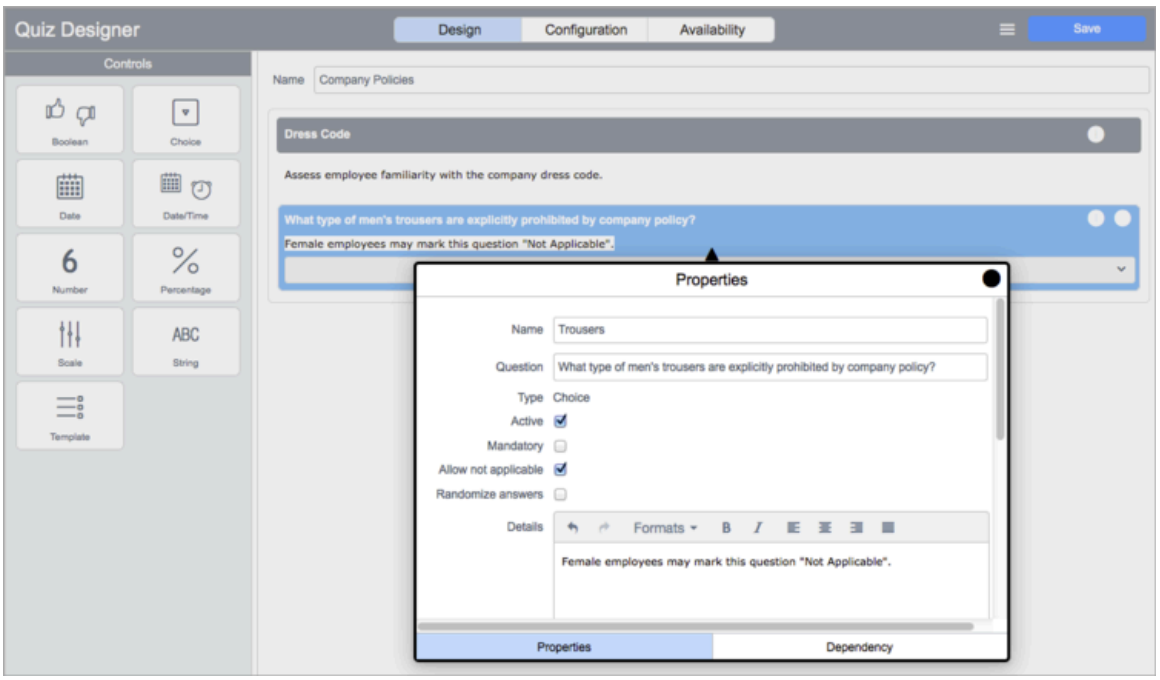
1. In the Design view, drag a data type icon from the Controls palette and drop it into a category container.



2. Configure the question.

Note:
To add a question with the same data type as an existing question in the category, click the **+** in the title bar of the existing question.

a. Click in the gear icon in its title bar.



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b. On the Properties form, fill in the fields.
For a description of the field values, see Question Properties form.

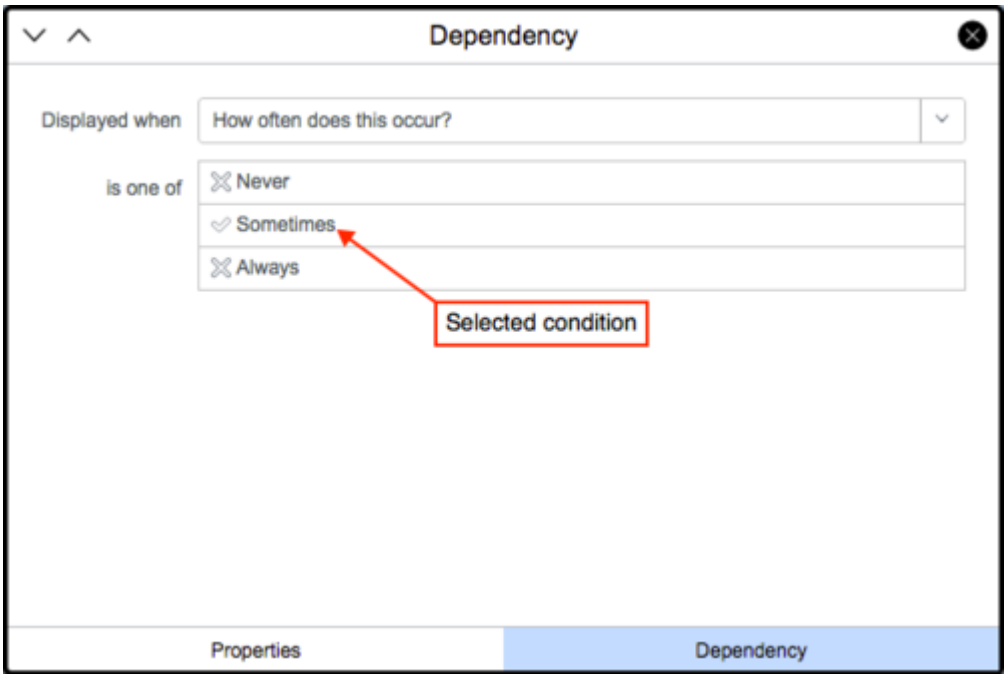
c. Create any special conditions that must be met for a question to appear on the quiz by clicking the **Dependency** tab and filling in the fields.

Dependent questions appear on the quiz when a recipient selects a specific answer or combination of answers to another question in the same category.

d. Select a question in the Displayed when field.
The system selects the appropriate operator and displays the possible answers for the selected question.

e. Select the answers that satisfy the condition.

Selected answers are indicated by a check mark.



f. Click **X** to close the question properties dialog box and save your settings.

3. **Optional:** Drag questions to change their order within a category or move them between categories.
4. **Optional:** Delete a question by clicking the X in its title bar.

Configure a template question

You can configure template questions when designing quizzes.

Before you begin

Role required: assessment_admin or admin

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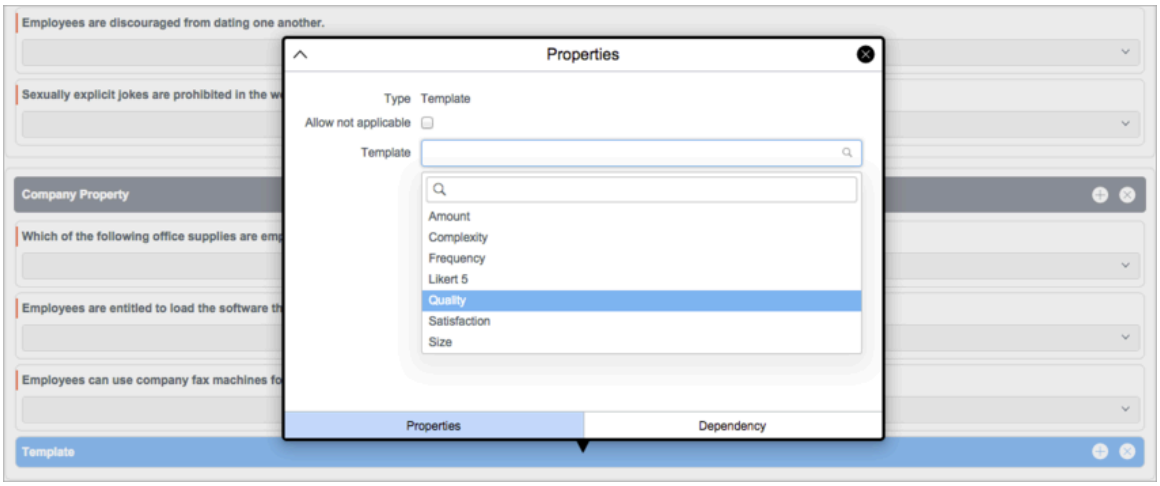
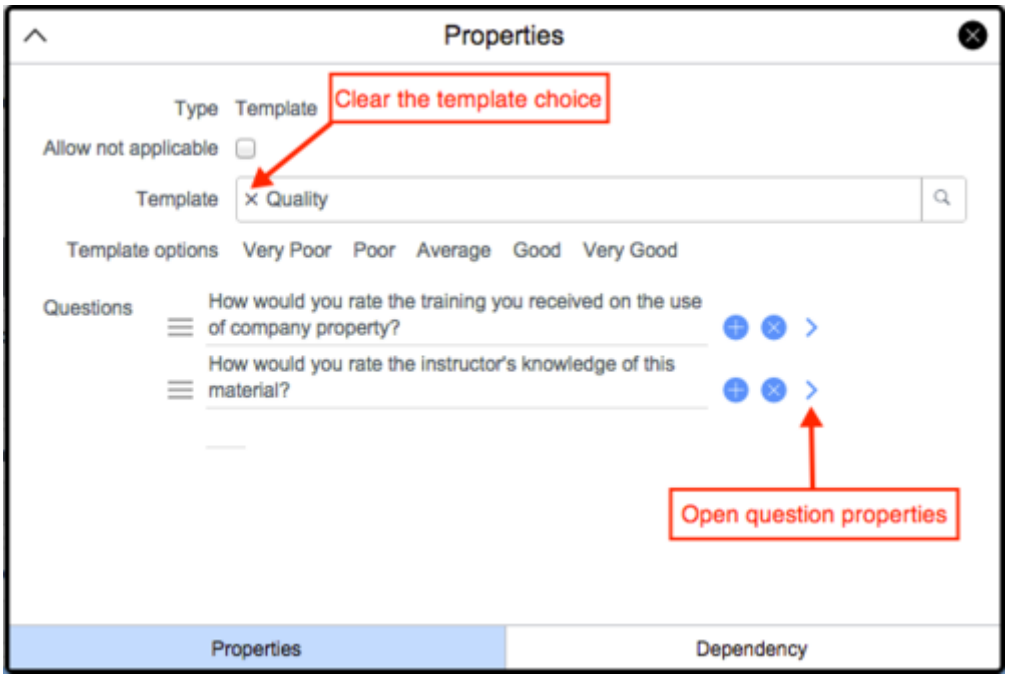
Procedure

1. Drag the **Template** data type icon into a category container.
2. Click the gear icon in the question title bar to open the template properties dialog box.
3. Select a predefined scale from the list.



Question entry fields appear for that template.

4. Enter one or more questions that are appropriate for the template.



5. Click the arrow to the right of a question to configure its properties.

   You must provide a name for each question.

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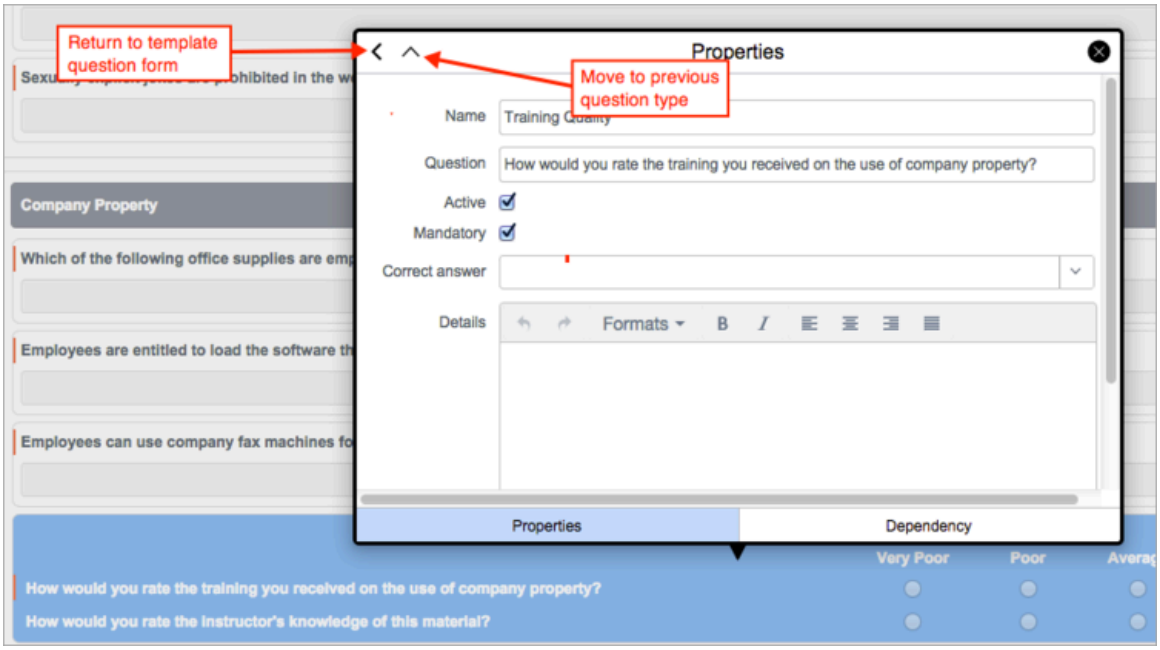

6. Click the up or down arrow to move between questions, or click the back arrow to return to the template properties dialog box.
7. Configure the properties for the remaining questions.
8. Click the **X** icon to close the template properties dialog box and save your settings.

Related topics

Quiz designer

Create a quiz

Configure a scored question

Only scored questions are considered when calculating category and quiz results.

Before you begin

Role required: assessment_admin or admin

About this task

A question must have a correct answer specified to be scored. Only results for scored questions are displayed in the quiz scorecard.

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open the quiz containing the questions you want to mark as scored.
3. In the **Metric Categories** related list on the **Assessment Metric Type** form, select the category for the questions you want to mark as scored.
4. In the **Assessment Metrics** related list on the **Metric Category** form, select a question from the list.
5. In the **Question Type** section of the **Assessment Metric** form, select the **Scored** check box.

   This check box is not available if the question's data type is not supported for scoring.
6. Select the **Correct answer** for the question.

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Note:
Multiple correct answers are supported for a few data types. See Data types for quizzes.

7. Click **Update**.
8. Repeat the process for all the questions in the category that you want the system to score.
9. Return to the list of metric categories, select another category, and configure scoring for the appropriate questions in that category.

Configure a quiz

You can configure an entire quiz.

Before you begin

Role required: assessment_admin, survey_creator, or admin

About this task

The values you enter and select on this page are applied to the entire quiz.

Procedure

In the quiz designer, click **Configuration** and then fill in the fields as described in the table.

Quiz designer configuration

Field	Description
Active	Check box for enabling the distribution of this quiz to recipients.
Description	Description of this configuration or the quiz to which it is attached.
Introduction	Introductory content to display on quizzes. You can add a welcome message or background information about the quiz.
Owners	Owners of the quiz. You can add a user with the survey_creator, survey_admin, or assessment_admin role.
Signature	[Optional] Acknowledgement by a quiz recipient of requirements, admonitions, or expectations related to a quiz.
Return URL	Destination address of a web page that is presented to users after they submit a completed quiz. When a return URL is configured, the **End note** content does not appear.
End note	Content that is displayed to recipients after they submit a completed quiz. You can add a thank you message, follow-up instructions, or other applicable information. End notes are not displayed if a **Return URL** is specified.
Duration	Amount of time that recipients are given to complete this quiz, starting from the time that the quiz is generated. The default duration is 14 days.
Manager	Assessment manager for this quiz. These users are only responsible for managing the quiz process and not the results. The system notifies the manager when submissions for this quiz are past due.
Notify manager if overdue	Check box for sending email notifications to a recipient's manager when that user fails to submit an assigned quiz before the due date.
Related Links	

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Field	Description
Show Benchmarks	Opens the Benchmarks Dashboard that provides visibility into your key performance indicators (KPIs) and trends. **Note:** • This related link is available only for survey_admin, assessment_admin and survey_reader with bm_viewer role. • You must opt in to Benchmarks to view the dashboard. See Enable Benchmarks • This is applicable only for a published quiz.

Select a quiz recipient

When the system distributes a quiz, it sends email notifications to the category users and their managers.

Before you begin

Role required: assessment_admin or admin

About this task

A category can have one or more assigned users, and the same user can be assigned to more than one category.

The system also creates a link to the quiz in the recipients' **My Assessments & Surveys** portal. Users can only answer questions in the categories that they are assigned to.

Procedure

To select the recipients for each quiz category, click **Availability** and then fill in the fields as described in the table.

Select recipients

Field	Description
Select category	Category for which the selected users are recipients.
Add users	Users selected as recipients for this category. The choice list shows all users in the system.

Related topics

Quiz designer

Publish a quiz

When you publish a quiz, the system sends email notifications to the recipients and to their managers. A card in each recipient's **My Assessments & Surveys** portal displays a link to the quiz.

Before you begin

Role required: assessment_admin or admin

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Procedure

1. If you want to see the quiz as the recipients will see it, point to the menu icon in the upper right of the quiz designer and click **Preview**.
2. When you are satisfied with the quiz, click **Save and Publish** or **Publish** to distribute it.

Related topics

Quiz designer

Copy a quiz

Create a copy of a quiz with at least one category to reduce the effort of creating another quiz with similar data.

Before you begin
Role required: assessment_admin or admin

About this task
All associated questions (type), configurations, categories, metrics, domain separation rules, and role-based categories are copied. Assigned users, category users, instances, and trigger conditions are not copied.

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Select a quiz.
3. Perform any of the following steps.

Edit a quiz

You can update a quiz after the quiz has been distributed.

Before you begin
Role required: assessment_admin or admin

About this task
You can only edit a quiz that has the same application scope as that of your current session.

- Questions that you add are available only on quizzes that are distributed after the update.
- Before a quiz is submitted or during the retake period:
  - Changes to existing questions are immediately available to users. This includes changes to the answers, such as additional choices or changes to the data type.
  - Deleted questions are deleted from distributed quizzes in users' queues.

Procedure

Open the quiz: Group the Service Details form with one of the following options.

Related topics

Quiz designer

Configure a scored question

Only scored questions are considered when calculating category and quiz results.

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Before you begin
Role required: assessment_admin or admin

About this task
A question must have a correct answer specified to be scored. Only results for scored questions are displayed in the quiz scorecard.

Procedure
1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open the quiz containing the questions you want to mark as scored.
3. In the **Metric Categories** related list on the **Assessment Metric Type** form, select the category for the questions you want to mark as scored.
4. In the **Assessment Metrics** related list on the **Metric Category** form, select a question from the list.
5. In the **Question Type** section of the **Assessment Metric** form, select the **Scored** check box.

   This check box is not available if the question's data type is not supported for scoring.
6. Select the **Correct answer** for the question.

   Note:
   Multiple correct answers are supported for a few data types. See Data types for quizzes.
7. Click **Update**.
8. Repeat the process for all the questions in the category that you want the system to score.
9. Return to the list of metric categories, select another category, and configure scoring for the appropriate questions in that category.

Configure a template question

You can configure template questions when designing quizzes.

Before you begin
Role required: assessment_admin or admin

Procedure
1. Drag the **Template** data type icon into a category container.
2. Click the gear icon in the question title bar to open the template properties dialog box.
3. Select a predefined scale from the list.

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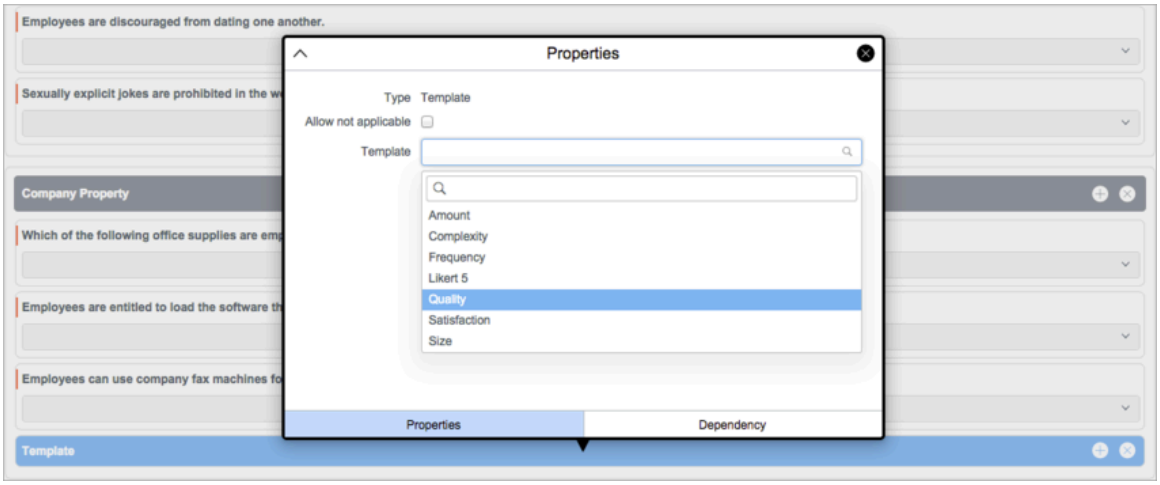
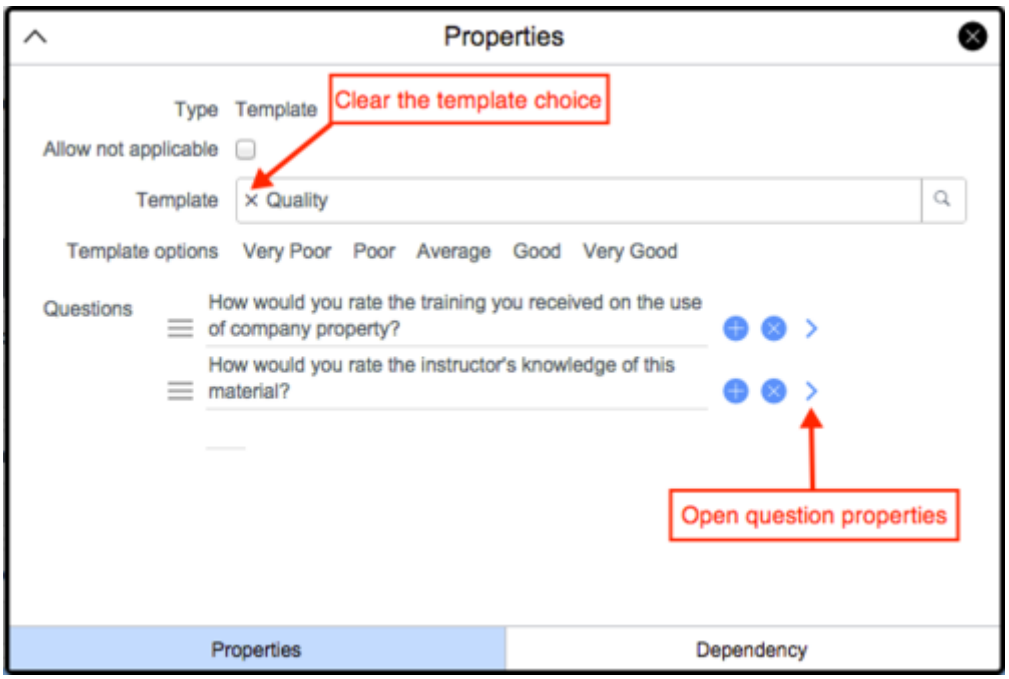


Question entry fields appear for that template.

4. Enter one or more questions that are appropriate for the template.



5. Click the arrow to the right of a question to configure its properties.

You must provide a name for each question.

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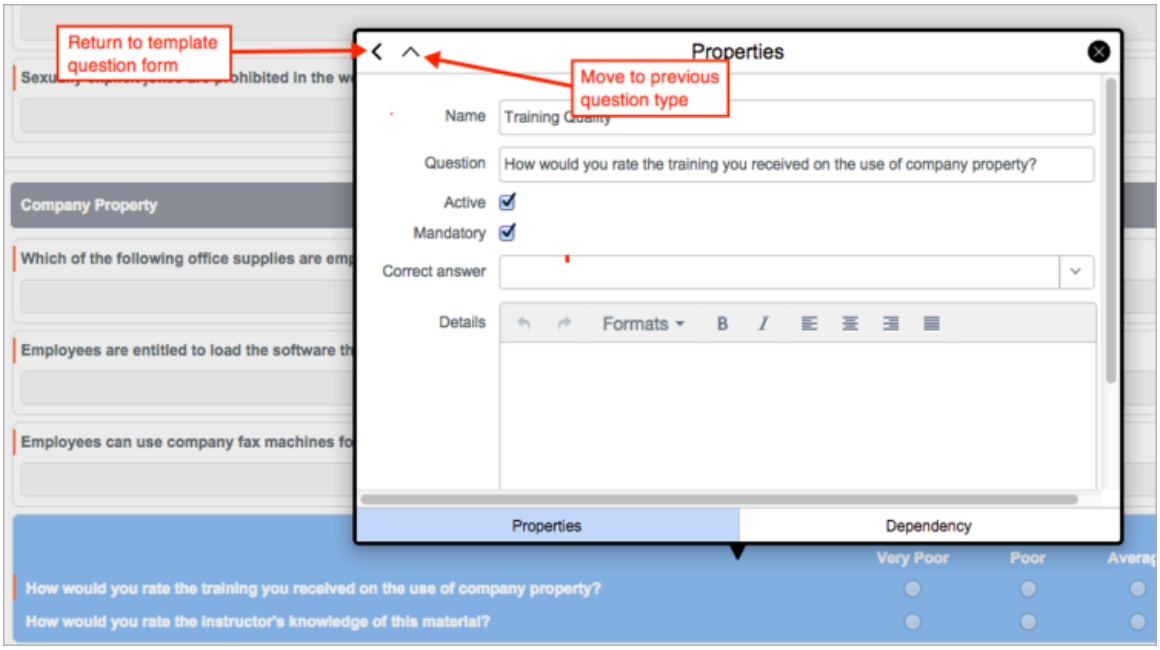

6. Click the up or down arrow to move between questions, or click the back arrow to return to the template properties dialog box.
7. Configure the properties for the remaining questions.
8. Click the **X** icon to close the template properties dialog box and save your settings.

Related topics

Quiz designer

Create a quiz

Enable a quiz retake

You can configure a quiz to allow recipients to resubmit their answers as many times as they like, until the quiz's due date.

Before you begin

Role required: assessment_admin or admin

About this task

Results are not calculated until the quiz's configured duration has elapsed. The card in the user's queue remains visible until the quiz's due date and displays a button to allow retakes.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Remove the **Evaluation method = Assessment** filter condition so you can see all the records in the list.
3. Open the quiz.
4. In the Assessment Metric Type form, select the **Allow retake** check box and save the record.

Related topics

Quiz designer

Publish a quiz

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View a quiz result

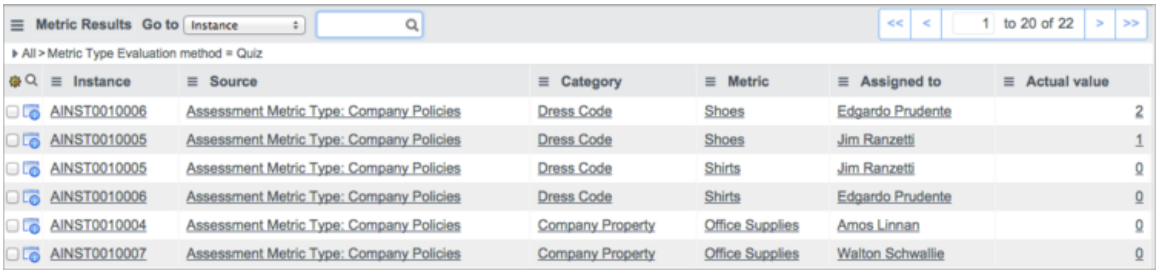
You can view quiz results for each question and category, or view the quiz scorecard for a detailed breakdown.

Before you begin
Role required: assessment_admin or admin

About this task
Quiz results are stored in the Metric Result [asmt_metric_result] table and display recipients' answers to each question in a category.

Procedure

Navigate to **All** > **Quizzes** > **Quiz Results**.



Related topics

Quiz designer

Publish a quiz

View a quiz designer scorecard

The quiz scorecard opens in the Category Results view.

Before you begin
Role required: none

About this task
For detailed information about scorecards, see Quiz Scorecards.

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open the quiz whose results you want to view.
3. Under **Related Links**, select **View Scorecard**.

   The scorecard for the selected quiz opens in the Category Results view.

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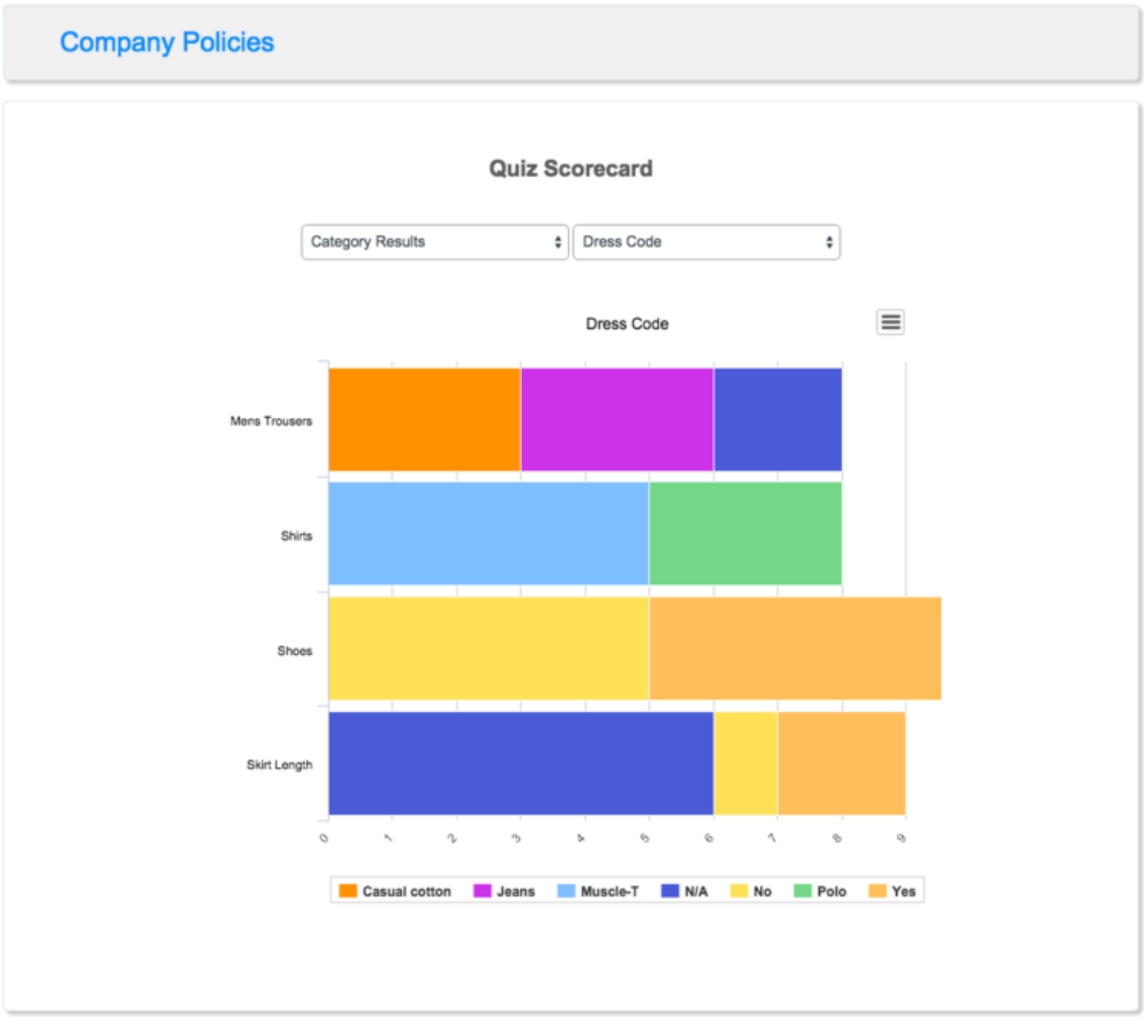
4. Select a category to view from the choice list above the chart.



Related topics

Quiz designer

View a quiz scorecard

View scorecards for a quiz record.

Before you begin

Role required: assessment_admin or admin

About this task

For detailed information about scorecards, see Quiz scorecards.

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open a quiz record.
3. Select the **View Scorecard** related link.

Note:
The scorecard link is hidden if there are no quiz results to report.

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The scorecard contains a header that displays the name of the quiz and a section that displays results or a comparison of ratings.

4. Determine the information you want to view.
   The available views are:
   - Category Results
   - Question Results
   - Average Ratings
   - History

View an assessment category result

Category results contain values that represent an evaluated record's performance in a specific metric category. Each category result record stores data from one assessment group. Category result values are calculated based on category and metric weights and from metric result values for the same category.

Before you begin

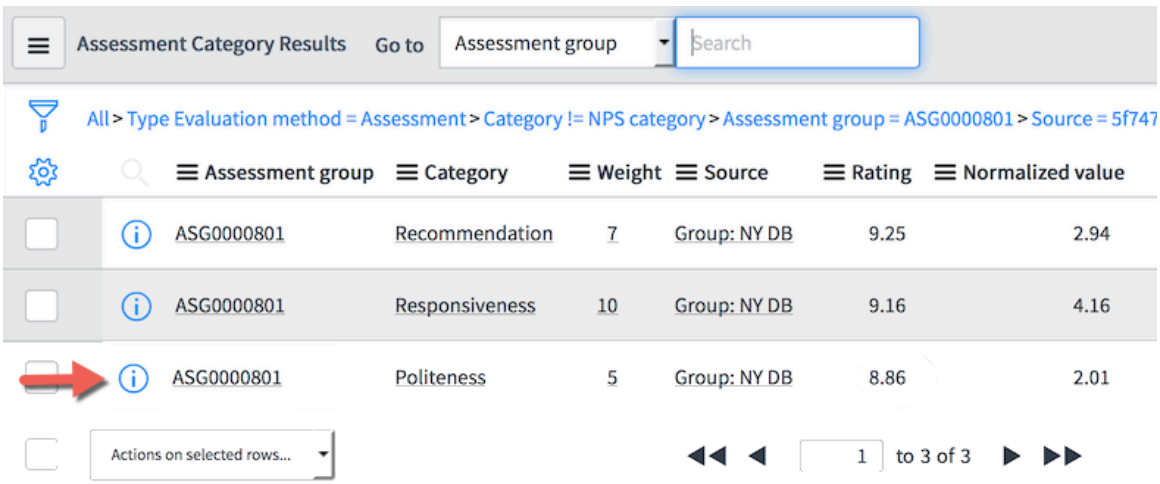
Role required: assessment_admin or admin

About this task

Note:
The system does not include metric results from certain responses in category result calculations. To compensate, the system adjusts the weight of the other normalized metric result values within the same category.

Procedure

1. Navigate to **All** > **Assessments** > **Results** > **Category Results**.
2. Click the reference icon ( ) next to an assessment group number to open the category result record.



3. View the Assessment Category Result form.
   All fields on the form are read-only.

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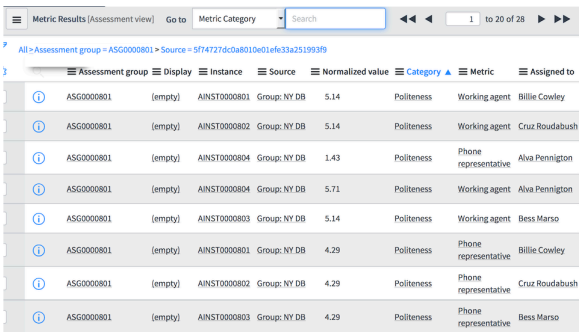
Assessment Category Result form

Field	Description
Category	Name of the metric category that the category result values apply to.

Rating	Rating is used on scorecards and decision matrixes. Rating is updated dynamically as users complete assessments. Rating is calculated as:
	`(Sum of all normalized values that share a particular assessment group, category, and assessable record) / (Number of assessment instances for the assessment group)`
	For example: In the Assessment Category Results table example, the assessment group **ASG0000801** with category **Politeness** from group **NY DB** (the assessable record) has a **Rating** value **8.86**.
	On the associated Metric Results table, you can see that there are **4** instances of this group: **AINST0000801**, **AINST0000802**, **AINST0000803**, and**AINST0000804**.
	The system calculated the rating using
	`(5.14+5.14+1.43+5.71+5.14+4.29+4.29+4.29) / 4 = 8.86`
	 

Assessment group	Assessment group to which the category result is associated. The category result **Rating** and **Normalized value** are calculated from metric results in this assessment group only.
Normalized value	Calculated value that measures the **Rating** relative to the weights of categories used to assess the record evaluated. The normalized value is calculated as follows: Normalized value = Rating x (Associated category weight / Sum of weights of all categories the source record has category results for in this assessment group) Example: A source record has four associated category results in assessment group ASG0000907, one for each of these categories: ○ Importance Rating (weight = 10) ○ Product Reliability (weight = 9) ○ Company Alignment (weight = 9) ○ Compliance Score (weight = 9)

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Field	Description
	If this source record's category result for Product Reliability has a Rating of 7.81, the normalized value calculation is: 7.81 x [9 / (10+9+9+9)] = 1.9
Weight	Weight of the associated category. You may need to configure the form to see this field.
Source	Record evaluated as the assessment subject. You may need to configure the form to see this field.

Related topics

Assessment results

Configuring the form layout

View a metric result

Quiz scorecards

The Quizzes application prepares printable scorecards.

A scorecard analyzes category and question responses and compares current ratings with previous ratings. You can examine ratings over time, compare question ratings, or compare the ratings of all categories. All ratings are averages for the time range selected.

The system dynamically updates a scorecard each time you view it, so the ratings reflect recently completed quizzes.

Category results

The Category Results view is a stacked bar chart of responses to all questions in a category.

Select the category to display from the choice list above the chart. Category results are only calculated for scored questions

This view displays responses that use the following data types:

- Checkbox
- Choice
- Likert Scale
- Number
- Template
- Yes/No

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Quiz designer.

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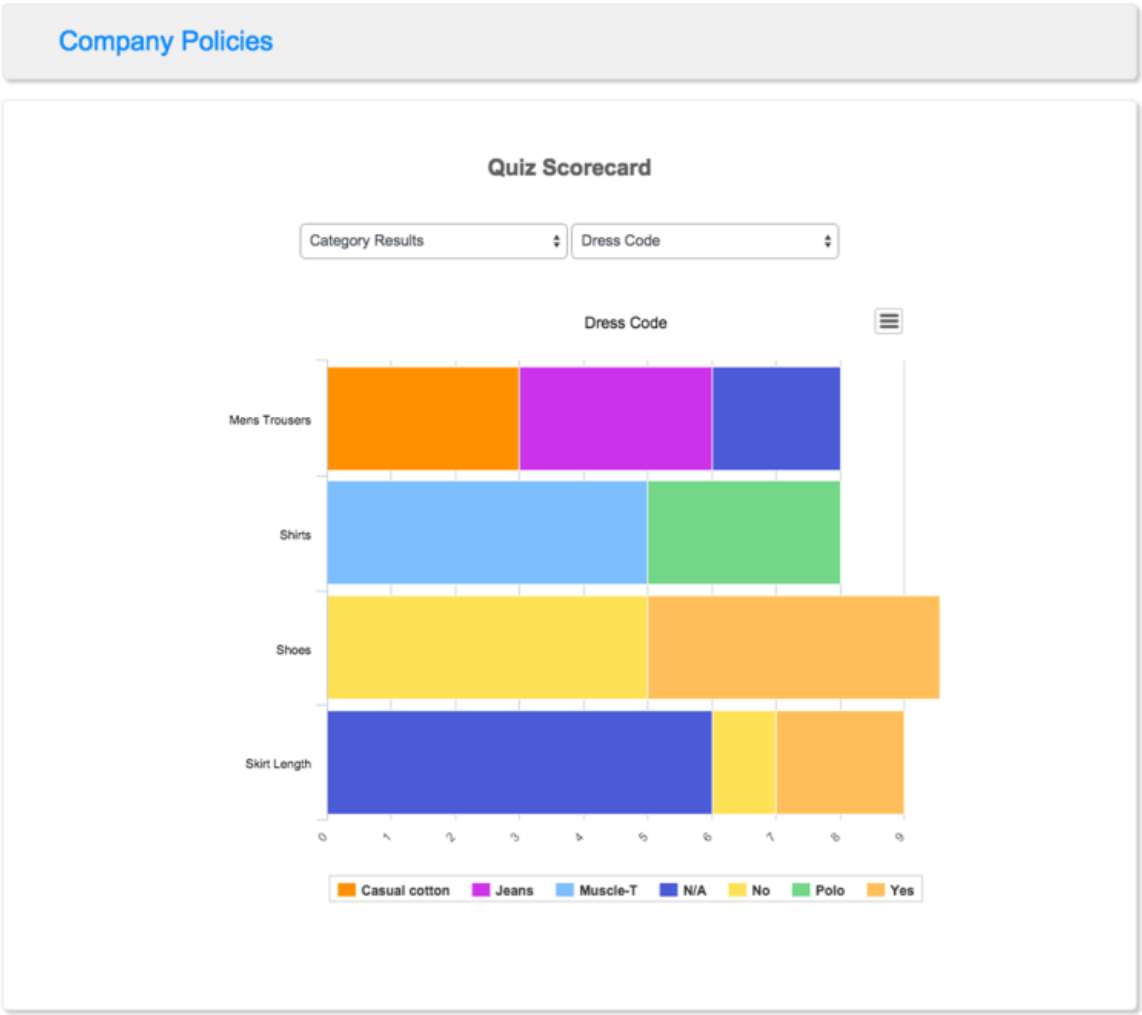
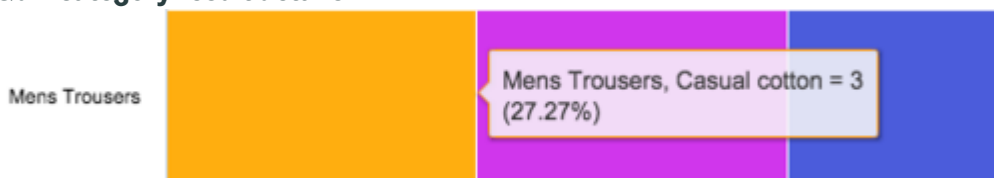
Quiz category results



To view details about a specific response to a question, point to the colored segment representing a specific response. The chart displays the count for those responses and the percentage it represents of the total responses to that question.

Quiz category result details



Question results

The Question Results view shows the results for all questions in a quiz.

Select a question by name from the choice list to display the results in a pie chart or a bar chart, based on the data type.

Pie chart

The pie chart shows question results for these data types:

- Checkbox
- Choice

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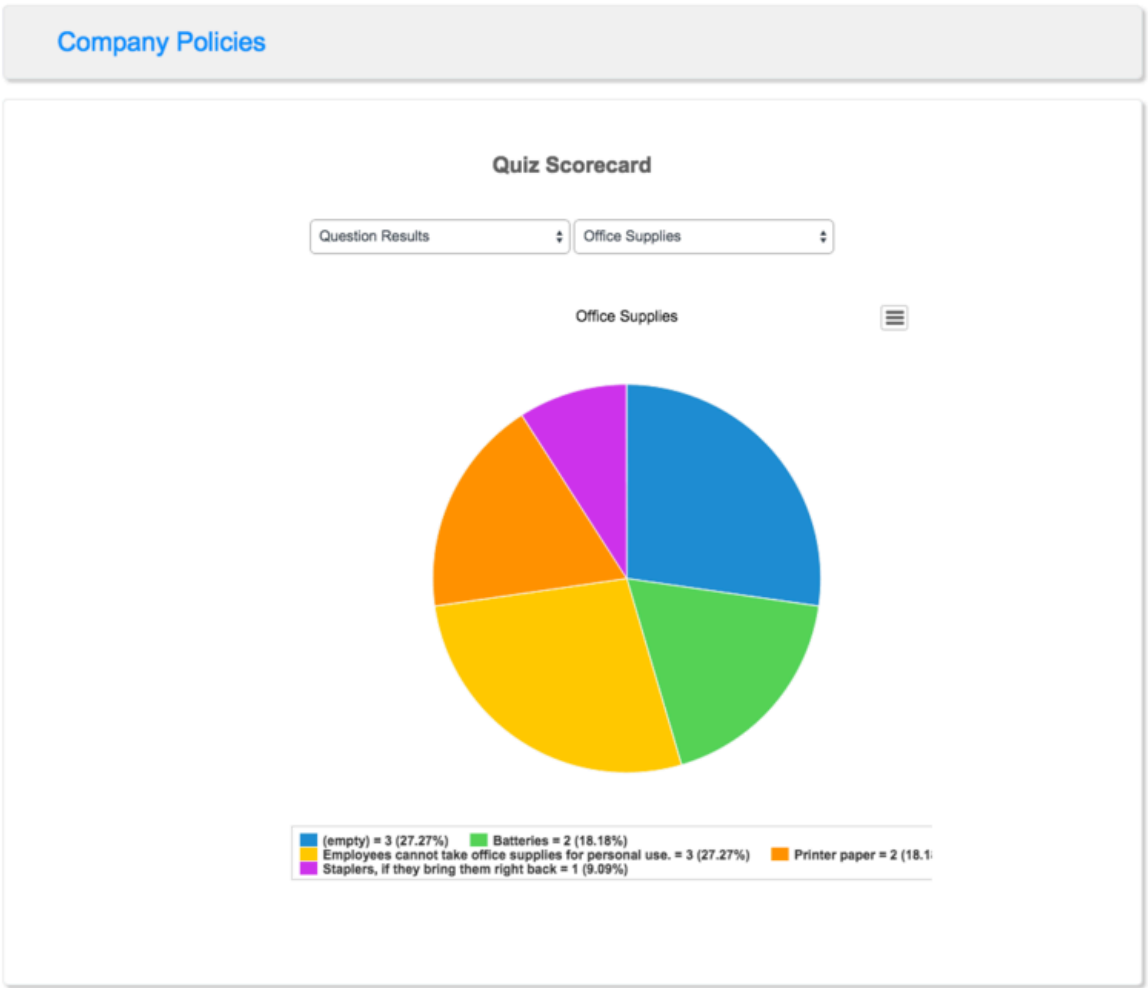
- Likert Scale
- Number
- Template
- Yes/No

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Quiz designer

Quiz scorecard question results - pie chart



Bar chart

A bar chart appears when question results use this data type:

Percentage

By default, all results for percentage questions use a report range of 20% segments. To configure a report range, navigate to **Reports** > **Administration** > **Report Ranges**.

Average ratings

The Average Ratings view displays a bar chart of the weighted average rating for each question in a category.

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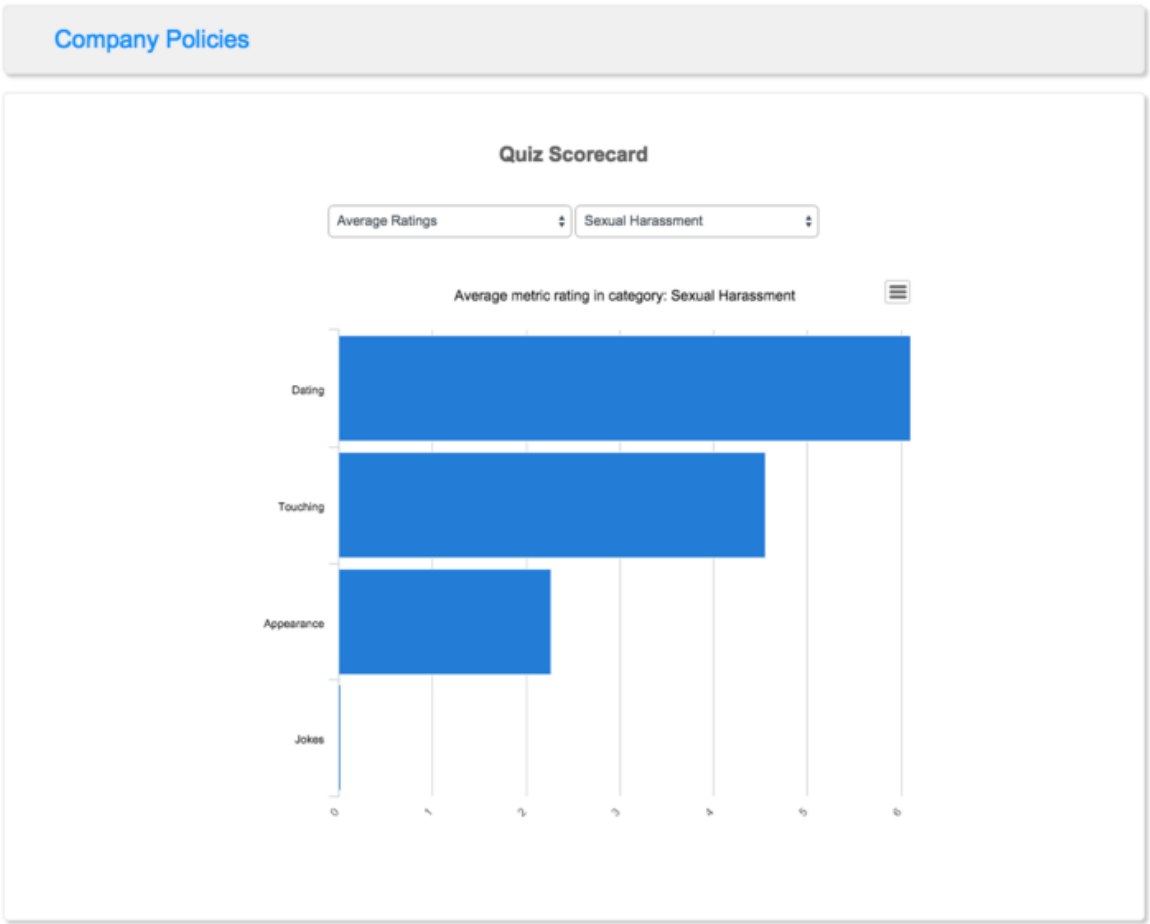
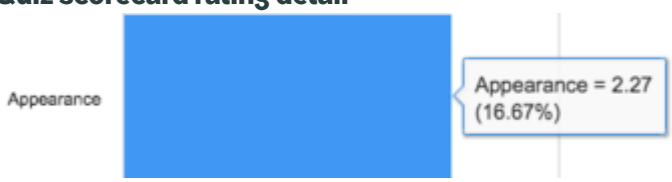
Use this view to learn how individual questions affect the overall rating for the category. Select a category from the second choice list above the chart. Ratings are only calculated for scored questions

Average Ratings view



To view the effect of each question's ratings on the entire category's ratings, point to the colored bar. The pop-up box shows the percentage of the total ratings represented by each individual question's weighted average.

Quiz scorecard rating detail



Scorecard history

The History view compares the current ratings for the categories and their questions with ratings from the previous three years or four quarters..

Ratings that have declined are highlighted in red and display negative numbers. Ratings that have improved are highlighted in green with positive numbers. Arrow icons beside the values in the **Diff** column indicate the trend of the current ratings against the previous ratings. Ratings are only calculated for scored questions questions.

Point to a category to display a line chart that shows the rating trend for that category. Click a category to view the Metric Category form containing the questions.

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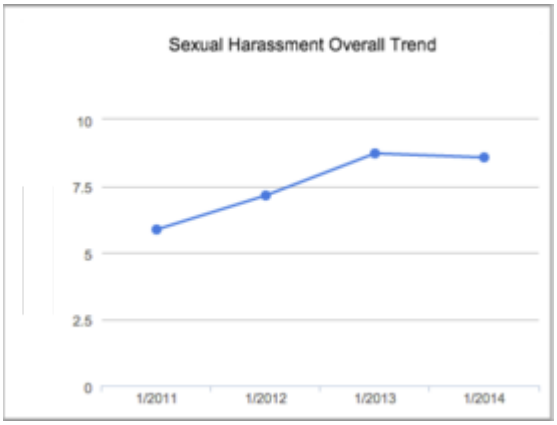
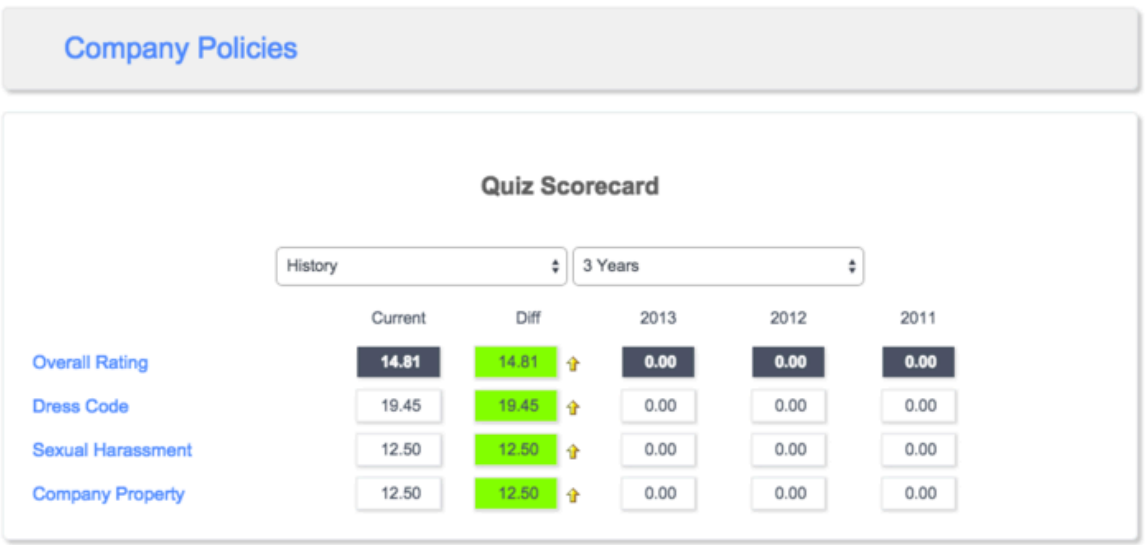
Scorecard trend chart



3 Years: To calculate the current ratings, the system averages the ratings from the trailing twelve month (TTM) period. The **Diff** column shows the discrepancy between the current ratings and the previous calendar year's ratings.

Scorecard history - 3 years



4 Quarters: Quarterly quizzes compare the average rating for each question and category in the current quarter against the average ratings from the previous four quarters. The **Diff** column shows the discrepancy between the current ratings and the previous quarter's ratings. The column labels count backward, by quarter from the current quarter. For example, if the current quarter is the 3rd quarter of 2013, then the previous quarters appear as 2nd [2013], 1st [2013], 4th [2012], and 3rd [2012]. All four of the previous quarters appear, whether or not there was any data for those quarters.

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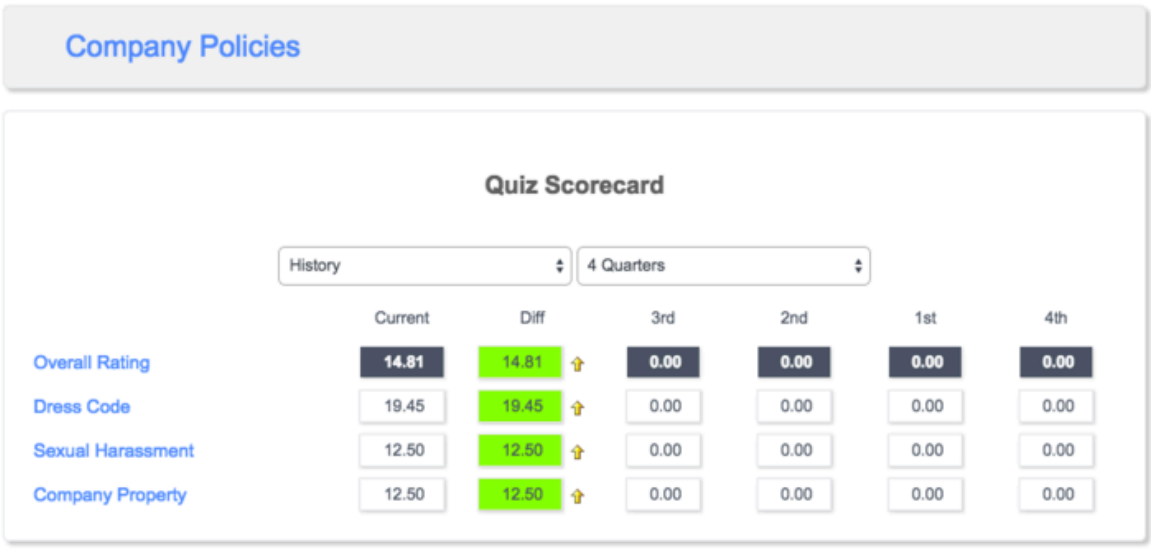
Scorecard history - 4 quarters



Modify the weight of a category

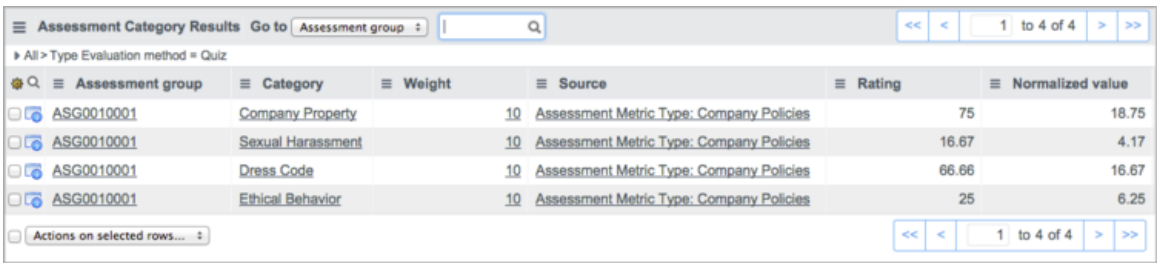
View category results stored in the Assessment Category Result [asmt_category_result] table, which display the overall ratings for each category based on the weighted value for each scored question, and edit the default Weight value.

Before you begin

Role required: none

Procedure

1. Navigate to **Quizzes** > **Category Results**.



   The system calculates results from the weight configured for each category. Weights are set to a value of 10 by default but can be changed.

2. Navigate to**Quizzes** > **Categories**, and select a category from the list.
3. In the Metric Category form, edit the default value in the **Weight** field.
4. Click **Update**.

> **Note:**
> You can also edit the weight of a question in the Quiz view of the Assessment Metric form.

Related topics

Quiz designer

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Take a quiz

All available quizzes assigned to you appear in your personal assessment and survey queue. When you submit a quiz, the system stores your responses. If a quiz allows retakes, you can resubmit it as many times as you like until its due date.

Before you begin

Role required: none

About this task

No special role is required to complete a quiz, but you must be logged in and the quiz must be assigned to you.

If configured to send email, the system sends you a notification when a quiz is assigned to you. The message contains a link to the quiz and instructions for viewing the assessment and survey queue.

Each quiz assigned to you appears in your assessment and survey queue as a card that contains information about the quiz, including a launch button. Overdue quizzes are marked with a red icon and red due date.

You must answer every required question, indicated by a red star, before you can submit the quiz. If you start to take a quiz but cannot complete it, save your responses and return to it later. When you have answered all the questions and are satisfied with the responses, submit the quiz.

By default, you cannot modify your answers to a quiz after submission. However, if the administrator has configured this quiz to allow retakes, the quiz remains in your queue after you finish it and the card shows a Modify Quiz button. You can retake the quiz as many times as you like before the due date.

Procedure

1. Navigate to **All** > **Self-Service** > **My Assessments & Surveys**.
2. Click **Take Quiz** on a quiz card to open the questionnaire.
   If there is more than one quiz category, you can click the collapse or expand icon to hide or show the questions in the category.
3. Answer each question to the best of your ability.
   If you are unsure of how to respond to a question or if a question does not apply to you, select Not Applicable if that choice is available.
4. Click **Save** at any time to save your responses without submitting them.
   You can reopen the quiz from your queue when you are ready to work on it again.
5. When you are ready to submit the completed quiz, read any assertions that require your attention.
6. If present, select the check box to acknowledge the assertion.

   Note:
   If your full name is displayed, you are required to provide authentication to acknowledge the assertion after you submit the quiz.

7. Click **Submit**.
8. If prompted, enter your user name and password to verify your signature.
   If you provided valid answers for all mandatory questions, a success message appears, displaying any end note that was configured. If the quiz allows retakes, the card remains in your queue with a **Modify Quiz** button after submission. If retakes are not permitted, the card disappears from your queue.

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9. If the system displays an error message indicating that a question has an invalid response or must still be answered, correct the error and resubmit the quiz.
10. **Optional:** Edit your answers and resubmit a quiz that permits retakes by clicking **Modify Quiz**. You can modify your responses to the quiz until its due date.

View a quiz instance

View an instance to verify that quiz instances were created, to check the state of a quiz instance, or to reassign a quiz instance. A quiz instance represents one questionnaire assigned to one user.

Before you begin

Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Quizzes** > **Quiz Instances**.
   The following submodules are available based on the state of the instances:
   - **Ready to take**: Displays quiz instances that the user can take. By default, these instances are sorted in ascending order by the **Number** field.
   - **In progress**: Displays quiz instances that are in progress. By default, these instances are sorted in ascending order by the **Number** field.
   - **Completed**: Displays quiz instances that are complete. By default, these instances are sorted in descending order by the **Taken on** field.
   - **Cancelled**: Displays quiz instances that are canceled. By default, these instances are sorted in ascending order by the **Number** field.
   - **All**: Displays quiz instances in all states. By default, these instances are sorted in ascending order by the **Number** field.
2. From the required submodule, click a quiz instance.

   By default, the fields listed in the following table are displayed for all submodules other than the **Completed** submodule.

   Note:
   When you select an instance in the **Completed** submodule, you are redirected to the User's Response page.

3. In the form, fill the fields.

Quiz instance form

Field	Description
Number	Automatically generated record number.
Metric type	Metric type of this quiz.
Due Date	Date by which the quiz instance should be completed. The system populates the due date based on the **Assessment duration** of the associated quiz definition, which is set to 14 days by default. The quiz due date is not enforced in the base system. If you want to enforce the due date, consider using a workflow or other mechanism to send survey recipients reminders when a survey is overdue.

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Field	Description
State	State of the quiz.
Assigned to	User that the quiz instance is assigned to. This field becomes read-only when the state is **In progress**, **Complete**, or **Canceled**.
Domain	Domain associated with the instance.
Related Link	
View User's Response	Shows a read-only version of the survey responses completed by the user.
Related List	
Assessment Instance Questions	All instance question records that store user response values for each question on the quiz questionnaire. The following columns are relevant to quiz: ○ **Category**: Displays the quiz categories the questions belong to. ○ **Metric**: Displays the quiz questions.

Related topics

Event scheduling

Add a metric category and metric in the question bank for quizzes

Reuse the question categories (metric categories) and questions (metrics) added in the question bank for quizzes. You can add metric categories or metrics from the question bank to a quiz, or from the quiz to a question bank.

Before you begin

Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Quizzes** > **Question Bank**.
2. Click **New**.
3. In the Metric Category form, fill the fields.

Metric Category fields

Field	Description
Name	Name of the metric category.
Description	Description of the metric category.
Total metrics	Total number of metrics in the metric category. This number is automatically updated when you add or delete metrics from the category.

4. Right-click on the title bar and click **Save**.
5. In the Assessment Metrics related list, click **New**.
6. In the Assessment Metric form, fill the fields.
7. Click **Submit**.

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Configure metric categories or metrics for a quiz using the question bank

Reuse question categories (metric categories) and questions (metrics) from the **Question Bank** module while creating or updating a quiz.

Before you begin

Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open a quiz definition.
3. **Optional:** To add metric categories to a quiz from the question bank in Platform, perform the following steps.
   a. In the Metric Categories related list, click **New Category from Bank**.
   The New Category from Bank dialog box is displayed with a list of all metric categories added in the question bank.
   b. Select the required categories and click **Add Selected**.
   A copy of the metric category and the corresponding metric definitions is created in the Metric Categories related list.
4. **Optional:** To add metrics to a quiz from the question bank in Platform, perform the following steps.
   a. In the Metric Categories related list, open a metric category definition.
   b. In the Assessment Metrics related list, click **New Metric from Bank**.
   The New Metric from Bank dialog box is displayed with a list of questions available in the question bank.
   c. Select the required metrics and click **Add Selected**.
   A copy of the metric and the corresponding metric definitions is created in the Assessment Metrics related list of the category.
5. **Optional:** To add a metric category to the question bank from a quiz in Platform, perform the following steps.
   a. In the Metric Categories related list, open a metric category definition.
   b. Click **Add to Question Bank**.
   A copy of the category is created along with its metrics and metric definitions in the question bank.
6. **Optional:** To add a metric to the question bank from a quiz in Platform, perform the following steps.
   a. In the Metric Categories related list, open a metric category definition.
   b. In the Assessment Metrics related list, open the required metric definition.
   c. Click **Add to Question Bank**.

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The Add to Question Bank dialog box is displayed.

d. In the **Choose a question bank to add this question/metric** field, select a metric category that you want to add this metric to, and click **OK**.
A copy of the metric and the corresponding metric definitions is created for the selected category in the question bank.

7. **Optional:** To add a metric category or metric to a quiz from the question bank in Quiz Designer, perform the following steps.
   a. Open the quiz in Quiz Designer.
   b. **Optional:** To add a metric category from the question bank, from the **Categories** tab in the left panel, drag the required category banner and drop in the **Design** tab.
   c. **Optional:** To add a metric from the question bank, drag and drop the required metric from the **Questions** tab or the **Categories** tab.

Note:

- When you drag and drop a metric category, all dependencies within the category are also added to the quiz.
- From the **Categories** tab, you can drag and drop an individual metric within a metric category.
- When you drag and drop a parent metric, all dependent questions are also added to the metric category.
- When you drag and drop a child metric, only the child question is added to the metric category.

Create quizzes with forms

As an alternative to the Quiz Designer, you can create a complete quiz using records in the Assessment application.

All the elements of a quiz, the categories, questions, and answers, are stored in tables used by the assessment engine and are displayed in **quiz views** of these tables. Users creating quizzes in the Assessment application must have the assessment_admin role.

Create a quiz using assessment forms by following the procedures in the order shown here:

- Create the quiz.
- Set up the categories.
- Create the questions for the quiz.
- Create the answers for the questions.
- Distribute the quizzes to recipients.

Note:
The recommended method of creating and editing quizzes is to use the quiz designer, which provides a single, intuitive interface for creating and editing quizzes quickly. If you determine that you need to add specific features to your quiz not offered through the quiz designer, you can do so by using some of the specific procedures described here.

Related topics

Create a quiz

Create a category for assessable records

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Set up a category

A category represents a theme for evaluating a specific element of the quiz topic and contains questions pertaining to that theme.

Before you begin

Role required: none

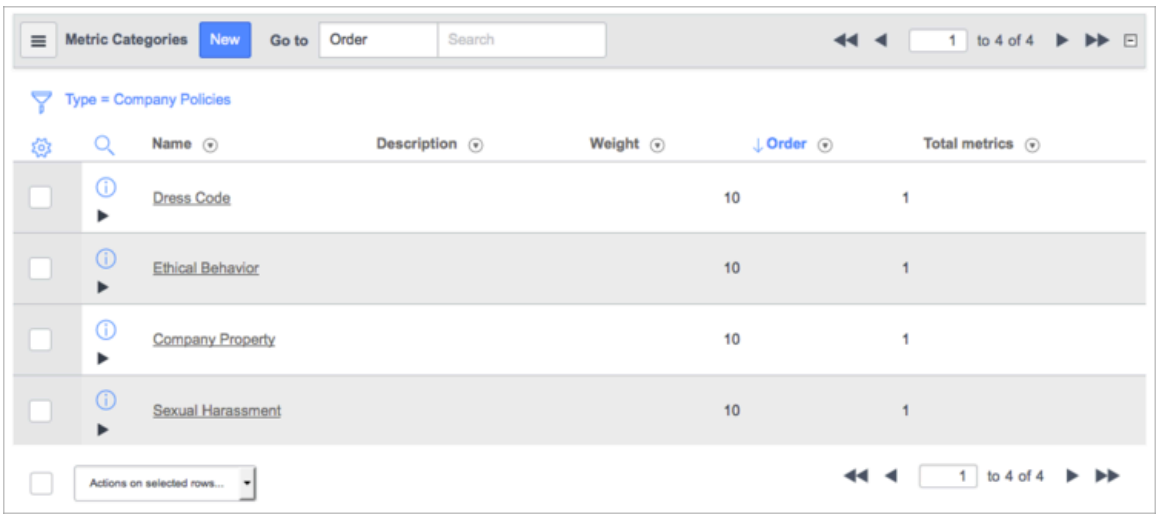
About this task

When you create a quiz, the system creates a default category with the name of the quiz. You can use this category, modify it, or create additional categories as needed. Categories are records in the **Quiz view** of the Metric Category table.

Categories have weighting values that contribute to the overall score for the quiz. By default, all categories are given a weighting value of 10. You can assign any weight to your categories. To have any results, a category must contain scored questions.

Procedure

You can create a new category or edit an existing one from the **Metric Categories** related list of a quiz record.



Related topics

- Create quizzes with forms
- Create a quiz
- Select a user for a category
- Data types for quizzes
- Change the order of an answer
- Distribute a quiz
- Modify a published quiz

Select a user for a category

Category users are the recipients of the questions for each category.

Before you begin

Role required: none

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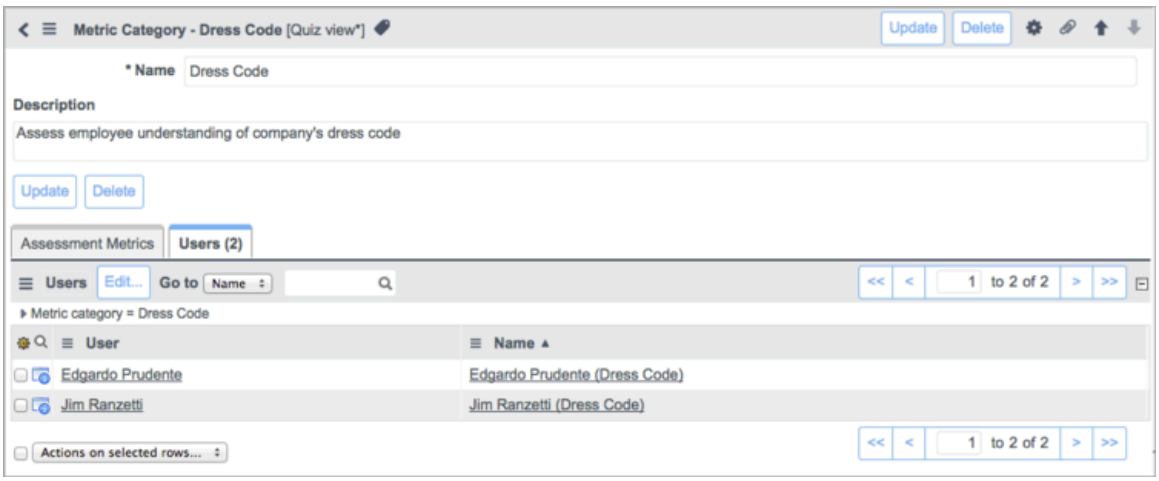
About this task

A category can have one or more assigned users, and the same user can be assigned to more than one category. When the system distributes a quiz, it sends an email notification, if configured, to the category users and creates a link to the appropriate questionnaire in their assessments and surveys portal. Users can only answer questions attached to their assigned categories.

Procedure

To select users for a category, select the **Users** related list in a category record, and click **Edit**.



Related topics

- Create quizzes with forms
- Create a quiz
- Set up a category
- Data types for quizzes
- Change the order of an answer
- Distribute a quiz
- Modify a published quiz

Create questions

Create quiz questions. A category can have multiple questions associated with it.

Before you begin

Role required: none

About this task

Each question can only be associated with one category. Each question has an answer data type that determines how recipients answer the question. Questions are records in the Quiz view of the Assessment Metric table.

Procedure

1. Open a category record.
2. Create a question record in one of the following ways:
   - By accessing the Assessment Metrics related list and selecting **New**.
   - Navigate to **Quiz Management** > **Questions** and select **New**.

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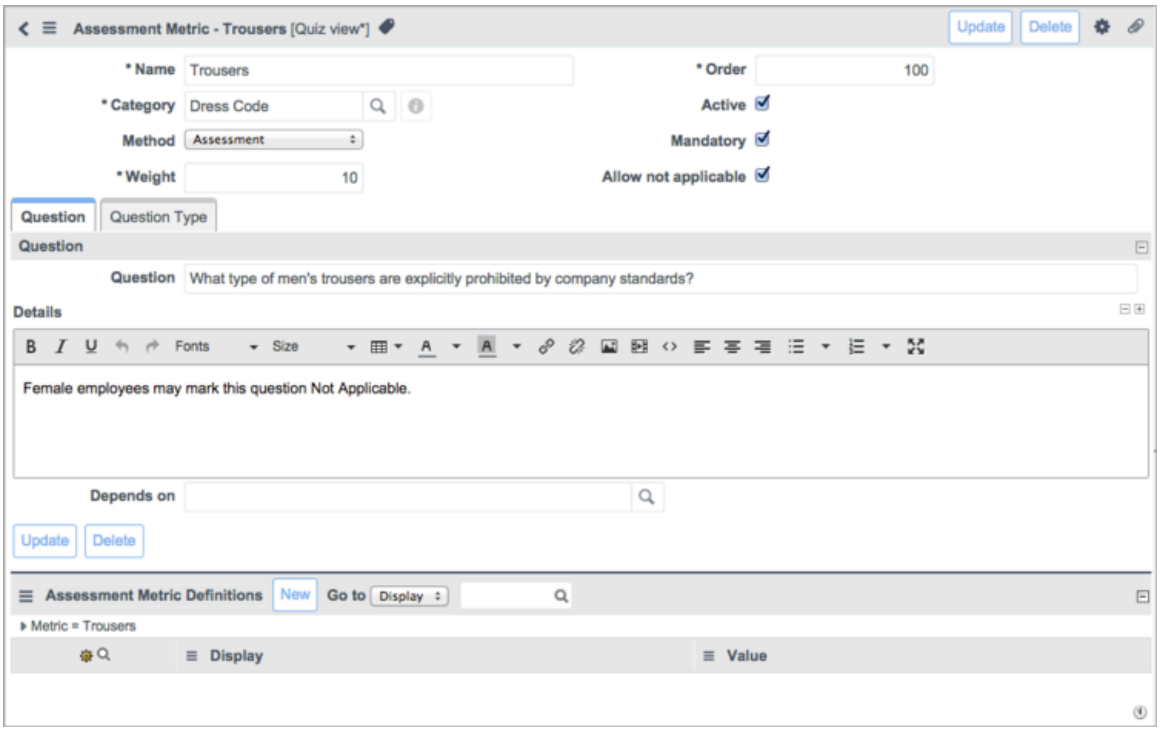
Warning:
When you create a **Choice**or **Likert Scale** question, you must reopen the Assessment Metric form after you submit it to create answers. If you distribute a questionnaire without creating the answers for questions with these data types, recipients are unable to answer the questions. If the questions are mandatory, the recipients are unable to submit their questionnaires.



On the form, fill in the fields.

Field	Description
Name	[Required] Name of the question.
Category	[Required] Category the question belongs to. The system populates this category if you create a new question from the Metric Category form. **Note:** You cannot change the category if the **Depends on** field is set or if another metric depends on this metric.
Method	Setting that determines how to use the question. ○ **Assessment**: Makes the question available on a quiz distributed to users. The **Assessment** method is compatible with all data types except **Duration**. ○ **Script**: Queries the database without user participation. Scripted questions are of limited value for quizzes, because they do not assess a user's knowledge of a topic. **Note:** If you select a **Data type** that is incompatible with the selected **Method**, the system automatically changes the **Method** to the correct value.

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Field	Description
Weight	Numeric value that represents the importance of this question relative to other questions in the same category. By default, the weight is 10. For weighting suggestions, see weight categories and metrics. This field is available and required unless the **Data type** is **Date**, **Date/Time**, or **String**. These data types are not included in results calculations.
Order	[Required] Numeric value that determines the order of the question in the category. The question with the smallest order value appears as the first question in the category's section. By default, the order is 100. **Note:** It does not matter which order value you use for metrics with the **Script** method, because they do not appear on questionnaires.
Active	Check box that determines whether this question appears on quizzes. If a question is inactive, it does not appear on quizzes generated after the question becomes inactive.
Mandatory	Check box for requiring users to answer the question. Users cannot submit questionnaires until they provide valid responses to all mandatory questions, which are denoted by a red field status indicator. This field is available only if the **Method** is **Assessment**, the **Depends**on field is empty, and the **Data type** is not **Checkbox**.
Allow not applicable	Check box for including **Not Applicable** as a possible answer for this question. Users can select **Not Applicable** if they do not have sufficient information to respond to a question. User responses of **Not Applicable** are excluded from results.
Question	
Question	The question that is displayed in quizzes. Enter a clear, straightforward question that is easy to understand.
Details	Information about the question and what it evaluates. Include details that help users understand how to answer the question or when you need HTML enhanced details for your question. You can create HTML text in this field with the WYSIWYG editor, such as embedding links and images.
Depends on	An existing question that this question is dependent on. You can select **Checkbox**,**Choice**, **Likert Scale**, **Template**, and **Yes/No** questions from the same category as this question. Then use the Displayed when field to set the conditions for displaying this question. The system prevents the creation of recursive dependencies between questions. For example, if Question A depends on Question B, Question B cannot depend on Question A.
Question Type	
Data type	[Required] Format of the expected response data. See the table of **data types** for details. **Note:** You cannot change the data type if another question depends on this question
Randomize answers	Check box for displaying the possible answers for this question in a random order whenever the question appears. Answer preference is sometimes

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Field	Description
	influenced by the order in which answer options appear, which can result in biased results. Randomizing answer options can help prevent this bias. This check box is available only if the **Data type** is **Choice** or **Likert** Scale. **Note:** Randomizing answer options for certain questions may make those questions confusing for users. In general, only randomize answer options that do not follow a logical order.
Scale definition	Setting that determines whether lesser or greater numerical values equate to a good score in quiz result calculations. Select **Low** if lesser numerical values are better. Select **High** if greater numerical values are better. The default value is**High**. This field is available and required unless the **Data type** is **Date**, **Date/Time**, or **String**. The results for these data types are not included in results calculations. When the Scored check box is selected, the scale value is set to **High** and the field is hidden. **Note:** For information about how to set the scale definition for data types that do not require you to set a numerical value, see Data types for assessments.
Min	Lowest numerical value that can be used as an answer option. This field is available and required only if **Data type** is **Number**, **Duration**, or **Percentage**.
Max	Highest numerical value that can be used as an answer option or scaled value. This field is available and required if **Data type** is **Number**, **Duration**, or **Percentage**.
String option	Setting for the appearance of a string field in a question. This field is available when the question type is **String**. The string options are: ○ **Single line**: Single line text field 40 characters in length that allows strings of any length. ○ **String line wide**: Full page width text field that allows a single line entry of any length. ○ **Multiline**: Full page width multiline text field that allows word wrap and returns.
Scored	Check box for using answers in scoring the category results and showing them in the quiz results. Scored questions are available for these data types: ○ Choice ○ Likert Scale ○ Template ○ Checkbox ○ Yes/No Selecting this check box hides the **Scale definition** field and sets the value in that field to **High**.
Correct answer	[Required] Desired answer to a scored question. This field is available when the **Scored** check box is selected. Multiple correct answers are supported for a few data types. See Data types for quizzes.

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Field	Description
Template	Answer template to use with this question. This field is available when the **Data type** is **Template**.
Related List	
Assessment Metric Definitions	List of options for this question. This related list is available only if the **Data type** is **Choice** or **Likert Scale**.

Related topics

- Assessment metrics
- Create quizzes with forms
- Create a quiz
- Set up a category
- Select a user for a category
- Data types for quizzes
- Create questions

Create answers for questions

Create answer options for questions with the Choice or Likert Scale data type.

Before you begin

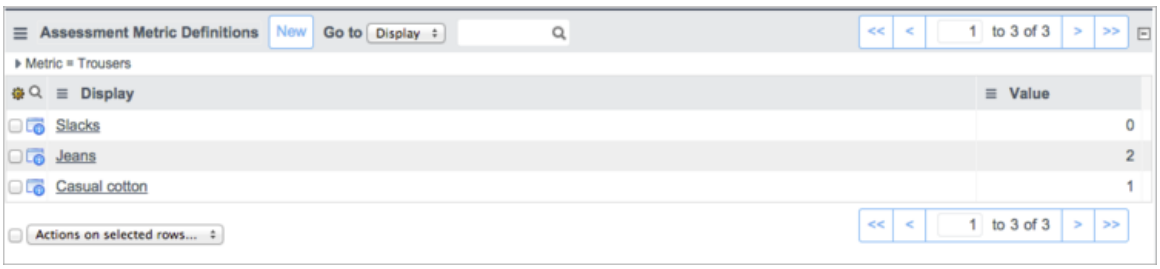
Role required: none

About this task

When you create a question with one of these data types, the Assessment Metric Definitions related list appears. Each metric definition appears as one answer option for a question on a quiz. For example, the question **What type of men's trousers are not permitted by company policy?** might have these three answers configured as metric definitions: **Slacks**, **Jeans**, and **Casual cotton**.

Procedure

1. Open the question record you want to edit.
2. Click **New** in the **Assessment Metric Definitions** related list.



3. Set the order in which the answers appear in the quiz by providing a hierarchical number in the **Value** field.

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Related topics

- Create quizzes with forms
- Create a quiz
- Set up a category
- Select a user for a category
- Data types for quizzes
- Change the order of an answer
- Distribute a quiz
- Modify a published quiz

Distribute a quiz

When you finish configuring the answers for the quiz questions, you are ready to distribute the quiz.

Before you begin

Role required: none

About this task

You can send the quiz to all the category users configured for the quiz or to a single category user.

Procedure

1. Navigate to **All** > **Quiz Management** > **Quizzes**.
2. Open the quiz record, and click **Publish**.
   The quiz is placed in the Published state, and it is sent to all its category users.
3. **Optional:** Edit the published quiz.
   See Modifying Published Quizzes to learn how various modifications affect the quiz contents.
4. **Optional:** Resend a quiz to either on category user or all category users.
   - Send the quiz to one category user by clicking **Assign Quiz**.
   - Send the quiz to all of its category users by clicking **Send Quizzes**.

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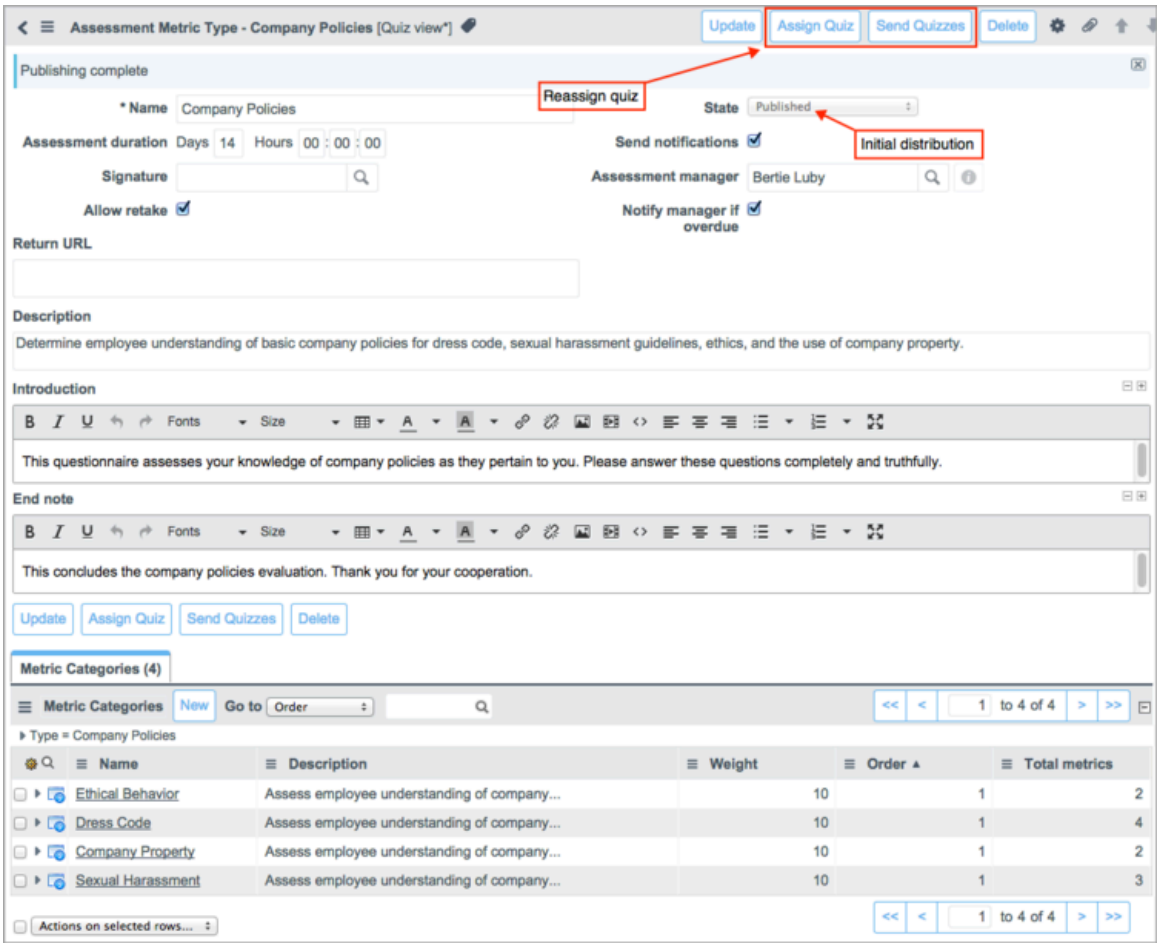
Note:
These buttons are hidden if there are no category users defined for the quiz.



Related topics

Create a quiz

Modify a published quiz

Modify a published quiz

Post changes to existing questions immediately. Make new questions available to users who have not started the quiz.

Before you begin

Role required: none

Procedure

You can edit a quiz even after it has been distributed, with these results:

- Added questions are available only on quizzes that are distributed after this change.
- Changes to existing questions are immediately available to users before the quiz is submitted or during the retake period. This includes changes to the answers, such as additional choices or changes to the data type.
- Deleted questions are also deleted from the distributed quizzes in users' queues.

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Related topics

- Create a quiz
- Change the order of an answer

Quizzes reference

Reference topics provide additional information about the forms, fields, and properties you use while working with quizzes.

Quiz scorecards

The Quizzes application prepares printable scorecards.

A scorecard analyzes category and question responses and compares current ratings with previous ratings. You can examine ratings over time, compare question ratings, or compare the ratings of all categories. All ratings are averages for the time range selected.

The system dynamically updates a scorecard each time you view it, so the ratings reflect recently completed quizzes.

Category results

The Category Results view is a stacked bar chart of responses to all questions in a category.

Select the category to display from the choice list above the chart. Category results are only calculated for scored questions

This view displays responses that use the following data types:

- Checkbox
- Choice
- Likert Scale
- Number
- Template
- Yes/No

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Quiz designer.

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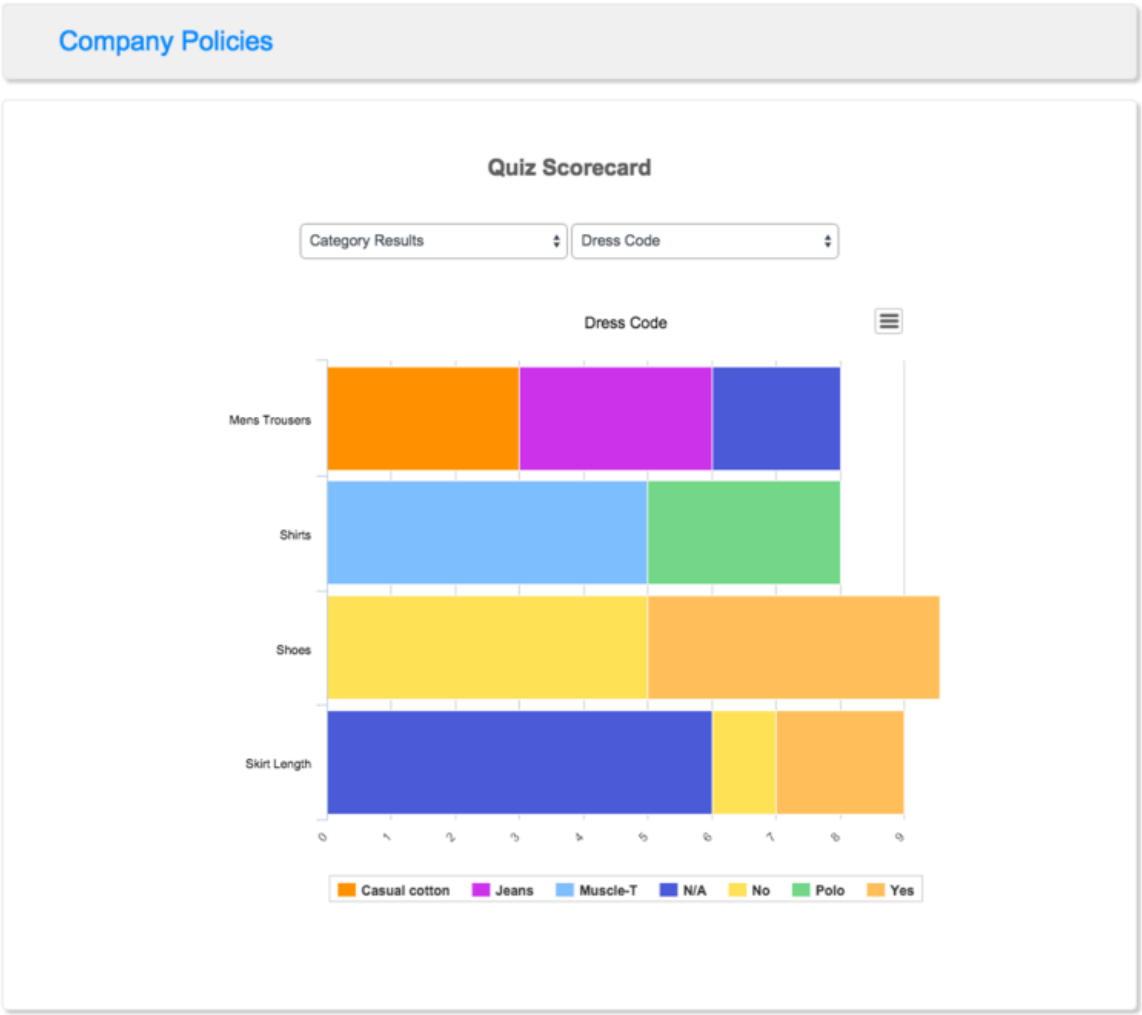
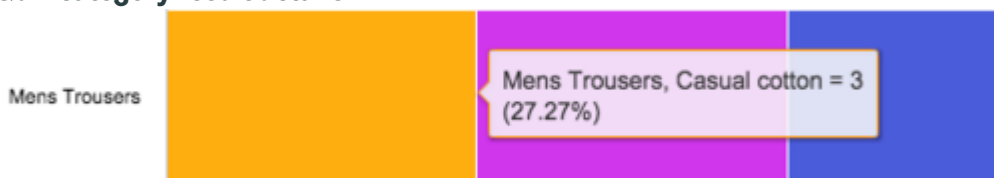
Quiz category results



To view details about a specific response to a question, point to the colored segment representing a specific response. The chart displays the count for those responses and the percentage it represents of the total responses to that question.

Quiz category result details



Question results

The Question Results view shows the results for all questions in a quiz.

Select a question by name from the choice list to display the results in a pie chart or a bar chart, based on the data type.

Pie chart

The pie chart shows question results for these data types:

- Checkbox
- Choice

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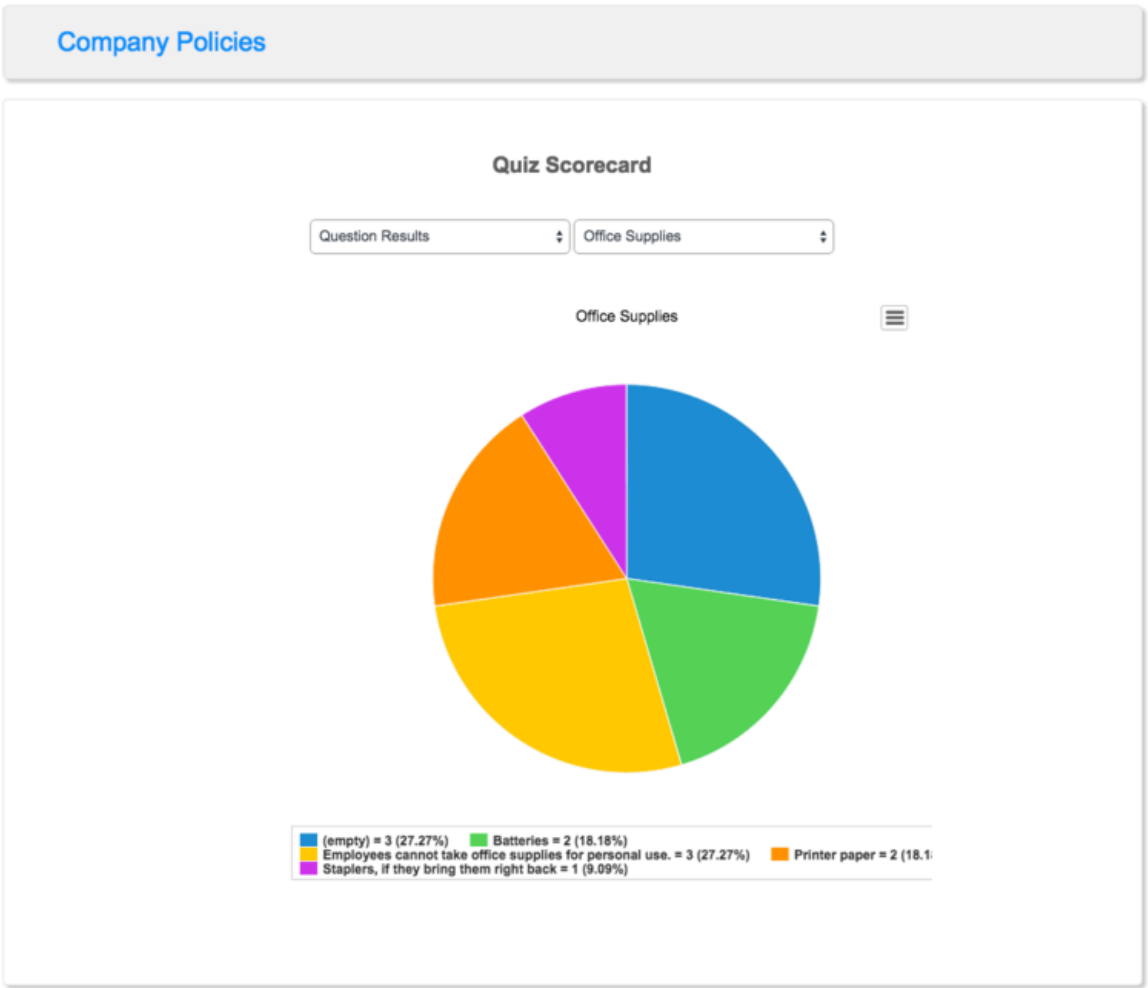
- Likert Scale
- Number
- Template
- Yes/No

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Quiz designer

Quiz scorecard question results - pie chart



Bar chart

A bar chart appears when question results use this data type:

Percentage

By default, all results for percentage questions use a report range of 20% segments. To configure a report range, navigate to **Reports** > **Administration** > **Report Ranges**.

Average ratings

The Average Ratings view displays a bar chart of the weighted average rating for each question in a category.

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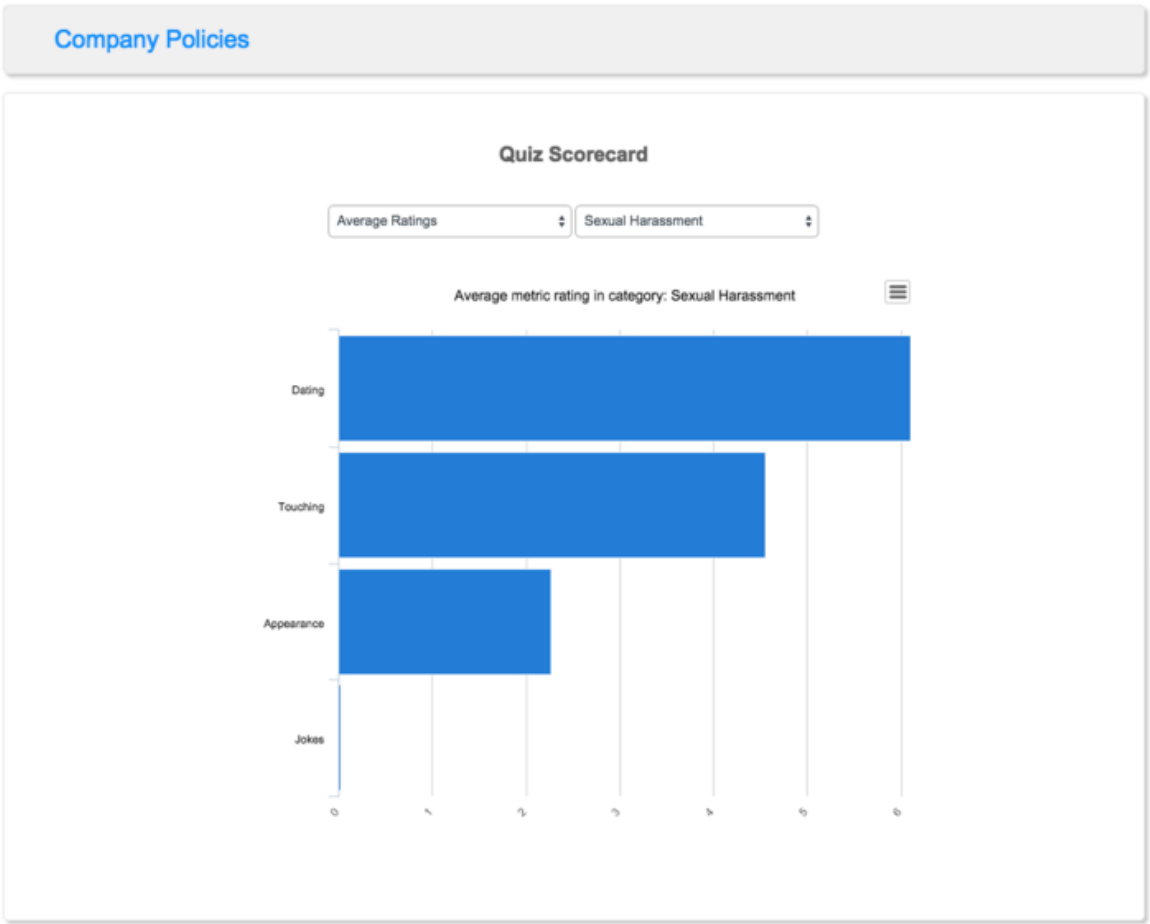
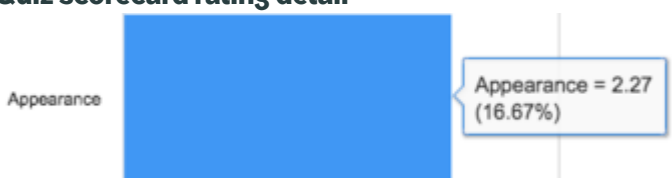
Use this view to learn how individual questions affect the overall rating for the category. Select a category from the second choice list above the chart. Ratings are only calculated for scored questions

Average Ratings view



To view the effect of each question's ratings on the entire category's ratings, point to the colored bar. The pop-up box shows the percentage of the total ratings represented by each individual question's weighted average.

Quiz scorecard rating detail



Question Properties form

Description of the field values for the Question Properties form.

Question Properties form

Field	Description
Name	[Required] Name of the question. Create a concise and easily recognizable name for your question. The system uses this value to identify the question in Assessment Metric lists and in scorecard charts.

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Question Properties form (continued)

Field	Description
Question	Text to display as the question on quizzes. Enter a clear, straightforward question that is easy to understand.
Type	[Read-only] Data type selected for this question. See the table in Controls for possible data types.
Active	Check box that determines whether this question is available on a quiz. If a question is marked inactive, it does not appear on quizzes generated after the question becomes inactive.
Boolean option	Whether a check box or a **Yes/No** list appears as the option for the Boolean question.
Mandatory	Check box for requiring users to answer the question. Users cannot submit quizzes until they answer all mandatory questions, which are denoted by a red Introduction_to_Fields#Field_Status_Indicator" --> field status indicator. This field is available when the question does not have a dependency and the question Controls is not **Boolean** with a check box option.
String option	Setting for the appearance of a string field in a question. This field is available when the question type is **String**. The string options are: • **Single line**: Single line text field 40 characters in length that allows strings of any length. • **String line wide**: Full page width text field that allows a single line entry of any length. • **Multiline**: Full page width multi-line text field that allows word wrap and returns.
Min	Lowest positive whole number that users can enter or select to answer the question. This field is available when the question type is **Number**, **Percentage**, or **Numeric Scale**.
Max	Highest positive whole number that users can enter or select to answer the question. This field is available when the question type is **Number**, **Percentage**, or **Numeric Scale**.
Allow not applicable	Check box for including **Not Applicable** as an option for this question. Users can select **Not Applicable** if they do not have sufficient information to respond to a question. User responses of **Not Applicable** are excluded from results calculations. This field is available when the question does not have a dependency and the question data type is not **Boolean** with a check box option.
Randomize answers	Check box for displaying answer options in a random order whenever the question appears in a quiz. Answer preference is sometimes influenced by the order in which options appear, which can result in biased results. Randomizing options can help prevent this bias. Randomizing options for certain questions may make those questions confusing for users. In general, only randomize options that do not follow a logical order.
Details	Information about the question that is displayed on the quiz. Include details that help users understand how to answer the question. You can also enter HTML text in this field with the WYSIWYG editor. For example, include HTML to embed links and images.

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Question Properties form (continued)

Field	Description
Correct answer	Answer option that you want to be selected by users. When you specify a correct answer for a question, the system scores the question. This field is available for all data types except **Date**, **Date/Time**, and **String**. Multiple correct answers are supported for a few data types. See data types.
Choices	Options for a question with a data type of **Choice** or **Scale**. The system automatically adds text and values that you can edit for each option. Click the **+** icon to add an option, or click the **X** icon to delete an option. By default, the system arranges options in the order established by their values. To change the order, drag and drop the options. 
Dependency	
Displayed when	Condition builder that hides or displays the question depending on the answer to another question in the same category. Select an existing question from the list with a data type of **Boolean**, **Choice**, **Scale**, or **Template**. Create the condition that must exist for recipients to see the dependent question, using the **is** or **is one of** operator. The system prevents recursive dependencies between questions. For example, if Question A depends on Question B, Question B cannot depend on Question A.

Related topics

Create quiz questions

Quiz reports

Quizzes provide several global reports so that assessment administrators can view important statistics.

You can share these reports with specific users or groups and change the display options.

For detailed field information and reporting options, click the link for the chart **Type**. To sort a column in ascending or descending order, click the arrow in the column heading

Quiz reports

Type	Description
Quizzes by State	State of distributed quizzes. This chart displays the percentage of distributed quizzes that are ready to take, in progress, complete, or canceled. • **Type**: Pie Chart • **Table**: Assessment Instance [asmt_assessment_instance]
Total Questions by Quiz	Total number of questions for all categories in each quiz.

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Quiz reports (continued)

Type	Description
	• **Type**: Bar Chart • **Table**: Assessment Metric [asmt_metric]
Questions by Data Type	Total number of questions in all quizzes by data type. • **Type**: Bar Chart • **Table**: Assessment Metric [asmt_metric]
Correct Answers by Assigned User	Total number of scored questions answered correctly by each assigned user. • **Type**: Bar Chart • **Table**: Metric Results [asmt_metric_result]
Number of Correct Answers	Total number of correct answers for each scored question. • **Type**: Bar Chart • **Table**: Metric Results [asmt_metric_result]
Incorrect Answers by Assigned User	Total number of scored questions answered incorrectly by each assigned user. • **Type**: Bar Chart • **Table**: Metric Results [asmt_metric_result]
Number of Incorrect Answers	Total number of incorrect answers for each scored question. • **Type**: Bar Chart • **Table**: Metric Results [asmt_metric_result]

Classic approvals

Classic approvals are a legacy process to require authorization on tasks before the work is done. In earlier releases, you could create approval records to define approval tasks and associate users or groups to approve or reject them.

Administrators can define classic approval logic by navigating to **All** > **System Policy** > **Rules** > **Approvals**.

Important:
Classic approval rules have been replaced by the Flow Designer Ask for Approval action. Use Flow Designer to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

Administrators can see all approval requests by navigating to **All** > **Self-Service** > **My Approvals** and removing the list filter.

An approval record consists of these fields:

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Approval record components

Field	Input value
Approver	A reference to the user who is responsible for approving the related record.
State	Choices are: • Not Yet Requested (This state indicates that you are not yet asking your approvers to approve this request. Until you set the status to **Requested** they will receive no email notifications about the request.) • Requested • Approved • Rejected
Approving	A document_id reference field to the record being approved, on any table.
Comments	A journal field for storing comments regarding the approval.
Approval Summarizer	A Create a formatter and add it to a form that displays key fields relevant to the approval from the referenced document. This summarizer will not display if there is no record referenced.

Approval engines

The differences in the way that companies handle their approvals, as well as the differences between approvals for the various applications (such as Service Catalog Requests and Change Management), calls for supporting flexibility in setting up approvals within applications.

Important:
Classic approval rules have been replaced by the Flow Designer Ask for Approval action. Use Flow Designer to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

This flexibility is provided through the selection of an "approval engine" that is used to manage the approvals for each of the Task tables (that is, all tables that extend the Task table).

There are three different approval engine options available for each Task table.

Approval engine options

Option	Description
Approval Rules	A simple set of rules that are evaluated until one matches for the Task table. The matching approval rule is used to create the users that are to approve the task. Set up approval rules by navigating to **System Policy** > **Approvals**.
Process Guides	A sequence of approval steps over which you may control how approvals and rejections are handled. This option is deprecated and should not be used.
Turn off Engines	Turn off both approval engines for this Task table. This option should be selected and is made read-only when a workflow is used to manage the approval process for the table. **Note:** Not turning off the approval engines might have a performance or behavioral impact on your instance.

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Set up an approval engine

To manage the approvals for each of the Task tables in the system, set up an approval engine.

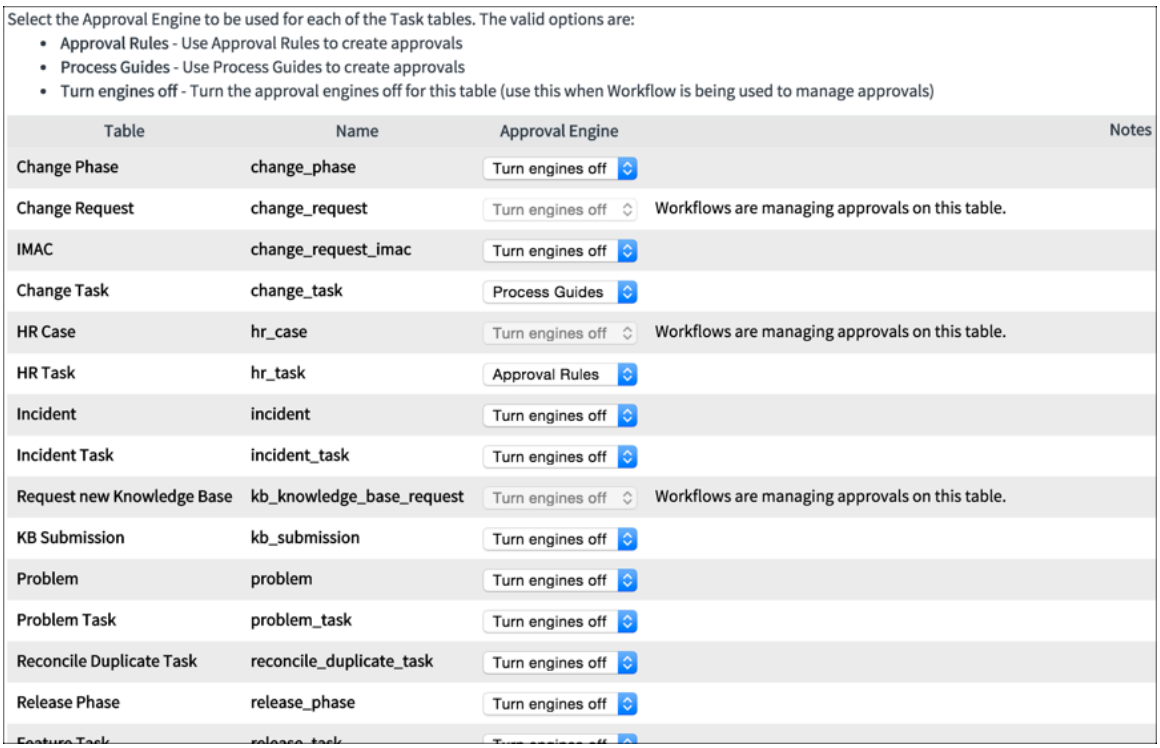
Before you begin

Role required: none

Procedure

1. Navigate to **All** > **System Properties** > **Approval Engines**.

   The following page appears with the **Approval Engine** option for each Task table in the system. If the **Approval Engine** option is greyed out and shows **Turn engines off**, read the **Notes** in the same row. The most common reason an approval engine is turned off is that a workflow is managing the approvals on the table. Having the approval engine turned off prevents conflicts with the workflow that could cause a range of issues. If you want to use an approval engine on the table, set the workflow to inactive.



Select the Approval Engine to be used for each of the Task tables. The valid options are:

- Approval Rules - Use Approval Rules to create approvals
- Process Guides - Use Process Guides to create approvals
- Turn engines off - Turn the approval engines off for this table (use this when Workflow is being used to manage approvals)

Table	Name	Approval Engine	Notes
Change Phase	change_phase	Turn engines off	
Change Request	change_request	Turn engines off	Workflows are managing approvals on this table.
IMAC	change_request_imac	Turn engines off	
Change Task	change_task	Process Guides	
HR Case	hr_case	Turn engines off	Workflows are managing approvals on this table.
HR Task	hr_task	Approval Rules	
Incident	incident	Turn engines off	
Incident Task	incident_task	Turn engines off	
Request new Knowledge Base	kb_knowledge_base_request	Turn engines off	Workflows are managing approvals on this table.
KB Submission	kb_submission	Turn engines off	
Problem	problem	Turn engines off	
Problem Task	problem_task	Turn engines off	
Reconcile Duplicate Task	reconcile_duplicate_task	Turn engines off	
Release Phase	release_phase	Turn engines off	

2. Select the approval engine option for each Task table from the choice list.
3. Click **Save**.
   These preferences are saved as system properties that are named *`glide.approval_engine.<table_name>`*.

Approval rules

Many organizations rely on an approval process to ensure that requests are reasonable and fit an organization's budget.

> **Important:**
> Classic approval rules have been replaced by the Flow Designer Ask for Approval action. Use Flow Designer to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

The service catalog can use these classes of approvals:

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Approvals

Title	Description
Gating approvals	Must occur before a request can be initiated. For example, allow a manager to reject an employee's request for a company car.
Process approvals	Take place within an execution plan process that has been initiated. For example, allow the security group to reject a request for access to SSN even though the employee's manager approved it.

Note:
To enable approval processes to operate smoothly, make sure that the appropriate users have the correct role, and that the role grants access to the necessary tables for users in all the relevant departments and domains.

Set automatic approval rules

Approval rules can automatically set the approval state to something other than *Not yet requested*. As a result, an approval rule can create a set of approvers. You can also start the approval process by setting the approval state to **Requested**.

Prerequisites

Role required: admin

Approval rules have two new fields:

- **Run rule before**: If true, the approval rule runs before the record is inserted/updated.
- **Set State**: If this rule applies, then the task record's approval state is automatically set to this value.

  Note:
  The **Set State** field only behaves as expected if the **Run rule before** check box is enabled.

- In the example below, this rule automatically sets the state of the task to *Approved* thereby auto-approving the task.

Approval Rules fields



Gating approvals

A gating approval acts as a gate through which a request must pass before it can start.

Until all gating approvals are met, no notifications go out, no tasks get sent to technicians, and nobody starts working on the request in question.

Generate gating approvals with:

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Gating approvals

Title	Description
Approval rules	Can apply to the service catalog as well as any other task table.
Item-based approvals	Flag specific catalog items as requiring specific approvals. Any requests for these items automatically require these approvals.

Set up a gating approval via an approval rule

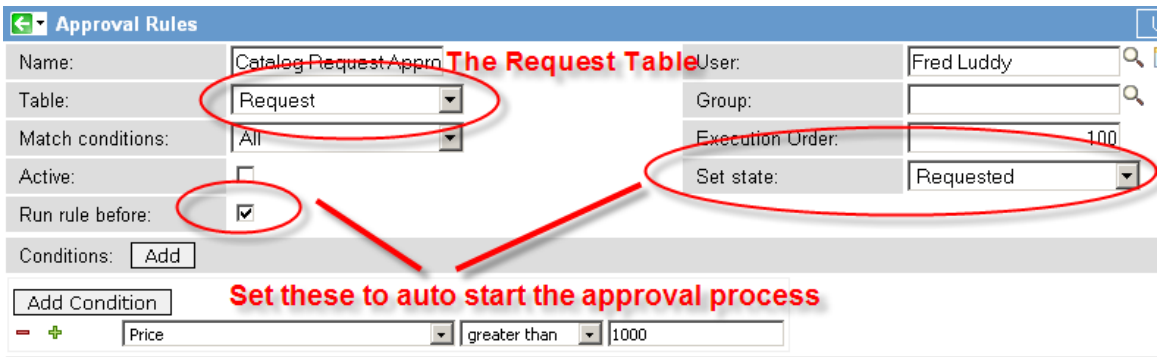
You canset up a gating approval via an approval rule.

Before you begin

Role required: admin

Procedure

1. From the left navigation pane, select **System Policy** > **Approval Rules**.
2. Click **New**.



Approval rules

Field	Description
Name	Name of this rule.
Table	Task table to which this rule applies. For most service catalog approvals, select **Request**. **Note:** The list shows only tables and database views that are Application scope as the approval rule.
Active	Indicator of whether the rule is active (defaults to true).
Run Rule Before	Indicator of whether the rule runs before or after the request record is saved. For most approvals, select this check box.
User	User who must approve this request (can be empty).
Group	Group that must approve this request (can be empty).
Set State	Value of the approval field on the task in after this rule runs. In most cases, select **Requested**.
Condition	Condition under which the rule applies.

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Field	Description
Script	An optional server script to programmatically specify who the approver should be. For example, for the one-line script `current.requested_for.manager`, ServiceNow checks the requested_for reference field on the current record. It then locates the manager field on the referenced record and assigns that person as the approver. For other examples, see the Script field on approval rules provided by ServiceNow.

Notes and limitations:

a. You can have as many rules as you want on a given table. If more than one rule applies, you will get more than one approver.

b. You can't get duplicate approvers, for example, if two rules both want Fred Luddy to approve a particular request, the system will only create one approval entry for him.

c. By default all requests start out in a **Not yet requested** approval state. Approval notifications will not go out until the request's approval state is set to **Requested**. You can do that manually, or you can do it in script, but the easiest way to do it is to use the **Set State** field to automatically set the request to **Requested**.

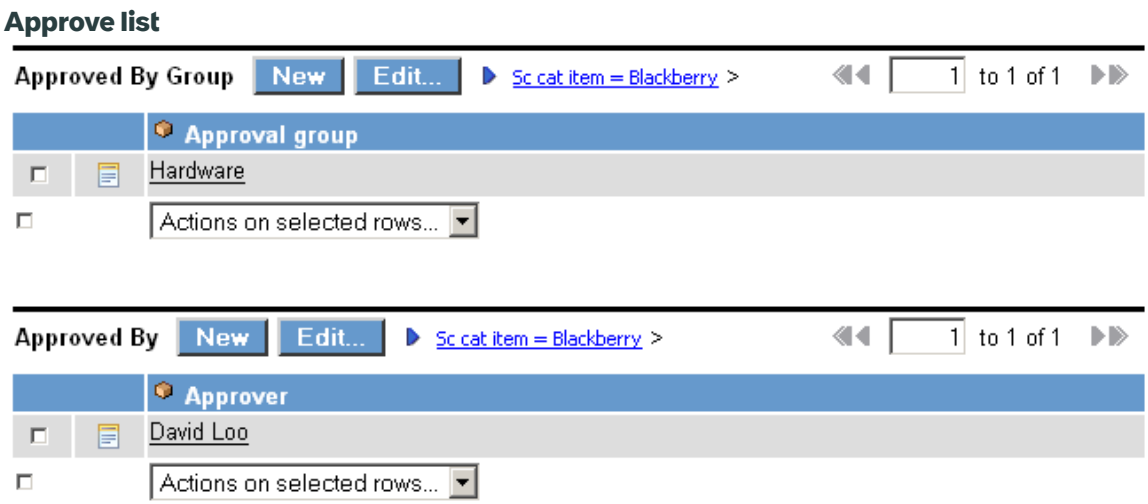
Set up a gating approval based on the item being ordered

In addition to adding approvals via approval rules, you can also add approvals based on what kind of item is being ordered.

In addition to adding approvals via approval rules, you can also add approvals based on what kind of item is being ordered. We can, for example, specify that all Blackberrys need to be approved by David Loo.

To do so, navigate to the item in question and scroll to the related list of required approvers. There are two lists:

- **Approved By Group**: A list of groups that have to approve requests for this item
- **Approved By**: A list of users who have to approve requests for this item



In the example above, this request must be approved by all members of the Hardware group and by David Loo.

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1. As with approval rules, you are protected against duplicate entries. Thus if a person is a member of the hardware group, as well as being a standalone approver, the person will only get one approval request.
2. Item-based approved work in addition to rather than instead of approval rules so you can (and probably will) use both.

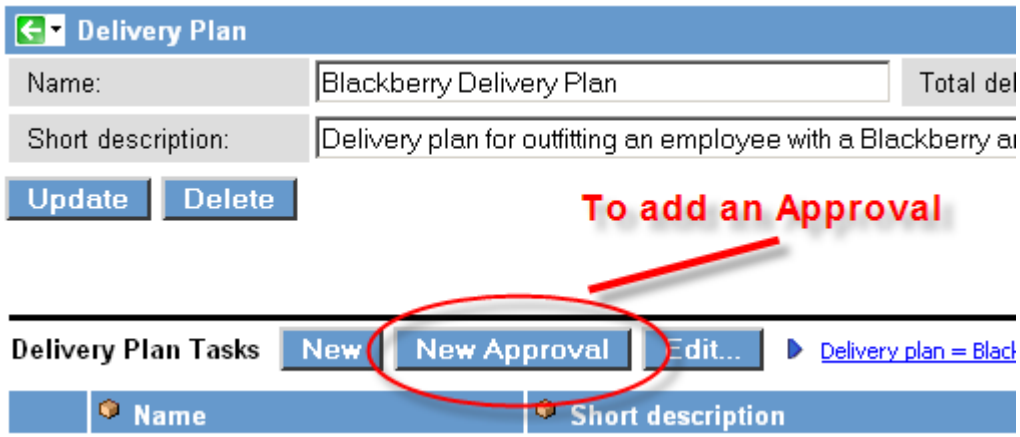
Process approvals

Once a request has passed its gating approvals, any relevant execution plans are initiated.

Those plans, in turn, create a sequence of required tasks. You can add an approval step to an execution plan, which is configured to occur at the appropriate point.

From the left navigation pane, select **Service Catalog** > **Execution Plans**, and then select the plan to which to add an approval step. Then click the **New Approval** button.

Add approval



The Approval Task screen appears. Just like a regular Service Catalog execution task, an approval execution task has:

- **Name**: The name of this task
- **Order**: Sequence of this task within the plan
- **SLA**: SLA to which this task applies
- **Delivery Time**: Time allowed for the completion of this task

After you create the task, right click the title bar and select **Save**. Two related lists appear at the bottom of the screen:

- **Approved By Group**: A list of groups that must approve the request before this task is complete
- **Approved By**: A list of users who must approve the request before this task is complete

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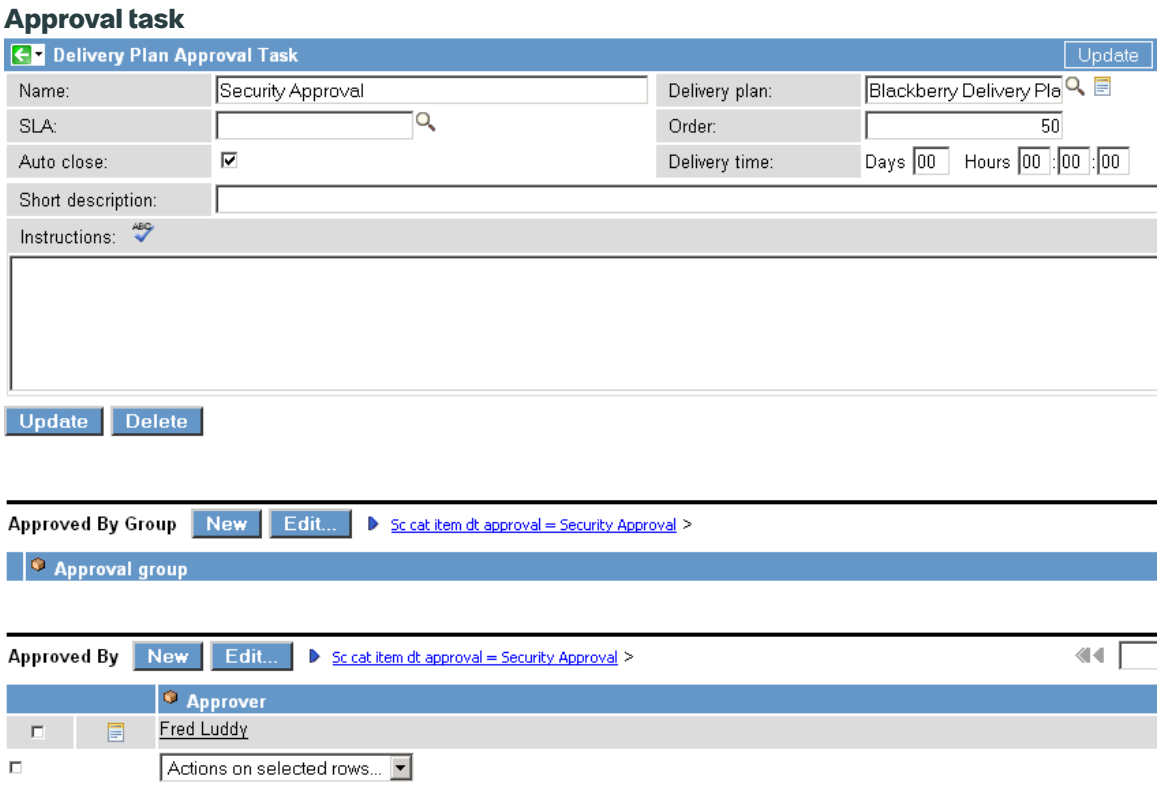

In the example above, this security approval task must be approved by Fred Luddy.

Note:
When an in-process approval is rejected, that particular line item is canceled as well, but the request itself isn't necessarily canceled. Thus if one ordered a blackberry and a laptop, and the blackberry was rejected, the laptop request would continue being processed.

Approve with a process guide

Process guides work similarly to approval rules in that their execution is controlled via a condition.

Before you begin
Role required: none

About this task
The default version of approval tasks allows you to specify that the approval in question be approved by:

1. One or more specific people
2. One or more groups of people

You can optionally use Process Guides instead of approval tasks. Process guides are more flexible in that they allow for:

1. "Any of" or "All of" approvals
2. Sequenced approvals

You can link a process guide to a execution task.

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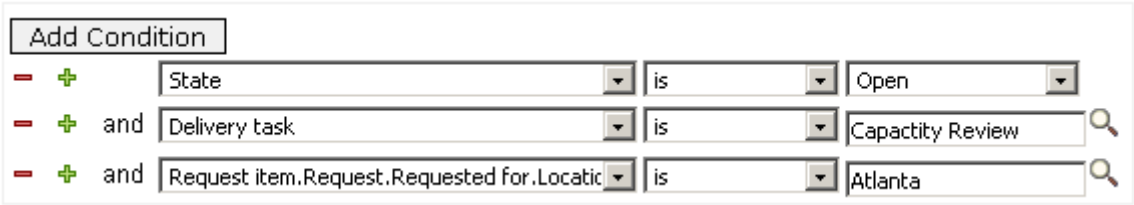
Procedure

1. From the left navigation pane, select **System Policy** > **Process Guides**.
2. Create a new guide.
3. Set the table to **Catalog task**.
4. Fill in a condition under which this guide should attach.

   Example #1: Apply to all "Capacity Review" tasks.



   Example #2: Apply to all "Capacity Review" tasks where there requester is in Atlanta.



   Process guide tips and tricks:

   a. All catalog tasks are generated when a request is first submitted, but tasks which aren't active yet have a state of "pending". So if you do not want to send out approval requests until a task has actually started, add "state=open" as part of your condition.

   b. There is a "Default" process guide in the system for catalog tasks with a sequence number of 10,000. It behaves exactly the same way the old, pre-process guide code did in regards to approvals. Approvals are based on the execution of task-related lists.

Schematic of a hypothetical approval process

In the diagram below of a hypothetical approval process, the gating approval is color coded blue and an in-process approval is orange.

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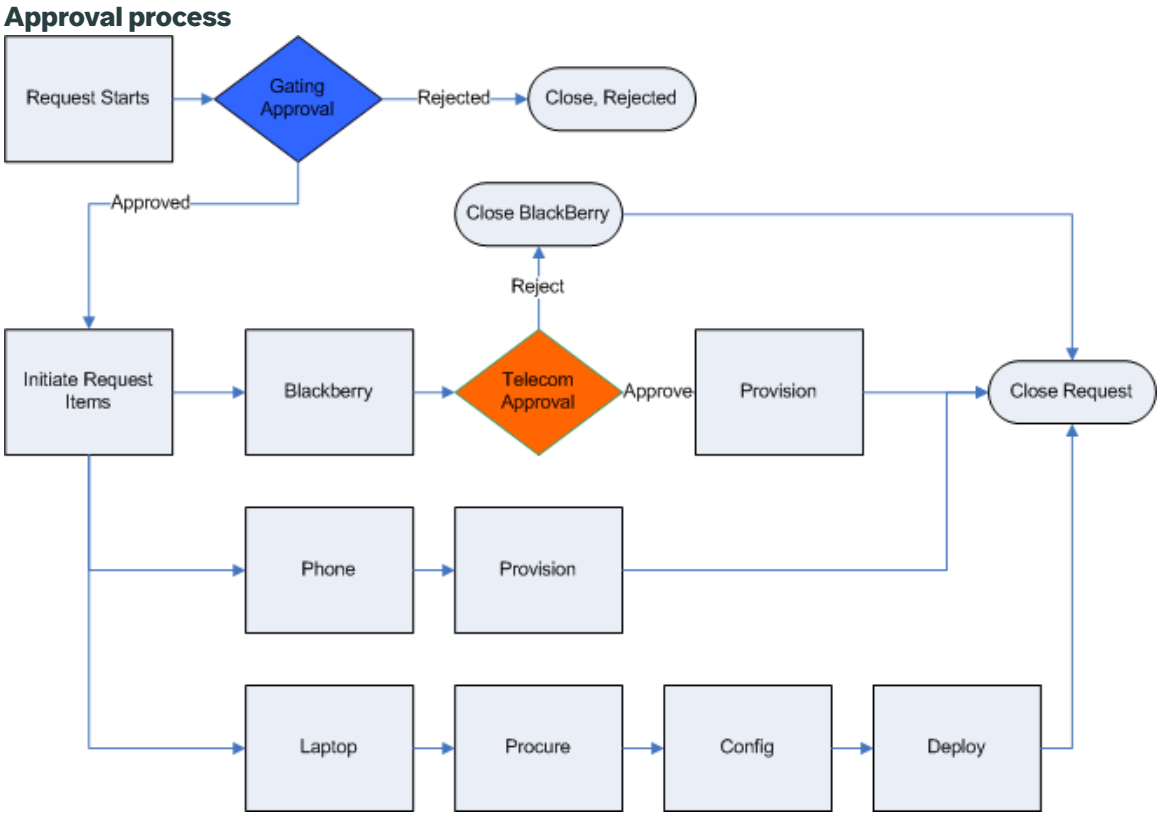
Approval process



Approval summarizer formatter

The approval summarizer formatter creates the summary at the bottom of an approval form.

The approval summarizer displays different information depending on what is being approved, such as a change request or a service catalog request. Following are two examples.

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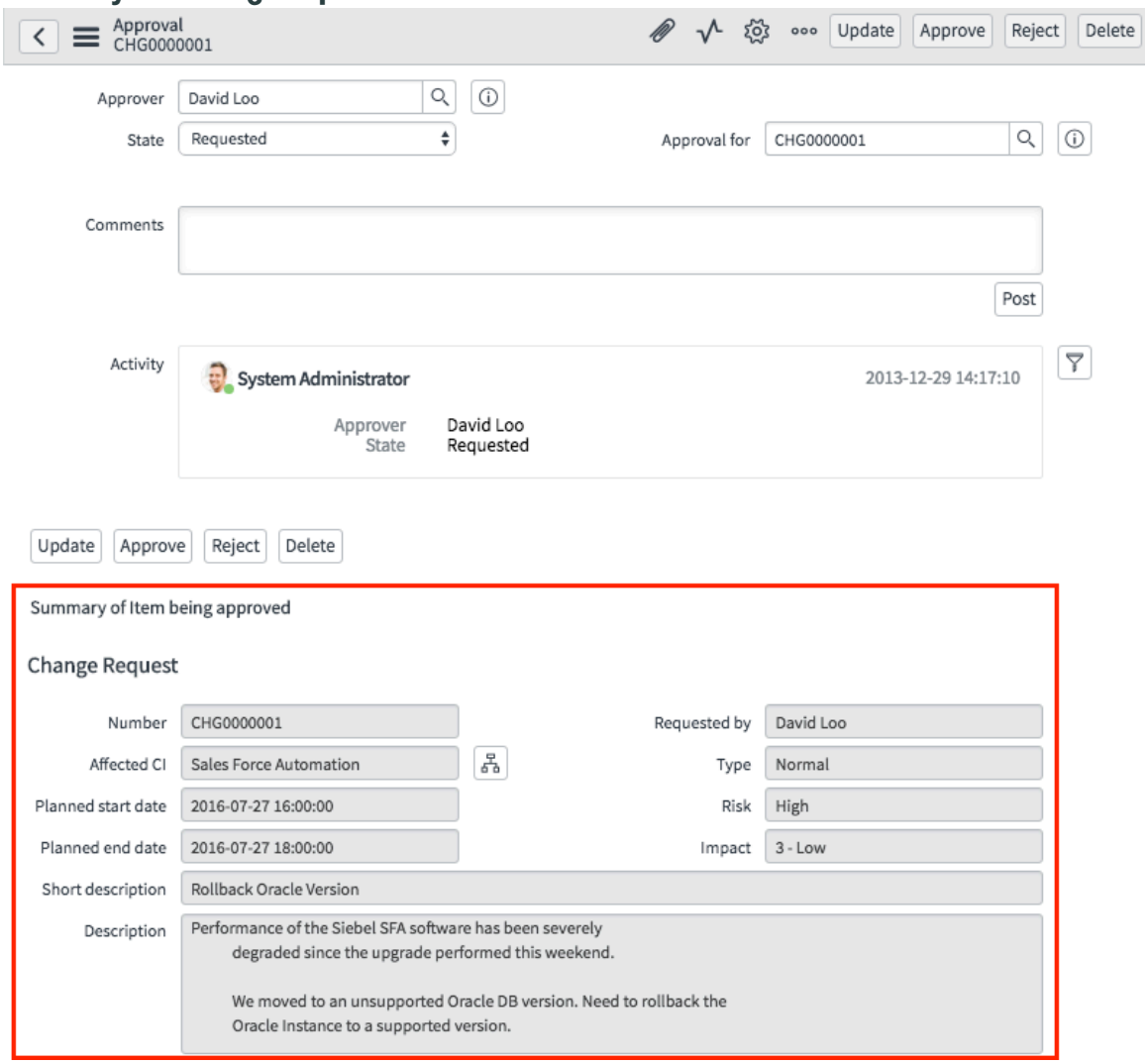
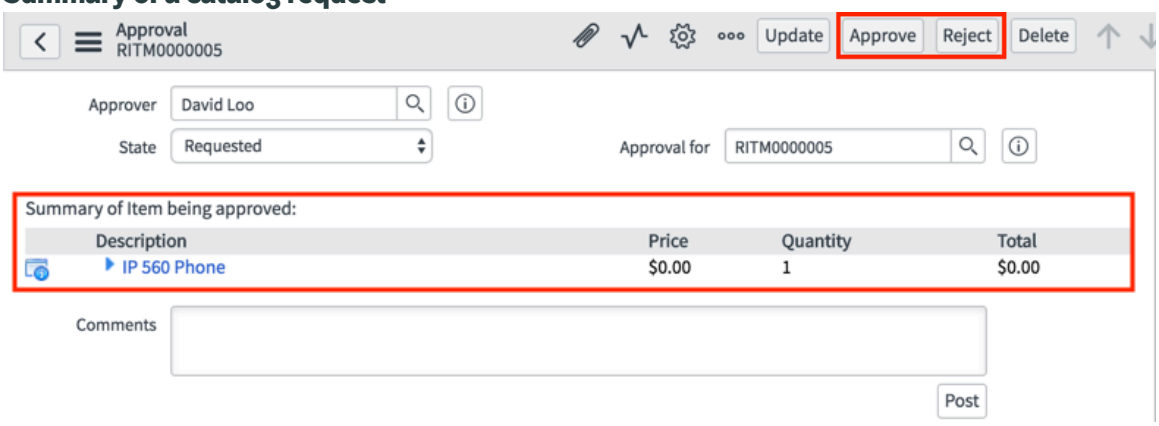
Summary of a change request



Summary of a catalog request



The **Reject** button allows the approver to deny one or more requested items in a multi-item request, before approving the overall request. If a requested item is denied, the workflow for that item never starts. The approver can then choose to **Accept** the item.

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Note:
When the overall request is approved, you must ensure this **Reject** button is hidden. If this button is used after request approval, the requested item workflow is canceled, leaving the stage in an inconsistent state. Similarly, the **Accept** button on requested items should only appear before the overall request is approved or rejected.

Summarizers

Approval summarizers are stored in the Macro [sys_ui_macro] table.

From the left navigation pane, select **System UI** > **UI Macros**. Summarizers use a naming convention of approval_summarizer_ + '<table_name> (for example, approval_summarizer_change_request is the summarizer for change requests, while approval_summarizer_sc_request is the summarizer for service catalog requests).

Each summarizer is written in Jelly script, which is used to define internal forms. The script is stored in the large XML field at the bottom of the UI Macro form.

Change an approval summarizer

You can modify existing approval summaries to include additional information.

Before you begin
Role required: none

About this task
These are advanced customizations that might not be appropriate for all implementations, and require creating a custom form.

Procedure

1. Navigate to **All** > **System UI** > **UI Macros**.
2. Open the summarizer you want to change.
3. Copy the script to another location before editing, in case you need to revert it.
4. Modify the script.
5. Click **Update**.

Create a new custom approval summarizer

After you add a new table that has approvals to an instance, you can add a custom activity formatter by creating a new UI macro and then add it to the appropriate form.

Before you begin
Role required: admin

About this task
approval_summarizer can only be used on approval forms in the global scope.

Procedure

1. Navigate to **All** > **System UI** > **UI Macros**
2. Click **New**.
3. Give the macro a name that follows the summarizer naming convention:
   `approval_summarizer_<tablename>`
4. Complete the rest of the form and click **Submit**.

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5. Create a formatter and add it to a form and add it to the appropriate form.
   To learn more about activity formatters, see Activity formatter.

Approval with e-signature

Approve or reject an approval record by re-entering your login credentials. See the history of an approval from its activity stream or its audit history.

Support for Title 21 Code of Federal Regulations (CFR) Part 11

The Approval with e-signature plug-in is validated for Title 21 CFR Part 11 electronic signature requirements. This plug-in is required for compliance to 21 CFR Part 11.

Each time someone approves a record, the system stores this information.

- The printed name of the signer
- The date and time when the signature was made
- The meaning of the signature (approval or rejection)

This information is stored as part of the activity stream and audit history of the record.

Approval tables

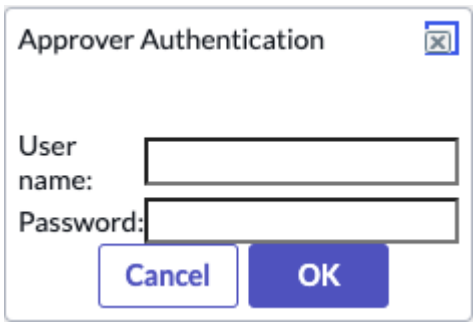
By default, Approval with e-signature supports these tables.

- Change Request [change_request]
- Standard Change Proposal [std_change_proposal]

When you add an approval table, any approval for the table needs an e-signature authorization. See Select an approval table to add or remove a table from supporting Approval with e-signature.

Approver Authentication dialog

Approvers must enter their user credentials to change the approval state. If the credentials fail, then the approval remains unchanged. The system checks the user credentials against local user records or an active single sign-on integration.



Approval History

Each Approval [sysapprover_approver] record has an activity stream that tracks changes to it. Approvals made by e-signature are stored as field changes.

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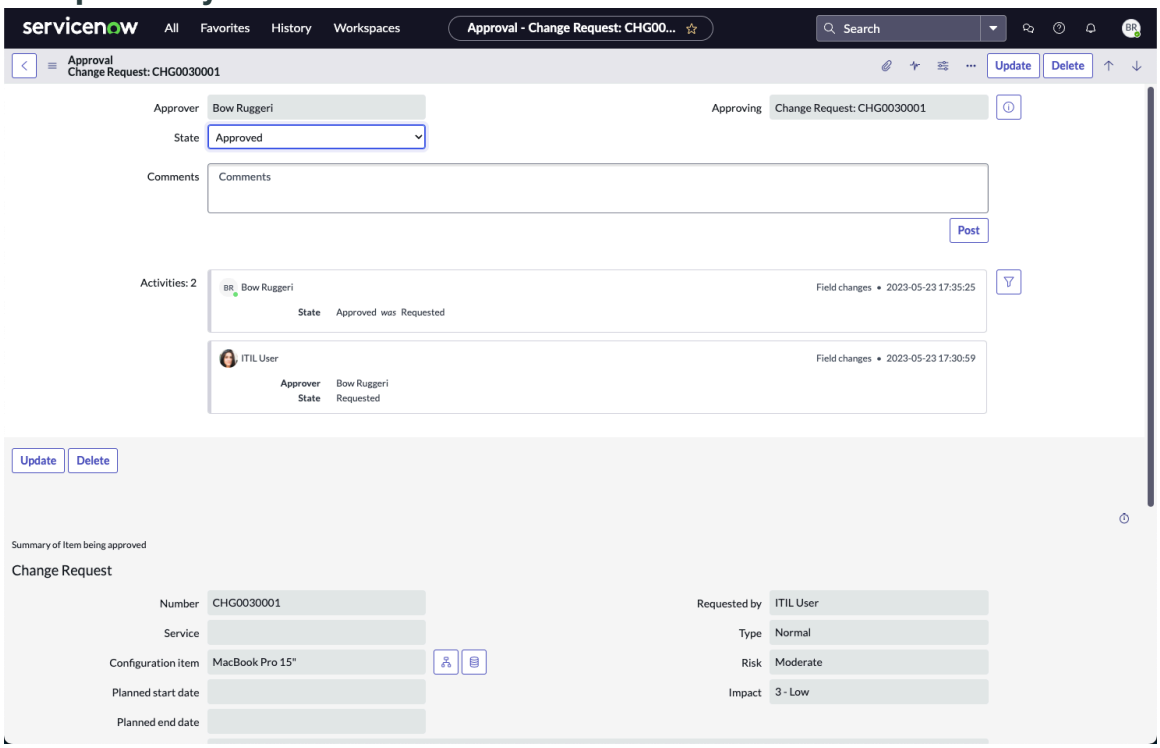
Example activity stream



Available approval options

The Change Request [change_request] table provides these approval options.

List options

The Change Request table provides context menu options to approve or reject records. When someone selects either the Approve or Reject context menu option, the system displays the Approver Authentication confirmation dialog.

UI actions

The Change Request form provides UI actions to approve or reject a record. When someone selects either the Approve or Reject UI action, the system displays the Approver Authentication confirmation dialog.

Change record state

The Change Request table provides a State field to approve or reject a record. When someone selects either the Approved or Rejected state, the system displays the Approver Authentication confirmation dialog.

User credential sources

Approval with e-signature supports these types of user credential sources.

- A set of local User [sys_user] records.
- A remote identity provider service accessed by the Multi-Provider Single Sign-On (SSO) integration.

User credentials must be set up before enabling Approvals with e-signature. See Creating users to create local User records.

See Multi-Provider Single sign-on (SSO) to create an integration to a Security Assertion Markup Language (SAML) 2.0 identity provider.

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Activate Approval with e-Signature plugin

The Approval with e-Signature plugin (com.glide.e_signature_approvals) allows users to approve requests by re-entering their login credentials.

Before you begin

Role required: admin

Note:
You must install the Code Signing Signatures (`com.glide.code_signing.signatures`) to install the E-signature plugin.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

De-activate e-signatures

Use this procedure to de-activate e-signatures.

Although plugins cannot be removed, e-signatures can be disabled.

1. Navigate to **System Definition** > **E-Signature Registry**.
2. Set **Enabled** to **False** on any tables where e-signatures are no longer required.

Select an approval table

By default, activating the Approval with E-signature plugin enables e-signature for all tables for which an approval exists.

Before you begin

Role required: admin

About this task

E-signature approvals can also be enabled on a table-by-table basis.

Procedure

1. Navigate to **All** > **System Definition** > **e-Signature Registry**.
2. Select **New**.
3. In **Table name**, use the drop-down list to select a specific table.

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Table Descriptions

Field	Input Value
Table	Table that requires e-signatures for approvals.
Enabled	Option to require e-signature for approvals. Clear this option to remove the e-signature requirement.

4. Select **Submit**.

Set up an approval from a local database

Enable users to authorize e-signature approvals using local database credentials.

Before you begin
Role required: none

Procedure

1. Activate the **Approval with e-signatures** plugin.
2. Create user records for approval users.

Use Multi-Provider SSO to set up an SSO approval for a SAML 2.0 authentication

An SSO approval with e-signature requires configuration on the SAML IdP and the ServiceNow instance.

Before you begin
Role required: admin

About this task
The SAML IdP must support and honor the forceAuthn attribute in SAML assertion requests. E-signature doesn't function without this IdP setting. Set up an approval with e-signature using credentials from a SAML 2.0 authentication.

Procedure

1. Activate or upgrade to SAML 2.0 with the Activate Multi-Provider SSO plugin.
2. Activate the Approval with E-Signature plugin.
3. Navigate to **Multi-Provider SSO** > **Identity Providers** and verify your 2.0 SAML IdP configuration Advanced tab shows the **Force AuthnRequest** attribute checked.
   Your SAML 2.0 IdP must support the **Force AuthnRequest** attribute, or e-signature isn't supported.
4. On the eSignature Approval tab, enter the following e-signature SAML properties.

Option	Description
Assertion Consumer URL for eSignature authentication	This property defaults to the appropriate URL. To configure this property, select the lock icon to make this field editable. After edits, select the icon to lock the field.
Assertion Consumer Index for eSignature authentication	If your Service Provider has more than one URL set for the AssertionConsumerURL, you

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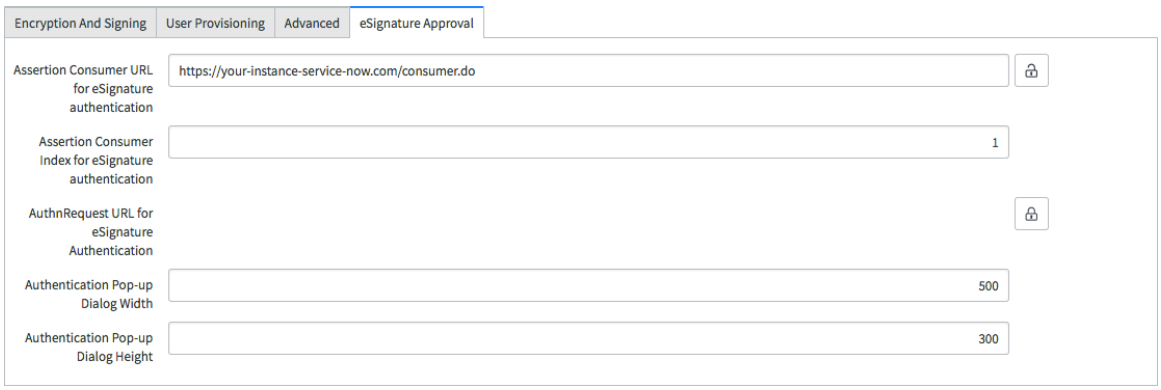
Option	Description
	can set the index to use for eSignature, start ing with index 1 or more.
AuthnRequest URL for eSignature Authenti cation	You can enter the URL that points to the SAML 2.0 IdP AuthnRequest URL for eSigna ture authentication. If the URL is the same as the Assertion Consumer URL, you can leave this setting empty.
Authentication pop-up Dialog Width	When a user approves a request using eSig nature, a dialog opens and a user can enter credentials. This setting controls the width of that dialog box. The default is 500.
Authentication pop-up Dialog Height	When a user approves a request using eSig nature, a dialog opens and a user can enter credentials. This setting controls the height of that dialog box. The default is 300.



5. Select the **Generate Metadata** button underneath the tabs to regenerate the service provider metadata.
6. Copy the service provider metadata, and update it on the SAML IdP.

Installed with approval with e-signature

Installing approval with e-signature installs certain properties.

- Module - E-Signature Registry
- UI Action - Approve (on table sysapproval_approver, with no action name)
- UI Action - Approve (on table sysapproval_approver, with no action name)
- UI Action - Approve (on table sysapproval_approver, with the action name authenticated_list_approval)
- UI Page - form_login_validate_dialog
- UI Page - login_validate_dialog
- UI page: saml2_esignature_login, the re-authentication page that appears when an approver tries to approve a request.
- Properties: see E-signature SAML properties
- Client Script - Authenticate Approver
- Script Include - User

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- Script Include - UserAuthentication
- Processor: eSigSaml2AssertionConsumer

Installing the plugin also disables the two out-of-the-box Approve UI Actions on the `sysapproval_approver` table.

Approval status

The approval status of a change request is determined by looking at the current status of all the approvers.

If any approver has rejected the change, the approval status will be Rejected. If all approvers have approved the change, the approval status will be Approved. If all approvers are in the Not Requested status or if there are no approvers, the change status will be Not Requested, otherwise the status will be Requested.

For added flexibility when creating approvals, including the ability to set up an "one of" approval where only one person of a group of approvers needs to approve, consider using Workflows .

Related topics

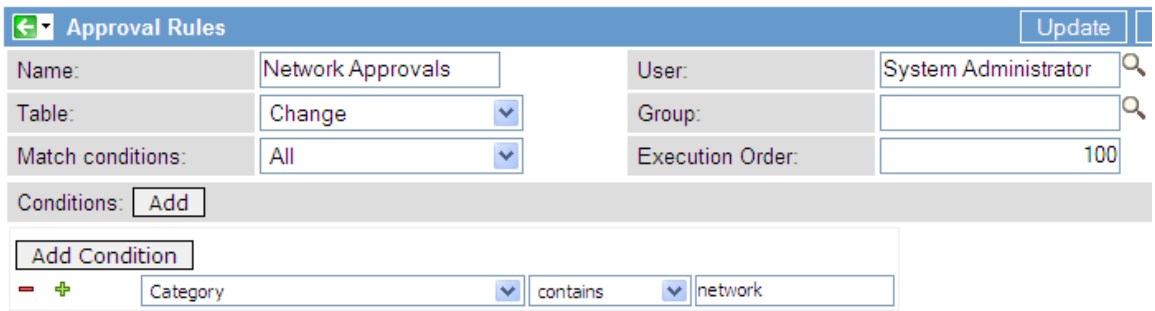
Classic approvals

Generate an approval using approval rules

The system can automatically generate an approval request to individuals or groups when specific criteria are met. The automatic generation of approval requests is driven using the System Policy feature.

In the sample below, a change opened in the category **network** is assigned to the System Administrator:

Approval Rules



When an approver is automatically added based on approval rules, the status of the approval automatically defaults to "Requested".

Related topics

Classic approvals

Generate approvals using the approvers related list

It is possible to manually add approvers to a request.

Additional approvers can be added by clicking the **Edit** button in the Approvers section near the bottom of a request. When an approver is added manually, the status for that approver defaults to **Not Yet Requested**. When the status of the approver changes to **Requested**, the approver is sent an email requesting approval action.

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Related topics

Classic approvals

Generate approvals using workflows

Workflows are a powerful and flexible method of generating approvals. Use workflows to create group approvals and user approvals.

A variety of variables are available to fine-tune the approval process, including the actions that occur when approval or rejection take place. When a workflow activity generates an approval record, the system populates the **Workflow activity** field on the approval record with a reference to the activity. Do not use this field when creating business logic. For more information, see Approval and Rollback Activities.

Note:
Conflicts can arise when the approval process for a table is managed by both the workflow engine and the approval engine. In general, if there is a workflow that manages the approval process for a table, the approval engine should be turned off for that table.

Related topics

Classic approvals

Multiple approvers

With multiple approvers, all approvers must authorize the request before the status will change to "Approved".

Should any approver reject the request, the status will immediately be set to "Rejected".

Related topics

Classic approvals

Receive notifications

Individuals who are designated approvers automatically receive approval notifications, including approval status updates.

Approval notifications will be sent at the following times:

- When an individual is assigned as an approver either automatically or manually. If a group is chosen, then all members of the group will be sent an email. By default, the email an approver receives will contain a "mailto" link that will allow the approver to either approve or reject the request directly from their email system.
- When the request reaches approved status, the person assigned to the request will receive an email indicating it has been approved.

The details contained in the emails and the points at which they are sent can be tailored using **System Definition** > **Business Rules** and **System Policy**.

Note for Blackberry users: In order to see the "mailto" links mentioned above to approve or reject a request (i.e. 'Click here to approve CHG55555' or 'Click here to reject CHG55555'), your Blackberry device must be using version 4.5 of their software which supports HTML emails.
If your Blackberry device is using an earlier version, you will not be able to view or use the "mailto" links. However, as a workaround, users can reply to the email and add the statements `state:approved` or `state:rejected` within the body of the email before sending it to force the automatic approval/rejection functionality.

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If you create an appropriate Inbound Email Action, you can let approvers respond to approval email notifications with a simple "yes" or "no" answer.

Embed an approval request within the Outlook email client

Embed an interactive approval request for service catalog requests in the email notification sent to a user. The user can accept or reject the approval request from the email client.

Before you begin

Role required: admin
The Outlook Actionable Messages plugin (com.sn_ms_oam) should be activated.

Note:

- The Outlook Actionable Messages (OAM) feature is not supported in all Microsoft mail products and versions. To verify whether your version of Outlook supports OAM, refer to the Microsoft documentation.
- Actionable messages are supported only for emails sent from the @service-now.com email address. If you are sending an email from a customized email address, you should register as a new service in the Microsoft website setting the scope as **Organization**. Specify the provider ID value in the *sn_ms_oam.outlookactionable.originator* property.
- Actionable messages are based on the Sender Policy Framework (SPF)/DomainKeys Identified Mail (DKIM) validation for the email sender verification. If an email recipient receives email via an external provider, emails may not be rendered as adaptive cards.
- You cannot customize the default actionable message templates.

Procedure

1. Navigate to **All** > **System Notification** > **Email** > **Notifications**.
2. For the approval notification that requires user approval, in the **What it will contain** tab, add the following script in the **Message** field in addition to the existing information, or to the **Message** field in the configured email template if applicable.

   ```
   ${mail_script:include_approval_actionable}
   ```

   For example, for the Catalog Approval Request and Approval Request notifications, you can include the script in `request.itil.approve.role` and `change.itil.approve.role` email templates.

   This script includes the Outlook actionable message in the email notification sent to the user for approvals.
3. Click **Update**.

Dynamic approval forms

When you are looking at an approval request, the form has a context-appropriate summary of the item to be approved.

For example, if you're looking at a Change Management approval request, you will see details from the relevant change request. For a Service Catalog approval request, you will get details of the request.

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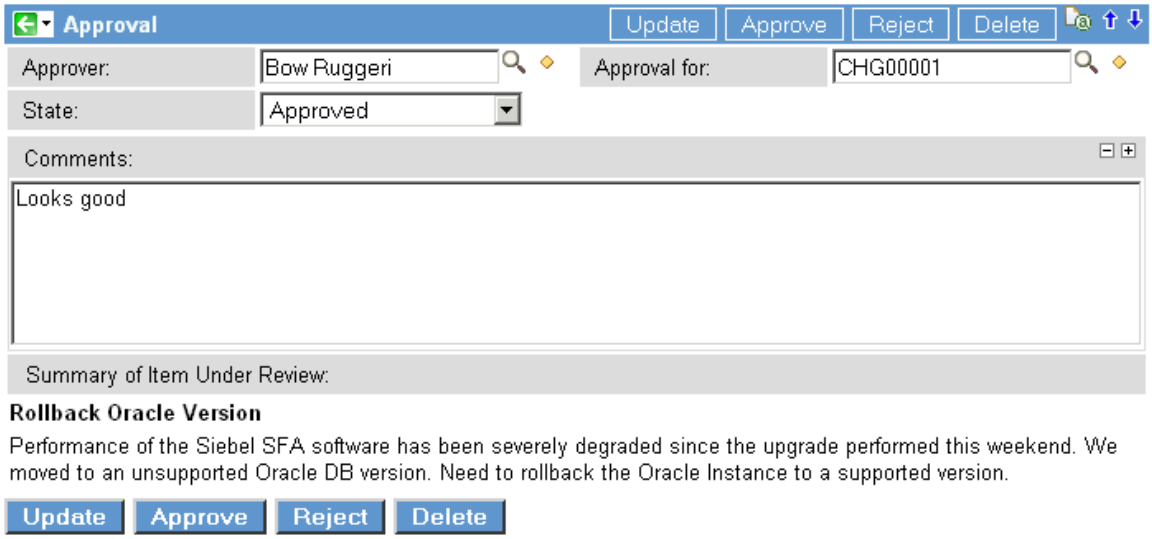
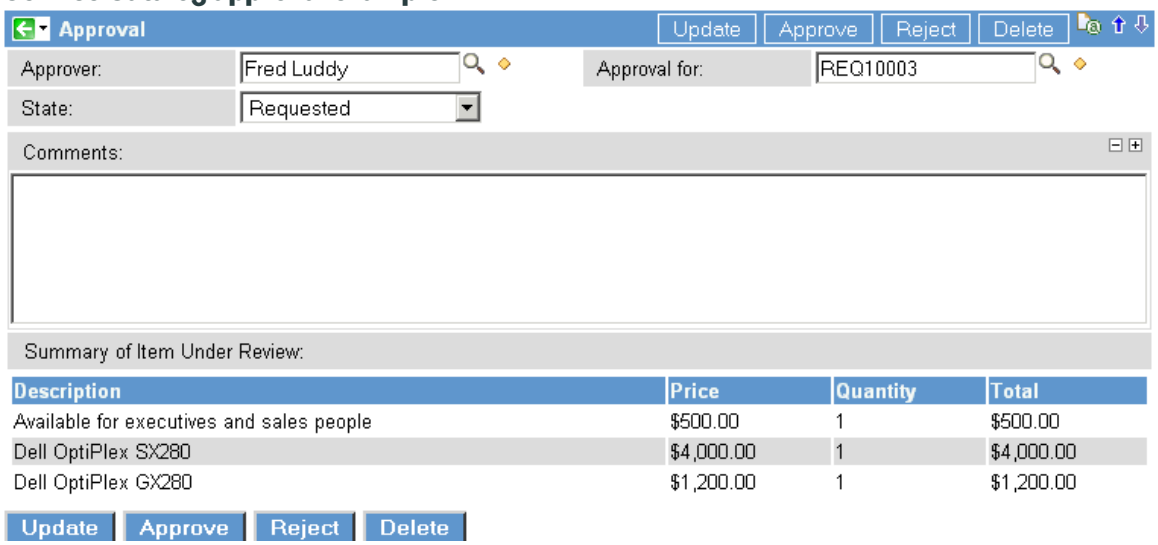
Change request approval example



Service Catalog approval example



Scripts and engines execution order

Scripts, assignment rules, business rules, workflows, escalations, and engines all take effect in relation to a database operation, such as insert or update. In many cases, the order of these events is important.

Note:
Client-based code that executes in the browser, using Ajax or running as JavaScript, will always execute before the form submission to the server.

The order of execution is as follows:

1. Before business rules: Scripts configured to execute before the database operation with an order less than 1000.
2. Before engines. The following are not executed in any specific order:
   - Approval engine (for task and sys_approval_approver tables)
   - Assignment rules engine (for task tables)
   - Escalation engine

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- Data policy engine
- Field normalization engine
- Role engine - keeps role changes in sync with sys_user_has_role table (for sys_user, sys_user_group, sys_user_grmember, and sys_user_role tables)
- Execution plan engine (for task tables)
- Update version engine - creates version entry when sys_update_xml entry is written (for sys_update_xml table)
- Data lookup engine inserts or updates
- Workflow engine (for default workflows)

3. Before business rules: Scripts configured to execute before the database operation with an order greater than or equal to 1000.
4. The data base operation (insert, update, delete).
5. After business rules: Scripts configured to execute after the database operation with an order less than 1000.
6. After engines. The following are not executed in any specific order:
   - Label engine
   - Listener engine
   - Table notifications engine
   - Role engine - keeps role changes in sync with sys_user_has_role table (for sys_user, sys_user_group, sys_user_grmember and sys_user_role tables)
   - Text indexing engine
   - Update sync engine
   - Workflow engine (for deferred workflows)
   - Trigger engine (for all Flow Designer flows)
7. Email notifications. The following are executed based on the weight of the notification record:
   - Notifications sent on an insert, update, or delete
   - Event-based notifications
8. After business rules (Only active records). Scripts configured to execute after the database operation with an order greater than or equal to 1000.

Note:
Like After business rules, Async business rules execute their logic after a database operation occurs. Unlike After business rules, Async business rules execute asynchronously, running in the background simultaneously with other processes. Async business rules run after the user submits the form and after the scheduler runs the scheduled job created from the business rule. The system creates a scheduled job from the business rule after the user submits the form but before any action is taken on the record in the database.

Fulfiller experience in Mobile Agent

Approve catalog requests, requested items, or change requests from anywhere using the ITSM ServiceNow Agent application.

As an ITSM agent or technician, you can use the mobile app when connected online to accomplish the following:

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- Accept or reject the pending approval requests.
- View the completed approval requests.

Note:

- The request experience is not available in this mobile app.
- On-load catalog UI policies (non-scripted) are supported for variables in record views, for example, requested item and incident.
  - Only the visibility condition is considered.
  - A variable with no value is not displayed.
  - These policies are also applicable for container variables and a group of check boxes.
  - Since the multi-row variable set is displayed with a message that it is not viewable, these policies can be used to display or hide that message.

Watch this three-minute video to learn how to manage approval requests in the mobile app. This video covers: Accessing the Approvals mobile app and viewing and approving or rejecting requests.

Activation information

This mobile application runs on the ServiceNow® mobile platform. You should activate the ITSM Mobile Experience (com.sn_itsm_mobile) plugin that enables the ITSM mobile application.

Get started with the mobile app for Approvals

Access the My Approvals application instance on your mobile app to manage approval requests using your mobile device.

Before you begin

Role required: business_stakeholder or approver_user

About this task

Download the ServiceNow® mobile application on an iOS platform from the Apple App Store or on an Android platform from the Google Play Store.

Procedure

1. Open the mobile app and tap the plus icon ().
2. Add a ServiceNow instance.
   For more information on adding the instance, refer to Add a ServiceNow instance.
3. Tap **My Approvals** to start managing your requests.

Related topics

Agent mobile app

Manage a catalog request approval

Manage your assigned catalog request or requested item by approving or rejecting it from anywhere using your mobile device.

Before you begin

Role required: business_stakeholder or approver_user

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Procedure

1. Tap **My Approvals** on your mobile app.
2. To approve or reject a pending approval request, perform the following steps.

   a. Tap the Pending Approvals applet.
   All approvals in the Requested state are displayed.

   b. Swipe a request and tap **Approve** or **Reject**.

   Note:
   You should specify the reason while rejecting a request.

   c. **Optional:** To view the details of a pending approval request, tap it.

   Note:
   To approve or reject a request, tap the menu icon ( ) and tap **Approve** or **Reject**.

3. To view a completed approval request, perform the following steps.

   a. Tap the Completed Approvals applet.
   All approval requests that are either accepted or rejected are displayed.

   b. To view the details of the request, tap it.

State flows

State flows enable an administrator to customize transitions from one state to another in tables derived from the Task [task] table and configure the system to perform work during transitions to specific states.

An example of a state transition is when the **State** field in an incident changes from **Active** to **Awaiting User Info**. An administrator might want to trigger an event during this transition or make a specific field mandatory when the incident reaches the end state.

State transitions in the Field Service Management application were reimplemented to use state flows. For information about customizing Field Service Management state flows, see State Flow Customization.

Installed with state flows

Several types of components are installed with state flows.

Tables installed with state flows

Tables are added with state flows.

Table	Description
State Flow [sf_state_flow]	Contains state flow definitions. This table contains all state flow definitions, including those for work orders and work order tasks.
Work Order Flow [sf_work_order]	Contains state flow definitions for work orders. This table is installed when Field Service Management is activated.
Work Task Flow [sf_work_task]	Contains state flow definitions for work order tasks. This table is installed when Field Service Management is activated.

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Business rules installed with state flows

Business rules are added with state flows.

Business rule	Table	Description
Assert Field Uniqueness in State Flow	State Flow [sf_state_flow]	Ensures that business rules and UI actions are not accidentally copied to new state flows.
Check Client Script	State Flow [sf_state_flow]	Adds a client script to new records.
Check Event Rule	State Flow [sf_state_flow]	Adds or deletes event rules, as the event field is updated.
Check Work Notes Rule	State Flow [sf_state_flow]	Adds or deletes work note rules, as the work notes for a state flow are updated.
Create Business Rule	State Flow [sf_state_flow]	Automatically creates a business rule when automatic conditions or script are present.
Create script for Field controls	State Flow [sf_state_flow]	Create scripts for field controls, when they are in use.
Create UI Action	State Flow [sf_state_flow]	Automatically creates a UI action when manual conditions or script are filled in.
Delete Related Elements	State Flow [sf_state_flow]	When state flows are deleted, delete all related client scripts, business rules, UI actions and overrides.
Remove script for Field controls	State Flow [sf_state_flow]	If all field controls are disabled, see if any of the client scripts should be removed.
State Change	State Flow [sf_state_flow]	Get the correct state choice value when the state is changed.
Update dependent records	State Flow [sf_state_flow]	When a state flow is made active or inactive, ensure the business rule and UI actions are made active or inactive as well.

Script includes installed with state flows

Script includes are added with state flows.

Script includes for state flows

Script include	Description
StateFlow	Implements state flows and supports creation of state flow elements, such as business rules, UI actions, dictionary overrides, and client scripts.

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Script includes for state flows (continued)

Script include	Description
StateFlowAJAX	Allows access to state flow functionality from client scripts.

Use state flows

You can create custom state flows for any table that uses states.

Make state transitions occur in any order or skip specific states according to your business practices. State flows can manage the behavior of fields and field visibility on a task form. State flows can also trigger system events that perform work such as sending Email and SMS notifications.

Administrators can configure state flows to:

- Limit the choice list for the **State** field to contain only those states that are valid for the flow.
- Define the behavior and visibility of specific fields on a task form when state transitions occur and for certain end states.
- Configure events that are triggered when a task changes states.
- Set up UI actions and business rules to implement certain state transitions, or while the task is in certain states.

The State Flow plugin installs records used by work management to control state transitions for work orders and work order tasks. For detailed information about using work management state flows, see State flow customization.

Creating and customizing state flows requires scripting knowledge. Users with the admin role can create state flow records.

Dictionary overrides for state flows

A dictionary override in a state flow defines the starting state for all new records in a specific table.

You set an override in tables that extend a base table only, so that your customizations are applied only to the extended table.

1. In a state flow record, select an **Ending state**.

   This is the override value which becomes the starting state for all new records in the table named.

2. Click **Create Default Value**.

   The system populates the *Dictionary override* field with a value of *state*, which is the field in the task table affected by the override. The *Dictionary override* field is read-only. After the override is created, the system hides the **Create Default Value** button on all subsequent state flow forms for that table.

Events triggered on state changes

You can configure a state flow to trigger a registered system event when a task transitions from a starting state to a specified end state.

For example, you can use events to trigger email notifications and create script actions. When you attach an event to a state flow, the system creates a business rule called State Flow Events

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for <table name> for the table specified in the state flow. If you specify a start and end state, the business rule executes when the record transitions from the start state to the end state. If the state flow only specifies an end state, the business rule executes whenever that end state is reached. The system creates one business rule for all state flows containing events on a single table. When all events or all state flows on a table are deleted, the system deletes the business rule.

Field controls

You can define controls for individual fields that are enforced when a record transitions between states.

Settings in the Field Controls section of the State Flow form enable you to apply field controls when the system detects a specified state transition or when the end state is the current state when the form is opened. The control is applied only to existing fields on the form. State flows cannot add fields to the form.

For example, you might want the *Problem* field to be visible when an incident moves to the *Awaiting Problem* state. If the incident state changes to *Awaiting User Info*, you hide the *Problem* field and make the *Caller* field mandatory.

When creating field controls, configure state flow records with an ending state only and to create the correct behavior for every ending state you want to control. This configuration ensures that the field controls are set properly when the user selects a new state, and also when the user returns a record's *State* field to the original state. Only specify a full state transition, with both a starting and ending state, when you want a particular behavior for that precise state transition.

Note:
State flows use client scripts to enforce field controls. It is possible that your settings can be changed by existing UI policies, which execute after client scripts.

The system creates the following objects, as needed, to enforce field properties in state flows:

Field Controls

Type	Name	Description
Business rule	State Flow Notes for <table name>	Enforces mandatory fields for the table on which that field behavior is defined.
Client script (onLoad)	<table name> state flow	Sets possible states and initial mandatory, read-only, and visible properties when a record is loaded.
Client script (onChange)	<table name> change state flow	Sets updated mandatory, read-only, and visible properties when a record is changed.

Rebuild state flows

You can rebuild state flows when a mismatch between existing and new sys_ids occurs.

When you use an XML file to import a state flow record into an instance, the system attempts to match the incoming states with existing states by comparing sys_ids. Because the sys_ids of items in a choice list can vary between instances, the system can fail to match the states, even though they are otherwise identical.

When matching fails, the start and end states of affected records are left blank or contain numeric values. To repair these records navigate to **State Flows** > **Admin** > **Rebuild State Flows**. This module runs a script that compares the numerical value of each item in the **State** field choice list until it finds a match in the imported state flow record.

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State flow cleanup

Work notes

Related topics

Use state flows

Create a state flow

Create a state flow

Creating State Flows.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **State Flows** > **State Flows** and click **New**.
2. Fill in the fields, as appropriate.

   The system enforces the field controls with the same client script that filters the choice list for the *State* field.

Creating state flows

Field	Description
Number	Automatically generated record number
Table	[Required] Table on which the state flow record runs. Only tables that extend the Task `[task]` table are available in the list.
Starting state	Name of the state at the beginning of the transition. The selections in this field are filtered by the possible states for the table selected.
Ending state	Name of the state at the end of the transition. The selections in this field are filtered by the possible states for the table selected.
Client script	Client script to run for this transition. The client script controls the available states you can select by limiting the contents of the *State* choice list to valid states. This client script also controls specific field behavior configured for state changes in the Field Controls section of the form.
Event	Name of an existing event to trigger when this transition occurs. See evernts triggered on state changes for more information.
Name	Name of this record. Make sure the name is descriptive of the state transition or the processing that the record is performing. This name does not have to be unique.
Roles	Not used for any processing.
Active	Enables or disables this state flow record.
Class	Defines the state flow class for this record. The system selects the appropriate class from these options:

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Field	Description
	○ *State Flow*: Records created for state flows in all task-based tables except those in work management. ○ *Work Order Flow*: Records created for state flows in the Work Order `[wm_order]` table. This class is available when work management is activated. ○ *Work Task Flow*: Records created for state flows in the Work Order Task `[wm_task]` table. This class is available when work management is activated.
Dictionary override	Sets the starting value for the *State* field on all new records for the table named in the state flow record. See dictionary overrides for configuration procedures.
Work notes	Noteworthy comments about this state flow transition. For details about how these notes are used, see Work Notes.
Comment	Details about the customized record.
Manual (Runs scripts from a UI action that require the user to click a button or related link.)	
Manual condition string	Conditions for enabling a UI action that cannot be defined with the condition builder. For example, you can use this string to define UI actions for mobile devices. This condition has an [and] relationship with the condition in the *Manual condition* field.
Manual condition	Conditions for enabling a UI action that can be defined for fields in the target table. This condition has an [and] relationship with the condition in the *Manual condition string* field.
Manual script	Script that defines what the UI action does when the conditions are true. This script runs when the user clicks a button or a related link.
UI action	[Read Only] Name of the button that the system creates to enable this transition. The system creates the label using the same name as the state flow record that created it.
Automatic (Runs a business rule automatically when a task record is changed and updated.)	
Automatic condition string	Conditions for running the business rule that cannot be defined with the condition builder, such as evaluating if the proposed transition is a valid flow. This condition has an [and] relationship with the condition in the *Automatic condition* field.
Automatic condition	Conditions for running the business rule that can be defined for fields in the target table. This condition has an [and] relationship with the condition in the *Automatic condition string* field.
Automatic script	Script that performs additional work when the condition is true. This script can do tasks such as update the date and time the transition occurred or notify someone using email when a specific state change occurs. Automatic state transitions occur when changes are made to the task record.
Business rule	Name of the business rule created for this transition. Two conditions must be satisfied before this business rule can run. The task must be on a specific starting state, and the *Automatic condition* must be true. If both of these conditions are satisfied, the business rule performs the transition requested, using the starting and ending states from the State Flow form.
Field Controls (Determines field properties when a record transitions between states or reaches a specific end state.)	

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Field	Description
Mandatory fields	Makes the selected fields required when this transition occurs, or when the end state is the current state.
Read only fields	Prevents the selected fields from being edited when this transition occurs, or when the end state is the current state.
Visible fields	Displays the selected fields when this transition occurs, or when the end state is the current state.
Not mandatory	Makes the selected fields optional when this transition occurs, or when the end state is the current state.
Not read only	Makes the selected fields editable when this transition occurs, or when the end state is the current state.
Not visible	Hides the selected fields when this transition occurs, or when the end state is the current state.

3. Determine if you want the state transition method to be manual or automatic and open the appropriate section on the form.
   - *Manual*: Click **Create UI Action** to create a button on the task form that enables users to execute the transition manually. The system uses the value in the *Name* field as the label for the UI action. The UI action executes the script in the *Manual Script* field when the conditions are true. For example, a manual transition can create an **Activate** button when an incident is in the *New* state that enables a user to mark the incident as active.
   - *Automatic*: Click **Create Business Rule** to create the business rule. The business rule executes the script in the *Automatic Script* field when the conditions are true. For example, a business rule created by the system can set an incident state to *Assigned* when the *Assigned to* field is populated. Business rules are automatically deleted when the state flow record is deleted. For more information, see Business rules.
4. **Optional:** Click **Create Client Script** to create the script that limits the values offered in a task record's *State* field to valid states for that transition.
5. Configure the fields in the *Field Controls* section to control how specific fields display when a task record changes states.

Related topics

Use state flows

State flow cleanup

The business rules, client scripts, and UI actions that the system creates automatically to perform custom transitions exist only while the state flow records that use them are present.

When all the state flows on a table are deleted, the system attempts to delete any unnecessary programming elements that were created on that table, using these criteria:

State Flow Cleanup

Element	Deleted When
UI action Business rule Dictionary override	The state flow that created it is deleted.

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State Flow Cleanup (continued)

Element	Deleted When
Business rule that processes events triggered by a state flow	All state flows for the table specified that have events configured are deleted.
Client script (onLoad)	All state flows for the table are deleted.
Client script (onChange)	All state flows with field controls are deleted.
Work notes business rule	All state flows with field controls or work notes are deleted

Related topics

Use state flows

Create a state flow

Work notes

Work notes are an important part of the state flow process and are used to communicate information about state transitions.

The state flow adds these work notes to the *Work notes* field of any task making this transition.

These rules apply to state flow work notes:

- For a state flow with no Starting state, the work note is added every time the task transitions to the Ending state.
- For a state flow with a Starting state and an Ending state, the work note is added only when the task transitions from that starting state to that ending state.
- If two state flows with work notes have the same Ending state, but only one has a Starting state, the system adds the work notes from the state flow with the starting state. This better matches the state flow work note to the more important transition between specific starting and ending states.

Related topics

Use state flows

Create a state flow

Domain separation and State Flows

Domain separation is unsupported in State Flows. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

For more information on support levels, see Application support for domain separation.

Overview

Domain separation provides complete data isolation for domain-specific users.

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Related topics

Domain separation for service providers

Geolocation

The geolocation feature uses Google Maps to track users, plan efficient routes between locations, and assist in finding accurate travel times for applications that require this information, such as Work Management.

The system locates users from latitude and longitude information provided by their mobile devices or browsers. Tracking the location of certain users can improve business processes such as the completion of work order tasks. For example, in work management geolocation, the system updates an agent's position each time that agent updates a task record. When the system updates an agent's location frequently, agents and dispatchers can use features like auto-routing to create efficient schedules.

Geolocation features can be configured by users with the admin role.

Related topics

Geolocation Google key

Geolocation history

Location tracking

Activate geolocation

Activate geolocation

An administrator can activate the Geolocation plugin.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Geolocation plugin (com.snc.geolocation) using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

Geolocation

Installed with geolocation

Several component types are installed with Geolocation.

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The Geolocation plugin adds a field called Geolocation tracked to the User [sys_user] table. This field allows the system to track individual users by their geographical coordinates.

Business rules installed with geolocation

Business rules are added with activation of Geolocation.

Name	Table	Description
GeoLocation Data updated	User [sys_user]	Populates the **Latitude** and **Longitude** fields on the Geolocation History [geo_history] table when the **Latitude** and **Longitude** fields are updated on the User [sys_user] table.

Related topics

Installed with geolocation

Client scripts installed with geolocation

Client scripts are added with activation of Geolocation.

Name	Table	Description
Update Geolocation on Task	Task [task]	Populates the **Latitude** and **Longitude** fields on a user record with GPS coordinates when that user loads any record on the Task table or a table that extends Task. This occurs only when geolocation tracking is enabled for the user.

Related topics

Installed with geolocation

Properties installed with geolocation

Geolocation provides the following configurable properties in **Geolocation** > **Administration** > **Geolocation Properties**.

The Google Maps plugin provides additional map properties that are used to implement and control specific geolocation features. You must have a private key for Google Maps API for Business to take advantage of the properties listed here.

Properties

Name	Description
glide.geolocation.allow.toll.roads	Allow toll roads to be used. Allows the system to use toll roads when auto-routing or optimizing task routes for agents. • **Type**: True/false • **Default value**: True
glide.geolocation.default.start.time	Default start time for all agents when no schedule is set. This value sets the start time for a day other than the current day, when no scheduled task exists or is continued from the previous day. This property uses a 24 hour clock.

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Properties (continued)

Name	Description
	• **Type**: String • **Default value**: 08:00
glide.geolocation.evening.rush.hours	Evening rush hour span, formatted as 14:30-16:00. All times are expressed as a range, separated by a dash with no spaces. Times not using this format are ignored. This property must be used with the work.management.morning.rush.hours and work.management.rush.travel.buffer properties and uses a 24 hour clock. • **Type**: String • **Default value**: 0
glide.geolocation.history.cleanup	Number of days to keep history data. ServiceNow keeps agent geolocation history records for the number of days specified by this value. • **Type**: Integer • **Default value**: 30
glide.geolocation.morning.rush.hours	Morning rush hour span, formatted as 06:30-08:00. This property uses a 24 hour clock. All times are expressed as a range, separated by a dash with no spaces. Times not using this format are ignored. This property must be used with the work.management.evening.rush.hours and work.management.rush.travel.buffer properties. • **Type**: String • **Default value**: 0
glide.geolocation.proximity	Minimum distance an agent must move to be considered in a new location (in meters). This setting establishes a geolocation perimeter that prevents ServiceNow from creating unnecessary history records when an agent has multiple tasks in the same vicinity. An example of this might be when an agent has several tasks in one building. The system assumes that all task activity within the specified radius is part of a single record and does not create additional records when the agent moves from task to task around the building. • **Type**: Integer • **Default value**: 500

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Properties (continued)

Name	Description
	Note: The iOS version of the app updates geolocation only when the mobile device detects a significant location change, which is determined by the your device's operating system. When the operating system updates its location, your app updates with that location change. Distance and time property values are not honored for the iOS version of ServiceNow apps.
glide.geolocation.proximity.location	Maximum distance an agent can be from a specific location and still be placed at that location (in meters). This setting defines the maximum distance that an agent can be from a specified location and still be placed at that location by the system. • **Type**: Integer • **Default value**: 200
glide.geolocation.rush.travel.buffer	Percentage to add to all rush hour travel times. The system uses this percentage to calculate schedules when auto-routing an agent. Use this property when both morning and evening rush hour times are defined. An example of a valid time buffer percentage is 15. • **Type**: Integer • **Default value**: 0
glide.geolocation.tracking.frequency	Sets the length of the recurring interval, in seconds, that the system waits between attempts to update a user's geographic coordinates. The system updates geographic coordinates only for users who have geolocation tracking enabled. Minimum amount of time between updating the user's location (in seconds). This setting defines how long the system waits before updating an agent's location, regardless of task activity or travel. This prevents ServiceNow from creating unnecessary history records if an agent in one location views a task multiple times. • **Type**: Integer • **Default value**: 300 Note the following: • The Android version of the app updates geolocation data at 15 minute intervals. The app collects a user's location using the interval set in this property, but that data is still uploaded to your instance every 15 minutes.

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Properties (continued)

Name	Description
	• The iOS version of the app updates geolocation only when the mobile device detects a significant location change, which is determined by the your device's operating system. When the operating system updates it's location, your app updates with that location change. Distance and time property values are not honored for the iOS version of ServiceNow apps.
glide.geolocation.travel.buffer	Percentage to add to all travel times. An example of a valid percentage value is 15. • **Type**: Integer • **Default value**: 0
glide.geolocation.work.spacing	Amount of time (in minutes) to add between the end of a task and the travel start of the next. An example of a valid time value is 10. • **Type**: Integer • **Default value**: 0

Script includes installed with geolocation

Script includes are added with activation of Geolocation.

Name	Description
GeolocationAJAX	Utilities the system uses when making geolocation AJAX calls.
GeolocationUtils	Core utilities for geolocation functionality.

Related topics

Installed with geolocation

Geolocation Google key

Geolocation functions in the ServiceNow AI Platform® require a Google Maps API for Business license, or a Google Maps Javascript API Key, to enable use of Google Maps.

The auto-routing or auto-dispatch functions in Field Service Management require this license or Javascript API Key to calculate precise travel time estimates. Without these values, precise driving times cannot be calculated, and it uses rough estimates or fixed times instead.

In **System Properties** > **Google Maps**, enable the Geolocation feature using the appropriate entries from a Google Maps API for Business license, or a Google Maps Javascript API Key. To learn more, see Set up Google Maps API

Related topics

Geolocation

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Geolocation history

The Geolocation History [geo_history] table contains the history of each tracked user's location over time.

To view geolocation history, navigate to **Geolocation** > **Geolocation History**. The record list shows time stamped location data for all users configured for geolocation tracking.

The following system properties, located in **Geolocation** > **Administration** > **Geolocation Properties**, control the data that appears in this table.

- Minimum distance an agent must move to be considered in a new location (in meters): Perimeter that defines a single location in which multiple tasks are present. This property prevents the system from creating unnecessary history records when multiple tasks are in the same general location.

  Note:
  A user's geo_history will not be logged if the user remained at approximately the same location, even if this property is set to 0.

- Maximum distance an agent can be from a specific location and still be placed at that location (in meters): Distance that a user can be from a specified location and still be placed at that location when the system creates history data.
- Number of days to keep history data: Time period for which the system retains history data.
- Minimum amount of time between updating the user's location (in seconds): Time period the system waits before updating a user's location, regardless of how often the user accesses tasks.

Location tracking

Geolocation adds the **Geolocation tracked** field to the User form. In the default view of a user record, select the **Geolocation tracked** check box to enable location tracking for the user.

When a user has geolocation tracking enabled, the system updates the user's geographic coordinates whenever the user opens, or loads, a record from the Task [task] table or from a table that extends Task. After this initial update, the system continues to update the user's geographic coordinates at a recurring interval if the user does not close or reload the record. To edit the length of this interval, navigate to **Geolocation** > **Administration** > **Geolocation Properties** and change the setting for the property that regulates the update interval for the user's location. The default setting for this property is **300** seconds (5 minutes).

Note:

- The system can update geographic coordinates only for users who have location services enabled in their browsers. Even users who have the **Geolocation tracked** check box selected may be prompted by their browsers to share or withhold their location.
- A user's geo_history will not be logged if the user remained at approximately the same location, even if the Minimum distance an agent must move to be considered in a new location (in meters) property is set to 0.

Related topics

Geolocation

Service Catalog

Use the ServiceNow® Service Catalog application to create service catalogs that provide your customers with self-service opportunities. Customize portals where your customers can request

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catalog items such as service and product offerings. You can also standardize request fulfillment to ensure the accuracy and availability of the items in the catalogs.

Get started

Explore	Configure	Integrate
		
Learn about the Service Catalog concept, types of catalog items, Catalog Builder, and catalog items.	Configure Service Catalog. Learn about setup, categories, scoping, request fulfillment, and Service Catalog security.	Learn about the integration of Service Catalog with other applications, such as ServiceNow® Employee Center, ServiceNow® Service Portal, Now® Mobile, and ServiceNow® Virtual Agent.
Create a Service Catalog Wizard	**Set up catalog builder**	**Create or edit a catalog item template**
		
Learn about Service Catalog wizards that you can use when the input required is huge and complex. The wizard offers a step-by-step experience for the requester and also provides a side panel to provide contextual help.	Learn about setting up the catalog item building process.	Pre-specify values or provide restrictions for attributes such as catalogs, categories, variable types, and portal settings, which are applicable during the catalog item creation or editing process.

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Debug	Reference	
		
Debug user criteria of catalog items, UI customizations for Service Catalog pages, actions on catalog item variables, performance diagnostics of a catalog item, and so on.	Get details about components like fields and properties.	

Troubleshoot and get help

- Ask or answer questions in the Service Catalog community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support
- Developer training
- Developer documentation

Exploring Service Catalog

You can use Service Catalog to customize portals where your customers can request catalog items such as service and product offerings. You can also standardize request fulfillment to ensure the accuracy and availability of the items in the catalogs.

Service Catalog overview

You can set up one or more service catalogs and provide self-service opportunities. Organize your catalog offerings by using the ability to publish multiple catalogs targeted to specific audiences.

Service Catalog terms and roles

The Service Catalog application uses these roles to manage different aspects of the application.

Service Catalog terms

Execution Plans

Define how something gets delivered. For example, a PDA could go through procurement / activation / and installation of the desktop software.

Execution Plan Tasks

Plan Tasks represent a step in the Execution Plan, are associated with a Fulfillment Group, and have an approximate duration.

Fulfillment Groups

Fulfillment Groups work execution tasks. For example, one group can activate a cell phone while a different group installs the desktop software.

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Tickets

Tickets represent work done by Fulfillment Groups as part of an Execution Plan.

Administrator [admin]

Can manage all aspects of the Service Catalog application, including scripting functions such as creating UI macros or business rules.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Catalog administrator [catalog_admin]

Can manage the Service Catalog application, including catalogs, categories, and items, but not including scripting functions available to administrators.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Catalog manager [catalog_manager]

Can edit and update a service catalog, as well as the categories and catalog items within the catalog. The manager can assign editors and also a different manager for the service catalog. You can perform these actions only on catalogs for which you are assigned as the manager.

Contains Roles

List of roles contained within the role.

None.

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Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Catalog editor [catalog_editor]

Can edit and update a service catalog, as well as categories and catalog items within the catalog. The editor can assign other editors, but cannot change the catalog manager. You can perform these actions only on catalogs for which you are assigned as the editor.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Catalog builder editor [catalog_builder_editor]

Can create and maintain items in the catalog builder using the templates that the user has access to.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Types of catalog items

Service Catalog offers a few types of catalog items.

The basic Service Catalog item types include:

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- Record producers: giving alternative ways of adding information such as Incidents via the service catalog.
- Order guides: to group multiple catalog items in one request.
- Content Items: catalog items which provide information instead of goods or services.
- Standard catalog items

Record Producer

A record producer is a specific type of catalog item that allows end users to create task-based records, such as incident records, from the service catalog.

Use record producers to provide a better end-user experience instead of using the regular task-based form for creating records. The look and feel of a record producer is similar to that of a catalog item. But the record producer generates a task record such as incident, instead of a requested item.

You can create a record producer for tables and database views that are in the same scope as the record producer. You can also create a record producer for tables that allow create access from applications in other scopes.

Define a record producer in the service catalog or from the table record.

Note:

- Use a record producer to create task-based records only.
- To ensure that standard service catalog processes are followed, such as initiating workflows as expected, do not create requested item records from record producers. Instead, create requested item using catalog items.
- If the record producer script aborts the record generation, no record is generated in the Item Produced Record [sc_item_produced_record] table.

  Note:
  Do not call the update, setAbortAction method, or set the sys_class_name on current record to avoid unexpected behavior.

Create a record producer

You can create a record producer for tables and database views that are in the same scope as the record producer. Also for tables that allow create access from applications in other scopes.

Before you begin

Role required: catalog_admin or admin

About this task

An overview of record producers in the Service Catalog: what they are, and how to create them and define variables and templates for them.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Record Producers**.
2. Click **New** or select the record producer to edit.
3. Complete the Record Producer form.

   For more information about the fields and their descriptions on the Record Producer form, see Record Producer form.

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4. To add attachments such as information and instruction documentation to the catalog item, see Add an attachment .
5. Click **Submit**.

   After you submit the form, the **Variables**, **Variable Sets**, **Categories**, and **Catalogs** related lists become available.
6. Open the record again to define variables for the record producer.

Create record producers from tables

You can create Service Catalog record producers directly from a table record.

Before you begin

Role required: admin

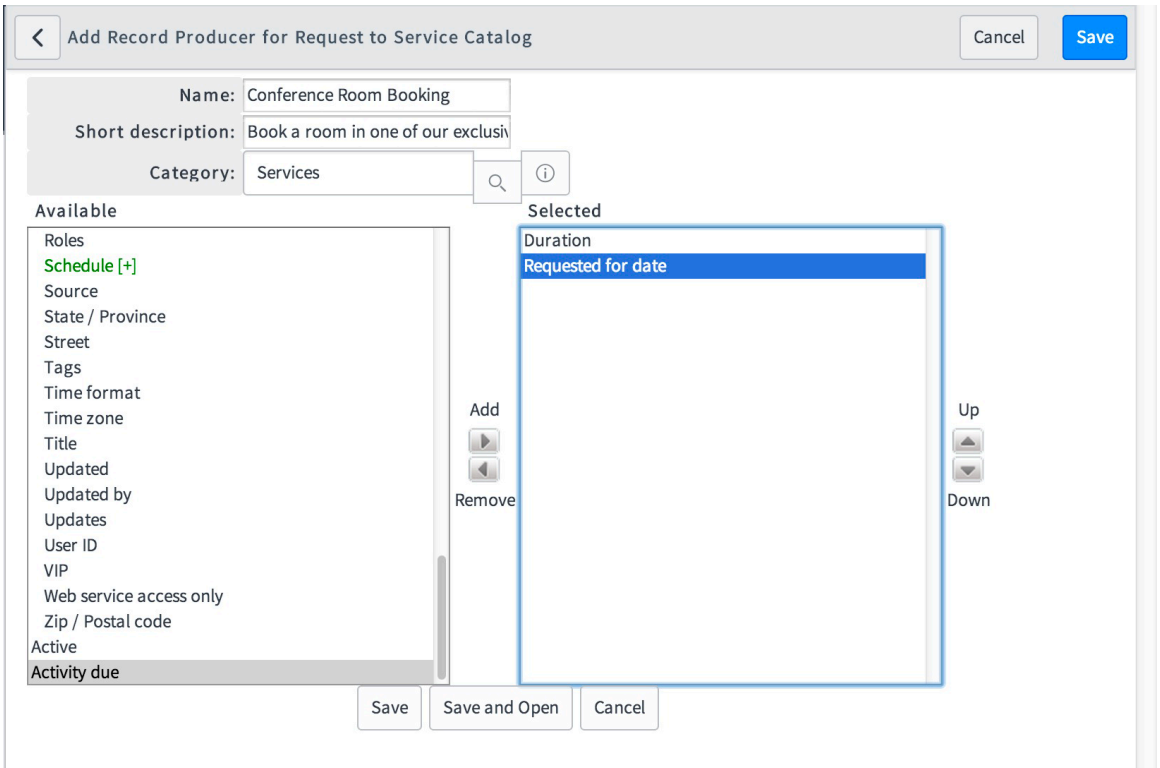
About this task

To create a record producer from a table record:

Procedure

1. Navigate to **All** > **System Definition** > **Tables** and open the table record.

   Note:
   When using a workflow with a Record producer, set the condition to Run the workflow.
2. Under **Related Links**, click **Add to Service Catalog**.
3. Complete the **Name**, **Short Description**, and **Category** fields as you would for service catalog items.
4. Use the list to select the fields and the order in which you want them to appear.
5. To use container variables, select **|- container start -|** and **|- container end -|**.



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6. Click **Save and Open** to open the record producer and define additional options. Alternatively, click **Save** to return to the table record.
   - A record producer is created with these values:
     - **Table name**: table record opened in step 1
     - **Name**, **Short Description**, and **Category**: information entered in step 3
   - A variable is created for each of the selected fields with these values:
     - **Name**: Column name of the field
     - **Type**: Variable type that corresponds to the field type
     - **Order**: Position selected in the slushbucket (for example, 100 for the first field and 200 for the second field)
     - **Question**: Column label of the field
   - If the field type is **Choice**, a corresponding question choice is created for each field choice.
   - The new record producer is added to the **Record Producers** related list on the table record.

Populate record producer data and redirect users

You can enter data for all records created by the record producer, and redirect an end user to a particular page after the record producer is submitted.

To enter data with a record producer, use any combination of the following methods:

- Create a variable on the record producer with the same name as the field in the target record. For example, a variable named caller_id on a **Create a New Incident** record producer populates the `caller_id` field on the new incident record. Use a variable type that corresponds to the field type.
- Define a template to assign a static field value for all records created by the record producer.
- Define a script that uses any variable or server-side objects and functions to assign values.
  - Use `current.*FIELD_NAME*` to reference fields on the record being created.
  - Use `producer.*VARIABLE_NAME*` to reference values entered by the end user.
  - Use RP.getParameterValue to return specified parameter values passed on the URL. The RP stands for Render Properties, not Record Producer.

Redirect after submitting a record producer

To redirect an end user to a particular page after the record producer is submitted, define the redirect link in the **Script** field using any of the following:

- `producer.redirect`: Enables the redirect behavior within the Platform UI.
- `producer.portal_redirect`: Enables the redirect behavior within Service Portal.

For example, the following code redirects users to their homepage after the record producer is submitted:

- Within the Platform UI:

```
producer.redirect="home.do";
```

- Within Service Portal:

```
producer.portal_redirect = "sp?id=sc_home"
```

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The following code gives the id of the record producer:

```
RP.getParameterValue('sysparm_id')
```

Order guides

Order guide submits a single service catalog request that generates several items.

For example, a New Employee Hire order guide can contain several items that new employees commonly need, such as business cards, computer, and cell phone. After selecting this order guide, the customer can then provide information about the new employee, including location and job title. The order guide then submits an order for catalog items like business cards, based on the details provided.

Order guides determine which catalog items to order by evaluating order guide rule conditions. Information the customer enters within the order guide can be passed as cascading variables to the ordered items, allowing common information to be reused across multiple items.

Administrators and catalog administrators can create order guides for the service catalog.

Order guides can be run automatically, generating a set of ordered items without needing to manually submit a service catalog request. For example, an onboarding workflow for a new employee can automatically run an order guide to order items for that employee. Order guides can also be configured to order the items of an order guide in a logical sequence. For example, you can configure your order guide to run the request for a new laptop before running the request for a new email.

Use the **Script** field in an order guide to add or remove catalog items to or from the order guide. Add catalog items to the order guide form by configuring the form layout.

- To add a catalog item that is not added to the order guide via a rule base, write the following code in the script field:

  ```
  guide.add("<sys_id_of_cat_item>")
  ```

- To remove a catalog item that is added to the order guide via a rule base, write the following code in the script field:

  ```
  guide.remove("<sys_id_of_cat_item>")
  ```

Create an order guide

You can create an order guide with a two-step or three-step ordering process.

Before you begin

Role required: catalog_admin or admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Order Guides**.
2. Click **New**.
3. Fill in the fields as appropriate.

   For more information about the fields and their descriptions on the Order guide form, see Order guide form.

4. Right-click the form header and click **Save**.
5. In the Rule base related list, define the rules that determine which items are included in an order.

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For more information, see Create a rule.

6. **Optional:** Configure the sequence in which the items in a rule base of an order guide must be fulfilled by selecting the **Generate sequence** button.

   (Optional) For more information, see Configure a sequence to fulfill items in order guides.

7. **Optional:** In the *Variables* related list, define any variables required.

Configure a sequence to fulfill items in order guides

Configure a sequence in Playbooks to fulfill items in order guides. Once you define a sequence, you don't have to manually check whether required items have been fulfilled before fulfilling their dependent items.

Before you begin

The Order Guide Sequential Fulfillment (com.glideapp.servicecatalog.order_guide_sequencing) plugin must be installed. Navigate to **System Plugin** and search for this plugin. The plugin form allows you to activate or repair the plugin.

The order guide must contain at least one item in the rule base.

Role required: admin or both catalog_admin and pd_admin

About this task

A sequence can be defined for an order guide so that all the items in the order guide do not move to the in-progress state immediately after order guide fulfillment is started. You can configure when an item must be fulfilled. The requested items will remain in the pending state until the time order guide fulfillment reaches the point where the requested item must be fulfilled. Any record generated through record producers will only be generated when order guide fulfillment reaches the point where the record is processed.

Sequence generated for order guides with only record producers as rule base items will not be considered.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Order Guides**.
2. Select the order guide for which you want to create a sequence in which the items must be fulfilled.
3. On the form, select the **Generate sequence** button in the top-right corner.
4. Enter a name for the sequencing process in the **Process name** field.
5. Select **Generate**.
   The Playbooks page is displayed on a new tab and items are added to **Lane 1** according to their sequence in the rule base.

   You can change the default name of the first lane, Lane 1, by selecting **Lane actions > Configure lane** and modifying the name.

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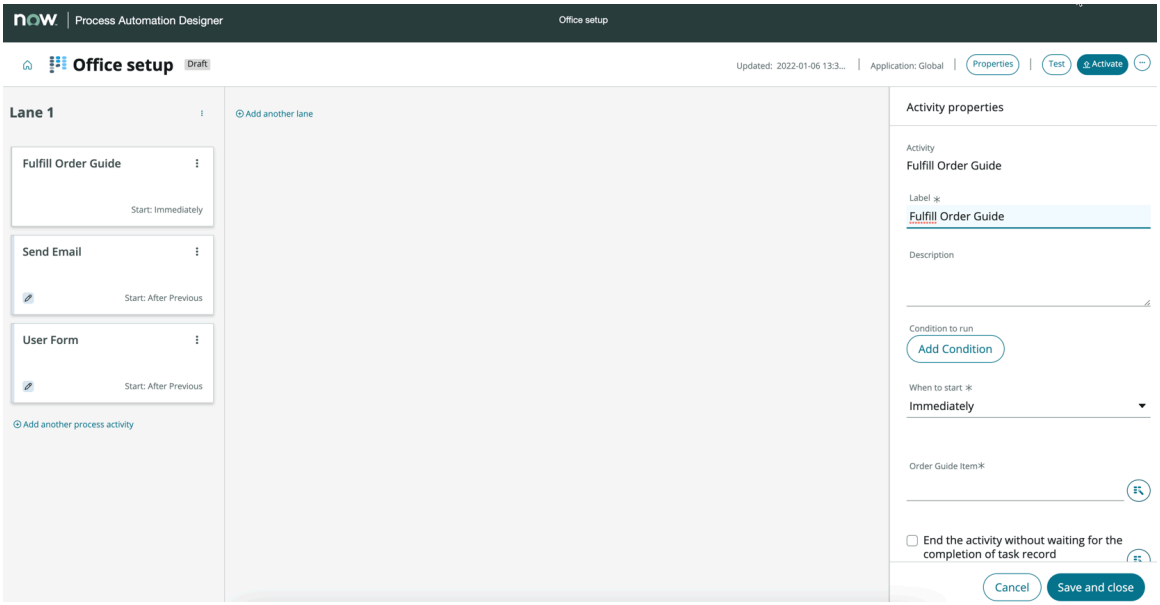

6. In the lane, select an activity card for the item you want to configure.
7. Configure the activity's properties.

Activity properties

Field	Description
Label	Name of the rule base in the sequence.
Description	Description of the activity.
When to start	Determines whether the activity must be run immediately, with the previous activity, or after the previous activity.
Order Guide Item	Item in the order guide for which the activity must be run.
End the activity without waiting for the completion of task record	Option to end the activity before completion of the task record. For example, you can select this option for an incident activity when you want to end the activity before the incident is closed so that the next activity can be started.

8. **Optional:** Add a condition for an activity that is configured to run after the previous activity by selecting **Add Condition**.
   The outputs (Generated Task Record, Record Id, Table) of the previous activity are available as options on which you can apply a condition. The Generated Task Record output is only available for catalog items and record producers whose target table is an extension of the Task table.
9. **Optional:** View the configured properties of the activity by selecting **View all properties**.
10. **Optional:** Add new items to the lane by selecting **Add another process activity** and then select an activity in the **Add activity** dialog box.

    (Optional) If an order guide contains more than 20 rule base items, only the first 20 items are added to the first lane. You can manually add the remaining ones to the sequence by selecting the **Fulfill Order Guide** activity in the **Add activity** dialog box. Items added via order guide script also needs to be added manually.

11. Select **Save and close**.

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Note:
If the same activity is added multiple times in a sequencing process, the activity runs only once when it occurs for the first time in the sequence.

12. **Optional:** Create a lane to group similar catalog items by selecting **Add another lane**.
13. **Optional:** Change the sequence of the activities by dragging the activity cards within or between the lanes.
14. **Optional:** Determine when the lane will run by selecting an option from the **When to start** drop-down menu.
15. **Optional:** View the properties of the configured sequence by selecting the **Properties** button in the top-right corner.
16. Publish the sequencing process by selecting **Activate**.

Watch this six-minute video to understand how to configure a sequence to fulfill items in order guides. Configure a sequence to fulfill items in order guides

Related topics

Process Automation Designer

Request an order guide

Once created, order guides present the customer with a three-step ordering process by default.

Before you begin
Role required: admin

Procedure

1. *Describe Needs*: Enter information as prompted.
   Order guide rules evaluate this information to determine which catalog items to order.
2. *Choose Options*: Select configuration options for the ordered items and provide any additional information needed, including attachments.
3. *Check Out*: Review and edit item information, then click **Submit Order** to place the request.
   If the requested item was ordered as part of an order guide, the **Order Guide** field on the Requested Item form shows the order guide name.

Note:
The *Check Out* step can be omitted from an order guide to provide a quicker two-step process. To omit this third step, select the **Two step** check box when creating the order guide.

Review an order guide example

Consider a scenario where you have a New Employee Hire order guide that provides services and items as part of the onboarding process.

Before you begin
Role required: admin

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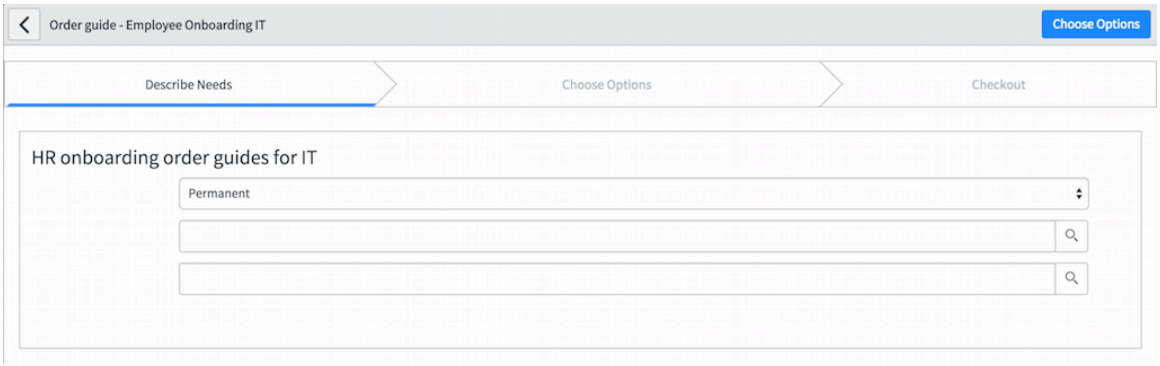
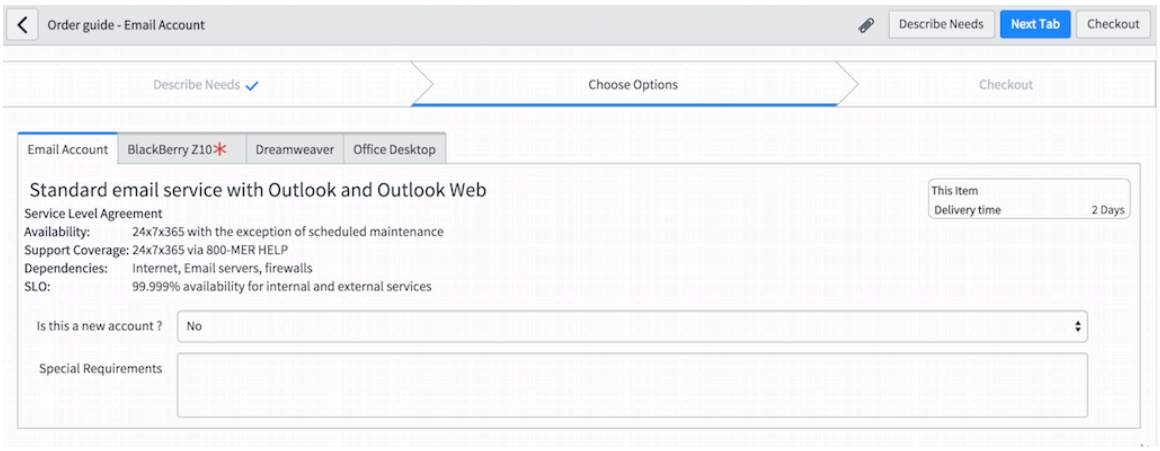
About this task

Procedure

1. *Describe Needs*: The order guide prompts the end user for information.



2. *Choose Options*: The order guide uses the information entered and predefined rules to generate options.



The end user selects configuration options for the ordered items, and provides any additional information needed.

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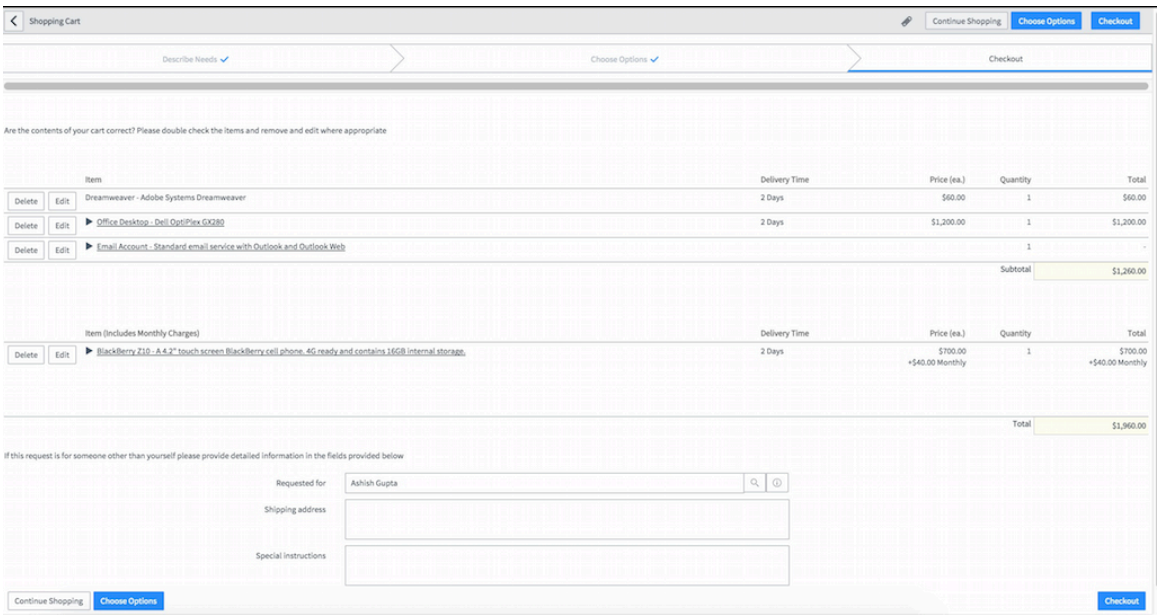
3. *Check Out*: The end-user reviews and edits item information, then click **Submit Order** to place the request.



Create an order guide rule to add a catalog item

You can add a catalog item to an order guide using specific rules.

Before you begin

Role required: admin

About this task

Order guide rules define conditions that must be met for a specific item to be included in an order. For example, a New Employee Hire order guide rule can state that if the new employee job title is CTO or Director, and the department is IT, then add an executive desktop item to the order.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Order Guides**.
2. Open an order guide.
3. In the **Rule base** related list, click **New**.
4. On the form, fill in the fields.

Rule guide

Field	Description
Guide	The order guide to which the created rules are applied.
At this position	Tab positions are numbered in order from left to right, with the lowest number appearing at the left of the screen.
Application	Name of the application that is being used.
If this condition is true	Conditions that must be true for this rule to apply. Create conditions using the condition builder . Conditions can be evaluated against *Keywords*, *Requested By*, *Requested For*, or any variables defined for that order guide.
Include this item	Item to include in the order if all conditions defined in *If this condition is true* are matched.

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Field	Description
	Note: You can also include record producers in the order guide.
Ignore Mandatory Evaluation	Option to allow customers to proceed without completing mandatory fields for the Describe Needs and Choose Options screens. The mandatory status of a field is determined by the variable defining that field. If mandatory fields are not enforced, then relevant information is not passed on to the ordered items. For example, in a New Employee Hire order guide, if the address is not provided then this information is not included in business cards ordered.
Use cart layout	Option to use the cart layout that has been configured.
Show quantity	Option to display the ordered quantity of a catalog item in the Choose Options section when a customer requests for an order guide through the Service Portal or Now Mobile app. **Note:** If the **Hide Quantity** portal setting is selected while creating or editing a catalog item, the ordered quantity is displayed in the Summary section but not in the Choose Options section.
Quantity	Option to select the default quantity of a catalog item for the order guide. When quantity is shown, this value can be modified during checkout.

5. Click **Submit**.

Create an order guide variable

You can create variables within an order guide.

To create or edit order guide variables, open an order guide, then select an entry from the **Variables** related list.

Service catalog variables within order guides define the questions and potential answers presented to the customer while ordering. This information is used by order guide rules. Variables can also be cascaded, which passes the variable values along to individual ordered items.

Pricing is not supported for an order guide variable, even when you define the pricing for the variable though a variable set, and associate the variable set to the order guide.

Create an item variable assignment

Create an item variable assignment that enables the catalog admin set up a default value mechanism in the order guide context so that the user can focus only on required values.

Before you begin

Role required: admin

About this task

For example, you can set the default storage of an iPhone to 64 GB for Sales, and to 16 kB for Development. This setting is configured in the new hire order guide by using mutually exclusive rules and setting the storage variable accordingly for Sales and Development.

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The value for an item variable is determined in the following order:

1. Item variable assignment
2. Cascading value (if no item variable assignment exists)
3. Default value defined in the variable definition (if no cascading value or item variable assignment exists)

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Order Guides**.
2. Open an order guide.
3. Open a rule.
4. In the **Item Variable Assignments** related list, click **New**.
5. On the form, fill in the fields.

Item Variable Assignment form

Field	Description
Item Variable	Name of the Item variable. Select an item variable from the list or create one.
Active	Check box to make the record active.
Assignment Type	Name of the assignment type. Select either Order Guide Variable or Value. When Order Guide Variable is selected, the **Order Guide Variable** field is enabled.
Order Guide Variable	Name of the order guide variable. Select an order guide variable from the list or create one. (This field is only visible if **Assignment Type** is Order Guide Variable.)

6. Click **Submit**.

What to do next

Set an item variable value to match an order guide variable value, or an order guide default value, using an item variable assignment.

Cascade an order guide variable

Cascading enables values entered for variables in the initial order form to be passed to the equivalent variables in the ordered catalog items.

Cascading allows values entered for variables in the initial order form to be passed to the equivalent variables in the ordered catalog items. For example, a variable on the initial order form prompts the customer to enter a delivery location value. If you enable cascading, the value for this variable then populates delivery location fields on each of the ordered items.

To enable cascading, select the **Cascade variables** check box when creating the order guide. Then, create variables on the catalog items that match the names of the corresponding variables in the order guide. When a customer places an order, the variables on the ordered items inherit the values of the identically named variables in the order guide.

Use a variable set

You can use a variable set with an order guide.

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Before you begin
Role required: admin

About this task
Cascading variables require that the same variable be on both the order guide and the ordered items. It can be useful to define each variable once in a variable set, then assign the variable set to both the order guide and the individual catalog item. This approach avoids duplication and ensures that the variable is the same in both locations.

To use a variable set with an order guide:

Procedure
1. Create the variable set.
2. In the Variable Set form, create each variable.
3. Add the variable set to the order guide and to each catalog item involved.

> **Note:**
> The individual variables in a variable set do not appear in the Order guide or Catalog Item forms. To view the variables in a variable set, open the variable set record.

Hide cascaded variables

You can hide the duplicated variables on the **Choose Options** screens to keep your screen clean.

When cascading variables, you can hide the duplicated variables on the Choose Options screens, making these screens simpler.

To hide duplicate variables on all screens after the initial Describe Needs screen in the Service Catalog Platform UI, run an *onLoad catalog client* script.

```
function onLoad(){
  var item = g_form.getControl("current_item");
  var guide = g_form.getControl("sysparm_guide");

  if (item == null && guide == null )
  return;

  if(item != null && guide != null && item.value == guide.value)
    return;
  g_form.setDisplay('YOUR_VARIABLE_NAME',false);
}
```

To hide duplicate variables on all screens after the initial Describe Needs screen in Service Portal, use the *isOrderGuide()* method.

```
if(g_service_catalog.isOrderGuide())
  g_form.setDisplay('variable_name', false);
```

Avoid enforcement of a mandatory field

You can avoid enforcing a mandatory field within tabs.

Before you begin
Role required: admin

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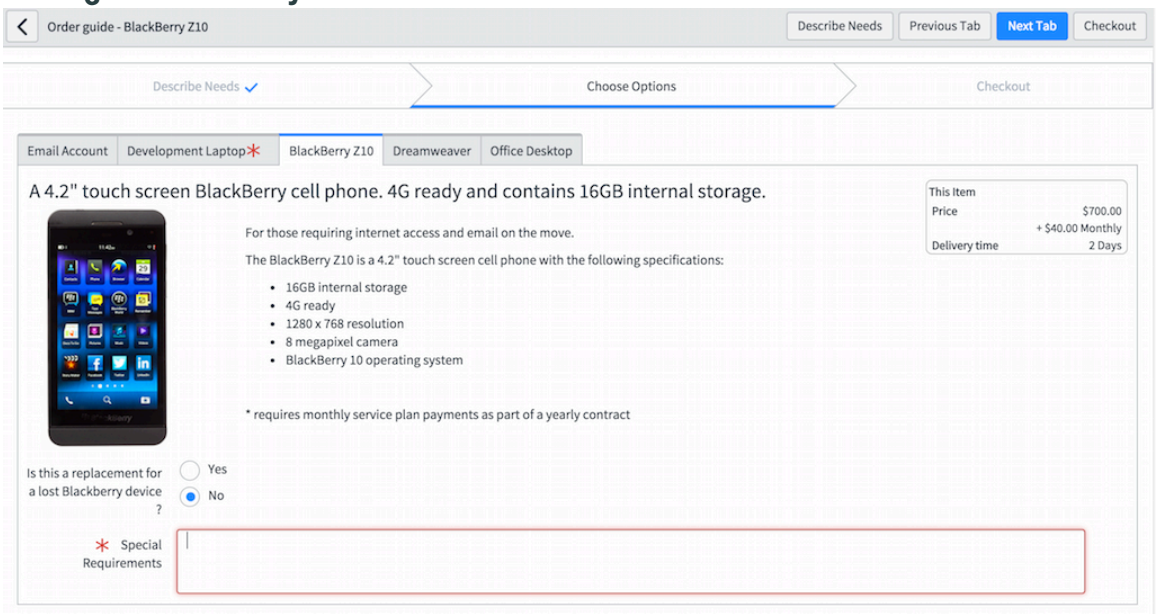
About this task

By default, mandatory fields must be filled in before switching tabs in the **Choose Options** section of order guides.

Order guide mandatory fields



In this example, if the customer attempts to select another tab without filling in the *Street Address* field, a warning prompt appears. The customer cannot switch tabs without entering this information.

To avoid this enforcement in all order guides:

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. Locate the property *Validate mandatory fields when switching tabs in 'Choose Options' section of Order Guides* (`glide.sc.guide.tab.validate`).
3. Clear the *Yes* check box.

   If you make this change, mandatory fields are still mandatory, but the customer can switch between tabs before filling in the mandatory fields. Enforcement is then checked when the customer chooses to proceed to the next step.

   To avoid enforcement of mandatory fields altogether, use the *Ignore Mandatory Evaluation* check box within the relevant order guide rule.

Run order guides automatically

You can run an order guide automatically from within a workflow or a server script, passing parameters to that order guide to define variable values.

Automatically generate a set of ordered items as part of a wider process, without needing to manually submit a service catalog request and reenter existing information.

For example, you can run an order guide to fulfill HR onboarding requests, passing parameters such as the new employee's position and department. The order guide then generates a set of requested items such as laptop and email account, based on those parameters.

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Related topics

Service Catalog API

Define a content item

A content item is a service catalog item that provides information instead of goods or services.

Before you begin

Role required: admin

About this task

Content items can reference knowledge articles, static blocks of text, or external web-based content.

To define content items:

Procedure

1. Navigate to **All** > **Service Catalog > Catalog Definition > Content Items**.
2. Click **New**.
3. Fill in the form to define the item.

Content Item form

Field	Description
Name, Category, Icon, Roles, Active,	As for standard catalog items.
Content type	The type of information to display when a user selects the item. ○ **KB Article**: a ServiceNow knowledge article available to users with the specified roles. ○ **Catalog Content**: a static block of text, formatted with HTML. ○ **External Content**: documents or web pages stored outside the base system instance.
Target	Location where the content appears. ○ **Within Catalog**: displays the content within the catalog iframe window (which may not render some external websites properly). ○ **New Window/Tab**: displays the content in a new browser window or tab. Choose this option if the content does not display properly within the catalog.
URL	The full URL (including the prefix http:// or https://) for external content to display when a user selects the item. This field is available only if the **Content type** is **External Content**. **Note:** Since base system instances are accessed via HTTPS, links to HTTP sites could result in a mixed mode content error or warning, depending on browser security settings.
KB article	The knowledge article to display when a user selects the item. This field is available only if the **Content type** is **KB Article**.

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Field	Description
Short description, Description, Picture	As for standard catalog items. These fields are only available if the **Content type** is **Catalog Content**.
Meta	Comma-separated list of tags used to search for the content item. See Configure keyword search for catalog items.
Hide on Service Portal	If selected, the content item is not available on Service Portal.

4. Click **Submit**.

Configure a default width for service catalog variables

Configure the default width for variables on a catalog item page to specify what percentage of the screen size that it can span.

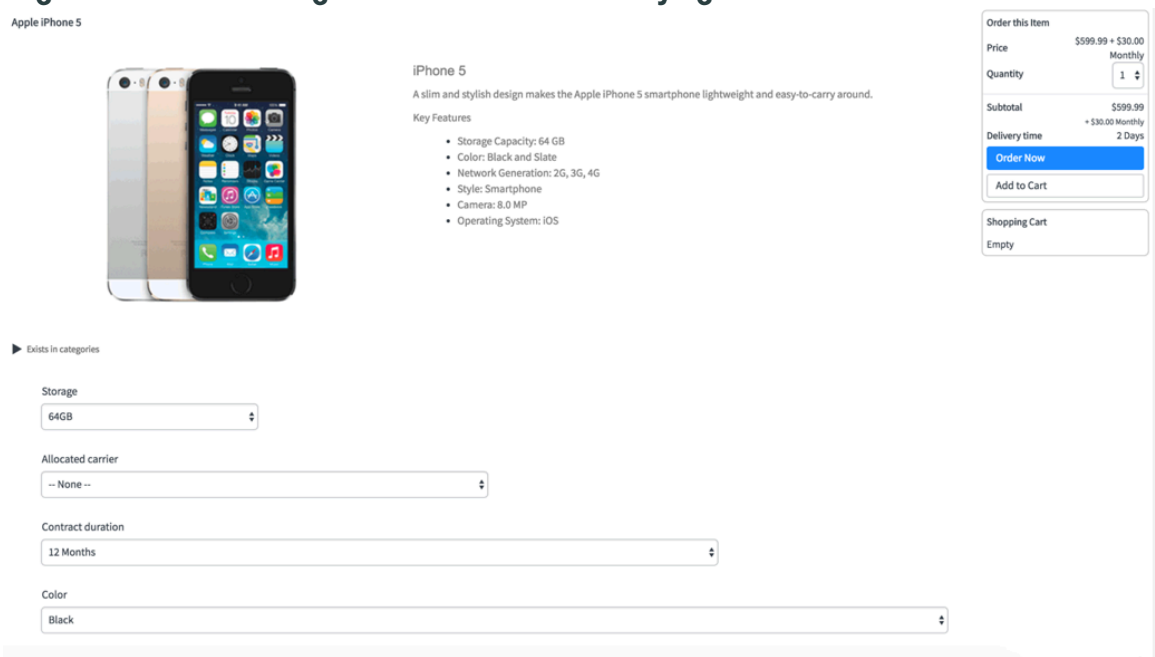
Before you begin

Role required: admin

About this task

The following figure shows how the variables for the different Apple iPhone 5 options are set to different widths.

Page for iPhone 5 catalog item with variables of varying widths



A default width size cannot be set or does not apply to the following variables:

- The break, container end, container split, container start, and label variables.
- Any variable placed in a container with two-column layout.
- A variable set with a two-column layout.
- Any variable that is created with a custom width set in the **Variable width** field on the Variable form. For details, see Create a service catalog variable. The custom width for the variable overrides the default width set for the variable type.

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Note:
Custom variable widths are not supported in either Mobile or Service Portal.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Variables** > **Variable Default Size**.
2. For each variable type, select a default width.

Option	Description
25%	Configures the variable to span 25% of the available screen size.
50%	Configures the variable to span 50% of the available screen size. By default, some vari ables require a minimum of 50% width.
75%	Configures the variable to span 75% of the available screen size.
100%	Configures the variable to span 100% of the available screen size.

3. Click **Save**.

Define a regular expression for a variable

Define a regular expression (regex) to validate a variable value.

Before you begin
Role required: catalog_admin or admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Variables** > **Variable Validation Regex**.
2. Click **New**.
3. On the form, fill the fields.

Field	Description
Name	Name of the regular expression.
Validation message	Message that appears when the validation fails.
Active	Specifies if the regex is active.
Regular Expression	Sequence of characters that define the format of the variable value. For example: ○ Invalid Regex: /(((ftp|http|https):\/\/)|(www\.))([-\w\.\/#$\?=+@&%_:;]+)/i ○ Valid Regex: (((ftp\|http\|https):\/\/)\|(www\.))([-\w\.\/#$\?=+@&%_:;]+)

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Field	Description
	Note: ○ Ensure that the regex does not cause catastrophic backtracking. ○ You should not use embedded flag expressions. ○ Use the **Regex Flag** list for the ignore case.
Regex Flag	Character set that is considered while validating the regular expression. ○ None: No regex flags are applied. ○ Case Insensitive: Enables case insensitive matching. Case insensitive matching assumes that only characters in the US-ASCII charset are being matched. Unicode-aware case-insensitive matching can be enabled by selecting **Both** as the regex flag. ○ Unicode Case: (Reserved for future use) Same behavior as **None**. ○ Both: Case insensitive matching is done in a manner consistent with the Unicode Standard.

4. Click **Submit**.

Related topics

Create a service catalog variable

Pass variables between tasks

Pass variables from one step of the fulfillment process to another.

Before you begin
Role required: admin

About this task
Variables can be processed by any workflow or execution plan that is associated with the requested items.

Note:
To pass a variable between tasks, select the **Global** check box when you create a Service Catalog variable.

For example, consider the following tasks within the fulfillment process for a New PC catalog item.

Procedure

1. Procure a PC.
2. Install corporate standard software.
3. Set up email account.
4. Deliver and set up PC for requester.
   Step 4 may require a piece of information from step 3 (the email account credentials for setting up email on the PC). If steps 3 and 4 are executed by different fulfillment groups, you can use variables to make this information visible in the tasks for steps 3 and 4. You can then pass the information between groups so that the second group can access the email account credentials.

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Create or edit a catalog item

Define individual catalog items using Service Catalog. You can create, edit, and copy catalog items.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Click **New**.
3. On the Catalog Item form, fill in the fields.

   For more information about the fields and their descriptions on the Catalog Item form, see Catalog Item form.
4. Click **Submit**.

What to do next

- Assign the item to additional catalogs and categories, if required.
- Define variables for the item, if applicable.
- To add attachments such as information and instruction documentation to the catalog item, see Add an attachment.

Here are some additional topics that might help.

- Create a service catalog variable
- Apply user criteria to items
- Set a recurring price

Edit a catalog item

Catalog administrators can edit an item from the service catalog listing. Catalog managers and catalog editors can also edit an item if they are assigned to the item.

Before you begin
Role required: admin

About this task
To edit a catalog item from the service catalog listing:

Procedure

Right-click the header and select one of the following options:

- **Configure Variables**: Add or remove variables from an item.
- **New Variable**: Create a new variable for the item.
- **Configure Item**: Edit the item definition.
- **Configure Client Scripts**: Edit the catalog client scripts for the item.
- **Configure UI Policies**: Edit the catalog UI policies for the item.

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Copy a catalog item

Copy an item to create a full duplicate of the item, including the item details, attachments, variables, client scripts, and approvals.

Before you begin
Role required: admin

About this task
Copying can be more useful than using the Insert function because the function only copies the item details.

Procedure

1. Open a catalog item form.
2. Use the **Copy** button to create a new copy of a catalog item, named **Copy of [item name]**.

Note:

- If you copy an active catalog item, the copy is also active. Consider deactivating the copy by clearing the **Active** check box until your changes are complete.
- When you specify a table in the **Relationship tables which should be part of the Copy Item Action. Table names should be comma separated** property in the **Service Catalog** > **Catalog Administration** > **Properties** page, the table records that have a reference to a catalog item are also copied. It is applicable only when you copy the catalog item using the **Copy** UI action. Table names should be comma-separated without any spaces.

Add a catalog item

Service catalog enables you to add a catalog item to multiple catalogs and categories.

Before you begin
Role required: admin

About this task
A catalog item may be available in more than one catalog and category. For example, a laptop carrying case can be available from both Laptops and Cases and Accessories categories. Within an item:

- The Catalogs related list defines the catalogs where the item is available.
- The Categories related list defines the categories where the item is available.

Procedure

To assign an item to another category or catalog, enter the new details in the appropriate related list.

Note:
The values in these lists override the values of the **Catalogs** and **Category** fields in the catalog item form. If you change values for either related list, these changes automatically update the values in those fields.

Share catalog items across catalogs

You can share a catalog item, enabling users to order that item from different catalogs. For example, you can share a Password Reset item across catalogs serving different teams.

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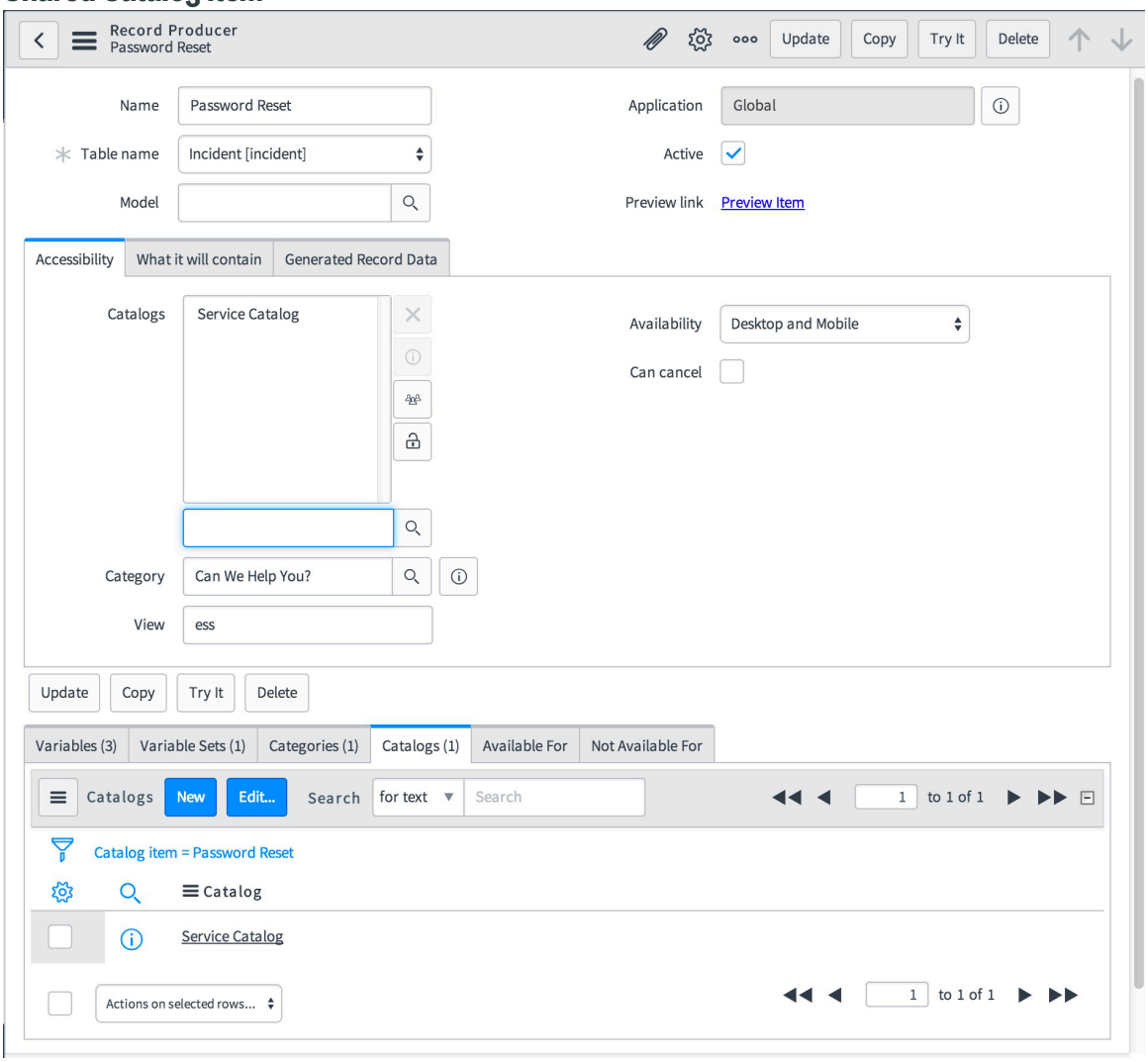
Before you begin
Role required: admin

About this task
To share a catalog item across several catalogs:

Procedure
1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**
2. Open the item to share.
3. Select the additional catalogs for that item in the **Catalogs** field.

Shared Catalog Item



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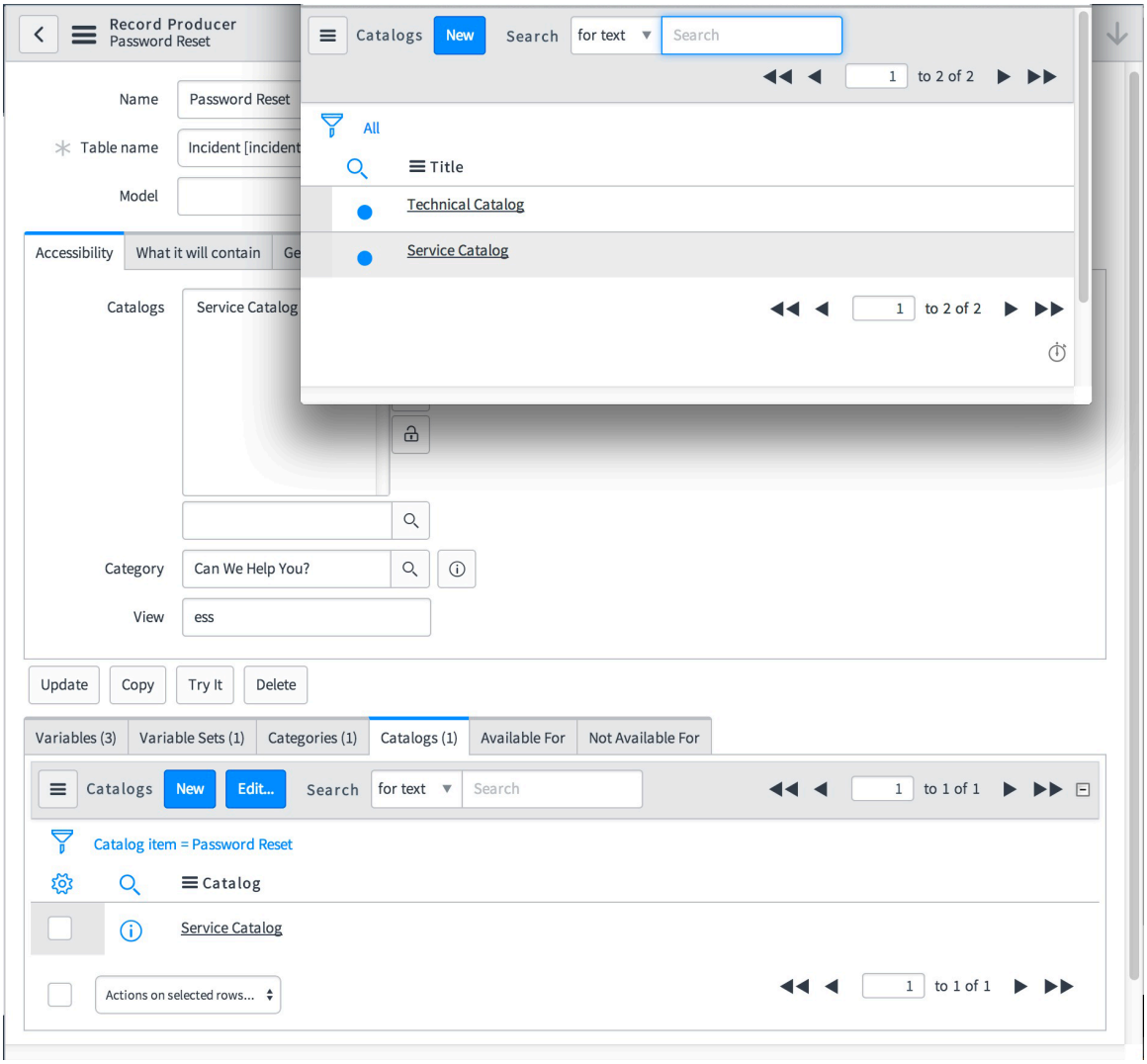

4. Select **Update**.

   The shared item then appears in the Catalog Items related list for each catalog selected.

Service Catalog for managers and end users

Every user with a login can view and order items from the Service Catalog from departments within your organization. These catalog items can include goods, services, and information.

Anything that can be ordered individually can be ordered as a catalog item. Anything that only exists as a part of a larger whole cannot be a catalog item. For example, a laptop can be a catalog item, but a high-resolution display for a laptop cannot.

After placing an order, its progress can be tracked by the requester. Fulfillment groups complete a predefined series of tasks in a fulfillment process that includes required approvals.

Managers can review record history and run reports to improve the service catalog process. For example, the manager can see most commonly ordered items, or those that are on backorder.

Service Catalog home page

The home page for a service catalog lists the goods and services available to order from that catalog.

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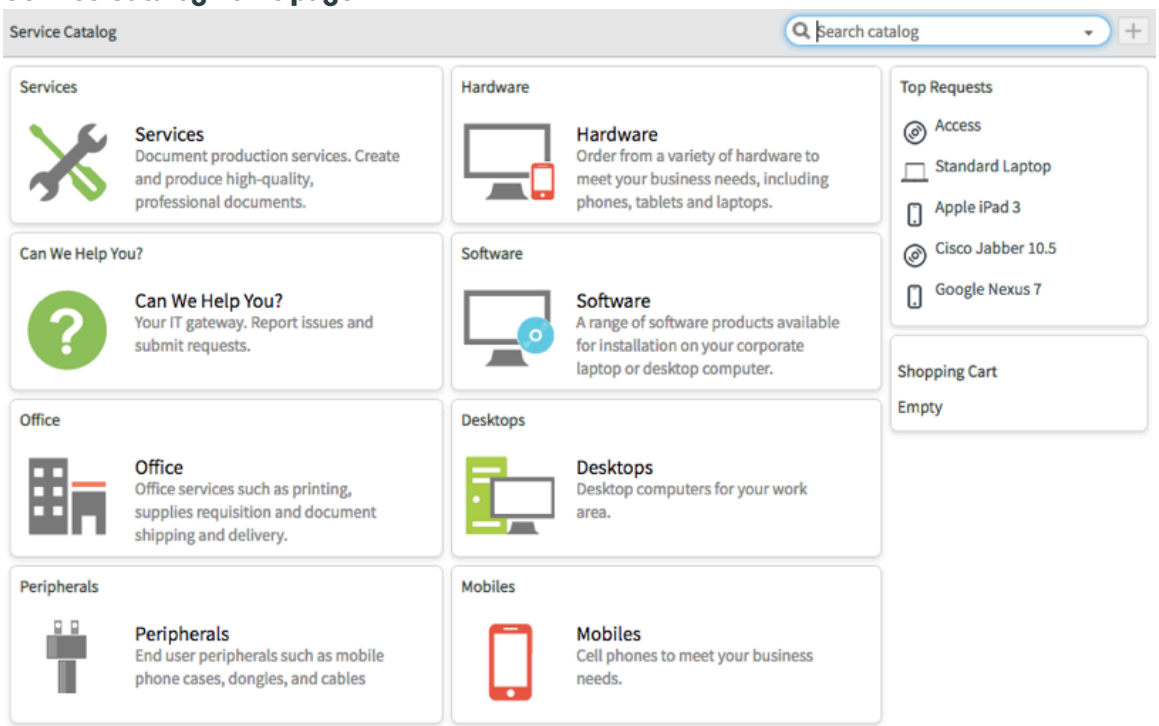
Catalog items are grouped into categories, which can also contain one or more subcategories. By default, the first 10 items in a category appear under the category name on the service catalog home page.

To access the default service catalog home page, navigate to **Self-Service** > **Service Catalog**.

Service Catalog home page



Click a category name to see a list of all subcategories and items in the category.

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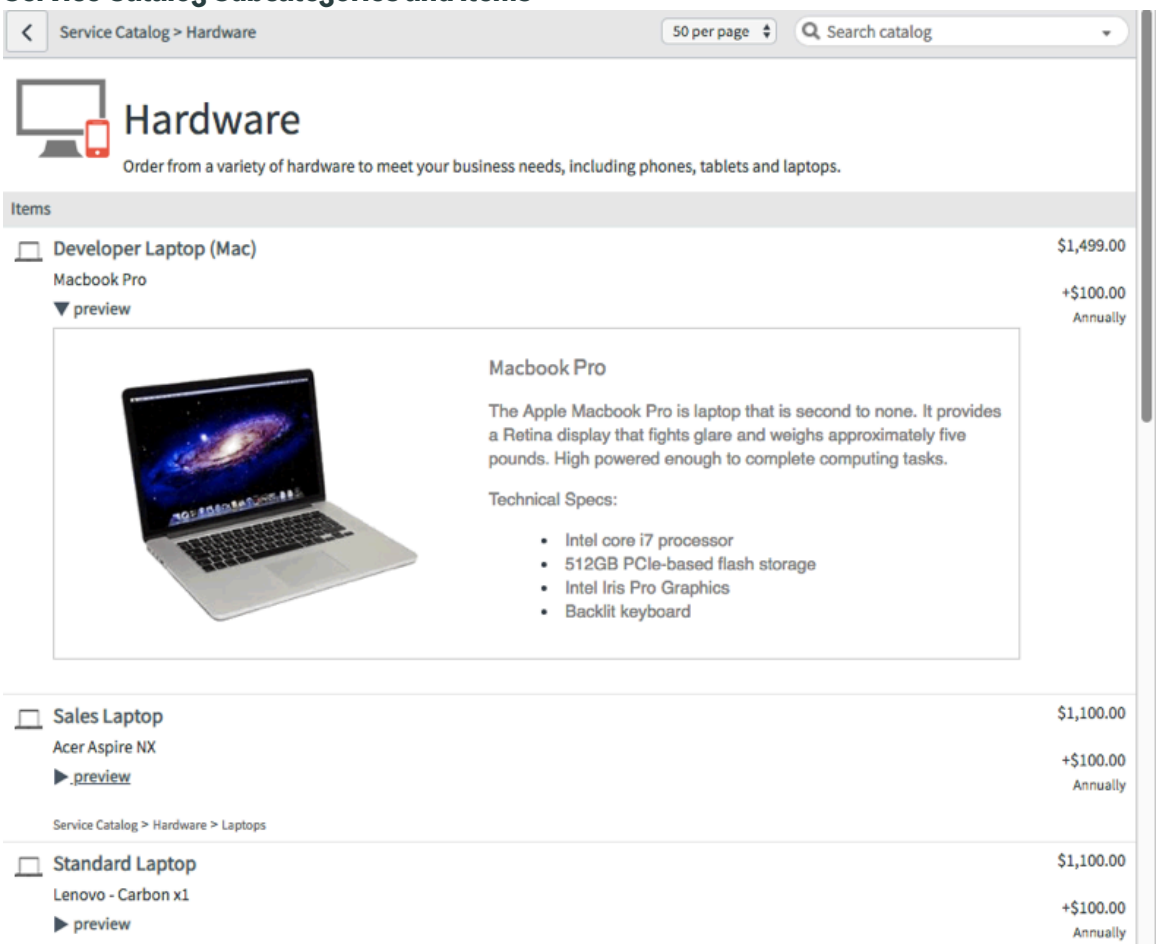
Service Catalog Subcategories and Items



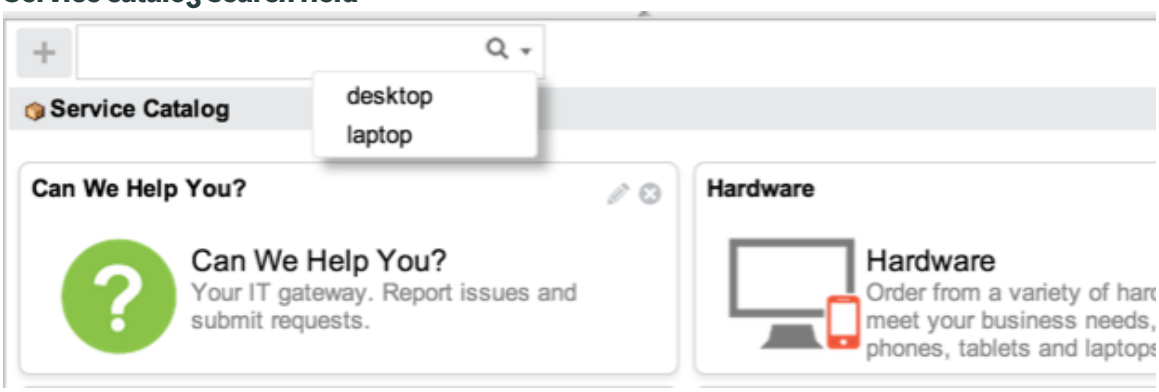
Searching a service catalog

If your organization has multiple service catalogs, you can search for the required catalogs using the **Search** field. The search results list items in active categories along with their short description.

Note:
If your organization has multiple service catalogs, searches return results only from the currently viewed catalog.

To find a specific item in a catalog, use the **Search** field. Click the down arrow to see a list of previous searches. Catalog search is available on catalog and category pages.

Service catalog search field



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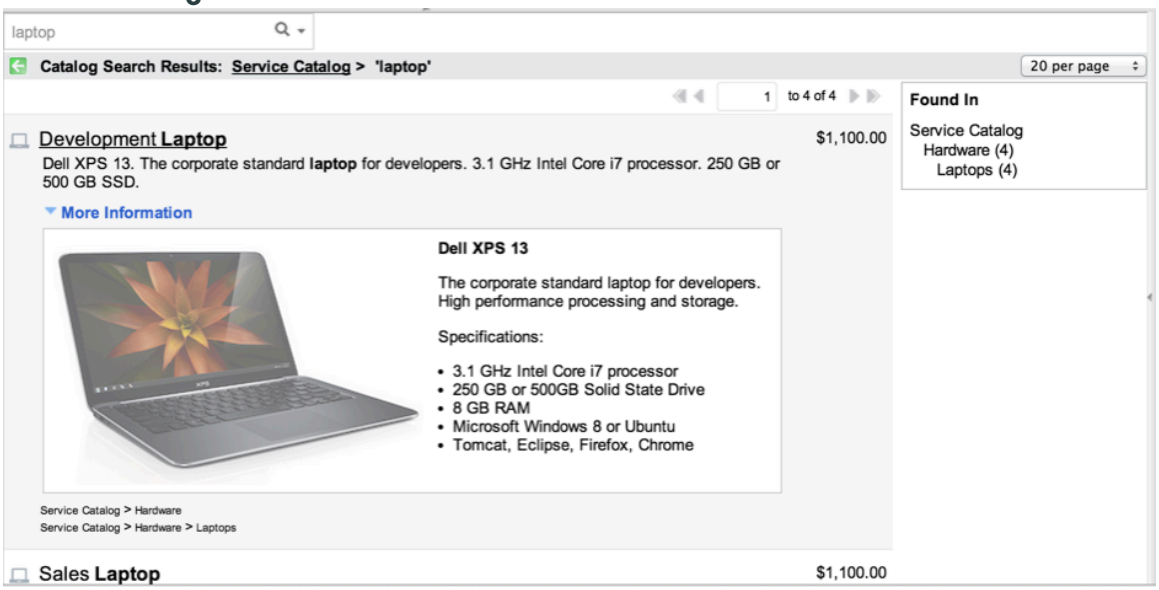
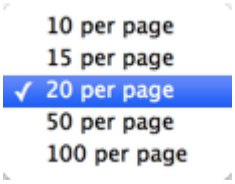
Search results list items in active categories along with their short description. Use the breadcrumbs in the header bar or below the short description to quickly navigate to a different page. The **Found In** list shows the categories related to the search results in hierarchical format.

Service catalog search results



You can control the number of results shown on one page with the search results selection list.

Search results selection list



In the catalog listing, click a link in the breadcrumbs at the top of the screen to quickly navigate back one or more levels in the hierarchy.

To remove the search term from the breadcrumbs, click the **x** next to the term.

If a search returns multiple results, obtain details about a specific catalog item by clicking **Preview**.

Note:
The system performs the type-ahead search based on keywords only.

Related topics

Service Catalog for managers and end users

Service Catalog request screens

To place a request from a service catalog, navigate to the catalog home page and select the item to order.

When an item is ordered, the base system generates a request to track the order and displays a summary that includes the order status in the **Stage** column:

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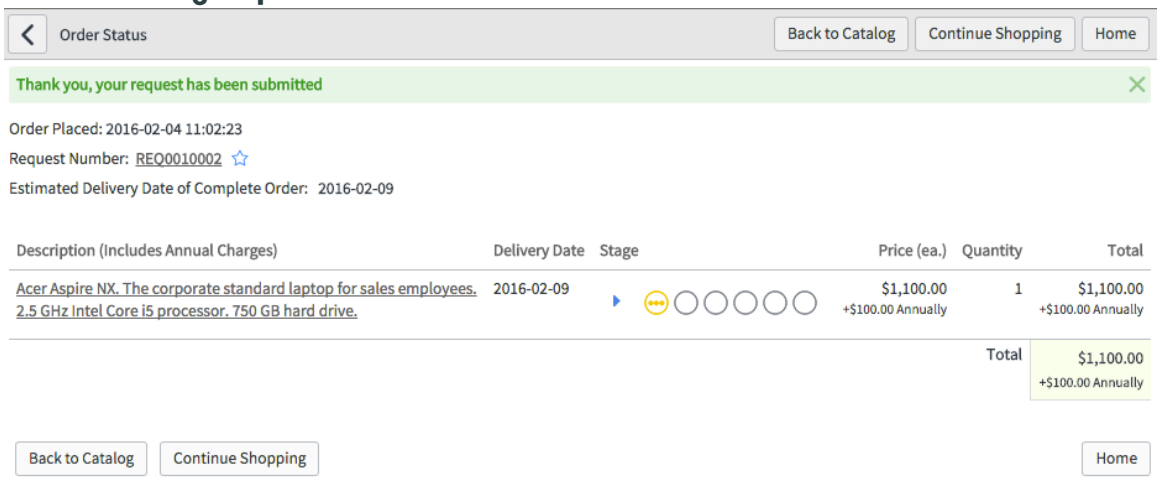
Service Catalog Request Status



Each individual catalog item in a request creates a discrete request item. For example, a request for 2 PCs, 1 chair, and 1 desk would produce four request items on a single request.

Shopping cart screens

The shopping cart screen displays previews of the cart immediately before an order is placed.

You can configure the layout for either the one-step or two-step catalog checkout process.

Order status screens

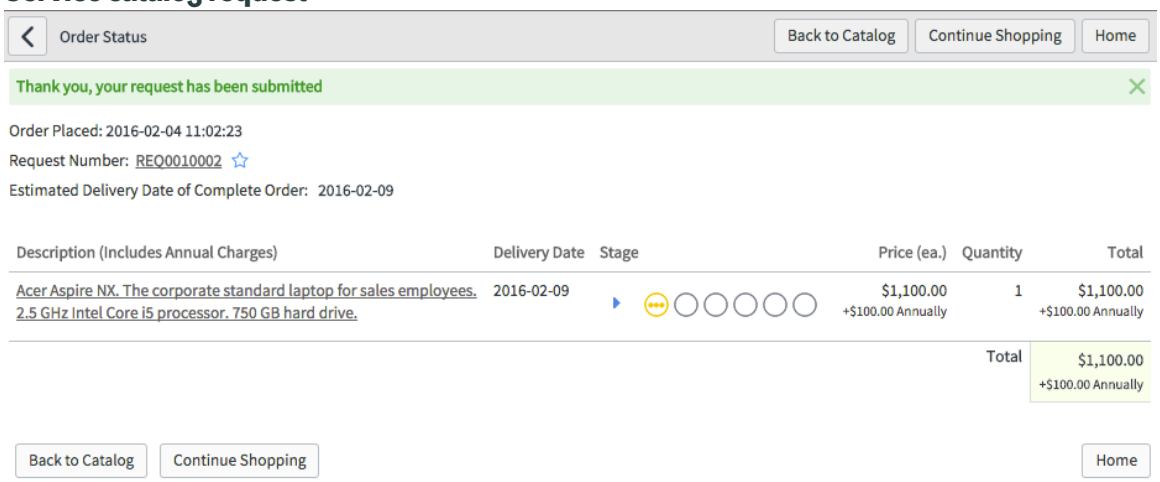
The order status screen is the final summary screen a user sees in the service catalog after placing an order successfully.

Request generation for a Service Catalog item

When a customer orders something from the catalog, a request is generated to track the order.

The user specified in the **Opened By** field of a Requested Item (sc_req_item) record has read access to it.

Service catalog request



Each individual catalog item that is part of a request creates a discrete request item with the request.

For example, a request for 2 PCs, 1 Chair, and 1 Desk would produce:

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- Request REQ0000001 -- 4 Things
  - Requested item RITM0000001 -- 2 X PC
  - Requested item RITM0000002 -- 1 X Chair
  - Requested item RITM0000003 -- 1 X Desk

After a service catalog request is submitted, a fulfiller may determine that the item is not in stock. The full filler can select the **Backordered** check box, and enter comments about when the item may be back in stock. The backorder status can be used in reports and dashboards.

If a service catalog request is canceled, all associated purchase orders and transfer orders that have not been received are canceled.

Related topics

Service Catalog home page

Clone a request

You can clone a request for up to 10 users on the notification list.

Before you begin

Your admin must enable cloning of requests before you can clone a request. For more information, see Clone requests.

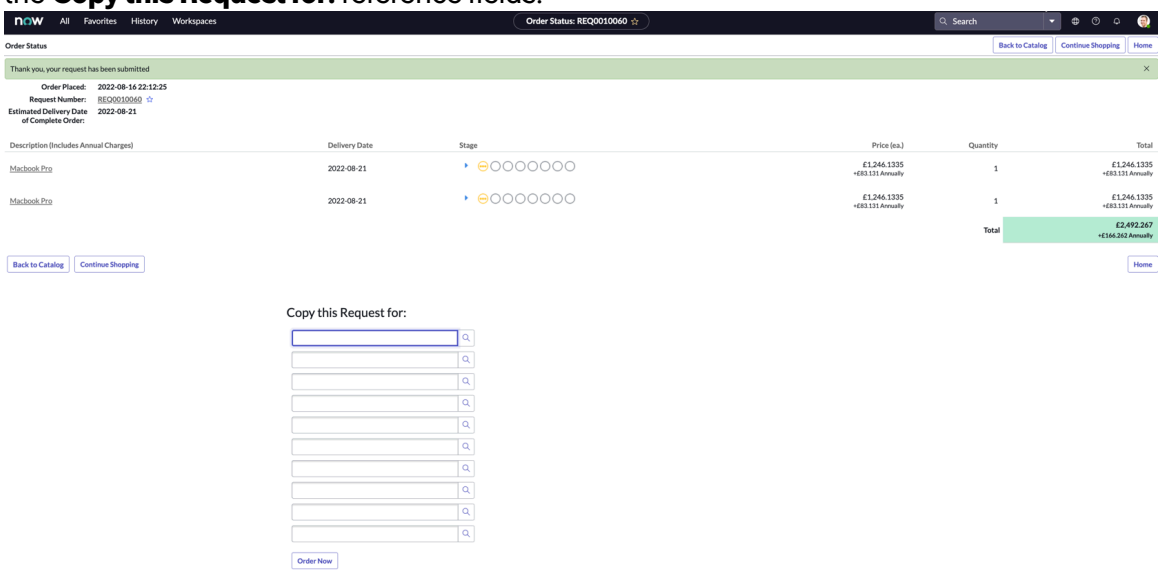
Role required: admin

About this task

When you clone a request that contains a multi-row variable set, the information that is specified in the multi-row variable set is available in all cloned requests. All UI policies and client scripts on the multi-row variable set are also cloned.

Procedure

1. Create a Service Catalog request.
2. On the checkout page, enter the users for whom to copy the request, up to a maximum of 10, in the **Copy this Request for:** reference fields.



3. Click **Order Now**.

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View catalog item audit history

You can view the audit history of changes to items you requested. For example, you can view changes to variable values to find out who made the changes. Fulfillers and administrators can view history for any requested item.

Before you begin

Role required: admin (history list or calendar), itil (calendar only)

Procedure

1. Complete one of the following actions for the history to view.

Option	Description
View history for your requested items	Navigate to **Self-Service** > **Requested Items** and open the item you requested.
View history for any requested item	Navigate to **Service Catalog** > **Open Records** > **Items** and open the requested item to view.

2. Open the form context menu and select **History** > **Calendar**, or **History** > **List** (with permission).
   The history calendar shows you the days where the record was changed, who made the change, and when. The history list displays each change in a list view. History records of variables are prefixed with "VARIABLE:."
3. Click the day number to get a view of the changes for that day, or click the week number to get the week view.

Saving catalog items to a wish list

You can save catalog items to your wish list and visit them later to complete the ordering process.

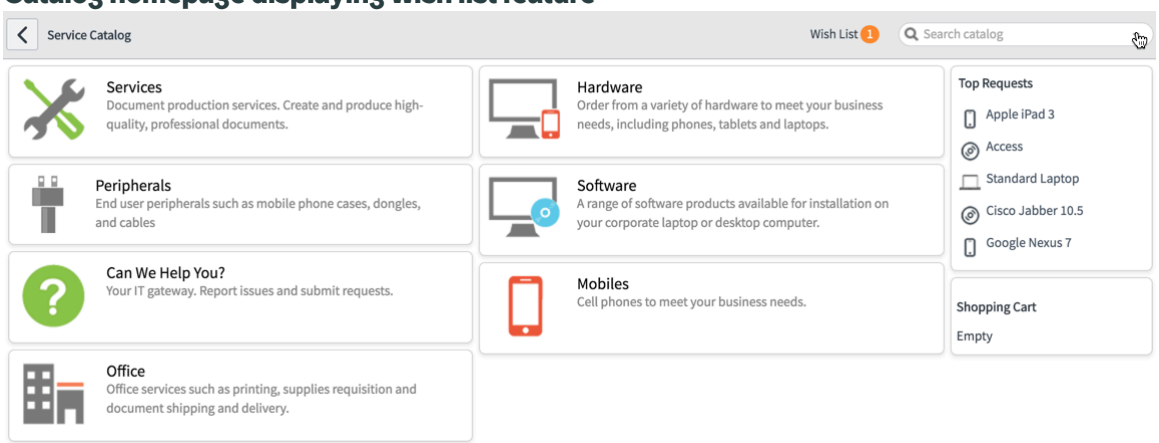
For example, you need a laptop with specific software installed on it. Add the laptop to your wish list, then visit it when you have the complete software configuration list. Data you enter is saved when you add items to your wish list.

Users with catalog_admin or admin role can enable/disable the wish list feature and configure the wish list cart for end users. By default, the wish list is always disabled for a catalog.

To enable the wish list feature for catalog end users, select the check box for **Enable Wish List** in the catalog record.

The wish list feature does not function if the property `glide.ui.doctype` is set to `false`.

Catalog homepage displaying wish list feature



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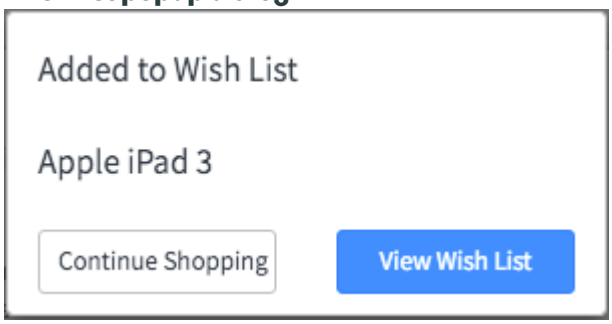
Note:
When the wish list feature is disabled for a catalog, any items in its wish list are deleted. The items in the wish list are retained only if the item is associated with another wish list-enabled catalog.

Working with wish lists

To save an item to your wish list, click **Add to Wish List** on the catalog item page. A pop-up dialog informs you that the item is added to your wish list. Duplicate entries of an item are not added to your wish list. If you try to add an item that is already in your wish list, the latest entry of that item gets updated in the wish list.

Wish list popup dialog



To access your wish list of catalog items, click **View Wish List** on the popup dialog. You can also click the link to wish list items on the header. The wish list cart allows you to update or delete wish list items.

To update a wish list item, go to wish list cart and click **View** for the item. Change the information, and then click **Update** to save the changes. To proceed with ordering the item, click **Add to Cart**. The item is removed from your wish list and added to the shopping cart for final checkout.

Service Catalog customization

Service Catalog enables you to customize the catalog in various ways.

No updates are supported on the following internal service catalog tables, either directly or through business rules.

- Options [sc_item_option]
- Variable Ownership [sc_item_option_mtom]
- Question Answer [question_answer]
- Item Produced Record [sc_item_produced_record]
- Multi Row Question Answer [sc_multi_row_question_answer]

Cart layout

Service catalog enables catalog administrators to configure the layout and functionality of the service catalog cart used in your organization to place requests for catalog items.

You cannot check out a cart item that is no longer available.

You can perform the following:

- Remove components. For example, hide prices throughout the cart if your catalog does not use pricing.
- Change labels. For example, change the **Order now** button label to **Request Item** in the shopping cart.

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- Change the order of elements. For example, change the order of the columns on the order status screen.
- Configure, hide, or create functionality. For example, add a **Requested For** reference field to the shopping cart.

Configure the cart layout

Configure cart layout records to define functionality for widgets or screens in the shopping cart.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Select a widget or screen.
   - Cart widgets: Item Ordering Widget, Shopping Cart Widget, or Item Ordering Widget (Order Guide)
   - Preview screens: Cart Preview Screen, Cart Preview Screen (Two Step), Cart Preview Screen (Wish List), or Cart Preview Screen (Classic Mobile)
   - Order status screens: Order Status Screen or Order, Status Screen (Classic Mobile)
3. Update the **Title** field to change the title that appears on the widget.
4. Leave the default **Target** value.
   Do not change this value because it identifies the cart element being defined.
5. Update the other sections of the cart layout record, as required.
   The availability of these sections varies for each widget and screen record.
   - In the **Components** section, select the components to display, such as delivery times, item descriptions, and prices.
   - In the **Columns** section, select which columns to display, such as the item description column, delivery time column, or price column.
   - In the **Buttons** section, select the buttons to display, such as **Add to Cart**, **Edit Cart**, and **Delete Item**.
   - In the **Button Labels** section, enter new labels to replace the default button labels.

     A new label is used on all screens that the button appears on. For example, the **Continue Shopping** button is used on several screens, so changing its label affects all those screens.
6. If required, configure the widget and column macros.
7. Save the record, and then test the results of your configuration by ordering items from your service catalog.

   Some settings and properties in your instance can override or affect your cart layout.

Cart layout considerations

When you enable cart layouts, service catalog properties are impacted. Consider the possible outcomes and alter the settings or properties to achieve the cart layout and functionality you require.

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Some of these properties are impacted when you use cart layouts. For example, with the order status screen, the **When to show prices and sub-totals on the Service Catalog Cart** (glide.sc.price.display) property overrides cart layout settings for displaying prices.

Table title

Property	Impact
Allow ESS users the option to cancel their requests from the checkout screen. [glide.sc.checkout.cancel]	Overridden when the **Cancel Request** check box in cart layout settings is selected. If this check box is selected, the **Cancel** button is displayed even if the property is set to **No**.
Enable cloning requests during checkout. [glide.sc.allow.checkout.clone]	Not used (deprecated) if cart layouts are enabled. Replaced by the **Clone Checkout**check box in cart layout settings. The **Clone Checkout** check box is cleared by default for new instances. For upgraded instances, the check box is set to the existing value of the glide.sc.allow.checkout.clone property.
List of roles (comma-separated) that can use the quantity selector in the shopping cart [glide.sc.allow.quantity]	Overrides any relevant cart layout settings.
Show the request item number for each line item on the checkout screen (default false). [glide.sc.checkout.request.number]	Not used (deprecated) if cart layouts are enabled. Replaced by the **Request Item Number column** check box in cart layout settings.
Show the 'Back to Catalog' button on the two-step checkout screen. [glide.sc.checkout.twostep.back]	Not used (deprecated) if cart layouts are enabled. Replaced by the **Back to Catalog** check box in cart layout settings.
When to show prices and subtotals on the Service Catalog Cart. [glide.sc.price.display]	Overrides any relevant cart layout settings.

Configure widget and column macros

Configure macros that define functionality for elements within each widget or screen.

Before you begin

Role required: admin

About this task

Some widgets or screens also have column macros that define the horizontal layout and configuration of shopping cart contents.

You can configure these macros to alter the display order of elements, or hide elements, within the widget or screen. You can also create new macros to implement any extra requirements.

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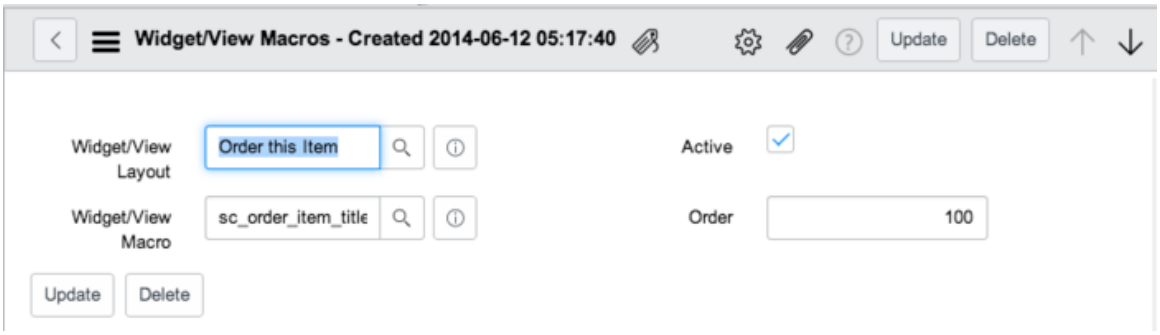
Procedure

1. Navigate to **All** > **Widget Macros** > **Column Macros** related list.
2. Click the order number entry of a macro to edit its display order, or to activate or deactivate it.



3. Click **Update**.
4. Click the **Widget / View Macro** entry of a macro to view its functionality settings.
   You cannot edit functionality settings for default macros, but these settings can be a useful reference for creating your own widget macros.

Create macros for cart layout

Create macros for cart layout records using Jelly scripts to define customized behavior and display within a widget or screen.

Before you begin
Role required: admin

About this task
Macros that you create do not affect upgrades because customized widget functionality is isolated from general cart behavior.

Procedure

1. Open the relevant cart layout record.
2. Navigate to **Widget Macros** or **Column Macro**related list.
3. Click **New**.
4. Enter details for the macro.

Macro form

Field	Description
Name	The name for the new macro.
Active	A check box to indicate whether the macro is displayed or not.
Description	A summary of how the macro is used.
Active	A check box to indicate whether the macro is displayed or not.
XML	The Jelly script to apply for your macro.

5. Save the macro record.

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Example:
This example demonstrates the script to add a **Requested for reference** field as a widget macro to a cart layout record.

```
<?xml version="1.0" encoding="utf-8" ?>
<j:jelly trim="false" xmlns:j="jelly:core" xmlns:g="glide"
 xmlns:j2="null" xmlns:g2="null">
    <j:set var="ref" value="sc_cart" />
    <j:set var="jvar_ref"
 value="${jvar_cart.getRequestedFor()}" />
    <j:set var="jvar_ref_display"
 value="${jvar_cart.getRequestedForDisplayName()}" />
    <tr>
        <td colspan="3">
            ${gs.getMessage('Requested for')}:
        </td>
    </tr>
    <tr>
        <td colspan="3" style="padding: 4px;">
            <g:catalog_requested_for />
        </td>
    </tr>
</j:jelly>
```

Configure cart layout for specific items

Set fields in the Catalog Item form to configure the cart layout for specific items.

Before you begin
Role required: admin

About this task
Overrides any general cart layout settings. For example, you can hide the price of an item by setting the **Omit price in cart** field to **true** for that item.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Select the catalog item.
3. Configure the form to add both **Use cart layout** and any of the following item configuration fields you require:
   - Omit price in cart
   - No cart
   - No order
   - No order now
   - No proceed checkout
   - No quantity
4. Clear the **Use cart layout** check box to display the configuration fields for that item.
5. Set the item configuration field values as required.

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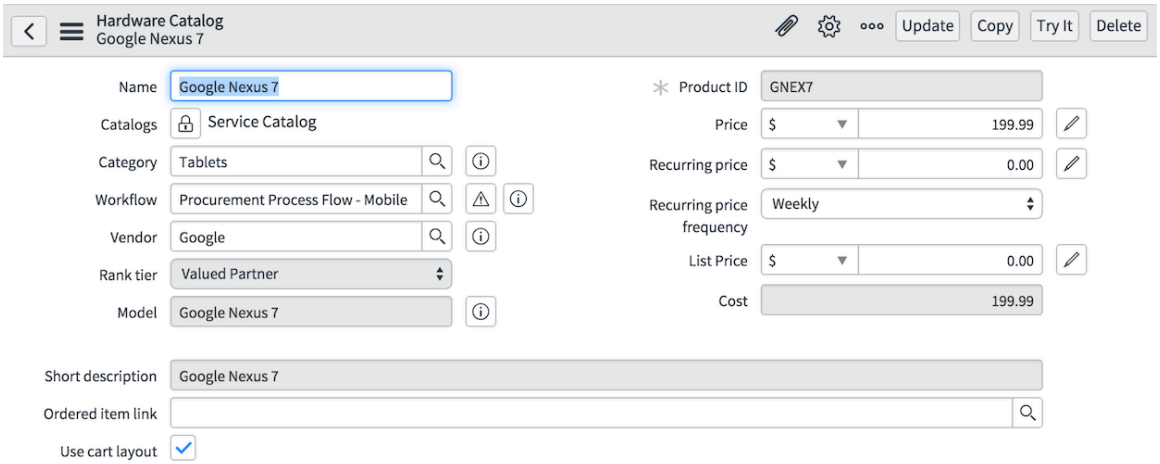

6. Click **Update**.

Override cart layouts for items

Service catalog enables you to use additional methods to configure cart behavior or layouts, which override cart layout record settings.

For example, your cart layout record settings can hide item prices, but you might decide to display the price of the **Sales Laptop**. In that case, you would set the relevant configuration values on that catalog item. Be aware of the impact of these additional methods, to ensure that your cart behaves in the way you want.

Note:

If you are migrating to cart layouts, you can have defined additional settings and properties that impact your cart layout settings.

Configure Service Catalog cart widgets

You can configure widgets for the shopping cart, catalog items, and order guides.

Before you begin
Role required: admin

About this task
Overview of configurable options in the Service Catalog on the Service Portal and explains how to perform those configurations.

Configure order guide widgets

You can customize the widget that provides details of the current catalog item on an order guide or wizard.

Before you begin
Role required: admin, catalog_admin

About this task
Order guide cart widget is visible when an order guide item is ordered.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Item Ordering Widget (Order Guide)** record.

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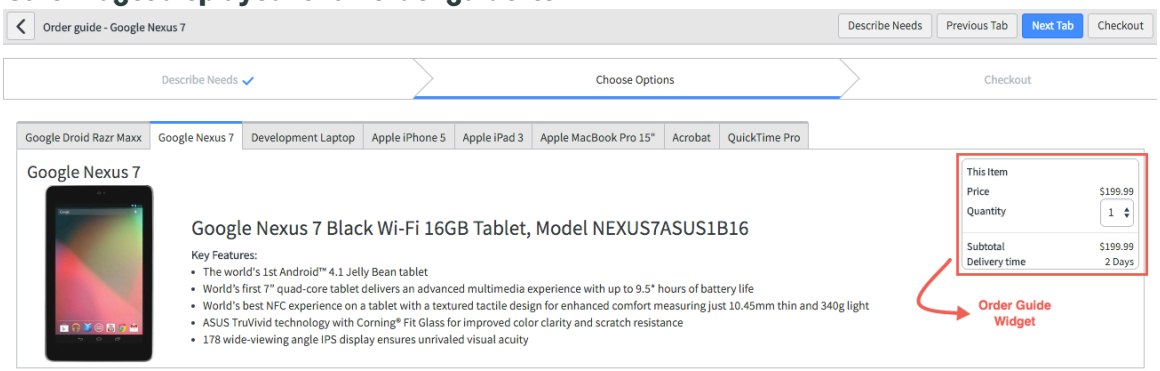
3. You can add/remove components and rename widget title.
4. Click **Update**.

Cart widget displayed for an order guide item



Note:
By default, order guides use a two-step process, and catalog items use a one-step checkout process. If you configure the checkout process, keep in mind that order guides and catalog items provide different cart experiences if they use different checkout processes.

Configure catalog item widgets

You can customize widgets that appear for catalog items.

Before you begin

Role required: admin, catalog_admin

About this task

Both shopping cart and item ordering widgets are visible on the standard catalog page and any ESS catalog page. The shopping cart widget is also available in additional locations, such as the catalog homepage.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
   a. Open the **Item Ordering Widget** record to modify the widget for ordering item.
   b. Open the **Shopping Cart Widget** record to modify the widget for shopping cart.
2. You can add/remove components, buttons, rename widget title and button labels.

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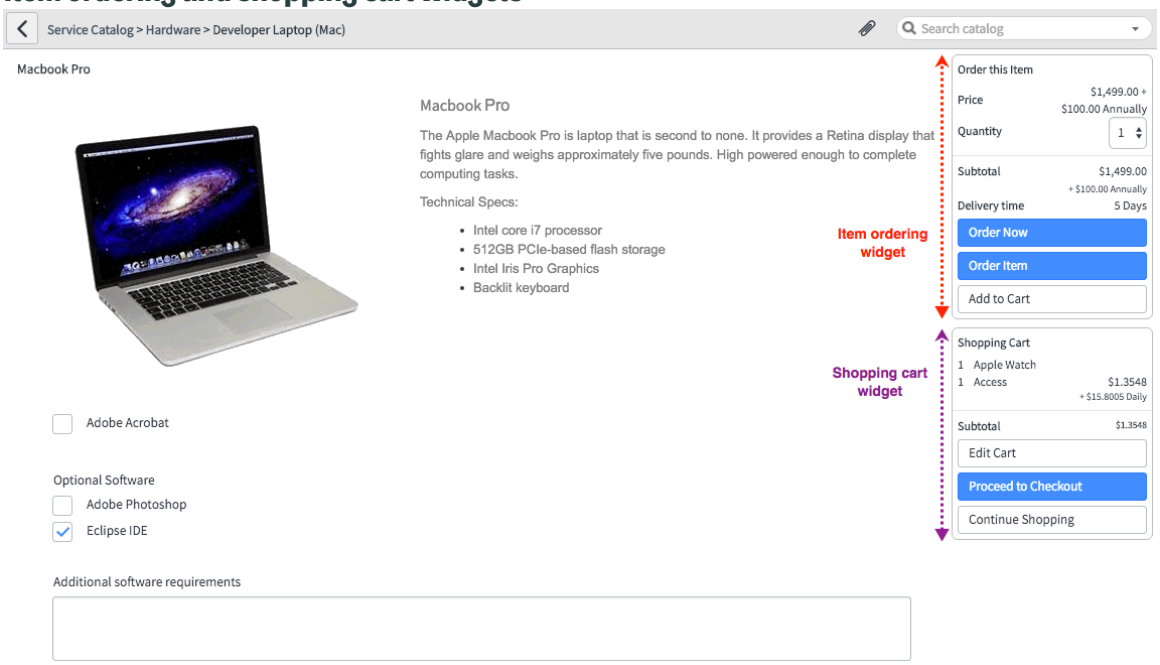
3. Click **Update**.

Item ordering and shopping cart widgets



Configure Service Catalog preview screens

You can configure shopping cart preview screens for the one-step and two-step carts, for the wish list, and for the Classic Mobile app.

Configure the wish list screen

Using Service Catalog, customize the cart preview screen for wish list items.

Before you begin

Role required: admin, catalog_admin

About this task

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Cart Preview Screen (Wish List)** record.
3. You can add/remove components, columns, buttons, and rename labels.
   For more information, see Configure cart layout.

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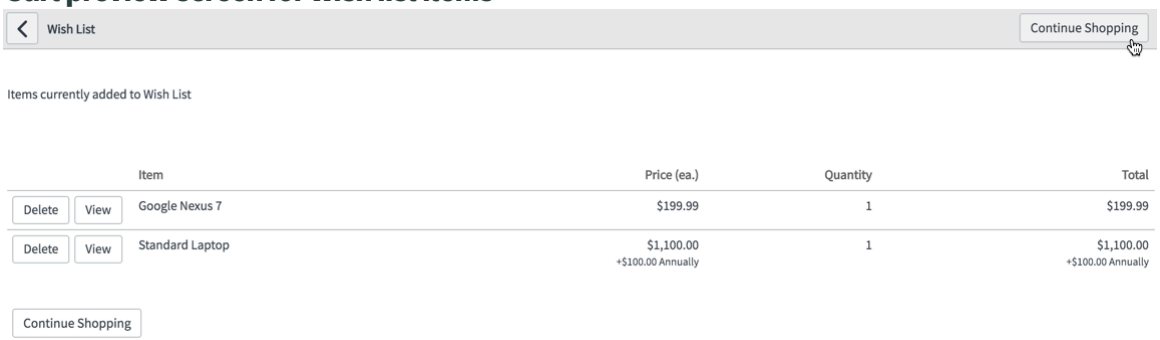
4. Click **Update**.

Cart preview screen for wish list items



Configure Classic Mobile shopping cart screen

Using Service Catalog, customize the shopping cart screen that is displayed on mobile devices.

Before you begin

Important:

Mobile Classic Is Deprecated!

The App Has Been Removed From The Stores And Can No Longer Be Activated. We Are Not Offering Enhancements, Bug Fixes, Or Support For The App. See ServiceNow Classic Mobile App Deprecation Effective September 15, 2022.

Role required: admin, catalog_admin

About this task

The shopping cart on Classic Mobile devices always uses a two-step checkout process. You cannot modify widget macros or button labels on Classic Mobile devices.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Cart Preview Screen (Classic Mobile)** record.
3. You can add/remove components and buttons.

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4. Click **Update**.

Shopping cart screen on Classic Mobile



Configure a one-step shopping cart screen

Using Service Catalog, customize the shopping cart display screen for a one-step checkout process.

Before you begin

Role required: admin, catalog_admin

About this task

One-step checkout is the default checkout process for catalog items.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Cart Preview Screen** record.
3. You can add/remove components, columns, buttons, and rename title and button labels. See Configure cart layout.

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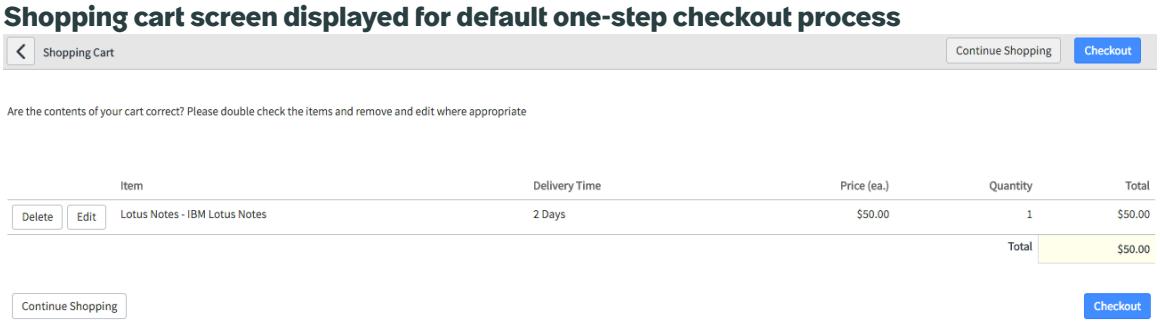
4. Click **Update**.



Configure a two-step shopping cart screen

Using Service Catalog, customize the shopping cart display screen for a two-step checkout process.

Before you begin

Role required: admin, catalog_admin

About this task

Changes made to the two-step record are visible only if the two-step checkout process is enabled in properties. By default, catalog items use a one-step checkout process.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Cart Preview Screen (Two Step)** record.
3. You can add/remove components, columns, buttons, and rename title and button labels. For more information, see Configure cart layout.

   In the **Components** tab, both **Shipping Location** and **Shipping Address** are not supported simultaneously. Deselect the selected component to select the other component.

   If you enable **Shipping Address** in the **Components** tab, the editable **Shipping address** field is displayed in the cart preview screen. If you enable **Shipping Location** in the **Components** tab, the editable **Shipping location** field and a read-only **Shipping address** field are displayed in the cart preview screen.

4. Click **Update**.

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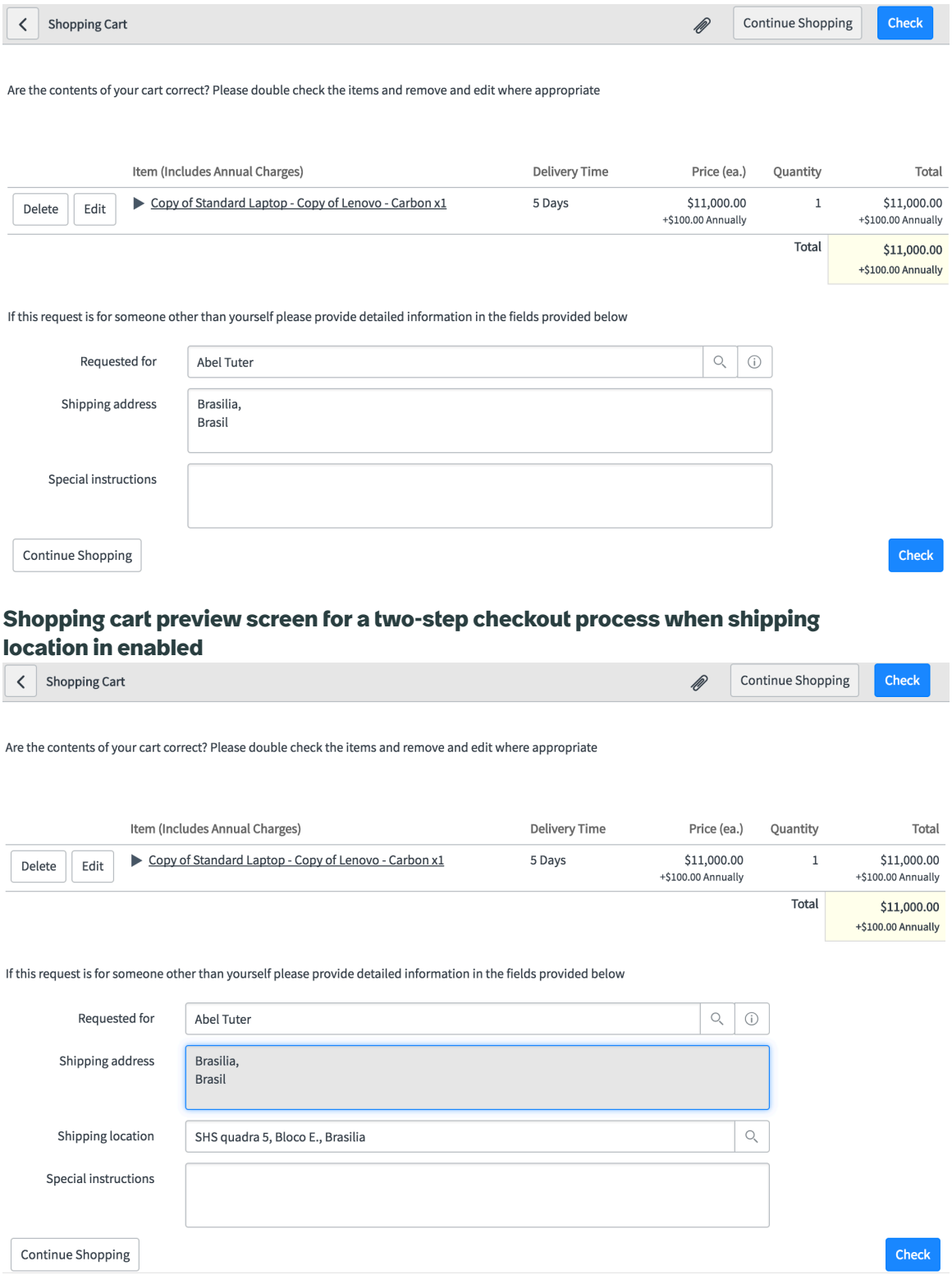
Shopping cart preview screen for a two-step checkout process when shipping address in enabled



Shopping cart preview screen for a two-step checkout process when shipping location in enabled

Configure Service Catalog status screens

You can configure shopping cart status screens for desktop and Classic Mobile orders.

Configure desktop order status screen

Using Service Catalog, customize the order status screen that is displayed on desktops.

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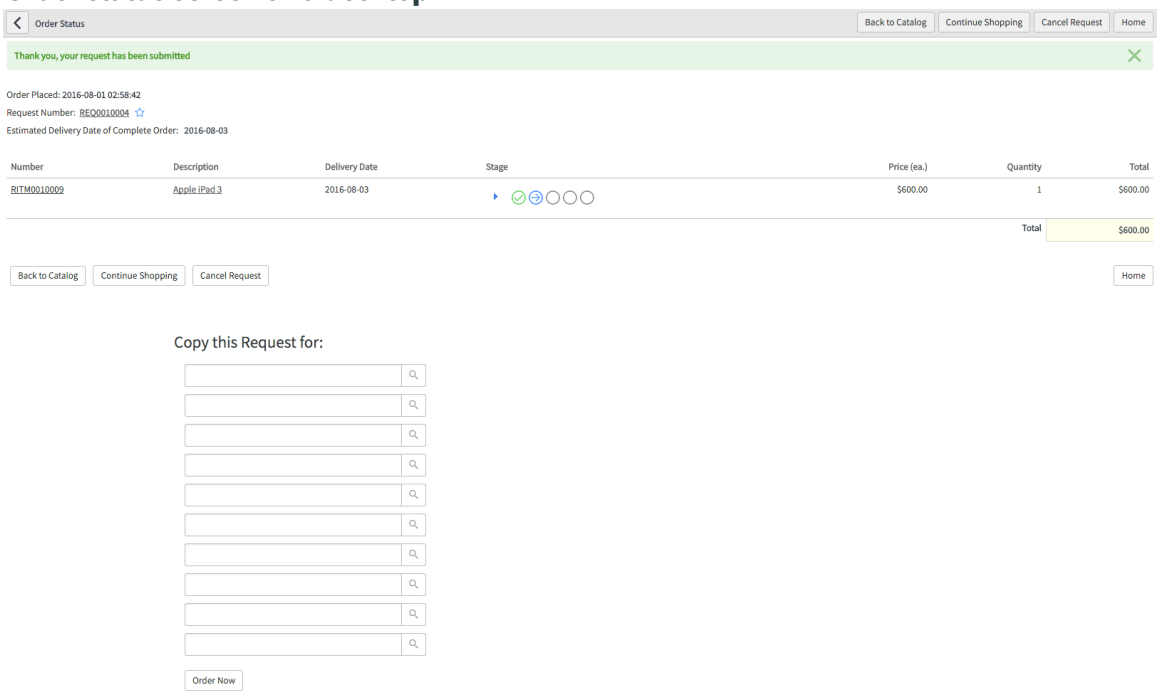
Before you begin
Role required: admin, catalog_admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Order Status Screen** record.
3. You can add/remove components, columns, buttons, and rename labels.
   See Configure cart layout.
4. Click **Update**.

Order status screen on a desktop



Configure Classic Mobile order status screen

Using Service Catalog, customize the order status screen that is displayed on Classic Mobile devices.

Before you begin
Role required: admin, catalog_admin

About this task
You cannot modify widget macros or button labels on Classic Mobile devices.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Order Status Screen (Classic Mobile)** record.
3. You can add/remove components and buttons.

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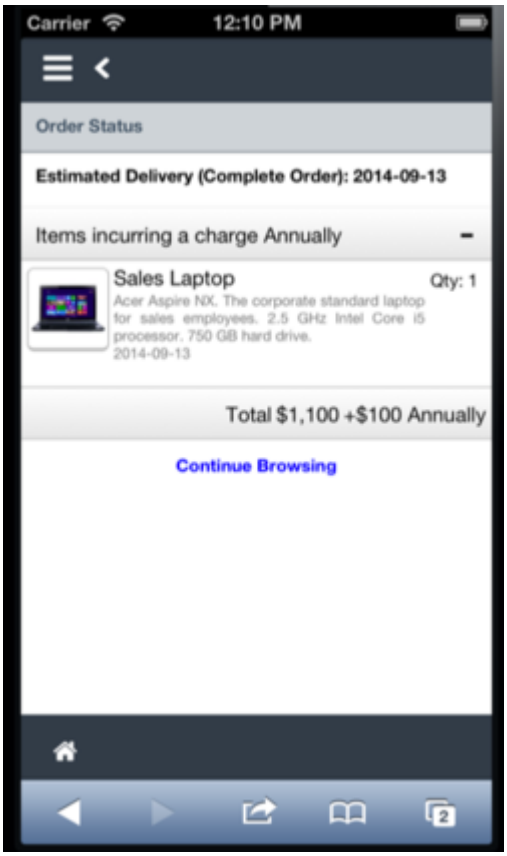
4. Click **Update**.

Order status screen on Classic Mobile



Migrating to cart layouts

Service catalog enables you to configure cart layouts to add, remove, or change elements of the service catalog shopping cart. Before you migrate your system to use cart layouts, familiarize yourself with existing configurations for catalog content and decide whether to discard or retain these configurations.

This feature is enabled by default in new instances and the default cart layout settings are implemented. For upgrades, an upgrade script checks to see if your current cart macros are customized. Only a user with an admin role can migrate cart layouts.

- If cart macros are not customized, cart layout configuration is enabled by default.
- If cart macros are customized, cart layout configuration is disabled. Migrate your system to use this feature.

Cart configuration settings

Check your current configurations for:

- UI macros defining custom shopping carts that have been linked to items.
- Service catalog properties impacted by cart layouts.
- Item-specific settings that can override cart layout record settings.

Item-specific settings

Some catalog items can have cart layout settings that are specific to them.

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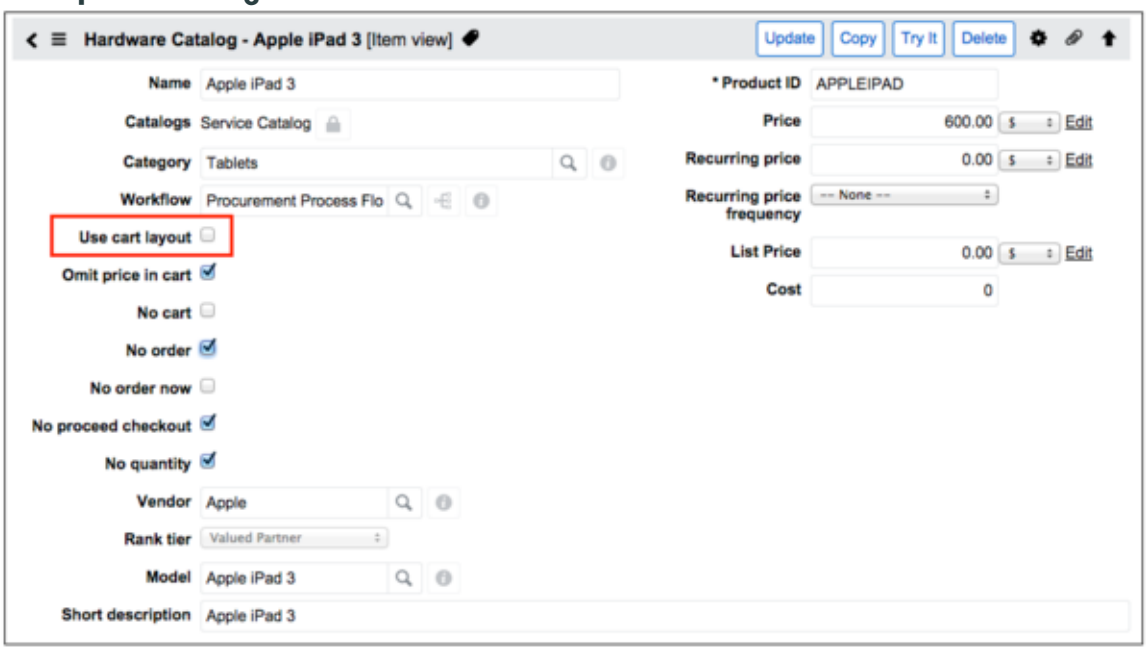
For example, these items can show prices even though the general cart layout record settings hide prices.

To retain item-specific settings, clear the **Use cart layout** check box in the catalog item form.

Item-specific settings



Note:
You can configure the form to display the **Use cart layout** check box.

Migrate customizations and enable cart layouts

Move customization to cart layout widgets, and then enable cart layouts.

Before you begin
Role required: admin

About this task
When you customize a few UI macros, you should migrate the customizations to cart layout widgets before you enable cart layouts.
Following are the UI macros whose customizations need migration before you enable cart layouts:

- sc_catalog_homepage_cart
- sc_catalog_requested_for
- catalog_item
- catalog_cart_default
- sc_cart_main

In addition, if you have customized the com.glideapp.servicecatalog_category_view UI page, or the Catalog Cart dynamic content, you must migrate these customizations before you enable cart layouts.

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Procedure

1. Save copies of the customizations for later reference.
2. Revert the customizations to restore the customized macros or other content to their standard state.
3. Remove the record for the customization from the Customer Update [sys_update_xml] table.
4. Run the following script in Background Scripts to set the property and set the correct state for all the items in the catalog:

```
var cm = new
 CartLayoutMigration();cm.configureLayoutProperty();cm.setLayou
tFalse();cm.setEmptyLayout();
```

5. Reimplement any cart layout customizations that you want to maintain in the upgraded instance by configuring widget macros.
6. To enable cart layouts, set the service catalog system property *glide.sc.use_cart_layouts* to **Yes**.

Legacy flexible checkout and delivery forms

ServiceNow includes several options that provide administrators some control over content in service catalog template-driven forms.

Some service catalog forms, such as the checkout form, are generated from templates, instead of being data-driven like other forms in the system, such as the Incident form.

Template-driven forms provide enhanced look-and-feel over standard data-driven forms, but they provide more limited control over the form content.

Note:

It is recommended that you use cart layout records to configure cart layouts. Using cart layout records lets you configure the service catalog cart without writing and maintaining scripts.

Modifications in the delivery screen

In the final checkout step, a summary screen provides a list of all items and services ordered.

Warning:
Modifying the Order Status or Summary screen requires advanced scripting and a knowledge of Jelly. Also, the upgrade process skips updates to the summary screen after a customization. With these constraints in mind, you can modify the summary screen by editing the *com.glideapp.servicecatalog_checkout_view* UI page.

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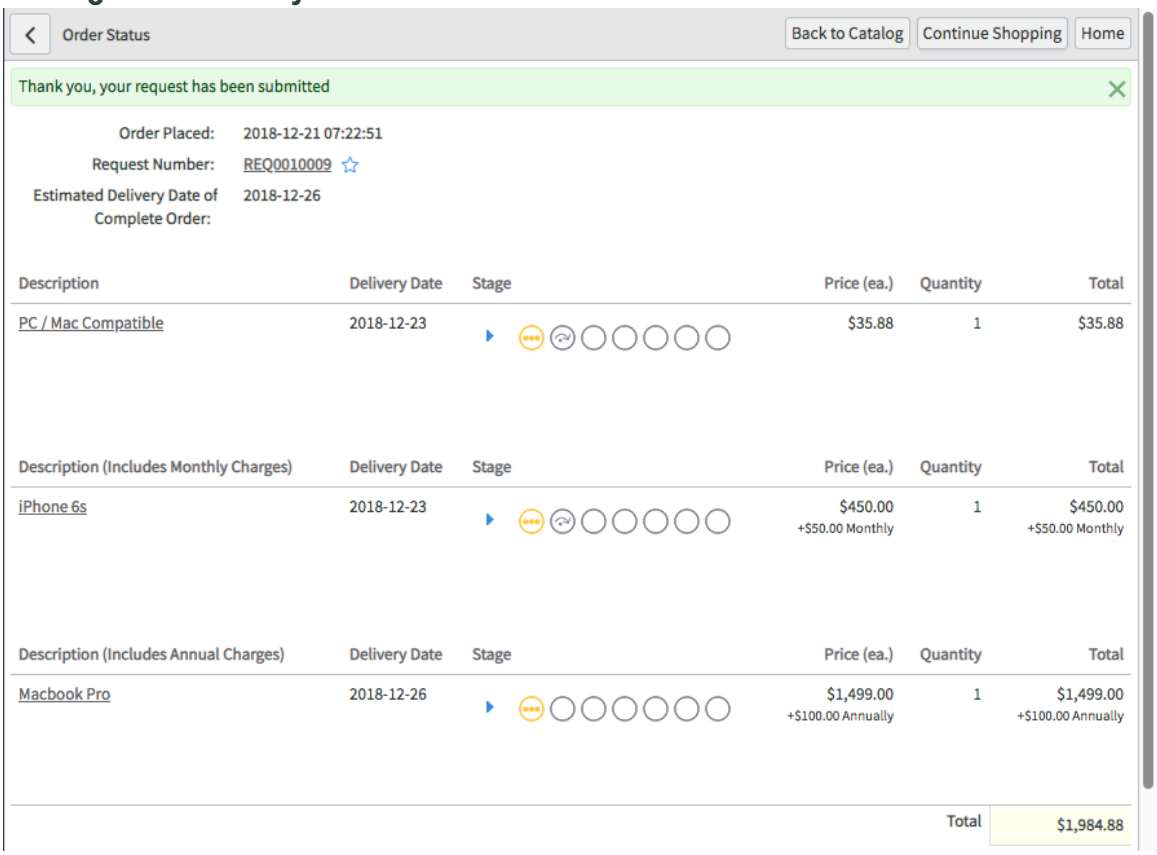
Catalog order summary status



Requester search results

After you enable the two-step checkout process, the *Requested for* field appears on the Request form.

The *Requested for* field references the User `[sys_user]` table and has an auto-complete feature. Two service catalog properties (**Service Catalog** > **Catalog Administration** > **Properties**) enable an administrator to add columns to the search results for this field and to order the list by one of the columns.

Service catalog properties

Property	Description
Additional columns for the "request for" Service Catalog widget. (glide.sc.request_for.columns)	Choose fields from the User `[sys_user]` table. Must be semicolon separated.
Ordering of matches for the "request for" Service Catalog widget. (glide.sc.request_for.order_by)	Choose fields from the User `[sys_user]` table.

Modifications in the checkout form

You can modify the checkout form to use an alternate description field or to add request item number for each line.

By default, the checkout forms list the **Description**, **Delivery Date**, **Stage**, **Price**, **Quantity,** and **Total** columns. An example of default checkout form is shown:

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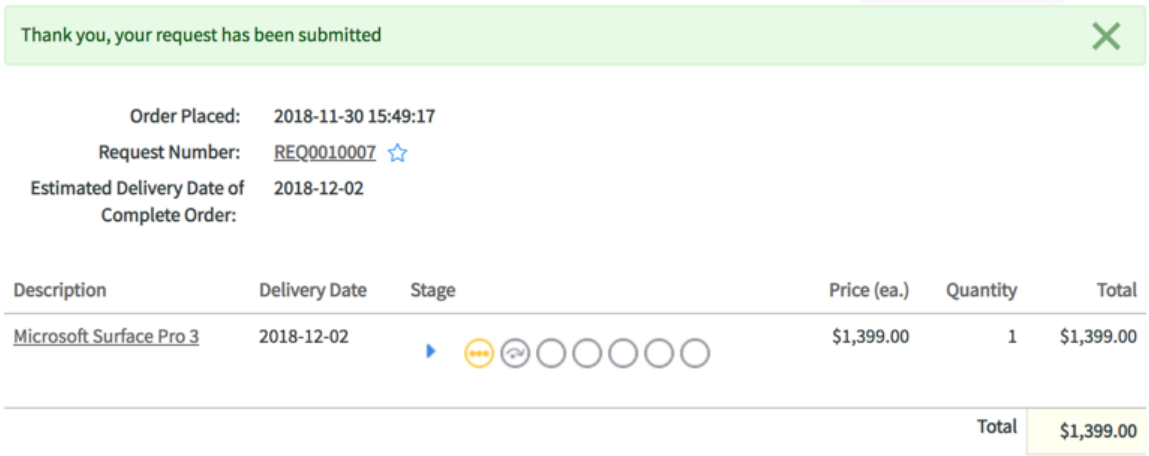
Checkout default



Add the request item number on checkout form

Add the request item number to display this number as an extra column on the checkout form. By default, the request item number is not displayed in the list.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. Locate the property: **Show the request item number for each line item on the checkout screen (default false)**.
3. Select the **Yes** check box to add the number column to the checkout form.

Checkout number



Use an alternate description field on the checkout form

Use an alternate description field to describe your category item in the checkout form. By default, the **short_description** column of the catalog item appears as the item description.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Policy** > **Properties**.
2. Locate the property **Field name to use for the description column of the checkout form. If blank, the default (short_description) is used**.
3. Enter the name of the alternative field (a column in the Catalog Item `[sc_cat_item]` table) and save it.
   For example, if you've selected **name**:

Checkout name

Summary

Your request number is **REQ10005**, which you can use to refer to this request in future interactions with the service desk.

You may also bookmark the following link to get back to Request REQ10005.

Note that clicking on the bookmark link (above) will simply take you back to this screen.

Description	Delivery Date	Stage	Price (ea.)	Qty	Total
Blackberry	2007-04-08		$500.00	1	$500.00
				Total:	**$500.00**

Delivery Information

Estimated Delivery Date of Complete Order: **2007-04-08**

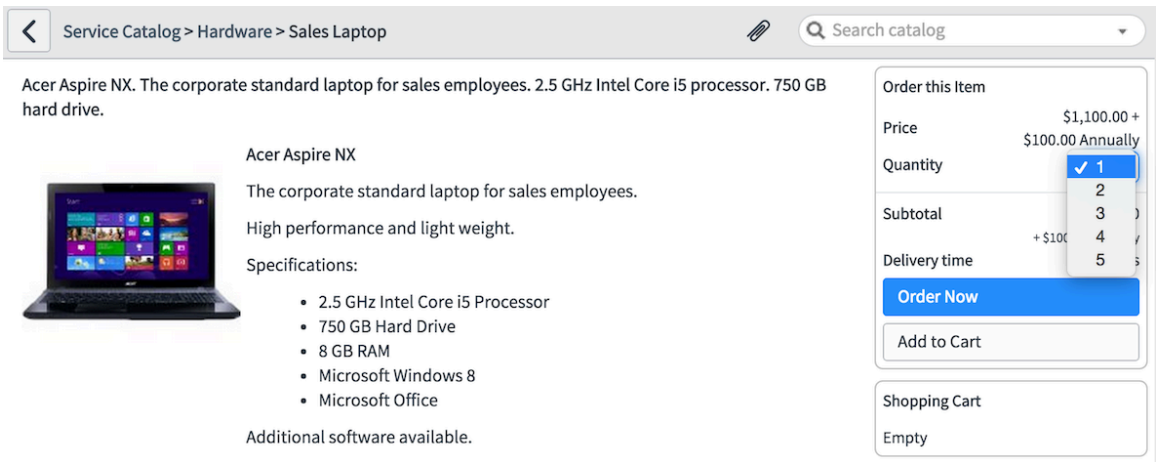
Define item quantity choices

In the Service Catalog, the default quantity choices are 1–10. You can configure the quantity selector with additional choices. This configuration is also applicable in Service Portal.

Before you begin

Role required: admin

About this task



Procedure

1. Navigate to **All** > **System Definition** > **Choice Lists**.
2. Search for the table **sc_cart_item** and the element **quantity**.
   The existing quantity choices appear.
3. Add quantity choices, modeling them after the existing ones.

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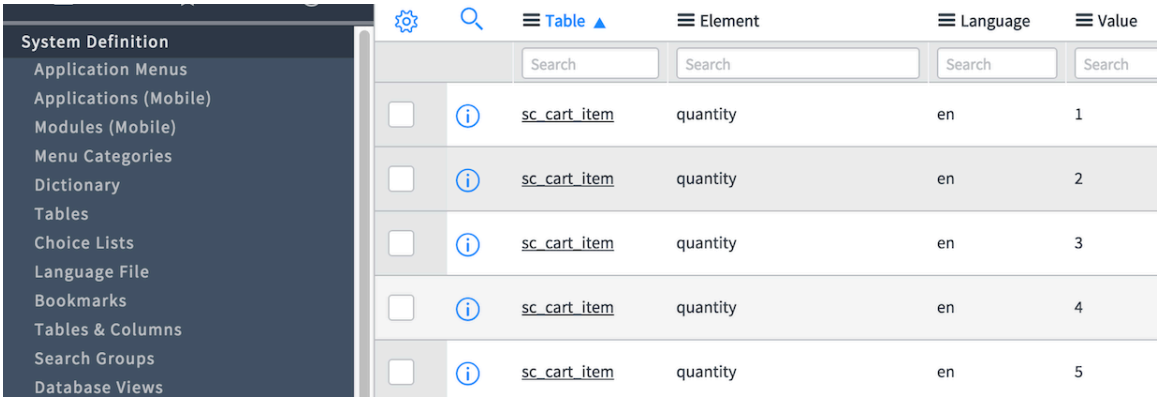

To reduce the quantities available for catalog items, delete the relevant quantity records. For example, to reduce the quantity range to 1-3, delete the records for 4 and 5.

To restrict the roles allowed to change quantities, edit the **List of roles (comma-separated) that can use the quantity selector in the shopping cart** (*glide.sc.allow.quantity*) service catalog property. For example, you can limit this ability to the admin and catalog_admin roles.

Related topics

Service Catalog administration

Remove item restrictions

Service Catalog enables you to remove or apply restrictions on all order guides, record producers, and wizard launchers.

Before you begin

Role required: admin

About this task

Catalog administrators can use Service Catalog properties to configure the behavior and usage of a catalog item.

By default, all order guides, record producers, and wizard launchers have these restrictions:

- They cannot be added to a requested item
- They do not provide a **Try It** action
- They are not added to the cart as items

To remove these restrictions or apply these restrictions to other types of items:

Procedure

Modify the comma-separated lists of tables in the following properties:

- **List of class names for catalog items that cannot be added to an existing request**(*glide.sc.item.cannot_add_to_request*): restricts the items that can be added to a requested item, after an end user places a request. For example, to restrict content items from being added to an existing request, add sc_cat_item_content to the list for this property.
- **List of class names for catalog items that do not use the default "Try It" UI Action**(*glide.sc.item.cannot_try_it*): restricts the items which allow you to click **Try**

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It on the item form to preview how it appears in the service catalog. Items with such restrictions do not display **Try It** on the form.

- **List of class names for catalog items that do not generate a normal cart item**(*glide.sc.item.not_normal_cart_item*): restricts which item types are added to the cart by default.

Using variables for price setup

You can define a price for every service catalog item. The price or recurring price of a catalog item can be modified with variables, increasing the base price for that item.

This pricing is useful if you want the price or recurring price dynamically calculated based on how a user completes the ordering form. For example, the cost of an item can be increased based on options the user selects, such as extra memory in a PC.

The following variable types can be configured to modify the total cost of an item:

- Check box
- Multiple choice
- Reference
- List collector
- Select box
- Lookup select box

Check box

A check box variable helps to set the price or recurring price of the item being ordered.

You can Create a check box variable and set the price of the item. Use the **Price if checked** or **Recurring price if checked** field to specify the price or recurring price difference for that variable when the option is selected.

Under the **Type Specifications** tab, you can specify the price in different currency types. Also, you can configure the price in the following pricing models:

- Calculated
- Fixed
- Multiple

For information on the pricing models, see Price fields .

Multiple choice

For a multiple choice variable, there are two options for pricing.

- Specify the price difference in the **Price** field on the question choices.
- Specify the recurring price difference in the **Recurring Price** field on the question choices.

Note:
Select boxes operate the same as multiple choice variables but are displayed as select boxes.

Reference

A reference variable includes a **Pricing implications** field.

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If this field is selected and there is a **price**, **u_price**, **recurring_price**, or **u_recurring_price** field on the referenced table, the value of that field is used to modify the cost of the item being ordered when a reference value is selected.

For example, suppose that computers in Phoenix cost $100 more than the ordering price, and computers in Boise cost $100 less than the ordering price.

1. Set up a reference variable to the Location [cmn_location] table.
2. Put a **u_price** field on the Location table.
3. Set that field to `100` for the Phoenix location.
4. Set that field to `-100` for the Boise location.

When ordering a computer, if **Phoenix** is selected as the location for this variable, the ordering price is increased by $100. If **Boise** is selected, the ordering price is decreased by $100.

Note:
List collectors operate the same as a reference variable, but use the **List table** field to specify the table being referenced. Since it is a list collector variable, multiple selections can be made that all modify the ordering price or recurring price.

Lookup select box

A lookup select box variable is more powerful than a reference variable.

Specify the following when creating a lookup select box variable:

- **Lookup from table**: the table from which values are queried.
- **Lookup value field**: the field on the lookup table whose value is used as the value of the variable (typically sys_id).
- **Lookup label field(s)**: a comma-separated list of fields on the lookup table whose values are used to display the selections in the select box. For example,**manufacturer,name** for the Software [cmdb_ci_spkg] table would display selections as:
  - Microsoft | Excel
  - Adobe | Photoshop Elements
- **Lookup price field**: the field whose value is used to modify the price of the item being ordered.
- **Lookup recurring price field**: the field whose value is used to modify the recurring price of the item being ordered.

Set a recurring price

A catalog item can have a recurring price in addition to an initial price.

Before you begin

Role required: admin

About this task

The price and the recurring frequency are set on the catalog item record. After the price and frequency are set, the recurring price appears in the catalog, catalog search results, catalog page for the item, shopping cart, and order summary screen.

For example, a subscription to a mobile phone contract could cost $500.00, with a $30.00 monthly recurring price.

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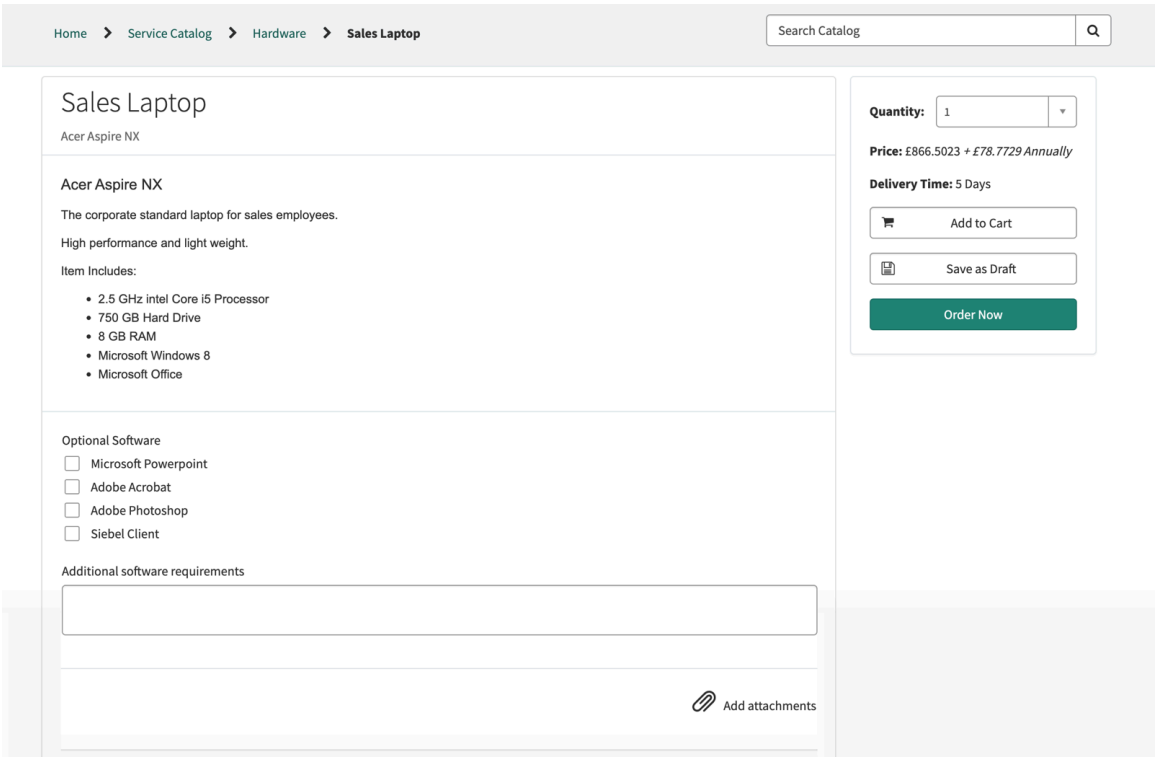
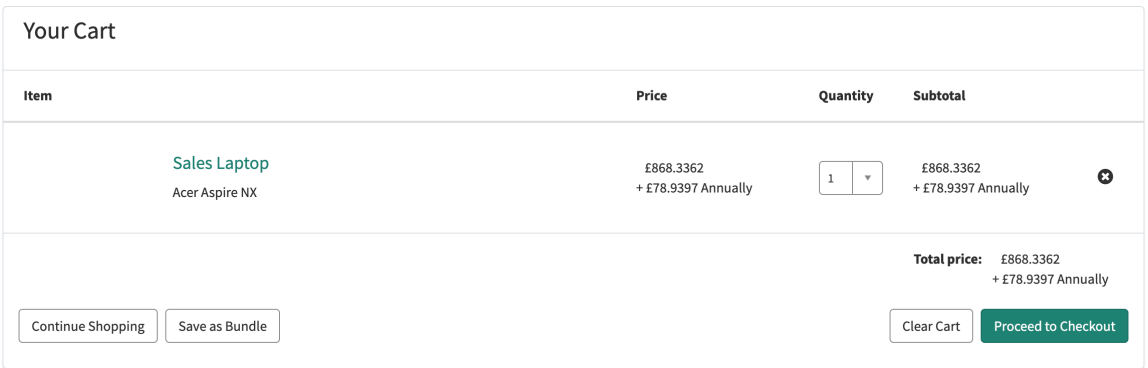


If multiple items with the same recurring price frequency are placed in the shopping cart, they are grouped. The grouping makes it easier to view how much items cost for each frequency (for example, weekly, monthly, and annually). If the shopping cart contains items with and without recurring costs, they are grouped separately.

If multiple items with the same recurring price frequency are placed in the shopping cart, they are grouped. The grouping makes it easier to view how much items cost for each frequency (for example, weekly, monthly, and annually). If the shopping cart contains items with and without recurring costs, they are grouped separately.



On a request record, recurring prices are grouped by frequency and shown in the **Recurring Prices** related list. In the example below, two items each have a monthly recurring cost of $100.00 and their prices are grouped as a single record of $200.00 monthly. Another item with an annual recurring cost of $500.00 is listed as a separate record.

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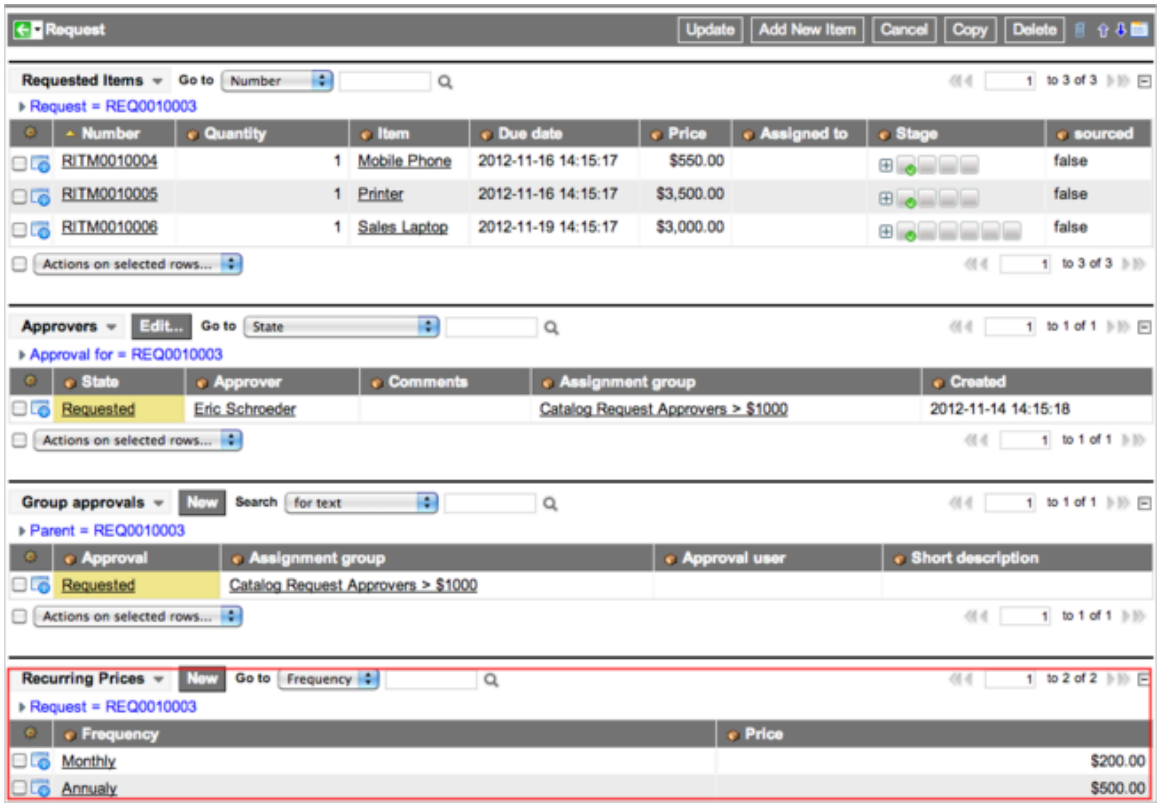

If a request record contains multiple items with the same recurring frequency, click the arrow next to the corresponding recurring prices record to view details.

Extend the pricing model

The pricing model is useful if you want the price or recurring price to be dynamically calculated based on how a user completes the ordering form. You can extend the pricing model of a catalog item by editing the item price or the recurring price.

Before you begin

Role required: admin

Procedure

1. From the left navigation pane, select **System Definition** > **Script Includes**.
2. Edit the CatalogPriceCalculator script to customize the item price and the CatalogRecurringPriceCalculator script to customize the recurring price.

Hiding prices in the service catalog

Administrators can configure options to hide catalog item prices in the service catalog for listings of specific items, for specific types of items, or for all items.

Item prices can appear in the following locations:

- A catalog item listing in the **Order This Item** panel.
- Catalog item listings in categories and subcategories.
- The **Shopping Cart** panel.
- The Edit Cart, Order Confirmation, and Order Status pages.

Hide prices globally

Configure service catalog properties to hide prices globally.

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To view and edit service catalog properties, navigate to **Service Catalog** > **Catalog Administration** > **Properties**.

Hiding prices by item types

By default, prices do not appear for order guides, record producers, and wizard launchers.

You can change which catalog item types show prices using the **List of class names for catalog items that do not show the price in listings** property (*glide.sc.item.cannot_show_price*). Provide a comma-separated list of table names for item types that you want to hide prices for.

For example, to hide prices for standard catalog items, add **sc_cat_item** to the list.

You can also remove an existing entry to display prices for that item type. For example, to display prices for order guides, remove the order guide entry **sc_cat_item_guide** from the list.

Hiding prices for all items

By default, zero-priced items have prices hidden in listings and carts.

You can configure this behavior to always hide or show prices, using the **When to show prices and sub-totals on the Service Catalog Cart** property (*glide.sc.price.display*).

Set this property to **Always show prices** to display prices for all items on all service catalog screens, or to **Never show prices** to hide prices for all items on all service catalog screens.

Hide prices for specific items

You can hide prices for specific items to match your organizational requirements.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Open the relevant item definition.
3. Select the **Omit Price on Cart** check box.

   The price does not appear in the catalog listing or when the item is added to the cart. The price is listed as "-" on the edit cart, order confirmation, and order status screens.

Clone requests

Clone a request to create up to ten copies (clones) of the same Service Catalog request, for different users, without having to enter the same information multiple times. For example, you can request a new piece of equipment for several specified people, generating multiple individual requests quickly from a single initial request.

Before you begin

Role required: admin or catalog_admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**
2. Under the **Target type: Browser Screen** section, select **Order Status Screen**.
3. In the **Components** tab, select the **Clone Checkout** check box.

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4. Navigate to **Service Catalog** > **Catalog Administration** > **Properties**.
5. In the **Cart** category, perform the following:
   - Enable the **Enable cloning requests during checkout** property.
   - For the **List of roles (comma-separated) that can use bulk ordering functionality** property, enter the roles for which you want to enable bulk request capability for all users with these roles, or leave the field blank to enable the capability for all users.
6. Click **Save**.

Related topics

Clone a request

Request a catalog item from Service Portal

Request an order guide from Service Portal

Delegated request experience

Create scripts

Service Catalog enables you to use certain scripts.

Some functions are available, specifically for Service Catalog:

- Client-side scripting allows catalog designers to use the same functionality available on other forms.
- The Service Catalog Script API makes catalog ordering easier from inside business rules.
- Scriptable Assignment of Execution Plans allows selection of an execution plan at the time of ordering, based on scripted conditions.

Create a custom cart

Administrators with a knowledge of Jelly can customize the look and feel of service catalog carts, either globally or for specific catalog items, using the UI macro capability.

Before you begin
Role required: admin

About this task

Note:
You can configure cart layouts without scripting.

Procedure

1. Navigate to **All** > **System UI** > **UI Macros**.
2. Click **New** to create a new macro.
3. Fill in the details and write the script to define your custom cart.

   Note:
   Designing a custom cart requires knowledge of the Jelly expression language. For reference purposes, the default cart script appears in the list as `catalog_cart_default`.

4. Click **Submit**.

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What to do next
After creating a custom card, you can reuse it and link it to catalog items.

Link a cart to an item

Link the default cart or a custom cart to an item so the requester sees the pertinent information.

Before you begin
Role required: catalog_admin or admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Items**.
2. Open an item to test the new cart.
3. In the **Cart** field, select the cart to use.
   You can configure the form layout to add this field to the form.
4. Save the changed form.

Service catalog home page configuration

The home page for a service catalog provides the primary front end for ordering items within that catalog. You can configure various elements of the pages within the Service Catalog.

Important:

The functionality found in homepages, arranging information from your instance to tell a story about your data, is found in dashboards on new instances. On upgraded instances with Next Experience enabled, users can view existing homepages if they have a direct URL, but they can't create or edit them. Responsive dashboards and Analytics Center dashboards take over homepage functionality.

Use the Homepage deprecation help tool to convert the homepages on your instance to responsive dashboards.

For more information, see:

- Dashboards in the Analytics Center.
- Working with responsive dashboards.

Administrators and catalog administrators can design a home page in any of the following ways.

- Customizing the catalog home page.
- Adding, removing, and arranging categories.
- Enabling content types.
- Using catalog properties to provide additional control over behavior and appearance.
- Using renderers to define the appearance of categories.

Note:
End users can access the catalog through the customizable user home page, or with content management pages that use content blocks for categories.

Configure search and navigation

You can use service catalog properties to configure search and navigation within the service catalog homepage.

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Navigate to **Service Catalog** > **Catalog Administration** > **Properties** to view service catalog properties.

Restrict search access

Each catalog homepage provides a search bar to help locate items not displayed on the homepage. By default, any user who can access the catalog homepage can search using this search bar.

To restrict access to this search function by role, use the **List of roles (comma-separated) that can search the service catalog** property (*glide.sc.can_search*).

For example, to only allow logged-in users to access search, set this field to blank. To remove the search function for all users, set this field to **None**.

Note:
Search results only show items that the logged-in user can access.

Hide search results from inactive categories

By default, search results are returned from all categories, including inactive categories.

To avoid returning results from inactive categories, set the **Service catalog searches return items in inactive categories** property (*glide.sc.search.disabled_cats*) to **No**. For example, when designing a new category, you can avoid users seeing search results from this category until you are ready to make it active.

Note:
Security constraints can also make a category or catalog item inaccessible.

Restrict search by item type

By default, a search field does not appear when viewing order guides, record producers, and wizard launchers.

To define which catalog item types do not show the search field, list these types in the **List of class names for catalog items that do not have the search field displayed** (*glide.sc.item.cannot_show_search*) property.

For example, to enable searching when viewing record producers, remove `sc_cat_item_producer` from this list.

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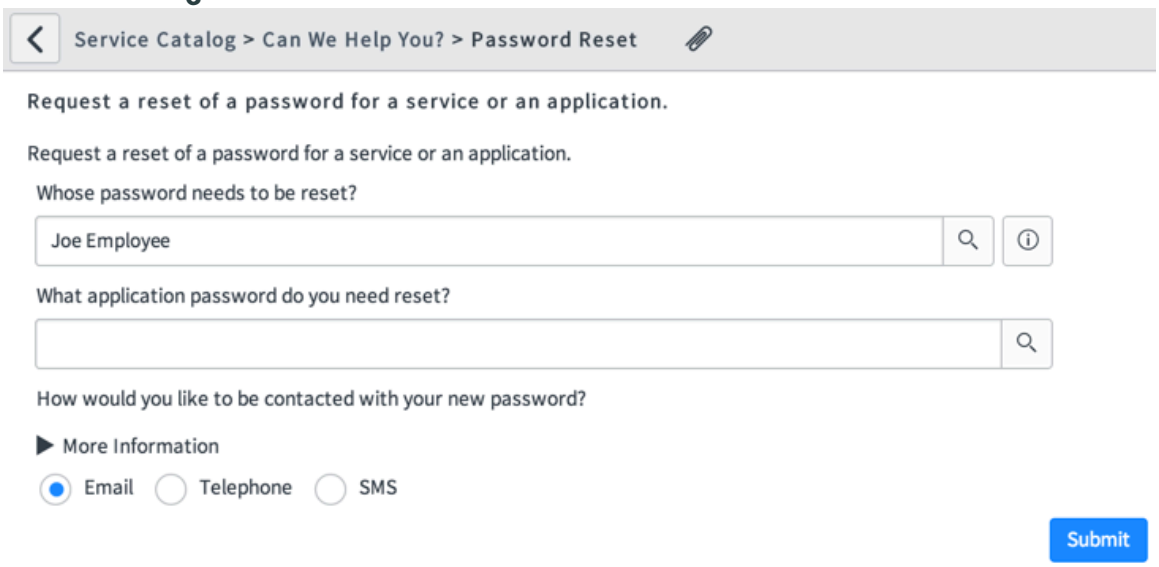
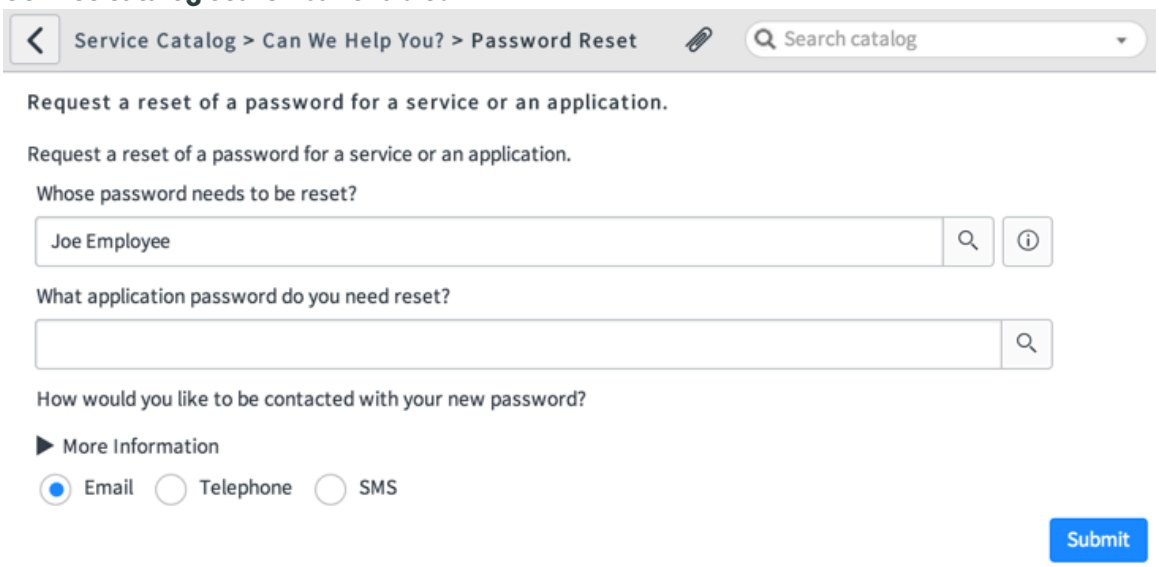
Service catalog search bar removed



Service catalog search bar enabled



Enable breadcrumb links

By default, breadcrumbs appear without links when using content management pages as service catalog homepages.

To display these breadcrumbs with links, set the **Use links for breadcrumbs rendered in Service Catalog pages accessed via a CMS site** property (*glide.sc.use_breadcrumb_links.cms*) to **Yes**. This setting provides greater navigational control for end users.

Disable search suggestions

By default, service catalog searches display "Did you mean?" suggestions if a search does not return any results and an alternate spelling or similar recent search does.

To disable these suggestions, set the **Specify whether search suggestions should be enabled** property (*glide.sc.search.suggestions*) to **No**.

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Refine search results

Use properties to refine search results in Service Catalog.

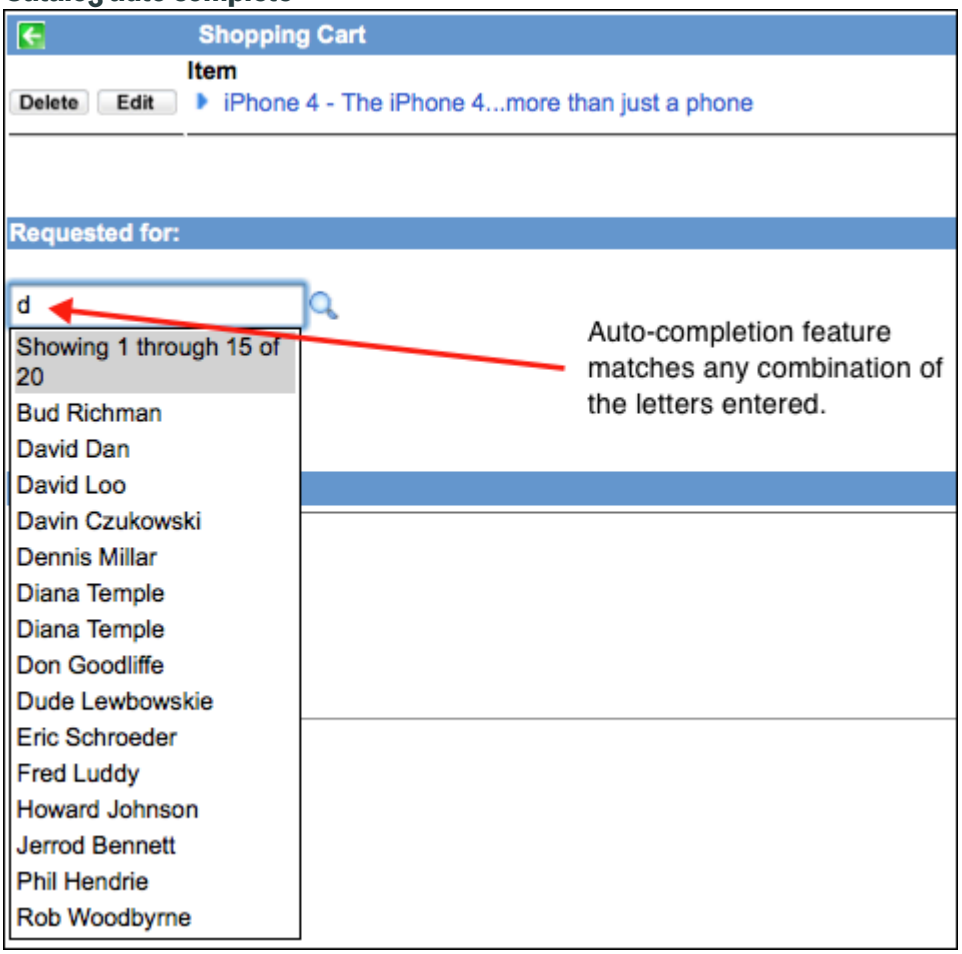
Before you begin

Role required: admin

About this task

The auto-completion feature returns values that contain an exact match to the letter combination entered.

Catalog auto complete



Administrators can use the **Additional columns for the "request for" Service Catalog widget** (*glide.sc.request_for.columns*) property to add columns to this list, to further refine the search results, and help determine which user to select when two users have the same name.

In this example, the property is set to display two additional columns, **Department** and **Title**:

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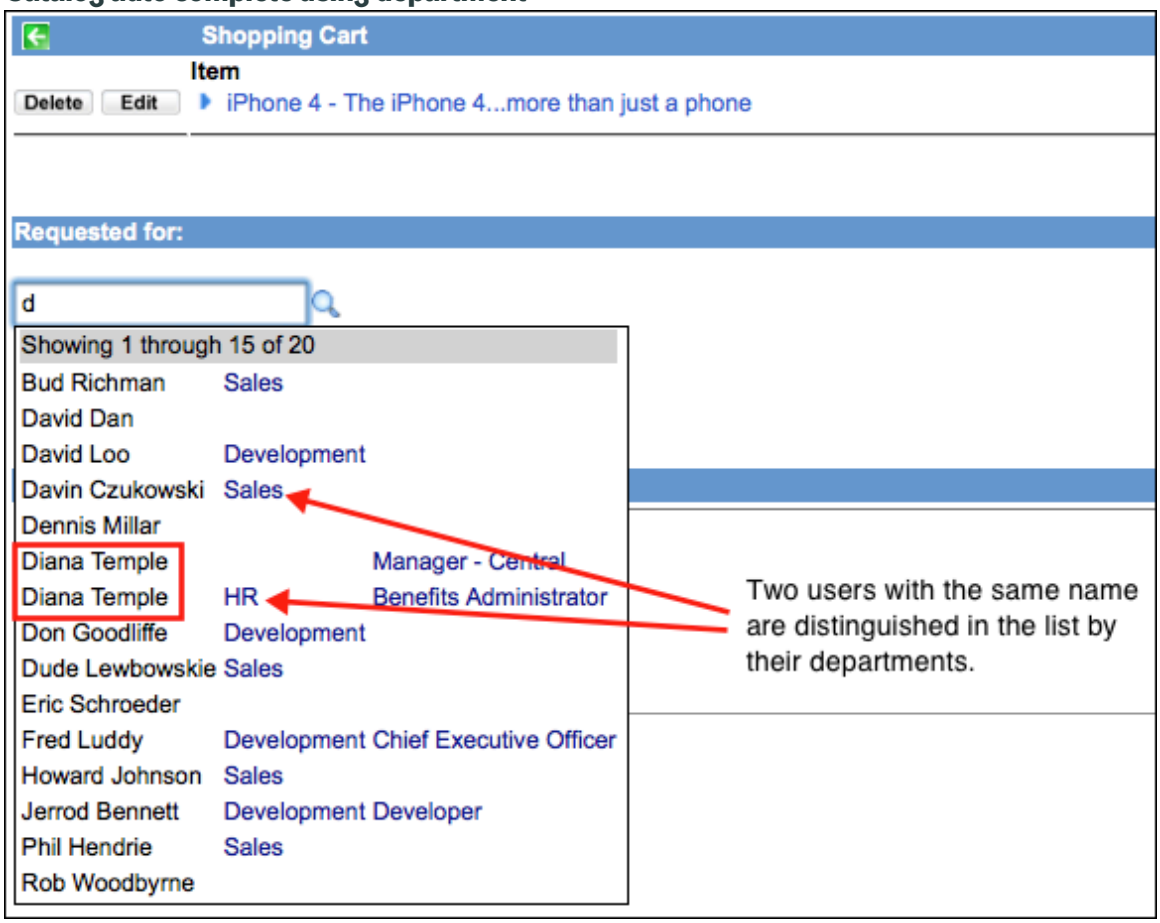
Catalog auto complete using department



Administrators can use the **Ordering of matches for the "request for" Service Catalog widget**. (*glide.sc.request_for.order_by*) property to configure the columns to sort by one of the values.

In this example, the is set to sort the results list by **department**.

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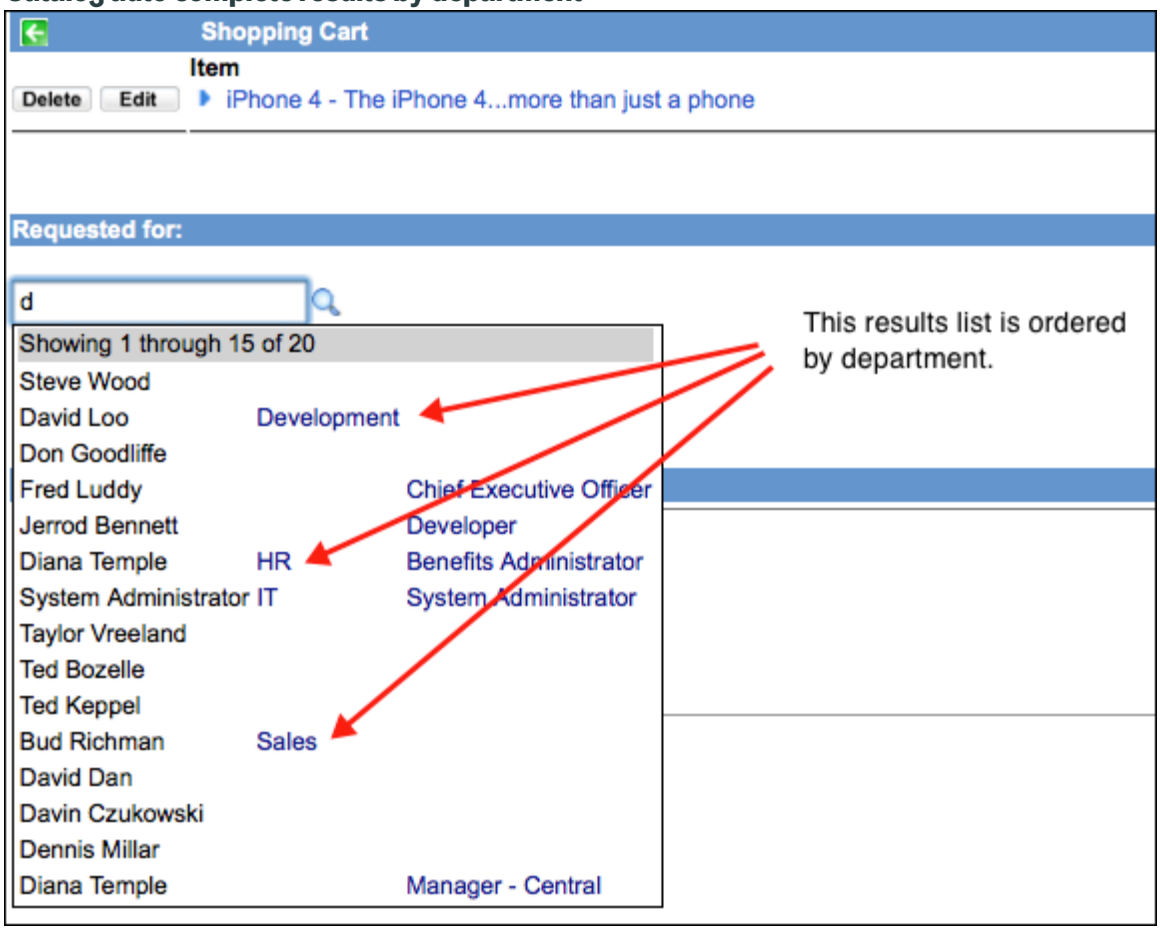
Catalog auto complete results by department



Auto-completion also applies to the **Request for** field, which can be added to the service catalog homepage.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog**.
2. Click **Add Categories**.
3. Select **Request for**.

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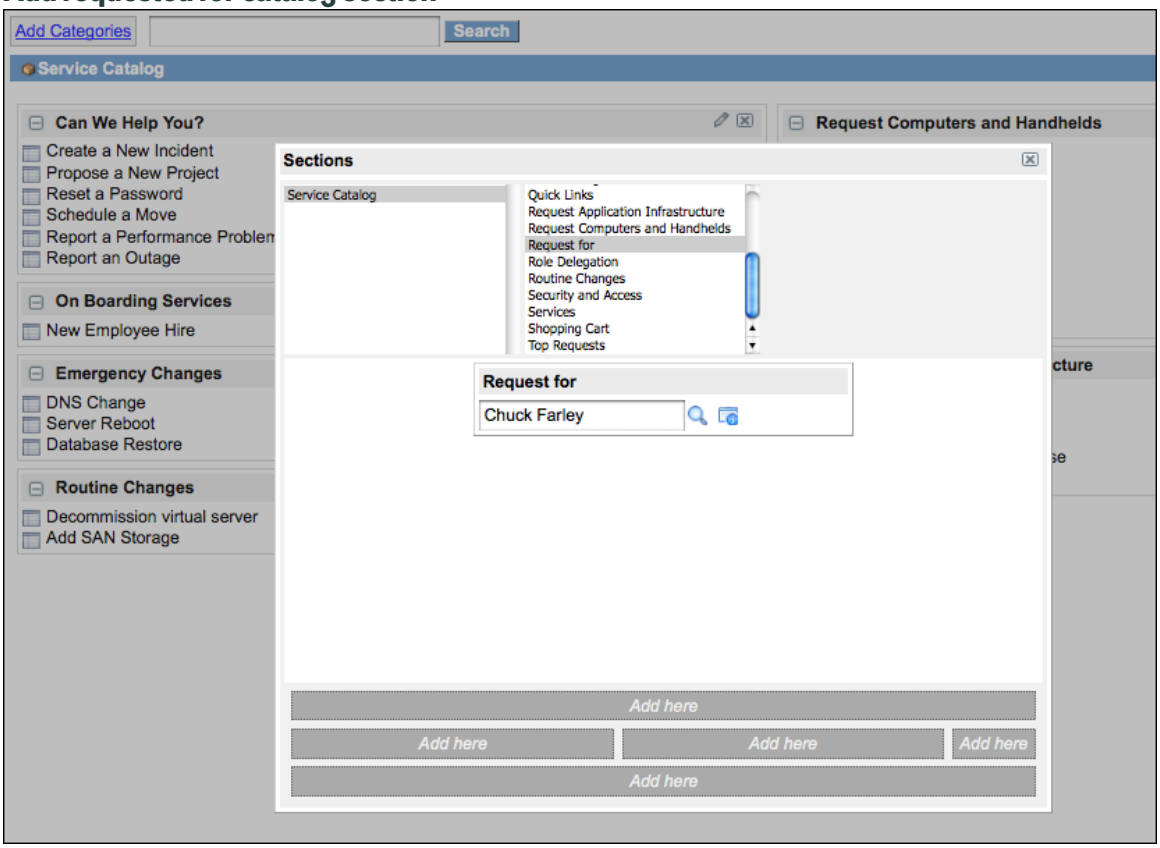
4. Place the category on the page.

Add requested for catalog section



Configure keyword search for catalog items

When you search for a catalog item by a keyword in Service Catalog, the search results are displayed by considering a few fields of the catalog table.

Before you begin

Role required: admin

About this task

If the keyword doesn't have exact matches, its closest matches are displayed as **Did you mean** suggestions. This search functionality is also applicable in Service Portal.

The search results are sorted in the following order based on the frequency of the keyword:

- Catalog items whose **Name** field contains the keyword (top).
- Catalog items whose **Meta** field contains the keyword.

> **Note:**
> The **Meta** field is used only for the Zing search and not for the AI search. If the **Meta** field isn't filled, the Zing search uses other sources, such as short description and name, for searching.

- Catalog items whose **Description** or **Short description** field contains the keyword.
- Categories whose **Name** or **Description** field contains the keyword.
- Catalogs whose **Name** or **Description** field contains the key term, or the catalog items whose **Class** field contains the keyword (bottom).

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Note:

- If your organization has multiple service catalogs, a search returns a result only from the catalog being viewed.
- Search results return an item only when the item is active, has a valid catalog and category association, and you're authorized to view the item.

Procedure

1. Complete the following steps to regenerate a text index for the sys_metadata table.
   a. Navigate to **System Definition** > **Text Indexes**.
   b. Open the text index for the Application File [sys_metadata] table.
   c. Select the **Regenerate Text Index** related link and select **OK**.
   The system schedules the table for the text indexing.
2. Complete the following steps to enable the **Did you mean** suggestions.
   a. Navigate to **System Properties** > **Text Search**.
   b. Under the **Did You Mean Properties** section, enable the **Suggest alternate search spellings for knowledge, catalog or global search** property.

Related topics

Search administration

Service Catalog for managers and end users

Regenerate a text index for a table

Configure a "Did You Mean?" suggestion

Create or edit a catalog item

Create a record producer

Create an order guide

Define a content item

Configure AI-based catalog search experience

Improve employee engagement with an AI-based catalog search experience in Service Portal and Now Mobile. Intelligent query features enable users to quickly and easily find the answers they need.

Before you begin

Role required: admin

About this task

You can configure AI-based catalog search experience in portals and Now Mobile. Following are the default search application configurations for Service Portal and Now Mobile:

- Service Portal Default Search Application. For information about AI Search in Service Portal, see AI Search in Service Portal.
- NowMobile App Search Configurations. For information about AI Search in Now Mobile, see AI Search in mobile.

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Each of these search application configurations have an associated search profile based on which the search results are filtered and displayed.

Note:
If the AI Search is enabled for Now Mobile, the **Experience for items not available in NOW Mobile** (*glide.sc.mobile.unsupported_discover*) property is not applicable. For information on Now Mobile properties, see Service Catalog properties.

Following are a few limitations for AI-based catalog search experience:

- The facets in Service Portal always show the primary category of the catalog item (even if the user does not have access to the primary category and the accessible path to the item is via another category that the item is associated with).
- If the user does not have read permissions for the category record and its fields, the search results cards in Now Mobile do not show the category of the item.

Procedure

1. Navigate to **All** > **AI Search** > **Search Experience** > **Search Applications**.
2. To edit the searchable catalogs in a portal or Now Mobile, perform the following steps.

   Note:
   Items are searched for only in the catalogs configured in the search source, irrespective of the catalogs associated with the portal. For information on associating a catalog with a portal, see Configure a catalog in Service Portal.

   a. In the Search Application Configurations list, select the search application configuration associated with the portal.
   For example, **Service Portal Default Search Application** for Service Portal.

   b. On the Search Application Configuration form, open the search profile.
   For example, **Service Portal Default Search Profile** specified for Service Portal.

      Note:
      To avoid conflicts with future upgrades, it is recommended that you create a search profile instead of using the search profile available in the base system.

   c. From the Search Sources related list, select a search source.
   For example, **Service Portal Catalogs**.

   d. In the **Conditions** field, add catalogs where you want the items to be searched for.

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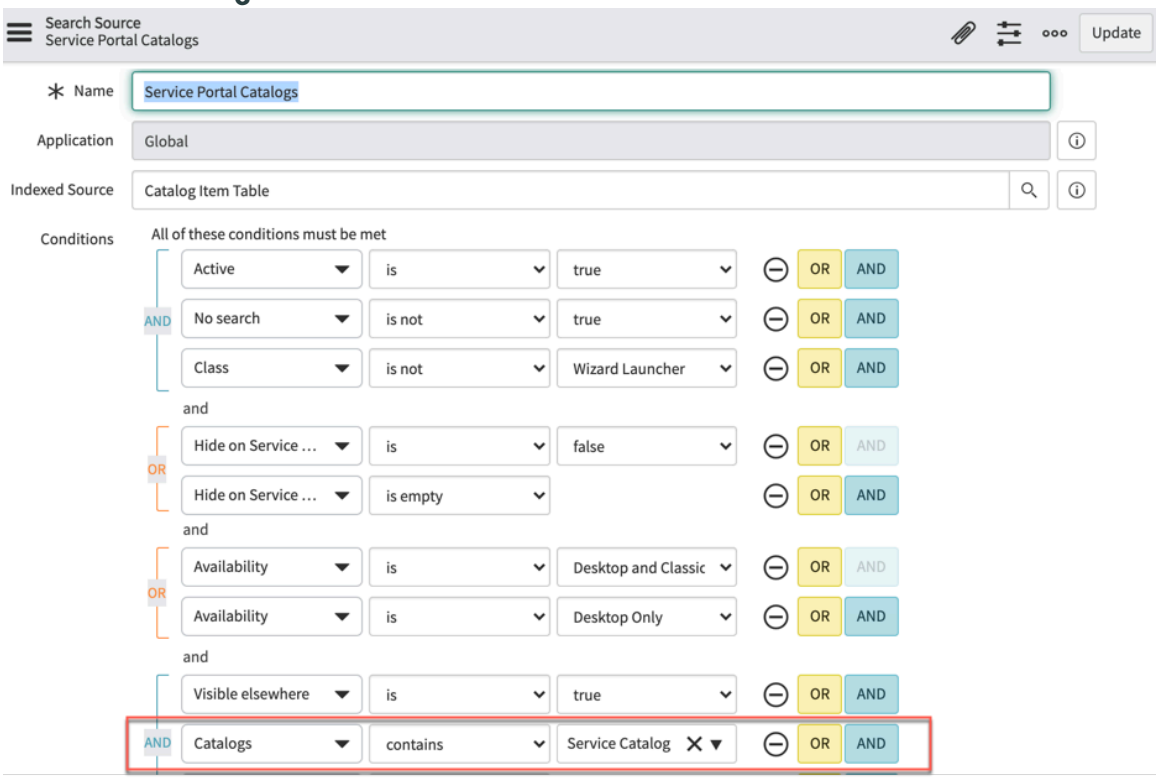
Searchable catalogs in Service Portal



e. Click **Update**.

Related topics

AI Search

Configure preview

Configure the number of items that have the **Preview** section expanded to display item details. You can also change the default number (5) of items and categories that display, and hide the **Exists in categories** information.

Before you begin

Role required: admin

About this task

By default, if not showing item details using pop-ups, the first two items listed in the category display have the **Preview** section expanded to display item details.

To change the number of items with this information expanded, set the **Number of Catalog Items to expand in browsing and search when not using pop-up icons to view details** (glide.sc.auto_expand) property to the number required.

Expanding to 2 items	Expanding to 1 item

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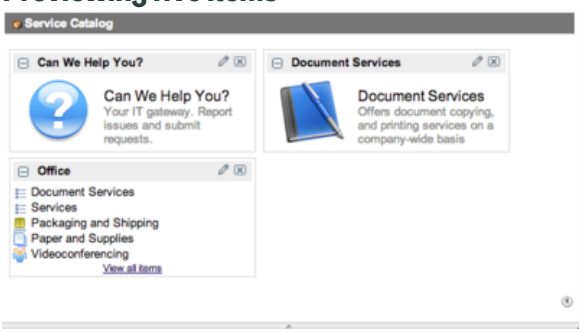
Set number of items and categories to preview

By default, up to five items or categories appear in each category on the homepage.

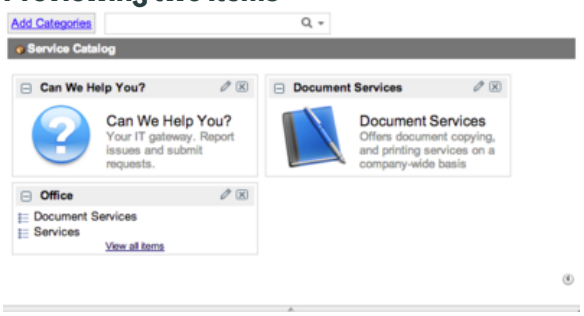
About this task

To change this number, set the *Number of Catalog Items/Categories to preview in a section* (glide.sc.max_items) property to the required value.

Previewing five items



Previewing two items



Hide the existing categories in the categories display

By default, catalog items that are in several categories show **Exists in categories** information that shows other categories that the items are available in. You can hide this information.

Before you begin

Role required: admin

Procedure

Set the **Show the additional categories section when viewing a catalog item** (glide.sc.show_additional.cats) property to **No**.

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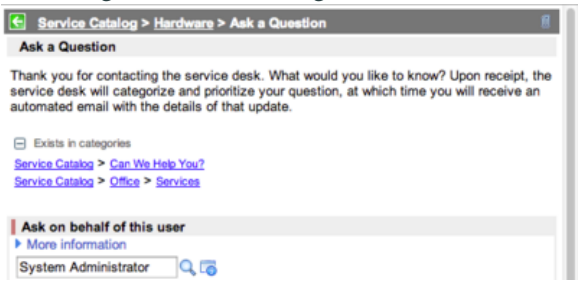
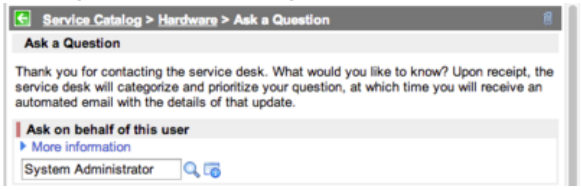
Showing additional categories



Hiding additional categories



Create a renderer

Create or modify renderers using UI macros to provide the rendering instructions. Renderers define a specific look and feel for a catalog or category.

Before you begin

Role required: catalog_admin or admin

About this task

Use renderers to specify the following formats:

- How catalogs appear on the multi-catalog homepage.
- How categories appear on a catalog homepage.

For example, you can create a renderer showing the category homepage image, the description, and the first two catalog items in a category.

Procedure

1. **Optional:** Create a UI macro to define specific rendering instructions.
2. Navigate to **Service Catalog** > **Catalog Definition** > **Renderers**.
3. Click **New**.
4. Select to create a catalog or category renderer.
5. Enter the renderer details.

Renderer Details

Field	Description
Name	A name for the renderer.
Macro	The UI Macro to use.
Render catalog title	Appears for catalogs renderers. A check box to display the catalog title bar on the multi-catalog homepage.
Render title	Appears for category renderers. A check box to display the category title bar on the catalog homepage. **Note:** The **admin** and **catalog_admin** roles can view the **Render title** even when the check box is not selected.

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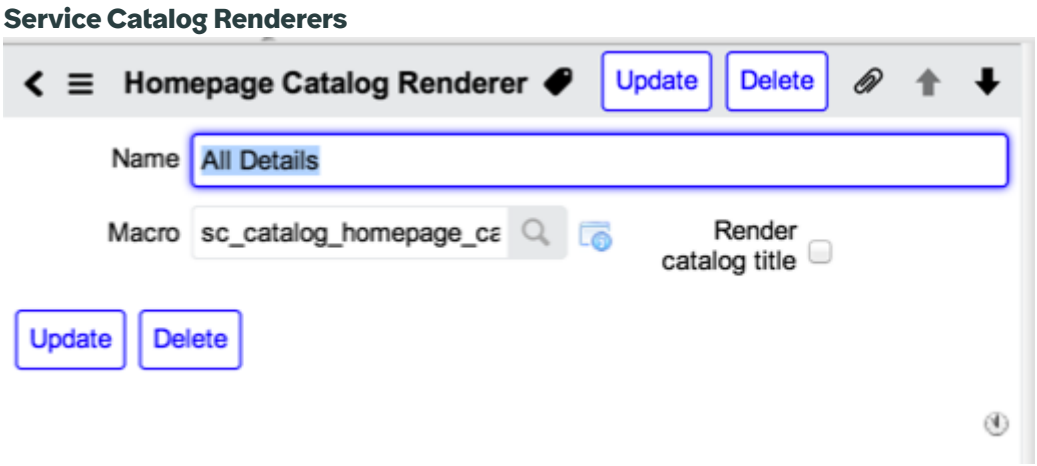

6. Click **Submit**.

> **Note:**
> To modify a default catalog or category renderer, follow a similar process, by selecting one of the default renderers listed.

This new renderer is added to the list of available choices when applying a renderer.

Select a renderer for a catalog

Select a renderer and apply them to a catalog to change its appearance.

Before you begin

Role required: catalog_admin or admin

About this task

The following default catalog renderer schemes are available:

- **All Details**: shows desktop image, title, and categories.
- **Image Only**: shows desktop image only.
- **Title and Image**: shows title and desktop image.
- **Title Only**: shows title only.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalogs**.
2. Click the add content icon (+) on the upper right.
3. Select a catalog in the middle panel of the pop-up window.

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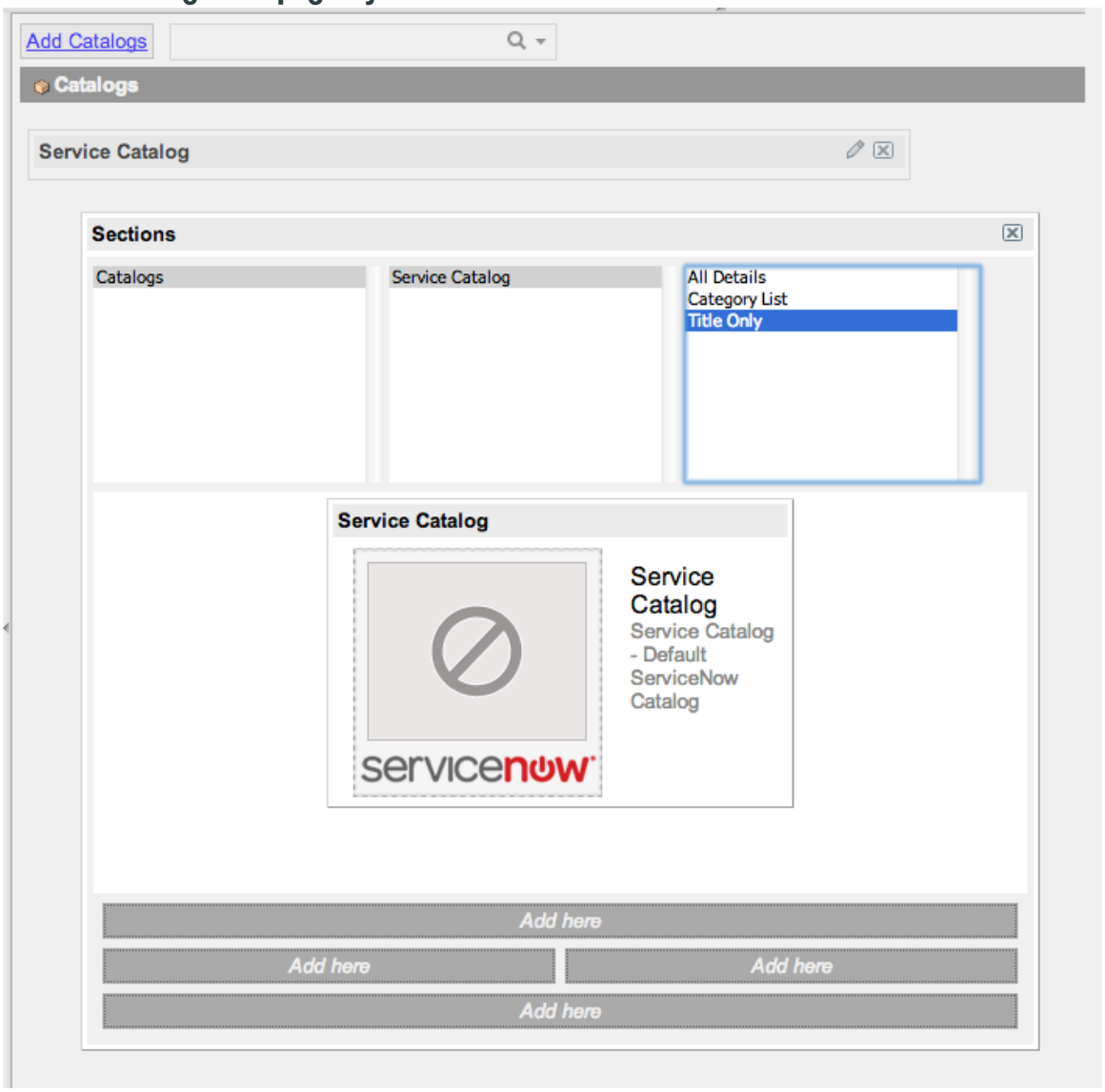
Service Catalog home page layout



4. Select a renderer from the list displayed in the right-hand panel, for example **Title Only**.
5. Click **Close** to save the catalog with the renderer settings you defined.

Select a renderer for a category

Select a renderer scheme for your categories.

Before you begin

Role required: catalog_admin or admin

About this task

The following default category renderer schemes are available:

- **Category Items**: shows desktop image, title, and description.
- **Category Items No Title**: shows desktop Image and description.
- **Category Details**: shows the subcategories and items in that category.

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog**.
2. Click the add content icon (+) on the upper right.
3. Select a category in the middle panel of the pop-up window.
4. Select a renderer from the list displayed in the right-hand panel, for example **Category Items**.
5. Click the close icon (x) to save the catalog with the selected renderer.

Customize a catalog homepage

Customize a catalog homepage to provide end users with access to catalogs from one homepage.

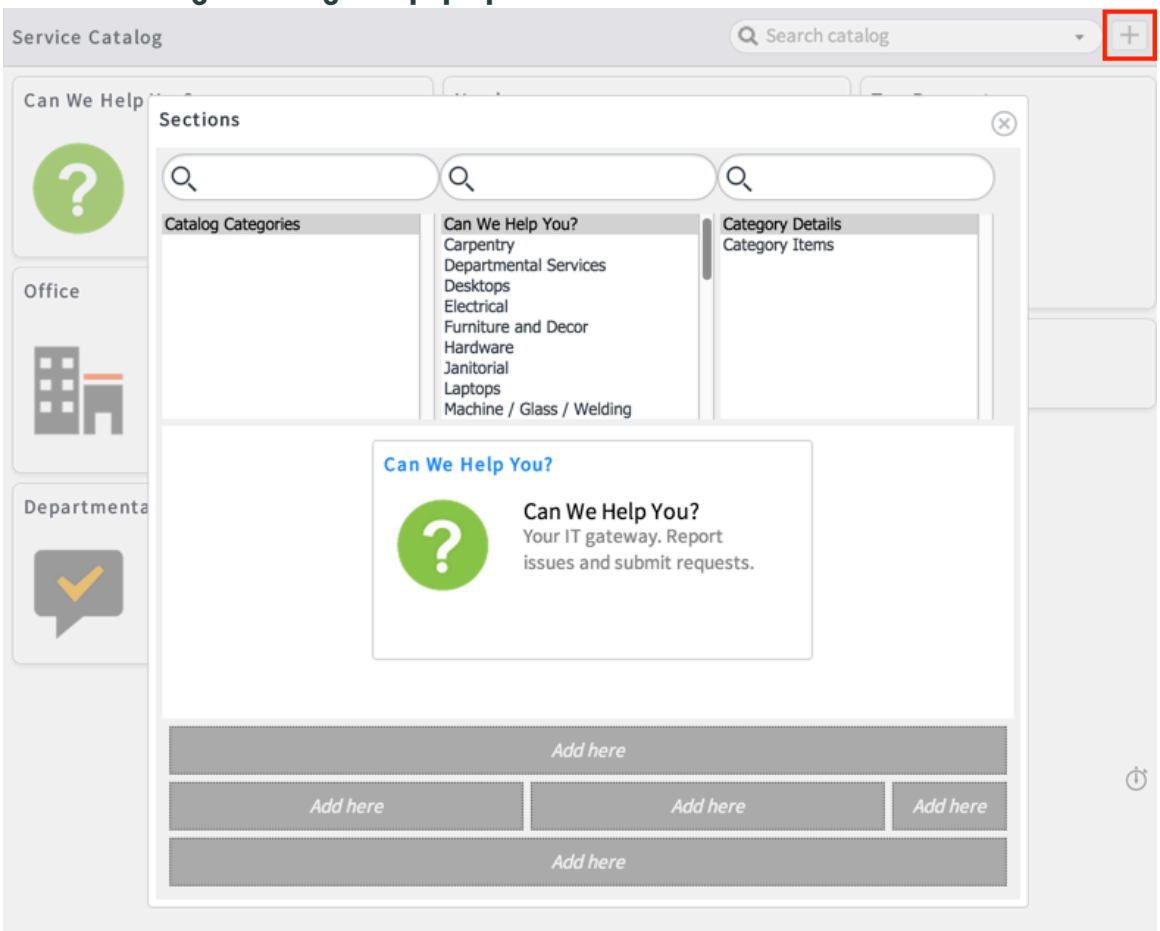
Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog**.
2. Click the add content icon (+) at the top of the page to add a category.
3. Select a category in the middle panel of the pop-up window that appears.

Service Catalog add categories pop-up window



4. Click **Add here** in the location where the category appears on the homepage.
5. **Optional:** Repeat steps 3–4 to add more categories.

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6. Close the pop-up window.
7. **Optional:** To change a category location, drag it to the appropriate place.
8. **Optional:** To remove a category, click the (**X**) icon on the top right of the category header.
9. **Optional:** Add a shopping cart on the page.

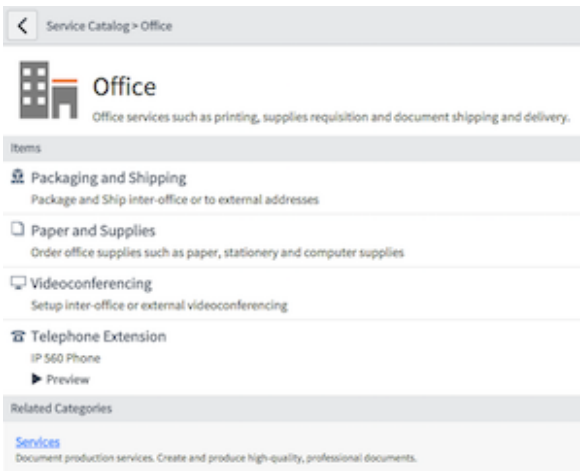
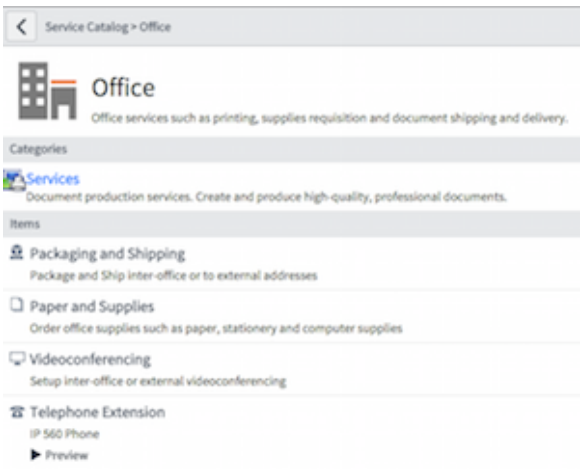
Display subcategories in a panel

By default, subcategories are displayed in a panel at the bottom of the category page. You can change a system property to list subcategories at the top.

Before you begin
Role required: admin

Procedure

Use the **In category view display subcategories in a panel** property (*glide.sc.use_sub_cat_section*).

Name of form	
When set to **Yes**, the subcategories appear in a panel at the bottom.	When set to No, the subcategories appear as a list at the top.
Set to Yes 	**Set to No** 

Customize the multi-catalog homepage

Customize the multi-catalog homepage to provide end users with access to multiple catalogs from one homepage.

Before you begin
Role required: admin

About this task
This task is similar to customizing the homepage for an individual catalog. In this task, you are adding catalogs, not catalog categories.

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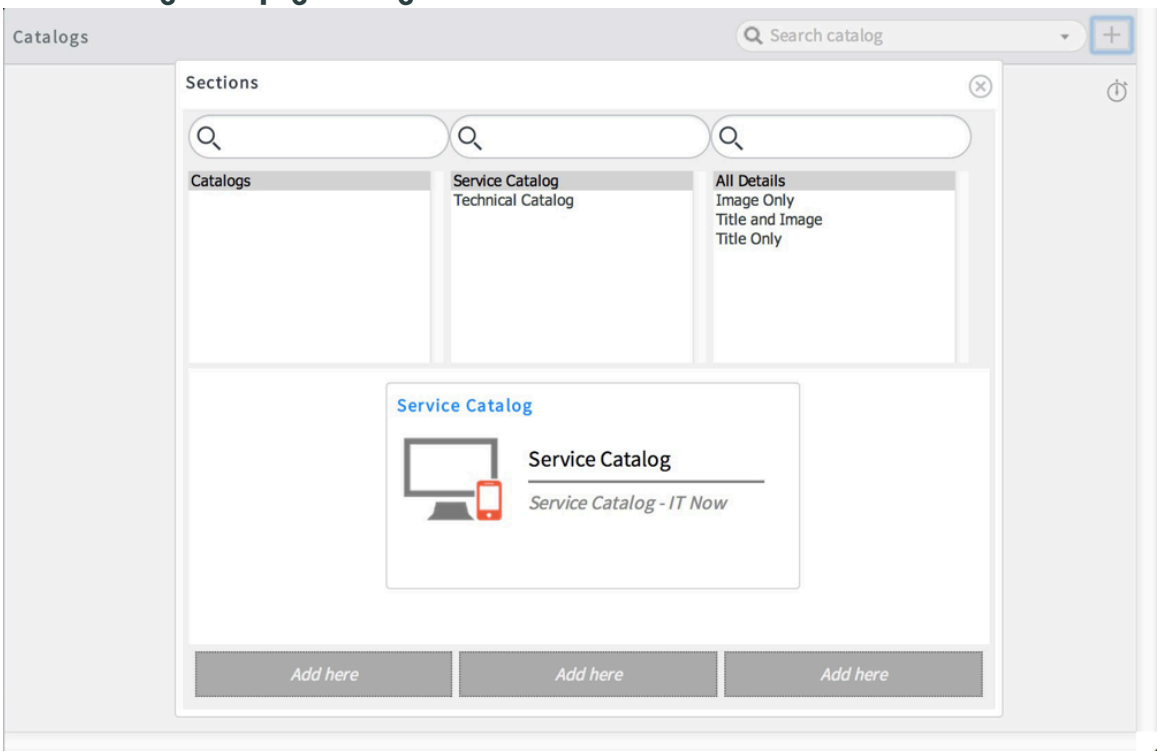
Procedure

1. Navigate to **All** > **Service Catalog** > **Catalogs**.
2. Select **Add Catalogs** at the top of the page to add catalogs to this page.
3. Select a catalog in the middle panel of the pop-up window.

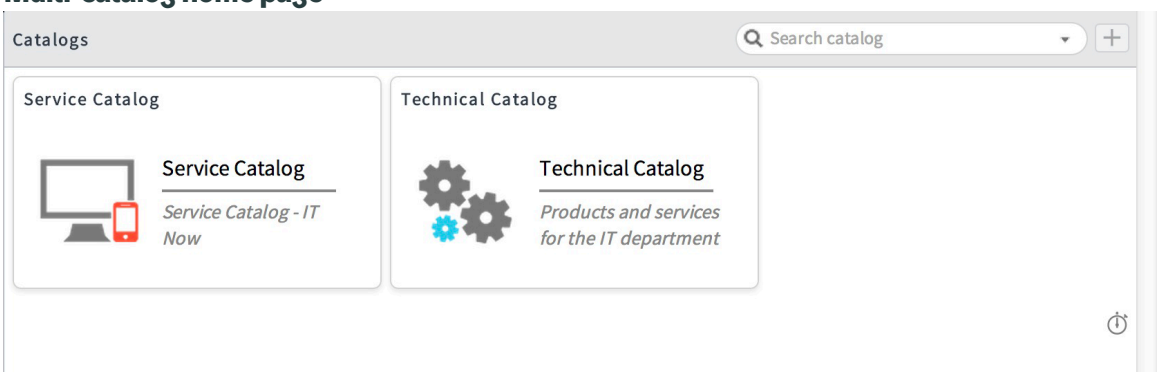
Multi-catalog home page arrangement



Note:
Only administrators can see catalogs that do not contain active categories or items.

4. **Optional:** Select a renderer from the right-hand panel, for example **Title Only**.
5. Click **Add here** in the location where the catalog appears on the homepage.
6. **Optional:** Repeat steps 3–5 to add more catalogs.
7. Close the pop-up window to save the changes.

Multi-catalog home page



You can modify the arrangement of catalogs within the homepage:

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- To change a catalog location, drag it to the appropriate place.
- To remove a catalog, click the X in the catalog title bar.
- To edit details for a catalog, click the pencil icon in the catalog title bar.

The catalogs appear on the homepage.

Show item details in sections or pop-ups

By default, a service catalog category displays the first two items with the preview section expanded to show item details. You can change the number of items that are previewed, or change the preview to appear in a pop-up window.

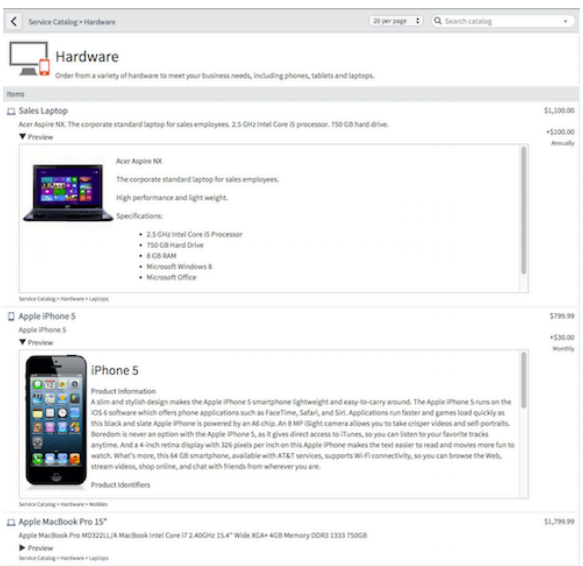
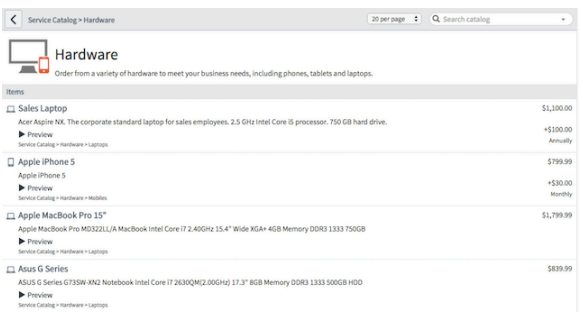
Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. To change the number of items previewed, set the **Number of Catalog Items to expand in browsing and search when not using pop-up icons to view details** (*glide.sc.auto_expand*) property to the desired number.

   Example

Expanded to 2 items.	Expanded to 1 item.
2 items 	**1 item** 

3. To use the preview icon, set the **When browsing a category use the pop-up icon to show item details** (*glide.sc.cat_view_use_popup_for_details*) property to **Yes**.

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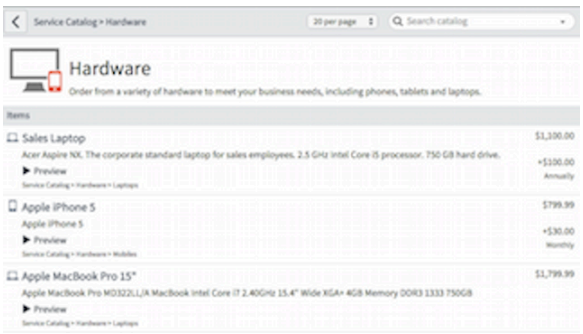
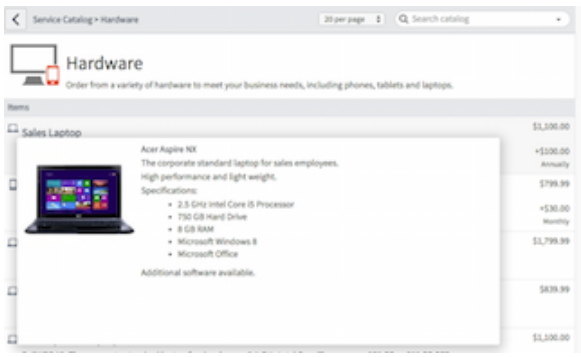
When set to **No**, the item details appear when you click **Preview**.	When set to **Yes**, the item details appear as a pop-up when the cursor hovers over the item icon.
Set to No  	**Set to Yes** 

Configure Classic Mobile devices

When you configure Service Catalog on a Classic Mobile device, you can define the layout and presentation of catalogs. You can then perform actions such as ordering products and services, submit incidents and problems using record producers.

Before you begin

Important:

Mobile Classic Is Deprecated!

The App Has Been Removed From The Stores And Can No Longer Be Activated. We Are Not Offering Enhancements, Bug Fixes, Or Support For The App. See ServiceNow Classic Mobile App Deprecation Effective September 15, 2022.

Role required: admin

About this task

Users can access the service catalog on Classic Mobile devices to:

- View and order products and services.
- Submit incidents and problems using record producers.

Note:
Users cannot access order guides, wizards, or content items from Classic Mobile devices.

Administrators and catalog administrators can configure the layout, presentation, and other aspects of the service catalog for Classic Mobile devices.

Including:

- Defining rendering options for Classic Mobile categories.
- Defining rendering options for Classic Mobile catalog items.

Accessing the Service Catalogon Mobile Devices

To access the service catalog, navigate to **Self-Service** > **Catalog**.

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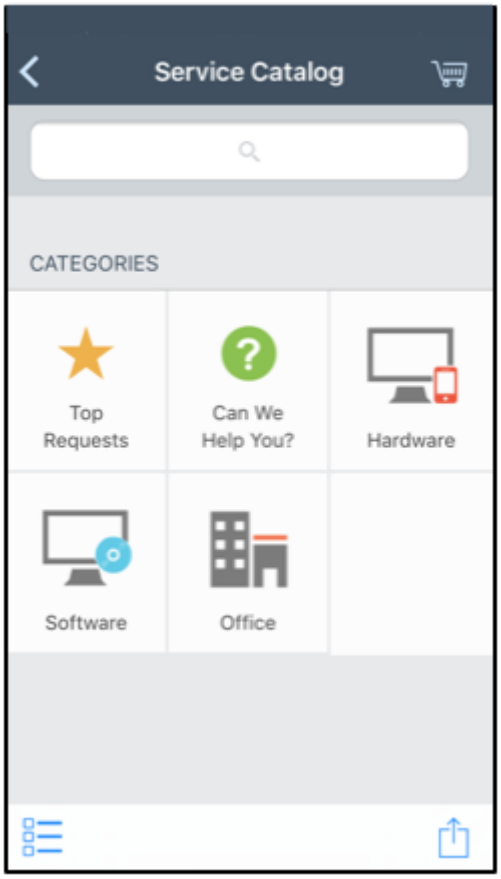
Service Catalog homepage Classic Mobile



Catalog items are grouped into categories, which can also contain one or more subcategories.

You can browse and select an item. To browse for an item within a category, tap the category filter to select the category or subcategory.

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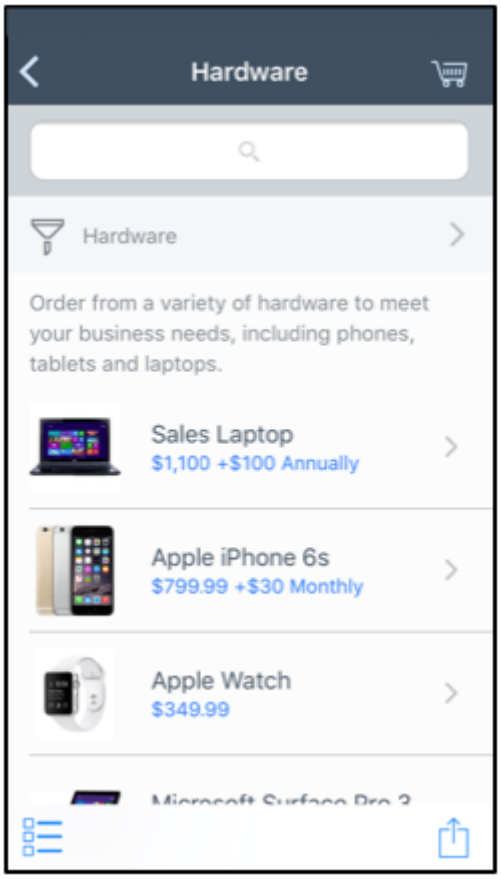
Sample service catalog category



To request an item:

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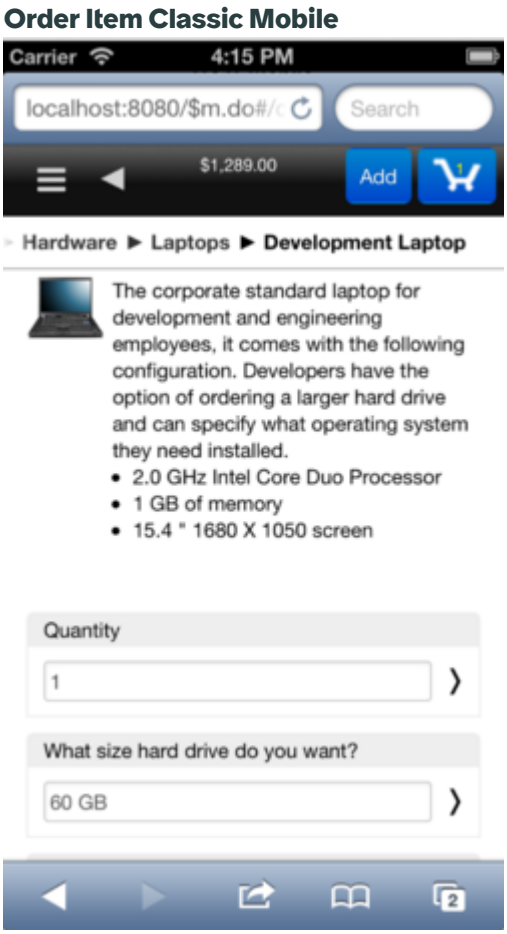
Procedure

1. Select an item.



2. Tap any field with an arrow (>) to add information, such as the name or location of the requestor, the need-by date, or item quantity.
3. Tap **Add to Cart** to add the item to your cart.

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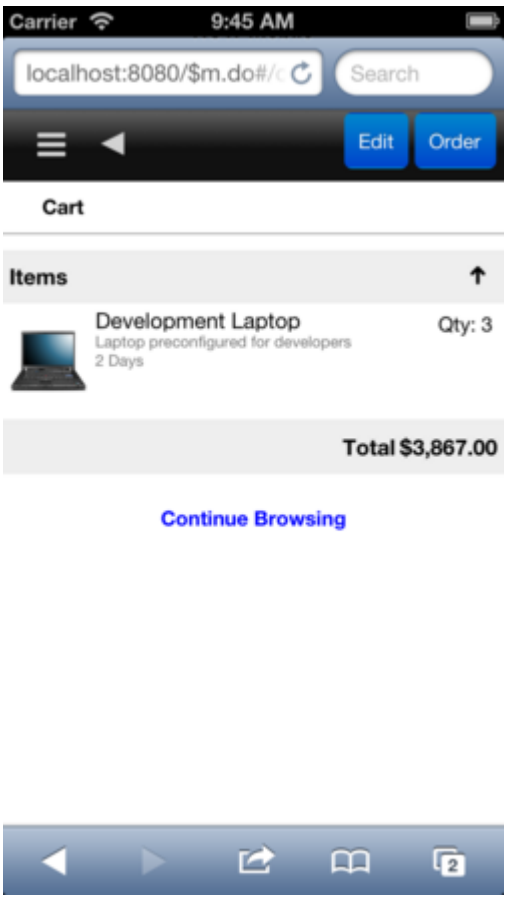
Order Item Classic Mobile 2



The order screen appears.

4. Tap **Edit** to edit your order, if required.
5. To order the item as specified, tap **Order**, then tap **OK** when prompted to confirm ordering. A confirmation message appears.

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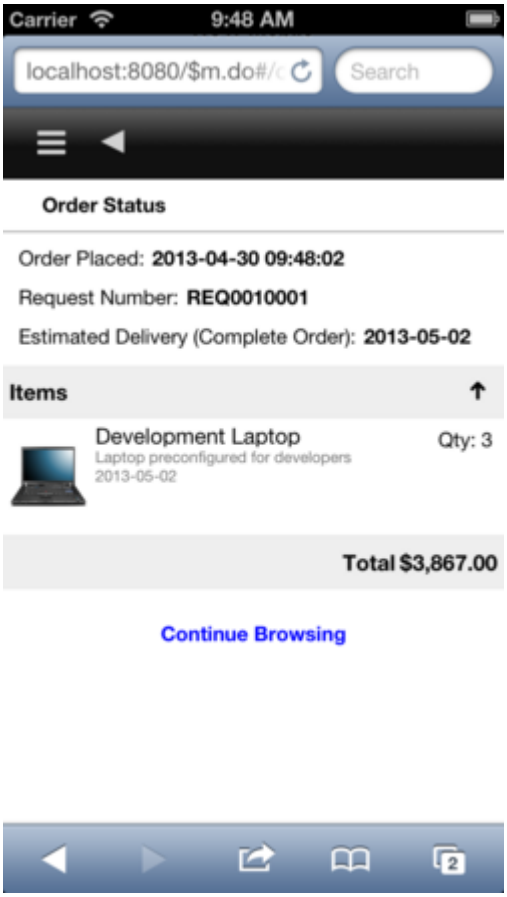
Classic Mobile Order Confirmation



6. Tap the item to see further details.

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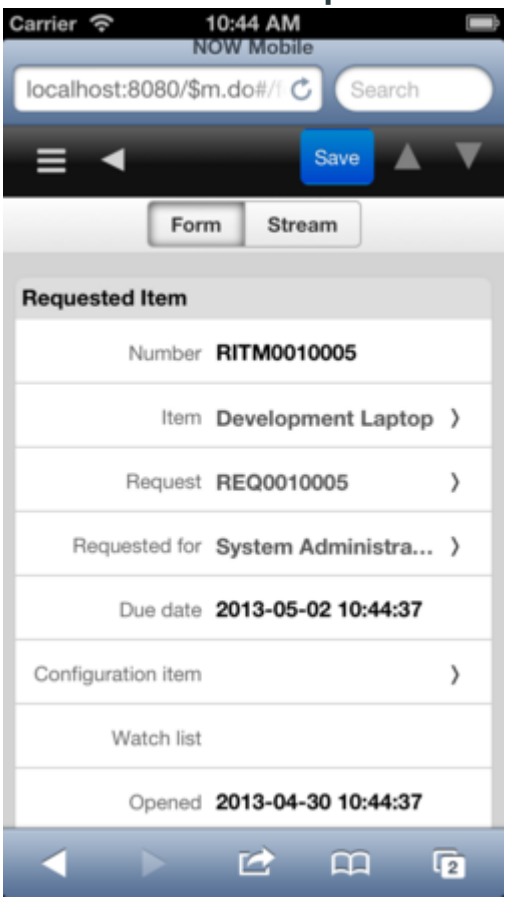
Classic Mobile Order Requested Item Details



7. Tap the back arrow to return to the confirmation message.
8. Tap **Continue Browsing** to return to the service catalog.

   After the request is submitted, ServiceNow follows request fulfillment processes to fulfill the ordered item.

Define the mobile layout

You can configure the Classic Mobile layout for categories within a service catalog.

Before you begin

Role required: admin

About this task

By default, service catalog categories appear on mobile devices in the same order as on desktop devices.

Procedure

1. Navigate to **All** > **Service Catalog** > **Classic Mobile Admin** > **Classic Mobile Layout** to display a list of service catalogs.
2. Click the lookup icon for the service catalog you want to configure.
   The mobile layout displays details for the catalog.
3. Click **Edit** to select which categories appear on mobile devices, and in which order.

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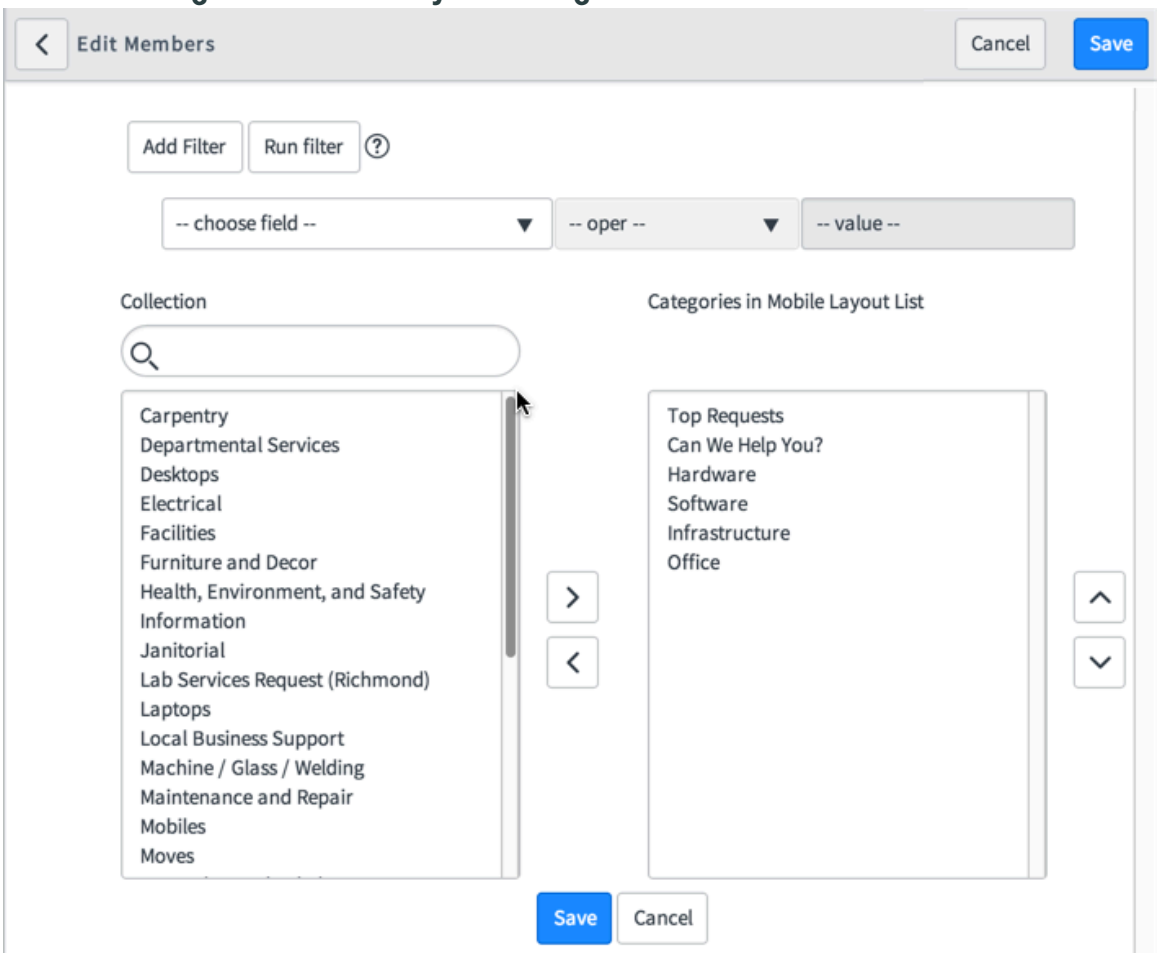
Service Catalog Classic Mobile layout catalogs



4. Add, remove, or reorder the selected mobile categories, and then click **Save**.

Note:
To return the display to the default desktop layout settings for the portal page associated with that catalog, click the **Replace categories with desktop layout** related link.

Limit description sizes in the Classic Mobile UI

By default, item descriptions in the smartphone interface are truncated to a maximum of two lines.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. Set the **Limit descriptions in category and item listings to two rows in the Mobile UI** property (glide.sc.mobile.limit.description) to **No**.

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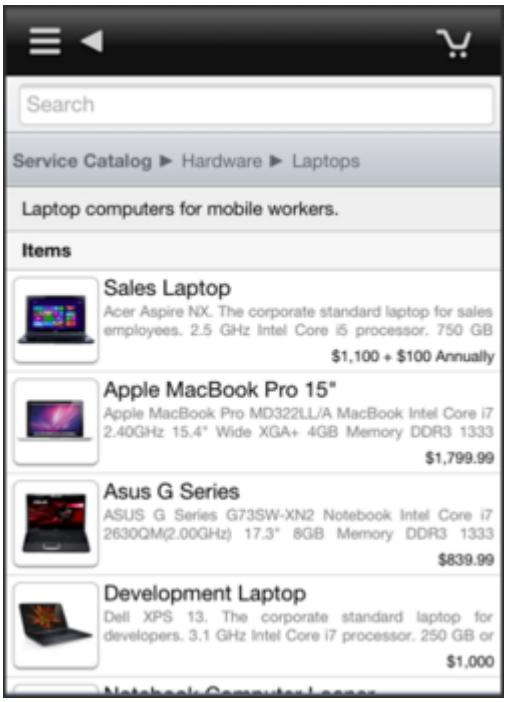
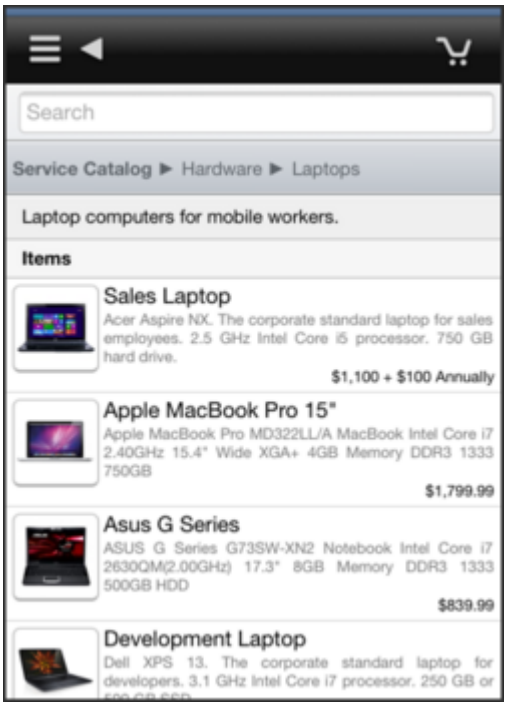
If set to **Yes**, descriptions are limited to two lines	If set to **No**, the full descriptions are given
Set to Yes 	**Set to No** 

Using the content management system with the service catalog

Use the content management system (CMS) to create a custom interface for the service catalog.

Important:
Use Service Portal for new development instead of CMS. Service Portal is an alternative to CMS with a refined user experience, and is active by default in the base system. For more information, see Service Portal and Content Management and Service Portal.

Manage catalogs in CMS sites

When your organization uses the content management system (CMS) as well as Service Catalog, you can select which catalogs are supported within the CMS sites.

Before you begin

Role required: catalog_admin or admin

About this task

Associating catalogs with sites ensures that users can always access an appropriate catalog.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Catalogs** and open the catalog to associate with a site.
2. In the Sites related list, click **Edit**, select the site to associate with the catalog, and then click **Save**.
3. Click the reference icon beside the site name, and then click **Open Record**.

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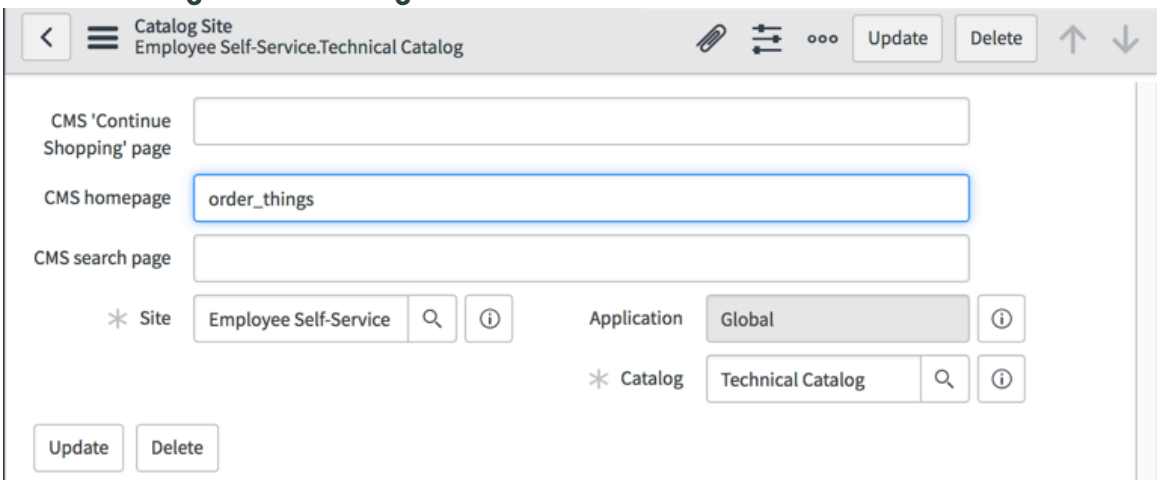
Service catalog details - catalog sites details



4. Enter values in the fields, as appropriate.

Field	Description
CMS homepage	The homepage for this site.
CMS search page	The location of the search page for the site.
CMS 'Continue Shopping' page	The location to direct end users to when they click the **Continue Shopping** button in that CMS site. This field is designed to reference a content page URL suffix.

5. Click **Update**.

Set up catalog portal pages

The Catalog Portal Page `[sc_catalog_view_mtom]` table links catalogs to CMS portal pages and defines the default catalog to portal page combination used by URLs.

For example, the default portal page for the service catalog is the catalog_default page.

Catalog portal page records appear in the *Catalog Portal Pages* related list on the Catalog form. The Catalog Portal Page table generates two values in a URL: **sysparm_catalog_view** and **sysparam_catalog**. Use the Catalog Portal Page form to enter a custom link, if required.

Resolve missing catalog portal pages

If a catalog record is not associated to a catalog portal page record, ServiceNow attempts to present a view based on a set prefix of: **catalog_<catalog name>**.

For example, if the default service catalog has no catalog portal page record, the system sets **sysparm_view** to **catalog_Service_Catalog**. With this setting, when you navigate to **Self-Service** > **Service Catalog**, you view a new and apparently blank **catalog_Service_Catalog** portal page, instead of the existing and populated **catalog_default** portal page.

To correct, go to the *Sites* related list on the Catalog form and add a new catalog portal page record manually.

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For example, for the default service catalog, add a record with the following values:

- *Catalog*: Service Catalog
- *Portal Page*: Catalog (catalog_default)
- *Default*: true

Manage catalog portal pages

Using Service Catalog, you can create and manage multiple portal pages for a catalog.

Before you begin
Role required: admin

About this task
A catalog portal page provides a homepage for a specific catalog. You can use portal pages to create different catalog views for different user groups. Each portal page accesses the same catalog content and presents that content in different ways.

Catalog portal page details include the owner, title, and view to use for that page.

Procedure

1. The Catalog Portal Pages related list shows portal pages available for that catalog. Each catalog has a default page, created automatically when the catalog is created.
2. Select an appropriate action:
   - Click **New** to create a new portal page.
   - Click **Edit** to select another portal page for the catalog.
   - Select a portal page to view and edit details for that page.

Service Catalog items

The overall catalog is made up of a collection of discrete catalog items.

The basic Service Catalog item types include:

- Standard catalog items
- Record producers: Provide alternative ways to add information such as `Incidents via the service catalog`.
- Order guides: Enable grouping multiple catalog items in one request.
- Content Items: These are the catalog items which provide information instead of goods or services.

Standard catalog item

A catalog item can be a good or service. If something can be ordered by itself, it is a catalog item. If something only makes sense as part of a greater whole, it is part of an item, rather than an item in and of itself. For example, a new Dell server is a catalog item, as is a new Executive Desk.

Use a catalog item to publish a service to your users. Add a service description, images, and a workflow to determine the approval and fulfillment processes for the catalog items.

Use the variables to present and gather information from the users. Catalog UI Policies and Catalog Client Scripts can also be added to control the item behavior based on user input.

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Specify related items and articles for a catalog item

Specify related items and articles for a catalog item to provide alternatives and additional information. These items and articles are displayed in the catalog item page in Service Portal and Now Mobile.

Before you begin

Role required: admin, catalog_admin, or catalog_editor

About this task

You cannot specify related items and articles for an order guide.
You cannot specify these types of items as related items for a catalog item.

- Wizard Launcher
- Content Item
- Standard Change Template
- Any item in Admin Home catalog

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. Select the required catalog item.
3. To specify a related article, perform these steps.
   a. In the Related Articles related list, click **Edit**.
   b. On the Edit Members form, move the required articles from the **Collection** column to the **Related Articles List** column.
   c. Click the up or down icon to arrange articles in the required order and click **Save**.
4. To specify a related catalog item, perform these steps.
   a. In the Related Catalog Items related list, click **Edit**.
   b. On the Edit Members form, move the required items from the **Collection** column to the **Related Catalog Items List** column.
   c. Click the up or down icon to arrange items in the required order and click **Save**.

> **Note:**
> In Service Portal, use the instance options to configure the number of articles and items shown in the **Related Articles** and **Related Items** section. See Configure related catalog item widget instance options or Configure knowledge related articles widget instance options.

Related topics

Map related articles

Add an ordered item link to an item

Use ordered item links to provide a link on the ordered item screen that provides more information about an item.

Before you begin

Role required: Catalog administrator

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About this task

After you order the catalog item, you can click the link to see relevant information about the item ordered, for example, for standard delivery terms and conditions. The URL text and link can be defined once and reused across multiple items.

Links are rendered with an added parameter providing the sys_id of the requested item. For example, if the link is mylink.com, it is rendered as mylink.com?req_item=abcde12345. This added parameter can be useful for virtual provisioning situations.

Note:
Ordered item links cannot be configured for Classic Mobile devices.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Ordered Item Links**.
2. Click **New**.
3. Enter a **Name** for the ordered item link.
4. Enter **Link text** to display as the link.
   For example, `Click here to see more information about the iPhone`.
5. Enter the exact **Link URL**.
   For example, http://www.mylink.com.
6. Select the **Target**.
   You can choose to open the link in a new window or tab, or within the catalog. If Within Catalog is chosen, the link must be within the same site. An HTTP site cannot be called from within HTTPS.
7. Click **Submit**.
8. Navigate to **Service Catalog** > **Catalog Definition** > **Maintain Items**.
9. Click an item **Name**.
10. In the **Ordered Item Link** field, click the reference lookup icon.
11. Click an ordered item link **Name**.
12. Click **Update**.

Create a Service Catalog client script

You can create client scripts to customize the catalog.

Before you begin

Role required: admin

About this task

Use catalog client scripts to control the behavior of the catalog items when presented to your users. Catalog client scripts can be applied to a catalog item or a variable set. These scripts run on the browser instead of the server, allowing you to better control the information that the user submits.

The priority order for g_form APIs is:

1. Mandatory (highest)
2. ReadOnly/Display

If a variable is set to mandatory and does not have value, readonly or hide do not work on that variable. If a variable is hidden or readonly, and then set to mandatory, the variable field becomes visible or editable.

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This priority order is also applicable for variable sets and containers. If a variable set or container has a mandatory variable without any value, then the container or variable set cannot be hidden.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Catalog Client Scripts**.
   A list of current custom catalog client scripts appears.
2. Click **New**.
3. On the form, fill in the fields.

Field	Description
Name	Unique name for the catalog client script.
Applies to	Item type this client script applies to: ○ **A Catalog Item**: enables the Catalog item field. ○ **A Variable Set**: enables the Variable set field.
Active	Check box to enable the client script. Clear the check box to disable the script.
UI Type	Whether to apply this field to desktop, Classic Mobile, or both.
Script	Enter the client script to run on the service catalog item.
Type	Select when the script runs, such as **onLoad** or **onSubmit**.
Catalog item or Variable set	Select a catalog item or variable set from the list. The field name and options available depend on the selection in the **Applies to** field.
Applies on a Catalog Item view	Check box to apply the catalog client script to catalog items displayed within the order screen on the service catalog. Available in the requester view.
Applies on Requested Items	Check box to apply the catalog client script on a Requested Item form, after the item is requested. Available in the fulfiller view. See VEditor.
Applies on Catalog Tasks	Check box to apply the catalog client script when a Catalog Task form for the item is being displayed. Available in the fulfiller view. See VEditor.
Applies on the Target Record	Check box to support the catalog client script on a record created for task-extended tables via record producers. See Default variable editor.

4. Click **Submit**.

Translation of Service Catalog items

You can translate Service Catalog items into multiple languages using the ServiceNow® Localization Framework.

Localization Framework standardizes and enhances the translation process of artifacts such as Service Catalog items through configurable workflows. For more information, see the Localization Framework topic. You can translate Service Catalog items by activating the Localization Framework Installer plugin (com.glide.localization_framework.installer). For information about the plugin activation, see the Activation of Localization Framework topic.

You can request translation for a single or multiple items from a catalog item list. For more information, see Request translations for Service Catalog items

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Note:

- When you translate a catalog item from a form or list, the corresponding variables, variable sets, catalog client scripts and catalog UI polices associated with the catalog item also get translated.
- You can create catalog items only in the primary language. If you change the language and edit a catalog item using catalog builder, the corresponding content of the catalog item does not get translated.

You can monitor the overall localization health of the Service Catalog items from the Localization Insights dashboard. The dashboard provides the localization health of the system with reports that are generated from the localization insights records as per the scheduled jobs.

Watch this six-minute video to learn more about the process of localizing catalog items.

Localization framework overview

Monitoring aggregated catalog item data

Monitor aggregated catalog item data like fulfillment automation coverage, translation coverage, and conversational coverage using the Service Catalog Overview dashboard.

Aggregated catalog item data graphs

You can access the aggregated catalog item data graphs in the Service Catalog Overview dashboard by navigating to **All > Service Catalog > Service Catalog Overview** if you have the catalog_admin role.

The Catalog item translation coverage graph is displayed only if you have enabled the Localization framework. For more information, see Localization Framework.

Service Catalog Overview dashboard

Graph	Description
Catalog request channel analytics - last 12 months	Vertical bar graph representing the count of catalog requests made through different channels such as Virtual Agent, Service Portal, Mobile in the last 12 months.
Catalog item best practice deviations	Pie-chart representing the Item Diagnostic Results report scores for catalog items, which indicate the health of items. A higher score means that an item has more deviations from best practices. For example, duplicate variables for a catalog item will represent a higher score. Each score is represented by a different color.
Catalog item VA render type	Horizontal bar graph representing the individual count of the way catalog items are rendered in Virtual Agent. It specifies whether an item is rendered as a pop-up, window, or conversation in Virtual Agent.
Catalog item fulfillment automation coverage	Vertical bar graph representing the count of fulfillment automation coverage of catalog items. It specifies whether items are fully

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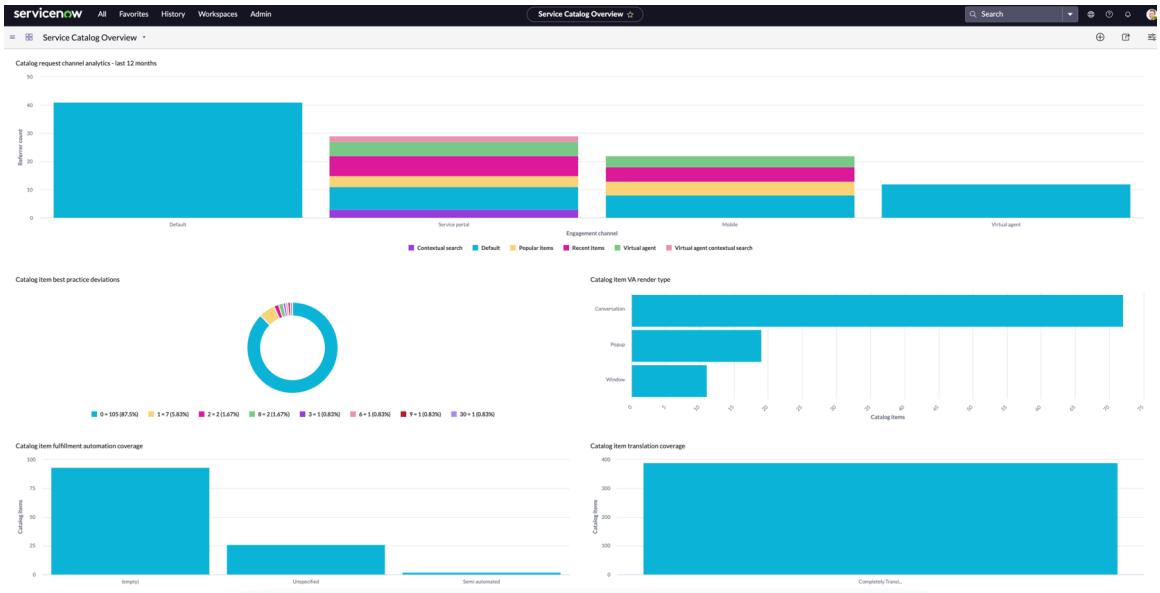
Service Catalog Overview dashboard (continued)

Graph	Description
	automated, semi-automated, manual, unspecified, or empty.
Catalog item translation coverage	Vertical bar graph representing the count of the translation status of catalog items. It specifies whether items are completely translated, partially translated, not translated, or in-progress.



Related topics

Dashboards overview

Service Catalog item designer

The Service Catalog item designer enables non-administrators to create, maintain, and publish catalog items. It uses a structured design and publishing process to ensure consistency of usage.

Starting with the Washington DC release, Service Catalog Item Designer is no longer deployed, enhanced, or supported. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

The item designer is best suited to manage items that have basic questions, approvals, and tasks.

Note:
To create and manage more complex items, use the Service Catalog features for creating items.

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Item designer process flow

- Administrators or catalog administrators set up the design environment to enable a controlled item design process, and process category requests.
- Catalog managers request categories, then manage their categories. A user requests a category, either requesting to become the manager of that category, or assigning another user as the category manager.
  1. An administrator or catalog administrator processes that request, creating the category with a selected category manager.
  2. The category manager optionally assigns catalog editors to a category that they manage.
- Catalog managers and catalog editors use the catalog item design to perform the following activities.
  1. Create items within a category that they are assigned to.
  2. Create questions, approvals, tasks, and sections, for the item.
  3. Publish items to the category after review.
- Self-service users can use the Service Catalog to request items in the category, like any Service Catalog item.

Catalog item designer roles

Role title [name]	Description
Administrator [admin] Catalog administrator [catalog_admin]	Can set up the catalog item designer environment and process requests for categories. Can also perform other service catalog functions.
Catalog Item Designer [catalog_item_designer]	Can view the status of category requests.
Catalog Manager [catalog_manager]	Can view and assign catalog editors to their categories. Can also create, modify, and publish items within their categories.
Catalog Editor [catalog_editor]	Can create, modify, and publish items within the categories that they are assigned to.

Configuring catalog item designer options

Administrators and catalog administrators can control the options for catalog managers and editors who use the catalog item designer.

Starting with the Utah release, Item Designer is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported. Catalog Builder provides the latest experience for this functionality. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

Configuration includes defining question types, approval types, and task assignment types. You can restrict these options to ensure that items are designed consistently and with few variations, or expand them to enable greater design flexibility.

You can also process category creation requests and view or modify definitions of notifications used by the catalog item designer.

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Process Flow

The catalog item designer uses the records in three distinct areas for creating, publishing, and requesting items:

1. **Creating**: The catalog item designer uses staging records for items that are being created, with staging records for any associated questions, approvals, and tasks. For example, a staging item [sc_ic_item_staging] record can have associated staging approval [sc_ic_aprvl_defn_staging] records. These records are staging only, and are not available to order from the Service Catalog.
2. **Publishing**: A published item can be requested from the Service Catalog. When item editors publish an item, the following actions occur:
   - Staging items create or update the corresponding catalog items.
   - Questions are copied into variables on that catalog item.
   - Associated approvals and tasks are copied into corresponding published tables. For example, approval [sc_ic_aprvl_defn_staging] records are copied to equivalent approval definition [sc_ic_aprvl_defn] records for the item.
3. **Requesting**: Requested items and associated records are created when a published catalog item is ordered by a self-service user.
   - A requested item is generated based on the last-published item and the last-published versions of any variables used by that item.
   - Associated approvals and tasks are copied from the published records into equivalent requested item tables. For example, Approval Definition [sc_ic_aprvl_defn] records are copied to equivalent Approval Definition (Requested Item) [sc_ic_req_item_aprvl_defn] records.

Define question types

Question types define the options available to catalog editors or catalog managers when they create questions for a catalog item.

Before you begin

Role required: admin

About this task

To meet requirements for your design environment, you can modify question types by expanding or restricting the list of types available. For example, you can deactivate date-based question types.

> **Note:**
> This list of available question types is also used when you create a new service in service creator. For example, if you deactivate Multi-Line Text, it is deactivated for both the catalog item designer and the service creator.

Procedure

1. Navigate to **All** > **Item Designer** > **Administration** > **Question Types**.
2. Click **New** or open an existing question type.

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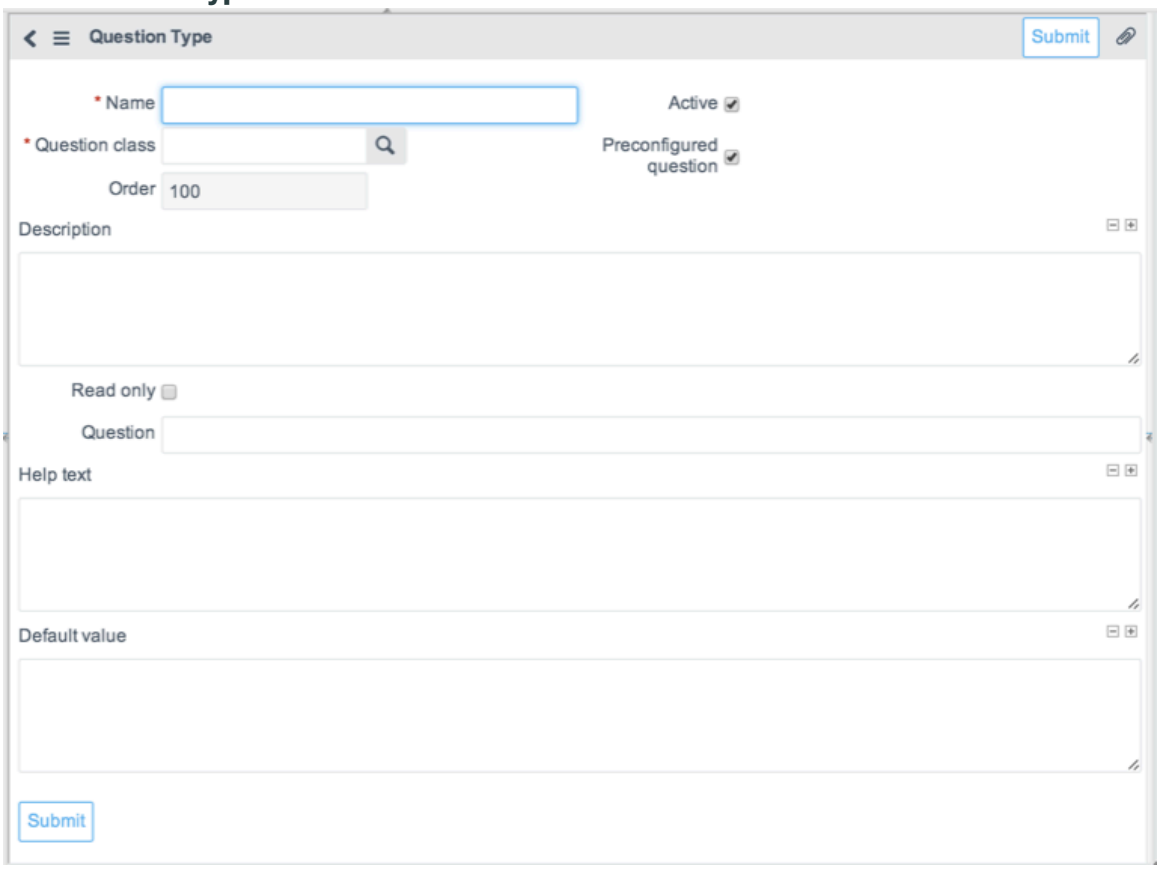
New Question Type form



3. Fill in the fields, as appropriate.

Question Type form

Field	Description
Name	The question type name.
Question class	The base variable type to use as the class for this question type. The most common variable types are available, but some complex types, such as macros, are available only when you use the Catalog Item form. The following classes are available: ○ Checkbox ○ Date ○ Date/Time ○ Label ○ Multi-Line Text ○ Multiple Choice ○ Numeric Scale ○ Reference

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Field	Description
	Note: Reference fields are only available as preconfigured questions. If you set the question class to *Reference*, the **Preconfigured Question** check box is automatically selected and made read-only. ○ Select Box ○ Single-Line Text ○ Yes / No
Order	The sequence in which the question type appears.
Active	A check box to indicate whether the question type is active or not. Clear this check box to deactivate a question type, so that it cannot be used when creating a question or a new service. **Note:** Deactivating a question type that is in use does not affect catalog items that are already using that question type.
Preconfigured question	A check box to indicate whether users can select this question as a preconfigured type when defining a question. This field is checked by default, and only one active non-preconfigured question type is available per question class. Some preconfigured question types are provided by default, such as a list of users. If **Preconfigured Question** is selected, the **Read only**, **Question**, **Help text**, and **Default value** fields also appear. Depending on the question class, additional fields can also appear to define variable attributes for that class. For example, if you select a preconfigured question type based on the **Multiple Choice** question class, the **Question Type Choices** field appears, allowing you to select the choices available for that question type.
Description	A description of the question type.
Read only	Whether the question type can be selected or not. Appears if **Preconfigured Question** is selected.
Question	The question itself, as displayed. Appears if **Preconfigured Question** is selected.
Help text	Help text to appear with the question. Appears if **Preconfigured Question** is selected.
Default value	The default value for the question. Appears if **Preconfigured Question** is selected.

4. Click **Submit** or **Update**.

Manage approval types

Approval types are available to catalog editors or catalog managers when they define approvals for an item. Add and change approval types, publish them, and expire them when they are no longer useful.

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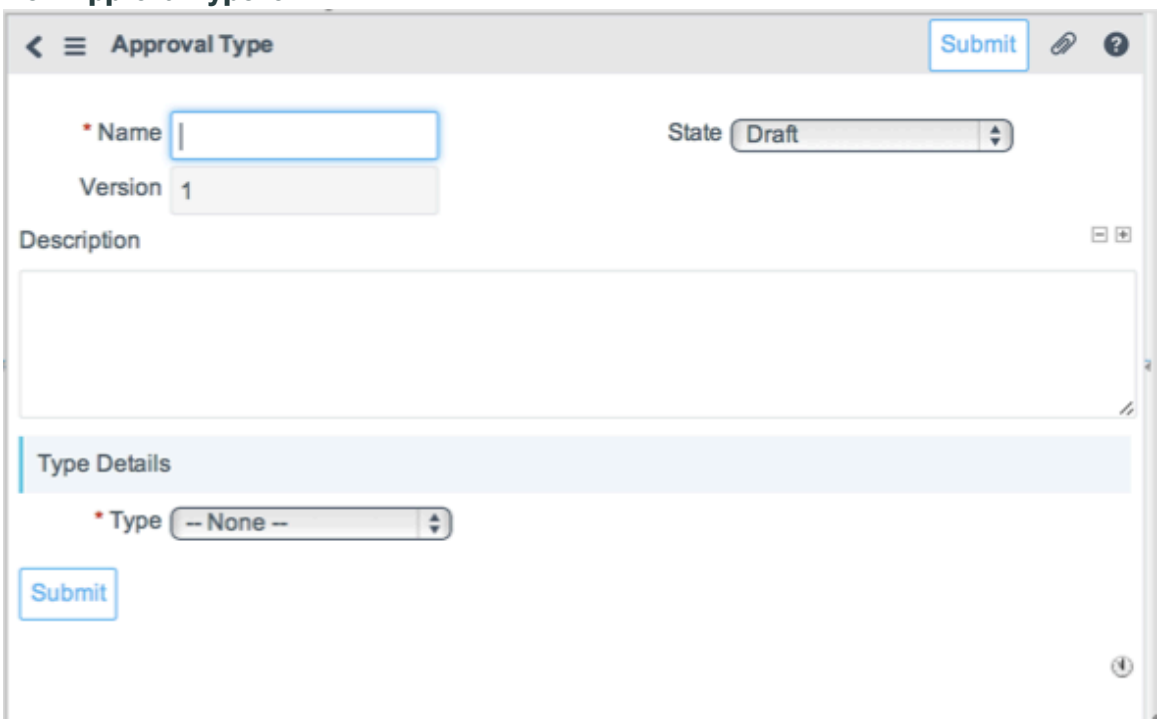
Before you begin
Role required: admin

About this task
For example, you can define**Facilities Items Approvers**, a specific list of approvers for facilities items.

Procedure
1. Navigate to **All** > **Item Designer** > **Administration** > **Approval Type Definitions**.
2. Click **New**.

New Approval Type form



3. Fill in the fields, as appropriate.

Approval Type form

Field	Description
Name	The name for the approval type.
Version	[Read-Only] The version of the approval type. The version number gets incremented whenever you save a change to that type.
State	[Read-Only] The approval type state. It is initially set to **Draft**. When you publish the approval type, the state changes to **Published**.
Description	A brief description of the approval type.
Type	The method for approving items that use the approval type. Can be **User**, **Group**, or **Script**. This selection determines which other fields are available.
User(s)	The individual users who can approve catalog items that use this approval type. This field is available only if the **Type** is set to **User**.
Group(s)	The groups who can approve catalog items that use this approval type. This field is available only if the **Type** is set to **Group**.

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Field	Description
Script output	The result of the script, creating either a set of users or groups. This field is available only if the **Type** is set to **Script**.
Approver script	A script to define that approval type, such as a script to define the manager of the requester. This field is available only if the **Type** is set to **Script**.

4. Click **Submit**.

Publish approval types

Publish an approval type after it is defined correctly for catalog editors or catalog managers to use when they create items.

- To publish an approval type, navigate to **Item Designer** > **Administration** > **Approval Type Definitions**, open an entry, and then click **Publish**.
- To view a list of published approval types, navigate to **Item Designer** > **Administration** > **Published Approval Type Definitions**.

Change approval types

Service Catalog enables you to change the details of an approval type.

- To change details for an approval type, navigate to **Item Designer** > **Administration** > **Approval Type Definitions**, open an entry, then edit the details and save your changes.

  Note:
  After you save your changes, the version number for that approval type increases by 1.

- To make your changes live, publish the changed approval type.

Expire approval types

To remove an approval type from use, you can expire it, making it inactive.

To expire an approval type, navigate to **Item Designer** > **Administration** > **Approval Type Definitions**, open an entry, and then click **Expire**.

Manage task assignment types

Task assignment types define the assignment options available to catalog editors and catalog managers when they define tasks for an item. You can add, change, publish, and expire task assignment types.

Before you begin
Role required: admin

About this task
When a user then requests that item, these assignment options determine which users are assigned to complete these tasks. For example, you can use information the user enters when requesting an item to dynamically assign a task to the on-call IT support contact of the requester.

Procedure

1. Navigate to **All** > **Item Designer** > **Administration** > **Task Assignment Definitions**.
2. Click **New**.

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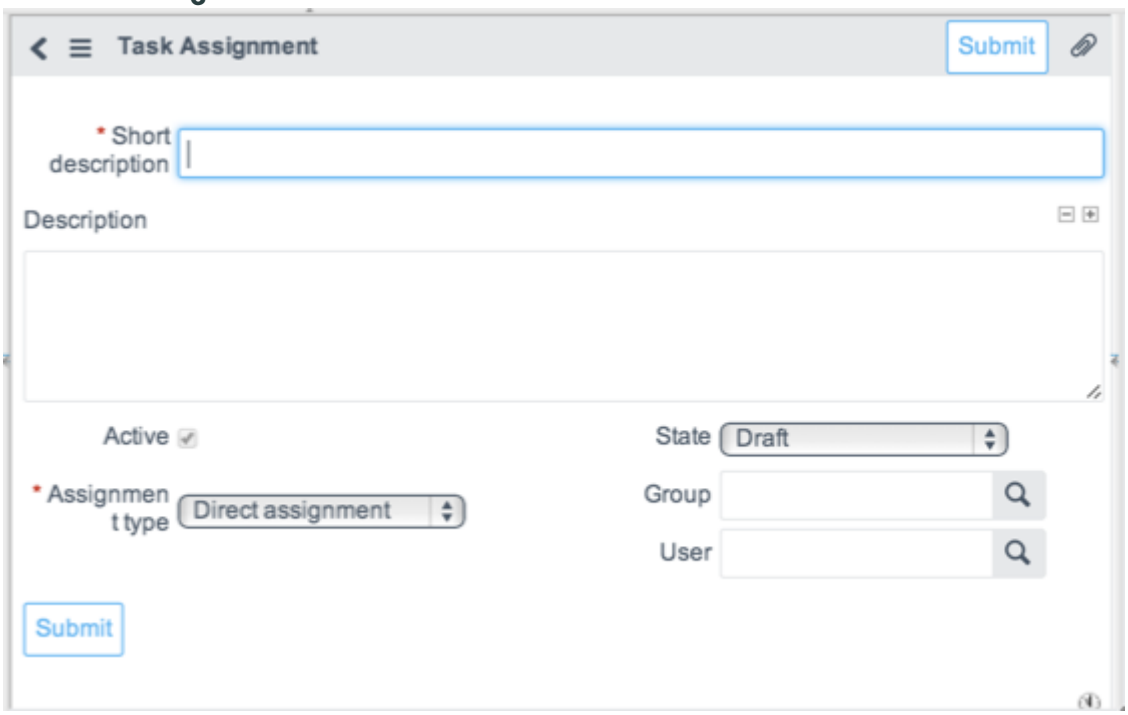
New Task Assignment form



3. Fill in the fields as appropriate.

Task Assignment form

Field	Description
Short Description	A brief summary of the task assignment type.
Description	A longer description of the task assignment type.
Active	[Read Only] A check box that indicates whether the task assignment type is active or not. To deactivate a task assignment type, expire it.
Assignment type	The type of assignment. Set to **Direct assignment** to define users or groups explicitly, or **Scripted assignment** to calculate assignments dynamically using a script.
State	The state of the task definition. Set to **Draft** if the record is being created or modified, or **Published** if the task assignment type is published.
Group	The group to assign to tasks that use this assignment type. This field is available only if the **Assignment type** is set to **Direct assignment**.
User	The specific user to assign to tasks that use this assignment type. This field is available only if the **Assignment type** is set to **Direct assignment**.
Assignment script	A script to determine who performs tasks that use this assignment type. This field is available only if the **Assignment type** is set to **Scripted assignment**. For

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Field	Description
	example, a script to identify the on-call support team for the requestor as the group to assign.

4. Click **Submit**.

Publish task assignment types

You can publish task assignment types after defining them.

- To change details for a task assignment type, navigate to **Item Designer** > **Administration** > **Task Assignment Definitions**, open an entry, then edit the details and save your changes.

  Note:
  After you save your changes, the version number for that task assignment type increases by 1.

- To make your changes live, publish the changed task assignment type.

Change task assignment types

Service Catalog enables you to change the details of a task assignment type.

- To change details for a task assignment type, navigate to **Item Designer** > **Administration** > **Task Assignment Definitions**, open an entry, then edit the details and save your changes.

  Note:
  After you save your changes, the version number for that task assignment type increases by 1.

- To make your changes live, publish the changed task assignment type.

Expire task assignment types

To remove an assignment type from use, you can expire it, making it inactive.

To expire an assignment type, navigate to **Item Designer** > **Administration** > **Task Assignment Definitions**, open an entry, and then click **Expire**.

Review category requests from self-service users

The **Item Designer Category Request** catalog item can be enabled to allow self-service users to request service catalog categories. If the category request is approved, the Item Designer application becomes available for the user to create and manage catalog items in the category.

Before you begin

Role required: catalog_admin or admin

About this task

A catalog administrator reviews category requests and takes an action to create the category or reject the request. For example, a category request is rejected if it duplicates an existing category.

Procedure

1. Navigate to **All** > **Item Designer** > **Administration** > **All Category Requests**.
2. Open a category request.

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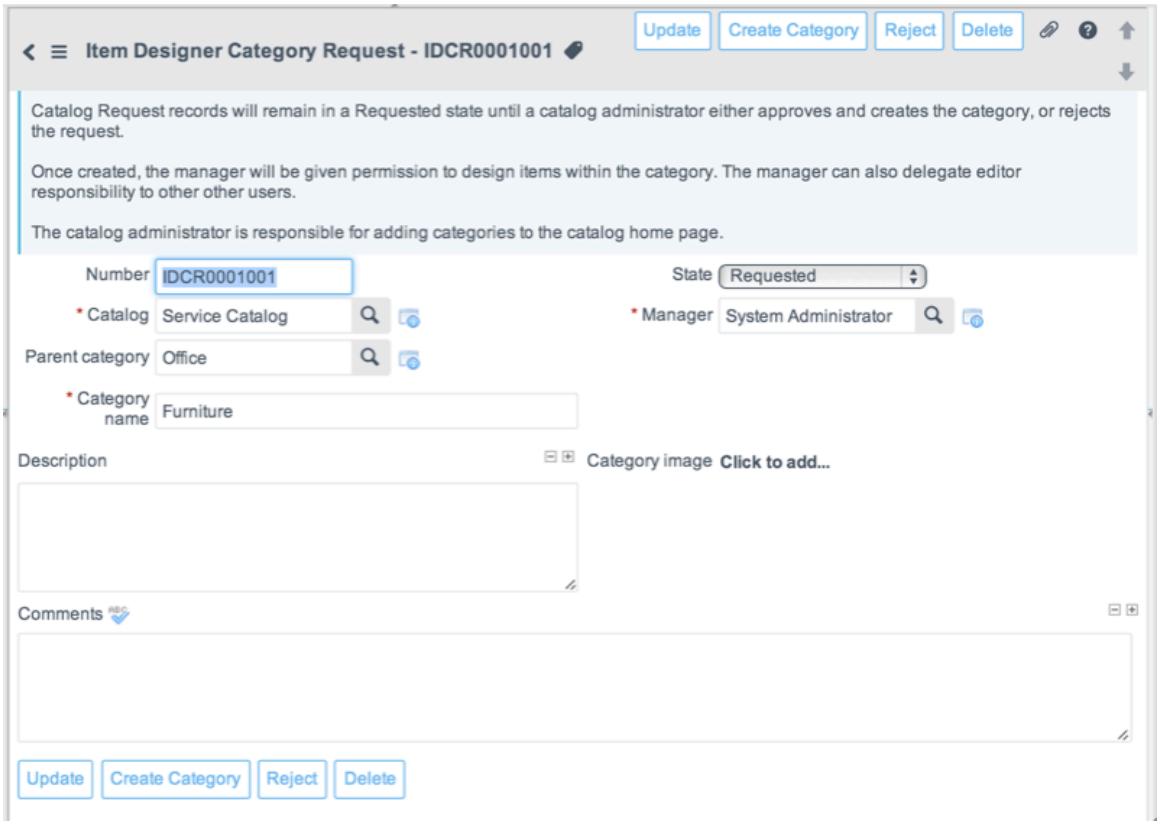

3. Perform one of the following actions.

Option	Description
To approve the request	Click **Create Category**. The category is created, the nominated cat egory manager receives an email notifica tion, and is granted the catalog manager role for that category. The category manager can then manage the new category and create catalog items in it.
To reject the request	Click **Reject**. Category request rejections cannot be re versed. To create a new category, the original requester must submit a new request.

Using the catalog item designer

Users with the catalog_manager role use the catalog item designer to manage their categories, assign editors to those categories, and create, modify, and publish catalog items.

For example, a facilities team leader can manage a **Facilities** category. Facilities team members with the catalog_editor role can create, edit, and publish items within the **Facilities** category.

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Note:
You can only manage standard catalog items using the catalog item designer, not more complex items such as order guides. In addition, UI policies and client scripts are not supported by the item designer. To implement these more advanced functions, use the service catalog features for creating items.

To view and manage catalog items created with the item designer, navigate to **Item Designer** > **Administration** > **All Items**.

For an overview of the catalog item designer process flow, see Service Catalog item designer.

Request a category

Self-service users can request a new category within a service catalog.

Before you begin
Role required: admin

About this task
For example, a facilities team leader who manages office furniture could request the **Office Furniture Requests** category within the **Facilities** catalog.

To request a category:

Procedure
1. Navigate to **All** > **Self-Service** > **Service Catalog**.
2. Select the **Can We Help You?** > **Item Designer Category Request** item.
3. Fill in the request form.

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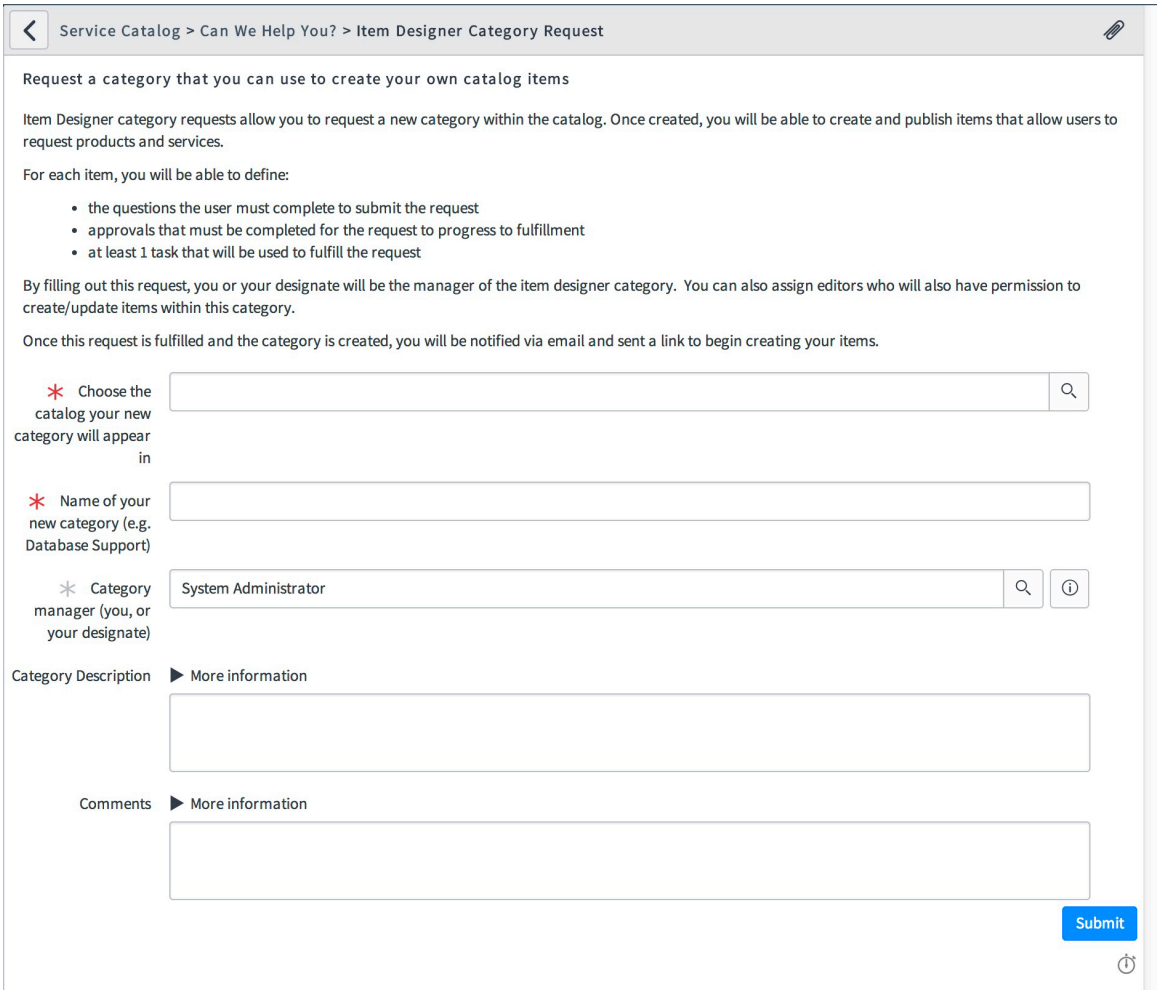

4. Click **Submit**.
   The catalog request record state is set to **Requested**, and you are granted the catalog item designer role so you can view the status of the request. Log out and back in to access the Item Designer application in the navigator.
5. Navigate to **Item Designer** > **My Item Categories** to view the status of the request.

Result

After the category is approved, new modules under Item Designer are provided to create and manage catalog items in the category.

Manage a category

After an administrator approves a category request, the category is immediately created with the selected category manager. The category manager can create and manage items in the category.

Before you begin

Role required: admin

About this task

New categories do not appear in the catalog until items are added to them.

Category managers can also create and manage items in their categories, and publish items to make them available to users.

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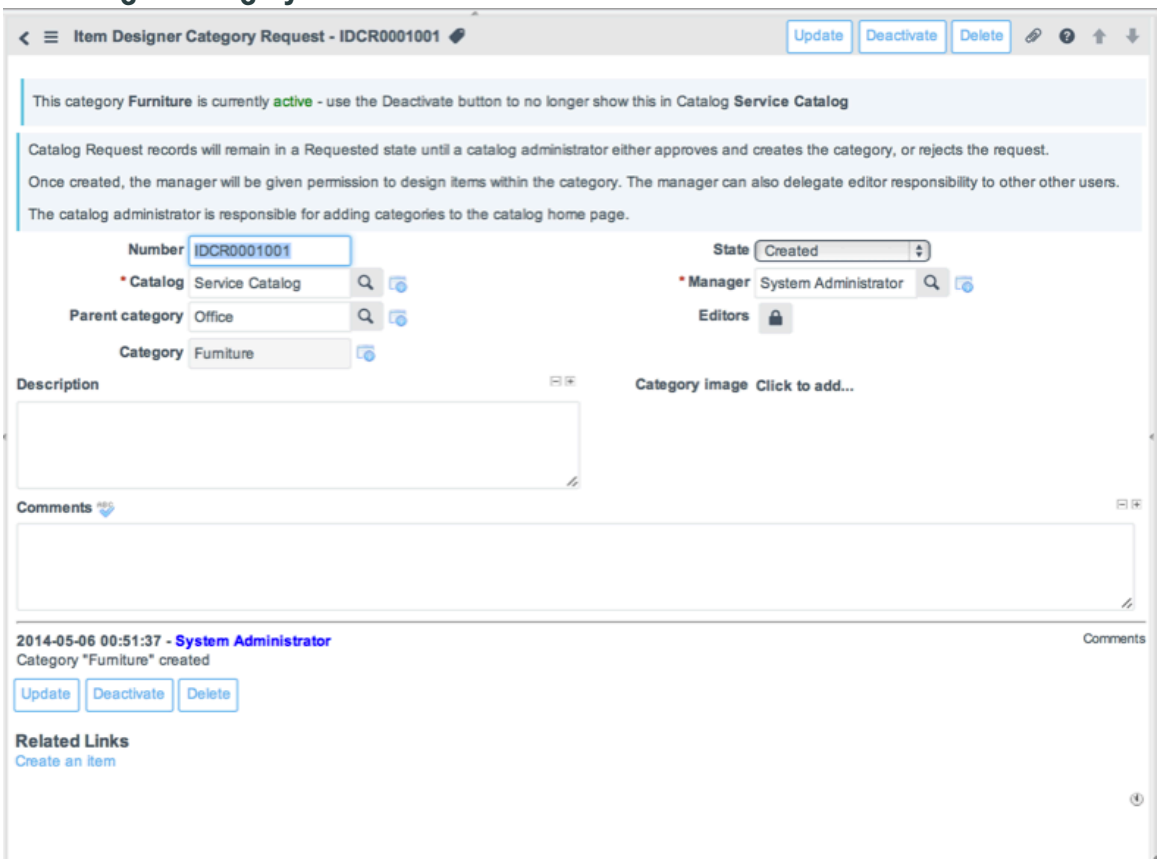
Procedure

1. Navigate to **All** > **Item Designer** > **My Item Categories** to view and edit categories you manage.
2. Click the category number to open that category.

Item designer category form



3. Complete any of the following actions.

Create an item

Category managers and catalog editors can create items using the item designer.

Before you begin
Role required: admin

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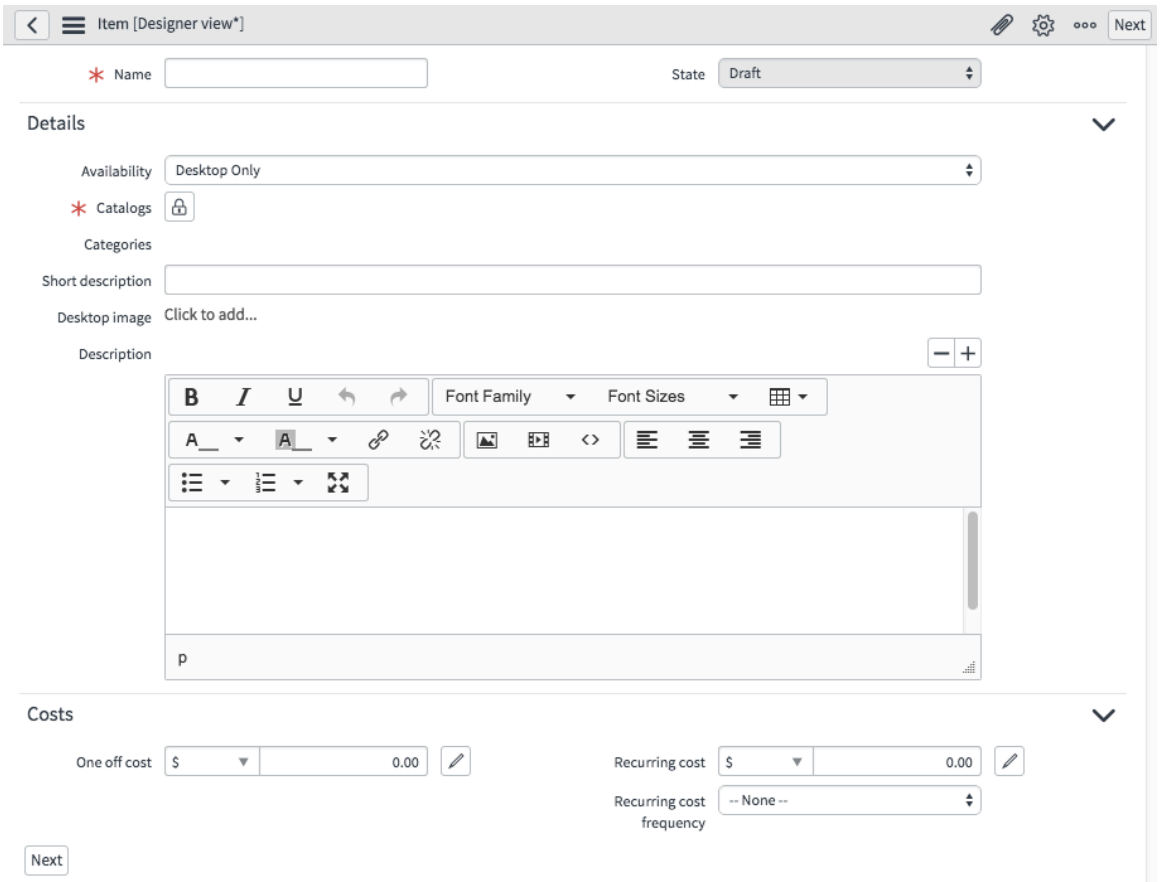
Procedure

1. Navigate to **All** > **Item Designer** > **Create New**.



2. Fill in the fields as appropriate.

Item designer view

Field	Description
Name	The name of the item.
State	[Read-Only] The state of the item. Initially the state is set to **Draft**. When you publish the item, the state changes to **Published**.
Details tab or section	
Availability	The interface where this item is available. Choose from **Desktop and Mobile**, **Desktop Only**, or **Mobile only**.
Catalogs	The catalogs the item is published to.
Categories	The categories the item is published to within the selected catalogs.
Short Description	A brief description of the item.
Desktop image	An image of the item. This field is available only if **Availability** is set to either **Desktop Only** or **Desktop and Mobile**.
Mobile image	An image of the item for the smartphone interface. This field is available only if **Availability** is set to either **Mobile Only** or **Desktop and Mobile**.

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Field	Description
Description	A full description of the item. This description appears in the catalog when a user selects the item or clicks the associated **More Information** link.
Costs tab or section	
One off cost	The price for the item and the currency for that price.

3. Click **Next** to save the record.
4. Under **Related Links**, click the appropriate link to add questions, approvals, sections, or tasks for the item.

Define an item question

Item questions appear in the catalog when a user requests the item.

Before you begin

Role required: admin

About this task

The user answers the questions to provide the information to fulfill the request. For example, a request for a new laptop can have a multiple choice question to specify the screen size. The requester can select one from a set of options.

You can organize questions into sections, to provide a logical flow for a multi-question item. If you plan to use sections, consider creating the sections so that you can select the appropriate section when defining the questions.

To add a question:

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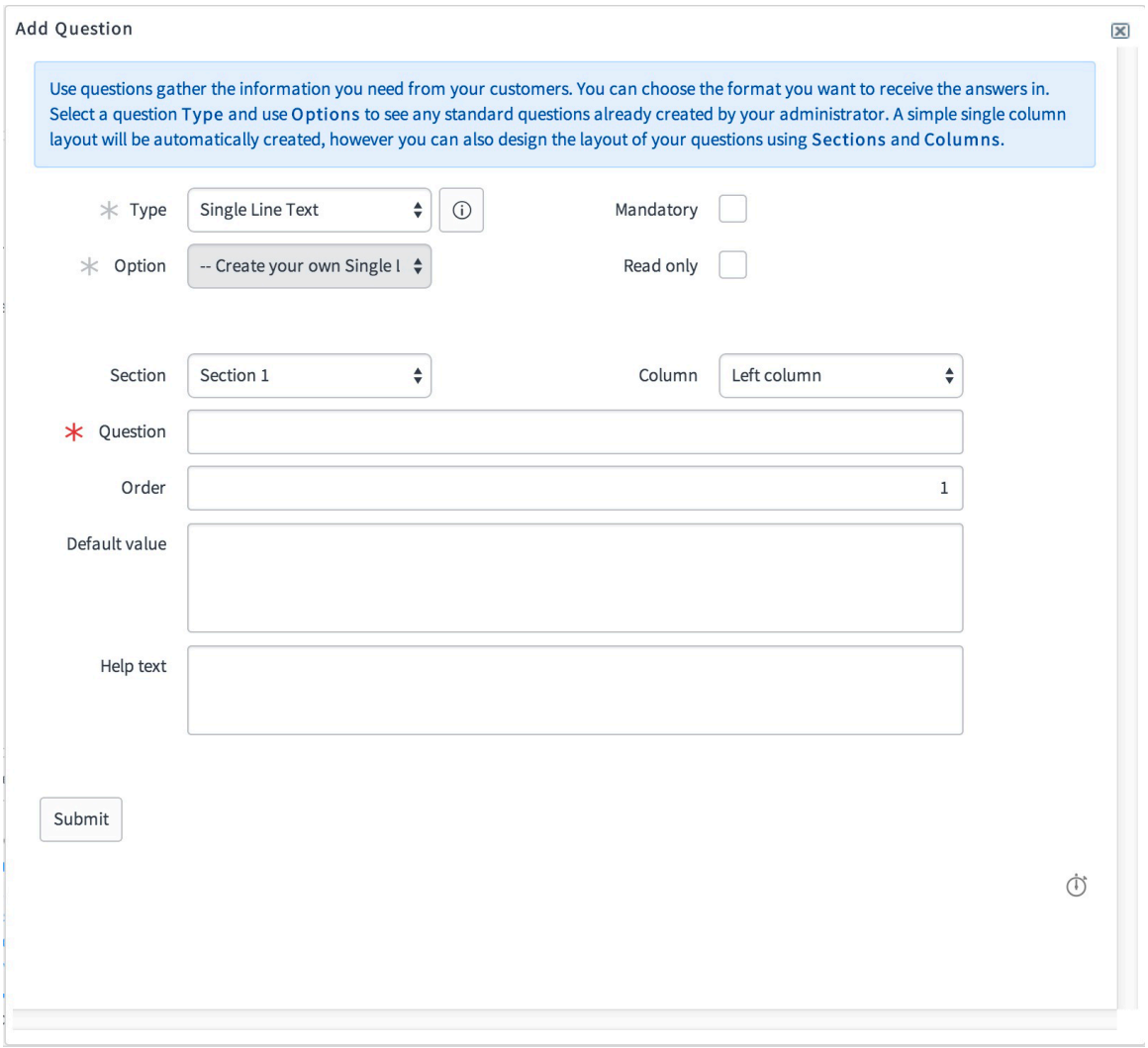
Procedure

1. On the Item form, click the **Add a Question** related link.



2. Fill in the fields, as appropriate.

Add question

Field	Description
Type	The type for the question, defining the format you would like to receive the information in. By default, the options are: ○ Checkbox ○ Date ○ Date/Time ○ Label ○ Multi Line Text ○ Multiple Choice ○ Numeric Scale ○ Reference

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Field	Description
	○ Select Box ○ Single Line Text ○ Yes/No Each type allows you to create your own option, using the **Option** field. Administrators and catalog administrators determine the question types available.
Option	The standard questions available within the selected question type, as set by the value of the **Type** field. By default, all question types contain **Create your own <type>** as an option, allowing you to define your own question of that type. These types can contain additional fields, allowing you to further define the question options. For example, *Create your own Numeric Scale* allows you to define **Scale Min** and **Scale Max** values. Some types also have additional preconfigured options available. By default, the following extra options are available: ○ Comments: allow the user to enter a short message. Available if the Type is **Multi Line Text**. ○ Contact preference: ask the user to select a preferred contact method: email, telephone, or SMS. Available if the Type is **Multiple Choice**. ○ Configuration item: allow the user to select a single configuration item from those items defined in the system. Available if the Type field is **Reference**. ○ Active user: allow the user to choose from a list of active user records. Available if the Type is **Reference**. Administrators and catalog administrators define the options available for each question type.
Mandatory	A check box to indicate whether users are required to provide an answer before they can submit the request. Only available for some question types.
Read only	A check box for indicating whether the question is read only. Only available for some question types.
Section	The section this question appears in. Sections allow you to group questions logically. Choose from the sections that have already been defined for the item.
Column	The column this question appears in within the selected section. Fields appear in the left column by default, but can be moved to a right column.
Question	The text of the question.
Order	The numeric sequence for the question. Questions appear in the selected column in the order defined here.
Default value	The default answer for the question, if any. Only available for some question types. **Note:** If you use a choice list, ensure that the default value matches a choice list value.

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Field	Description
Help text	Text that helps the user decide how to answer this question. Help text appears under the **More information** link below the question.
Question Choices	The choices a user can choose for answering the question. Double-click the row to add an entry to the list. This field appears only for question types which have choices, such as Multiple Choice.

3. Click **Submit**.

   The new question is added to the **Questions** related list.

4. To edit a question, open it from the related list.

Define an item approval

An approval for an item identifies a user or group that must approve each request for this item.

Before you begin

Role required: admin

About this task

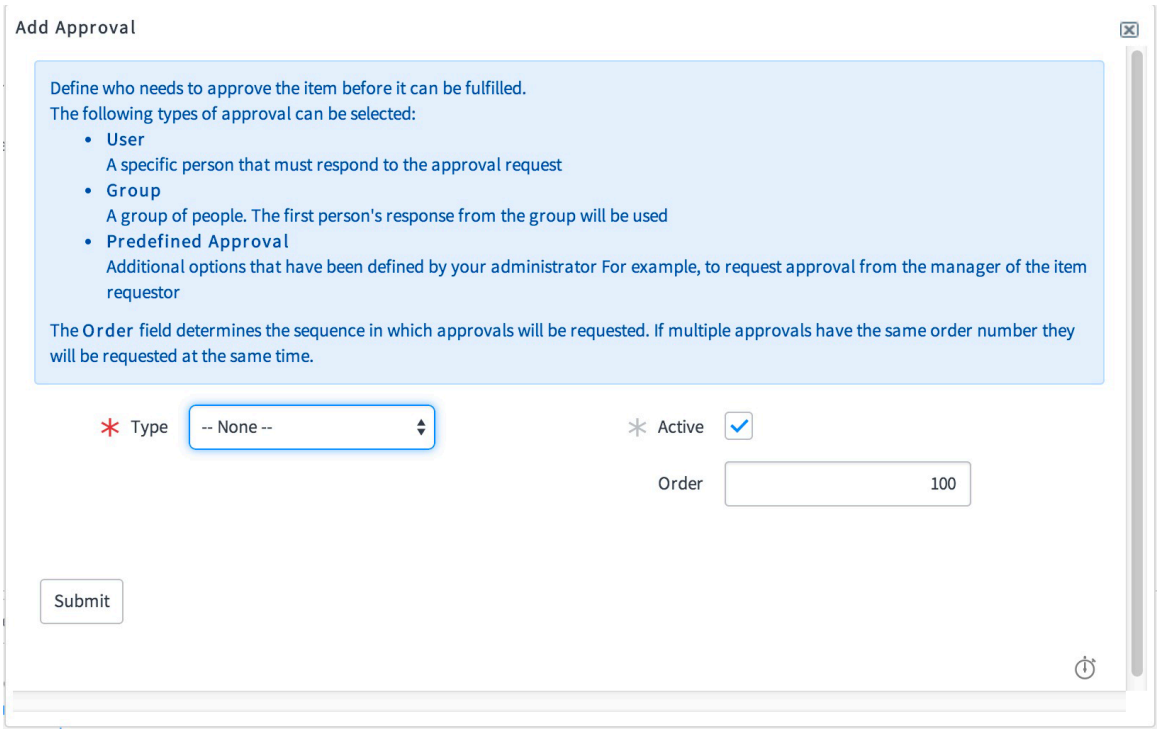
An approval for an item identifies a user or group that must approve each request for this item. All listed approvers must approve this request for it to be fulfilled. A rejection halts the process immediately. For example, you could define approvers for a facilities item to be the facility management team.

Users can view their open approvals by navigating to **Self-Service** > **My Approvals**, or by opening the requested item and viewing the approval in the **Group approvals** related list.

To add an approval to an item:

Procedure

1. On the Item form, click the **Add an Approval** related link.



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2. Fill in the fields, as appropriate (see table).
3. Click **Submit**.

   The new approval is added to the **Approvals** related list.
4. To edit an approval, open it from the related list.

Define an item approval

Field	Description
Active	A check box for indicating whether this approval is active.
Order	The sequence in which the approvals are requested. Approvals are only created when any approvals with lower-order numbers are completed. For example, if Approval 1 has order 100 and Approval 2 has order 150, Approval 2 is only created when Approval 1 is completed. If multiple approvals have the same order number, they are requested at the same time.
Type	The approval type. Set to **User** for a specific user, **Group** for a specific group, or **Predefined Approval** to select approvers from a predefined list.
User	A specific user to be the approver. Appears if the approval type is set to **User**.
Group	A specific group to be the approver. Appears if the approval type is set to **Group**. The first group member who responds to the approval request responds for the entire group.
Predefined	A check box allowing you to select an approval type created by the administrator or catalog administrator. Appears if the approval type is set to **Predefined**. For example, if you select the default predefined approval of **Requester's Manager**, the approval is sent to the manager of the person who requests the item.

Define an item task

Item tasks describe the work required to fulfill a request for an item.

Before you begin

Role required: admin

About this task

Item tasks are generated as standard catalog tasks when an item is ordered, like the tasks generated by workflows. Tasks are assigned to users or groups as part of the fulfillment process when that item is ordered. For example, an item to request a laptop can have a task to deliver the laptop to the user.

Users can view their open tasks by navigating to **Service Catalog** > **Open Records** > **Tasks**, or can open the requested item and view the task in the **Catalog Tasks** related list.

To add a task to an item:

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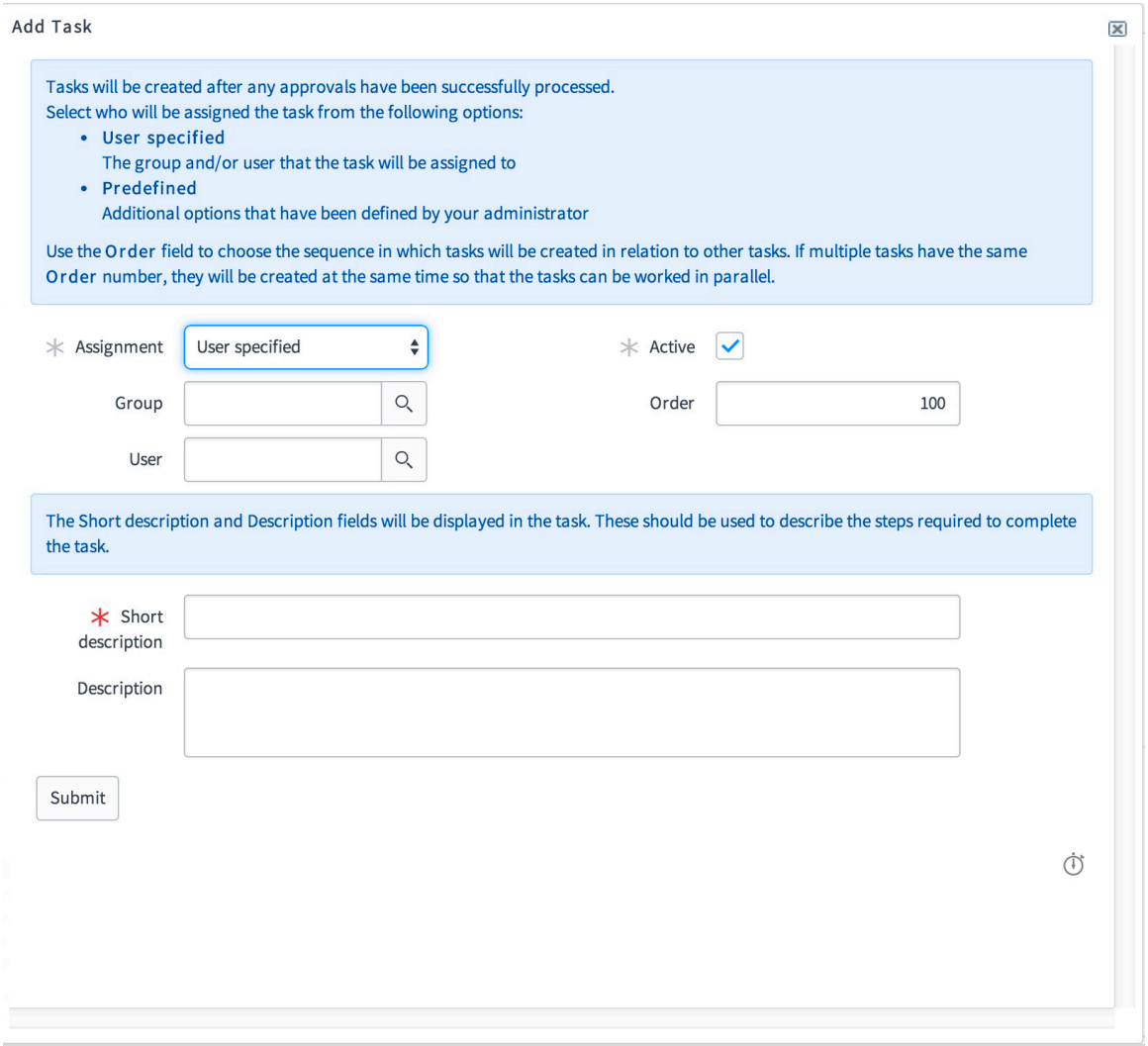
Procedure

1. On the Item form, click the **Add a Task** related link.



2. Fill in the fields, as appropriate (see table).
3. Click **Submit**.

   The new task is added to the **Tasks** related list.
4. To edit a task, open it from the related list.

Add task

Field	Description
Short Description	A brief description of the task.
Description	A more detailed description that provides details and instructions for the people performing the task.
Assignment	The assignment type. Select **User specified** to select your own assignment options, or **Predefined** to select from predefined task assignment definitions set by an administrator.

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Field	Description
Group	The group to perform the task. Appears if the assignment is set to **User specified**.
User	The user to perform the task. Appears if the assignment is set to **User specified**. If you select a group first, only users from that group are available in the **User** selection list.
Assign to	A predefined assignment option. Appears if **Assignment** is set to **Predefined**. Select from the task assignment types created by the administrator or catalog administrator. Assignment types commonly base the task assignment on information provided with the request. For example, if you select **Local database team for the requestor**, the system assigns the task to someone from the designated team.
Order	The sequence in which tasks are created. Tasks are only created when any tasks with lower-order numbers are completed. For example, if Task 1 has order 100 and Task 2 has order 150, Task 2 is only created when Task 1 is completed. If multiple tasks have the same order number, they are created at the same time, so the tasks can be performed at the same time.

Define an item section

You can add sections to organize questions into logical groups, each with its own heading, which can streamline the request process.

Before you begin

Role required: admin

About this task

For example, an item to request a new laptop can have sections for the hardware specifications and software requirements.
Add the sections before you add the questions to simplify the layout process.

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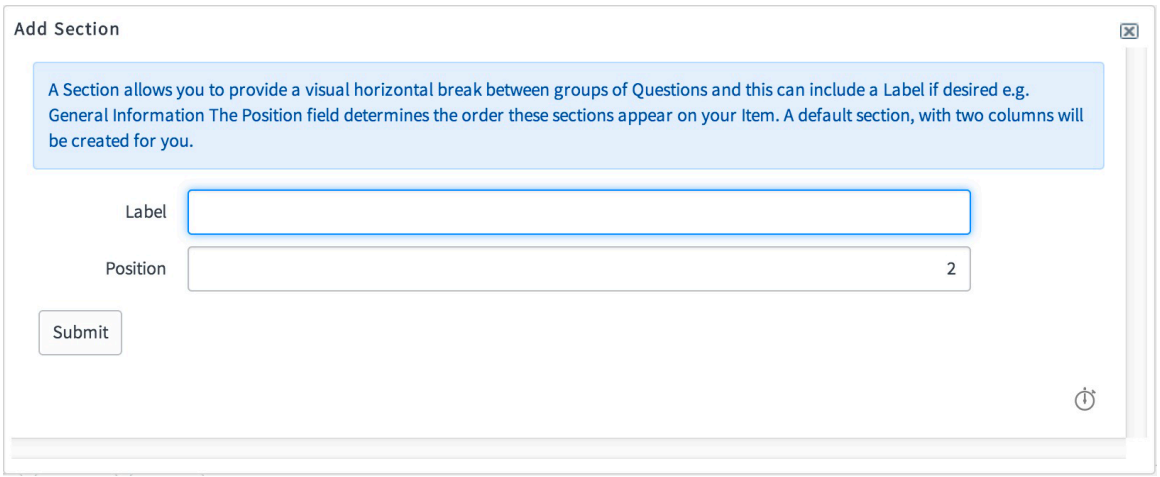
Procedure

1. On the Item form, click the **Add a Section** related link.



2. Fill in the fields as appropriate.

Item section

Field	Description
Label	The section title that describes the type of questions in the section. For example, you can define sections such as **User Details**.
Position	A number indicating the vertical position of the section. Position 1 shows at the top, position 2 is below Position 1, and so on.

3. Click **Submit**.

   The new section is added to the **Sections** related list.

4. To edit a section, open it from the related list.
   By default, a single two-column section is created for each item.

Publish an item

When you publish an item, it is available in the catalog for ordering.

Before you begin
Role required: admin

About this task
When you create an item, it is in a **Draft** state. You can review the item, make changes, and refine the layout as many times as necessary to get the details exactly right.

When the item is ready, a category manager or catalog editor can publish it, making it available as a catalog item in the service catalog.

Procedure

1. Navigate to **All** > **Item Designer** > **Administration** > **All Items**.
2. Open the item record.
3. Click **Publish**.

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The item is now a live catalog item, available for ordering.

4. To view a list of published catalog items, navigate to **Item Designer** > **Published Items**.

   It is best not to edit an item record from the Published Items module. Doing so directly accesses that catalog item using standard service catalog functions, not the catalog item designer, losing the benefits of the controlled publishing environment.

   For example, if you copy an item, the copied catalog item is not listed in the Published Items module. To access this copy, navigate to **Service Catalog** > **Catalog Definition** > **Maintain Items** and locate the item named **Copy of [item name]**. The copied item is an active catalog item. Consider deactivating it by clearing the **Active** check box until your changes are complete.

Republish an item

Each time you make changes to an item, you must republish it in order for the changes to reflect in the item catalog.

Before you begin
Role required: admin

About this task
When you edit an item, the item state returns to **Draft**. The live catalog item remains available to order, but does not have the changes you made. This process enables you to make changes to the item in a staging area, then apply those changes to the live catalog item after review.

Procedure

1. Navigate to **All** > **Item Designer** > **Administration** > **All Items**.
2. Open and edit the item record.
3. Click **Publish**.

Unpublish an item

When you unpublish an item, it is removed from the service catalog.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Item Designer** > **Administration** > **All Items**.
2. Open the item record and select **Unpublish**.
   The item is then inactive within the service catalog, but remains available for editing and republishing. This state is useful if you do not want customers to order the catalog item while you are making changes to them.

Expire an item

When you expire an item, it is removed from both the service catalog and the item designer.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Item Designer** > **Administration** > **All Items**.
2. Open the item record.
3. Click **Expire**.
   The item is removed from the list of active items, and cannot be edited or republished.

Item version

The system can create a new version of the item and deactivate the previous version to ensure that items currently being requested are not affected by these changes.

If you alter a question associated with an item, then you can republish the item. For example, if you change the default value of a question associated to an item, a new version of that item is automatically created when the changed item is published.

As a result, you can see multiple records with the same item name in the Catalog Item Table `[sc_cat_item]` when viewing all items. The published version of the item is the only active one.

Installed with catalog item designer

The catalog item designer adds or modifies tables, user roles, script includes, and other components.

Demo data is available with the catalog item designer.

Tables installed with catalog item designer

Tables are added with activation of the catalog item designer.

Tables

Display Name [Table Name]	Description
Requesting Item Designer Category Request `[sc_ic_category_request]`	Requests made by users for a new category.
Item `[sc_ic_item_staging]`	Item definitions, used when designing the item.
Approval `[sc_ic_aprvl_defn_staging]`	Approvals for items.
Approval Definition `[sc_ic_aprvl_defn]`	Approvals for catalog items.
Approval Definition (Requested Item) `[sc_ic_req_item_aprvl_defn]`	Approvals for requested items.
Approval Type `[sc_ic_aprvl_type_defn_staging]`	Approval types for items.
Approval Type Definition `[sc_ic_aprvl_type_defn]`	Approval types for catalog items and requested items.
Task Assignment `[sc_ic_task_assign_defn_staging]`	Task assignment types for items.
Task Assignment Definition `[sc_ic_task_assign_defn]`	Task assignment types for catalog items and requested items.

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Display Name [Table Name]	Description
Task [sc_ic_task_defn_staging]	Tasks for items.
Task Definition [sc_ic_task_defn]	Tasks for catalog items.
Task Definition (Requested Item) [sc_ic_req_item_task_defn]	Tasks for requested items.
Question [sc_ic_question]	Questions for items. Stored as Variables [sc_item_variables_task] records for catalog items and requested items.
Question Choice [sc_ic_question_choice]	Choices if the question is a choice type (select box, multiple choice, or checkbox).
Question Class [sc_ic_question_class]	Base variable types to use as the class for a question type.
Question Type [sc_ic_question_type]	Question types for items.
Question Type Choice [sc_ic_question_type_choice]	Choices if the question type is a choice type (select box, multiple choice, or checkbox).

Table relationships installed with catalog item designer

Some equivalent information is stored as records in different tables in creating, publishing, or requesting areas to provide a controlled environment for item design.

For example, catalog items are stored as Item [sc_ic_item_staging] records in the creating area, as Catalog Item [sc_cat_item] records in the publishing area, and as Requested item [sc_req_item] records in the requesting area.

This table illustrates the relationships for these records.

Creating	Publishing	Requesting
Task [sc_ic_task_defn_staging]	Task Definition [sc_ic_task_defn]	Task Definition (Requested Item) [sc_ic_req_item_task_def
Item [sc_ic_item_staging]	Catalog item [sc_cat_item]	Requested item [sc_req_item]
Approval [sc_ic_aprvl_defn_staging]	Approval Definition [sc_ic_aprvl_defn]	Approval Definition (Requested Iter [sc_ic_req_item_aprvl_de
Approval Type [sc_ic_aprvl_type_defn_staging]	Approval Type Definition [sc_ic_aprvl_type_defn]	
Question [sc_ic_question]	Variables [sc_item_variables_task]	
Task Assignment [sc_ic_task_assign_defn_staging]	Task Assignment Definition [sc_ic_task_assign_defn]	

Roles installed with catalog item designer

Roles are added with activation of the catalog item designer.

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Role	Contains Roles	Description
catalog_editor	none	Can create, modify, and publish items within categories to which they are assigned. Can also perform the following for items and categories to which they are assigned: • Apply existing user criteria. • Attach a variable set. • Create a UI policy. • Edit a catalog item in a catalog client script.
catalog_item_designer	none	Can view the status of category requests.
catalog_manager	none	Can request a category, view and assign catalog editors to their categories, and create, modify, and publish items within their categories. Can also perform the following for items and categories to which they are assigned: • Apply existing user criteria. • Attach a variable set. • Create a UI policy. • Edit a catalog item in a catalog client script.

UI policies installed with catalog item designer

UI policies are added with activation of the catalog item designer.

UI Policy	Table	Description
Allow category entry	Item [sc_ic_item_staging]	Allow category entry only if a catalog is selected.
Show Mobile Image	Item [sc_ic_item_staging]	Make the mobile image field visible if availability is set to **Both Desktop and Mobile** or **Mobile Only**.
Show Desktop Image	Item [sc_ic_item_staging]	Make the desktop image field visible when availability set to **Both Desktop and Mobile** or **Desktop Only**.
Show Published Item	Item [sc_ic_item_staging]	Show the catalog item if the staged item is published.

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UI Policy	Table	Description
Hide Item field on Item Designer - Approval view	Approval [sc_ic_aprvl_defn_staging]	Hide the catalog item field from the item designer approval view.
Show "User" field when Type=User	Approval [sc_ic_aprvl_defn_staging]	Make the user field visible and mandatory if a user approval is selected.
Show "Group" field when Type=Group	Approval [sc_ic_aprvl_defn_staging]	Make the group field visible and mandatory if a group approval is selected.
Show "Predefined approval" field when Type=predefined_approval	Approval [sc_ic_aprvl_defn_staging]	Make the **Predefined approval** field visible if a predefined approval is selected and the predefined type is selected.
Show Predefined approval description when appropriate	Approval [sc_ic_aprvl_defn_staging]	Make the predefined approval description visible and mandatory if a predefined approval is selected.
Show "User(s)" field when Type=User	Approval Type [sc_ic_aprvl_type_defn_staging]	Make the **User(s)** field visible and mandatory if a user approval is selected.
Show "Group(s)" field when Type=Group	Approval Type `[sc_ic_aprvl_type_defn_staging]`	Make the **Group(s)** field visible and mandatory if a group approval is selected.
Show "Script" fields when Type=Script	Approval Type [sc_ic_aprvl_type_defn_staging]	Make the **Script output** and **Approver script** fields visible if a script approval is selected.
Show published information	Approval Type [sc_ic_aprvl_type_defn_staging]	Make the approval definition and approval definition

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UI Policy	Table	Description
		version visible if the published definition is not empty.
Show assignment type fields	Task Assignment [sc_ic_task_assign_defn_staging]	Make the **Assignment type** field visible if it is a direct assignment.
Show published assignment definition	Task Assignment [sc_ic_task_assign_defn_staging]	Make the published assignment definition visible if the published definition is not empty.
Show custom assignment fields	Task [sc_ic_task_defn_staging]	Make the **User(s)** and **Group(s)** fields visible if the assignment has a user specified.
Hide Item field	Task [sc_ic_task_defn_staging]	Hide the **Item** field if the item is not empty.
Hide meta fields	Question [sc_ic_question]	Hide fields used by underlying logic, but not requiring user input.
Hide Mandatory	Question [sc_ic_question]	Hide field if type is **checkbox** or **label**.
Show default value	Question [sc_ic_question]	Show default values, depending on the type of variable selected.
Numeric Scale type fields	Question [sc_ic_question]	Show numeric scales: **Maximum** and **Minimum** if the preconfigured variable type **Number** is selected.
Show Choices related list when appropriate	Question [sc_ic_question]	Show the **Choices** related list if the variable type **Multiple Choice** or **Select Box** is selected.
Hide Read Only	Question [sc_ic_question]	Hide the **Read only** field if the variable type **Label**, **Date**,

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UI Policy	Table	Description
		or **Date/Time** is selected.
Read only question type	Question [sc_ic_question]	Hide field if the variable type **Read only** is selected.
Hide Item field on Item Designer - Question view	Question [sc_ic_question]	Hide **Staging item** field if the item is selected.
Force preconfigured Reference type fields	Question [sc_ic_question]	Set the value of preconfigured field to true and read-only if the variable type **reference** is selected.
Show Choices related list when appropriate	Question [sc_ic_question]	Show **Choices** related list if the variable type **Multiple Choice** or **Select Box** is selected.
Preconfigured checkbox type fields	Question Type [sc_ic_question_type]	
Preconfigured Reference fields	Question Type [sc_ic_question_type]	Show reference and reference qualifier fields if the question type is preconfigured reference type.
Preconfigured Questions	Question Type [sc_ic_question_type]	Show question text, read only, help text, and default value fields if the preconfigured question type is selected.
Preconfigured Numeric Scale type fields	Question Type [sc_ic_question_type]	Show numeric scales: **Maximum** and **Minimum** if the preconfigured variable type **Number** is selected.
Show "Predefined Approval" field when Type=predefined_approval	Approval Definition [sc_ic_aprvl_defn]	Make the **Predefined Approval** field visible and mandatory if no type is selected.

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UI Policy	Table	Description
Show "Group" field when Type=Group	Approval Definition [sc_ic_aprvl_defn]	Make the **Group** field visible and mandatory if no type is selected.
Show "User" field when Type=User	Approval Definition [sc_ic_aprvl_defn]	Make the **User** field visible and mandatory if the user type is selected.
Show "Script" fields when Type=Script	Approval Type Definition [sc_ic_aprvl_type_defn]	Make the **Script** field visible and mandatory if the script type is selected.
Show "User(s)" field when Type=User	Approval Type Definition [sc_ic_aprvl_type_defn]	Make **User(s)** field visible and mandatory if the user type is selected.
Show "Group(s)" field when Type=Group	Approval Type Definition [sc_ic_aprvl_type_defn]	Make **Group(s)** field visible and mandatory if the group type is selected.
Show assignment type fields	Task Assignment Definition [sc_ic_task_assign_defn]	Make the **User(s)** and **Group(s)** fields visible and hide the **Script** field if the direct assignment variable type is selected.
Custom task fields	Task Definition [sc_ic_task_defn]	Make the **User(s)** and **Group(s)** fields visible and hide the **Assignment Definition** field if variable type Create my own selected.

Script includes installed with catalog item designer

Script includes are added with activation of the catalog item designer.

Note:
Many of the business rules link to these script includes.

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Name	Description
sc_ic_Section	Wrapper class for item designer question layout sections.
sc_ic_Factory	Entry point for all customization of the service catalog item designer script.
sc_ic_ColumnSecurityManager	Security manager for the Column table [sc_ic_column].
sc_ic_QuestionSecurityManager	Security manager for the Question table [sc_ic_question].
sc_ic_CatalogItemRecordProducer	Wrapper class for Record Producer table [sc_cat_item_producer] for the item creator.
sc_ic_Base	Base class for all item designer wrapper classes.
sc_ic_QuestionClass	Wrapper class for the Question class table [sc_ic_question_class].
sc_ic_TaskDefnStagingSecurityManage	Security manager for the Task table [sc_ic_task_defn_staging].
sc_ic_SectionSecurityManager	Security manager for the Section table [sc_ic_section].
sc_ic_CategoryRequest	Wrapper for the category request table.
sc_ic_ApprovalDefnStagingAJAX	Helper function which can be called from client scripts.
sc_ic_QuestionChoiceSecurityManager	Security manager for the Question Choice table [sc_ic_question_choice].
sc_ic_ApprovalDefnStagingSecurityManager	Security manager for staged approval definitions.
sc_ic_TaskAssignDefnStaging	Wrapper class for `sc_ic_task_type_definition_staging`.
sc_ic_TaskDefnStaging	Wrapper class for staged task definitions.
sc_ic_Question	Wrapper class for item designer questions. Subclass to modify and inject using `sc_ic_Factory`. See `sc_ic_Factory` for more information.
sc_ic_SectionAJAX	Service dealing with sections that can be called from client scripts.
sc_ic_CatalogTask	Wrapper class for Catalog Task table [sc_task] for item designer functionality.
sc_ic_CatalogItem	Wrapper class for Catalog Item table [sc_cat_item] for the item designer.
sc_ic_QuestionChoice	Wrapper class for Question Choice table [sc_ic_question_choice].
sc_ic_CatalogItemVariable	Wrapper for catalog item variables.
sc_ic_ApprovalDefnStaging	Wrapper for that approval definition staging table.
sc_ic_ReqItemApprovalDefn	Wrapper for requested item approval definitions.

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Name	Description
sc_ic_Item	Subclasses, injected using `sc_ic_Factory`. For more information, see `sc_ic_Factory`.
sc_ic_CatalogItemVariableChoice	Wrapper class for variable choices.
sc_ic_ReqItemTaskDefn	Wrapper for requested item approval definitions.
sc_ic_ItemStagingSecurityManager	Security manager for the Item table [sc_ic_item_staging].
sc_ic_BaseTypeDefnStaging	Base class for all type definition staging classes
sc_ic_Column	Wrapper class for item designer question layout columns.
sc_ic_ApprovalTypeDefnStaging	Wrapper class for staged approval type definitions.
sc_ic_CatalogItemRecordProducerService	Wrapper class for Service table [sc_cat_item_producer_service] for the item designer.
sc_ic_QuestionAJAX	Service for item designer questions that can be called from the client.
sc_ic_QuestionType	Wrapper class for item designer question types. Subclass to modify and inject using `sc_ic_Factory`. See `sc_ic_Factory` for more information.
sc_ic_TaskDefnStagingAJAX	Service for staged task definitions that can be called from client scripts.
sc_ic_RequestedItem	Item creator wrapper class for the Requested Item table [sc_req_item].
sc_ic_ApprovalTypeDefn	Wrapper class for the approval type definition table.
sc_ic_TaskAssignDefn	Wrapper class for task assignment definitions.
sc_ic_TaskDefn	Wrapper class for task definitions.
sc_ic_SecurityManager	Base security manager class for the item designer tables.
sc_ic_BaseFactory	Base factory class. Make all customizations in the `sc_ic_Factory` class. See `sc_ic_Factory` for more information on how to mount customizations.
sc_ic_ApprovalDefn	Wrapper for approval definitions.
sc_ic_getCategoriesForModule	Class that gets categories.

Client scripts installed with catalog item designer

Client scripts are added with activation of the catalog item designer.

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Script	Table	Description
Get next order number	Approval [sc_ic_aprvl_defn_staging]	Populates the **Order** field by adding 100 to the biggest order on an approval definition defined against the item.
Get Approval Type Description	Approval [sc_ic_aprvl_defn_staging] sc_ic_aprvl_defn_design	Displays or hides the approval type description on change of the predefined field value.
Reload when an image is deleted true	Item [sc_ic_item_staging]	Reloads the Item designer form when a Desktop or Classic Mobile image is deleted. If it has been **Published**, sets the record back to state **Draft**.
Process Dialog action	Item [sc_ic_item_staging]	Prompts to make a decision about keeping the modifications to the item before completing the selected action which causes an update. Performs the prompt if the state of the item is set to **Published** and there are unsaved changes to the item record.
Dialog functions	Item [sc_ic_item_staging]	Defines available dialog functions for actions such as display, process, and refresh.
Force update of Column dropdown	Question [sc_ic_question]	Updates the **Section** choice list values on load of the **Question** dialog box.
Mandatory checked	Question [sc_ic_question]	Ensures read only is not true if the question is mandatory.
Read only checked	Question [sc_ic_question]	If the question is read only, ensures mandatory is not true.
Populate meta fields ["Type" changed]	Question [sc_ic_question]	Populates the meta field values on change of Type on the Add Question form.
Populate meta fields ["Option" changed]	Question [sc_ic_question]	Populates the meta field values on change of Option on the Add Question form.
Get Question Type Description	Question [sc_ic_question]	Displays the Question type description on change of the Option field value for the following Types: **Multi-Line Text**, **Multiple Choice**, **Reference**.
Update Order on Section change	Question [sc_ic_question]	Updates the Order value on the question record to the next question order number available for a selected Section on change.
Hide Question Type	Question Type [sc_ic_question_type]	Controls the visibility of Question Type Choice related list for questions of type Select Box and Multiple Choice.

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Script	Table	Description
Choices related list		
Adjust position for display	Section [sc_ic_section]	Adjusts the position value on a section record to determine the correct display order.
Validate and adjust Position	Section [sc_ic_section]	Validates that the position on a section record value is greater than 0 and displays a field message if not.
Get next position	Section [sc_ic_section]	Populates the position field by adding 1 to the biggest position number on a section defined against the item.
Get next order number	Task [sc_ic_task_defn_staging]	Populates the **Order** field by adding 100 to the biggest order on an approval definition defined against the item.

Business rules installed with catalog item designer

Business rules are added with activation of the catalog item designer.

Name	Table	When	Description
Validate Category	Item [sc_ic_item_staging]	BEFORE	Abort action if category is invalid.
Set Question for non-preconfigured types	Question Type [sc_ic_question_type]	BEFORE	For non-preconfigured question types, set the label using the class name.
Prevent multiple non-preconfigured	Question Type [sc_ic_question_type]	BEFORE	Abort the insert/update action and display an error message to the user if a non-preconfigured question type exists.
Set Name field	Section [sc_ic_section]	BEFORE	Set name field to label field and add additional message detail.
Set value if nil	Question Choice [sc_ic_question_choice]	BEFORE	Set text field to empty string when value is null.
Check for duplicate	Section [sc_ic_section]	BEFORE	Abort the insert/update action and display an error message to the user if a section exists.
Check for Questions before deleting	Section [sc_ic_section]	BEFORE	Prevent deletion of columns by aborting the delete action and display an error message to the user if the column contains questions.
Position must be between 0 or 1	Column [sc_ic_column]	BEFORE	Show message to user.
Check for Questions before deleting	Column [sc_ic_column]	BEFORE	Show message to user.

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Name	Table	When	Description
Group/user required for user specified	Task [sc_ic_task_defn_staging]	BEFORE	Show message to user.

The following business rules do not contain independent logic, but simply call methods in script includes, as indicated. To find out which business rules call which script includes, refer to the default class registrations within the sc_ic_BaseFactory script include.

Name	Table	When
sc_ic: Copy Approval Definitions	Requested Item [sc_req_item]	AFTER
sc_ic: Copy Task Definitions	Requested Item [sc_req_item]	AFTER
Approval definition changed	Approval [sc_ic_aprvl_defn_staging]	AFTER
Update detail field	Approval [sc_ic_aprvl_defn_staging]	BEFORE
Set the item to draft	Approval Type [sc_ic_aprvl_type_defn_staging]	BEFORE
Check and update manager/ editor roles	Item Designer Category Request [sc_ic_category_request]	AFTER
Copy changes to real Category	Item Designer Category Request [sc_ic_category_request]	AFTER
Add Item Designer role on insert	Item Designer Category Request [sc_ic_category_request]	AFTER
Column changed	Column [sc_ic_column]	AFTER
Set layout changed on delete	Column [sc_ic_column]	AFTER
Create default Section	Item [sc_ic_item_staging]	AFTER
Set draft if changed	Item [sc_ic_item_staging]	BEFORE
Check for Valid Name	Question [sc_ic_question]	BEFORE
Question definition changed	Question [sc_ic_question]	AFTER
Question meta changed	Question [sc_ic_question]	AFTER
Set definition changed on delete	Question [sc_ic_question]	AFTER
Set Question Type and Base Type	Question [sc_ic_question]	BEFORE
Set question name	Question [sc_ic_question]	BEFORE
Question Choice changed	Question Choice [sc_ic_question_choice]	AFTER
Set Order number	Question Choice [sc_ic_question_choice]	BEFORE
Set layout changed on delete	Section [sc_ic_section]	AFTER
Create default Columns	Section [sc_ic_section]	AFTER

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Name	Table	When
Section changed	Section [sc_ic_section]	AFTER
Set Draft	Task Assignment [sc_ic_task_assign_defn_staging]	BEFORE
Set assignment details	Task Assignment [sc_ic_task_assign_defn_staging]	BEFORE
Set assignment details	Task [sc_ic_task_defn_staging]	BEFORE
Set task definition changed on item	Task [sc_ic_task_defn_staging]	AFTER

Email notifications installed with catalog item designer

Email notifications are added with activation of the catalog item designer.

Name	Table	Condition	Recipients
Item Designer Category Request Opened	Item Designer Category Request [sc_ic_category_request]	state EQUALS requested	manager
Item Designer Category Rejected	Item Designer Category Request [sc_ic_category_request]	state CHANGES TO rejected	manager
Item Designer Category Published	Item Designer Category Request [sc_ic_category_request]	state CHANGES TO created	manager, editors

Configuring Service Catalog

Service Catalog enables users with the Catalog Administrators role (catalog_admin) to set up the service catalog.

Configuration overview

Set up one or more service catalogs and provides self-service opportunities. You can organize your catalog offerings by using the ability to publish multiple catalogs targeted to specific audiences.

Service catalog categories

Categories organize service catalog items into logical groups. Administrators and catalog administrators can create and configure categories, defining their characteristics and adding content such as catalog items to them.

Categories can have a parent-child relationship, for example, **IT** and **Laptops**. A child category is a subcategory of its parent category. Each catalog item, order guide, record producer, content item, and subcategory appears as a single item within the category. A catalog item can exist in multiple categories, giving you the flexibility to offer the same service from multiple places within your catalog.

Introduces creating categories in a ServiceNow Service Catalog.

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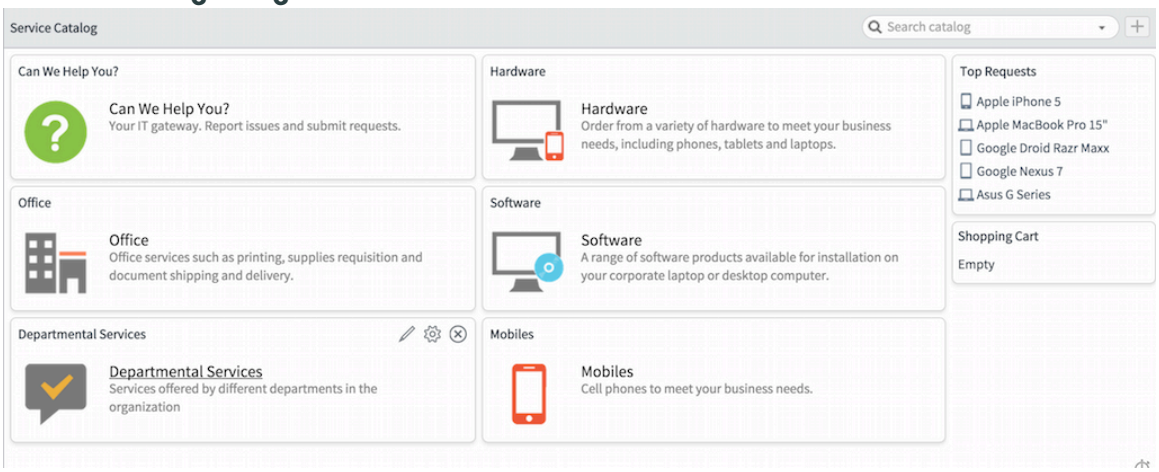
Service Catalog Categories



Certain system properties control the following Service Catalog category configuration.

- How categories are displayed to users. For example, are subcategories displayed in a panel or as a list in the category view.
- What content types and search and navigation elements are available on the homepage. For example, searching the service catalog can be enabled or disabled for all users.
- How catalog items, item class names and item categories appear to users. For example, what number of catalog items or categories are previewed in a section.

Catalog managers and catalog editors can also configure categories, but only categories to which they are assigned.

Note:

- If there are no active items in a category's hierarchy, that category does not appear in the catalog, and cannot be added to the catalog.
- Users with the admin or catalog_admin roles can view categories only if there is an active item in the category and **Availability** is set to either **Desktop** or **Both**.
- Configure the *`glide.sc.category.canview.override`* property to change the roles for this behaviour.

Create a category

Administrators and catalog administrators can create or edit a category.

Before you begin

Role required: admin

About this task

To create or edit a category:

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Categories**.
   A list of existing categories appears. If the **Parent** field is blank, the category does not have a parent category.
2. Click **New** or select the category to edit.

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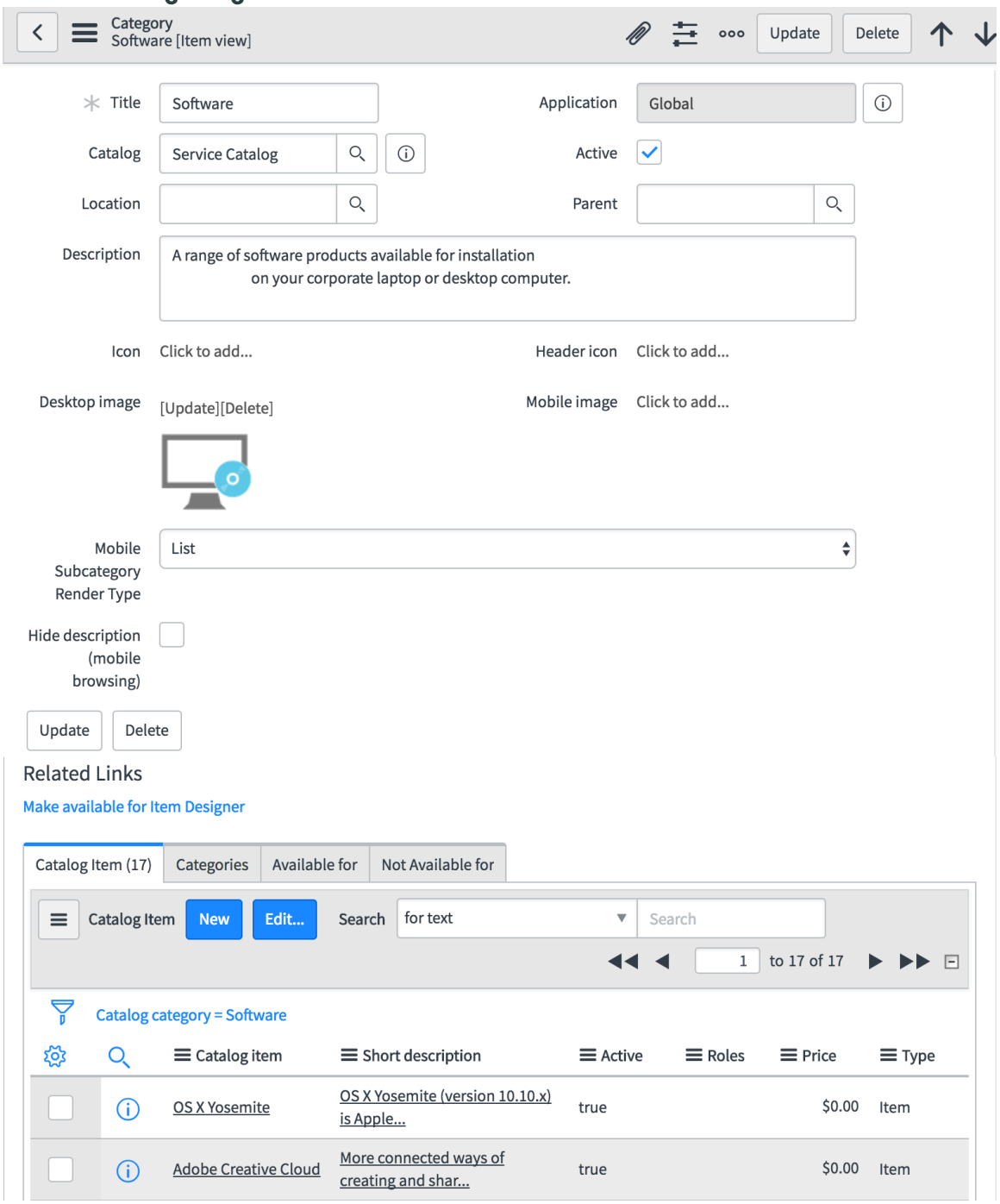
Note:
The visibility of a category is controlled by user criteria. See Apply user criteria to items and categories.

Service Catalog categories



3. Fill in the fields on the form, as appropriate.

Service Catalog category form

Field	Description
Title	Descriptive name for the category.

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Field	Description
Application	The application scope in which the category is applicable.
Catalog	The catalog this category belongs to.
Active	Check box to indicate that the category is available to add to the service catalog homepage.
Location	Any location information relevant for the category.
Parent	Any parent category for which this category is a subcategory.
Description	Information about the category. The description appears when the category is collapsed on the service catalog homepage. The description also appears in the **Related Categories** list when a user clicks the parent category title.
Icon	The small icon displayed beside the category name, when the category is listed as a subcategory.
Header icon	The icon displayed beside the category header, when the category is a top-level category.
Desktop image	A larger image to display with the category on the Service Catalog homepage. This image is visible only if the relevant renderer defines it to be used (the default renderer does not display this field).
Classic Mobile image	A picture to use on Classic Mobile devices for this category. If a mobile image is not selected, the **Desktop image** appears if the **Classic Mobile Subcategory Render Type** is set to **Cards**.
Classic Mobile Subcategory Render Type	The rendering option to control how subcategories are displayed. Select **List** for a single-column list, or **Cards** for a multi-column display.
Hide description (classic mobile browsing)	Option for displaying the description at the top of the list on Classic Mobile devices.

Configure dynamic categories

Dynamic categories let you organize and display commonly requested items and knowledge articles. Dynamic categories appear on the right side of the service catalog homepage by default.

Before you begin

Role required: admin

About this task

Use dynamic categories to provide users with an access option that automatically adjusts to changing request trends.

To configure dynamic catalog categories:

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Dynamic Categories**.
2. Select **New** or open an existing dynamic category.
3. Fill in the fields on the **Dynamic category** form, as appropriate.

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The **Dynamic category** form contains many of the same fields as the Category form. Additional fields are:

Name of form

Field	Description
Type	The kind of items to display. Can be **Requested items** or **KB Articles**
Search how long?	For catalog items only, the period during which to search for the most common requests. For example, enter 7 00:00:00 to display the most commonly requested items in the previous seven days.
Number of Entries	The number of items to display in the dynamic category.

4. Use this example of a step with additional info.
   The results displayed are limited to those items or knowledge articles available in the currently viewed catalog.

Service catalog setup

Service Catalog enables users with the Catalog Administrators role (catalog_admin) to set up the service catalog.

Service Catalog enables you to set up one or more service catalogs and provides self-service opportunities. You can organize your catalog offerings by using the ability to publish multiple catalogs targeted to specific audiences.

An overview of ServiceNow service catalog administration.

Set up a service catalog

To set up a Service Catalog, plan the way your organization defines and maintains Service Catalog items, and how it fulfills them.

Before you begin
Role required: admin

About this task
Administrators and catalog administrators, users with the catalog_admin role, can use the Service Catalog application to define service catalog content and layout. Catalog managers, users with the catalog_manager role, can define and manage a single service catalog. Catalog editors, users with the catalog_editor role, can manage a single service catalog.

Administrators and catalog administrators can define and manage multiple service catalogs. A catalog manager can define and manage a single catalog. One or more catalog editors can manage a single catalog.

Follow these steps to plan for your service catalog:

Procedure
1. Assign roles to the users working with the service catalog.
2. Define content to provide in the service catalog:

Catalog items	The goods and services available within the catalog.

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Categories	The groups of items displayed on the catalog home page
Variables	The options available for tailoring a catalog item to meet specific needs.

3. Customize the service catalog homepage to meet your requirements such as defining a Classic Mobile layout.
4. Define the request fulfillment processes your organization uses to deliver ordered catalog items.
5. **Optional:** Create a navigation module for the new catalog.
6. **Optional:** Add the catalog to the multi-catalogs home page.

What to do next

Administrators and catalog administrators can further extend the service catalog to provide more powerful features, using specialized catalog items, configuration options, and scripting functions. For example, administrators can customize the checkout process used when ordering catalog items.

Related topics

Service Catalog terms and roles

Set up Platform URLs for catalog modules

You can direct users to a specific catalog via a URL to a module in that particular catalog.

Before you begin

Role required: admin

About this task

When you create a module for your catalog page, you can direct users to a specific catalog and view from this module via a URL.

Procedure

In the **Link Type** section, select **URL (from Arguments)**, then in the **Arguments** field, enter a URL of the form `catalog_home.do?sysparm_catalog=id of sc_catalog record&sysparm_catalog_view=view name of sys_portal_page`.

For example, `catalog_home.do?sysparm_catalog=742ce428d7211100f2d224837e61036d&sysparm_catalog_view=catalog`

Note:
If you make the default catalog inactive, then deactivate the **Catalog** module otherwise users can continue to access the inactive catalog using that module.

If a URL has a valid *sysparm_catalog* parameter, but an invalid or missing *sysparm_catalog_view* parameter, the view with the default value from the corresponding Catalog Portal Page record is used.

If a URL has a valid *sysparm_catalog_view* parameter, but an invalid or missing *sysparm_catalog* parameter, the corresponding Catalog Portal Page record is used to set the catalog.

Note:
To ensure peak performance, define both parameters correctly.

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Multiple service catalogs setup

Multiple service catalogs enable your organization to offer different sets of services to different teams within the organization, such as IT services, human resources, and facilities management.

Administrators and catalog administrators can define and manage multiple service catalogs. End users can access multiple catalogs from a single homepage, can search across all catalogs, or can search directly within each catalog.

Enabling access for catalogs

You can enable read access to the catalogs by applying the rule **read ACL** on Catalog (sc_catalog) table. See Access Control Rules for more information.

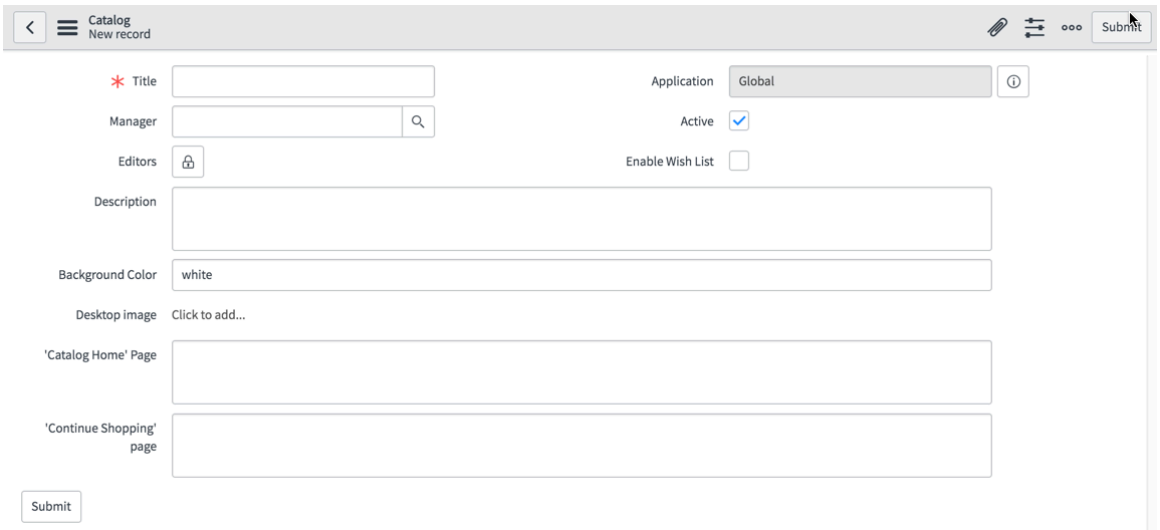
Create a catalog

Using Service Catalog, you can create a catalog and define items and categories within the catalog.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Catalogs**.
2. Select **New**.



3. Enter the new catalog details (see table).
4. Right-click the form header and select **Save**.
5. Define catalog items and categories to include in the catalog.
6. **Optional:** Define additional portal pages for the catalog.
7. **Optional:** Manage sites if you are using a CMS system.

Field	Description
Title	Descriptive name for the catalog.
Application	The application scope for this catalog. For information on the application scope, see Application scope .

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Field	Description
Manager	Name of the catalog manager assigned to this catalog. (Optional) The manager is able to edit and update the catalog, as well as the categories and catalog items within the catalog. The manager can assign editors and also a different manager for the catalog, if desired. Only one manager can be assigned to a catalog and must have the catalog manager role or catalog_admin role assigned.
Active	Select the check box to make the catalog available to end users.
Editors	Name of the catalog editor. (Optional) The editor is able to edit and update the catalog, as well as categories and catalog items within the catalog. The editor can assign other editors, but cannot change the manager. Multiple editors can be assigned to a catalog. Each user must have the catalog editor role assigned.
Enable Wish List	Select the check box to enable the wish list feature for the catalog.
Description	Information about the catalog, displayed on the multi-catalog homepage.
Background Color	The background color used for the catalog on the multi-catalog homepage.
Desktop image	The larger image to display with the catalog on the multi-catalog homepage. This image is only shown if image display is included in the renderer selected, such as the default **Title and Image** renderer.
'Catalog Home' page	The location to direct service catalog users to when they click the **Catalog Home** button. This field is designed to reference a content page url suffix.
'Continue Shopping' page	The location to direct service catalog users to when they click the **Continue Shopping** button. This field is designed to reference a content page url suffix.

What to do next
To add a module in the navigator for the new catalog, see Create a module.

Manage items in a catalog

Using Service Catalog, you can view and manage items within a catalog.

Before you begin
Role required: admin

About this task
Use the **Catalog Items** related list on the Catalog form to view and manage the items available in the catalog.

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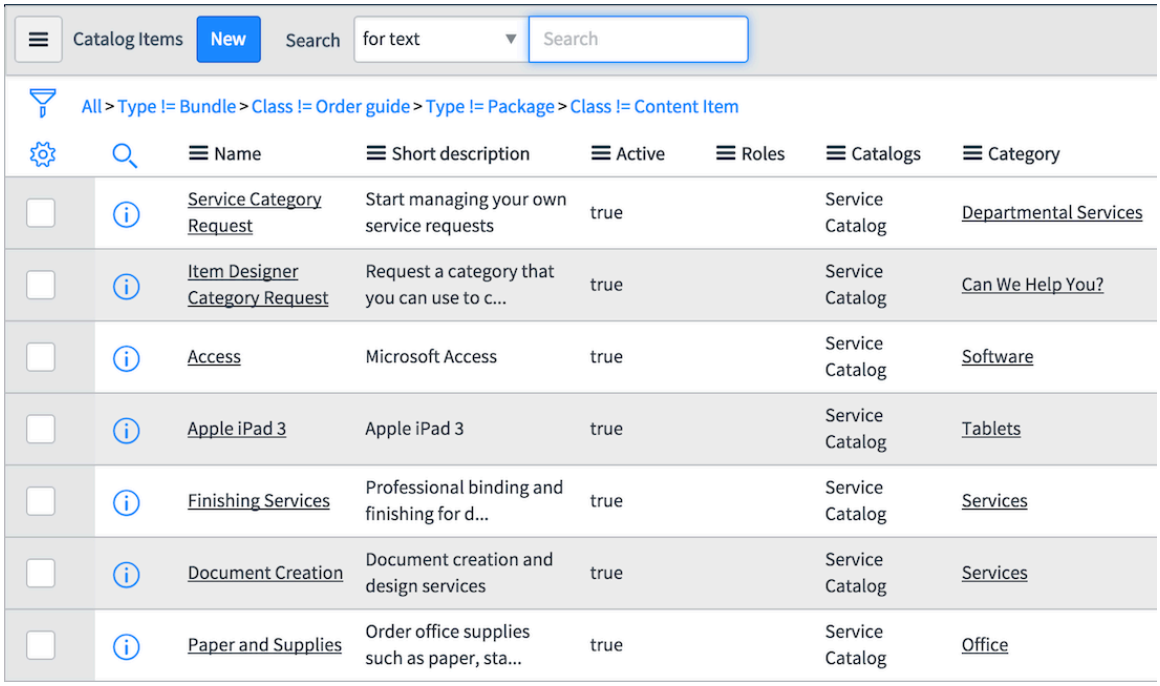

To define a new catalog item for the catalog, click **New** and enter the details for the item.

Manage catalog portal pages

Using Service Catalog, you can create and manage multiple portal pages for a catalog.

Before you begin

Role required: admin

About this task

A catalog portal page provides a homepage for a specific catalog. You can use portal pages to create different catalog views for different user groups. Each portal page accesses the same catalog content and presents that content in different ways.

Catalog portal page details include the owner, title, and view to use for that page.

Procedure

1. The Catalog Portal Pages related list shows portal pages available for that catalog. Each catalog has a default page, created automatically when the catalog is created.
2. Select an appropriate action:
   - Click **New** to create a new portal page.
   - Click **Edit** to select another portal page for the catalog.
   - Select a portal page to view and edit details for that page.

Tables provided with multiple service catalogs

Administrators and catalog administrators must consider these points before they upgrade to multiple service catalogs.

Before upgrading, be aware of changes made to the underlying Service Catalog data model. These changes are made to implement multiple catalogs and do not affect a standard upgrade. However, if you have made customizations, such as changes to the data model, the changes can impact the instance.

The following tables are provided with multiple service catalogs:

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Tables provided with multiple service catalogs

Table [name]	Description
Catalog Site [sc_catalog_site]	Associates catalogs to sites.
Catalog Portal Page [sc_catalog_view_mtom]	Links catalogs to CMS portal pages. Defines the default catalog to portal page combination used by default links.
Catalog Items Catalog [sc_cat_item_catalog]	Stores the catalogs an item is available in.
Catalog Item Category [sc_cat_item_category]	Stores the categories an item is available in.

Catalog site records

Catalog site records appear in the **Sites** related list on the Catalog form.

The Catalog Site [sc_catalog_site] table associates catalogs with CMS web sites.

Several service catalog system properties are used to specify values for different sites used by different catalogs.

Catalog site records properties

Property	Catalog site field [name]
glide.sc.home.cms_page	CMS homepage [cms_home]
glide.sc.search.cms_page	CMS search page [cms_search]
glide.sc.continue.shopping.target	CMS 'Continue Shopping' page [cms_continue_shopping]

Service Catalog scoping

Scoping support is available to define the limits of entities in Service Catalog.

- A catalog can have categories from different scopes.
- A category can only be in the same scope as its parent category.
- You can associate a catalog item with categories of a different scope.
- Catalog items can contain variable sets from a different scope.
- Variables can only be in the same scope as the catalog item or variable set.
- Catalog UI policies can only be in the same scope as the catalog item or variable set.
- Catalog client scripts can only be in the same scope as the catalog item or variable set.
- Catalog data lookup can only be in the same scope as the catalog item or variable set.
- The rule base of an order guide can have items from different scopes.
- The scope of the record producer and the target table should be the same.

Scriptable service catalog variables

You can use scripting to reference any request item variable from a table in scoped and non-scoped environment.

An example of a variable reference follows.

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```
current.variables.<variable_name>
```

Where current refers to the current record, and *<variable_name>* is the name of your variable.

Note:
In order to reference a variable from JavaScript, it must have a name.

When a variable is part of a variable set, you can reference it as current.variables.<variable_name> or current.variables.<variable_set_name>.<variable_name>.

Variable set is also a first-class citizen in Service Catalog. Like variables, a variable set has read, write, and create roles. If roles are provided for a variable set, the roles are applicable for the variables within the set. Roles of an individual variable are overridden by the roles of the variable set.

Print a variable

```
var original = current.variables.original_number;
gs.print(original);
```

Set a variable

```
current.variables.name = "Auto-Generated:" +
 current.variables.asset_tag;
```

Create an inventory item with fields set from variables

```
doCreation();

function doCreation ( ) {
var create = current.variables.create_item;
if (create == 'true') { // we want to create an asset
  var computer = new GlideRecord('cmdb_ci_computer');
  computer.initialize();
  computer.asset_tag = current.variables.asset_tag;
  computer.serial_number = current.variables.serial_number;
  computer.name = current.variables.name;
  computer.manufacturer = current.variables.company;
  computer.insert(); } }
```

Get GlideElementVariable of variables and variable sets associated with a GlideRecord

```
now_GR.variables
```

Get the name value pair of variables associated with a GlideRecord

```
now_GR.variables.getVariableValue();
```

Get a list of GlideElementVariable for variables within a task record

```
now_GR.variables.getElements();
```

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Get a list of GlideElementVariable for variables (including multi-row variable set) within a task record

```
now_GR.variables.getElements(true);
```

Note:
The *getElements()* method returns all the variables present on the given task record except for the formatter variables like label, break, container end, container split, and so on.

APIs for GlideElementVariable

- *now_GR.variables.<var_name>.isMultiRow()*: Get whether the GlideElementVariable is a multi-row variable set or a variable.
- *now_GR.variables.<var_name>.getQuestion()*: Get the Question object for a variable. Applicable only for a variable (*isMultiRow()* is false) and not for a multi-row variable set.
- *now_GR.variables.<var_name>.getLabel()*: Get the label of the GlideElementVariable. For a variable, the label of the variable is returned. For multi-row variable set, the title of the variable set is returned.
- *now_GR.variables.<var_name>.canRead()*: Get whether the user can view a variable or multi-row variable set.
- *now_GR.variables.<var_name>.canWrite()*: Get whether the user can edit a variable or multi-row variable set.
- *now_GR.variables.<var_name>.getDecryptedValue()*: Get the decrypted value for a masked variable. Applicable only for a masked variable.
- *now_GR.variables.<var_name>.getRows()*: Get the list of row objects for a multi-row variable set. Applicable only for a multi-row variable set (*isMultiRow()* is true).
- *now_GR.variables.<var_name>.getRowCount()*: Get the number of rows for multi-row variable set. Applicable only for a multi-row variable set (*isMultiRow()* is true).

Example to access variables of GlideRecord for the Task table

```
var now_GR = new GlideRecord('sc_req_item');
if (now_GR.get('635a1f5387320300e0ef0cf888cb0b73')) {
    var variables = now_GR.variables.getElements();
    for (var i=0;i<variables.length;i++) {
        var question = variables[i].getQuestion();
        gs.log(question.getLabel() + ":" + question.getValue())
    }
}
```

Example to access a multi-row variable set of GlideRecord for the Task table

```
var now_GR = new GlideRecord('sc_req_item');
now_GR.get('02c38dcd87013300e0ef0cf888cb0bb2');

var vars = now_GR.variables.getElements(true);

for (var i=0; i<vars.length; i++) {
    var now_V = vars[i];
    if (now_V.isMultiRow()) {
        var rows = now_V.getRows();
        for (var j=0; j<now_V.getRowCount(); j++) {
```

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```
            var row = rows[j];
            var cells = row.getCells();
            for (var k=0; k<cells.length; k++) {
                var cell = cells[k];
                gs.info(cell.getLabel() + ":" +
 cell.getCellDisplayValue())
            }
        }
    }
}
```

Multi-row variable set

Multi-row variable set

Operation	Usage
Table operations	
Return JSON array value as String	`now_GR.variables.table_var`
Set value of a multi-row variable set	`now_GR.variables.table_var = <val>` **Note:** An array of ordered (key, value) pairs is also applicable as input.
Get value of column, var1, of a multi-row variable set	`now_GR.variables.table_var.var1`
Set value of a variable set, var1	`now_GR.variables.table_var.var1 = <val>` **Note:** An array of ordered (key, value) pairs is also applicable as input.
Row operations	
Get the current row count	`now_GR.variables.table_var.getRowCount()`
Returns the row specified by the variable "i" - getRow(<int> i)	`var row = now_GR.variables.table_var.getRow(<int> i);`
Get the cell value for a question column mapped to <var_name>	`row.<var_name>`

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Multi-row variable set (continued)

Operation	Usage
Set the cell value for a question column mapped to <var_name>	`row.setCellValue('<var_name>', value)`
Set the cell value for a question column mapped to <var_name>	`row.<var_name> = value`
Add an empty row at the end of the table and return a scriptable object	`var row = now_GR.variables.table_var.addRow()`
Delete a row	`row.deleteRow()`

Notes and limitations

- //Single column of table_Var
- now_GR.variables.table_var.var1
- now_GR.variables.table_var.var1 = <val>

1. You can only set a variable in a before business rule. Variables set in an after rule are not written to the database.
2. There is nothing in place to prevent namespace collision with variables. Creating two variables named computer_speed would result in only one of them showing up; the second one would overwrite the first one.
3. Date/time variables use the same time zone formatting and storage rules as all other dates in the system. They are stored internally in GMT, but translated into the user's local time zone and format for display.

Define filters for My Requests

Define request filters to filter incidents, requests, or tasks under the **Self-Service** > **My Requests** module in ServiceNow AI Platform, the **My Requests** widget in Service Portal, and the My Requests applet in the Now® Mobile app.

Before you begin

Role required: catalog_admin or admin

Since the My Request Filter [request_filter] table has been reparented to the Filter [sys_filter] table, a few fields from the My Request Filter table have been migrated to fields in the Filter table. The **Short Description** field from the My Request Filter table has been migrated to the **Title** field in the Filter table. The **Table Name** field from the My Request Filter table has been migrated to the **Table** field in the Filter table.

Note:
If the My Request Filter form is modified, the form still displays the **Short Description** and **Table Name** fields that are no longer valid. Delete these invalid fields from the form and add the **Title** and **Table** fields to the form.

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Procedure

1. Navigate to **Service Catalog** > **Catalog Administration** > **My Request Filter**.
2. On the form, fill the fields.

My Request Filter form

Field	Description
Title	Name of the filter.
Table	Table on which the filter condition is applied.
Application	Application scope of the filter.
Active	If set to true, the filter is active.
Applies to	Interface for which the filter is applicable. Possible values: ○ Desktop ○ Service Portal ○ Desktop/Service Portal ○ Mobile
Filter	Conditions to filter requests.
Portal Settings	
This section is displayed when the **Applies to** field is set to **Service Portal** or **All**.	
Portal page	Portal page that opens when you click the request.
Primary field to display	Primary information displayed for the request.
Secondary fields to display	Secondary information displayed for the request. **Note:** ○ Add a maximum of three secondary fields. ○ Do not add an image field. ○ If the Request [sc_request] table is selected, secondary field is not configured. If the request contains only one item, the Requested Item name is displayed. Else, it contains the requested item count.

3. Click **Submit**.

Related topics

My Requests widget

Activate the page route map for the standard ticket page

Delegated request experience

You can request a catalog item on behalf of another user or multiple users using the Requested For variable.

Delegated request experience comprises of the following entities:

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- Requested For variable for a catalog item. For information about this variable, see Requested For.
- Requested For field on a requested item (RITM)

Note:
The form views, list views, and email notifications are not updated to reflect the Requested For field on a RITM.

Configuration options

The following configuration options are available:

- Specify who you want to submit the request for using the Requested For variable. You can also map the Requested For variable to a field on the table for record producers.
- If required, configure the **Requested For** field on the RITM form. This field automatically stores the value of the Requested For variable.
- Allow delegated requests for a catalog item using its **Access Type** field, where you can specify if a request can be submitted for a user who does not have access to the catalog item.
- Submit a single request for an item on behalf of multiple users in Service Portal

Important:
If two-step checkout is enabled, the delegated request experience is not supported.

Request Management

After you submit a catalog item request, the Requested For variable value is copied to the **Requested For** field of the RITM. In case this field is not available on the RITM form, you should configure it.

Note:
After you submit a catalog item, the **Requested For** field value is not automatically updated when the Requested For variable is modified, and vice versa.

In Service Portal,

- If RITMs have different Requested For users, the following information is displayed in the order status page.
  - The **Requested For** column to display the RITM's Requested For user.
  - When the user viewing the Order Status page is not the user who submitted the request, the **Requestor** information to display the request's Requested For user. This is also applicable in Now Mobile, when the user viewing the RITM is not the user who requested it.
- If the RITM's Requested For user is different from the request's (REQ) Requested For user, My Requests menu displays the RITM records to the user who the RITM is being requested for. If the RITM Requested for is the same as the REQ requested for user, My Requests menu displays REQs.
- When you create a bundle from the cart by adding a catalog item with a Requested For variable, the item preserves the variable value. When you later add it to the cart to request for another user, you should edit the Requested For variable value as required.

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Request experience for a record producer

After you submit a record producer, the Requested For variable value is copied to the target record's field based on the **Map To Field** configuration.

Request experience for an order guide

This experience is supported in an order guide only if the following conditions are met:

- Order guide has a Requested For variable
- All items in the order guide have a Requested For variable

A catalog item is included in an order guide based on the Requested For user's access to a catalog item.

- When the user has no access to the catalog item and its **Access Type** is set as `Restricted`, that item is not included in the order guide.
- When the user has no access to the catalog item and its **Access Type** is set as `Delegated`, that item is included in the order guide.

The Requested For variable value from the **Describe Needs** section is always cascaded to the Requested For variable of catalog items in rule bases.

- The cascading of the Requested For variable value depends just on the variable type, but not the variable name.
- The Requested For variable value is cascaded even when the **Cascade Variables** check box is not selected for the order guide.
- The Requested For variables in the included catalog item cannot be edited.

Submitting a catalog item request for multiple users

To support submitting a request for multiple users, you can configure the Requested For variable of a catalog item.

1. From the **Type Specifications** tab, select the **Enable also request for** check box.
2. Specify the roles in the **Roles to use also request for** field that can submit a catalog item request for multiple users. If no role is specified, anyone who has access to the catalog item can submit the request.

After you configure the Requested For variable of a catalog item, the **Also request for** field is displayed for that item in Service Portal. After you specify multiple users in this field, you can:

- Add the item to the cart
  - Separate cart items are created for each user specified in the **Also request for** field.
  - The Requested For variable of each cart item is populated with the corresponding user.
- Submit the request
  - A single request is created and assigned to the current logged-in user requesting the item
  - Separate RITMs are created, one for each user specified in the **Enable also request for** field and the Requested For variable.

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Note:

- This experience is available in Service Portal.
- This experience is not available in Now Mobile and Workspace.
- This experience is not available for a record producer and order guide.
- The **Also request for** field is not displayed in the wish list and cart.
- Catalog client scripts, catalog UI policies, and g_form() APIs are not applicable for the **Also request for** field.
- The **Also request for** field is displayed only if the Requested For variable is editable. For example, the field is not displayed if the requesting user has no write permissions for the Requested For variable, or if the variable is made read-only via catalog client scripts.
- You can add up to a maximum of 50 users in the **Also request for** field.
- If any of the users does not have access to a catalog item with **Access Level** set as **Restricted**, then the item cannot be added to cart.

Request cloning

When you clone a request:

- The Requested For value for the cloned request is updated with the user for whom the request is being cloned.
- The Requested For value for cloned RITMs (with or without a Requested For variable) is updated with the user for whom the request is being cloned for the following entities:
  - RITM Requested For user
  - Requested For variable value

For information about cloning requests, see Clone requests.

Important:

- You can clone a request only when all RITMs are requested for the same user.
- You cannot clone a request for a user who does not have access (based on **Access Type**) to any item in the request.
- Variable dependencies on the Requested For variable are not considered when a request is cloned.

Cart behavior

Using the Requested For variable, you can add multiple catalog items to the cart for different users and submit the cart as one request. When you submit a request for a cart with multiple items, a single request is created with separate RITMs, one for each catalog item. In this case, the **Requested for** field of each RITM inherits the corresponding Requested For variable value.

When you add multiple items to the cart for different users and submit the request, a single request is created with a separate RITM for each catalog item with the corresponding Requested For user.

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Cart submission scenarios

Scenario	Cart behavior
All items in the cart have a Requested For variable and are requested for the same user	• Requested For value of the RITM is the Requested For variable value. • Requested For value of the request is the Requested For variable value.
All items in the cart have a Requested For variable and are requested for different users	• Requested For value of the RITM is the Requested For variable value. • Requested For value of the request is the logged-in user or the default Requested For user specified in the cart.
No items in the cart have a Requested For variable	• Requested For value of the RITM is the default Requested For user specified in the cart. • Requested For value of the request is the logged-in user or the default Requested For user specified in the cart.

Few items in the cart have a Requested for Variable while others do not	• Requested For value of the RITM is one of the following:
	  ○ If a Requested For variable exists, it is the variable value.
	  ○ If no Requested For variable value exists, it is the logged-in user or the default Requested For user specified in the cart
	• Requested For value of the request is the logged-in user or the default Requested For user specified in the cart.

Passing parameters for the Requested For variable

You can use parameters in ServiceNow AI Platform and Service Portal to specify the default Requested For variable value for a catalog item.

- In Platform, pass a user's sys_id as the *sysparm_requested_for* value in the URL.
- In Service Portal, specify the *requested_for_id* and *requested_for_display* parameters in widget instance options.

  For example, navigate to a catalog item widget, press Ctrl+click to select **Instance in Page Editor**, and specify the following parameters in the **Additional options, JSON format** field.

```
"requested_for_id": "a8f98bb0eb32010045e1a5115206fe3a
"requested_for_display": "Abraham Lincoln"
```

Note:
The Requested For value is set after the catalog form is loaded.

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Related topics

Types of service catalog variables

Configure the default behavior to request items for other users

Define the default behavior when no roles are specified in the *glide.sc.req_for.roles* property.

Before you begin

Role required: admin

About this task

The *glide.sc.req_for.roles* property specifies the list of roles who can request items for other users. When no roles are specified, then the default behavior is defined by the *glide.sc.req_for.roles.default* property. For information about the *glide.sc.req_for.roles* property, see Service Catalog properties.

Following are the possible values for the *glide.sc.req_for.roles.default* property.

- When the property is set to `allow`, then any user can request items for other users.
- When the property is set to `deny`, then no user can request items for other users.

The value of the *glide.sc.req_for.roles.default* property is considered as `allow` in any of the following scenarios and any user can request an item for other users:

- The *glide.sc.req_for.roles.default* property is not defined.
- The value of the *glide.sc.req_for.roles.default* property is empty, `allow`, or any string other than `deny`.

A user with the admin role can request an item for other users. In this case, values of both the properties, glide.sc.req_for.roles and glide.sc.req_for.roles.default, are not considered.

For zBoot customers, the *glide.sc.req_for.roles.default* property is available in the base system with the default value as `deny`. Upgrade customers can add and modify the property if required.

Procedure

1. Navigate to sys_properties.list.
2. Select the *glide.sc.req_for.roles.default* property.
3. On the System Property form, in the **Value** field, specify the value.
4. Click **Update**.

Service Catalog request fulfillment

When a user orders a catalog item, a request is created that follows a fulfillment process. A fulfillment process defines the steps to request approval, assign fulfillment tasks, and fulfill requests. Flow Designer flows, workflows, or execution plans are used to define fulfillment processes.

Preparing to fulfill catalog item requests involves the following activities.

- Set up fulfillment groups to assign to tasks.
- Define the fulfillment processes using Flow Designer flows, workflows, or execution plans.
- Assign the fulfillment process to catalog items.

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Using Flow Designer flows

The Flow Designer application enables process owners to automate work, such as approvals, tasks, and notifications, without having to code. Build multi-step flows from reusable components. For more information, see Exploring Flow Designer.

Using workflows

Workflows provide greater flexibility than execution plans, which are linear. Workflows allow for different paths to the end of the process. For example, an approver can reject a request, ending the process. If the request is approved, the process continues through fulfillment to the end of the process.

Use the Workflow Editor to define fulfillment workflows. The Workflow Editor offers the following features.

- Edit workflows graphically.
- Modify activities and conditions.
- Define transitions between workflow activities.
- Summarize workflow progress through stages.
- Validate workflows to identify potential problems.
- Publish workflows for other users.

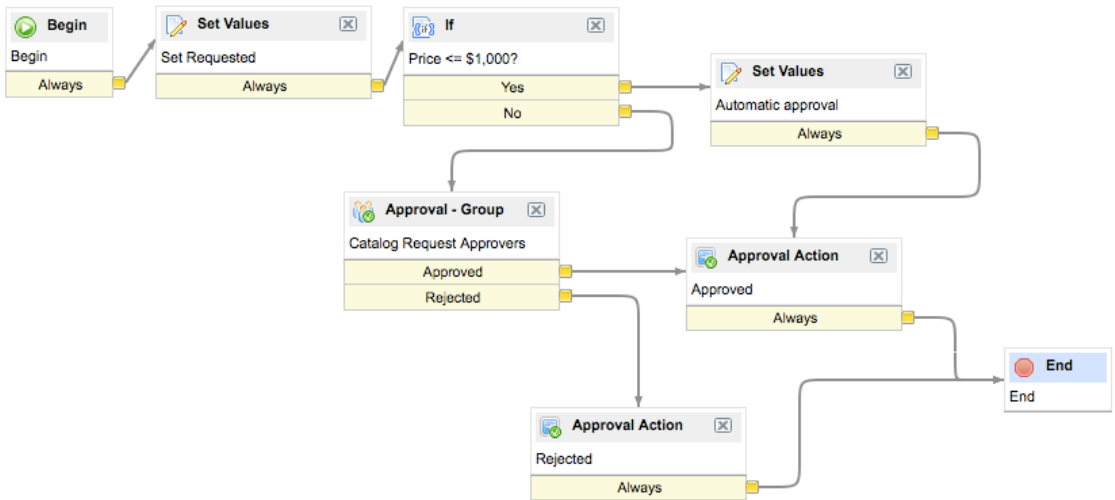
Service catalog workflows

Two service catalog workflows are provided in the base system. Use the Graphical Workflow Editor to modify the default workflows or to create additional service catalog workflows. Service catalog workflows support domain separation.

Default service catalog workflows

- **Service Catalog Request**: a simple workflow that fulfills a simple order.
- **Service Catalog Item Request**: a more complex workflow that fulfills a more complex order.

Service Catalog Request workflow



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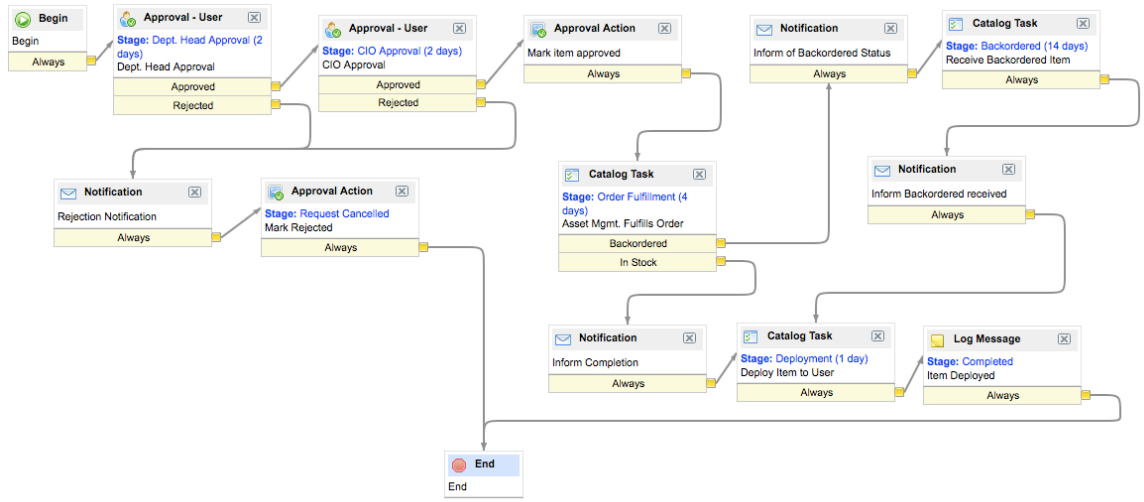
Service Catalog Item Request workflow



Defining service catalog workflows

Creating a workflow involves the following processes:

- Create a workflow to process the catalog item.
- Define the workflow activities to process the catalog item.
- Publish the catalog item workflow.
- Create or edit a catalog item to call the catalog item workflow

Note:
If your catalog workflow requires catalog tasks to access catalog variables, create the catalog tasks from a parent workflow. A catalog workflow cannot access catalog variables from catalog tasks created by a subflow.

Deleting catalog workflow records

Workflow stage fields for service catalog workflows display when a user deletes a record required by the workflow. If a user deletes a catalog item and that catalog item has active request workflows running, the workflow stage field displays **Catalog item removed**. Similarly, deleting the associated workflow context causes the stage field to display **Workflow context removed**.

Associating items with the domain-specific workflow

When using service catalog workflows with domain separation, ensure your catalog items use the domain-specific workflow. If you create a domain-specific version of a workflow, existing catalog items continue to use the original workflow. To configure the catalog item to use the domain-specific workflow, select the new workflow in the **Workflow** field on the catalog item record.

Create a catalog workflow

Create service catalog workflows when the default workflows are not appropriate for a fulfillment process.

Before you begin
Role required: workflow_creator, workflow_admin, or admin

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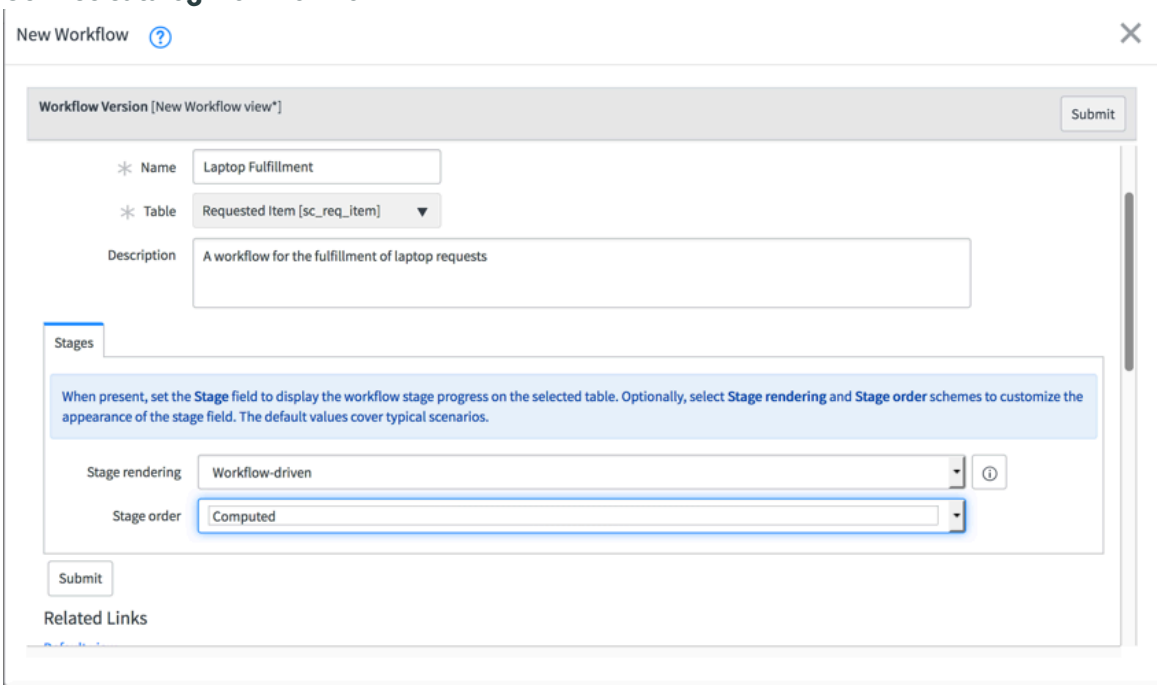
About this task

This example describes the procedure to set up fulfillment for a laptop request.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**
2. Click **New Workflow**.

Service catalog workflow form



3. Complete the form with the following information.

Field	Input value
Name	`Laptop Fulfillment`
Table	**Requested Item [sc_req_item]** Consider the following information: ○ Workflows on the Service Catalog Requested Item [sc_req_item] table fulfill the request of a single catalog item. Each requested item triggers its own fulfillment workflow when the item is ordered. Use the Requested Item table to add workflows for requested items. **Note:** To enable approval-type workflows to operate smoothly, make sure that the appropriate users have the correct role to access necessary tables in all domains. ○ Use caution when using *`before query`* business rules, as they can restrict access to the requested item record. ○ Workflows on the Request [sc_request] table always run when a service catalog request is submitted, regardless of what item was ordered. These

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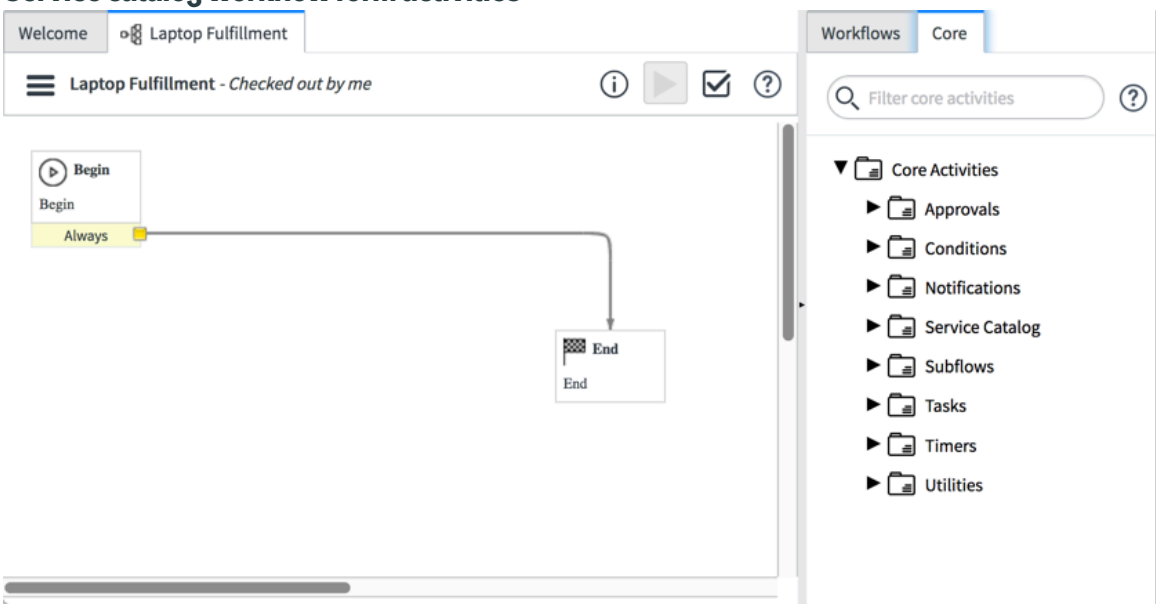
Field	Input value
	workflows control the entire request process, which can involve delivering several requested items. Therefore, Request table workflows are not assigned to a specific item from the maintain item form. If you do use the Request table for service catalog requests, add conditions to the workflow to ensure it runs when the correct item is requested.
Expected time	**Days** 7, **Hours** 00 : 00 : 00. Workflows cannot calculate the end time because not all the activities within the workflow have defined times. Therefore, the **Expected time** on the workflow becomes the **Delivery Time** on the catalog request. **Note:** When both **Expected time** and **Schedule** are filled in, the catalog delivery time is then calculated based on the combination of both. For example, if you put 2 days as **Expected time**, it is calculated as 48 hours. If you then add a schedule that defines a work day as 8 hours, the delivery time becomes 48 / 8 = 6 days. If your schedule excludes weekends, the calculation also add 2 days for the weekend, making the delivery time 8 days.
Schedule	**8–5 weekdays**.
Timezone	**US/Pacific**. The timezone that the schedule applies to.
Description	`A workflow for the fulfillment of laptop requests.`

4. Click **Submit**.

Service catalog workflow form activities



What to do next

After initiating a workflow, add workflow activities to it. Workflow activities are listed on the **Core** tab in the right pane.

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Add an activity to a catalog workflow

You can add activities to a workflow to perform tasks such as running a script, sending notifications, or requesting approvals. Activities can succeed or fail, which can result in actions performed by other activities.

Before you begin

Role required: workflow_creator, workflow_admin, or admin

About this task

After creating the workflow to add a laptop fulfillment process, add the activities.

Procedure

1. Complete the following steps to add an activity that requests manager approval.

   a. In the **Core** pane, expand **Approvals** and drag the activity **Approval - User** onto the arrow between **Begin** and **End**.
   This activity generates an approval from the manager of the person requesting the laptop.

   b. Complete the form with the following information.

   - **Name**: `Manager Approval`
   - **Stage**: **Waiting for Approval**
   - **User**: Click the lock icon in the Approvers section, and then click the select fields icon. Expand **Requested** > **Requested For**, and then select **Manager**.

   c. Click **Submit**.

2. Complete the following steps to add an action for when the approver rejects the request.

   a. Expand **Utilities** in the **Core** pane and drag the activity **Set Values** to the space below the approval.

   b. Complete the form with the following information.

   - **Name**: `Rejected`
   - **Stage**: **Completed**
   - **Values** condition builder: **[Approval] [Rejected]**

   c. Click **Submit**.

   d. Drag from the yellow box beside **Rejected** on the **Approval - User** activity to the new **Set Values** activity.

   e. Drag again from the yellow box beside **Always** on the **Set Values** activity to **End**.
   This activity marks the request as rejected if the manager rejects the request and then ends the workflow

3. Complete the following steps to add an action for when the approver approves the request.

   a. Drag the activity **Set Values** onto the arrow between **Approval - User** and **End**.

   b. Complete the form with the following information.

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- **Name**: `Approved`
- **Stage**: **Fulfillment**
- **Values** condition builder: **[Approval] [Approved]**

This activity marks the request as approved once a manager approves it.

c. Click **Submit**.

4. Expand **Tasks** and drag the activity **Create Task** onto the arrow between **Approval - User** and **End**, add the following information, and click **Submit**.
   - **Name**: `Laptop Procurement`
   - **Stage**: **Fulfillment**
   - **Task Type**: **Catalog Task [sc_task]**
   - **Priority**: **3 - Moderate**
   - **Fulfillment group**: **Procurement**
   - **Short description**: `Procure a Laptop`

   This task tells Procurement to procure a laptop for the user.
5. Expand **Notifcations** and drag the activity **Notification** onto the arrow between **Laptop Procurement** and **End**, add the following information, and click **Submit**.
   - **Name**: `Procurement`
   - **Stage**: **Fulfillment**
   - **To**: Click the lock icon in the Addressee(s) section, and then click the select fields icon. Expand **Requested** and select **Requested For**.
   - **Subject**: `Your laptop has been procured.`

   This activity marks the request as approved if a manager approves it.
6. Drag the activity **Create Task** onto the arrow between **Procurement** and **End**, and then fill in the form.

Option	Description
Name	Set Up Laptop
Stage	Fulfillment
Task Type	Catalog Task
Priority	3 - Moderate
Fulfillment Group	Hardware
Short Description	Set up laptop.

   This task tells Hardware to configure the laptop and prepare it for use.
7. Drag the activity **Create Task** onto the arrow between **Set Up Laptop** and **End**, add the following information, and click **Submit**.
   - **Name**: `Pickup Laptop`
   - **Stage**: **Delivery**
   - **Task Type**: **Catalog Task [sc_task]**

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- **Priority**: **3 - Moderate**
- **Assigned to**: Leave the field blank, as the script in the **Advanced** field assigns this task to the requester.
- **Short description**: `Pick up laptop.`
- **Advanced**: Select the check box and set the **Advanced Script** value to: `task.assigned_to=current.requested_for;`

This task informs the requester to come pick up the laptop.

8. Drag the activity **Log Message** onto the arrow between **Pick Up Laptop** and **End**, add the following information, and click **Submit**.
   - **Name**: `Delivered`
   - **Stage**: **Completed**
   - **Message**: `The laptop delivery workflow is complete.`

   Leaves a message in the log to record the successful completion of the workflow.

Publish a catalog workflow

Publish the catalog workflow to make it available for use in the system.

Before you begin

Role required: workflow_creator, workflow_admin, workflow_publisher, or admin

About this task

After adding activities to your workflow, publish it to make it available for use.

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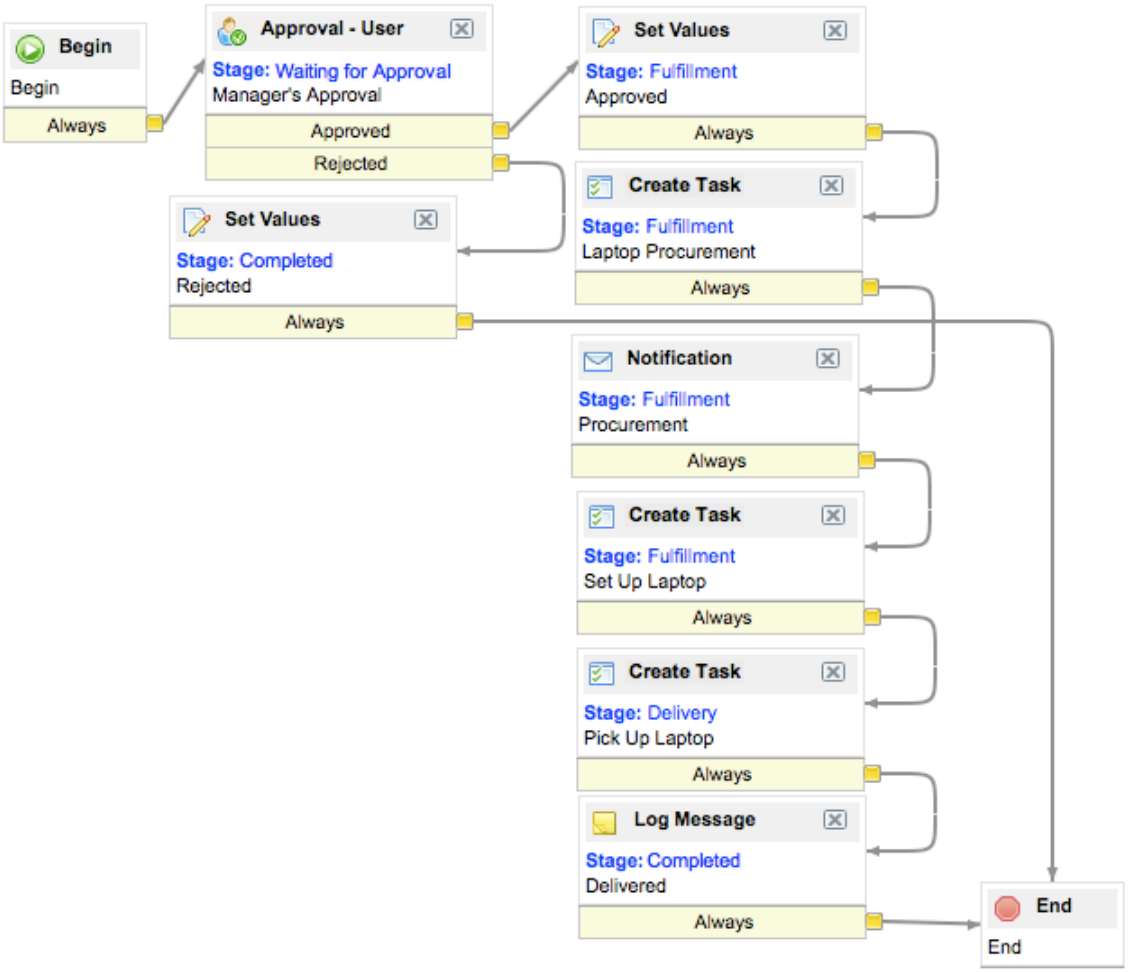
Procedure

1. Open the workflow actions menu on the left beside the workflow name.
2. Click **Publish** to publish the workflow.



Execution Plans

An execution plan describes how a catalog item is procured, configured, and installed.

Execution plans enable you to describe simple, linear processes. Each execution plan contains one or more tasks. For example, an organization could create an execution plan for delivering a corporate standard PC that contains these tasks:

1. Procure the PC from a supplier.
2. Configure the PC according to requester specifications.
3. Deliver the PC to the requester.

An execution plan is not specific to any one catalog item. There could be many different models of PC that a user can order, all using the same execution plan. It is not necessary to create a new execution plan for each individual catalog item in a mature service catalog.

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Note:
Execution plans are not as powerful or flexible as workflows, and cannot be designed using a graphical editor. Execution plans are useful in some circumstances, for example, if you want to build your processes programmatically or through imports. ServiceNow recommends using workflows for request fulfillment processes.

Create an execution plan

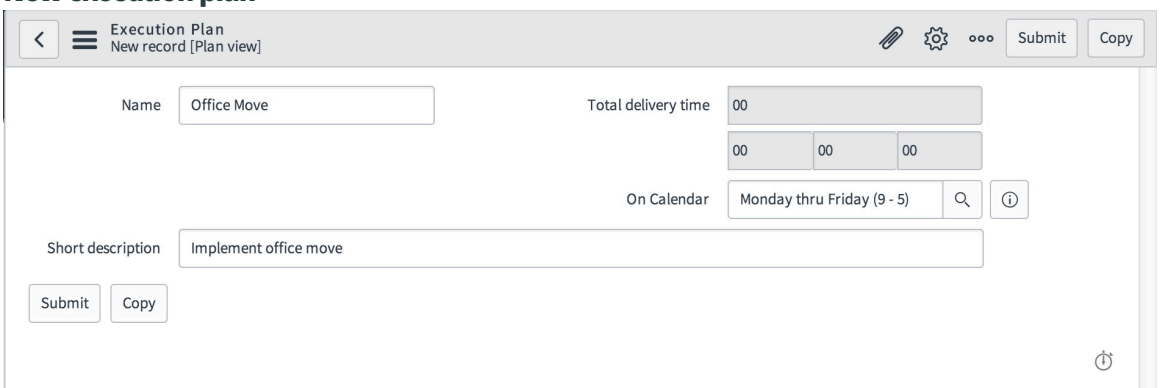
Administrators and catalog administrators can create and manage execution plans and the associated variable tasks.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Execution Plans**.
2. Click **New**.

New execution plan



3. Enter a *Name* and *Short description* for the execution plan.
4. Specify delivery information in the *Total delivery time* and *On Calendar* fields.
5. Click **Submit**.

Add catalog item variables to a task

You can add variables of a catalog item to a task to specify information about the requested catalog item.

Before you begin
Role required: admin

About this task
For example, when a user requests a laptop, the fulfillment group can need to know what screen size and how much memory to order.

Each catalog item can contain one or more variables for gathering information from the user who requests the item. Assuming that the relevant catalog items have been associated to the execution plan, you can associate these variables to the specific created tasks that need the information.

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Execution Plans**.
2. Open an execution plan.
3. In the *Execution Plan Tasks* related list, open a task.
   Ensure that the form shows the Plan view. If not, right-click the header bar and select **View** > **Plan**.
4. Go to the *Available Variables* related list and click **Edit**.
5. Use the slushbucket to select the variables that are appropriate for the task.

   Consider all the types of catalog items that could use this execution plan, and select all the variables that can be assigned to them.
6. Click **Save** to associate these variables to the execution plan task, making them accessible.

Execution plan tasks

An execution plan contains one or more execution plan tasks, such as for obtaining approval. Execution plan tasks are assigned to a fulfillment group.

Each task represents work to be completed by a specific group as part of the overall request fulfillment process.

Administrators create templates for tasks as part of defining an execution plan. The catalog tasks themselves are then created when the relevant item is requested, based on these task templates.

Set up an execution plan approval task

Approval tasks are specific types of tasks within execution plans.

Before you begin

Role required: admin

About this task

If an approval task is rejected, the execution plan can roll back to a previous task, but the approval record does not roll back.

To set up an approval task including a rollback action:

Procedure

1. Navigate to **All** > **Service Catalog** > **Execution Plans**.
2. Select an execution plan.
3. From the Execution Plan Tasks related list, select **New Approval** to create the approval task.
4. Fill in the fields for that approval task.

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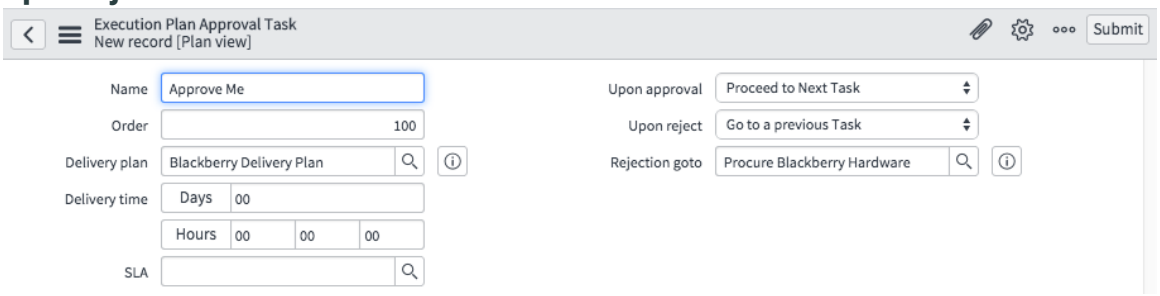
Upon Reject



5. Use the *Upon reject* field to define the action to take if the task is rejected:
   - *Cancel all future Tasks*: [default] cancels all future tasks in the execution plan and also cancels the parent request item.
   - *Go to a previous Task*: displays the *Rejection goto* field where you can select which task this execution plan rolls back to.
6. **Save** the task, then scroll down to the *Approved By* list and select one or more approvers for the tasks.

   You can also use an Approval script to select approvers.
7. Select **Update** to add the task to the execution plan.

   This example shows how the process works in practice, using a request to order a Blackberry phone.

   First, the request is ordered:

Rollback 1

Catalog Tasks | New | Request item = RITM10007 | 1 to 5 of 5

Number	Assignment group	Assigned to	Short description	Due date	Work start	Work end	State
TASK10007	Procurement		Order Blackberry Hardware or Move from I...	2009-08-06 11:48:10	2009-08-05 11:48:12		Open
TASK10008	Field Services		Pick up Blackberry and deliver to IT Labs	2009-08-07 11:48:10			Pending
TASK10009			Example Approval Tasks	2009-08-07 11:48:10			Pending
TASK10010	Hardware		Configure Blackberry	2009-08-09 11:48:10			Pending
TASK10011	Field Services		Deliver Blackberry to Customer	2009-08-10 11:48:10			Pending

   Next, complete the first two steps, which leads to the approval task.

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Rollback 2

Catalog Tasks | New | Request item = RITM10007 | 1 to 5 of 5

Number	Assignment group	Assigned to	Short description	Due date	Work start	Work end	State
TASK10007	Procurement		Order Blackberry Hardware or Move from I...	2009-08-06 11:48:10	2009-08-05 11:48:12		Closed Complete
TASK10008	Field Services		Pick up Blackberry and deliver to IT Labs	2009-08-07 11:48:10			Closed Complete
TASK10009			Example Approval Tasks	2009-08-07 11:48:10			Open
TASK10010	Hardware		Configure Blackberry	2009-08-09 11:48:10			Pending
TASK10011	Field Services		Deliver Blackberry to Customer	2009-08-10 11:48:10			Pending

Actions on selected rows... | 1 to 5 of 5

Reject the request to roll back the execution plan to a previous task, and reset any intermediate tasks to pending:

Rollback 3

Catalog Tasks | New | Request item = RITM10007 | 1 to 5 of 5

Number	Assignment group	Assigned to	Short description	Due date	Work start	Work end	State
TASK10007	Procurement		Order Blackberry Hardware or Move from I...	2009-08-06 11:48:10	2009-08-05 11:48:12		Open
TASK10008	Field Services		Pick up Blackberry and deliver to IT Labs	2009-08-07 11:48:10			Pending
TASK10009			Example Approval Tasks	2009-08-07 11:48:10			Pending
TASK10010	Hardware		Configure Blackberry	2009-08-09 11:48:10			Pending
TASK10011	Field Services		Deliver Blackberry to Customer	2009-08-10 11:48:10			Pending

After a plan has been rolled back, ServiceNow adds to the rolled-back task a note indicating that it was rolled back and why.

Note:
Rolling back reverts all intermediate tasks within the execution plan. Other plans within the same request are not rolled back, however.

Set up a fulfillment group

Fulfillment groups perform the tasks related to fulfilling an order.

Before you begin
Role required: admin

About this task
This group setting can include approving an order based on characteristics such as content and price, or any direct action required to complete the order. For example, loading software or installing hardware. Any existing user group (in **User Administration** > **Groups**) can be assigned fulfillment tasks.

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To create a group specifically for order fulfillment:

Procedure

1. Navigate to **Service Catalog** > **Catalog Policy** > **Fulfillment Groups**.
2. Click **New**.
3. Fill in the Group form as described under creating groups.
   These groups have the type *catalog* and are assigned the catalog and itil roles, but are otherwise normal groups.

Delivery information for tasks

When managing execution plans, catalog administrators can specify the delivery information to provide an estimated date of delivery based on the execution plan.

Use the **Total delivery time** field to specify an estimated delivery time for each task in your execution plan. This estimate is calculated based on the combined total of times for the tasks in that execution plan.

By default, time estimates do not use a "working days" calendar system, but are based on simple elapsed time. For example, for a 5-day execution plan, if you submit the request on a Friday, the delivery date is Wednesday of the following week. This estimate means five elapsed days later, even if your organization does not work on weekends.

Setting the calendar to Monday through Friday (9-5) defines each day as being eight hours long, but the task delivery time day is 24 hours. If you create a task that takes one day (24 hours), the plan calculates the task as needing three work days (which are eight hours each) for the total delivery time. Similarly, if a task takes two days (48 hours), the plan calculates eight days of total delivery time. This total breaks down as six work days of eight hours each and, because six days are longer than the five-day work week, two weekend days. When assigning delivery times, keep this calculation process in mind.

Use the *On Calendar* field to specify a calendar system to apply to the execution plan, to help estimate more accurate delivery times.

If using this calendar system for estimated delivery time, ensure that estimates are expressed in working hours and days. For example, a task which is supposed to take one day on a 9-5 calendar is assumed to take 24 working hours. This process takes three working days.

Note:
This calendar system is used to help provide delivery estimates only, and is not linked to any SLAs you have set on execution tasks.

Skipped tasks

If a task is skipped, the request fulfillment process moves on to the next task.

If the last task in an execution plan is skipped, the process is finished and the appropriate request item is closed as complete. Skipped tasks have their state set to **Closed Skipped** and display as gray boxes on a requested items list.

Creating execution plan tasks

An execution plan contains one or more task templates. Each task template defines work that can be completed by a specific fulfillment group.

Execution plans are associated with catalog items. When the relevant catalog item is requested, these task templates are used to generate tasks. That is, tasks to be performed as part of the

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request fulfillment process for that requested item. Each generated task within that requested item is assigned a catalog task number.

Example

The execution plan for an executive desktop computer catalog item could define the following task templates in the execution plan:

- Obtain managerial approval
- Order hardware
- Install standard corporate applications
- Deliver computer to requester

When this catalog item is ordered, the following request, requested item, and tasks are then created:

Request REQ0002 -- 1 PC

Requested Item ITEM0004 -- 1 X executive desktop

- Catalog Task0001 -- Obtain managerial approval
- Catalog Task0002 -- Order hardware
- Catalog Task0003 -- Install standard corporate application
- Catalog Task0004 -- Deliver computer to requester

Define task templates

Each execution plan contains one or more task templates that define actions that must be taken to fulfill a request.

Before you begin

Role required: admin

About this task

After creating the execution plan, define these task templates.

When the relevant catalog item is ordered, request tasks are generated for that requested item, based on this information.

To define an execution plan task template:

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Policy** > **Execution Plans**.
2. Open an execution plan.
3. In the **Execution Plan Tasks** related list, click **New**.
4. Fill in the fields on the Execution Plan Task form (see table).
5. Click **Submit**.

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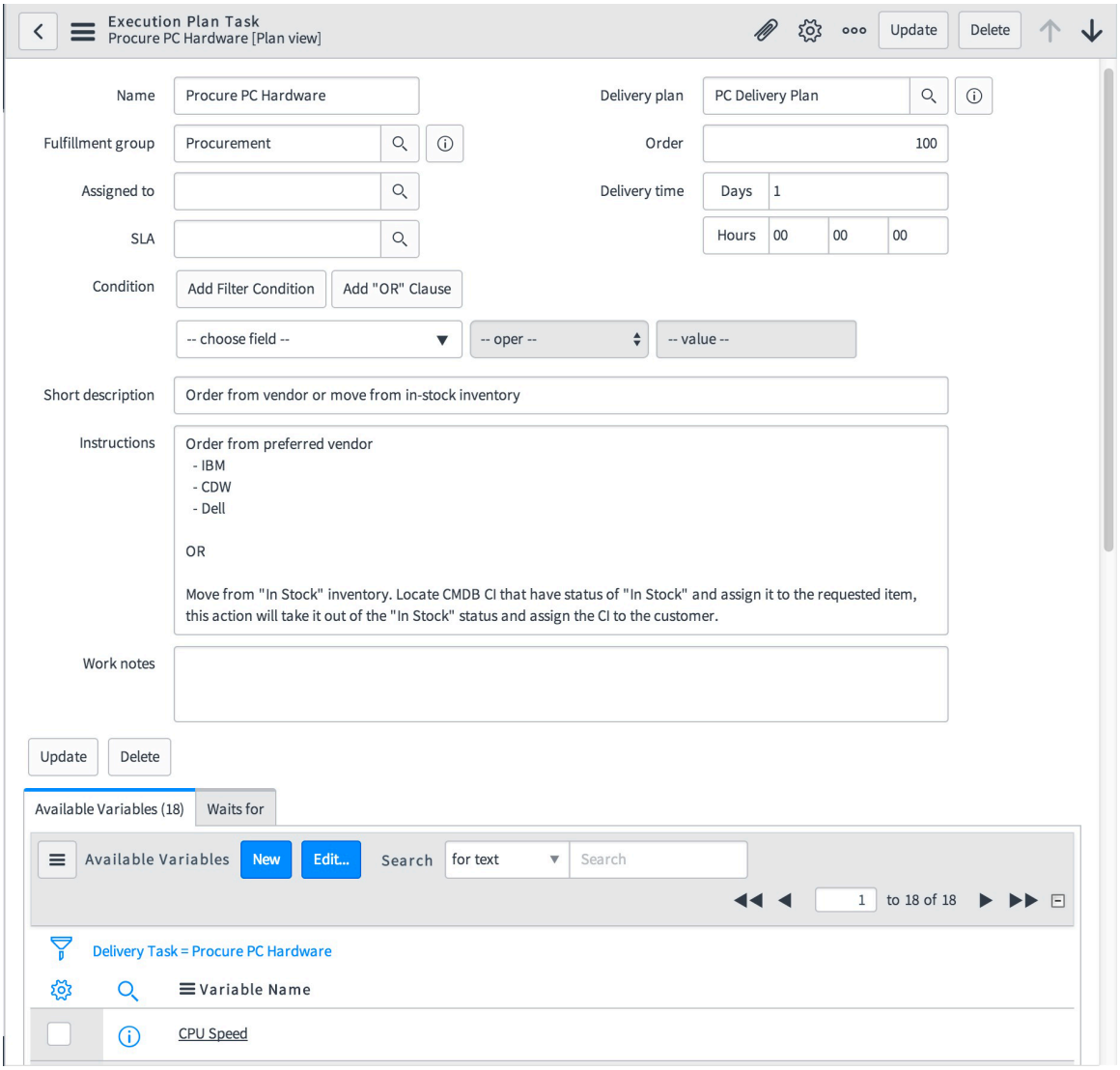
Cat DP Task1



Defining Task Templates

Field	Description
Name	Name of the task. This name becomes the created task name.
Fulfillment group	The group that performs the task. Whenever a user requests a catalog item associated with this execution plan, the task is automatically assigned to the fulfillment group. Leave blank if automatic assignment to a group is not required.
Assigned to	The individual who performs the task. Leave blank if automatic assignment to a user is not required.
SLA	The service level agreement that applies to catalog items associated with this execution plan. **Note:** This field is normally left blank, as the functionality was superseded by the service level management functionality.

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Field	Description
Delivery plan	The parent execution plan for this task.
Order	A number representing the task sequence in the execution plan. It is good practice to "leave gaps" between order numbers (for example, 100, 200, 300). That way you can insert new tasks without changing the order number of existing tasks. (If the order for several execution plan tasks is the same, each of these tasks starts at the same time.)
Delivery time	Amount of time the task is expected to take. This value becomes a component of the overall time to complete the execution plan.
Condition	Condition under which the task is performed (if the condition is not met, the task is skipped).
Short description	Brief description of the task activity. This information populates the created task short description field.
Instructions	Details of the activities to be performed for the task. This information populates the created task description field.
Work notes	A journal field for entering comments about the task template. Note: this information is separate from the created task work notes field.

Conditions to run execution plan tasks

Administrators and catalog administrators can define conditions under which a particular execution plan task runs, or is skipped, when the relevant item is requested.

For example, an execution plan can contain the following tasks:

1. Order hardware
2. Receive hardware
3. Configure hardware
4. Deliver hardware

If the hardware requested is already on-site, it does not need to be ordered. The first task in the list can be skipped.

Note:
Skipped task records are still created, but are marked as skipped, and are not processed within the execution plan.

Conditional Tasks

To make an execution plan task conditional, defining the conditions under which the task runs.

1. Navigate to **Service Catalog** > **Execution Plans**.
2. Open an execution plan, and then open a task within that plan.
3. Use the **condition** field to select the condition under which the task runs.

If no conditions are set, the task runs every time a user orders an item associated with this execution plan.

Here is an example of conditional task for an IT lab based in Atlanta:

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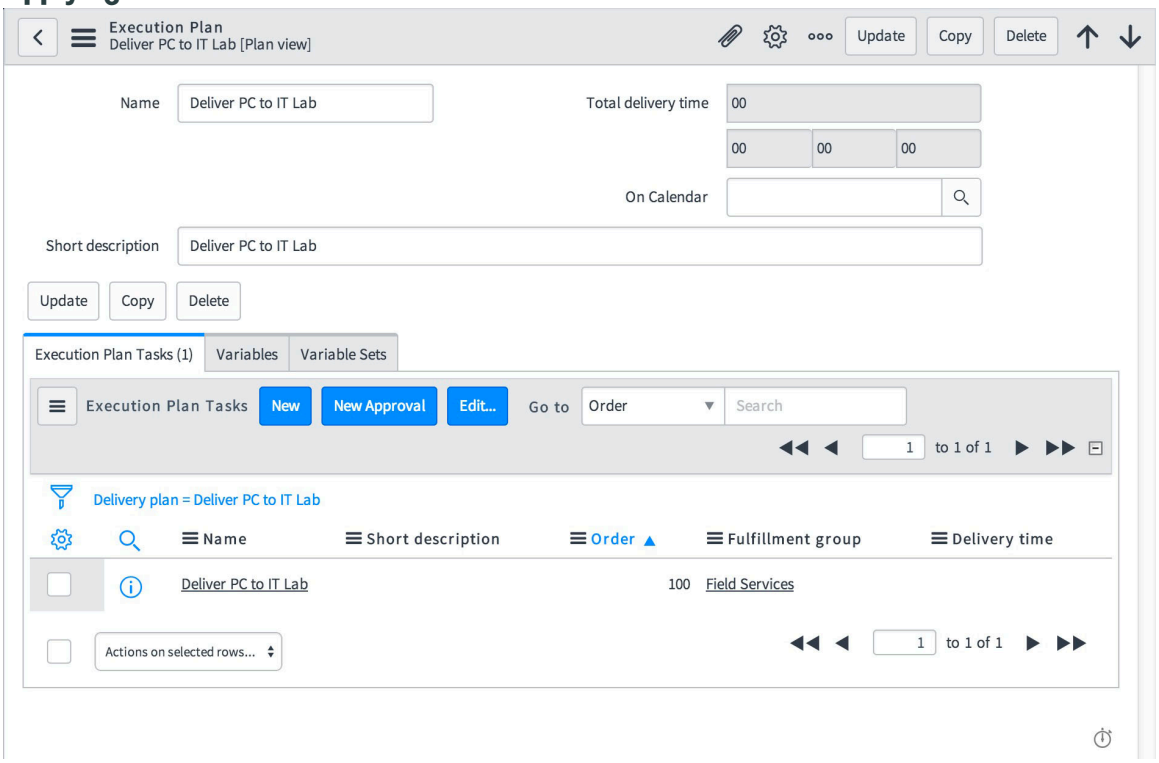
Applying Conditions to Execution Plan Tasks



In this example, the **Deliver to IT Labs** step does not run if the request itself is in Atlanta. There is no need to deliver something to the IT lab if it is already there.

Condition scripts to run tasks

Administrators can use a condition script in addition to or instead of any condition to determine whether a task runs.

> **Note:**
> If you are using both a condition (via the condition field) and a condition script, both must be true before the task runs.

To use a script, you must configure the Execution Plan Task form to add the "Condition script" field. If the script returns true, the task runs. If the script returns false, the task does not run.

Ensure that you add the variable used in the script to the execution plan task.

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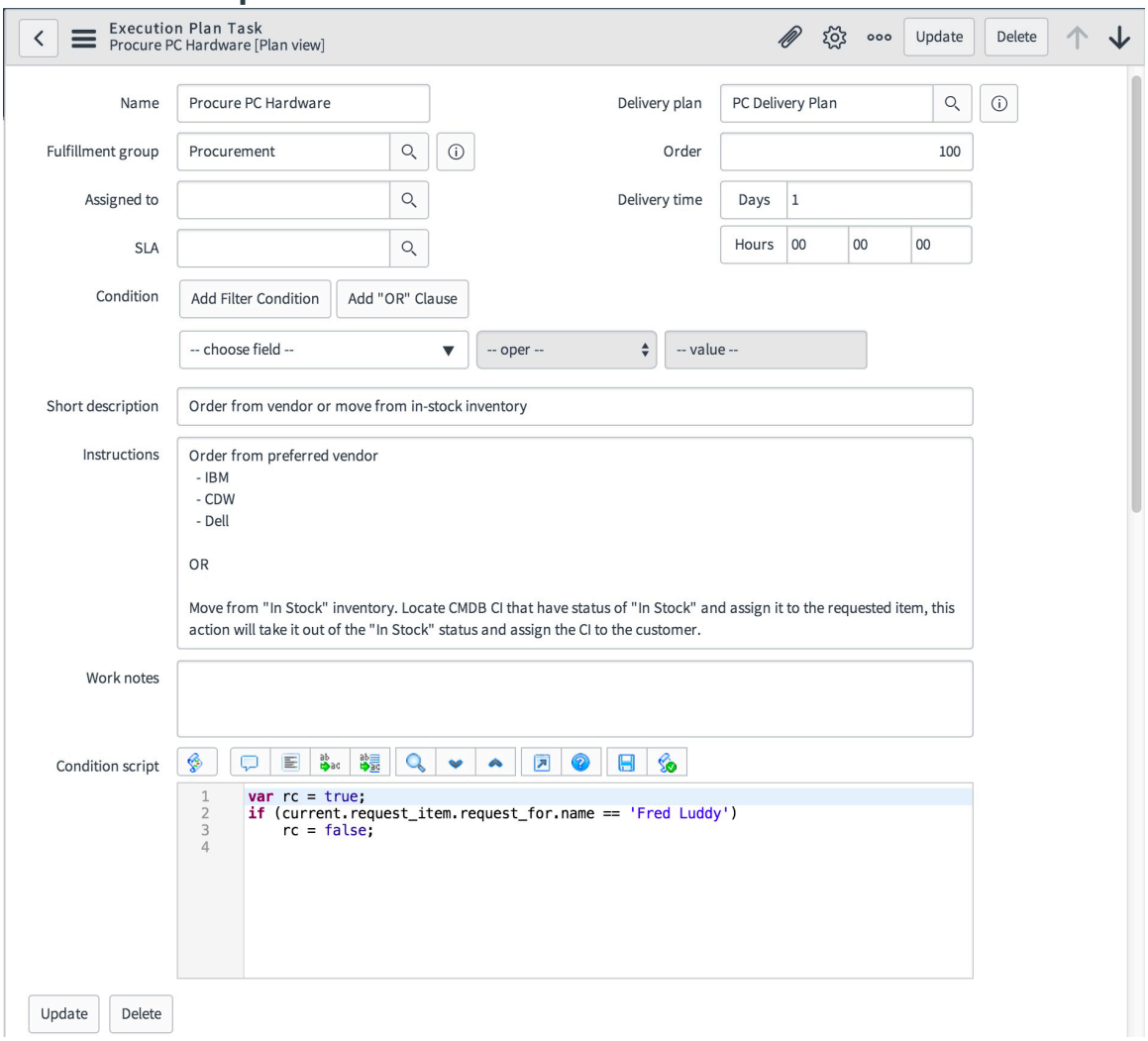
Use Condition Scripts



Service catalog execution plans

Service catalog enables you to associate execution plans with catalog items.

Once you have created the execution plan record, you can associate it with catalog items, create task templates, and associate any catalog item variables to tasks, if required.

You can also:

- Apply conditions to tasks
- Create approval tasks, enabling you to step back to a previous step if the approver rejects the request.

Associate execution plan with items

After you submit the execution plan record, you select a catalog item to use the execution plan.

Before you begin

Role required: admin

About this task

This association can be done later, but doing it at this stage enables you to access relevant catalog item variables in the execution plan.

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Select a catalog item.
3. In the *Execution Plan* field, select the new execution plan.
4. Click **Update**.

Service Catalog checkout models

The service catalog defaults to one-step checkout model, but also allows two-step checkout. Administrators and users with the catalog_admin role can enable and configure the two-step checkout model and control how the delivery address is populated.

The service catalog defaults to a one-step checkout model. When a user clicks **Proceed to checkout** or **Order now**, items in the shopping cart are ordered and the order summary or status screen appears. The one-step checkout model runs in the following order:

Press Checkout > **Order Summary**

The service catalog also supports a two-step checkout model. Under this model, when a user clicks **Proceed to checkout** or **Order now**, an order confirmation screen appears. You can edit the order, choose a delivery location, or upload an attachment before submitting the order. The two-step checkout model runs in the following order:

Press Checkout Order > **Confirmation Screen** > **Submit Order** > **Order Summary**.

Access check for a catalog item is performed during its checkout. This check is also applicable in scripts and APIs.

Enable the two-step checkout process

You can enable the two-step checkout to specify a recipient, delivery address, and special instructions for an order.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. Locate the property *Use the two step catalog checkout model (default false)*.
3. Select the **Yes** check box to enable the two-step process.
4. Locate the property *Show the 'Back to Catalog' button on the two step checkout screen*.
5. Select the **Yes** check box to provide a button that navigates back to the catalog from the order confirmation screen (default).
   Clear the check box to hide the button.

Specify requester location

Administrators can control how the delivery address is populated. By default the delivery address is defined by the client script called set location.

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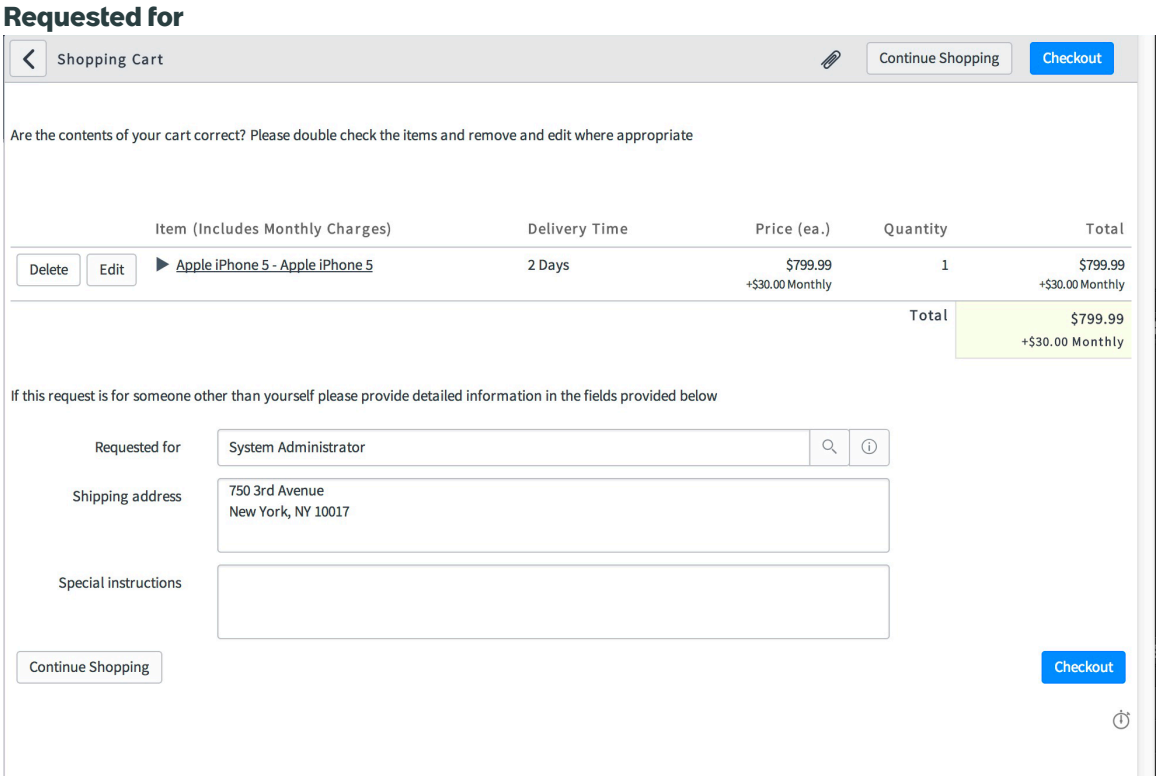

When the two-step checkout process is enabled, the `set location` script retrieves the address of the user and enters formatted details in the *Deliver to* field.

Create a catalog request from another flow

You can create a catalog request to join the Service Catalog flow from a different flow. For example, from an incident flow, you can create a request, and associate the request with the incident. It helps you in tracking the requests associated with an incident and vice versa.

Before you begin

Role required: itil

- To associate a request with any parent table record, the corresponding mapping configuration should be available in the **Catalog Administration** > **Request Parent Mapping** submodule.
- To associate a record producer request with the parent table record, retrieve the *`sysparm_parent_sys_id`* and *`sysparm_parent_table`* parameters from the URL using the RP.getParameterValue() method in the **Script** field of the record producer.

Note:
If you set the **Use the sc_layout driven cart macros (default true)** (*`glide.sc.use_cart_layouts`*) property to **false** and create a request from a parent table record, the request is not associated with the parent table record.

Procedure

1. Navigate to the required table and select a parent record.
2. Click the additional actions menu icon and select **Create Request**.
   The Catalogs home page is displayed with all active catalogs that you can access.

Note:
If there is only one active catalog, then that catalog page is displayed with available categories.

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3. Select the required catalog and navigate through its categories and items.
4. Check out the required catalog item, order guide, or record producer.
   For information on checkout models, see .
   For a catalog item or order guide, a request is created and displayed under the **Requests** tab of the parent table record. For a record producer, the corresponding task is created and displayed under the **Problems** tab of the parent table record, for example, an incident.

   Note:

   - The associated incident is specified in the annotation message throughout the request process.
   - Both for the one-step and two-step checkout, the caller of the incident is automatically set as the **Requested For** user for the request. If the two-step checkout is enabled, the fulfiller can change the **Requested For**.

     Note:
     For delegated request experience, the caller of the incident is populated in the Requested For variable. For information on delegated request experience, see Delegated request experience.

   - You cannot add items to the wish list, or save a record producer in this flow.

Configure a parent mapping for a request

You can configure a mapping that specifies the association between the parent record and the request record.

Before you begin

Role required: admin or catalog_admin

Procedure

1. Navigate to **All** > **Catalog Administration** > **Request Parent Mapping**.

   Note:
   The Incident request configuration that creates a mapping between the incident table and the request table is available by default.

2. Click **New** and specify the field information.

Request Parent mapping fields

Field	Description
Name	Name of the mapping configuration for a request.
Parent table	Table from which the request is created.
Request Parent	Request table field that specifies the association with the parent table.
Parent requestor	User reference field on the parent table that is specified as the requestor of the request.

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Field	Description
	Note: For delegated request experience, the user from the parent table record is populated in the Requested For variable. For information on delegated request experience, see Delegated request experience.

3. Click **Submit**.

State closure in the request fulfillment execution plan

The state closure in the request fulfillment process of a catalog item depends on the status of the associated catalog tasks, request items, and the request. It is applicable only for execution flows.

State closure dependency between a catalog task and RITM

- If all catalog tasks are closed as **Closed Complete**, the RITM is closed as **Closed Complete**.
- If there is at least one catalog task closed as **Closed Incomplete**, the RITM is closed as **Closed Incomplete**.
- If all catalog tasks are closed as **Closed Skipped**, the RITM is closed as **Closed Skipped**.

State closure dependency between a RITM and request

- If all RITMs are closed as **Closed Complete**, the request is closed as **Closed Complete**.
- If there is at least one RITM closed as **Closed Incomplete**, the request is closed as **Closed Incomplete**.
- If all RITMs are closed as **Closed Skipped**, the request is closed as **Closed Skipped**.

View request notifications

View request notifications that are sent during specific events in a catalog request life cycle. These notifications are sent to various recipients including the Employee Center and ITIL users.

Before you begin

Role required: admin

About this task

Use the email notification layout and template that is shipped with the Employee Experience Foundation (com.snc.sn_ex_emp_fd) plugin to deliver notifications that are consistent and built with industries best practices layout. Applying the layout to email notifications elevates the look and feel, and also helps to deliver branded notifications. For more information, see Use email notification layout.

Procedure

1. Navigate to **All > System Notification > Email > Notifications**.
2. View the notifications related to request by filtering the **Table** field by **sc_request**and **sc_req_item**.
3. Click the notification name to view the details.

Note:
To receive these notifications, the end user must enable notifications. For more information, see Subscription-based notifications.

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Service Catalog security

Service Catalog enables you to set the security for catalog with user criteria.

Set security for items and categories

An administrator can control access to content in the service catalog by creating and applying user criteria records.

Catalog managers and catalog editors can apply existing user criteria for items and categories to which they are assigned. Catalog managers and catalog editors cannot create or edit user criteria directly.

You can create user criteria records that define conditions for user information and then apply these criteria records to catalog items and categories. In this way you can control access to these items and categories.

For example, create a **USA Sales** user criteria record matching users who are both in the sales team and based in the USA. Then apply this record to the **USA IT Hardware** catalog category, so only users matching the record can access that category.

The feature is active by default in new Fuji instances and upgraded instances that do not use entitlement-based access controls. If you upgrade an instance that uses entitlements, you can migrate to user criteria to take advantage of the improved control, flexibility, and reuse.

Access controls allow you to:

- Manage access to multiple items and categories in one user criteria record. For example, create a single **UK Employees** user criteria record and apply it to multiple items and categories that are available to employees in the UK.
- Allow access if one condition matches, or if all conditions match. For example, define that only users who are both in a specific location and who belong to a specific department can have access.
- Use **Available For** and **Not Available For** lists to allow or prohibit access to users matching the conditions in a criteria record. For example, specify that a US-based catalog category is available for the users located in the USA but is not available for users belonging to the Sales department (whether in the US or not).
- Extend matching to create conditions matching additional fields in the User [sys_user] table, without having to use a script. For example, you can add a condition to match items against the **Cost center** field in user records.

Important:
After making user criteria additions or changes, you may need to log out and log back in to clear the prior configuration.

Related topics

Debug user criteria of a catalog item

Create a user criteria record in Service Catalog

Create a user criteria record to define conditions that are evaluated against user records.

Before you begin

Role required: admin, catalog_admin

About this task

You can apply several user criteria records to a single catalog item or category. In this situation, users match only one of these criteria records to have access.

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **User Criteria** and create a record.
2. Fill in the fields on the form, as appropriate.

User criteria fields

Field	Description
Name	The name of the criteria record.
Users	The individual user records to match.
Groups	The group records to match.
Roles	The roles to match. **Note:** ○ The evaluation of a role is cached in the session, so any change in the role requires you to logout and login, similar to roles in ACL (Access Control List). ○ User Criteria is not applicable for elevated privilege roles.
Advanced	A check box to display or hide the **Script** field.
Script	A script to define any additional criteria, and return **true** or **false**. This field is available only if **Advanced** is selected. **Note:** ○ The script is evaluated in the scope that the user criteria is created in. ○ The evaluation of the script is cached in the session, so any change in the evaluation requires you to logout and login, similar to roles in ACL. ○ Do not use `gs.getUser()` or other session APIs since they cause conflict when used in diagnostic tools. Use the pre-defined `user_id` variable available in the script to get the user id of the user being used to evaluate the script. ○ Because scripts are evaluated dynamically, including scripts in user criteria records can decrease performance. ○ Because answer is a pre-reserved keyword, do not use a function with its name as answer, that is, answer().
Active	A check box to activate or deactivate this criteria record.
Companies	The companies to match.
Locations	The locations to match.
Departments	The departments to match.
Match All	A check box to determine whether all elements from each populated criteria field must match. If selected, only users who match all criteria are given access. If cleared, the user must meet one or more of the set criteria to be given access. By default, this check box is cleared so that any condition met provides a match.

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Field	Description
	For example, consider a user criteria record for the following: ○ Locations A or B ○ Company C or D With **Match All** selected, only users meeting all these conditions are matched. For example, a user with a location A and a company C. With **Match All** cleared, users meeting any of these conditions are matched. For example, a user with a location B. **Note:** If you select **Match All**, ensure that you do not create contradictory conditions which can never be met. For example, if all users in location A work for company G, then the conditions in this example can never be met.

Implementing user criteria

When creating user criteria for your system, consider the following recommendations.

- Design Criteria for Reuse:

  Ensure that you design user criteria for maximum reuse. Create user criteria records with common sets of conditions matching your organization requirements. Allow them to be shared across as many items and categories as possible, rather than creating multiple similar criteria records for individual items and categories.

- Naming conventions: Give each user criteria record a meaningful name, to help you determine the function for that record. For example,
  - Users in company Cloud Dimensions AND in Madrid
  - Users in company Cloud Dimensions OR in Madrid
  - Users belonging to the Group Development, IT, or Sales
  - Users with role itil, asset_manager, or catalog_admin
- Test user criteria on a development or test instance, and then transfer the records from the user criteria tables and catalog records to your production instance using update sets.

Apply user criteria to items and categories

Apply a user criteria record to items and categories, either from the item or category form or from the user criteria form.

Before you begin

Role required: admin

About this task

The user criteria restriction applies only within Service Catalog for the specific item it is applied for. However, the user criteria restriction is not applied outside the Service Catalog where the user has access to the item via the table.

To apply criteria directly to an item or category, use the Available For or Not Available For related lists in the Item or Category form.

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Note:

- When a change is made to the end-user profile, such as location, and it affects their ability to view items, those changes do not take effect until the end user has relaunched the session.
- The user criteria restrictions of a category do not automatically apply to the catalog items within the category. If required, you should apply the user criteria restrictions to the individual catalog items.

To apply criteria directly from the User Criteria form, add items to the Available For Catalog Items and Not Available For Catalog Items related lists, and add categories to the Available For Categories and Not Available For Categories related lists. You can configure the User Criteria form to add these lists.

Note:

The **Not Available For** settings override **Available For** settings. A user on the **Not Available For** list for an item cannot access that item, even if that user is also on the **Available For** list for that item.

Apply user criteria to items

Apply user criteria to an item to define which users can and cannot access that item.

Before you begin

Role required: admin

About this task

You can apply user criteria to all types of catalog item, including order guides, content items, and record producers.

Note:

The user criteria restriction applies only within Service Catalog for the specific item it is applied for. However, the user criteria restriction is not applied outside the Service Catalog where the user has access to the item via the table.

Procedure

1. In an item record, navigate to the Available For or Not Available For related lists.
2. Click **Edit** to add an existing user criteria record, or click **New** to create a new one.
3. Save the record to associate the user criteria record with the item.

Note:

The **Not Available For** settings override **Available For** settings. A user on the **Not Available For** list for an item cannot access that item, even if that user is also on the **Available For** list for that item.

Apply user criteria to categories

Apply user criteria to a category to define which users can and cannot access a category.

Before you begin

Role required: admin

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Procedure

1. In a category record, navigate to the Available For or Not Available For related lists.
2. Click **Edit** to add an existing user criteria record, or click **New** to create a new one.
3. Save the record to associate the user criteria record with the category.

Note:

- The **Not Available For** settings override **Available For** settings. A user on the **Not Available For** list for a category cannot access that category, even if that user is also on the **Available For** list for that category.
- The user criteria restrictions of a category do not automatically apply to the catalog items within the category. If required, you should apply the user criteria restrictions to the individual catalog items.

Extend user criteria

Extend the user criteria table when the available user criteria fields are not sufficient. User criteria references various user fields (fields from the User [sys_user] table), such as department, company, and groups. You can extend user criteria with a custom field to include any other user reference field (field from the User [sys_user] table) of interest.

Before you begin

Role required: admin

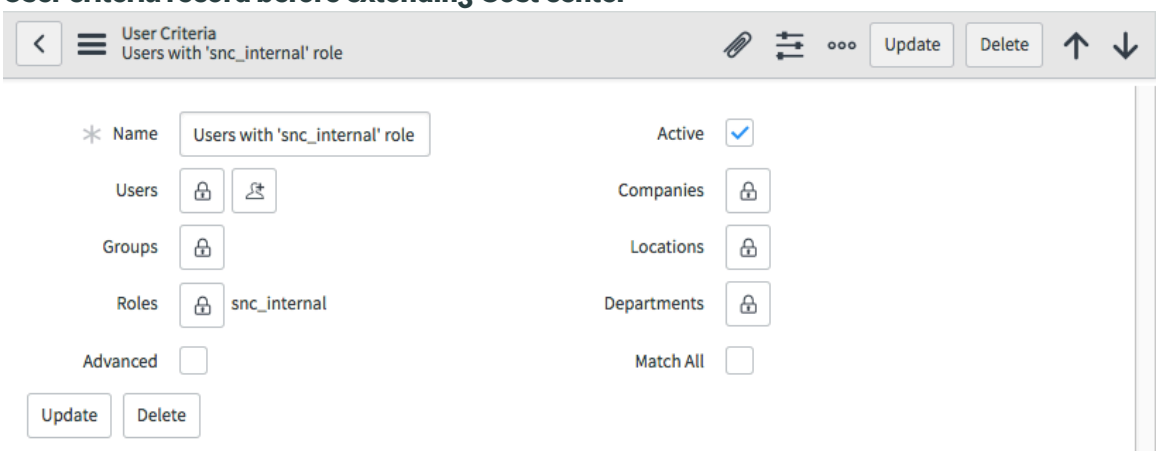
About this task

For example, you can extend user criteria to include the user's cost center, and then restrict certain catalog items only to members of that cost center.
Meet the following rules to extend the user criteria table.

- The field to add must be a reference field in the user record.
- The field added to the user criteria table must be **List** type.
- The fields must have matching names. For example, **cost_center** [sys_user] and **u_cost_center** ("u" prefix is added to custom fields in a table) are considered to be matching.

This example demonstrates how to extend the current user criteria record to include **Cost center** as an option.

User criteria record before extending Cost center



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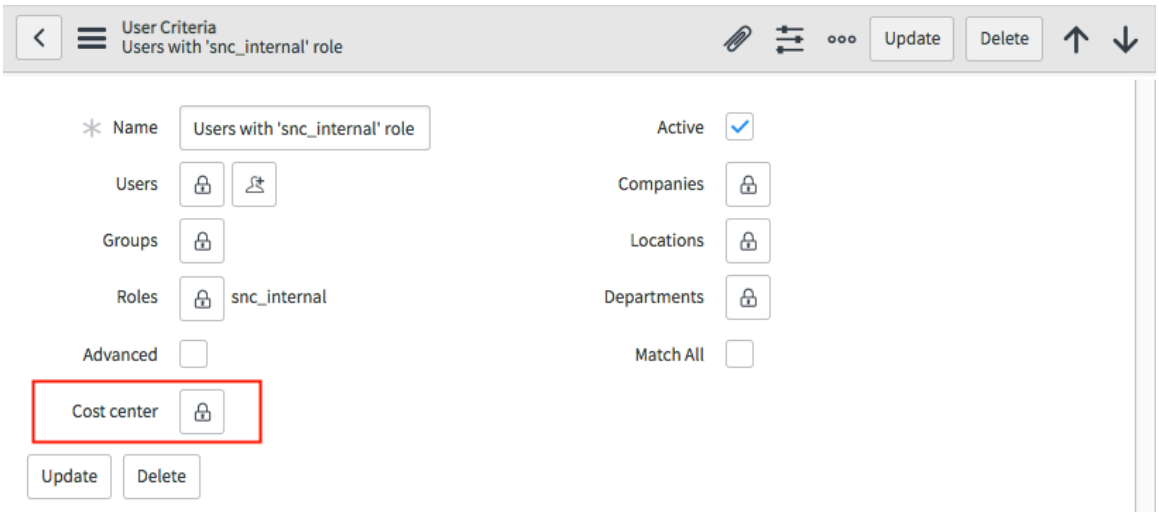
Procedure

1. Navigate to **All** > **System Definition** > **Tables**.
2. Open the **User Criteria** record.
3. In the **Table Columns** related list, click **New**.
4. Set the type to **List**, and then enter `Cost center` as the column label.
   The **Column name** field populates with **u_cost_center**.
5. In the Reference Specification form section, select **Cost Center** for the reference field.
6. Add any conditions or additional information to the dictionary entry as desired.
7. Click **Submit**.
8. Navigate to **Service Catalog > Catalog Definition > User Criteria**.
9. Select or create a user criteria record, and see that you can now use the new field.

What to do next

Test the user criteria record by navigating to **Service Catalog** > **Catalog Definition** > **User Criteria**, and opening any record. Verify that the extended field is available.

User criteria with cost center



You can extend the User [sys_user] table if there are fields in other tables that you want considered in user criteria. After extending the User table, follow the steps in this procedure to extend it to user criteria.

User criteria migration

Service catalog user criteria records provide access control for service catalog items and categories.

You can migrate your access controls to use user criteria. The user criteria feature is automatically enabled for new instances. If you upgrade your instance, a script runs to determine current access control usage.

- If your instance does not use entitlement-based access controls, the user criteria feature is automatically enabled.
- If your instance does use entitlements, the user criteria feature is not enabled. If you want to use user criteria, use the procedure described on this page to migrate your access controls from entitlements to user criteria.

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Migrate to user criteria to provide more reuse, control, and flexibility compared to entitlements.

For example, you can use a single criteria record to make multiple catalog items available to only users who meet all these requirements:

- Are located in EMEA or APAC
- Belong to ACER
- Are in the Training department

Migrate to Service Catalog user criteria

Service Catalog enables you to maintain the required access controls to your service catalog while migrating from entitlements to user criteria.

Before you begin

Role required: admin

About this task

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties** and verify that the user criteria feature is not already enabled on your system.
   - If the property **Use "User Criteria" to define access to catalog items and categories** (*glide.sc.use_user_criteria*) is set to **true**, you can skip the following steps. The user criteria feature is automatically enabled because entitlements were not used in your old system.
   - If this property is set to **false**, continue with the following steps. The user criteria feature has not been enabled yet on your system.
2. To preview the user criteria feature, set the service catalog property **Enable both "User Criteria" and "Entitlement" related lists for catalog items and categories when migrating from entitlements** (*glide.sc.user_criteria_migration*) to **true**.
   This option lets you compare user criteria records and entitlements before you fully switch to user criteria.
3. Inspect your service catalog items and categories to identify access control sets that you can configure user criteria records for.
   Review your current entitlements and record your current design for access controls. Focus on identifying patterns where multiple items have the same combination of location, group, and so on. Each combination is a possible access control set.
4. Create a user criteria record for each access control set that you identified from your inspection of the service catalog.
   You have a step with a list, note, and image.
5. Apply these user criteria records to the items and categories identified, replacing the equivalent entitlements.
6. Enable user criteria on your system by setting the service catalog property **Use "User Criteria" to define access to catalog items and categories** (*glide.sc.use_user_criteria*) to **true**.
   When this property is set to **true**, any remaining entitlements are no longer used.

> **Note:**
> Scripts in user criteria cannot reference the category or catalog item as **current** as entitlement scripts do. For scripts in user criteria, use the **user_id** available for the user currently being evaluated against the category or catalog item.

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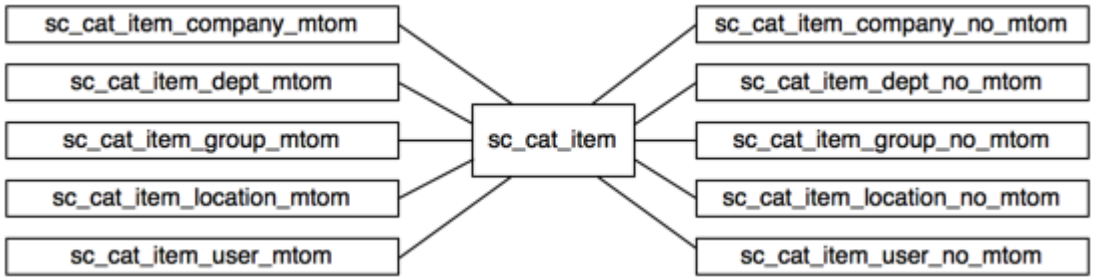
Data structure differences

There are significant data structure differences between entitlements and user criteria, which you must be aware of while migrating.

Using entitlements, the following tables are loaded into memory and evaluated before rendering.

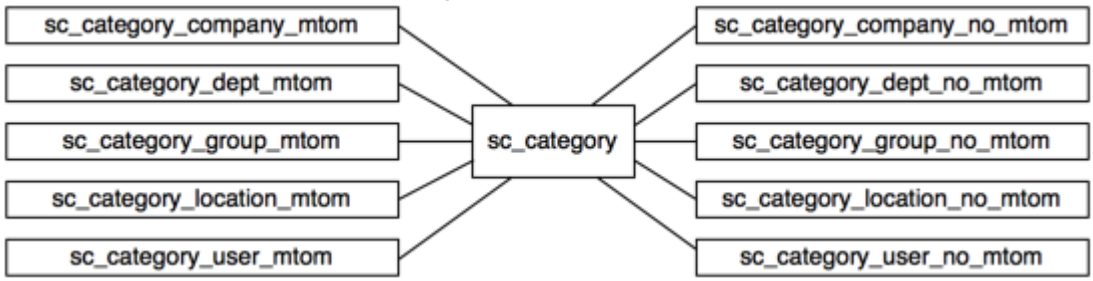
For catalog items:

Entitlements Data Structure - Catalog Items



For categories:

Entitlements Data Structure - Categories



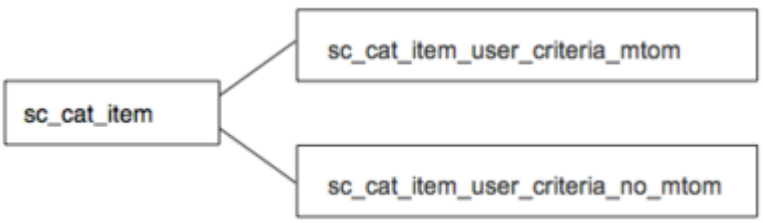
The user criteria architecture collects all user attributes in the User Criteria [user_criteria] table.

User criteria records can link to items and categories, as follows.

For catalog items:

- Catalog Item Available for [sc_cat_item_user_criteria_mtom]
- Catalog Item Not Available for [sc_cat_item_user_criteria_no_mtom]

User Criteria Data Structure - Catalog Items



For categories:

- Category Available for [sc_category_user_criteria_mtom]
- Category Not Available for [sc_category_user_criteria_no_mtom]

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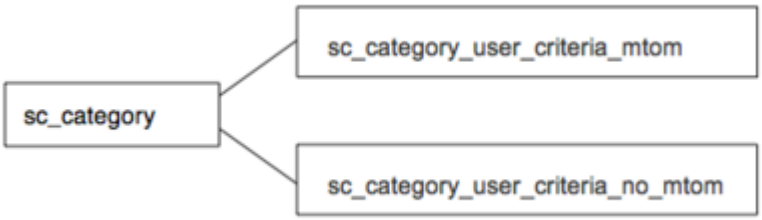
User Criteria Data Structure - Categories



Legacy service catalog access controls

Service catalog supports several ways to control access to a catalog item or category. These controls are also known as catalog entitlements.

Instead of access controls, use user criteria that is the supported security model for catalog item and category. For information about user criteria, see Apply user criteria to items and categories.

A service catalog item with no specific access controls is available to all users. If access controls are specified, only users who meet all conditions have access.

The following entitlements are available:

- Role
- Custom script
- Company, Department, Group, User, or Location

Access controls are checked in the following order: roles, then scripts, then Company, Department, Group, User, or Location.

Note:
The functionality described here is superseded by access controls using user criteria. Migrate to user criteria for a more flexible and reusable way to define access controls.

Service Catalog administration

Service Catalog enables an administrator to configure the service catalog.

Before you begin
Role required: admin

About this task

Procedure

1. Navigate to **All** > **Service Catalog** > **Maintain Items** or **Service Catalog** > **Maintain Categories**.
2. Open an item or category, and then configure the related lists in the form to add **Available for Department and Available for Company**.
3. Click **Update** to save the form layout.
4. Open the item or category you wish to secure and add companies and departments to related lists.

   The item or category is available only for the companies and departments listed. If no companies or departments are listed, then the item or category is available to all companies or departments.

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Restrict access

Service Catalog enables an administrator to grant or deny access to a service catalog item or category by company, department, group, user, or location.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Maintain Items** or **Service Catalog** > **Maintain Categories**.
2. Open the relevant catalog item or category.
3. Configure the form to add the appropriate **Available** or **Not available** lists.



4. Add the companies, departments, groups, users, or locations to the appropriate list.
5. Click **Update**.

Restrict access by role

By default, individual catalog items and categories do not have access restrictions.

Before you begin

Role required: admin

About this task

Administrators can grant or deny access to a service catalog item or category based on role.

Procedure

1. Navigate to **All** > **Service Catalog** > **Maintain Items** or **Service Catalog** > **Maintain Categories**.
2. Open the relevant catalog item or category.
3. Add the required roles to the **Roles** field.

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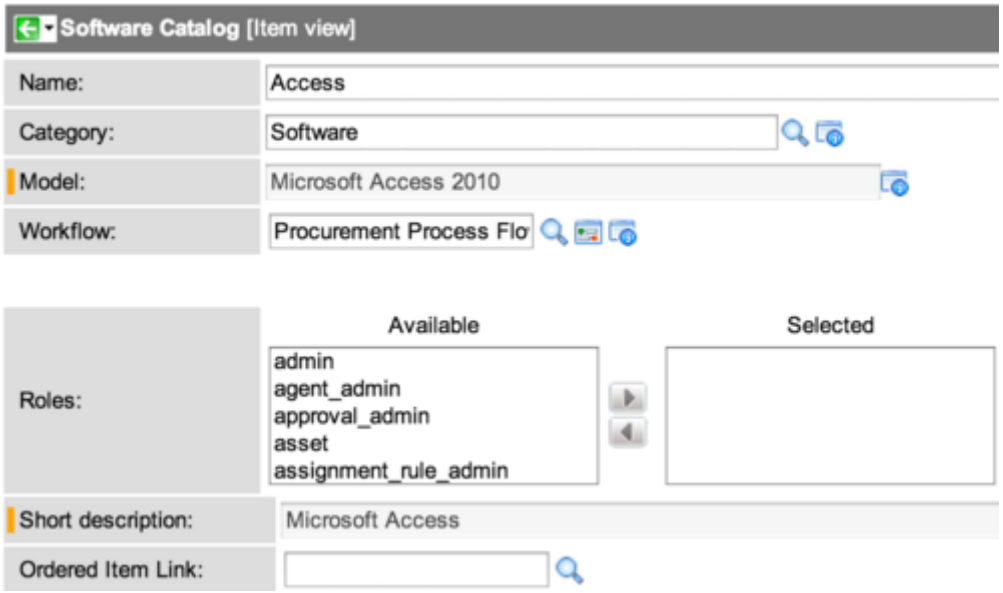
You can, if needed, Configure the form or change to **Default View** to see the **Roles** field.

Roles Granted



Restrict access by a script

Service Catalog enables you to control access to a service catalog item or category with a custom script.

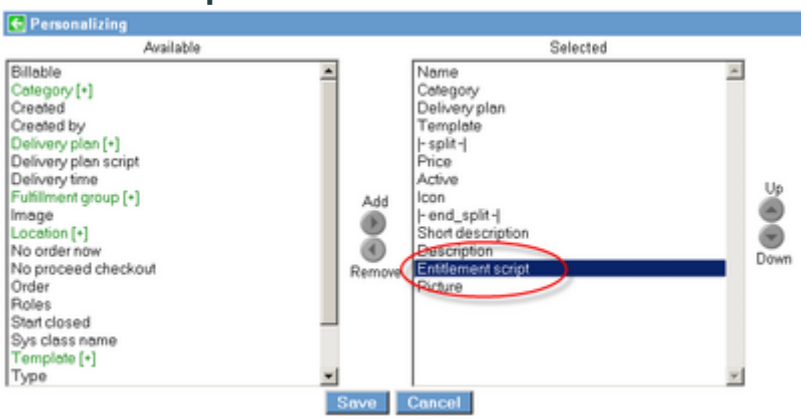
Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Maintain Items** or **Service Catalog** > **Maintain Categories**.
2. Open the relevant catalog item or category.
3. Configure the form to add the **Entitlement Script** field.

Entitlement Script



4. In the **Entitlement Script** field, enter the access control script.

   Sample Scripts:

   The following example script grants access to a catalog item named French Blackberry to users with a language of Fr (French):

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```
gs.log ( 'Running Entitlement script for French Blackberry' ) ;

 if (gs. getUser ( ). getLanguage ( ) == 'fr' )
    answer = true ; else
    answer = false ;

answer ;
```

The following example script could be used to distinguish between two categories of users (one with full access and one with restricted access) on the catalog of services:

```
var userid  = gs. getUserID ( ) ; var now_GR  = new GlideRecord
 ( 'sys_user' ) ;
now_GR. get ( 'sys_id' , userid ) ;

 if (now_GR. source )
    answer = true ; else
    answer = false ;

answer ;
```

Overriding Entitlement Scripts by Role

a. Navigate to **Service Catalog** > **Properties**.

b. Enter the roles for which to override the entitlement script (grant access) in the property List of roles (comma-separated) that can override normal entitlement checking inside the catalog. An itil role of "itil" means that the itil role can order any catalog item, even one protected by entitlement restrictions.

Creating a Service Catalog Wizard

Service Catalog wizards help you to create wizard like, multi-step experiences.

Before you begin

Service Catalog wizards are especially useful when the input required is huge and complex since the wizard offers a step-by-step experience for the requester and also provides a side panel to provide contextual help. A visa application is a good example where Service Catalog wizards could be used as the data needs to be presented in steps such as Personal details, Education details, and so on.

Pre-requisites for creating Service Catalog wizards:

- Ensure that you have either a composite record producer, or a record producer set up. For more information, see Create a record producer.
- The **Save options** field must have the value **Save in destination** in the composite record producer or record producer to enable the wizard to create records.
- The **Allow edit** option should be selected on the composite record producer or record producer form so that records are editable in the wizard.

Role required: wizard_admin, or admin

About this task

The Service Catalog Wizard is available as a component in UI Builder (UIB). You can use it to create guided experiences backed by composite record producers or record producers. You can create multi-step wizard experiences using Service Catalog Wizard.

Service Catalog Wizards are used in these modes:

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- **Normal** mode: To create records in the table configured in the record producer, or the composite record producer associated with the wizard.
- **Template** mode: To create a template where admins can predefine some data and provide guardrails to fine-tune and personalize the creation of records.

Procedure

1. Navigate to **Service Catalog Wizards** > **Maintain Wizards**, and click **New** to create a new wizard.
2. On the form, fill in the fields.

Service Catalog Wizard form

Field	Description
Name	Name of the wizard.
Type	The wizard uses a composite record producer, or record producer.
Producer	Reference of the composite record producer, or record producer.
Has feedback panel	Option to specify if the wizard has a feedback panel.
Layout[Stacked/Tabbed]	The rendering of wizard steps can be either stacked or tabbed layout mode.
Title	Title of the wizard. **Note:** The title can also dynamically refer to the composite record producer, or record producer variables using ${variable} syntax.
Enable Save	Auto-save the wizard on each step change.
Show review step	The Review and submit step is displayed to summarize the wizard steps, and field values.
Show Submit on last step	If **true**, the **Submit** button is displayed in the last step.
Review step label	Label of the Review and submit step.

For more information on fields, steps, sections, or questions on Service Catalog wizard, see the following:

- Add a step, section, or question to a catalog item wizard
- Catalog Wizard form

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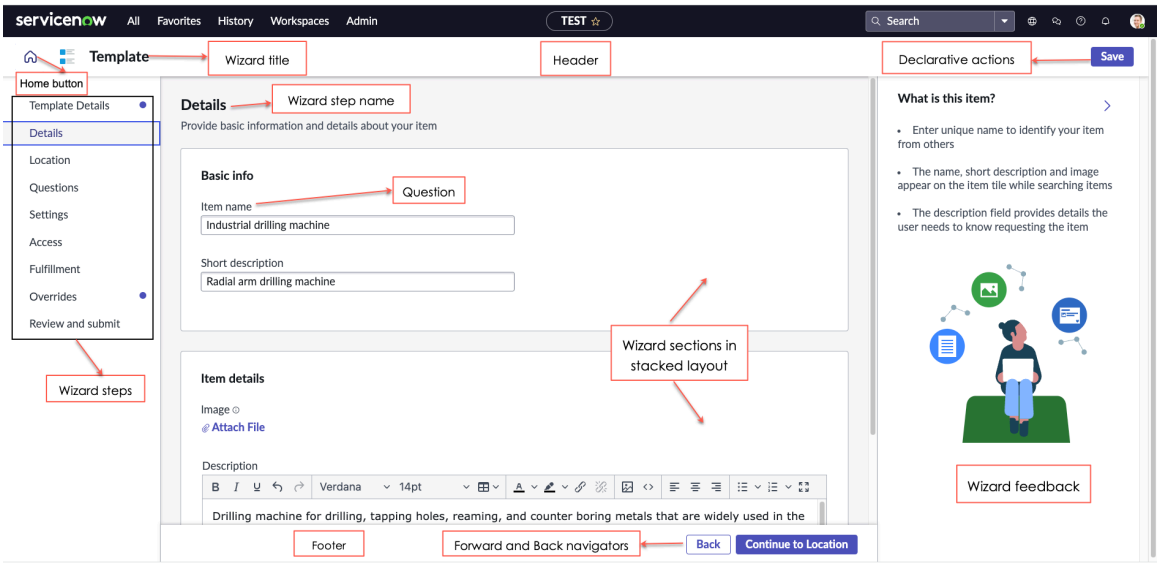
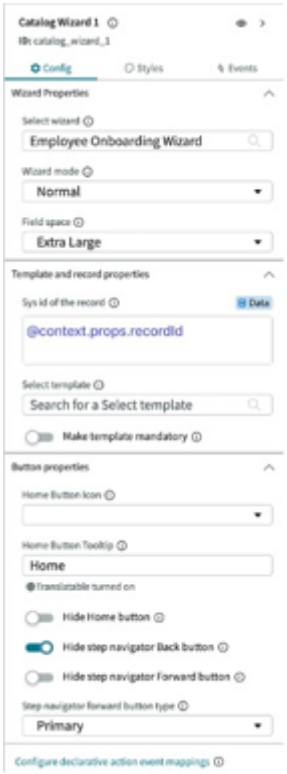


After you set up the field values, the resulting wizard with the steps, layout, labels, and other elements appear as follows:

Elements of a Service Catalog Wizard

3. Set up the Catalog Wizard component properties using the UI Builder (UIB) components, for more information see Customize UI Builder pages using components.



a. **Select Wizard**: Select the wizard that you're creating the experience for (you can choose the wizard you created in the previous step).

b. **Wizard mode**: Select the mode for this experience.

c. **Field space**: Specify the spacing that should appear between fields in the wizard. The possible values are **Small**, **Medium**, **Large**, and **Extra Large**.

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d. **Sys_id of the record**: In Normal mode, the sys_id of the record being edited or created by the wizard. In Template mode, the sys_id of the template that is being edited.

e. **Select template**: Select the template that must be applied to the wizard. The **Select Template** option is applicable only in Normal mode.

f. **Make template mandatory**: If **true**, providing a template is mandatory for creating records, and is applicable only in Normal mode.

g. **Home button icon**: Select an icon that appears in place of the Home button icon.

h. **Hide home button**: If **true**, the **Home** button is hidden in the wizard.

i. **Hide step navigator Back button**: If **true**, hides the **Back** button in the footer of the wizard.

j. **Hide step navigator Forward button**: If **true**, hides the **Forward** or **Continue** button in the footer of the wizard.

k. **Step navigator forward button type**: Specify the button type for the **Forward** button in the wizard footer. The possible values are **Primary** or **Secondary**.

For more information, see Next Experience Components in the developer documentation site.

Create declarative actions for Service Catalog Wizards

Create and configure declarative actions to enable administrators to configure buttons (wizard actions) in Service Catalog Wizards.

Before you begin

There are two types of declarative actions for catalog wizards:

- UXF Client Action: Create declarative actions and map an action to a UIB page level event handler. Use this if you need to handle events at the UIB level such as opening a dialog box, or opening another catalog wizard, and so on.
- Client Script: Use a client script that executes on a button click. Use this if you need to manipulate g_form fields of the composite record producer that are linked to the catalog wizard.

The Catalog Wizard model is the declarative action model for catalog wizard which has the model fields that define the properties of the wizard. Use these fields to define what the payload can contain (for UXF Client Action type), or define conditions for button display on the wizard. Every wizard must use the Catalog Wizard model to create declarative actions.

Role required: wizard_admin, admin

Procedure

1. Navigate to **Service Catalog Wizards > Catalog Wizard Declarative Actions**.

   Important:
   Use this navigation path only to create declarative actions. This path sets the fields correctly when the declarative action form is loaded.

2. Click **New** to create a new declarative action.
3. Specify Catalog Wizard **Action Model Fields** to create payloads.

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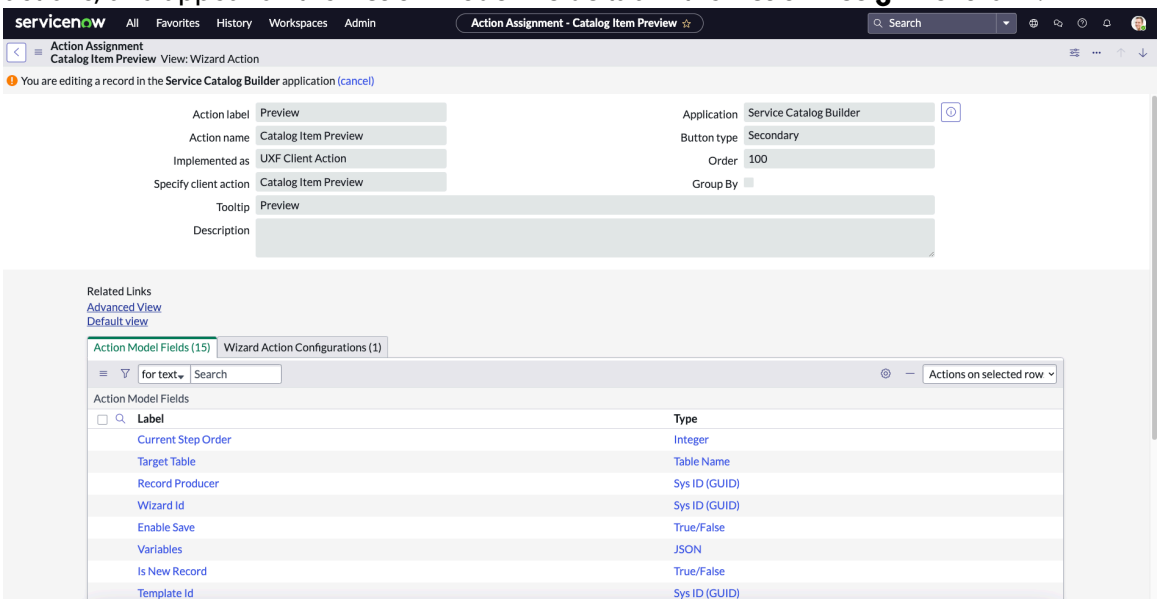
The action model fields are available by default for catalog wizard declarative actions, and appear on the **Action Model Fields** tab in the **Action Assignment** form.



Action Model Fields tab

Field	Description
Current Step Order	Order of the current selected step.
Target Table	Target table of the record producer or composite record producer used by the wizard.
Record Producer	Sys_id of the record producer or composite record producer used by the wizard.
Wizard Id	Sys_id of the wizard.
Enable Save	Value of the **Enable Save** field on the wizard record.
Variables	Object containing name and value for composite record producer variables associated with the wizard.
Is New Record	The value is **True** when creating a new record using the wizard.
Template Id	Sys_id of the template applied on the wizard.
Has Review Step	The value of the **Has Review Step** field on wizard record.
Is Last Step	Indicates if it's the last step of the wizard. The last step is not dependent on order, and could change dynamically based on client scripting or UI policies of the wizard.
Form Dirty	The value is **True** if the wizard has unsaved changes.
Submitting	The value is **True** if a submission of the wizard is in progress.

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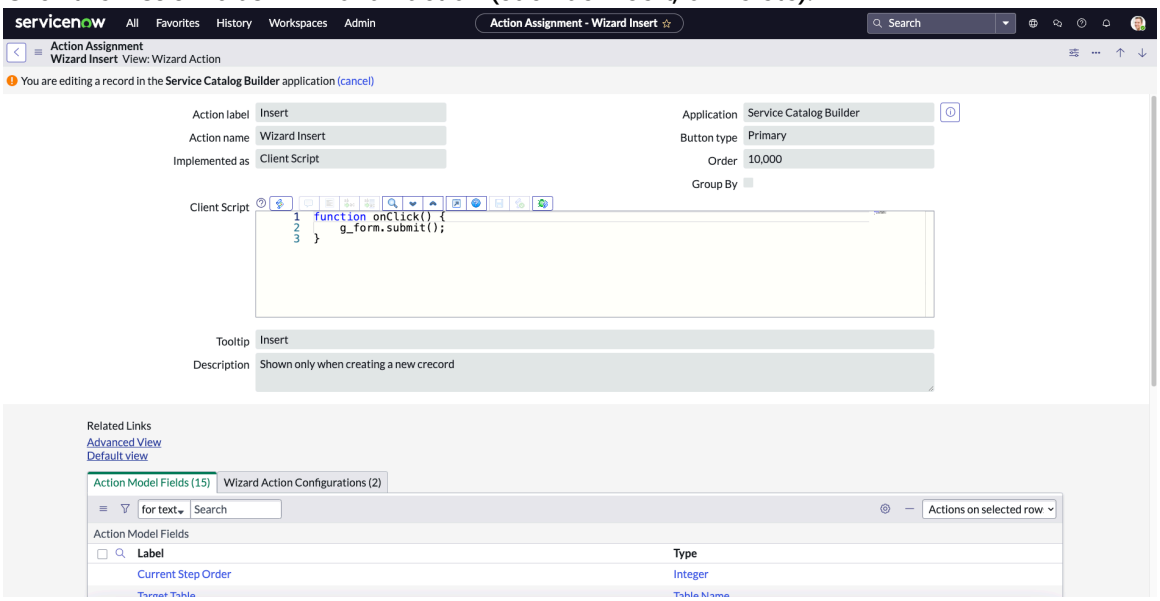
Field	Description
Mode	Mode in which the wizard is operating (Template or Normal mode).
Target Record Data	Not Applicable (this field is no used).
Record Id	Sys_id of the record being created or edited by the wizard.

4. Click the **Action label** link for an action (such as Insert, or Delete).



Action Assignment form

Field	Description
Action label	Display label for the button on the wizard.
Action name	Identifier for the action.
Implemented as	UXF Client Action or Client Script for wizard declarative actions.
Specify client action	The payload definition if **Implemented as** is the UXF Client Action.
Client Script	If the **Implemented as**field value is Client Script, this value must be specified. **Important:** You can only use the variables on the CRP that are linked to the wizard.
Tooltip	Tooltip for the button.
Button type	Possible values are **Primary** or **Secondary**.
Order	Sequence that the button appears in.
Group By	Option that must be selected if the button is part of a group.

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Field	Description
Group	The group the button belongs to, for the **Group By** option. Grouped buttons are displayed as a split button in the wizard.
Scripted client conditions	The conditions to be evaluated during button display. For example: `mode=='template'&&variables.var=='xxxx'`. **Note:** This field does not appear on the form by default.

5. Click **Submit** to create the Wizard action.
6. Navigate to **Service Catalog Wizards** > **Catalog Wizard Actions Configurations** and click **New**.
   Create a Wizard Action Configuration record so you can use the declarative action in a wizard. Enter the following fields in the form.

Wizard Action Configuration record

Field	Description
Name	Identifier of the wizard action configuration record.
Declarative action	Select a declarative action that was created using the Catalog Wizard model.
Applies to	The wizard mode in which this action should appear. The values are **Normal mode**, **Template mode**, or **All** (both modes).
Global	This action configuration applies to all wizards, regardless of whether it's mapped to a particular wizard or not. **Note:** The global actions **Save** and **Submit** are available by default.
Overflow	The button is displayed as part of overflow menu.
Force Save	Saves the wizard if any field values have been updated in the wizard before triggering the action.
Label override	Enter a label to override the label specified in the declarative action.
Button type override	The button type specified by the declarative action is overridden.

7. Navigate to **Catalog Wizard** > **Maintain Wizards**.

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To display a declarative action as a button on the wizard, map the Wizard Action Configuration with the Catalog Wizard.

Open the wizard that you want to add the declarative action to. Use the related list **Wizard Actions Configurations** to create a mapping record between the wizard and the wizard action configuration.

a. Click **New** to create a new configuration directly.

b. Click **Edit** to attach an existing configuration to create a mapping record between the wizard and the configuration. The mapping record also has a toggle to hide a specific action.

c. Toggle the **Hide action** field to True to hide a specific action.

> **Tip:**
> Buttons with global configurations are available on the wizard by default. To hide a global action in a wizard, map the global configuration to the wizard and set the **Hide Action** to true.

For more information on Catalog Wizards, see Creating a Service Catalog Wizard.

8. Use the **Configure declarative actions event mappings** action on the **Config** tab of UI Builder. Configure declarative actions event mappings is applicable only to UXF Client Action type of declarative action. Create a page level event handler, then map the declarative action to the page level event handler and specify the payload. For more information on binding events to declarative actions in UI Builder, see Bind an event to a declarative action.

Integrating Service Catalog

You can integrate Service Catalog with other applications, such as Service Portal and Employee Center.

Integrate Service Catalog

- Submit requests for service and product offerings using catalog items from the Employee Center.
- Configure an improved version of catalog. Customize Service Portal where your customers can request catalog items such as service and product offerings.
- Use a mobile and track request and approval flows of Service Catalog.
- Configure a catalog item or record producer to create a universal request when a request is submitted.
- Design a topic conversation in Virtual Agent by including reusable topic blocks to perform request submission tasks.

Service Catalog in Employee Center portal

Employees can submit requests for service and product offerings using catalog items from the Employee Center portal.

ServiceNow® Employee Center provides a single and unified portal experience for employees to find information and request services across various departments, including HR, IT, Legal, Workplace, and Procurement. Using the Content Taxonomy framework, you can modify the default IT taxonomy to include your catalog items as content in the topics or child topics.

To enable Service Catalog on the Employee Center portal, ensure you've the following ServiceNow applications and plugins installed:

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- Employee Center plugin (sn_ex_sp)
- Employee Experience Taxonomy plugin (sn_ect)

IT taxonomy on Employee Center

The base system taxonomy—Employee—is installed when you install the Employee Experience Taxonomy plugin. To provide catalog items, the following IT taxonomy structure is available by default under the IT taxonomy:

1. **Hardware**
2. **Software**
3. **Network**
4. **Browse IT**

Associate a catalog item with a taxonomy topic in Employee Center

Associate your existing and new catalog items, knowledge base articles, and quick links to the appropriate taxonomy topics so that the catalog items are available in the Employee Center as content in the topics or child topics.

Before you begin

Role required: admin

About this task

You must associate your catalog items that you want to display in the Employee Center with a taxonomy topic.

By default, Employee Center application ships employee-centric taxonomy and taxonomy topics for IT, HR, Workplace, Legal, and Procurement. You can use the default IT taxonomy to associate your catalog items or you can clone a taxonomy to make your own additions or modifications to the default topic structure that matches your requirements. To clone a taxonomy, refer to the steps mentioned in the Clone taxonomy for employee content topic.

You can associate your existing or new catalog items with a taxonomy topic directly from the Content Taxonomy also. To associate your existing or new catalog items with a taxonomy topic, refer to the steps mentioned in the Associate connected content to a topic topic.

For more information about Unified taxonomy, see Unified taxonomy for Employee Center.

To associate a catalog item from the Service Catalog:

Procedure

1. Navigate to **All** > *Service Catalog* > **Catalog Definition** > **Maintain Items**.
2. Select the item that you want to associate with a taxonomy topic.
3. In the Assigned Topics related list, click **Add**.
4. Select the base taxonomy from the **Taxonomy** list.
5. Select the appropriate topic, for example **IT**.
6. Select the appropriate child topic from the topic list.
   For example, to add a laptop, select **Hardware**, and then **Computers**.
7. Click **OK**.

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Result
The catalog item is associated with the selected taxonomy topic and appears on the Employee Center.

Enable Shopping Cart and Add to Wish List options in Employee Center

Modify the Main Menu configuration of the Employee Center to provide the Shopping Cart and Add to Wish List options while requesting catalog items.

Before you begin
Enable the wish list feature for catalog. For information about enabling the wish list, see Saving catalog items to a wish list.

Role required: admin

About this task
The Shopping Cart and Add to Wish List menu options that are available by default on the Service Portal are not available in the Employee Center. You must enable these options in the Employee Center to allow employees to add catalog items to the Shopping Cart and Wish List.

If these features are not required, then consider disabling these options in Service Catalog for a seamless experience in the Employee Center. To enable or disable the shopping cart option in Service Catalog follow the first three steps mentioned in the Enable the Shopping Cart Widget topic and for information on enabling or disabling the Wish list option in Service Catalog, see Saving catalog items to a wish list topic.

Procedure
1. Navigate to **All** > **Service Portal** > **Portals**.
2. Search for and select **Employee Center**.
3. If you are prompted with the message `To edit this record click here`, then click **here**.
4. Open the **Main menu** by clicking the preview this record icon (ⓘ).
5. Change the values for **enable_cart** and **enable_wishlist** to **True**.

```
{
 "enable_cart":{
  "displayValue":"true",
  "value":true
 },
 "auto_update_cart":{
  "displayValue":"true",
  "value":true
 },
 "exclude_search_on_homepage":{
  "displayValue":"true",
  "value":true
 },
 "enable_wishlist":{
  "displayValue":"true",
"value":true
```

6. Click **Update**.

Result
The Shopping Cart and Add to Wish List options appear on the Employee Center.

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Add an item to the wish list in Employee Center

Add catalog items or record producers to the wish list to review them when required.

Before you begin

Role required: requester

Procedure

1. Navigate to **All** > **Employee Center** > **IT**.
2. Select a topic to view the catalog items and then select catalog item or record producer from the Catalog.
3. Click the Add to Wish List icon ( ) in the Ordering widget.

   Note:

   When you edit an item that is added to the wish list, the Update Wish List icon ( ) is displayed in the corresponding Ordering widget.

4. Click **View Wish List** from the confirmation message or the **Wish List** menu option on the main navigation bar.
   The wish list details page is displayed.
5. If required, perform any of these actions.

Option	Description
Remove Item	To remove an item from the wish list, click the Remove Item icon ( ).
Clear Wish List	To clear the wish list, click **Clear Wish List**.
View the Catalog	To navigate to the Service Catalog landing page, click **View the Catalog**.

6. To navigate to any wish list item page, click the image or name of the item in the wish list details page.

   Note:
   This does not open a new instance of the item, but the instance that is in the wish list, where you can edit the details.

Add a catalog item to the shopping cart in Employee Center

Add a catalog item or order guide to the shopping cart to store at one place and checkout.

Before you begin

Role required: requester

Procedure

1. Navigate to **All** > **Employee Center** > **IT**.
2. Select a topic to view the catalog items and then select catalog item or record producer from the Catalog.
3. Click **Add to Cart** in the Ordering widget.

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Note:

- You can add the same item to the cart multiple times. Every time you add an item to the cart, a new instance of the item is created.
- The cart information is automatically updated.

4. Click **View Cart** from the confirmation message or the **Cart** option on the main navigation bar.
   The cart details page is displayed.
5. To navigate to any cart item page, click the image or name of an item in the cart details page.

   Note:
   This step doesn't open a new instance of the item, but the instance that is in the cart, where you can edit the details.

6. **Optional:** If necessary, edit the quantity of items.
7. **Optional:** To remove an item from the cart, click the Remove Item icon ( ).
8. **Optional:** To make changes to this item, select it, and then select **Save as Draft**.

   (Optional) The item is removed from the cart. You can access the saved drafts from the My Request widget in the **Drafts** tab.

9. To navigate to the Service Catalog landing page, click **Continue Shopping**.
10. **Optional:** To clear all the items from your cart, click **Clear Cart**.
11. **Optional:** To create a bundle from the cart:
    a. Click **Save as Bundle**.
    b. In the Create New Bundle window, specify the **Bundle Name** and select the items that you want to include.
    c. Click **Save**.

    Note:
    When you create a bundle from the cart, which includes an order guide, the association of the items to the order guide is lost.

12. **Optional:** To add a saved bundle to the cart, open the bundle from the **My Saved Bundles** section and click **Add to Cart**.
13. **Optional:** To replace the cart items with a saved bundle, open the bundle from the **My Saved Bundles** section and click **Replace Cart**.
14. Click **Proceed to Checkout**.
    The Order Confirmation window is displayed.
15. **Optional:** Specify the **Delivery Information** and **Special instructions**.
16. **Optional:** To add one or more attachments for the cart, click the add attachment icon ( ).

    (Optional) You can browse and choose the files, drag the files, or copy and paste them in the Add attachments window.

17. Click **Checkout**.

    The corresponding request is displayed in the My Requests page with the request number, estimated delivery date for the entire order, price, and the order status of individual ordered items.

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Related topics

Save a draft of a catalog item

Request a catalog item from Employee Center

Use the SC Catalog Item widget in Employee Center to request a catalog item.

Before you begin

Role required: requester

Procedure

1. Navigate to **All** > **Employee Center** > **IT**.
2. Select a topic to view the catalog items and then select catalog item or record producer from the Catalog.
3. Enter the required information in the catalog item form.
4. Enter the number of items in the **Quantity** field.
5. If required, perform any of these actions.

Option	Description
Add attachments	To add one or more attachments to the cata log item, click the add attachments icon ( ). You can browse and choose the files, drag the files, or copy and paste them in the Add at tachments window.
Add to Cart	To add the catalog item to the shopping cart, click **Add to Cart**.
Add to Wish List	To add the catalog item to the wish list, click the Add to Wish List icon ( ).

6. Click **Order Now**.
   The Order Confirmation window is displayed.
7. From the **Request for** list, select the user for whom you are requesting.

   Note:
   By default, the user who is logged in is selected in this list.

8. If required, specify the **Delivery Information** and **Special instructions**.
9. Click **Checkout**.
   The corresponding request is displayed in the My Requests page with the request number, estimated delivery date for the order, price, and the order status.

Request an order guide from Employee Center

Request multiple catalog items together as an order guide from the Employee Center for a specific purpose.

Before you begin

Role required: requester

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About this task

An order guide submits a single service catalog request that contains several catalog items so that you don't have to request each item manually. For more information, see Order guides.

For example, a New Employee Hire order guide can contain several items that new employees commonly need, such as business cards, computer, and cell phone. After selecting this order guide, the customer can then provide information about the new employee, including location and job title. The order guide then submits an order for catalog items like business cards, based on the details provided.

Procedure

1. Navigate to **All** > **Employee Center** > **IT**.
2. Select an order guide from the Catalog.
3. In the **Describe Needs** section, enter the required information and click **Next**.

   Note:
   The **Next** button is disabled until you fill all mandatory fields on the form.

4. In the **Choose Options** section, enter the requirements for catalog items and click **Next**.

   Note:
   - If a catalog item has fields that need user inputs, **Options** is displayed on the accordion.
   - If the fields are mandatory, a red asterisk is displayed beside **Options**.

   a. To expand or collapse the catalog item information, click the accordion.

   b. To include or exclude the catalog item from the order guide request, set the toggle switch to off on the accordion.

      Note:
      When the item is excluded from the order guide request, the item is not editable and the corresponding mandatory field restrictions are ignored.

   c. To add an attachment for the catalog item, click the Add attachments icon ( ) and select the required attachment.

   d. Click **Previous** to navigate to the **Describe Needs** section.

5. In the **Summary** section, review the order guide summary.
6. **Optional:** To add the order guide to the shopping cart, click **Add to Cart**.

   Note:
   When you add an order guide to the cart, you can only edit the order guide instance in the cart.

7. **Optional:** To go to the **Choose Options** section and edit the order guide items, click **Edit Options**.
8. Click **Order Now**.
   The Order Confirmation window is displayed.
9. From the **Request for** list, select the user for whom you are requesting.

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Note:
By default, the user who is logged in is selected in this list.

10. **Optional:** If required, specify the **Delivery Information** and **Special instructions**.
11. **Optional:** To add one or more attachments for the cart, click the add attachment icon ( ).

    (Optional) You can browse and choose the files, drag the files, or copy and paste them in the Add attachments window.
12. Click **Checkout**.
    The corresponding request is displayed in the My Requests page with the request number, estimated delivery date for the entire order, price, and the order status of individual ordered items.

Related topics

Request an order guide

Create an order guide

Save a draft of a catalog item

Save a draft of a catalog item while requesting it on the Employee Center, Service Portal, and Now Mobile.

Before you begin
Role required: requester

About this task
If enabled, save the draft if you don't want to discard the form and edit it later. For example, this procedure explains how you can save a draft in Employee Center.

For information about enabling **Save as Draft**, see Catalog Item form.

Procedure
1. Navigate to **All** > **Employee Center** > **IT**.
2. Select the item that you want to request and start filling the form.
3. If you want more information to fill the form and want to save it, select **Save as Draft**.

   Your draft is saved. You can access the saved drafts from the My Request widget in the **Drafts** tab.

   If you open a new but the same item to request, and the draft of the item is already saved, you get a message stating that the draft of this item exists. If you want to save the draft of this new item as well, you must give a unique name to this item in the **Save as draft** field, and select **Save**.

   The **Drafts** tab shows all the draft items related to the same item name.
4. Open a draft item that you want to edit, and if you still don't want to submit it, select **Update draft** or if you want to submit it, select **Submit**.

Related topics

Add a catalog item to the shopping cart in Employee Center

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Service Catalog in Service Portal

Use Service Portal to configure an improved version of Catalog. You can customize Service Portal where your customers can request catalog items such as service and product offerings. You can use the Service Catalog widgets to build a catalog for your portal.

Note:
If you're an existing customer using Service Portal we recommend that you migrate to the Employee Center for a better experience. For more information on Employee Center, see Employee Center

The Catalog landing page provides an interface from where you can access the catalog items, requests, approvals, popular items, recent items, and saved bundles. This page is available by default for zBoot users.

Note:
Upgrade users need to activate the Service Portal - Service Catalog v2 plugin (com.glideapp.servicecatalog.portal).

Overview of configurable options in the Service Catalog on the Service Portal and explains how to perform those configurations.

You can access the Catalog landing page in Service Portal using the **Catalog** option from the main menu header of Service Portal.

The landing page has:

- A search bar to search within all configured catalogs in Service Portal. When you search for a specific item, the search results page displays results based on the configured catalogs and categories.

  Only the items associated with a catalog and category are searchable. The primary category of the item is displayed under the **Category** filter. The catalog where the primary category is defined for the item is displayed under the **Catalog** filter.

- The **Browse by Categories** option to navigate to the list of categories in Service Catalog and the items within. Click this option to navigate to the categories landing page.
- The Requests and Approvals widget to display the list of requests and approvals associated with the user. The list is based on the configurations available in the **My Request Filter** module in Platform. For information about the **My Request Filter** module, see Define filters for My Requests.
- The My Saved Bundles widget to display the saved bundles associated with the user. You can remove a bundle, or open a bundle to add or replace the cart with the items in the bundle.
- The My Recent Items widget to display catalog items, record producers, or order guides that are most recently viewed or requested by the user. An instance option on the widget allows you to display either the viewed or requested items. This widget is not displayed when it has no data.
- The Popular Items widget to display the most popular catalog items ordered across the organization by other users. These items are displayed based on the **Top Requests** dynamic category. This widget is not displayed when there is no data.

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Note:

- In the order status page of a request, stage renderer displays the current stage in a collapsed view. You can expand this view for all stages.
- These pages have dynamic titles to display the name of the selected entity.
  - Catalog Item [sc_cat_item]
  - Catalog Categories [sc_category]
  - Order Guide [sc_cat_item_guide]

Related topics

Service Catalog widgets

Content Management and Service Portal

Access Service Catalog categories in Service Portal

Access Service Catalog categories to access the catalog items within.

Before you begin
Role required: requester

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Click any of the following:
   - The **Request Something** link from the Service Portal landing page.
   - The **Catalog** option from the main menu header of Service Portal and then the **Browse by Categories** option.

   The popular items from all categories are displayed.
3. In the **Catalogs** section, select the required catalog from the list.
   For information on how you can configure a catalog, see Configure a catalog in Service Portal.

   Note:
   - The **Catalogs** section is available only when you have multiple catalogs and have access to items of multiple catalogs.
   - The list contains all catalogs configured for Service Portal.

   The following information is displayed:
   - Categories of the selected catalog in the **Categories** section.
   - Popular items of the selected catalog.
4. In the **Categories** section, click the required category.
   The category details and the items within are displayed.

   Note:
   - You can click the category count or anywhere in the row to view the category details.
   - For a category with a long name, additional text is displayed as ellipses. Point to the category name to view the additional text.

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5. To change the display of category items, click the card view icon ( ) or the grid view icon ( ).

Note:
When you access a catalog item from the Catalog landing page or type ahead search results, the breadcrumb of the item displays the path based on the primary category configured on that item. When you access the item from a specific category, the breadcrumb of the item displays the path based on that category.

Related topics

SC Categories widget

Add an item to the wish list in Service Portal

Add catalog items or record producers to the wish list to review them when required.

Before you begin
Role required: requester

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Select a catalog item or record producer from Service Catalog.
3. Click the Add to Wish List icon ( ) in the Ordering widget.

Note:
When you edit an item that is added to the wish list, the Update Wish List icon ( ) is displayed in the corresponding Ordering widget.

4. Click **View Wish List** from the confirmation message or the **Wish List** menu option on the main navigation bar.
   The wish list details page is displayed.
5. If required, perform any of these actions.

Option	Description
Remove Item	To remove an item from the wish list, click the Remove Item icon ( ).
Clear Wish List	To clear the wish list, click **Clear Wish List**.
View the Catalog	To navigate to the Service Catalog landing page, click **View the Catalog**.

6. To navigate to any wish list item page, click the image or name of the item in the wish list details page.

Note:
This does not open a new instance of the item, but the instance that is in the wish list, where you can edit the details.

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Related topics

SC Wish List Cart widget

Add a catalog item to the shopping cart

Add a catalog item or order guide to the shopping cart to store at one place and checkout.

Before you begin

Role required: requester

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Select a catalog item or order guide from Service Catalog.
3. Click the Add to Cart icon ( ) in the Ordering widget.

   Note:
   - You can add the same item to the cart multiple times. Every time you add an item to the cart, a new instance of the item is created.
   - The cart information is automatically updated in all open tabs or windows.

4. Click **View Cart** from the confirmation message or the **Cart** menu option on the main navigation bar.
   The cart details page is displayed.
5. To navigate to any cart item page, click the image or name of an item in the cart details page.

   Note:
   This step does not open a new instance of the item, but the instance that is in the cart, where you can edit the details.

6. If required, edit the quantity of items.
7. To remove an item from the cart, click the Remove Item icon ( ).
8. To navigate to the Service Catalog landing page, click **Continue Shopping**.
9. To clear the cart, click **Clear Cart**.
10. To create a bundle from the cart:
    a. Click **Save as Bundle**.
    b. In the Create New Bundle window, specify the **Bundle Name** and select the items that you want to include.
    c. Click **Save**.

    Note:
    When you create a bundle from the cart, which includes an order guide, the association of the items to the order guide is lost.

11. To add a saved bundle to the cart, open the bundle from the **My Saved Bundles** section and click **Add to Cart**.
12. To replace the cart items with a saved bundle, open the bundle from the **My Saved Bundles** section and click **Replace Cart**.

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13. Click **Proceed to Checkout**.
    The Order Confirmation window is displayed.
14. From the **Request for** list, select the user for whom you are requesting.

    Note:

    - By default, the user who is logged in is selected in this list.
    - The User [sys_user] table columns specified in the **Additional columns for the "request for" Service Catalog widget. Choose fields in the sys_user table. Must be semicolon separated** (*glide.sc.request_for.columns*) Service Catalog property are displayed in the **Request for** list and you can search for a user by the specified columns.
    - You can provide additional widget options to control the **Request for** default value. For example:

      ```
      "requested_for_id": {
      "value": "62826bf03710200044e0bfc8bcbe5df1"
      },
      "requested_for_display": {
      "value": "Abel Tuter"
      }
      ```

15. If required, specify the **Delivery Information** and **Special instructions**.
16. To add one or more attachments for the cart, click the add attachments icon ( ).

    You can browse and choose the files, drag the files, or copy and paste them in the Add attachments window.
17. Click **Checkout**.

    The corresponding request is displayed in the Order Status page with the request number, estimated delivery date for the entire order, price, and the order status of individual ordered items.

    Note:

    - Use the instance options on the Order Status page to display the pre-defined columns.
    - You can display either the RITM number or the name of the catalog item. By default, the name of the catalog item is displayed.

Related topics

SC Shopping Cart widget

Request a catalog item from Service Portal

Use the SC Catalog Item widget in Service Portal to request a catalog item.

Before you begin
Role required: requester

Select the **Allow Cloning** instance option on the Order Status page to display the **Additional Actions** section after placing the request.

For information about the SC Catalog Item widget, see SC Catalog Item widget

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Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Select a catalog item or record producer from Service Catalog.
3. Enter the required information in the catalog item form.
4. Enter the number of items in the **Quantity** field.
5. If required, perform any of these actions.

Option	Description
Add attachments	To add attachments to the catalog item, click the add attachments icon ( ). You can browse and choose the files, drag the files, or copy and paste them in the Add attachments window.
Add to Cart	To add the catalog item to the shopping cart, click the Add to Cart icon ( ).
Add to Wish List	To add the catalog item to the wish list, click the Add to Wish List icon ( ).

6. Click **Order Now**.
   The Order Confirmation window is displayed.

Note:
For a record producer, you can edit the label of the **Submit** button by using the widget instance options.

For example, if you want to change the label to **Request**, press Ctrl+click on the catalog item widget, select **Instance in Page Editor**, and specify the following parameters in the **Additional options, JSON format** field.

```
"record_producer_label":{
   "value" : "Request"
  }
```

7. From the **Request for** list, select the user for whom you are requesting.

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Note:

- By default, the user who is logged in is selected in this list.
- The User [sys_user] table columns specified in the **Additional columns for the "request for" Service Catalog widget. Choose fields in the sys_user table. Must be semicolon separated** (*glide.sc.request_for.columns*) Service Catalog property are displayed in the **Request for** list and you can search for a user by the specified columns.
- You can provide additional widget options to control the **Request for** default value. For example:

```
"requested_for_id": {
"value": "62826bf03710200044e0bfc8bcbe5df1"
},
"requested_for_display": {
"value": "Abel Tuter"
}
```

8. If required, specify the **Delivery Information** and **Special instructions**.
9. Click **Checkout**.
   The corresponding request is displayed in the Order Status page with the request number, estimated delivery date for the order, price, and the order status.

Note:

- Use the instance options on the Order Status page to display the pre-defined columns.
- You can display either the RITM number or the name of the catalog item. By default, the name of the catalog item is displayed.
- When a service catalog item is ordered from an existing record, a link is added between the order item request and the parent record.

10. **Optional:** To clone a request for other users, perform the following steps.

    a. In the **Additional Actions** section, from the **Also request for** list, select the required users and click **Submit**.

    b. In the Cloning Requests window, click **Ok**.

Note:

- The logged in user should be specified in the **List of roles (comma-separated) that can use bulk ordering functionality. Blank means all users** (*glide.sc.allow.clone.roles*)) property.
- You can clone the request for multiple users.
- When you clone a request that contains a multi-row variable set, the information that is specified in the multi-row variable set is available in all cloned requests. All UI policies and client scripts on the multi-row variable set are also cloned.

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- A separate request is created for each specified user and that user is displayed in the **Requested For** field of the request.
- The **Opened By** field of the cloned requests is updated with the logged in user.
- Select the **Requests** menu option or the My Requests widget on the catalog homepage to view the cloned request created for the user.

Related topics

Service Catalog request screens

Create a variable set and add it to an item

Request an order guide from Service Portal

Use the SC Order Guide widget on Service Portal to request an order guide with several catalog items for a specific purpose.

Before you begin

Role required: requester

Select the **Allow Cloning** instance option on the Order Status page to display the **Additional Actions** section after placing the request.

For information about the SC Order Guide widget, see SC Order Guide widget.

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Select an order guide from Service Catalog.
3. In the **Describe Needs** section, enter the required information and click **Next**.

   Note:
   The **Next** button is disabled until you fill all mandatory fields on the form.

4. In the **Choose Options** section, enter the requirements for catalog items and click **Next**.

   Note:
   - If a catalog item has fields that need user inputs, **Options** is displayed on the accordion.
   - If the fields are mandatory, a red asterisk is displayed beside **Options**.
   - The ordered quantity value is displayed in the **Quantity** field and can be modified only if the **Show quantity** option is selected while creating an order guide rule base,

   a. To expand or collapse the catalog item information, click the accordion.

   b. To include or exclude the catalog item from the order guide request, click the toggle on the accordion.

   Note:
   When the item is excluded from the order guide request, the item is not editable and the corresponding mandatory field restrictions are ignored.

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c. To add an attachment for the catalog item, click the Add attachments icon ( ) and select the required attachment.

d. Click **Previous** to navigate to the **Describe Needs** section.

5. In the **Summary** section, review the order guide summary.
6. To add the order guide to the shopping cart, click the Add to Cart icon ( ).

Note:
When you add an order guide to the cart, you can only edit the order guide instance in the cart.

7. To go to the **Choose Options** section and edit the order guide items, click **Edit Options**.
8. Click **Order Now**.
   The Order Confirmation window is displayed.
9. From the **Request for** list, select the user for whom you are requesting.

Note:

- By default, the user who is logged in is selected in this list.
- The User [sys_user] table columns specified in the **Additional columns for the "request for" Service Catalog widget. Choose fields in the sys_user table. Must be semicolon separated** (*glide.sc.request_for.columns*) Service Catalog property are displayed in the **Request for** list and you can search for a user by the specified columns.
- You can provide additional widget options to control the **Request for** default value. For example:

```
"requested_for_id": {
"value": "62826bf03710200044e0bfc8bcbe5df1"
},
"requested_for_display": {
"value": "Abel Tuter"
}
```

10. If required, specify the **Delivery Information** and **Special instructions**.
11. To add one or more attachments for the order guide, click the add attachments icon ( ).

    You can browse and choose the files, drag the files, or copy and paste them in the Add attachments window.

12. Click **Checkout**.
    The corresponding request is displayed in the Order Status page with the request number, estimated delivery date for the entire order, price, and the order status of individual ordered items.

Note:

- Use the instance options on the Order Status page to display the pre-defined columns.
- You can display either the RITM number or the name of the catalog item. By default, the name of the catalog item is displayed.

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13. **Optional:** To clone a request for other users, perform the following steps.

    a. In the **Additional Actions** section, from the **Also request for** list, select the required users and click **Submit**.

    b. In the Cloning Requests window, click **Ok**.

    Note:

    - The logged in user should be specified in the **List of roles (comma-separated) that can use bulk ordering functionality. Blank means all users** (*glide.sc.allow.clone.roles*)) property.
    - You can clone the request for multiple users.
    - If a record producer is included in the order guide, a request is created for all items other than the record producer.
    - When you clone a request that contains a multi-row variable set, the information that is specified in the multi-row variable set is available in all cloned requests. All UI policies and client scripts on the multi-row variable set are also cloned.

- A separate request is created for each specified user and that user is displayed in the **Requested For** field of the request.
- The **Opened By** field of the cloned requests is updated with the logged in user.
- A user can view the cloned request created for the user from the **Requests** menu option or the My Requests widget on the catalog homepage.

Related topics

Request an order guide

Create an order guide

Standard ticket page for a requested item

In Service Portal, you can configure the ticket page of a requested item to display the related information, while still having a consistent layout that is similar to other request types. This configuration ensures a consistent experience when viewing submitted requests in Service Portal.

In Service Portal, you can access the ticket page for a requested item by using the Requests option from the main menu header.

For new instances, the standard ticket page for a requested item is available by default. For upgraded instances, you need to activate the Standard Ticket Route page route map. For information about activating this page route map, see Activate the page route map for the standard ticket page.

Standard ticket page configuration for a requested item

The layout of the standard ticket page can be configured for a requested item. Navigate to **Standard Ticket** > **Standard Ticket Configurations** and edit the sc_req_item ticket configuration. For information about configuring the standard ticket page, see Configure the standard ticket page.

Related topics

Standard ticket page

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Service Catalog in mobile

You can use a mobile and track request and approval flows of Service Catalog.

Fulfiller experience in Mobile Agent

Approve catalog requests, requested items, or change requests from anywhere using the ITSM ServiceNow Agent application.

As an ITSM agent or technician, you can use the mobile app when connected online to accomplish the following:

- Accept or reject the pending approval requests.
- View the completed approval requests.

Note:

- The request experience is not available in this mobile app.
- On-load catalog UI policies (non-scripted) are supported for variables in record views, for example, requested item and incident.
  - Only the visibility condition is considered.
  - A variable with no value is not displayed.
  - These policies are also applicable for container variables and a group of check boxes.
  - Since the multi-row variable set is displayed with a message that it is not viewable, these policies can be used to display or hide that message.

Watch this three-minute video to learn how to manage approval requests in the mobile app. This video covers: Accessing the Approvals mobile app and viewing and approving or rejecting requests.

Activation information

This mobile application runs on the ServiceNow® mobile platform. You should activate the ITSM Mobile Experience (com.sn_itsm_mobile) plugin that enables the ITSM mobile application.

Get started with the mobile app for Approvals

Access the My Approvals application instance on your mobile app to manage approval requests using your mobile device.

Before you begin

Role required: business_stakeholder or approver_user

About this task

Download the ServiceNow® mobile application on an iOS platform from the Apple App Store or on an Android platform from the Google Play Store.

Procedure

1. Open the mobile app and tap the plus icon ().
2. Add a ServiceNow instance.
   For more information on adding the instance, refer to Add a ServiceNow instance.
3. Tap **My Approvals** to start managing your requests.

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Related topics

Agent mobile app

Manage a catalog request approval

Manage your assigned catalog request or requested item by approving or rejecting it from anywhere using your mobile device.

Before you begin
Role required: business_stakeholder or approver_user

Procedure

1. Tap **My Approvals** on your mobile app.
2. To approve or reject a pending approval request, perform the following steps.
   a. Tap the Pending Approvals applet.
   All approvals in the Requested state are displayed.
   b. Swipe a request and tap **Approve** or **Reject**.

   Note:
   You should specify the reason while rejecting a request.

   c. **Optional:** To view the details of a pending approval request, tap it.

   Note:
   To approve or reject a request, tap the menu icon ( ) and tap **Approve** or **Reject**.
3. To view a completed approval request, perform the following steps.
   a. Tap the Completed Approvals applet.
   All approval requests that are either accepted or rejected are displayed.
   b. To view the details of the request, tap it.

Request experience in Now Mobile

You can enable users to request for an item or service, and track or approve requests on mobile using the Now® Mobile app.

Activation of Now Mobile for Service Catalog

If you have the admin role, activate the ServiceNow Mobile Request Native Application Screens and Applet Launcher plugin (com.glide.mobile-employee). See Now Mobile app. This plugin enables the Service Catalog functionality by default.

For Me tab

When you log into Now Mobile, the following functionality related to Service Catalog is available:

- **My To-Dos**: Displays approval records of requests and requested items assigned or delegated to the user.
- **My Requests**: Displays requests based on the filters defined for mobile in the **My Requests Filter**. By default, the Incident Mobile and Service Catalog Request Mobile filters are available.

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For information about configuring filters, see Define filters for My Requests and Configure My Requests.

Note:
It is recommended to include only open requests.

Services tab

You can submit or track requests.

- **Recent Services**: Displays the items and services (10 items and services in the last 12 months) that were requested recently by the logged-in user.
- **Popular Services**: Displays the most requested items and services (10 items and services in the last 12 months) that are visible to the user. Displays the 10 recent items and services in the last 12 months.
- **Browse Services**: Displays the categories of items and services that you can browse through and order.

Note:

- If a category contains both items and sub-categories, the items specific to the category are displayed under **Others**.
- The category listings do not display the catalog information for users who do not have the roles that have permissions to read the records in the sc_category table. For such users, an ACL can be added to provide read permission for the Title field of the sc_catalog table.

Note:

- You cannot request these item types in the mobile app.
  - Content items
  - Wizard
  - Standard change template
- All items hidden in Service Portal are also hidden in the mobile app.
- In the RITM and record view, these variable types are not supported.
  - HTML
  - Custom
  - Custom with Label
  - UI Page
- In the RITM and request view, a multi-row variable set is not supported. A message is displayed in this view that this variable set is not viewable.
- On-load catalog UI policies (non-scripted) are supported for variables in record views, for example, requested item and incident.
  - Only the visibility condition is considered.
  - A variable with no value is not displayed.
  - These policies are also applicable for container variables and a group of check boxes.
  - Since the multi-row variable set is displayed with a message that it is not viewable, these policies can be used to display or hide that message.

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From Now Mobile, you can also perform the following tasks:

- Browse catalog items using the catalog hierarchy in addition to the category hierarchy. For information about its configuration, see Browse catalog items using the catalog hierarchy.
- Change the label of the **Submit** button for a record producer. For information on editing the button label, see Edit the label of Submit button for a record producer.
- Use the mobile camera to scan bar codes for identifying a variable value of a catalog item. This is only applicable by using the *barcode* attribute for the Single Line Text variable. For information about this variable attribute, see Service Catalog variable attributes.

Quick actions

You can provide easy access to a catalog item by creating a quick action. For information on creating a quick action in Now Mobile, see Create a quick action.

Siri shortcuts

iOS users can use Siri shortcuts to open the following pages in the mobile app.

- Browse items and services.
- Open my requests

See Siri shortcuts.

Now Mobile properties

You can define the following behavior for various catalog entities by configuring the Now Mobile properties. For information about configuring these properties, see Configure Now Mobile properties.

- Sort categories by the **Order** field.
- Define the availability of a catalog item in one of the following ways:
  - Include the catalog item with **Availability** set to `Desktop only` in Now Mobile.
  - Specify catalog item types to exclude in Now Mobile.
- Define the non-availability behavior of a catalog item by making it discoverable but not viewable, or not available at all.
- Specify colors for buttons to match your mobile theme.

Related topics

Now Mobile app

Mobile plugins and upgrades

Configure catalogs

Enable your users to view and request their associated items in the Now Mobile app. If no catalogs are selected, users can view and request items from all catalogs in the system. By default, the app uses Service Catalog.

Before you begin

Role required: admin

About this task

Demonstrates configuring service catalogs, knowledge bases, and My Requests in the Now Mobile App.

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Procedure

1. Navigate to **All** > **Now Mobile App** > **Catalogs**.
2. **Optional:** In the portal catalogs [m2m_sp_portal_catalog] table, add a catalog in addition to the base system catalog, or change the catalog that is associated with the base system record:
   a. Click **New** or open the base system record.
   b. On the form, fill in the fields.

Portal catalogs form

Field	Description
Portal	Portal that you select. Select **Employee Center**.
Catalog	Catalog that you would like to associate with the app.
Order	Number that indicates the order that the configurations should run. If there are multiple configurations on a portal, the system runs the configurations from the lowest to the highest order that you selected.

Result
Your users can view and request items from all added catalogs.

Browse catalog items using the catalog hierarchy

In addition to the category hierarchy, browse catalog items using the catalog hierarchy for proper context.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **System Mobile** > **Now Mobile app** > **Applet Launchers**.
2. Select the **Services** applet launcher.
3. Replace the **Browse Services** applet launcher section with the **Browse Catalog** applet launcher section.
   a. On the Applet launcher form, navigate to the **Body** section.
   b. Under the **Section** column, click **Browse Services**.
   c. On the Item Section form, set **Destination screen** as `Browse Catalog`.
   d. Click **Update**.
   After the **Browse Catalog** applet launcher section is enabled, the catalog appears as the first level of browsing and then the categories.

Submit and track a request

Submit a request for an item or service and track the progress of your request with the Now Mobile app.

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Before you begin
Role required: none

Procedure

1. In the navigation bar, tap **Services**.
2. Browse items and services, or search for an item.
3. Tap the item or service that you would like to request.

> **Note:**
> If configured by your administrator, the related items and articles area provides alternatives and additional information.

4. Select **ORDER NOW**.
5. On the form, fill in the fields.

Field	Description
Request for	Change this field if ordering the item for someone else.
Delivery Information	Confirm the shipping address for the item.
Special instructions (Optional)	Add any special instructions for the item.

6. Tap **CHECKOUT**.
   The app displays a confirmation that your request is submitted.
7. To return to the list of items, tap **Close**.
8. In the navigation bar, tap **For Me**.
9. To view all your requests, tap **My Requests**.
10. To view the status of your request, tap the item that you ordered.
    a. To view information about the request, use the **Details** tab.

    > **Note:**
    > You can add comments for an open incident.

    b. To view field changes and comments about your request, use the **Updates** tab.

    c. Tap + to add comments and work notes, or to attach a file.

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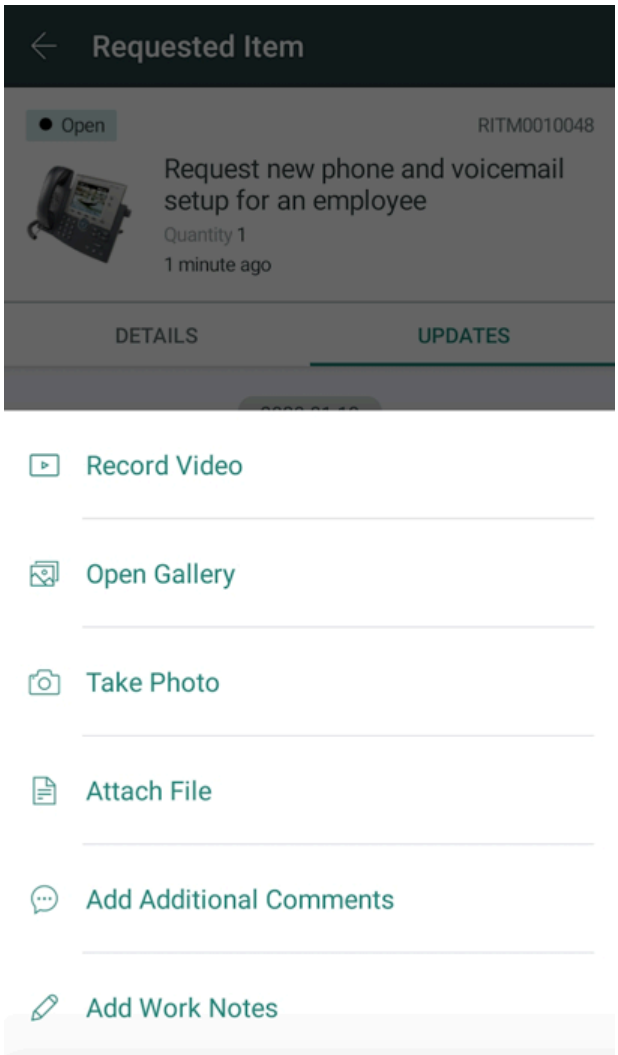
Note:
When you add comments for a resolved incident, you can reopen it.



Create a quick action in your mobile applications

Provide easy access to an important item by creating a quick action. For example, you can create a quick action that opens a Service Catalog item.

Before you begin
Role required: admin

Procedure

1. Create a function for the quick action.

a. Navigate to **System Mobile** > **Functions**.
The Function [sys_sg_button] table opens.

b. Click **New**.

c. On the form, fill in the fields.

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Button fields form

Field	Description
Name	Name of the function record.
Description	Description to enable other users to easily understand the purpose of the function.
Type	Type of quick action that you want to create. To create a quick action that opens a Service Catalog item, select **URL**. For more information about function types, see Configure a smart button.
Context	Whether the function applies at the record or table level. ▪ Record: Action only applies at the record level. For example, updating a field. ▪ Global: Action that only applies at the table level. For example, creating or deleting a record. For this example, select **Global**.
Link Label	Label for the link. This value does not display in the user interface.
Link URL	Relative URL for the item that you want to open when the user clicks the function. For example, to open a Service Catalog item in the Now Mobile portal, enter `/mesp?id=sc_cat_item&sys_id=060f3afa3731300054b6a3549dbe5d3e`. This field only displays if the **Type** field is **URL**.
Relative URL	Option that is selected to determine whether the URL is relative. For this example, choose **Selected**. This field only displays if the **Type** field is **URL**.
Condition	
Table	Table on which the condition runs.
Condition	Condition that should be met for the action to be successful. For a catalog item, enter `var item = new sn_sc.CatItem('3f1dd0320a0a0b99000a53f7604a2ef9'); answer = item.canView() && item.isVisibleServicePortal();` to display the quick action only when the end user has permissions to view the item.
Roles	Roles that you want to user to have to view the quick action.

2. Add an instance of the function that you created to the page.

   a. In the native UI, navigate to **Now Mobile App** > **Applet Launchers**.

   b. Open the applet launcher record that you would like to add the quick action to.

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c. Select the **Body** tab.

d. Insert a new row in the Quick Actions Menu Maps related list.
If you're not able to insert a row, make sure that you're in the **ServiceNow Now Mobile App Screens and Applet Launcher** application scope.

e. Click the magnifying glass to look up an item
The Function Instances [sys_sg_button_instance] table opens.

f. Click **New**.

g. On the form, fill in the fields.

Function instance form

Field	Description
Name	Name of the function instance.
Description	Description to enable other users to easily understand the purpose of the function instance.
Parent	Page on which you are adding the quick action. For example, select **Applet Launcher: Homepage** to add the quick action to the home page. Select a value in the **Parent table** field first.
Application	Application scope.
Parent table	Table that contains the record type where the button appears. For this example, select **applet Launcher [sys_sg_applet_launcher]** to add the quick action to an applet launcher page.
Function	Function record that you created earlier.
Label	Label to help the user understand what the quick action opens. For example, `Report an outage`.
Location	Location where the button appears in the UI. For this example, select **Quick Action**.
Icon	Icon to display next to the label. For more details on mobile icons, see Mobile icons. **Note:** Not all listed icons work with quick actions. To see a list of compatible icons, filter your list where the **Icons** field contains `now-mobile-icons-buttons`. **Note:** The **Icons** field is not on the icon list by default. To add the **Icon** field to your list, right-click the list header and select **Configure** > **List Layout**. Then, add the *Icon* field to the selected list. You should see the icon field on your reference field list.
Order	Number that indicates the order that the functions are listed. If there are multiple instances in the same location, the app displays them from the lowest to the highest.

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h. Click **Submit**.

i. Save the applet launcher record.

Result

Your users can open the quick action by selecting the  icon on the applet launcher page.

Enable notifications in Now Mobile

Allow push notifications on your mobile device when there is an update for a request.

Before you begin

Role required: admin

Procedure

1. Tap **Notifications** in the navigation bar.
2. Tap the **Enable notifications** radio button.
   You will receive a notification in any of the following scenarios.
   - Request Completed (one RITM)
   - Request Completed (multiple RITM)
   - Request not Processed
   - Approval Record Assigned - RITM
   - Approval Record Assigned - Request
   - Request Rejected
   - Agent adds comment to Requested Item

Enable the cart in Now Mobile

Allow a requester to add or edit items in the cart. By default, the cart is disabled in Now Mobile.

Before you begin

Role required: admin

Procedure

1. Navigate to sys_properties.list.
2. For the *glide.sc.cart.enabled* property, specify **Value** as `true`.
3. Click **Update**.
   The Cart icon is displayed at the top of the app and the **Add to Cart** button is enabled for items.

Edit the label of Submit button for a record producer

For a record producer submission experience that you can relate to, edit the label of the **Submit** button.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **Service Portal** > **Widgets**.
2. Select the SC Catalog Item (widget-sc-cat-item-v2) widget.
3. From the Instances related list, preview and open the instance for the ServiceNow NowMobile App – Catalog Screens and Applet Launcher application.
4. In the **Additional options, JSON format** field, specify the *record_producer_label* parameter.

   For example, if you want to change the label to **Request**, press Ctrl+click on the catalog item widget, select **Instance in Page Editor**, and specify the following parameters in the **Additional options, JSON format** field.

   ```
   "record_producer_label":{
      "value" : "Request"
     }
   ```

5. Click **Update**.

Configure Now Mobile properties

Define the behavior of various catalog entities in Now Mobile.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. On the Service Catalog Configuration form, select the **Mobile** section.
3. Configure the required properties.

Now Mobile properties

Property	Description
Catalog category sort option in Now Mobile (*glide.sc.mobile.category.order_by*)	Sort option for categories in Now Mobile. ○ Title: Categories are sorted by their title. By d sorted alphabetically by their title. ○ Order: Categories are sorted by their order.
Include 'Desktop only' Items in Now Mobile (*glide.sc.mobile.include_desktop_only_items*)	Option to include the catalog item with **Availab** `only` in Now Mobile.
Catalog item classes not available in Now Mobile (comma separated list) (*glide.sc.mobile.item_class_not_supported*)	Catalog item types to exclude in Now Mobile. F `sc_cat_item_content, sc_cat_iten`
Experience for items not available in Now Mobile (*glide.sc.mobile.unsupported_discover*)	Option to define the non-availability behavior Possible options: ○ Discoverable-show message that item is not Item is discoverable in the search and brows viewable. ○ Not discoverable-do not show in search and Item is neither discoverable in the search an viewable.

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Property	Description
	Note: ○ If AI Search is enabled for Now Mobile, t applicable. ○ This property is supported only when or properties are applicable: ▪ Include 'Desktop only' Items in NOW M (*glide.sc.mobile.include_d* ▪ Catalog item classes not available in Now Mobile (comma-separated list) (*glide.sc.mobile.item_clas*
Primary color for buttons in the catalog request experience in Now Mobile (*glide.sc.mobile.primary_color*). If Next Experience is turned on, the property will be ignored.	Color for buttons in the catalog request experi

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Important:
The following properties are interdependent.

- Include 'Desktop only' Items in NOW Mobile
- Catalog item classes not available in NOW Mobile (comma separated list)
- Experience for items not available in NOW Mobile

Dependency between the Include 'Desktop only' Items in NOW Mobile property and Experience for items not available in NOW Mobile property

Availability value of the catalog item	Include 'Desktop only' Items in NOW Mobile (true)	Include 'Desktop only' Items in NOW Mobile (false) Desktop only
Desktop only	Viewable in search and browse experience	○ If set as discoverable using the *`Experience for items not available in NOW Mobile`* property, viewable in search and browse experience, but not available when you click the item. ○ If set as not discoverable, not viewable in search and browse experience
Desktop and Classic Mobile	Always viewable in search and browse experience	Always viewable in search and browse experience
Classic Mobile only	Not viewable in search and browse experience	Not viewable in search and browse experience

Dependency between the Experience for items not available in NOW Mobile property and Items excluded using the Catalog item classes not available in NOW Mobile (comma separated list) property

Experience for items not available in NOW Mobile property value	Items excluded using the Catalog item classes not available in NOW Mobile (comma separated list) property
Discoverable-show message that item is not viewable in the mobile	Item types are viewable in search and browse experience, but not available when you click them.
Not discoverable-do not show in search and browse experience)	Item types do not appear in search and browse experiences

4. Click **Save**.

Service Catalog topic blocks in Virtual Agent powered by NLU

You can design a topic conversation in NLU-powered Virtual Agent by including reusable topic blocks to perform request submission tasks.

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Search Catalog Item

You can use this topic block to search for a catalog item based on the search criteria. If there are multiple search results, you can select one from a carousel view.

Input parameters

Parameter	Description
query_term	Keyword to search for a catalog item. For information on configuring keyword search for a catalog item, see Configure keyword search for catalog items.
catalogs	Comma-separated list of catalogs where a catalog item should be searched for.
result_limit	Number of search results that should be displayed. By default, this number is set to 5.

Output parameters

Parameter	Description
catalog_item_id	If a catalog item is selected, sys_id of the item is returned. If no catalog item is selected, that is, **None of these** option is selected, -1 is returned.
item_type	sys_class_name of the catalog item that the user selected.
is_conversational	Specifies if the catalog item can be requested in the conversation mode in Virtual Agent.

Request Catalog Item

You can use this topic block to request for a catalog item.

Input parameters

Parameter	Description
catalog_item_id	sys_id of the catalog item that should be requested.
execute_contextual_search	Option to specify if the contextual search should be run for a record producer based on its configuration. For information on defining contextual search for a record producer, see Define contextual search for record producer.
confirm_catalog_item	Option to specify whether the user must confirm the catalog item before continuing with the next step. If this is set to `false`, user can answer the catalog items questions by skipping the confirmation.
show_end_state_card	Option to display the end state card information about the generated record to the user.

Output parameters

Parameter	Description
record_id	sys_id of the record that is generated after the item submission.

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Output parameters (continued)

Parameter	Description
	If the catalog item is not supported in the conversation mode or if the user does not have access to the item, -1 is returned.
record_table	Name of the table in which the record is generated.
variables	Questions related to the catalog item.

Virtual Agent render type

A catalog item can be rendered in Virtual Agent as a conversation, window, or popup.

Requesting a catalog item in a conversation mode

A user can submit a request in the conversation mode (by answering the questions in line).

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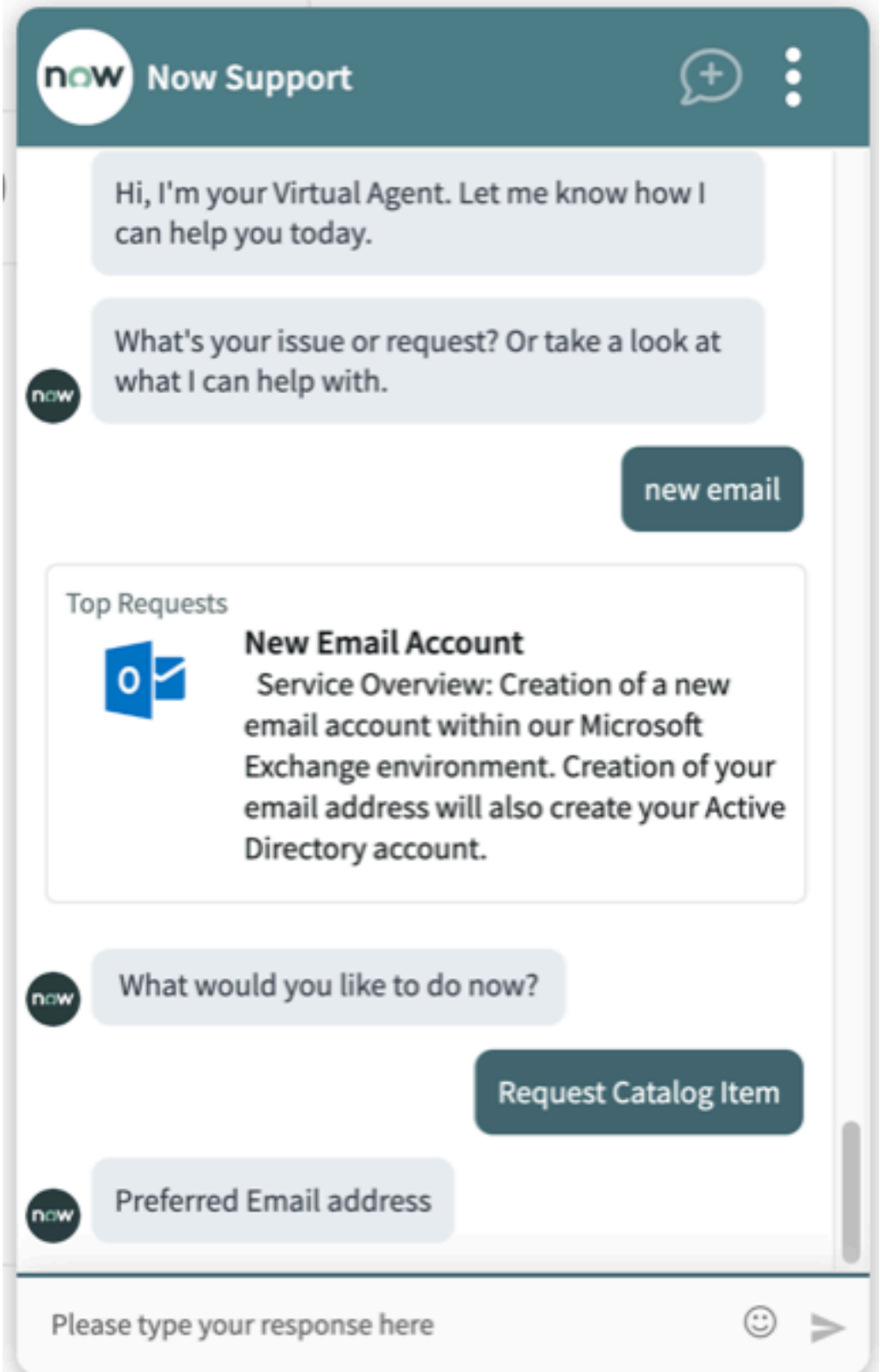

The following conditions must be met when a user requests a catalog item in the conversation mode in Virtual Agent powered by NLU.

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- A catalog item cannot have more than the number of questions specified in the *glide.sc.conversational.request.question.limit* property. By default, this number is set to 10. For more information about this property, see Service Catalog properties.
- A catalog item can have non-scripted catalog UI policies. These UI policies should be defined such that variables are affected sequentially, that is, only a variable with the lower order affects a variable with the higher order.
- A catalog item cannot have catalog client scripts that are defined for Now Mobile or Service Portal.
- Only the following variables are supported:
  - Attachment
  - Check box (A group of check box variables isn't supported)
  - Date
  - Date/Time
  - Email
  - IP Address
  - Label
  - Lookup Multiple Choice (without pricing implications and advanced reference qualifier)
  - Lookup Select Box (without pricing implications and advanced reference qualifier)
  - Multiple Choice (without pricing implications)
  - Multi Line Text
  - Numeric Scale (without pricing implications)
  - Reference (without pricing implications and advanced reference qualifier)

    Note:
    Reference type variable that corresponds to a table that has more than 7000 records are not supported. The upper limit for the number of records can be specified in the *glide.sc.va.reference_question_choices.limit* property. By default, it is set to 7000.

  - Requested For (without pricing implications and advanced reference qualifier)
  - Rich Text Label
  - Select Box (without pricing implications)
  - Single Line Text
  - URL
  - Wide Single Line Text
  - Yes / No
  - Container variables
- The following variable attributes are supported:
  - ref_ac_order_by
  - allowed_extensions
  - max_file_size

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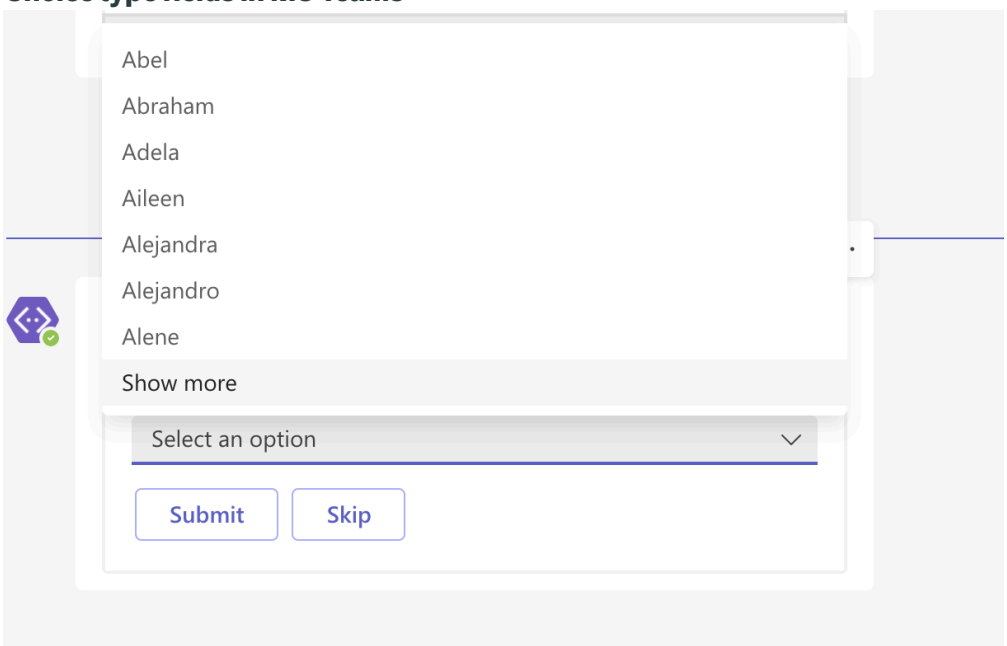
Note:
All the other variable attributes are ignored in Virtual Agent.

- A catalog item can have a single-row variable set but not a multi-row variable set.
- If a catalog item has a default value configured for a question, the default value is displayed in VA, which enables the user to proceed with the default value without having to select it manually. The user can also choose a different value other than the default value.
- If a catalog item has a data lookup configured for a question, the setter value is displayed in VA, which enables the user to proceed with the setter value or choose a different value. A catalog item with data lookup is not supported as a conversational item when the setter question precedes the matcher question.
- User cannot skip the following type of questions for a catalog item:
  - Lookup Multiple Choice
  - Select Box
  - Lookup Select Box
  - Yes/No
  - Numeric Scale (If **Do not select first choice** configuration is not selected)
  - Multiple Choice (If **Do not select first choice** configuration is not selected, or **Include none choice** configuration is selected)
- If the user is using VA in a different supported collaboration tool like MS Teams:
  - Searching for a value using the search icon in choice type of fields is not supported.

Choice type fields in MS Teams



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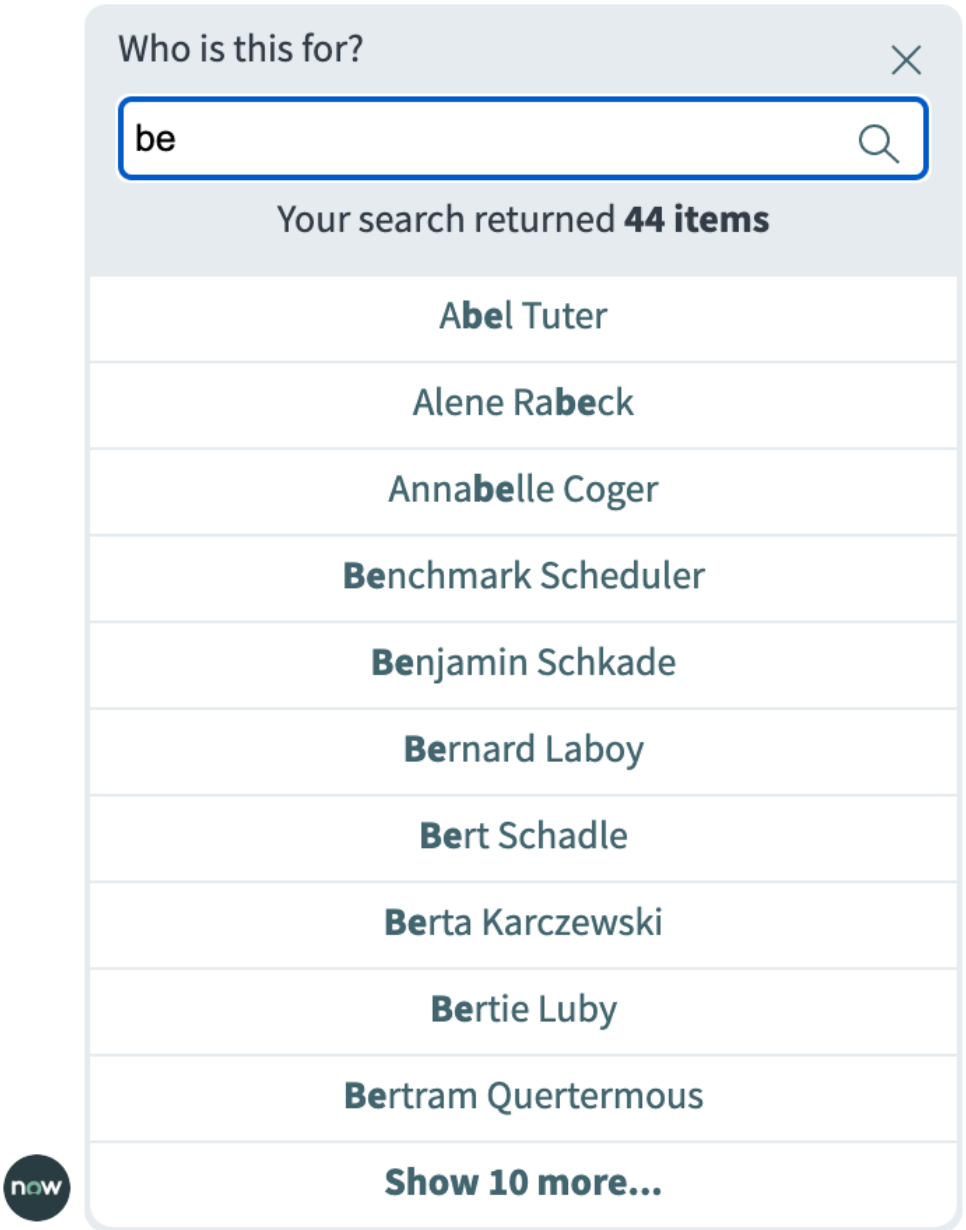
Choice type fields in VA



- Searching for a value in reference type of fields is performed in the form of a question.

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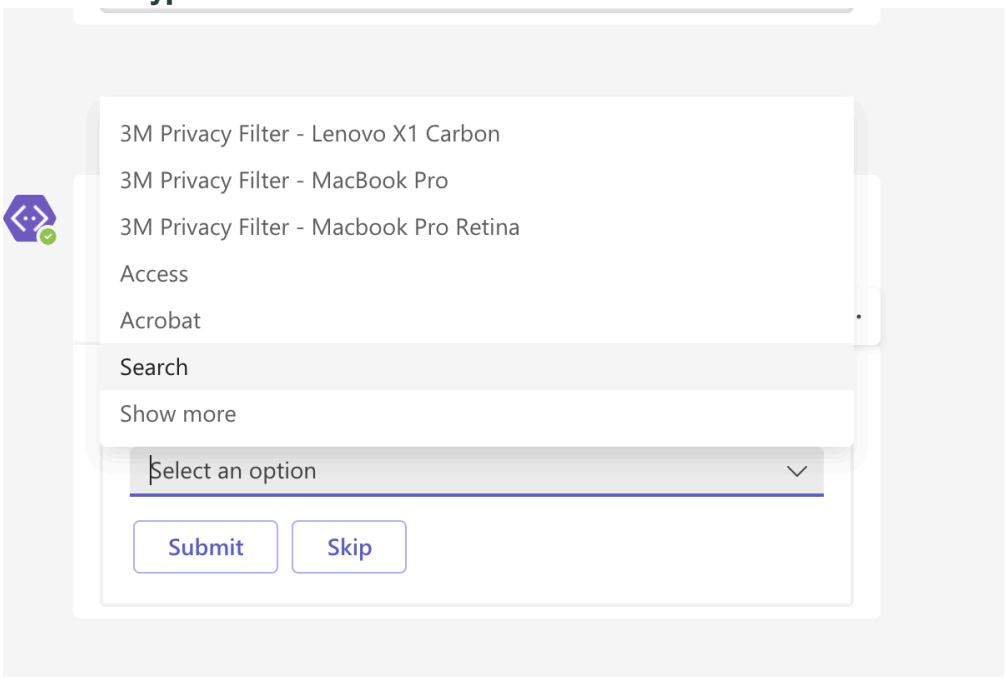
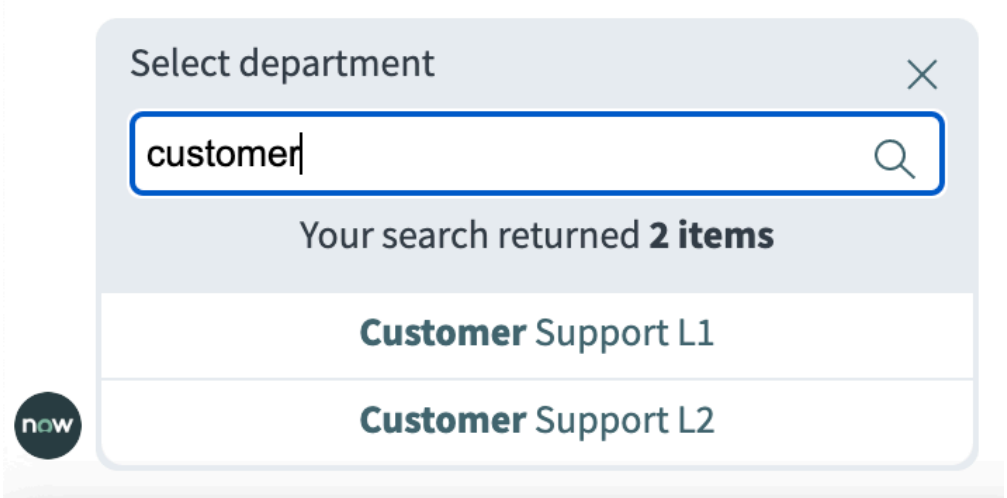
Reference type fields in MS Teams



Reference type field in VA



Requesting a catalog item as a pop-up

A user can submit a catalog item request as a pop-up for items, which are not conversational. In a pop-up, Virtual Agent provides a link for the user to submit the request in a pop-up without navigating to a new tab. A non-conversational catalog item can be rendered as a pop-up only if it does not have any Custom, Custom with label, or UI Page variables.

Note:
If you do not want to render your Virtual Agent conversation as a pop-up, set the *glide.sc.va.render_type.legacy* property to true, which renders all non-conversational catalog items in the configured portal in a new tab.

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Requesting a catalog item as a window

A user can submit a catalog item request in a window. In a window, Virtual Agent provides a link for the user to submit the request in the Service Portal defined in the *sn_itsm_va.com.snc.itsm.virtualagent.portal_url* property. A non-conversational item is rendered as a window if it has a Custom, Custom with label, or UI Page variable.

A catalog item is rendered as a window if it is of the following types:

- Content Item
- Order Guide
- Wizard Launcher
- Standard Change Template

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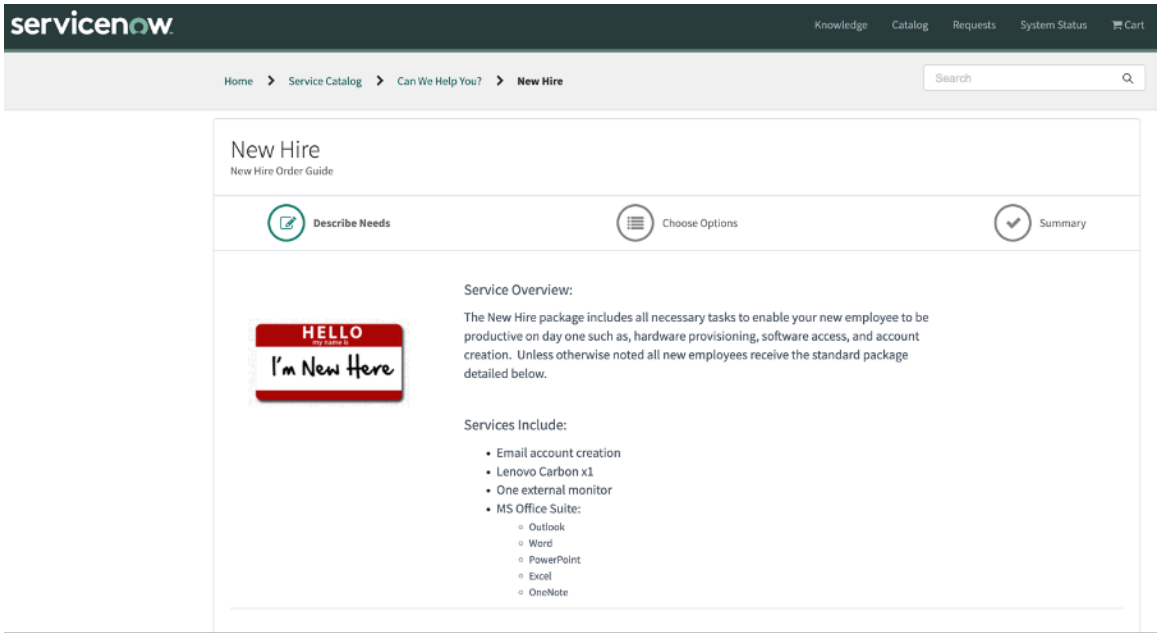


Related topics

Catalog builder preview topic conversation

Configure Now Assist in Conversational Catalog Request

Submit a request topic conversation

Users can submit a request in a Virtual Agent conversation.

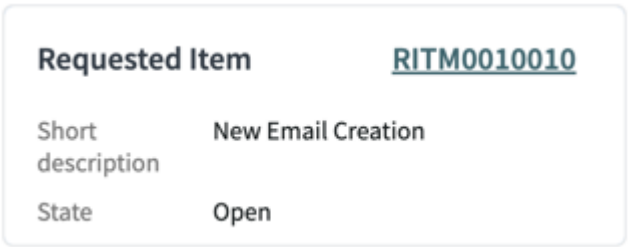
The Submit a request topic conversation uses the following topic blocks:

- Search Catalog Item
- Request Catalog Item

Using the Submit a request topic conversation, users can submit a request by choosing from all available options. For example, when a user is requesting an item, the Virtual Agent prompts the user to enter a search keyword. After the user enters the keyword, the Virtual Agent responds with available choices in a carousel view.

When the user selects the required item, the following scenarios are possible:

- A user can submit a request in the conversation mode (by answering the questions in line). After the request submission, a requested item card is displayed with the request number as a link to the request page.



Note:
In Now® Mobile, the URL opens the native screen.

- A user can submit a request in a popup or a window.

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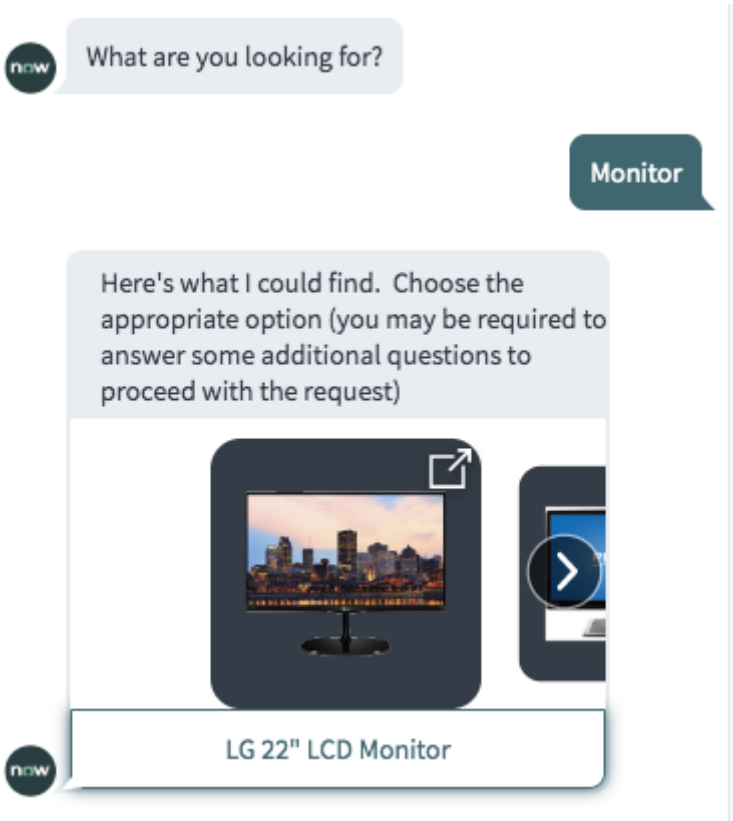
- In case of a popup, Virtual Agent provides a link for the user to submit the request in a popup without navigating to a new tab. A non-conversational catalog item can be rendered as a popup only if it does not have any Custom, Custom with label, or UI Page variables. For more information, see Service Catalog topic blocks in Virtual Agent.
- In case of a window, Virtual Agent provides a link for the user to submit the request in the Service Portal defined in the *sn_itsm_va.com.snc.itsm.virtualagent.portal_url* property. A non-conversational item will be rendered as a window it has a Custom, Custom with label, or UI Page variable. For more information, see Service Catalog topic blocks in Virtual Agent.

Note:
Now Mobile opens the item in Mobile Employee Service Portal (mesp).



Related topics

Service Catalog topic blocks in Virtual Agent powered by NLU

Service Catalog topic blocks in Virtual Agent powered by LLM

You can design a topic conversation in LLM-powered Virtual Agent by including reusable topic blocks to perform request submission tasks.

Request catalog item (LLM)

You can use this topic block to request for a catalog item through a conversational and streamlined experience based on generative AI. For information about configuring Now Assist in conversational catalog request, see Configure Now Assist in Conversational Catalog Request.

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Input parameters

Parameter	Description
catalog_item_id	sys_id of the catalog item that should be requested.
context_json	Context of the conversation in JSON format.
execute_contextual_search	Option to specify if the contextual search should be run for a record producer based on its configuration. For information on defining contextual search for a record producer, see Define contextual search for record producer.
confirm_catalog_item	Option to specify whether the user must confirm the catalog item before continuing with the next step. If this is set to `false`, user can answer the catalog items questions by skipping the confirmation.
show_end_state_card	Option to display the end state card information about the generated record to the user.

Output parameters

Parameter	Description
record_id	sys_id of the record that is generated after the item submission. If the catalog item is not supported in the conversation mode or if the user does not have access to the item, -1 is returned.
record_table	Name of the table in which the record is generated.
status	Status of the request. Possible options are success or error.
variables	Questions related to the catalog item.
message	Message that gives additional information in case of any failure.
used_LLM	Option that indicates if LLM was used while requesting the item, that is, if slot filling was done for questions defined in a catalog item using generative AI.

Virtual Agent render type

A catalog item can be rendered in Virtual Agent as a conversation, window, or popup.

Requesting a catalog item in a conversation mode

A user can submit a request in the conversation mode (by answering the questions in line).

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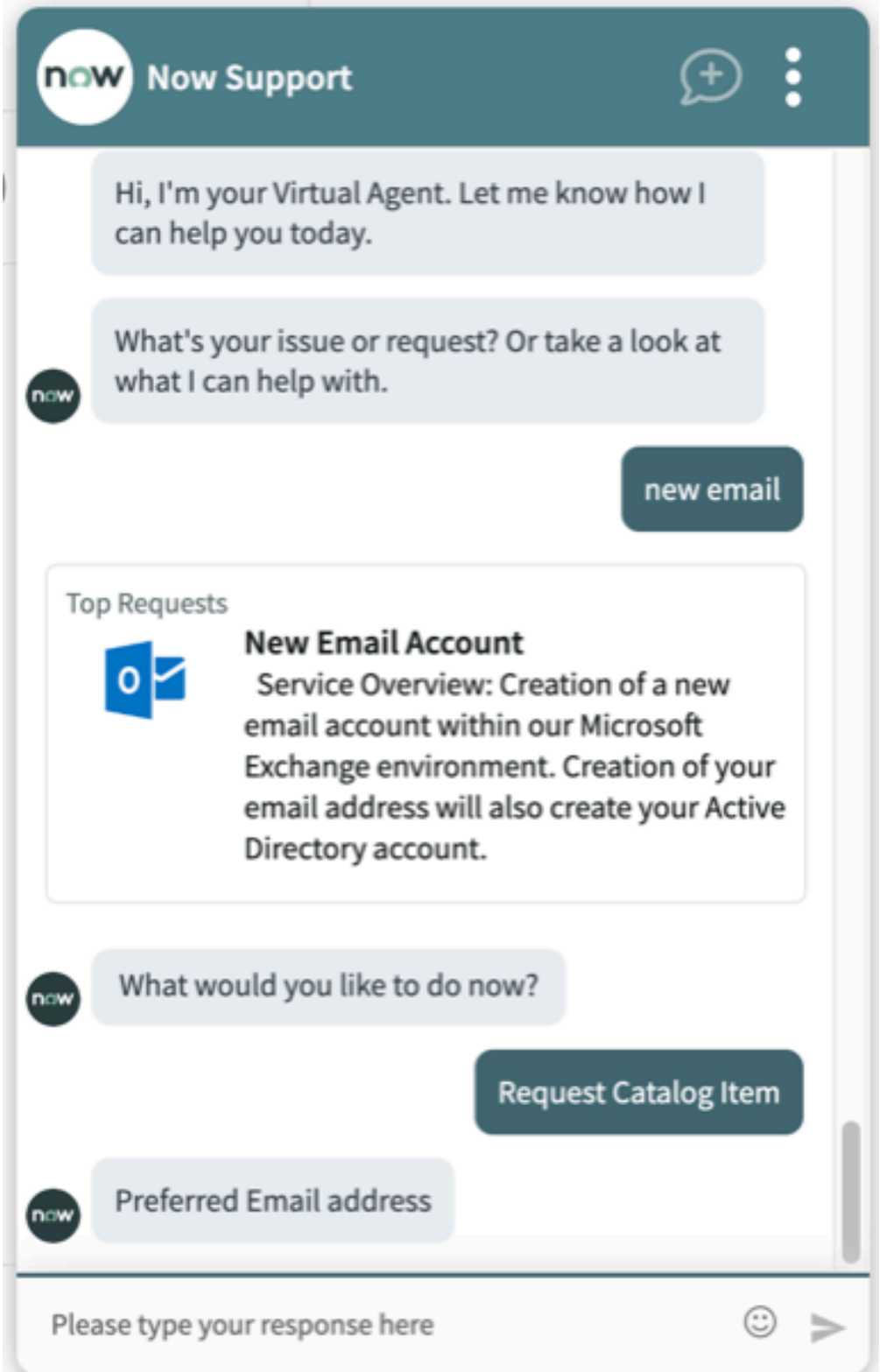

The following conditions must be met when a user requests a catalog item in the conversation mode in Virtual Agent powered by LLM.

- A catalog item cannot have more than the number of questions specified in the *sn_now_assist_cr.llm.conversational.request.question.limit* property. By default, this number is set to 500. For more information about this property, see Service Catalog properties.

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- A catalog item can have scripted catalog UI policies. But when a catalog item has scripted UI policies containing unsupported methods or functions, the catalog item becomes non-conversational.
- The following methods or classes are supported in the catalog client scripts or scripted UI policies for a catalog item to be conversational:
  - moment
  - window.location.href
  - top.location.href
  - top.window.open
  - window.open
  - open
  - Array
  - Boolean
  - Date
  - Error
  - GlideAjax
  - GlideRecord
  - JSON
  - Math
  - Number
  - Object
  - RegExp
  - String
  - alert
  - console.info
  - console.error
  - console.debug
  - console.warn
  - console.log
  - console.clear
  - console.count
  - console.countReset
  - console.dir
  - console.dirxml
  - console.table
  - decodeURI
  - decodeURIComponent
  - encodeURI
  - evalexec
  - g_form.addErrorMessage

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- g_form.addInfoMessage
- g_form.addOption
- g_form.clearMessages
- g_form.clearOptions
- g_form.clearValue
- g_form.getActionName
- g_form.getDisplayValue
- g_form.getEditableFields
- g_form.getIntValue
- g_form.getReference
- g_form.getSysId
- g_form.getTableName
- g_form.getUniqueValue
- g_form.getValue
- g_form.hasField
- g_form.hideAllFieldMsgs
- g_form.hideErrorBox
- g_form.hideFieldMsg
- g_form.isMandatory
- g_form.isNewRecord
- g_form.isReadOnly
- g_form.isVisible
- g_form.removeOption
- g_form.save
- g_form.setDisabled
- g_form.setDisplay
- g_form.setLabel
- g_form.setLabelOf
- g_form.setMandatory
- g_form.setReadOnly
- g_form.setReadonly
- g_form.setValue
- g_form.setVariablesReadOnly
- g_form.setVisible
- g_form.showErrorBox
- g_form.showFieldMsg
- g_form.submit
- g_user
- ga.addParam

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  - ga.getXML
  - indexOf
  - isLoading
  - isNaN
  - newValue
  - oldValue
  - onChange
  - parseFloat
  - parseInt
  - this
  - toFixed
  - trim
  - undefined
  - escape
  - unescape
- A catalog item can have catalog client scripts. But when a catalog item has catalog client scripts containing unsupported methods or functions, the catalog item becomes non-conversational.
- Only the following variables are supported:
  - Attachment
  - Check box (A group of check box variables isn't supported)
  - Date
  - Date/Time
  - Duration
  - Email
  - HTML
  - IP Address
  - Label
  - Lookup Multiple Choice (without pricing implications)
  - Lookup Select Box (without pricing implications)
  - Masked
  - Multiple Choice (without pricing implications)
  - Multi Line Text
  - Numeric Scale (without pricing implications)
  - Reference (without pricing implications)
  - Requested For (without pricing implications)
  - Rich Text Label
  - Select Box (without pricing implications)
  - Single Line Text

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- URL
- Wide Single Line Text
- Yes / No
- Container variables

Note:
The UI page variable type is ignored in Virtual Agent like the UI page is ignored in Service Portal. For more information, see Types of service catalog variables.

- Advanced reference qualifiers are supported.
- Field messages are supported.

Note:
The field messages aren't shown to the requester in the following scenarios:

- If the field message appears for the question that's already answered.
- if a question is not shown to the requester or the question isn't answered already.

- The following variable attributes are supported:
  - ref_ac_order_by
  - allowed_extensions
  - max_file_size

Note:
All the other variable attributes are ignored in Virtual Agent.

- A catalog item can have a single-row variable set but not a multi-row variable set.
- If a catalog item has a default value configured for a question, the default value is displayed in Virtual Agent, which enables the user to proceed with the default value without having to select it manually. The user can also choose a different value other than the default value.
- If a catalog item has a data lookup configured for a question, the setter value is displayed in Virtual Agent, which enables the user to proceed with the setter value or choose a different value. A catalog item with data lookup is not supported as a conversational item when the setter question precedes the matcher question.
- User can't skip the following type of questions for a catalog item:
  - Lookup Multiple Choice
  - Select Box
  - Lookup Select Box
  - Yes/No
  - Numeric Scale (If **Do not select first choice** configuration is not selected)
  - Multiple Choice (If **Do not select first choice** configuration is not selected, or **Include none choice** configuration is selected)
- If the user is using Virtual Agent in a different supported collaboration tool like Microsoft Teams:

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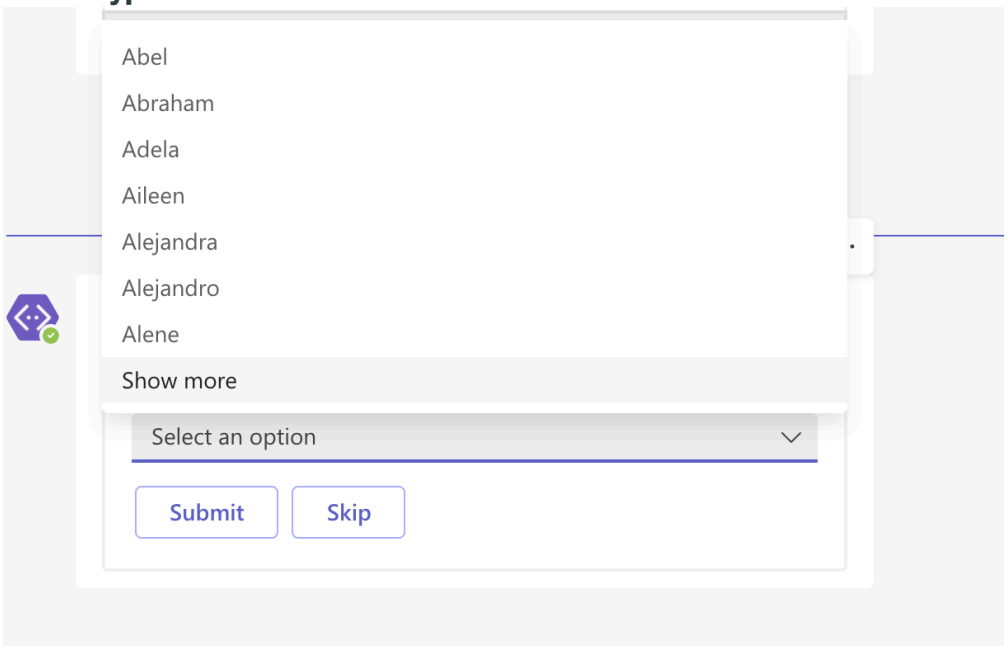
- Searching for a value using the search icon in choice type of fields is not supported.

Choice type fields in Microsoft Teams



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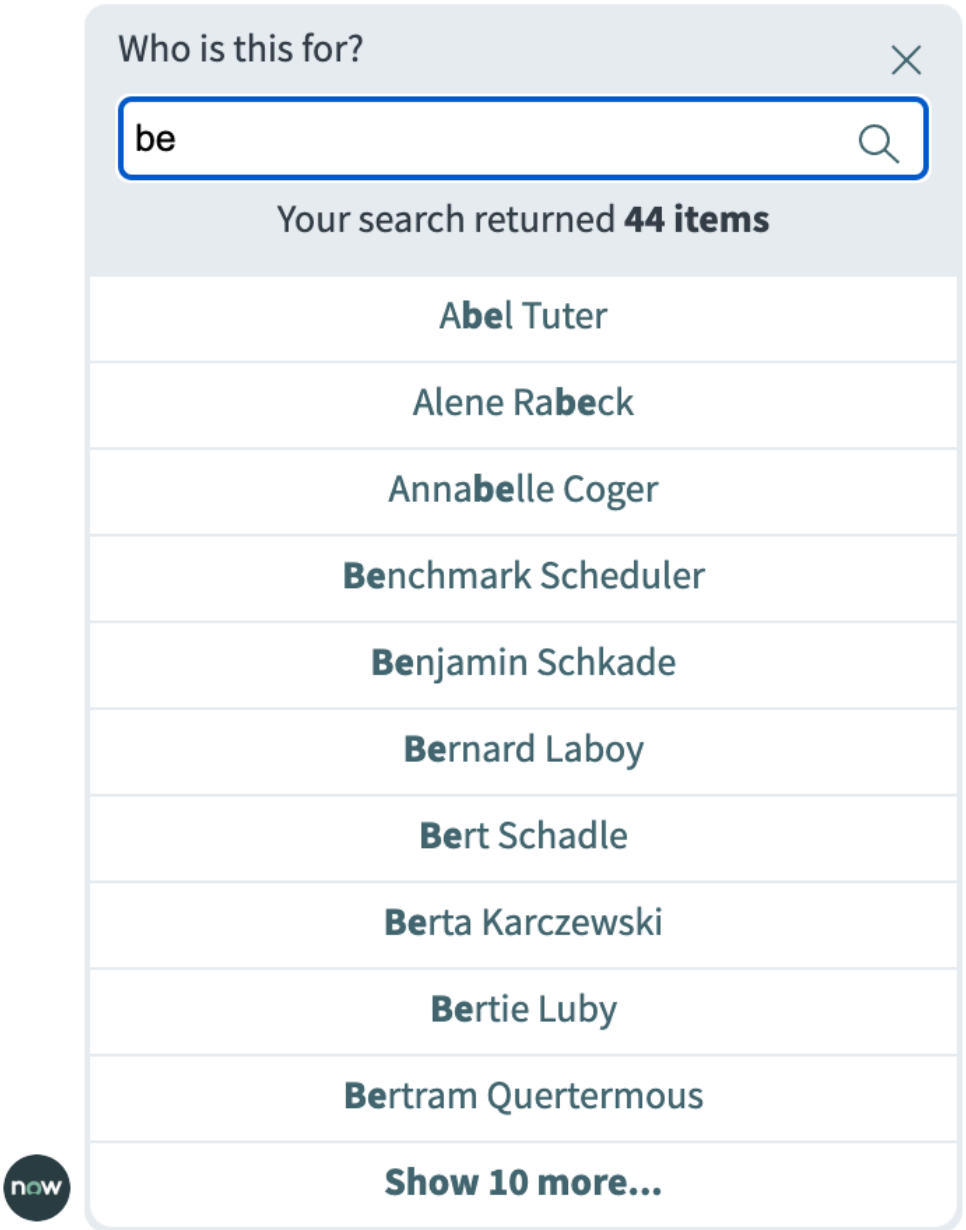
Choice type fields in Virtual Agent



- Searching for a value in reference type of fields is performed in the form of a question.

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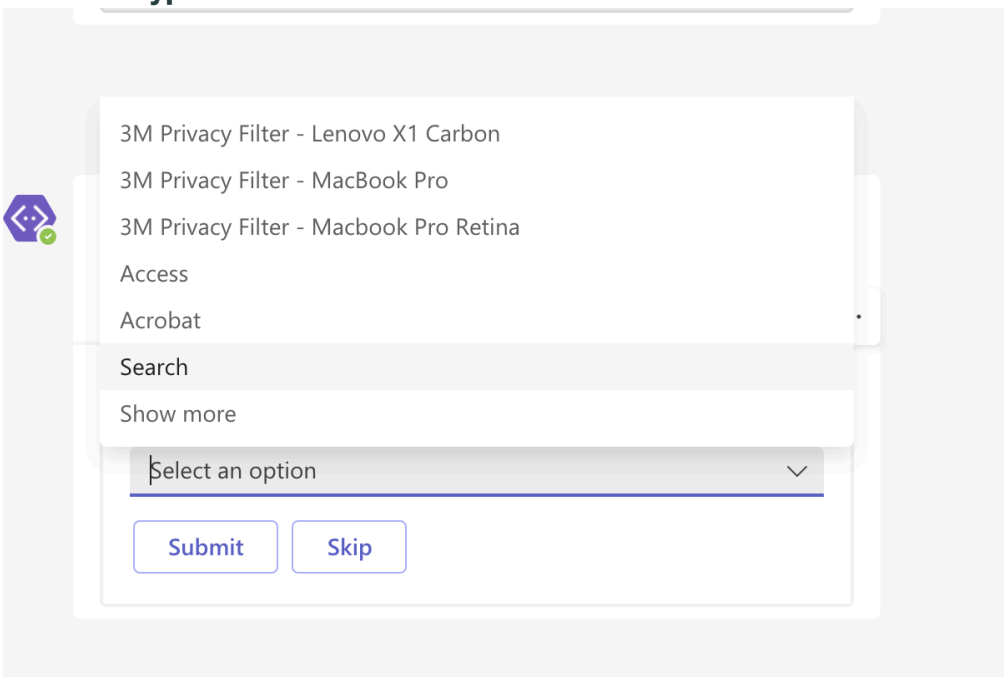
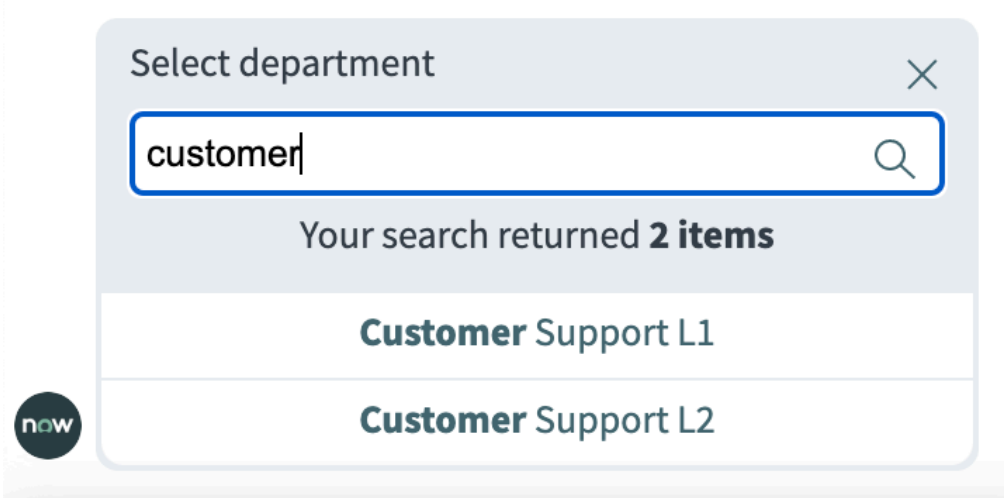
Reference type fields in Microsoft Teams



Reference type field in Virtual Agent



Note:
If you've installed the Now Assist in Conversational Catalog Request application, these conditions corresponds to the catalog item's conversational mode in the Virtual Agent powered by LLM.

Requesting a catalog item as a pop-up

A user can submit a catalog item request as a pop-up for items, which are not conversational. In a pop-up, Virtual Agent provides a link for the user to submit the request in a pop-up without navigating to a new tab. A non-conversational catalog item can be rendered as a pop-up only if it does not have any Custom, Custom with label, or UI Page variables.

Note:
If you do not want to render your Virtual Agent conversation as a pop-up, set the *glide.sc.va.render_type.legacy* property to true, which renders all non-conversational catalog items in the configured portal in a new tab.

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Apple iPhone 13

Request for Apple iPhone 13

All-new dual-camera system with ultra wide and night mode. All-day battery. Six new colours. And the A13 Bionic, our fastest chip ever.

Key features:

- Storage capacity: 128 GB, 256 GB, 512 GB
- Network generation: 4G
- Style: Smartphone
- Camera: 12.0 MP
- Operating System: iOS

Is this a replacement for a lost or broken iPhone? *

- ○ Yes
- ○ No

Monthly data allowance *

-- None --

Requesting a catalog item as a window

A user can submit a catalog item request in a window. In a window, Virtual Agent provides a link for the user to submit the request in the Service Portal defined in the *sn_itsm_va.com.snc.itsm.virtualagent.portal_url* property. A non-conversational item is rendered as a window if it has a Custom, Custom with label, or UI Page variable.

A catalog item is rendered as a window if it is of the following types:

- Content Item
- Order Guide
- Wizard Launcher
- Standard Change Template

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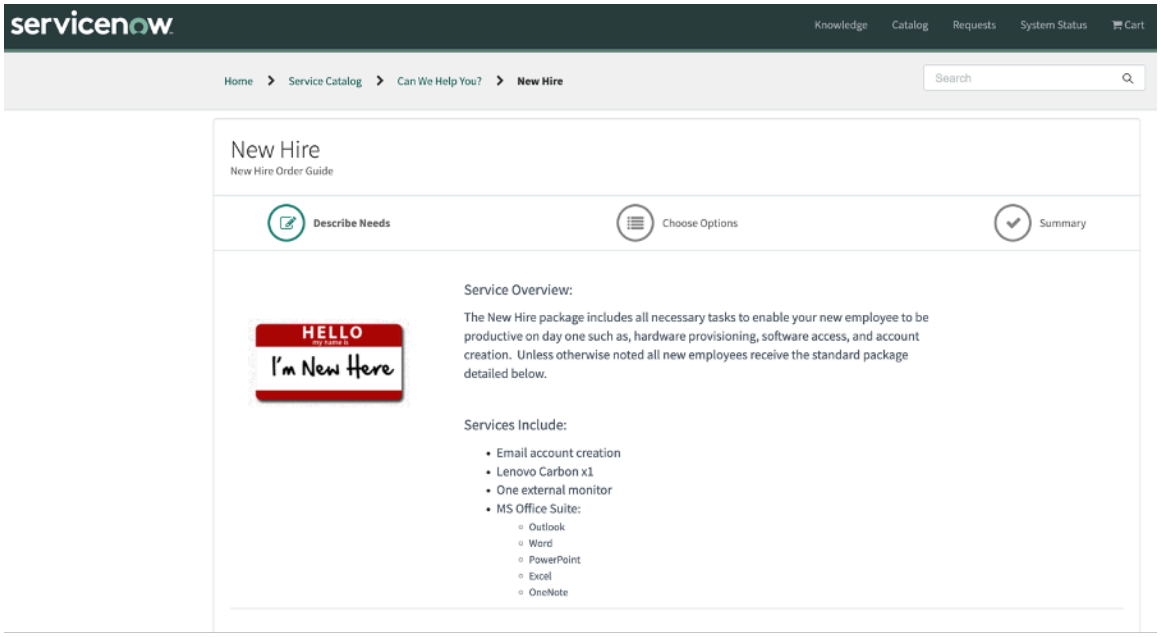

Related topics

- Configuring Now Assist in Virtual Agent
- Catalog builder preview topic conversation
- Now LLM Service updates

Service Catalog configuration for Universal Request

You can configure a catalog item or record producer to create a universal request when a request is submitted. The associated requested item (for catalog item) or task-based record (for record producer) becomes the primary ticket for that universal request.

Related topics

- Create or edit a catalog item
- Create a record producer
- Configure a catalog item or record producer to create a universal request

Configure all catalog items or record producers to create a universal request

Reduce the implementation time by configuring all catalog items or all record producers at a time for universal request creation.

Before you begin

Role required: admin

About this task

For catalog items, RITM should be registered as a service in Universal Request.

For record producers, the target table should be registered as a service in Universal Request.

For information about service configurations, see Service Configuration form.

Procedure

1. Navigate to sys_properties.list.
2. Click **New**.

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3. To configure all catalog items to create a universal request:

   a. On the form, fill in the fields.

   System Property form

Field	Description
Name	Unique identifier of the property. Specify *sn_uni_req.enable_ur_all_cat_items*.
Type	Type of the property. Specify **boolean**.
Value	Option to specify if all catalog items can be configured at a time to create a universal request. Possible values are **true** or **false**.

   b. Click **Submit**.

4. To configure all record producers to create a universal request:

   a. On the form, fill in the fields.

   System Property form

Field	Description
Name	Unique identifier of the property. Specify *sn_uni_req.enable_ur_all_rec_prod_items*.
Type	Type of the property. Specify **boolean**.
Value	Option to specify if all record producers can be configured at a time to create a universal request. Possible values are **true** or **false**.

   b. Click **Submit**.

Service Catalog Reference

Reference topics provide additional information about the lists and forms.

Service Catalog properties

The Service Catalog application contains properties used to configure various settings in the application.

To configure Service Catalog system properties, navigate to **Service Catalog** > **Catalog Administration** > **Properties**. The properties are categorized into the following sections.

- **Homepage**: Configure settings for the Service Catalog homepage, and control the behavior of the categories and the items displayed on the homepage.
- **Catalog Items**: Configure settings for catalog items and record producers.
- **Order Guides** > **General**: Configure settings for the order guide.
- **Order Guides** > **Scriptable Order Guides**: Configure settings for scriptable order guides.
- **Cart**: Control the behavior of the shopping cart and checkout screens.
- **Request Fulfillment**: Configure settings for request fulfillment processes.
- **Search**: Configure search settings for the Service Catalog homepage.

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- **Security**: Configure security settings for the Service Catalog.
- **Pricing**: Configure settings for the pricing engine and pricing display.
- **Portal**: Configure settings for catalog portal widgets.
- **Virtual Agent**: Configure settings for request submission in Virtual Agent.

  This section is visible only when you activate the Service Management Virtual Agent Topic Blocks
  plugin (com.glideapp.cs.sm_topic_blocks)
  .
- **Mobile**: Configure settings for Now Mobile.
- **Other**: Additional settings for the Service Catalog.

Service Catalog properties

Name	Description
Homepage	
Number of Catalog Items/Categories to preview in a section (*glide.sc.max_items*)	Number of catalog iter • **Type:** integer • **Default value:** 5
Show category descriptions in the category view page (*com.glide.servicecatalog.view_includes_category_descriptions*)	Show category descri • **Type:** yes | no • **Default value:** yes
In category view display subcategories in a panel (*glide.sc.use_sub_cat_section*)	In category view, displ • **Type:** true | false • **Default value:** true
Toggle whether the expand/collapse icon is rendered for category widgets on the service catalog homepage (*glide.sc.homepage.show.collapse*)	Toggle whether the ex widgets on the service • **Type:** true | false • **Default value:** false
When browsing a category use the pop-up icon to show item details (*glide.sc.cat_view_use_popup_for_details*)	When browsing for a c to the category or cata • **Type:** true | false • **Default value:** false
Number of catalog items to expand in browsing and search when not using pop-up icons to view details (*glide.sc.auto_expand*)	Number of catalog iter using pop-up icons to • **Type:** integer • **Default value:** 2

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Service Catalog properties (continued)

Name	Description
Show the additional categories section when viewing a catalog item (*glide.sc.show_additional_cats*)	Show the additional c • **Type:** true | false • **Default value:** true
Limit descriptions in category and item listings to two rows in the Mobile UI (*glide.sc.mobile.limit.description*)	Limit descriptions in t Classic Mobile UI: • **Type:** true | false • **Default value:** true
List of content types (comma-separated) to allow on the catalog homepage. Blank allows all content types. (*glide.sc.home.filter*)	List of content types (homepage. Blank indi
Name of placeholder picture for items that don't have a picture defined (*glide.sc.placeholder.image*)	Name of the placehol defined. Applicable or By default, two images **sc_placeholder_imag** with a custom image: **Default value:** sc_plac
Catalog Items	
Specifies the default behavior of record producer after record generation (*glide.sc.producer.redirect_url*)	Default redirect behav Possible values: • **Generated Task rec** the record producer • **Catalog Homepage** for the record produ Override this behavio the record producer o the record producer.
Enabling this makes sure that the attachments uploaded to the attachment variable are deleted from the system if and when they are replaced/deleted on the form (*glide.sc.variable.attachment.delete.v2*)	Automatically deletes you replace or delete variable.
List of class names for catalog items that can't be added to an existing request (*glide.sc.item.cannot_add_to_request*)	List of class names for request: • **Type:** string • **Default value:** sc_ca sc_cat_item_wizard
List of class names for catalog items that don’t use the default "Try It" UI action (*glide.sc.item.cannot_try_it*)	List of class names for action:

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Service Catalog properties (continued)

Name	Description
	• **Type:** string • **Default value:** sc_ca sc_cat_item_wizard,
List of class names for catalog items that don't generate a normal cart item (*glide.sc.item.not_normal_cart_item*)	List of class names for item: • **Type:** string • **Default value:** sc_ca sc_cat_item_wizard
Relationship tables which should be part of 'Copy Item' action. Table Name should be comma-separated (*glide.sc.item.copy.include_relationship*)	Specify the tables in w item are also copied w action: **Note:** Table names shou
Disables clickthrough via the info-icon on a reference variable. Set value to true to enable this functionality (*glide.sc.variable.reference.clickthrough*)	Disable clickthrough v value to true to enable
Order Guides	
General	
List of class names for catalog items that can't be included in an order guide (*glide.sc.item.order_guide_exclusion*)	Comma-separated list be included in an orde sc_cat_item_content.
Validate mandatory fields when switching tabs in 'Choose Options' section of Order Guides (*glide.sc.guide.tab.validate*)	Validate mandatory fie section of order guide • **Type:** true | false • **Default value:** true
Render order guide on cart preview and order status page (*glide.sc.render_order_guide_column*)	Render the order guid item is part of an orde If a user attempts to d confirmation message
On an order guide, reset cascading or assigned variable values on an item when a user goes back using the "describe needs" button (*glide.sc.reset_cascade*). **Note:** This property is supported in Platform only, not in the portal.	On an order guide, res user navigates by click
On an order guide, reset all variables when cascading variables or assigned variable values are reset on an item after a user goes back using the "describe needs" button (*glide.sc.reset_cascade_all*)	In an order guide, rese cascading values on a between the **Describe false**, only the values

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Service Catalog properties (continued)

Name	Description
Note: This property is supported in Platform only, not in the portal.	
Scriptable Order Guides	
During the processing of a scriptable order guide, create a failure record when the JSON payload is empty (*glide.sc.sog.empty_payload*)	If selected, creates a f during the processing
During the processing of a scriptable order guide, create a failure record when the order guide is inactive (*glide.sc.sog.inactive_order_guide*)	If selected, creates a f during the processing
During the processing of a scriptable order guide, create a failure record when the order guide sys_id is invalid (*glide.sc.sog.invalid_order_guide_id*)	If selected, creates a f invalid during the proc
During the processing of a scriptable order guide, create a failure record when there is a general JSON parsing error (*glide.sc.sog.json_parsing*)	If selected, creates a f parsing error during th
During the processing of a scriptable order guide, create a failure record when JSON parameters are missing (*glide.sc.sog.mandatory_json_parameters*)	If selected, creates a f during the processing
Cart	
Enable cloning requests during checkout. Deprecated by sc_layout; if sc_layout is enabled then this property is not used (*glide.sc.allow.checkout.clone*)	Enable cloning reques **Note:** This property is d
List of roles (comma-separated) that can use bulk ordering functionality. Blank means all users (*glide.sc.allow.clone.roles*)	Roles (comma-separa Blank value indicates
Show the 'Back to Catalog' button on the two-step checkout screen (*glide.sc.checkout.twostep.back*)	Show the **Back to Cat**
Use the two-step catalog checkout model (default false) (*glide.sc.checkout.twostep*)	Use the two-step cata **Default value:** false
Condition under which users may cancel a request (previous property must also be true). For example, current.opened_by == gs.getUserID() || current.caller_id == gs.getUserID() (*glide.sc.checkout.cancel.condition*)	Condition under whic **users the option to ca** be **True**.
Allow ess users the option to cancel their requests from the checkout screen. In conjunction with sc_layout feature, if either is set to true the cancel button becomes visible (*glide.sc.checkout.cancel*)	Enable Employee Self their requests from the
Use the two-step checkout model when placing a Catalog Order from a Wizard (default true) (*glide.expert.checkout.twostep*)	Use the two-step chec wizard: **Default value:** true
List of roles (comma-separated) that can update the "Requested for" widget in the service catalog. Blank means all users. If the user doesn't have privileges to change requested for, they will not have ability to get other user address details (*glide.sc.req_for.roles*)	List of users with the r here can request item specified, then the de *glide.sc.req_fo* about configuring the property, see Configu users.

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Service Catalog properties (continued)

Name	Description
	Controls access to the homepage. Users with another person. Users name only.
Ordering of matches for the "request for" service catalog widget. Choose fields in the sys_user table (*glide.sc.request_for.order_by*)	Ordering of matches f Choose fields in the u
Show the request item number for each line item on the checkout screen (default false). Deprecated by sc_layout; if sc_layout is enabled then this property is not used (*glide.sc.checkout.request.number*)	Show the request item screen: **Default value:** false **Note:** This property is d
Field name to use for the description column of the checkout form. If blank, the default (short_description) is used (*glide.sc.ess.description*)	Field name for the des the default is used: **Default value:** short_d
Additional columns for the "request for" service catalog widget. Choose fields in the sys_user table. Must be semicolon separated (*glide.sc.request_for.columns*)	Additional columns fo Choose fields in the u separated.
Automatically update the delivery address for catalog carts when the details of a users location changes (*glide.sc.auto.cart.address.reset*)	Automatically update user location details c If enabled, when char user has an active car enabled, the old addre • **Type:** true | false • **Default value:** false
When determining the address of a user prioritize the details on an associated location record over the details on the user record itself (*glide.sc.prioritise.user.location*)	If selected, when dete details on an associat record itself.
Determines whether 'Order Now' button exhibits new or old behavior. If this property is true, clicking "Order Now" button in the service catalog, only orders the item currently selected, any items saved in user's shopping cart is left untouched for future ordering. Old 'Order Now' feature is deprecated, 'Order Item' button is deprecated too (*glide.sc.enable_order_now*)	Determines whether t behavior. If this prope catalog only orders th shopping cart are left Now feature and the **C**
List of roles (comma-separated) that can use the quantity selector in the shopping cart. Blank means all users (*glide.sc.allow.quantity*)	List of roles (comma-s the shopping cart. Bla
Enable removal of inactive catalog items from cart (*glide.sc.remove_inactive_cat_items_from_cart*)	Enable removal of ina If enabled, automatica the shopping cart. Avo cart while active and a

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Service Catalog properties (continued)

Name	Description
	• **Type:** true | false • **Default value:** false
Use the sc_layout driven cart macros (default: true) (*glide.sc.use_cart_layouts*)	Use the sc_layout driv Activates the new cart of cart and checkout-r own the UI macros or • **Type:** true | false • **Default value:** true
Show tasks related to requests on the order status page (the screen you see in the service catalog after a successful order is placed) (*glide.sc.checkout.task.display*)	Show tasks related to that you see in the ser
Round all delivery plans > 1 day to the nearest day (true) or display the precise time (false) (*glide.sc.round.delivery.times*)	Round all delivery plan precise time (false).
Request Fulfillment	
Prevent changes to requested item quantity when approved (except for catalog_admin users) (*glide.sc.restrict.quantity.changes*)	Prevent changes to th catalog_admin users).
Show the current pending approver's name in the stage widget mouseover (*glide.sc.approval.hover*)	Show the current pend mouseover.
Service catalog tasks approval engine (*glide.approval_engine.sc_task*)	Service Catalog Tasks
Audit changes to service catalog variables (*glide.sc.audit.variables*)	Audit changes to Serv
Hide the border and background in variable editor ui (*glide.sc.hide_variable_editor_background*)	If selected, hides the b default value is false.
Use delivery task name instead of short_description for the delivery plan summarizer field. Default is false (uses the short_description) (*glide.sc.delivery_summary.name*)	Use the delivery task n delivery plan summari **Default value:** false (u
Render variables on a request item as they appear on the order panel, followed by the delivery plan variables (true), or merge the two based on their order values (false) (*glide.sc.variable.snapshot*)	Render variables on a followed by the delive on their order values (
Service Catalog Requests approval engine (*glide.approval_engine.sc_request*)	Service Catalog reque
Search	
List of class names for catalog items that don't have the search field displayed (*glide.sc.item.cannot_show_search*)	List of class names for displayed: • **Type:** string • **Default value:** sc_ca sc_cat_item_wizard

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Service Catalog properties (continued)

Name	Description
Allow empty service catalog searches (*glide.sc.search.allow_empty_search*)	If selected, an empty q query is performance-
List of roles (comma-separated) that can search the service catalog. Blank means all users (*glide.sc.can_search*)	List of roles (comma-s Blank means all users
Show breadcrumbs for the categories associated with items when they are displayed in browse and search listings (*glide.sc.show_listing_breadcrumbs*)	If selected, display bre items when they are d
Service catalog searches return items in inactive categories (*glide.sc.search.disabled_cats*)	Service Catalog searc Search results can inc as specified by the ac • **Type:** true | false • **Default value:** true
List of catalog sys_ids (comma-separated) that are excluded from catalog item search (*glide.sc.search.exclude_catalogs*)	List of catalog sys_ids catalog item search.
Number of service catalog matches returned for global searches (*glide.sc.search.rowcount*)	Number of the service Limits the number of r search performance.
Specify whether search suggestions should be enabled (*glide.sc.search.suggestions*)	Specify whether searc • **Type:** true | false • **Default value:** true
Security	
Use "User Criteria" to define access to catalog items and categories (*glide.sc.use_user_criteria*)	Use user criteria to de Entitlements are not h • **Type:** true | false • **Default value:** true
Enable both "User Criteria" and "Entitlement" related lists for catalog items and categories when migrating from entitlements (*glide.sc.user_criteria_migration*)	Enable User Criteria re migrating from entitler Set to **true** to display t switch to user criteria • **Type:** true | false • **Default value:** false
List of roles (comma-separated) that can override normal entitlement checking inside the catalog. A role of "itil" means that the itil role can order any catalog item, even one protected by entitlement restrictions (*glide.sc.entitlement.override*)	List of roles (comma-s checking inside the ca order any catalog item
List of roles (comma-separated) that override entitlements so that they can view any category within the service catalog (*glide.sc.category.canview.override*)	List of roles (comma-s viewing of any catego

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Service Catalog properties (continued)

Name	Description
	Default value: admin a
Pricing	
Append pricing information to option labels (*glide.sc.enhance.labels*)	Append pricing inform Service Portal.
List of class names for catalog items that don't show the price in listings (*glide.sc.item.cannot_show_price*)	List of class names fo listings.
When to show prices and sub-totals on the service catalog cart (overrides sc_layout record settings) (*glide.sc.price.display*)	When to show prices a
When set to true then the two script includes CatalogPriceCalculator and CatalogRecurringPriceCalculator are used generate prices (enabling custom functionality) (*glide.sc.use_custom_pricegenerator*)	When set to **true**, the and *CatalogRecur* prices, which enables To use your own price edit the **calcPrice** met **CatalogRecurringPric** price calculation algor • **Type:** yes | no • **Default value:** no
Portal	
Show order confirmation pop-up in checkout process (*glide.sc.sp.twostep*)	If selected, displays th checkout process inS
Use Cart V2 widget in Header Menu widget (*glide.sc.portal.use_cart_v2_header*)	If selected, the Cart V cart-v2)) widget is ena Portal.
Virtual Agent This section is visible only when you activate the Service Management Virtual Agent Topic Blocks plugin (com.glideapp.cs.sm_topic_blocks) .	
Specifies the upper limit for the number of questions beyond which the item doesn't support conversational requests, default value of the property is 10. (*glide.sc.conversational.request.question.limit*)	Maximum number of q request submission in
Specifies the upper limit for the number of questions beyond which the item doesn't support conversational requests, default value of the property is 500. (*sn_now_assist_cr.llm.conversational.request.question.limit*)	Maximum number of q request submission in LLM model type.
Mobile	
Catalog category sort option in Now Mobile (*glide.sc.mobile.category.order_by*)	Sort option for catego • Title: Categories are sorted alphabeticall • Order: Categories a

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Service Catalog properties (continued)

Name	Description
Include 'Desktop only' Items in Now Mobile (*glide.sc.mobile.include_desktop_only_items*)	Option to include the only in Now Mobile.
Catalog item classes not available in Now Mobile (comma separated list) (*glide.sc.mobile.item_class_not_supported*)	Catalog item types to sc_cat_item_con
Experience for items not available in Now Mobile (*glide.sc.mobile.unsupported_discover*)	Option to define the n Possible options: • Discoverable-show Item is discoverable viewable. • Not discoverable-do Item is neither disco viewable. **Note:** • If AI Search is e applicable. • This property is properties are a ○ Include 'Desk (*glide.sc* ○ Catalog item Now Mobile ((*glide.sc*
Primary color for buttons in the catalog request experience in Now Mobile (*glide.sc.mobile.primary_color*). If Next Experience is turned on, the property will be ignored.	Color for buttons in th
Other	
Log all client-side actions on variable (*glide.sc.log.variable_actions*)	If set to **true**, captures window: • **Type:** true | false • **Default value:** false
Use links for breadcrumbs rendered in service catalog pages accessed via a CMS site (*glide.sc.use_breadcrumb_links.cms*)	Use links for breadcru accessed via a CMS s Enables users with the choose whether servi without links for greate • **Type:** true | false • **Default value:** false

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Service Catalog properties (continued)

Name	Description
Enable the ui policies related to variable set to be run first (*glide.sc.ui_policy.variable_set_run_first*)	Enable the UI policies If enabled, UI policies policies on items: • **Type:** true | false • **Default value:** false
The maximum number of orphan sc_item_option records to delete when any sc_req_item record is deleted (*sc_orphan_item_option_delete_limit*)	Maximum number of any sc_req_item reco

Installed with Service Catalog

Several types of components are installed with the Service Catalog.

Script includes installed with Service Catalog

Script includes are added with activation of Service Catalog.

Service Catalog adds the following script includes.

Script include	Description
DemoSCCreateItem	Demonstrates the use of service catalog scoped API.

Domain separation and Service Catalog

Domain separation is supported in Service Catalog. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Activation information

You should activate the Service Catalog - Domain Separation plugin (com.glideapp.servicecatalog.domain_separation) to enable domain separation for Service Catalog. For information on how you can request for the plugin activation, see Request for domain separation in Service Catalog.

This plugin should only be activated if there is a need for the following scenarios:

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- Isolate items to requesters in a specific domain.
- Make items unavailable for request in any other domain irrespective of the domain hierarchy.

If Service Catalog has already been domain separated as a custom solution, activating this plugin may override the existing behavior to enforce the plugin-specific isolation.

How domain separation works in Service Catalog

Service providers supporting multiple customers in a single ServiceNow instance can ensure data privacy across domains using domain separation. Service providers can ensure that items created or published in a specific domain can only be requested by users in that domain without adding additional user criteria to the individual catalog items.

In Service Catalog, catalog items (catalog items, record producers, content items, and order guides) are domain-separated as data. Catalogs, categories, and variables are not domain-separated, and belong to the global domain. Also, items that need to be shared across multiple domains must be published in the global domain and restricted by user criteria.

Domain separation in Service Catalog is applicable to all requester views in the ServiceNow AI Platform, Service Portal, Agent Workspace, mobile application, as well as to all API calls requesting for items.

Domain-separated tables

The **Domain** (sys_domain) and **Domain Path** (sys_domain_path) columns are added to the following tables that are domain-separated:

- sc_cat_item
- sc_item_option
- sc_multi_row_question_answer
- question_answer

Effective domain for a user

For users with visibility to a single domain, the effective domain is the user's domain. For users with visibility to multiple domains, the effective domain is the domain selected in the domain picker.

Visibility of catalog items - Item creation and maintenance

A catalog item can be created or published in any domain in the hierarchy. For information on creating a catalog item, see Create or edit a catalog item.The item is created in the effective domain of the user. For information on enabling the domain picker, see Enable domain selection menus in Core UI. Once the item is created in a specific domain, all future edits to the item are done in that domain itself.

If a catalog item is published using Item Designer, the domain of the item is the domain selected in the domain picker while publishing the item. Once the item is published, it can only be modified and re-published in the domain it was originally published in.

Catalog items are domain separated as data. Only for maintenance and administration, the visibility of the catalog items follows the data domain hierarchy rules. For information on domain separation hierarchies, see Domain separation hierarchies.

User criteria associated with a catalog item must be visible in the domain of the catalog item. If not visible, catalog item is considered to be not associated with that user criteria.

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Visibility of catalog items - Item request flow

The catalog item created in a specific domain is available in the browse, search, and request experience only in that domain and not available in the peer domains, child domains, and parent domains irrespective of the hierarchy and visibility of the domains. So, requesters can only request for items in their domain as well as in the global domain.

For users with access to multiple domains (for example, IT fulfiller), the items are available for request based on the domain selected in the domain picker. To view or request an item of a specific domain, the user should switch to that domain. For information on enabling the domain picker, see Enable domain selection menus in Core UI.

When a requester submits a request using an order guide which has items from multiple domains, only the items in the effective domain and the global domain are ordered.

The target records such as requests, requested items, or records created by record producers are created in the effective domain.

Request fulfilment flow and reporting for a domain-separated catalog item

The target records such as requests, requested items, or records created by record producers can be accessed by a fulfiller who has visibility to the domain that the record has been generated in. For information on visibility in domain hierarchies, see Visibility domains and Contains domains. Even when the fulfiller modifies the requested item from a domain other than the requested item's domain, the modifications are recorded in the target record's domain. Since the target records are separated as data, the reports retrieve data based on the effective domain of the user requesting the report.

Request flow by a fulfiller from a different domain

When a fulfiller creates a request from a parent record such as an incident in Agent Workspace or in ServiceNow AI Platform, the fulfiller can only request for an item from the parent record's domain or from the global domain. Also, the corresponding target records are created in the parent record's domain.

Note:
Items from multiple domains cannot be added to the cart.

Catalog client scripts and catalog UI policies

Since the catalog client scripts and catalog UI policies are domain-separated as processes, scripts and policies in the parent domain can be overridden in the child domains. However, these scripts and policies are applicable based on the domain of the catalog item or the domain of the target record.

For example, consider that A is the parent domain and B is its child domain. A catalog item in domain B is associated with a catalog client script defined in domain A. If this catalog client script is overridden in the child domain B, the overridden script in domain B is applicable while fulfilling the requested item in domain B. Even when a fulfiller from the parent domain A fulfills the requested item in the child domain B, the overridden script in domain B is applicable.

Note:
It is recommended to not override catalog client scripts and catalog UI policies.

Catalog builder

An item can only be edited in the domain that it has been created. Catalog UI policies and actions added in catalog builder are created in the same domain as that of the item.

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Related topics

Domain separation for service providers

Request for domain separation in Service Catalog

Enable domain separation in Service Catalog by requesting for the activation of the Service Catalog - Domain Separation plugin (com.glideapp.servicecatalog.domain_separation).

Before you begin

Role required: admin

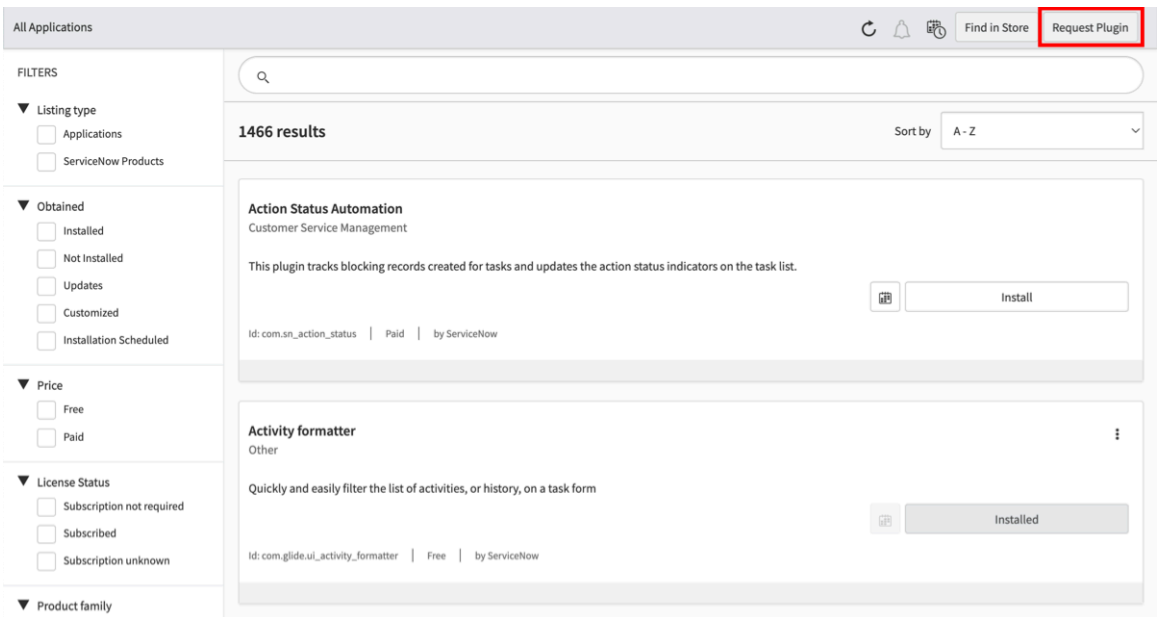
About this task

There are two ways to request a plugin:

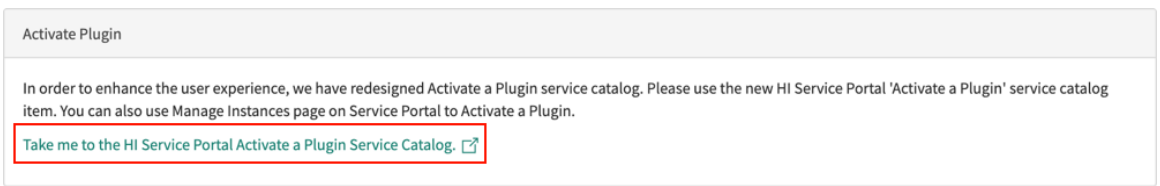
- Access the Now Support Service Catalog directly by selecting **All** > **Service Catalog** > **Activate Plugin** on Now Support.
- Access the Now Support Service Catalog through the All Applications page on your instance by following these steps.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the **Activate Plugin** form on Now Support.



3. On Now Support, select the link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the **Activate Plugin** form, provide the following information.

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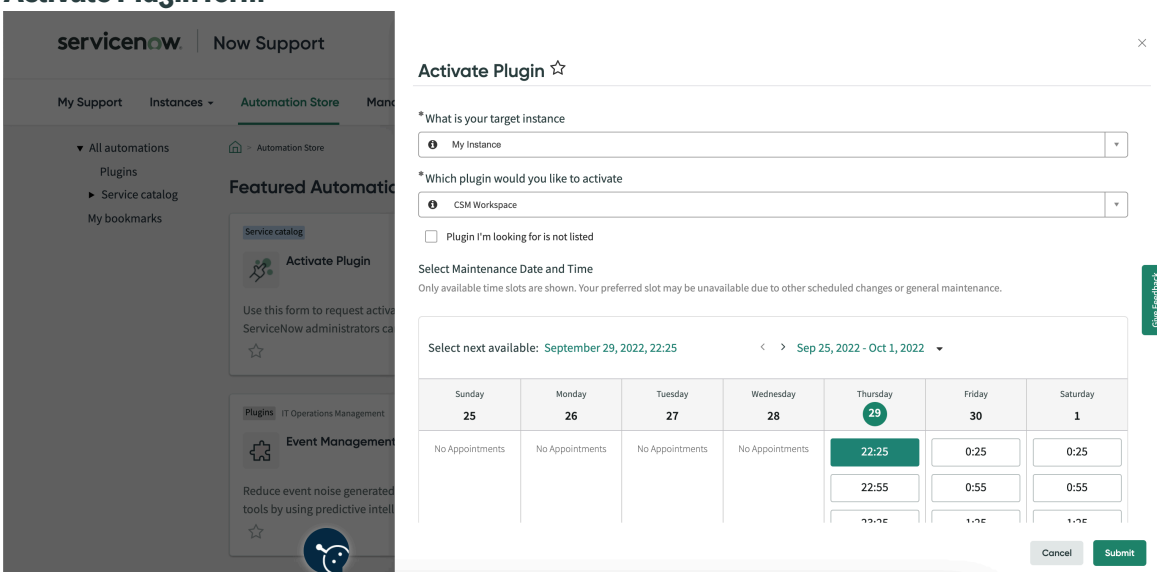
Activate Plugin form

Field	Description
What is your target instance	Instance on which to activate the plugin.
Which plugin would you like to activate	Name of the plugin to activate. **Note:** If the system does not list the plugin you want or if you are activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	The date and time to activate the plugin. **Note:** Plugins are activated in two batches, once in the morning and once in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.

Example

For example, see the following form to activate the CSM Workspace plugin on an instance named My Instance.

Activate Plugin form



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7. Select **Submit**.
   For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

Sample ATF tests for Service Catalog in Service Portal

Validate the continued functionality of Service Catalog after any configuration change such as an upgrade or after developing an application. All test suites and tests should pass on a default implementation. To validate a custom implementation, copy the automated tests and configure them for your customizations.

Service Catalog sample tests require activating the Service Catalog - ATF Tests plugin (com.glideapp.servicecatalog.atf.test) along with the demo data. To run these tests using a suite, follow the procedure described in Run an automated test suite by selecting the **Service Catalog - ATF Tests** test suite. These sample tests are dependent on the demo data items.

Service Catalog Tests test suite

Test	Description
Ordering an item with a multi-row variable set (SP)	Validate ordering an item in Service Portal that needs data from a multi-row variable set
Ordering catalog items using an Order Guide (SP)	Validate ordering an item from an order guide in Service Portal
Request a catalog item (SP)	Validate requesting a catalog in item in Service Portal
Search for items, add to cart and checkout (SP)	Validate using the cart in Service Portal
Submitting requests using a Record Producer (SP)	Validate using a record producer in Service Portal
Viewing and editing catalog item variables in the Catalog Task page	Validate catalog item variables from a catalog task
Viewing and editing catalog item variables in the Requested Item page	Validate catalog item variables from a requested item
Add comment on catalog item(s) request created by user	Add comments on a ticket page for a requested item or incident
Approving requests on different catalog item ordered from end-users	Approving a request for catalog items
Catalog item(s) ordering from multiple catalogs	Order catalog items from multiple catalogs
Filter for recent records from My Request filter	Filter for recent open and closed records from the **My Requests** menu
Ordering catalog item(s) from saved bundle	Order catalog items from a saved bundle
Validate contents of 'My Recent Items'	Validate contents of the My Recent Items widget
Validating Regex for Variables	Validate variables using a regular expression
Validate Requested For variable flow for Cart Checkout	Validate the Requested For variable flows for cart checkout

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Service Catalog Tests test suite (continued)

Test	Description
Validate Requested For variable flow for Order Guide	Validate the Requested For variable flows for an order guide
Validate Requested For variable flow with Catalog Item access	Validate the Requested For variable flows based on the catalog item access

Variables to collect data for record producer fields

Use variables to collect data for record producer fields.

You can use the following variable types to collect data for the corresponding record producer fields.

Variables for record producer fields

Field type	Recommended variable type
True/False	Yes/No
Reference	Reference
Date or Due Date	Date
Date/Time	Date/Time
Choice or any field with an associated choice list	Select Box
Email address	Email
URL	URL
HTML	HTML
List or UI Action List	List Collector
String with length greater than 256	Multi-Line Text
String, Integer, Decimal, Floating Point Number	Single-Line Text
File Attachment	Attachment
All other field types	Multi-Line Text

Note:

- If the record producer variable is mapped to an encrypted field of another table, then this variable value is not stored in Question Answer [question_answer] table. So, it is also not available in the variable editor of the target record.
- If the record producer variable is masked and encrypted, and also mapped to an encrypted field of another table:
  - The variable value is not stored in Question Answer [question_answer] table.
  - The decrypted value of the variable is copied to the encrypted field of the target record.

Values Returned

When you construct a record producer, be aware of the return value.

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Most of these field types return a string. However, there are some exceptions. For example, a **Reference** value returns the `sys_id` of the target object, and a **List** value returns a comma-separated list of `sys_ids`.

Example 1: For a **List** value, return an array which can be iterated to retrieve the individual values submitted by your user:

```
var sys_id_string  = producer.glide_list_field;
var sys_id_list = sys_id_string.split(',');
```

Example 2: For a **Date** or **Date/Time** value, return a date which GlideDate can evaluate.

```
var glideDateTime  = new GlideDateTime(producer.date_field);
```

Service catalog variables

Service catalog variables capture and pass on information about choices a customer makes when ordering a catalog item. Variables help define the structure of a catalog item form that is displayed to the customer.

For example, you can define a variable called **Memory** to provide users with memory options at an extra cost for a PC catalog item. An Apple iPhone catalog item can use a variable called **Color** that allows customers to select the color when they order the phone from the catalog. You can define some variables to affect an item price, depending on the choices made.

Service Catalog provides several types of variables, which are also referred to as questions. Variables can be stored, accessed from multiple places, and passed between tasks in a process when fulfilling a request. They can be displayed on the Requested Item and Catalog Task forms after an item has been ordered.

You can define service catalog variables with the catalog_admin role.

Related topics

- Scriptable service catalog variables
- Use service catalog variables in a report – Report Designer

Types of service catalog variables

Variables allow you to specify questions for a catalog item. Several types of service catalog variables are provided. Some variable types accept variable attributes.

See the following sections for more details on each variable type. For details on creating a variable, see Create a service catalog variable. You can also provide help text for any service catalog variable. For information on defining help information, see Define help information for a service catalog variable.

Support in various channels

Service Catalog variables are supported in various channels. For information on their availability, see Variable support in various channels.

Attachment

When submitting a catalog item request, this variable lets you upload an attachment for a question of the item. After you upload the attachment, you can also download, update, and delete it. Even when fulfilling the request, you can download, update, and delete the attachment in a requested item or catalog task. You can specify restrictions for file size and extensions using the *max_file_size* and *allowed_extensions* variable attributes. For information on these variable attributes, see Service Catalog variable attributes.

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Important:

- You should specify only an integer value for the following:
  - The `max_file_size` variable attribute
  - The *`glide.sc.variable.attachment.default_max_size`* system property (catalog-level). The default value is 20.
- If the `max_file_size` variable attribute is not specified, the *`glide.sc.variable.attachment.default_max_size`* system property value is considered as the upper limit for the attachment file size.
- Irrespective of the file size allowed in the variable, the attachment file size cannot exceed the size specified in *`com.glide.attachment.max_size`* system property, which is applicable for attachments across ServiceNow AI Platform.
- The *`g_form.setValue()`* API is supported in catalog client scripts.

Note:
When you edit an attachment, the existing attachment is removed and a new attachment is uploaded.

When you upload an attachment to this variable, an entry is created in the Attachment [sys_attachment] table. The variable is not updated until you submit the item request, add it to the cart, or save the record while editing it (in fulfiller flows). If you delete or update the attachment before submitting the corresponding catalog item, the entry in the Attachment [sys_attachment] table is cleared.

The attachment uploaded for this variable is copied in the following scenarios:

- In an order guide, when the variable is cascaded to a catalog item in the rule base

  Important:
  The individual variable attributes are not honored for the catalog items in the rule base. For example, let us consider that a variable in the **Describe Needs** section allows a .pdf attachment and the variable of a catalog item in the rule base allows a .txt attachment. When you upload an attachment of .pdf type for a variable in the **Describe Needs** section, it is initially cascaded to the variable in the catalog item as well and the variable attributes specified in the catalog item are not honored. However, if you delete this initially cascaded attachment from an individual item and try to upload a new attachment, then the individual variable attributes of the catalog item are honored.

- In a record producer, when the variable is mapped to a task table field. This variable can be mapped only to the File Attachment field type of a task table.

Important:
After an attachment is copied, the changes to the individual attachments are independent. For example, any change to an attachment in the order guide does not impact the same attachment cascaded to the catalog item in the rule base.

Warning:
Since the attachments are copied, a larger size can lead to performance issues.

If the system-wide anti-virus check is enabled, the anti-virus check is performed on the attachment when you:

- Submit a request for the corresponding catalog item
- Add the catalog item to the cart or wish list

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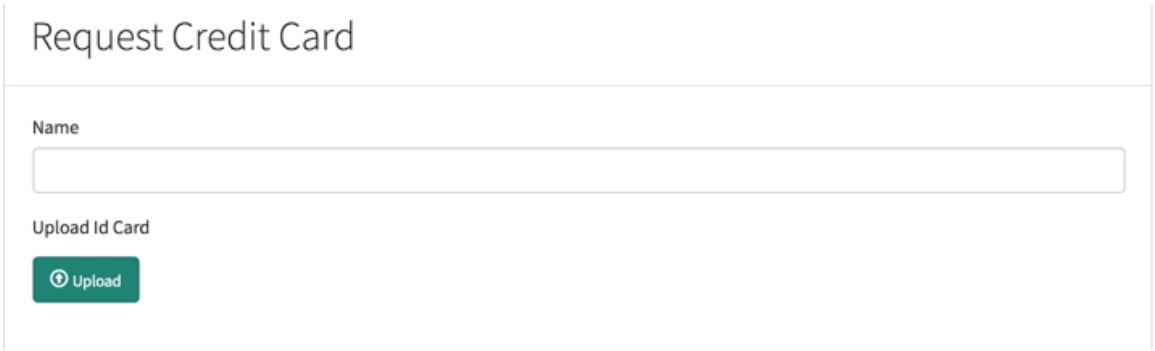
Note:

- This variable is not supported in a multi-row variable set.
- This variable is supported in flows and workflows.
- This variable is available in condition builder
- For this variable, item variable assignment is not supported in order guide.

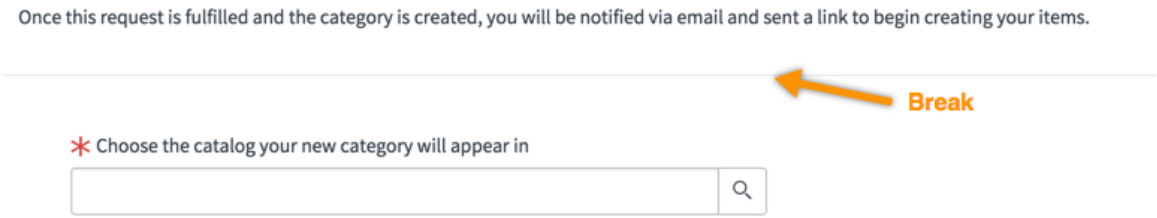
Attachment variable



Break

The break variable displays a horizontal line across the form. This line is a formatting element that does not collect data.

Example: break variable



Check box

The check box variable lets you enable and disable options by selecting and clearing it.

To make a check box mandatory, select the **Selection Required** option when you create the variable. For example, use this option to require users to select the **I agree** check box for an agreement form. If users try to submit the agreement form without selecting the check box, an alert message is displayed to tell users that they must select the check box.

A group of check box variables is created when you create consecutive check box variables. These check box variables are sorted by their order within the group. If you want to define a custom label for the group of check boxes, create a label variable at the start of the consecutive check box variables. The label is then considered a part of this group and acts a label of the group. If there is no custom label, check boxes are grouped under an **Options** label by the application.

In a group of check box variables:

- If any check box variable in the group is mandatory, the entire group becomes mandatory irrespective of the visibility of the mandatory check box variable. An asterisk (*) is then displayed next to the group label and you must select at least one of these check boxes.
- Hiding the label hides the entire group.

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- If all other check box variables of a mandatory check box group are hidden and not selected, the following scenarios are applicable:
  - The group remains mandatory as long as there is one check box in the group that is visible and not selected.
  - The last check box of this group cannot be hidden if it is not selected.

In Service Portal, to make a group of check box variables mandatory, set at least one of the check box variables as mandatory. While defining the label for a group of check boxes, setting a label mandatory does not make the group of check box variables mandatory.

In catalog builder, the following scenarios are applicable:

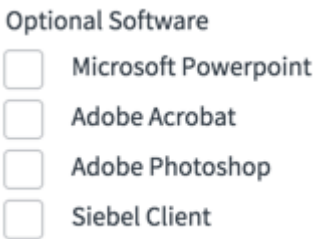
- If there are two consecutive check boxes, then a virtual container is created for a group of check boxes. Only check box variable types can be added inside the group
- Even if a check box variable is added immediately after a group of check boxes, it is automatically added to the group.

Under the **Type Specifications** tab, you can specify the price in different currency types. Also, you can configure the price in the following pricing models:

- Calculated
- Fixed
- Multiple

For information on the pricing models, see Price fields .

Example: check box variable



Container start, container split, and container end

The container start, container split, and container end variables define a layout for a container that can hold more variables. Use the container start and container end variables to define the start and end points of a container layout. The container end must be used along with the container start to close a container.

A container layout can be split into two or three columns using the container split variable. By default, the split is calculated at the 50% mark.

A container is similar to a variable set. Unlike a variable set, containers can be used anywhere, including inside a variable set. Containers can also be nested inside each other.

For more help with selecting the appropriate container type, see the Determining if you are using the correct container variable [KB0539982] article in the HI Knowledge Base.

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Note:

- The container variables are not yet supported on mobile devices.
- Container start, container split, and container end variables are supported in Service Portal. However, if the settings are done on the top-level container, a maximum of two-column layouts can be achieved.
- Variable sets are also considered as containers. So, a container start variable with a two-column layout under a variable set is not supported in Service Portal.

To reproduce the container shown in the following figure, enter the following settings when creating a container start variable:

- Select a **Layout** with *2 Columns Wide, alternating sides*.
- Select the **Display title** check box to use a collapsible title bar.

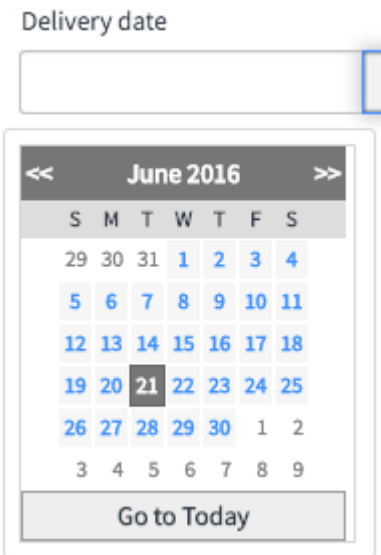
Example: container variable



Date

The date variable creates a widget with a field and calendar to select a date.

Example: date variable



Date and time

The date and time variable creates a widget with a calendar and fields to select a date and time. The time value is stored in Greenwich Mean Time (GMT) and displayed in your time zone.

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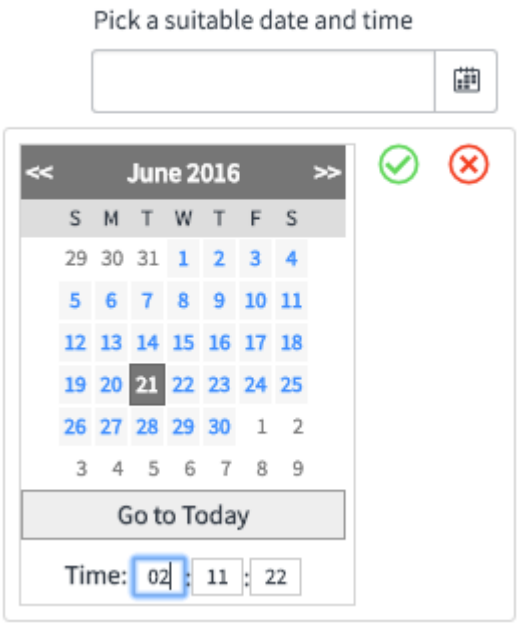
Example: date and time variable



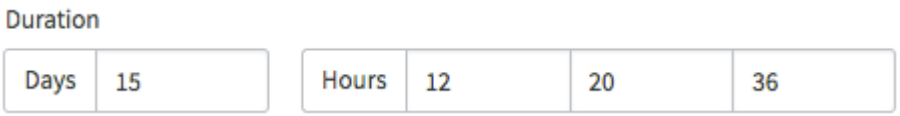
Duration

Use the duration variable to specify the duration for which a catalog item is available.

For attributes supported by this variable, see variable attributes.

Note:
Enter the duration in the DD HH:MM:SS format when setting the default value of the variable, and specifying in the g_form.getValue() and g_form.setValue() functions.

Example: duration variable



Email

The email variable creates a widget to enter and select an email address. The variable accepts only valid email expressions containing @ and domain information.

Note:
Variable validation is not supported in Service Portal.

Example: email variable



HTML

The HTML variable lets you provide content with advanced formatting, including images, for a catalog item.

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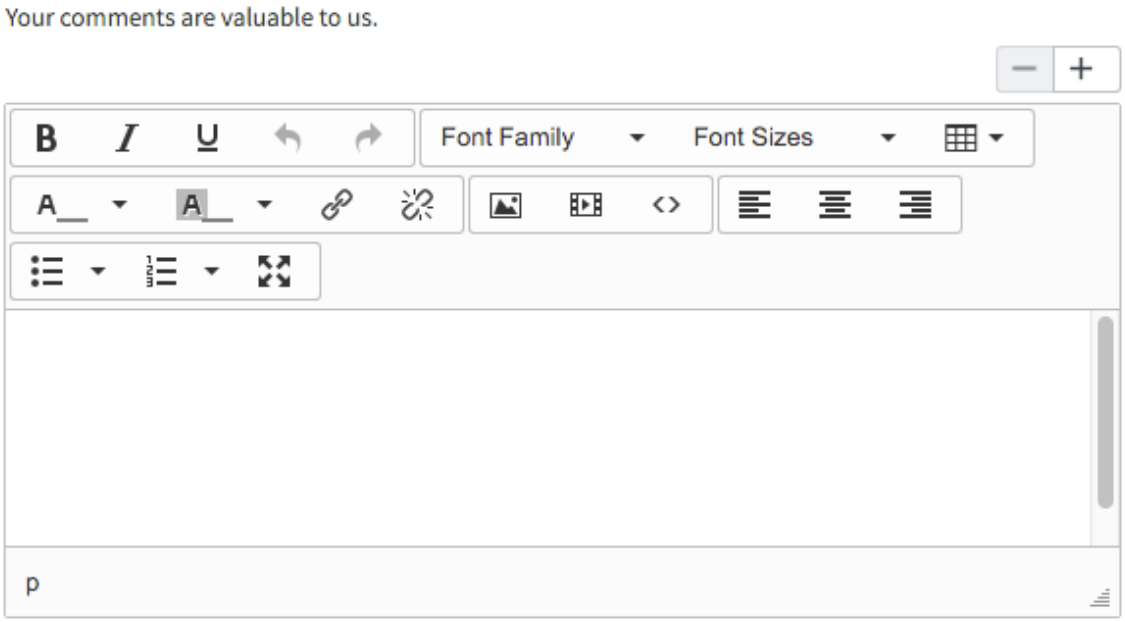
Use the variable to create fields for user input. You can also use the variable for reusable content when put into a variable set, such as terms and conditions.

The variable is available in two modes: edit and read-only. In edit mode, a toolbar is available, and links do not work. In read-only mode, the toolbar is disabled, and links work. To switch between modes, use entitlements or create a UI policy to set the HTML field to read-only mode.

Note:
HTML variables are not supported for display on the shopping cart summary or approval summary screens.

Example: HTML variable



IP Address

Use the IP address variable to specify the IPv4 and IPv6 data for a catalog item. Under the **Validation Scripts** submodule, a validation script type associated with this variable is available.

Note:

- Variable validation is not supported in Service Portal.
- When you set the default value for the **IP Address** variable, or specify its value in the g_form.getValue() and g_form.setValue() functions, the delimiter is (.).

Example: IP address variable



Label

The label variable displays a label across the form. Labels are formatting elements. No data is collected.

You can use labels to arrange questions into sections. You can also use labels for questions with multiple options. For example, label check boxes for the different options for a question.

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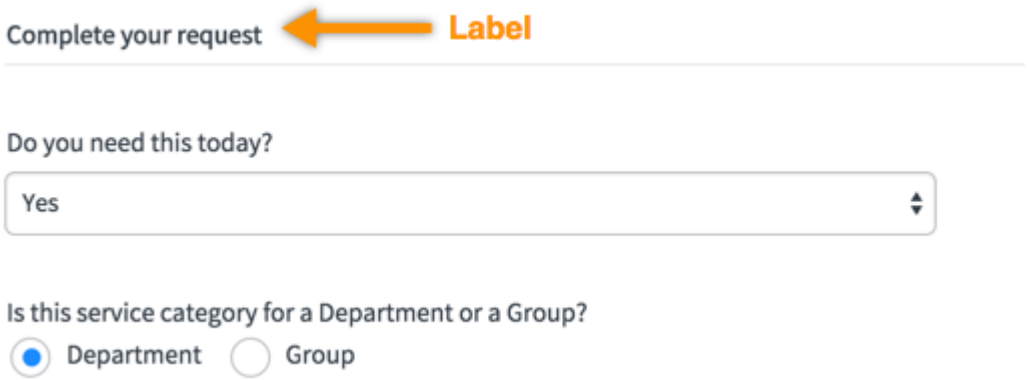
You cannot set a Label variable as mandatory. However, you can make mandatory, a group of check box variables preceded by a Label variable.

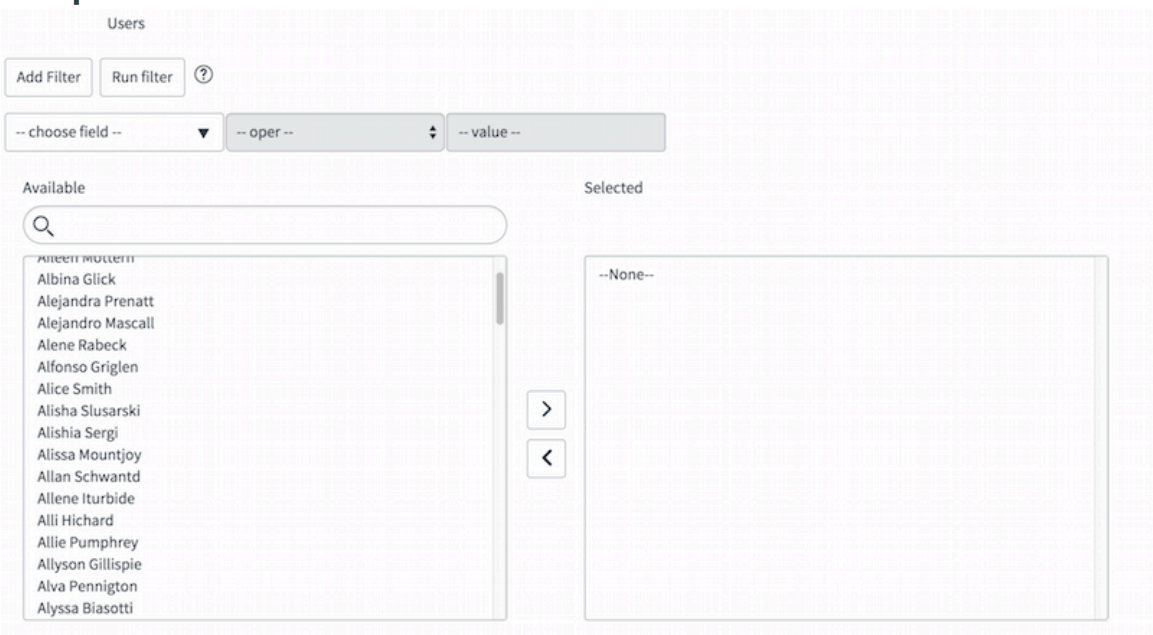
Example: label variable



List collector

The list collector variable creates an interface that lets you select and add multiple records from a table. For attributes supported by this variable, see variable attributes.

Example: list collector variable



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Note:

- The Reference Qualifier and glide_list attribute applies to releases from Helsinki onward only. The attribute does not apply to Geneva.
- You can set a value for this variable using the `g_form.setValue()` function in a catalog client script.
- When the glide_list attribute is not true, you can only set the value that is visible in the **Available** list using the `g_form.setValue()` function. This functionality is not applicable when the `setValue()` function is called onLoad.
- Table with large data causes performance issues when loading the page. Use reference qualifiers to reduce data or use the glide_list attribute.
- The values in the referenced table do not appear if the user is not logged in.
- The list collector displays a maximum of 100 items in a list. After moving items to the **Selected** list, you can click **Run Filter** to refresh the **Available** list. This action will add more available items to the list, to a maximum of 100 items.

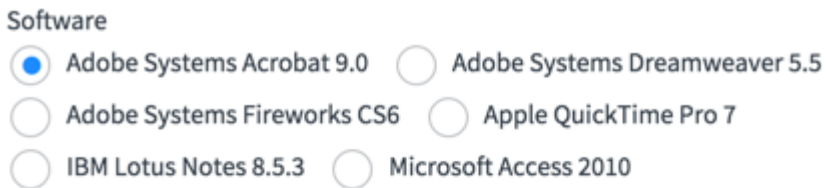
Lookup multiple choice

The lookup multiple choice variable creates radio buttons using data from a table. Its functionality is similar to the lookup select box variable, which creates a choice list from queried data. For attributes supported by this variable, see variable attributes.

Note:

- Table with large data causes performance issues when loading the page. Use reference qualifiers to reduce data or use the reference type variable.
- You cannot add more than 10,000 choices.

Example: lookup multiple choice variable





Lookup select box

The lookup select box variable creates a choice list using data queried from a table. Its functionality is similar to the lookup multiple choice variable, which creates radio buttons from queried data. For attributes supported by this variable, see variable attributes.

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To create the lookup select box, enter the following values when creating the variable:

- **Lookup from table**: `Incident [incident]`
- **Lookup value field**: `Sys ID`
- **Lookup label field**: `number, category, priority`
- **Reference qual**: `caller_id=javascript:gs.getUserID()^active=true`

Note:

- Table with large data causes performance issues when loading the page. Use reference qualifiers to reduce data or use the reference type variable.
- You cannot add more than 10,000 choices.

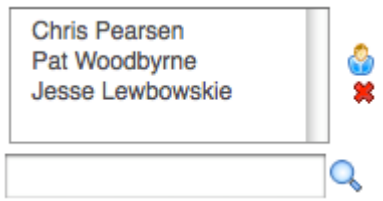
Custom

This variable inserts a UI macro into the catalog item.

UI macros in the service catalog do not support the following glide_list functions: clickthrough, slushbucket editing, and email field.

- Use phase one Jelly only for any UI macros added as variables. Phase two Jelly within the macro is not processed and appears on the page as standard content.
- This variable is not yet supported on Classic Mobile devices.
- This variable is supported in Service Portal through widgets. Create a widget with the same functionality as that of a macro and link the widget with the variable.

Example: Custom variable

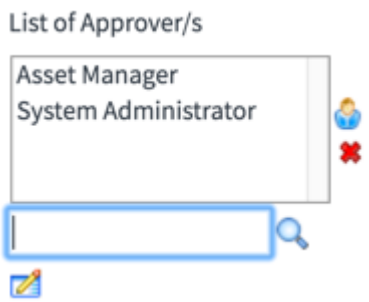


Custom with label

This variable inserts a UI macro with a label.

- This variable is not yet supported on Classic Mobile devices.
- This variable is supported in Service Portal through widgets. Create a widget with the same functionality as that of a macro with label, and link it with the variable.

Example: Custom with label variable



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Masked

The masked variable inserts a field that masks the text entered. Each character entered is displayed as an asterisk (*). Use this variable to ask users for sensitive or confidential data such as passwords.

By selecting the **Use encryption** check box, you can configure the variable to encrypt its value using various encryption algorithms before storing in the database. These values can only be decrypted by using now_GR.variables.var_name.getDecryptedValue() on RITM, Catalog Task, or any task extension record created using a record producer.

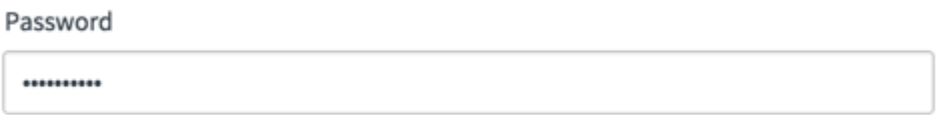
Note:
By default, the **Use encryption** field is set to true to ensure secure storage of information.

On the variable editor, you can also decrypt and encrypt the values of a masked variable using the **Show** and **Hide** buttons. These buttons are not available for a fulfiller (itil) without the catalog_view_masked role. You can only view the value that you specified while requesting.

Actions on an encrypted variable

Action	Roles		
	Requester	Fulfiller with the catalog_view_masked role	Fulfiller without the catalog_view_masked role
View or hide the encrypted value on catalog forms	Yes	Not applicable	Not applicable
Edit the encrypted value on catalog forms	Yes	Not applicable	Not applicable
View or hide the encrypted value on the variable editor	Yes	Yes	No
Edit the encrypted value on the variable editor	Yes **Note:** If the masked variable is read-only on the variable editor, the variable value is not editable	Yes **Note:** If the masked variable is read-only on the variable editor, the variable value is not editable	No

Example: masked variable



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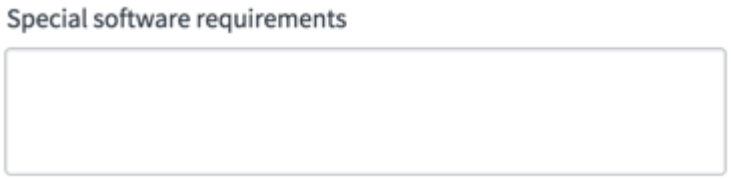
Multi-line text

The multi-line text variable creates a field that lets you enter multiple lines of text.

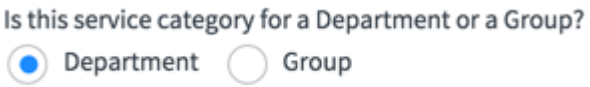
Example: multi-line text variable



Multiple choice

The multiple choice variable creates radio buttons for question choices.

Example: multiple choice variable



Numeric scale

The numeric scale variable creates a set of radio buttons for a range of options, like a Likert scale.

Example: numeric scale variable



Reference

A reference variable references a record in another table. For example, a variable named point_of_contact references the User [sys_user] table. For attributes supported by this variable, see variable attributes.

Keep the following information in mind when you create a reference variable:

- Reference variables use the auto-complete feature . To ensure that users have enough information to make the selection, configure the reference lookup list .
- Reference variables store the sys_id of the selected record (like reference fields). To use the display value in a script, use the same methods as for a reference field.

```
current.variables.<variable name>.getDisplayValue()
```

Example: reference variable



Requested For

Before submitting a catalog item request, this variable helps you specify who this request can be submitted for. You should specify this information while answering catalog item questions.

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Important:

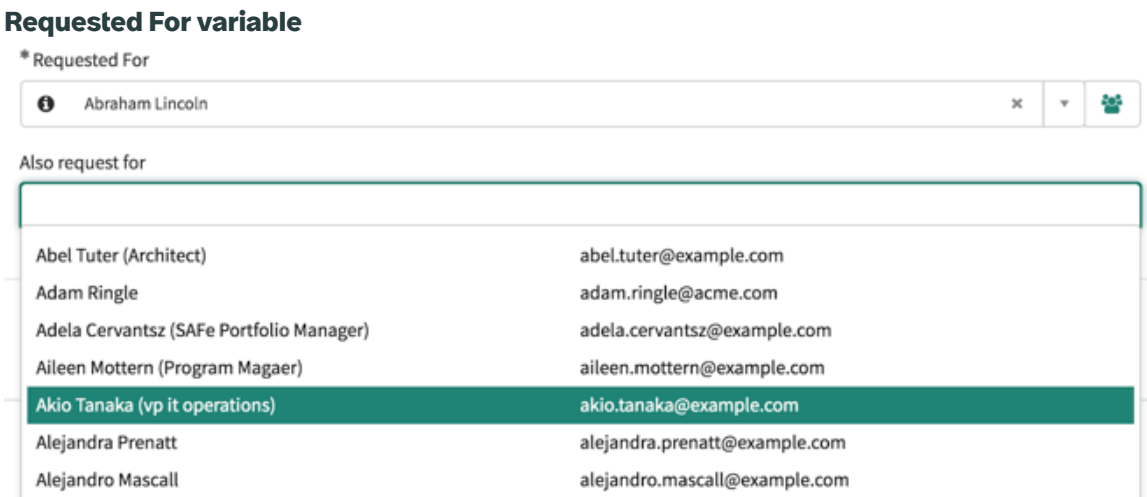
- You can only specify users from the User [sys_user] table.
- If you don't specify the default value for this variable, the current logged-in user requesting the item is considered as the default Requested For variable value.
- You can submit the request for a user based on access to a catalog item. The **Access Type** field of the catalog item can be used to specify if a request can be submitted for a user who does not have access to the catalog item.
- For this variable, item variable assignment is not supported in the rule base of an order guide. If the order guide contains the Requested For variable, the value would be cascaded to the equivalent variable of items in the rule base as read-only.

Using the **Enable also request for** field of the Requested For variable, you can request a catalog item for different users under one request.

For information about delegated request experience, see Delegated request experience.

Important:

- You can add this variable to a catalog item or variable set. However, when submitting the request, a catalog item can have only one Requested For variable.
- You can add only one Requested For variable for a variable set.
- This variable is not supported in a multi-row variable set.
- After the request is submitted, this variable value is visible in the variable editor and variable summarizer.



Rich Text Label

This variable displays a formatted label on a catalog item form. In the TinyMCE rich text editor, you can format the label and add images or links. This variable supports the HTML tags.

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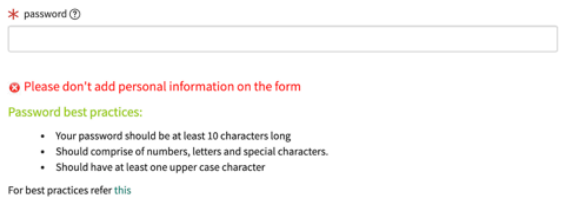
Note:

- You can make this variable visible using catalog client scripts and catalog UI policies.
- You cannot cascade this variable in an order guide.
- You cannot set this variable as mandatory.
- In the Automated Test Framework, this variable is only supported in the Variable State Validation step to check the visibility.
- This variable is not supported in the following:
  - Variable summarizer
  - Multi-row variable set
  - Condition builders and reports
- You cannot specify the following for this variable:
  - Help text and instructions
  - Tool tip
  - Permissions
  - Variable width
  - Example text
- The `g_form.setValue()`, `g_form.setReadOnly()`, and `g_form.setMandatory()` APIs are not supported in catalog client scripts. Only the `g_form.setVisible()` API is supported.

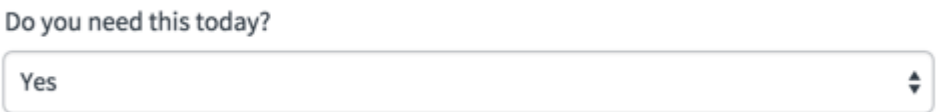
Rich Text Label variable



Select box

The select box variable creates a list from predefined question choices. For attributes supported by this variable, see variable attributes.

Example: select box variable



Single-line text

The single-line text variable creates a field to enter a single line of text. For attributes supported by this variable, see variable attributes.

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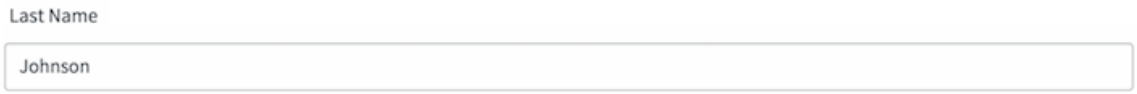
Example :single-line text variable



UI page

The UI page variable inserts a UI page into the catalog item.

- Use phase one Jelly only for any UI macros added as variables. Phase two Jelly within the macro is not processed and appears on the page as standard content.
- This variable is not yet supported on Classic Mobile devices and in Service Portal.

URL

The URL variable creates a widget for users to enter URLs. URLs are validated for the following protocols: HTTP, HTTPS, FTP.

Note:

- Variable validation is not supported in Service Portal.
- This variable is not editable on Now Mobile.

Example: URL variable



Wide single-line text

The wide single-line text variable creates a field that spans the form, letting users enter longer lines of text. For attributes supported by this variable, seevariable attributes.

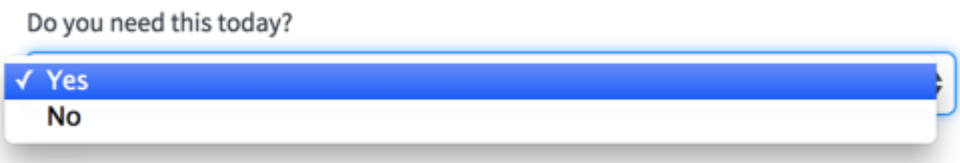
Example: wide single-line text variable



Yes/No

The Yes or No variable creates a choice list with **Yes** and **No** as options.

Example: Yes or No variable



Variable support in various channels

Service Catalog variables are supported in various channels.

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Variable support

Variable	ServiceNow AI Platform	Service Portal	Now Mobile	Conversational interface in Virtual Agent powered by LLM	Conversational interface in Virtual Agent powered by NLU	Variable editor in Workspace and Catalog Item UIB component
Attachment	Yes	Yes	Yes	Yes	Yes	Yes
Break	Yes	Yes	Yes	Ignored or skipped	Ignored or skipped	Yes
CheckBox	Yes	Yes	Yes	No	Single check box without the pricing implications is supported	Yes
Container End	Yes	Yes	Yes	Yes	Yes	Yes
Container Split	Yes	Yes	Yes	Yes	Yes	Yes
Container Start	Yes	Yes	Yes	Yes	Yes	Yes
Date	Yes	Yes	Yes	Yes	Yes	Yes
Date/Time	Yes	Yes	Yes	Yes	Yes	Yes
Duration	Yes	Yes	Yes	No	No	Yes
Email	Yes	Yes	Yes	Yes	Yes	Yes
HTML	Yes	Yes	Yes	No	No	Yes
IP Address	Yes	Yes	Yes	Yes	Yes	Yes
Label	Yes	Yes	Yes	Yes	Yes	Yes
List Collector	Yes	Yes	Yes	Yes	No	Yes
Lookup Multiple Choice	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications and advanced reference qualifier)	Yes
Lookup Select Box	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications and advanced reference qualifier)	Yes
Custom	Yes	Yes	Yes	No	No	No
Custom with Label	Yes	Yes	Yes	No	No	No
Masked	Yes	Yes	Yes	Yes	No	Yes

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Variable support (continued)

Variable	ServiceNow AI Platform	Service Portal	Now Mobile	Conversational interface in Virtual Agent powered by LLM	Conversational interface in Virtual Agent powered by NLU	Variable editor in Workspace and Catalog Item UIB component
Multi Line Text	Yes	Yes	Yes	Yes	Yes	Yes
Multiple Choice	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications)	Yes
Numeric Scale	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications)	Yes
Reference	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications and advanced reference qualifier)	Yes
Requested For	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications and advanced reference qualifier)	Yes
Rich Text Label	Yes	Yes	Yes	Yes	Yes	Yes
Select Box	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications)	Yes
Single Line Text	Yes	Yes	Yes	Yes	Yes	Yes
UI Page	Yes	No	No	Ignored or skipped	No	No
URL	Yes	Yes	Yes	Yes	Yes	Yes
Wide Single Line Text	Yes	Yes	Yes	Yes	Yes	Yes
Yes / No	Yes	Yes	Yes	Yes	Yes	Yes

Create a service catalog variable

Create service catalogs variables to gather information from users ordering a catalog item, for example, to ask users which options they want for the item.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. Select the catalog item that you want to create a variable for.
3. In the **Variables** related list, click **New**.
4. Select the variable type.
   Only the applicable fields for the variable type are then displayed.
5. In the form, fill the fields.

Variable form

Field	Description
Application	Read-only field that indicates which applications can use this variable.
Map to field	Maps the variable to a specific field on the table for the record producer. This field appears if the variable belongs to a record producer.
Type	The variable type that you want to create. For more information, see Types of service catalog variables.
Catalog item	Catalog item using the variable.
Order	Order that the variable is placed on the page for the catalog item. The variables are organized from top to bottom from least to greatest order value. For example, a variable with an order value of 1 is placed above other variables with higher-order values.
Active	Check box to make the variable available for use
Mandatory	Check box to make the variable mandatory as part of the ordering process. **Note:** This behavior is applicable only on page load, and can be changed via client APIs.
Read only	Option to make a variable read only or editable.
Hidden	Option to hide a variable.
Unique	Option to disallow duplicate values for this variable within a multi-row variable set. **Note:** ○ This field appears only for a variable created in a multi-row variable set. ○ This behavior is applicable only in ServiceNow AI Platform, Service Portal, and variable editor in Agent Workspace.
Selection Required	Check box to require users to select the check box variable. For example, use this option to require users to select an **I agree** check box for an agreement form. If users try to submit the agreement form without selecting the check box, an alert message is displayed to tell users that they must select the check box.

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Field	Description
Global	If selected, the variable is available for all catalog tasks within service catalog workflows or execution plans by default. If deselected, the variable must be associated with individual catalog tasks.
Field	Field that the variable maps to. This field appears if the variable belongs to a record producer.
Record producer table	Table that the record producer creates a record in. This field appears if the variable belongs to a record producer.
Question	
Question	Question to ask users ordering the catalog item.
Name	A name to identify the question. **Note:** If this field is empty, its value is auto-populated based on the **Question** field for all variable types except break, container split, and container end.
Tooltip	Tooltip text to display when users point to the variable. Enter a brief note to describe the purpose of the 'Question'.
Example text	Hint that is displayed in the question field before a user enters a value. Applicable for the following variables: ○ IP Address ○ Email ○ URL ○ Single Line Text ○ Wide Single Line Text ○ Multi Line Text ○ Date ○ Date/Time
Rich Text	Formatted label to be displayed on a catalog item form. Applicable for the Rich Text Label variable.
Annotation	
Show help	If selected, displays the help text and instructions for the variable. **Note:** ○ It is not available for break and check box variables. ○ Help text and instructions are not available for a variable set.
Always Expanded	If selected, the **Help text** and **Instructions** field value are expanded by default when the catalog item page loads.

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Field	Description
	This check box appears only when the **Show help** check box is selected. **Note:** ○ This field is also applicable in Service Portal. ○ This field is not applicable in the variable editor in Workspace and Catalog Item UIB component. ○ If the **Expand help for all questions** check box is selected at the catalog item level, then the **Always Expanded** field setting at the variable level is overridden. ○ If the **Expand help for all questions** check box is deselected at the catalog item level, then the **Always Expanded** field setting at the variable level is applicable.
Help tag	If the **Always Expanded** check box is deselected, click the value specified in this field to display the **Help text** and **Instructions** field values. This field is not applicable in the variable editor in Workspace and Catalog Item UIB component.
Help text	Help information for a service catalog variable. This field is applicable in ServiceNow AI Platform, Service Portal, and variable editor in Workspace, and Catalog Item UIB component. However, in Workspace and Catalog Item UIB component, you can view either help text or instructions. If both instructions and help text are available, you can view only the instructions. This field is not applicable for Break, CheckBox, Container End, Container Split, Macro, and UI Page variables. In Workspace and Catalog Item UIB component, this field is additionally not applicable for a Masked variable.
Instructions	Information that requires rich text formatting or adding images to support help information. This field is applicable in ServiceNow AI Platform, Service Portal, and variable editor in Workspace, and Catalog Item UIB component. However, in Workspace and Catalog Item UIB component, you can view either help text or instructions. If both instructions and help text are available, you can view only the instructions. In Workspace and Catalog Item UIB component, this field is additionally not applicable for a Masked variable. **Note:** For HTML tables, use sizes that are within the width of the variable.
Type Specifications (The fields in this section vary for each variable type)	
Variable Width	Width for the variable on the catalog item page, to specify what percentage of the screen size that it can span. For details, see Configure a default width for service catalog variables.

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Field	Description
	This field appears for all variable types except for break, container end, container start, container split, container layout, and label variables.
Enable also request for	Option to allow a catalog item request to be submitted for multiple users. After you select this option, the **Also request for** field is displayed along with Requested For variable in a catalog item. ○ This functionality is only applicable in Service Portal. ○ This field is applicable only for the Requested For variable. For information about delegated request experience, see Delegated request experience.
Roles to use also request for	Option to specify the roles that can submit a catalog item request for multiple users. ○ This functionality is only applicable in Service Portal. ○ This field is applicable only for the Requested For variable. ○ This field appears only when the **Enable also request for** check box is selected. **Note:** If no role is specified, anyone who has access to the catalog item can submit the request. For information about delegated request experience, see Delegated request experience.
Choice direction	The direction in which the choice list is arranged. ○ **Across**: Arranges choices horizontally. ○ **Down**: Arranges choices vertically. This field appears for lookup multiple choice variables. **Note:** The selected direction is also applicable in Service Portal.
Choice field	Table field to populate options for the variable. If no choices are defined for a field, then the variable loads field-related distinct values from the table. This field appears for select box variables.
Choice table	Table with values to populate in the **Choice field**. This field appears for select box variables.
Do not select the first choice	Check box to leave all options for the variable cleared on the catalog item page. If this check box is selected, the first choice for the variable selected by default. This field appears for multiple choice and numeric scale variables.
Dynamic ref qual	Dynamic qualifier. Select a dynamic filter to run a query against the reference field.

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Field	Description
	This field appears for reference variables when **Use reference qualifier** is set to **Dynamic**.
Include none	Check box to include the **None** option in a list of choices. This field appears for lookup multiple choice, lookup select box, multiple choice, and select box variables.
Layout	Layout for a container, whether one or two columns. This field appears for container start variables.
List table	Table with the values for the list collector. The table should have a display column specified. This field appears for list collector variables.
Lookup from table	Table from which values are obtained for users to select. The values from this table are populated in the **Lookup value field**. This field appears for lookup multiple choice and lookup select box variables.
Lookup value field	Field in the lookup table that populates options for the variable. This field appears for lookup multiple choice and lookup select box variables.
Lookup label field(s)	Comma-separated list of fields in the lookup table whose values are used to display options. This field appears for lookup multiple choice and lookup select box variables.
Lookup price field	Field in the lookup table whose value is used to modify the price of the item being ordered. This field appears for lookup multiple choice and lookup select box variables.
Lookup recurring price field	Field in the lookup table whose value is used to modify the recurring price of the item being ordered. This field appears for lookup multiple choice and lookup select box variables.
Macro	UI macro to insert into the catalog item. This field appears for macro, macro with label, and UI page variables.
Summary macro	Applicable only for Marco, and Macro with Label type variables.
Widget	Applicable only for Marco, and Macro with Label type variables.
Price if checked	Price of the item. This field appears for check box variables.
Recurring price if checked	Price that increments for the item, when the user requests more than one order of the item.

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Field	Description
	This field appears for check box variables. For more information about prices and recurring prices, see Using variables for price setup.
Reference	Reference table for the variable. The table should have a display column specified. This field appears for reference variables.
Reference qual	Qualifiers to restrict data that is available in the field. Supports reference qualifiers and advance qualifiers. For more information, see Reference qualifiers. Returns all matching results (no maximum). **Note:** For security reasons, the use of scripts in the **Reference qual** field is restricted to system administrators through the **Allow javascript in Default Value** business rule. This field appears for list collector, lookup multiple choice, lookup select box, reference and Requested For variables. It appears for reference variables when **Use reference qualifier** is set to **Dynamic**.
Reference qualifier condition	Options to build conditions. This field appears for reference variables when **Use reference qualifier** is set to **Simple**.
Scale max	Highest value on the scale of available options for the variable. This field appears for numeric scale variables.
Scale min	Lowest value on the scale of available options for the variable. This field appears for numeric scale variables.
Unique values only	Check box to require a unique value for the field. When this check box is selected, two records cannot have the same value for that field. This field appears for lookup multiple choice, lookup select box, and select box variables.
Use confirmation	Check box to prompt users to reenter data to verify their entries. This field appears for masked variables.
Use encryption	Check box to store the answer in encrypted format in the database. If not encrypted, the answer is stored in plain text format. Encryption uses Triple DES with system encryption. This field appears for masked variables.

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Field	Description
Use reference qualifier	Type of qualifier to use. This field appears for reference variables.
Validation Regex	Regular expression that validates the variable value. This field is displayed only for Single Line Text and Wide Single Line Text variable types. To define regular expressions, see Define a regular expression for a variable. **Note:** ○ This field is also applicable in Service Portal. ○ The max_length attribute value is valid even when the validation regex is set. ○ You cannot add a catalog item with regex validation errors to the wishlist.
Variable attributes	Attributes that define the behavior and restrictions for a variable. For information on variable attributes, see Service catalog variable attribute.
Default Value	
Default value	Default value for the variable.
Permission If no role is specified in this tab for the read, write, or create actions, all users who can access the catalog item can perform these actions irrespective of their role. For example, if no role is specified for the **Write roles** field, all users who can access the catalog item can edit the variable value in the variable editor. A user with a role that does not match any of the following roles cannot set variable values even through scripting. These roles are not available for Label, Break, Container Split, Container End, Macro, Macro with Label, and UI Page variables.	
Read roles	Roles that can view the variable before or after requesting the catalog item or record producer. Only a user with the roles specified in this field can view the variable.
Write roles	Roles that can edit the variable in the variable editor after requesting the catalog item or record producer. If a user does not have the roles specified in this field, the variable is read-only in the variable editor.
Create roles	Roles that can create values for the variable before requesting the catalog item or record producer. If a user does not have the specified role, the variable is read-only before requesting the catalog item or record producer.
Availability	
Visible Elsewhere	If selected, the variable is visible in the item form before ordering the item, in VEditor after ordering the item, and in the cart view of the item.
Visible on Bundles	If selected, the variable is visible when the item is added to a bundle.

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Field	Description
Visible on Guides	If selected, the variable is visible when it is added to an order guide, or when it is added to a catalog item that is included in the order guide. **Note:** If an order guide has too many items and variables, consider clearing this check box on as many items as possible, to improve loading performance on order guides.
Visible on Summaries	If selected, the variable is visible on any variable summarizer of the catalog item. In Service Portal, the variable is visible in the RITM ticket page and the Approval page. In Now Mobile, the variable is visible in the RITM and the Approval records.

6. Click **Submit**.

Define help information for a service catalog variable

Enter help information for a variable to help users determine what info they must provide for a service catalog variable.

Before you begin
Role required: admin

About this task
Demonstrates these options to provide help text for service catalog item variables: tooltips, help text, instructions (HTML help text), and example text.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items** and click the catalog item with the variable that you want to provide help for.
2. In the **Variables** related list, click the variable.
3. In the **Annotation** section of the Variable form, select the **Show help** check box.
   The **Help tag**, **Help text**, and **Instructions** fields appear.
4. In the **Help tag** field, enter the short descriptive text that appears between the question and the responses.
   For example, **Click here for help** or **Preview**.
5. In the **Help text** field, enter the help text that displays for users who clicks the **Help tag** on the page for the catalog item.

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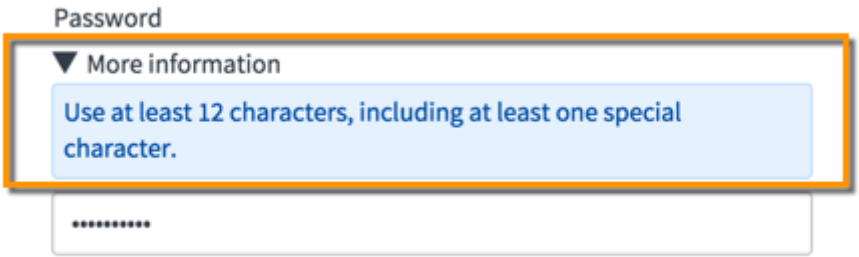
Note:
The **Help** and **Help text** fields do not support HTML tags.

Example of help information



Service Catalog variable attributes

There are a few Service Catalog variables support specific attributes to define the behavior and restrictions for variables.

In the Catalog variable form, under the **Type Specifications** tab, you can specify the variable attributes in the **Variable attributes** field.

Note:

- You can enter multiple attributes for a variable type by separating each with a comma.
- You can enter multiple values for an attribute by separating each with a semicolon.
- If you don't see the **Variable attributes** field, enable the **Show attributes when Type is One of Certain Values** UI policy.
- Pre-selected values are not cleared automatically when the dependent variable value changes when using an attribute or reference qualifier. Create a client script to clear the values based on your needs and the needs of your customer.

Variable attributes

allowed_extensions

Specifies a list of allowed file types. For example, `allowed_extensions=txt;pdf`.

Applicable variables: Attachment

barcode

Specifies if the barcode can be scanned using the mobile camera for identifying a variable value of a catalog item. For example, `barcode=true`.

Applicable variables: Single Line Text

max_file_size

Specifies the maximum file size in MB. For example, `max_file_size=2`.

Applicable variables: Attachment

glide_list

Changes the list collector interface from slushbucket to glide list.

Applicable variables: List collector

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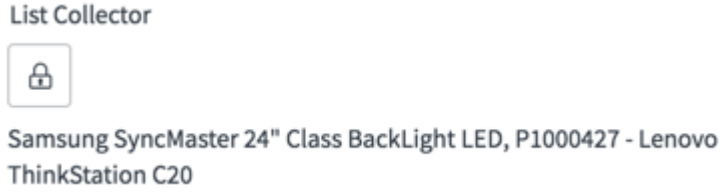
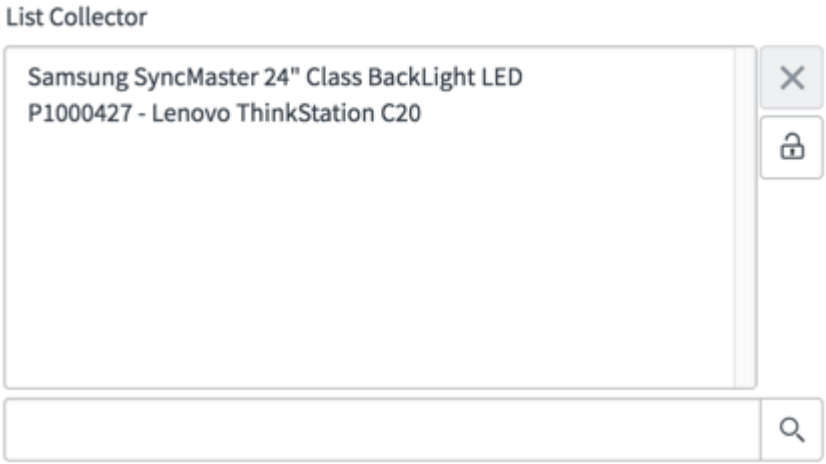
Collapsed glide_list



Expanded glide_list



is_searchable_choice

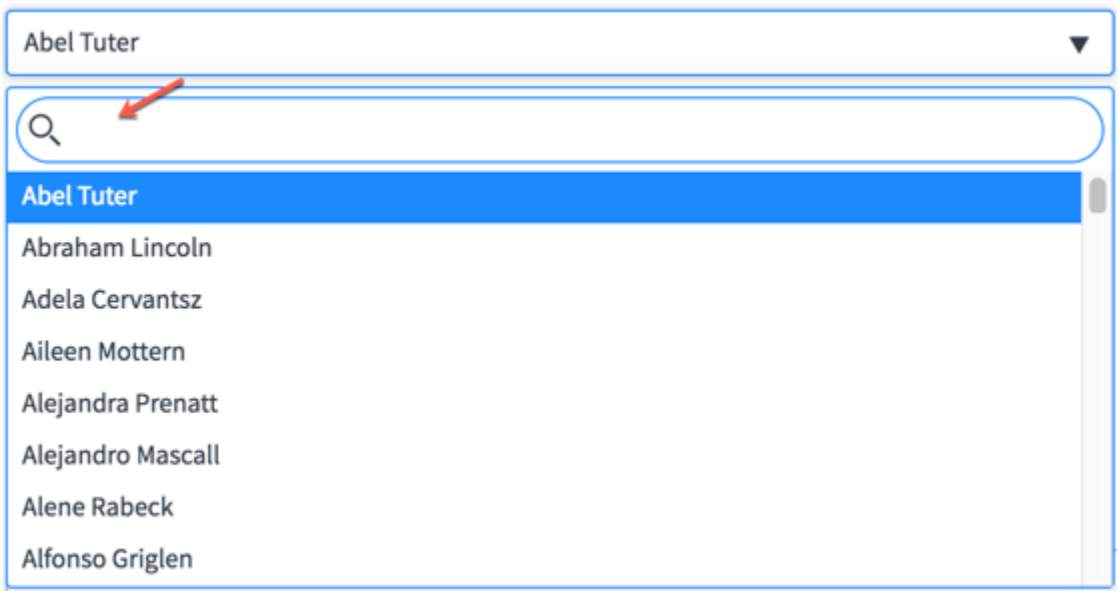
If set to **true**, enables you to search for and select the required value for the variable. For example, `is_searchable_choice=true`.

Note:

- For Lookup select box, a default value is available at the page load itself.
- This attribute is not applicable in Service Portal.

Applicable variables: Lookup select box, Select box

is_searchable_choice



max_length

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Sets the maximum number of characters allowed in the field. By default, the field accepts long strings of text, several thousand characters. Set the *max_length* attribute as appropriate for the information that the variable is collecting. For example, to allow for entry of an address, set `max_length=200`, or other appropriate length.

Applicable variables: Single-line text, Wide single-line text

max_unit

Sets the maximum unit of time for the duration. Possible values are `max_unit=days`,`max_unit=hours`,`max_unit=minutes`, and `max_unit=seconds`.

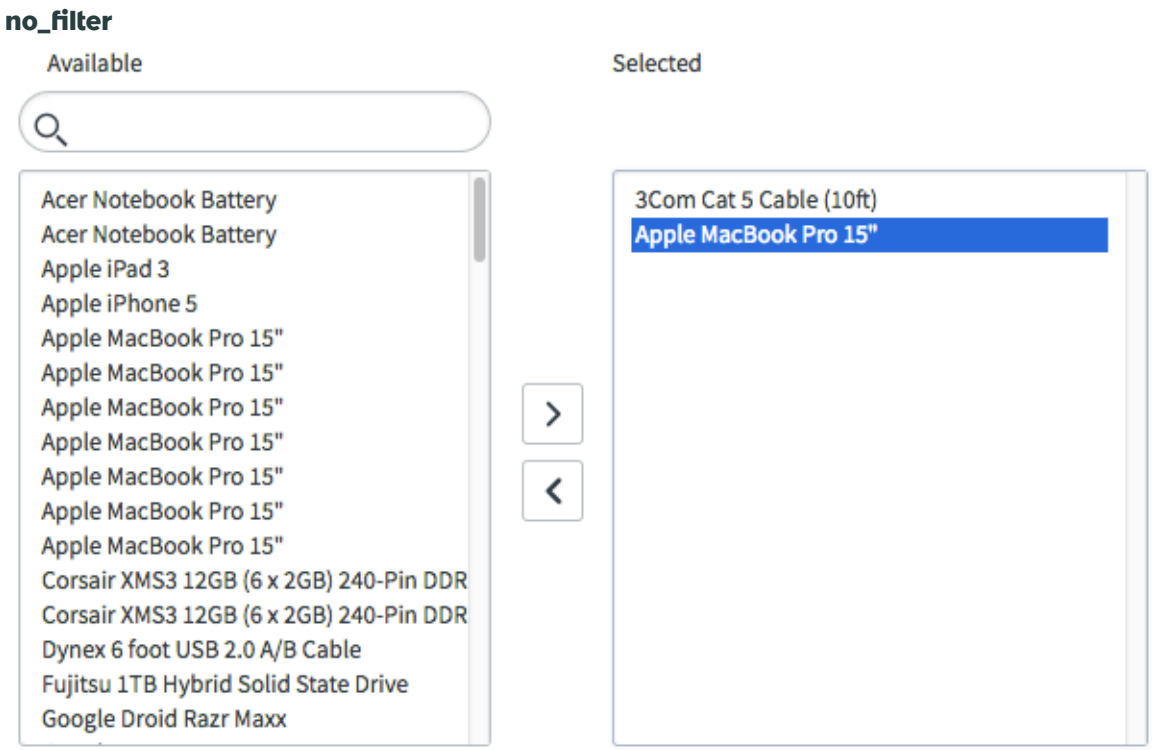
For example, if `max_unit=minutes`, the duration is displayed in minutes and seconds. In this case, a duration of 2 days 3 hours 5 minutes 15 seconds is displayed as 3065 minutes 15 seconds.

Applicable variables: Duration

no_filter

Hides the filter fields that appear above a list collector.

Applicable variables: List collector



ref_ac_columns

Specifies the columns with display values that appear in an auto-completion list in addition to the name. Separate column names with a semicolon. For example, `ref_ac_columns=user_name;email;sys_created_on` allows auto-complete to match text from the user_name, email, and sys_created_on columns.

Applicable variables: Reference, Requested For.

ref_ac_order_by

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Specifies the column that is used to sort the auto-completion list. For example, `ref_ac_order_by=name` sorts the auto-completion choices alphabetically by name.

Applicable variables: Reference

ref_auto_completer

Specifies the name of a JavaScript class (client-side) that creates the list for auto-completion choices. Valid class values include:

- **AJAXReferenceCompleter**: Displays matching auto-complete choices as a drop-down list. The list only displays the display value column of the reference table. If there is no other auto-completion class specified, reference fields automatically use this class.
- **AJAXTableCompleter**: Displays matching auto-complete choices as rows in a table. The table displays the display value column of the reference table and any columns listed in the ref_ac_columns attribute.
- **AJAXReferenceChoice**: Displays matching auto-complete choices as a drop-down list. The list only displays the display value column of the reference table. The list only displays up to 25 matching choices. If there are more than 25 auto-complete choices, the reference field instead displays the choices with the AJAXTableCompleter class.

Applicable variables: Reference

ref_qual_elements

A list of fields to be sent back to the server to get an updated reference.

Applicable variables: Lookup multiple choice, Lookup select box, List Collector.

Important:
Attribute behavior is specific to the service catalog desktop.

Define a question choice for a variable

Define a question choice for a variable with service catalog.

Before you begin
Role required: admin

About this task
Some variable types present the user with a list of choices. For example, a multiple choice variable that asks how much memory you want in a computer requires you to define the available choices, such as 1 GB and 2 GB.

Procedure

1. Open the variable definition.
2. In the **Question Choices** related list, click **New**.
3. Enter the question choice details in **Question Choice** form and click **Submit** to save the record.
   - **Price** and **Recurring price**: variables can affect the item price and recurring price (if used).
   - **Order**: the number defining the order in which the price appears when displayed.
   - **Question**: the actual question being asked for that variable.
   - **Text**: the choice presented to the user.

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- **Value**: the value stored in the database.
- **Inactive**: Option to make a question choice inactive.

4. Repeat the steps for each available choice to define the full set of choices for that variable.

> **Note:**
> When you modify variable choices that are attached to a catalog item, the existing requested items (RITMs) are also affected. For example, if you add a variable choice for the catalog item, the value of that choice is also considered in the existing RITMs. If you delete a variable choice that is selected for a RITM, the value of that choice still persists in the RITM.

Service catalog data lookup

The Data Lookup and Record Matching Support for Service Catalog plugin offers similar features to the general Data Lookup and Record Matching Support plugin.

Use the plugin for service catalog to perform data lookups for variables. This lookup can be on service catalog item screens, on requested items, and on catalog tasks as a user fills out the values contained in variables.

Service Catalog data lookup roles

Service Catalog enables specific roles to participate in the process of creating and using Service Catalog data lookups.

Service Catalog data lookup roles

Role	Description
catalog_lookup_admin	Similar to data_lookup_admin. Can create, update, and delete catalog data lookup definitions, matcher variable definitions, and setter variable definitions.
catalog_lookup_manager	Can read catalog data lookup definitions, matcher variable definitions, and setter variable definitions. The role can be granted to anyone using catalog data lookups so they can see the definitions for which they are creating rules. As required, grant create, read, write, or delete access to the individual data lookup rules tables created to delegate maintenance.

Create a catalog lookup definition

Create a catalog data lookup definition record.

Before you begin

Role required: admin or catalog_admin

About this task

> **Note:**
> The *Run on Insert* and *Run on Update* options are not supported for catalog data lookups. Other options operate the same as for normal data lookup.

Procedure

1. Navigate to **All** > **System Policy** > **Rules** > **Data Lookup Definitions**.
2. Click **New**.

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3. Select **Catalog Data Lookup Rule**.
4. Enter a *Name*.
5. In *Applies to*, select catalog item or variable set.
6. In *Catalog item/Variable set*, select a specific item or set.
7. Select a **Matcher Table**.
8. Select other options, as required.
9. Right-click the form header and click **Save**.
10. From the *Catalog Matcher Variable Definitions* related list, click **New**.
11. Fill in the fields, as appropriate.

Catalog data lookup definitions fields

Field	Description
Name	Enter a unique name to identify the definition record.
Applies to	Select what the data lookup rule applies to: a catalog item or a variable set.
Catalog item/ Variable Set	Select the catalog item or variable set to which the data lookup rule applies.
Matcher Table	Any table within the current scope containing the lookup values. **Note:** The list shows only tables and database views that are in the same scope as the catalog data lookup definition.
Active	Select this check box to run this catalog data lookup rule. Clear the check box to ignore this catalog data lookup rule.
Run on form change	Select this check box to automatically look up values whenever a user changes a variable value on a catalog item or form. This option is the only supported method for catalog data lookup rules. **Note:** This option does not include changes automatically made by other data lookup rules, such as the priority lookup rules.

12. Click **Submit**.
13. From the *Catalog Setter Variable Definitions* related list, click **New**.
14. Fill in the fields as appropriate.

Setter variable definition fields

Field	Description
Data Lookup	Displays the name of the parent data lookup definitions record.

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Field	Description
Source variable field	Select the variable from the source item or variable set that the data lookup updates.
Matcher table field	Select the field from the matcher table that provides the new value for the update.
Always replace	Select this check box to replace any existing value with a value from the data lookup. Clear this check box to ignore the update if the field has an existing value.

15. Click **Submit**.
16. Click **Update**.

Add a data lookup value

The columns of a data lookup table contain both matcher and setter field data. Each data lookup is a query that searches for a row containing values that match the matcher fields.

Before you begin

Role required: catalog_lookup_admin

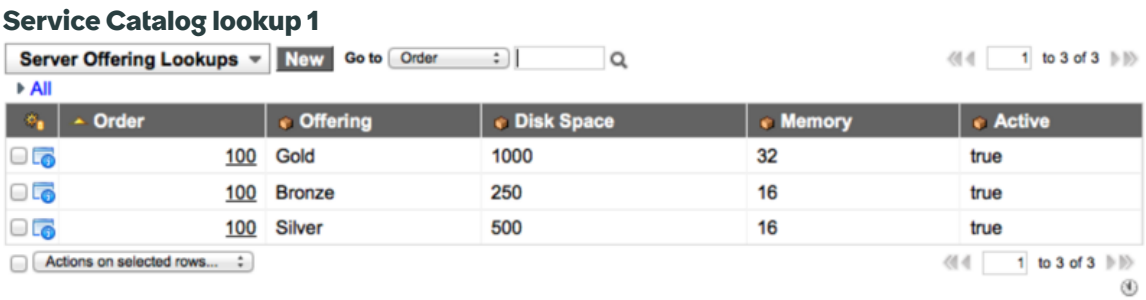
About this task

The data lookup then returns the value listed in the setter fields.

For example, you can define the matching settings for bronze, silver, and gold offerings as described previously.

Procedure

1. In the navigation filter, enter the name of the new custom lookup table.
2. Configure the list and create appropriate fields for the lookup table.
3. From the table list, click **New** and enter appropriate matcher and setter field values.
   For example:



Note:
Each row in a data lookup table must be unique.

Custom data lookup

You can create a custom table to store lookup data.

The custom table must extend the Data Lookup Matcher Rules [dl_matcher] table.

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For example, you can create a Server Offering Lookups table. It stores information about matcher offerings (bronze, silver, and gold) and associated setter values (memory and disk space) for each matcher offering.

Create a custom data lookup

Creating a catalog data lookup is similar to creating a normal, custom data lookup except when creating the catalog data lookup definition record.

1. Create a custom data lookup table. It must extend the Data Lookup Matcher Rules `[dl_matcher]` table.
2. Add data lookup values to the data lookup table.
3. Create a catalog data lookup definition record.
4. (Optional) Create a data lookup module.

Troubleshooting

If the custom data lookup definition rules are not behaving as expected, check for certain conditions.

If the custom data lookup definition rules are not behaving as expected, check for the following conditions:

- Ensure that the matcher variable is not read-only. Since users cannot change read-only variables, there cannot be an on form change event for read-only variables.
- Ensure that the data in the matcher table is correct.
- If the lookup requires an exact match, verify that there is a matcher table row for each possible combination (including blank values). The lookup fails if it cannot find a matching value.
- If the variable is an option or check box, it always has a value, so you must select **Always replace**.
- Verify that you have not created a recursive rule, such as:

  If Variable A = 1, then Variable B =2. If Variable B = 2, then Variable A = 2.

Audit service catalog variables

Audit the variables so that the audit history records all changes to the named variables.

Before you begin

Role required: admin

About this task

Auditing is enabled by default for service catalog variables.

These changes are displayed in:

- The requested item history for all variables associated with the item.
- The catalog task history for all variables that are used by the task.

This auditing allows service catalog administrators to view a full history of changes to variables that can affect the parent record, including their creation.

Note:
Unnamed variables are not audited.

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Procedure

1. Navigate to **All** > **System Properties** > **Service Catalog**.
2. Locate the line **Audit changes to Service Catalog Variables**.
3. Select the **Yes** check box to enable auditing.

Service Catalog variable editors

Variable editor displays variable values in fulfiller forms. A requester, while requesting the item, specifies these variable values in the catalog item questions.

Types of variable editors based on the catalog item type:

- For a catalog item, the VEditor (*`com.glideapp.servicecatalog.VEditor`*) displays the values of questions in the requested item and catalog task forms.
- For a record producer, the default variable editor (*`com.glideapp.questionset.DefaultQuestionEditor`*) displays the values of questions for records generated from a record producer for task-extended tables.

Warning:
The variable editor depends on the **Variables** column of the Task [task] table. By default, this column is inactive, and you should not make it active.

VEditor

The VEditor is applicable only for the requests created from catalog items.

In ServiceNow AI Platform, this editor is a formatter added on the requested item (RITM) form (Default View) and the catalog task form (Default View).

The VEditor is applicable only for RITMs and catalog tasks. It cannot be used for any other tables. To support catalog UI policies or catalog client scripts on the VEditor for the RITM and catalog task form, select the **Applies on Requested Items** and **Applies on Catalog Tasks** check boxes for the catalog UI policy or the catalog client script.

Note:
The values in the VEditor are displayed from the Options [sc_item_option] table. This is an internal table and you should not add any business rules to this table.

To make the VEditor read-only in ServiceNow AI Platform, activate the onLoad client script, *`Variable Editor Readonly`*, for the following tables:

- Requested Item [sc_req_item]
- Catalog Task [sc_task]

Note:
You can make the *`Variable Editor Readonly`* scripts conditional, by adding conditions to them.

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VEditor



Default variable editor

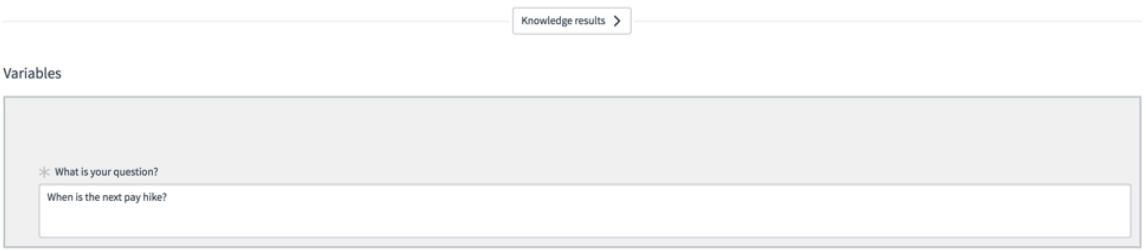
The default variable editor is applicable only for record producers. This editor is a formatter added on records that are generated by a record producer for task-extended tables. This editor displays the values of questions specified in the record producer.

By default, this editor is applicable for the Incident and Change tables. For other tables, you can configure this editor.

Catalog UI policies, catalog client scripts, catalog data lookups, reference qualifiers, and dependent reference fields are supported on the default variable editor only for task-extended tables. To support a catalog UI policy or a catalog client script on this editor, select the **Applies on the Target Record** check box for the catalog UI policy or the catalog client script.

Note:
The values in the default variable editor are displayed in the Question Answer [question_answer] table. This is an internal table and you should not add any business rules to this table.

Default variable editor



Variable editor in Agent Workspace

In Agent Workspace, the following scenarios are possible:

- If the variable editor formatter is available in the Workspace view of the form, the variable editor is automatically added to the **Variables** section in the Agent Workspace UI.
- If the variable editor formatter is added inside a section in the Workspace view of the form, that section does not display the variable editor in the Agent Workspace UI.

The following variable types are not displayed in the variable editor.

- Macro
- Macro With Label
- UI Pages

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The following variables are displayed as a select box in the variable editor:

- Multiple Choice
- Numeric Scale
- Lookup Multiple Choice

Variable editor in Service Portal

In the Service Portal UI, the variable editor is available for forms with the variable editor formatter.

Note:
Since Service Portal is only for requester use cases, it is recommended to use the Agent Workspace UI for the variable editor.

Making a variable editor read-only

The following options are available to make a variable editor read only, depending on application.

Service Catalog variable editors in the core UI

The *GlideForm* setVariablesReadOnly() method is supported for ServiceNow AI Platform and Agent Workspace forms to make the variable editor read-only. This method is intended for requested item, target record, and catalog tasks.

Note:
This method is not applicable in Service Portal and is not recommended for catalog forms.

Service Portal variable editors

To make the VEditor read-only in Service Portal, navigate to **Service Portal** > **Portals**, select **Service Portal**, and specify the following code in the **Quick start config** field.

```
"readonly_variable_editor": "true"
```

Note:
The UI Page, Macro, and Macro with Label variables are rendered even when the variable editor is read-only.

Configure the default variable editor for a task-extended table

After you configure the default variable editor for a task-extended table, you can view and edit the values of questions specified by the requester in the record producer. Applicable only for records generated by a record producer.

Before you begin
Role required: admin

Procedure

1. Create a formatter for the task-extended table.
   a. Navigate to **System UI** > **Formatters**.
   b. Click **New**.
   c. On the form, fill the fields.

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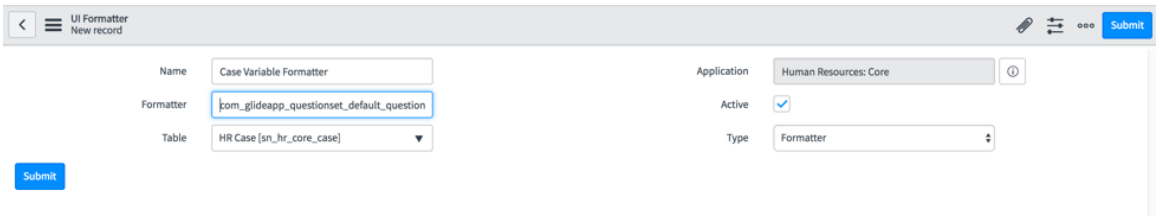
Field	Description
Name	The name of the formatter that is displayed in the form of the task-extended table.
Formatter	The file name of the formatter. In this case, specify `com_glideapp_questionset_default_question_editor`.
Table	The table that uses the formatter.
Active	Specifies if the formatter is active.
Type	The type of the formatter. In this case, specify `Formatter`.

UI formatter



d. Click **Submit**.

2. Add the formatter to the form of the task-extended table.
The formatter is displayed on the form according to your selections.

a. From the **Additional Actions** menu on the form, select **Configure** > **Form Layout**.

b. Use the list to select the display order for the formatter field.

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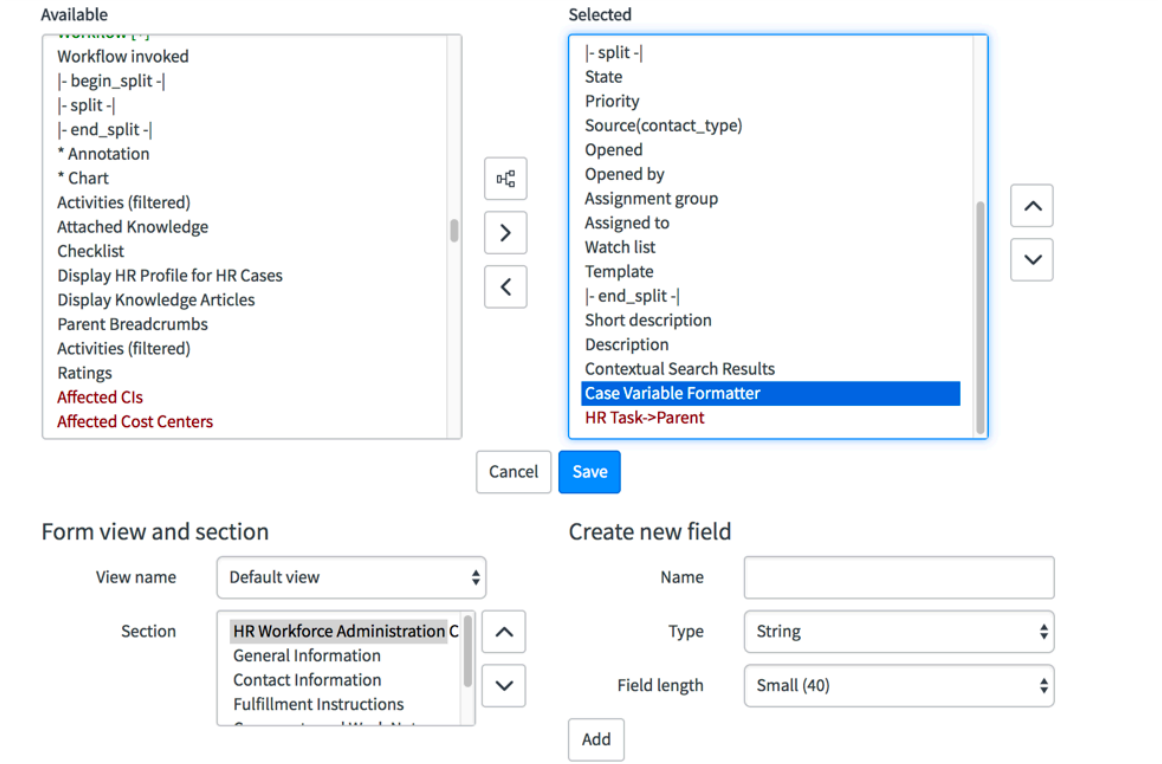
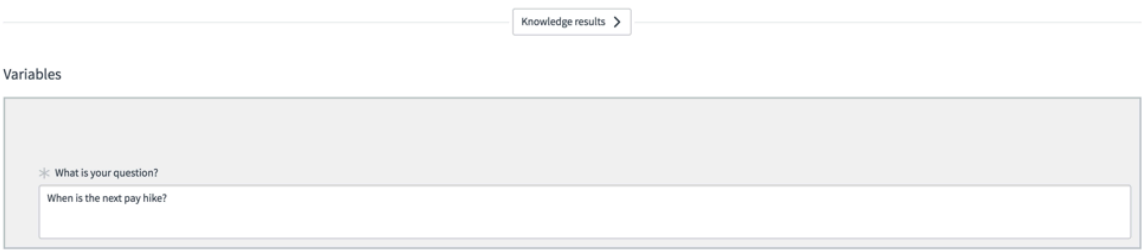
Add a formatter to a form



c. Click **Save**.
The default variable editor is available on the form.

Default variable editor



Service catalog variable sets

Administrators and catalog administrators often define multiple catalog items that use the same group of service catalog variables. Catalog managers and catalog editors can attach a variable set for items to which they are assigned. However, catalog managers and catalog editors cannot create a variable set.

For example, a catalog administrator defines 10 catalog items for types of servers. The request process for all these items asks the same five questions, using the same variables.

Associating these variables individually per catalog item is repetitive, time-consuming, and error-prone. Also, to make a single change to multiple catalog items involves manually changing each item. For example, to add a variable to 10 catalog items, you would need to manually associate the variable with each item.

Variable sets allow you to create a collection of variables that can be reused across multiple catalog items and order guides. Using variable sets saves time because you do not have to

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create the same variables individually for many catalog items. Also, when variables should be modified, you can modify the variable set and the changes are reflected across all the catalog items that are associated with the variable set.

Variable sets also allow you to define catalog client scripts and UI policies that are applicable to the variables in the set.

Note:
Variables in a set use the same rules as other variables to determine when the variables in a set appear on a task. For example, variables must either be global or be attached directly to an item.

A catalog administrator can provide read, write, and update roles to access a variable set. When you access variables of a variable set, a validation is first done at the variable set level, and then at the variable level. If the access is blocked at the variable set level, then the access settings on the variable are over-ridden. If the access is allowed at the variable set level, then access at the variable level is verified.

Note:
Both single-row and multi-row variable sets are supported in ServiceNow AI Platform, Service Portal, Now Mobile, and in the Variable editor in Agent Workspace.

Single-row variable set

Use a single-row variable set to capture data from variables that are grouped together, while submitting a catalog item request for a single entity.

Multi-row variable set

Use a multi-row variable set (MRVS) to capture variable data in a grid layout while submitting a catalog item request for a group of entities. For example, for HR during the reorganization of employees, a single record producer should be able to capture the relevant information such as the department and manager for a group of employees. Also, when you request a catalog item to order virtual machines and servers, configuration options should be captured as a single request. In this case, a requester can define multiple hardware units as rows and their configuration options as columns of an MRVS.

You cannot include the following variable types in an MRVS:

- Attachment
- Break
- Container End
- Container Start
- Container Split
- HTML
- Label
- Macro
- Macro with label
- Rich Text Label
- UI Page

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Note:

- You can configure an MRVS variable to disallow duplicate values. For information about the **Unique** field, see Create a service catalog variable.
- You can hide a variable in the MRVS so that it does not appear when the dialog box is open.
- The **Map to field** functionality is not supported for variables used in an MRVS.
- Only the glide list interface is supported for the List Collector variable.
- Cascading functionality for variables in an order guide is not supported in an MRVS.
- An MRVS is not displayed when added within a container.
- You cannot add variables with read roles in an MRVS.
- When you clone a request that contains an MRVS, the information that is specified in the MRVS is available in all cloned requests. All UI policies and client scripts on the MRVS are also cloned.
- Set a limit to the number of rows that you can add to an MRVS by using the *max_rows* attribute in the **Variable Set attributes** field.
- In the RITM and request view in Now Mobile, an MRVS is not supported. A message is displayed in this view that this variable set is not viewable.
- An MRVS is supported in the variable summarizer only in Service Portal.
- You can include an MRVS in the GetCatalogVariables and CreateCatalogTask actions using Flow Designer.
- You can iterate through individual rows and access variables using the For Each flow logic.
- You can include MRVS while creating a catalog task using a workflow.

An MRVS form changes dynamically based on the data in the catalog item form that includes the following:

- Other rows of that MRVS
- Other variables outside of that MRVS on the catalog item form.

For information about accessing data in a multi-row variable set (MRVS) when a dialog box is open, see g_service_catalog - Client.

You can define catalog client scripts, catalog UI policies, and catalog data lookups for an MRVS. Visibility is honored just on the MRVS form and not in the list.

Note:

- *onSubmit* catalog client scripts are not supported for an MRVS.
- Catalog UI policies and catalog client scripts defined at the item level are not applicable for variables in an MRVS. Only those catalog UI policies and catalog client scripts defined within the MRVS are applicable for variables in the MRVS.
- Scripts that are not included in an MRVS cannot affect variables inside the MRVS. Similarly, the scripts included in the MRVS cannot affect the variables that are not included in the MRVS.
- Variables that are not included in an MRVS cannot be used in dependent reference qualifiers for variables in the MRVS. Similarly, the variables included in the MRVS cannot be used in dependent reference qualifiers for variables that are not in the MRVS. For a reference qualifier, the current row is the one that is being edited.

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You cannot set **Global** as `True` for any variable that belongs to an MRVS. So, an MRVS is not available in catalog tasks.

If the variables included in the MRVS have price implications for a catalog item, the price of the catalog item reflects the corresponding changes when a row is added, edited, or removed from this variable set.

Note:
When you disable the *glide.sc.use_cart_layouts* property, the Order Item Widget does not reflect the price changes of the item from the MRVS. However, when you add this item to the cart, these price changes are reflected.

You cannot select variables of an MRVS when defining the following for a catalog item:

- UI policy conditions
- Unsupported ATF step configurations. You can only validate if an MRVS is visible, mandatory, or read only.
- Reporting

Create a variable set and add it to an item

Create a set of variables and add them to multiple catalog items and order guides for reuse.

Before you begin
Role required: catalog_admin, admin, catalog_editor, or catalog_manager

About this task

- Variable sets within a catalog item cannot have the same internal name.
- Within a catalog item, the name of a variable cannot be the same as the title or internal name of a variable set.
- Any catalog client script or catalog UI policy script should refer to the internal name of a variable set instead of its name or title.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Variables** > **Variable Sets**.
2. Click **New**.
   The Variable Set Creation page is displayed.
3. Select any of the following.
4. Enter details.

Field	Description
Title	Title of a variable set. Appears if the **Display title** check box is selected.
Internal name	Variable set name for internal use. For example, to access the variable set for the front-end (through the *g_form* API) and server side scripting.
Order	Order number for the variable set.
Type	Type of the variable set. Possible choices are:

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Field	Description
	○ Single Row ○ Multi Row
Application	Applications that can use this variable set.
Display title	If selected, adds a title and an expandable header to the right of the variable set. **Note:** When a user requests the item, all check box variables are grouped under a default title of **Options**. To use a custom title, insert a variable of type **Label**, with an **Order** value that puts it directly above the check box variables.
Variable Set attributes	Attributes for configuring a multi-row variable set. Use the *max_rows* attribute to set a limit to the number of rows that you can add to a multi-row variable set. For example, specify `max_rows=1` as the field value.
Layout	The layout display. Set to **1 Column Wide** or **2 Columns Wide, alternating sides** or **2 Columns Wide, one side, then the other**.
Description	Description of the variable set.

5. Right-click and select **Save**.
6. Create the variables to use in that set.
   a. In the Variables related list, click **New**.
   b. Follow the steps for creating variables.

   Note:
   For a multi-row variable set:
   - The included variables are displayed as columns of a table.
   - The column order is the order of variables defined in the variable set.

7. To create an associated catalog data lookup rule, perform the following steps.
   a. In the Catalog Data Lookup Definitions related list, click **New**.
   b. On the Catalog Data Lookup Definitions form, fill the fields.
   For information on creating a data lookup rule, see Create a catalog lookup definition.
8. Click **Submit**.

Add a variable set to a catalog item or order guide

Service Catalog enables you to add a variable set to one or more catalog items or order guides.

Before you begin
Role required: catalog_admin, admin, catalog_editor, or catalog_manager

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Procedure

1. Open a catalog item or an order guide.

2. In the **Variable Sets** related list, click **Edit**.

   You can configure the form to add the **Variable Sets** related list.

3. Select and add a variable set.

   Note:
   If the **Cascade Variables** check box is selected for an order guide, multi-row variable set data should be cascaded to the included items.

4. Click **Save**.
5. Click **Try**.

   Note:
   For a multi-row variable set:

   - The associated variables are displayed as columns of a table on a catalog item or record producer. Each row corresponds to a set of data for all variables in the variable set.
   - The column order is the order of variables defined in the variable set.

6. **Optional:** Edit a multi-row variable set.

   a. To add a row, click **Add** within the variable set, specify the variable information in the **Add Row** window, and click **Add**.

   Note:

   - A maximum of 50 rows can be added.
   - Unless default values are provided for variables or On Load scripts are used to pre-populate data, you should add variable data for each row.

   b. To edit a row, click the edit row icon in the **Actions** column, specify the variable information in the Edit Row window, and click **Save**.

   Note:
   When you add or edit an existing row, all catalog UI policies and client scripts associated with the multi-row variable set should be honored.

   c. To remove a row, click the remove row icon in the **Actions** column and click **Remove** in the confirmation window.

   d. To remove all rows of the table, Click **Remove All** within the variable set and click **Remove** in the confirmation window.

Variable set layout

Variable sets can have one of many layouts. You can define the order of the variables for each item.

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- **1 column wide**: Variables appear in a single vertical column, ordered from top to bottom. This column is a simple way to display information, but can result in empty space to the right of questions. This order is the default layout.
- **2 columns wide, alternating sides**: Variables are laid out in two columns with variables placed alternately in the left and right columns.
- **2 columns wide, one side, then the other**: The first half of the variable set is laid out sequentially in the left column and the second half is laid out sequentially in the right column.

Note:
Variables with several possible choices defined, such as multiple choice variables, are considered a single entity in layouts. All choices are displayed as a single, contiguous unit.

Variable set order

A variable set is a discrete unit with an order number by default. All variables within the set are included wherever the set is included.

For example, if you set the following order for some example variables and a variable set:

- Variable A (100)
- Variable B (200)
- Variable C (300)
- Variable Set 1 (250) - containing three variables (VS1, VS2, VS3) with incremental order values (150, 250, 350)

The variables are displayed in this order:

- Variable A (100)
- Variable B (200)
- Variable Set 1 (250): Variable VS1 (150)
- Variable Set 1 (250): Variable VS2 (250)
- Variable Set 1 (250): Variable VS3 (350)
- Variable C (300)

Additional layout options

For additional layout options, you can also add container variables to a variable set.

For example, create the following variables and orders:

Order of variables

Variable	Order
Alfa	100
Bravo	200
Charlie	300

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Order of variables (continued)

Variable	Order
Delta	400
Echo	500
Foxtrot	600

Order of variables in a layout

1 Column Wide	2 Columns Wide, alternating sides	2 Columns Wide, 1 side, then the other
Alfa	Alfa Bravo	Alfa Delta
Bravo	Charlie Delta	Bravo Echo
Charlie	Echo Foxtrot	Charlie Foxtrot
Delta		
Echo		
Foxtrot		

Set an item-specific order

You can set the order value on a per item basis.

Before you begin

Role required: admin

About this task

When a variable set is used by more than one catalog item, you can define item-specific ordering to provide more flexibility in the layout. You do this using the catalog variable set record associated with the item.
Use the **Order** field in this catalog variable set record to set this order value on a per-item basis, overriding the default value defined in the variable set.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Open the catalog item to edit.
3. Navigate to the Variable Sets related list.
4. Click the reference icon for the variable set.

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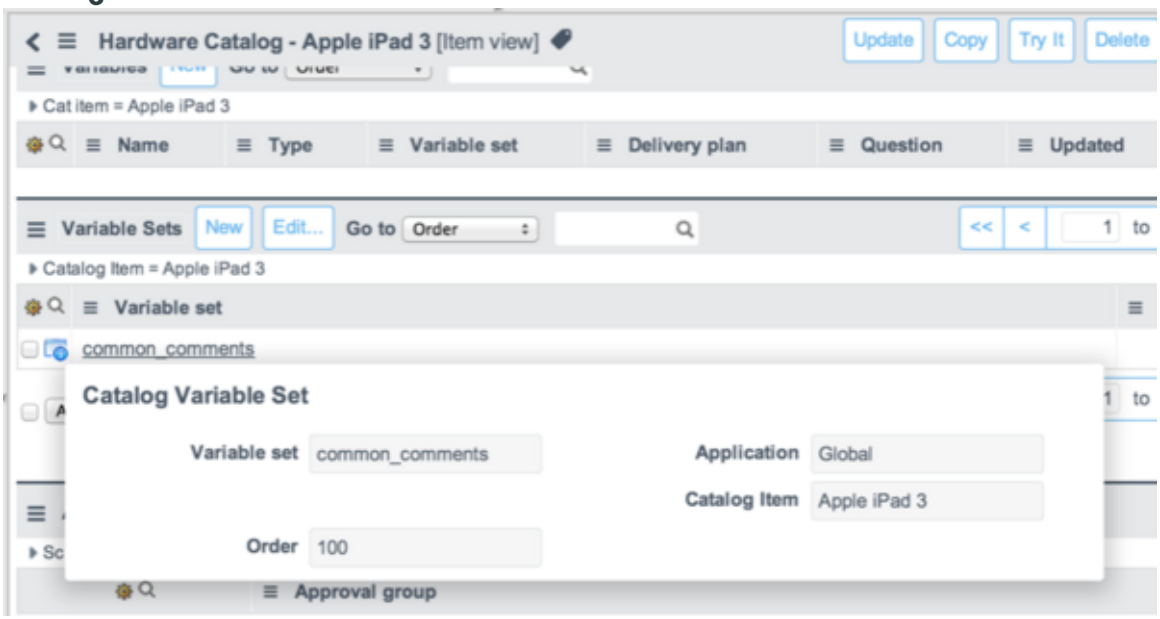
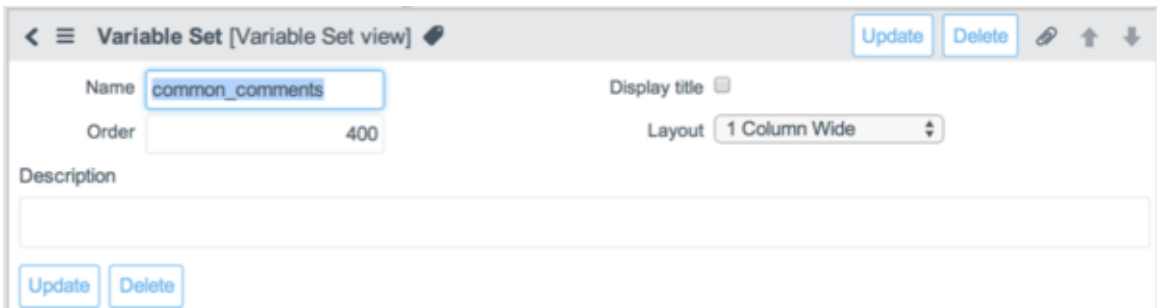
Catalog variable set



5. Set the order value as required.
   The catalog variable set order is specific to the link between the item and the variable set. It overrides the default order defined on the variable set itself.

Variable set order



Examples of variable set orders

The following example demonstrates the layout of variables when variable sets and item variables are associated with an item under different scenarios.

The order for display of the variables and variable sets is specified using the Information icon in the Related Lists.

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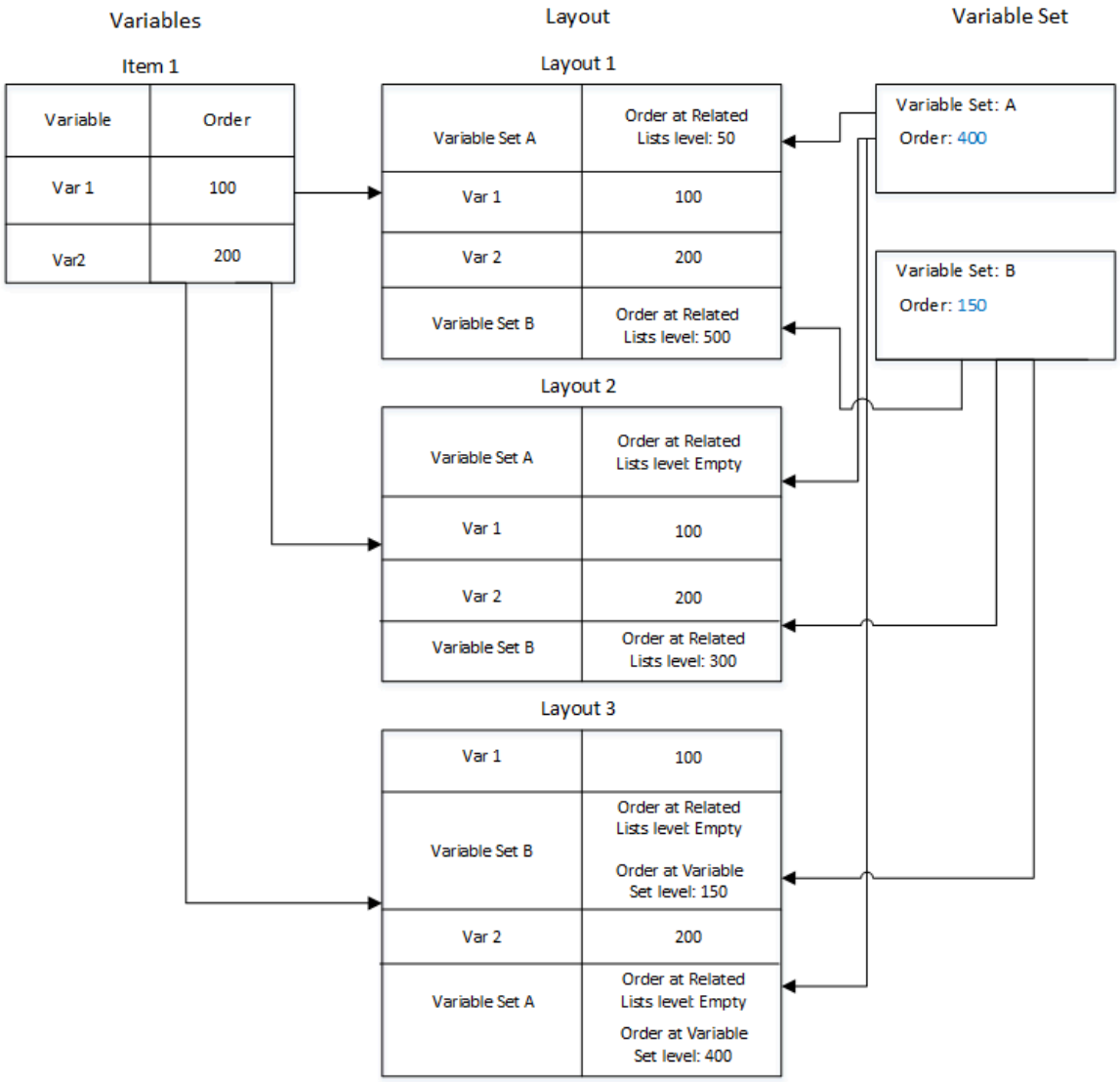
Order of variables and variable sets



- In Layout 1, order values are specified for both Variable Set A and Variable Set B at the Related Lists level and those order values always takes precedence. Hence, the layout is organized based on the order value specified for the variable sets at the Related Lists level.
- In Layout 2, an order value is not specified for Variable Set A whereas an order value is specified for Variable Set B at the Related Lists level. In this case, the empty value for Variable Set A is considered as zero. Hence, the layout is organized based on the order value of 0 for Variable Set A and 300 for Variable Set B.
- In Layout 3, order values are not specified for both Variable Set A and Variable Set B at the Related Lists level. In this case, the order values specified within the variable sets are considered. Hence, the layout is organized based on the order value of 400 for Variable Set A and 150 for Variable Set B.

Service Catalog parameters

You can use the Service Catalog parameters to identify the parent mapping configuration for a request, and join the service catalog flow from any other flow. For example, from an incident flow, you can create a request, and associate the request with the incident.

These parameters are passed in the application URL.

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Service Catalog parameters

Name	Description
sysparm_parent_sys_id	sys_id of the source record that is passed to the target record generated from it. Format is *sysparm_parent_sys_id*= <sys_id of the parent>. For example, sysparm_parent_sys_id=85071a1347c12200e0ef563dbb9a71c1.
sysparm_parent_table	Name of the parent table from which the catalog request is created. Format is *sysparm_parent_table*=<name of the parent table>. For example, sysparm_parent_table=incident.
sysparm_view	Type of the catalog view. Format is *sysparm_view*=<name of the catalog view>. For example, sysparm_view=catalog_default. **Note:** This is only applicable in Platform.
sysparm_processing_hint	Specifies a processing hint. Format is *sysparm_processing_hint*=setfield:request.parent=<incident sys_ For example, sysparm_processing_hint=setfield:request.parent=85071a1347c12200e0ef563dbb9 **Note:** If specified, this parameter overrides the configuration in the **Request Parent Mapping** sub-module.

Related topics

Create a request from an incident

Catalog Wizard form

Description of the fields for the Catalog Wizard Step, Catalog Wizard Section, Variable, and Catalog Wizard Question forms in Service Catalog wizards.

Catalog Wizard Step

Field	Description
Name	Unique name of the step.
Wizard	Wizard for which you are creating the step.
Hide on template	Option to hide the step in the catalog item template.
Custom step	Option to configure the step as a custom step.
Short description	Brief description of the step.
Feedback	Option to associate a feedback record with the step in the catalog item builder wizard or record producer builder wizard.

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Catalog Wizard Step (continued)

Field	Description
Template feedback	Option to associate a feedback text with a step in the catalog item template.
Order	Order where the step is placed in Catalog Builder.
Macroponent	Reusable seismic building blocks in the Next Experience UI Framework that can be used to create a custom step. This field appears only when the **Custom step** check box is selected. For more information, see https://developer.servicenow.com/dev.do#!/reference/now-experience/sandiego/ui-framework/getting-started/introduction

Catalog Wizard Section

Field	Description
Name	Unique name of the section.
Style	Display style of the section.
Order	Order in which the section appears inside a step.
Wizard step	Step with which the section is associated.
Short description	Brief description of the section.
Width	Width of the section in Catalog Builder.

Variable

Field	Description
Map to field	Maps the question to a specific field on the Catalog Item (sc_cat_item) table or Record Producer (sc_cat_item_producer) table.
Type	The variable type that you want to create.
Catalog item	Catalog item associated with the question.
Active	Option to make the variable available for use.
Mandatory	Option to make the variable mandatory as part of the ordering process.
Hidden	Option to hide the variable.
Read-only	Option to make the variable read only or editable.
Question	Question to ask catalog item creators in Catalog Builder.
Name	Name to identify the question.
Tooltip	Tooltip text to display when catalog item creators point to the variable in Catalog Builder. You can enter a brief note to describe the purpose of the question.

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Variable (continued)

Field	Description
Example Text	Hint that is displayed in the **Question** field before a catalog item creator enters a value. Applicable for the following variables: • IP Address • Email • URL • Single Line Text • Wide Single Line Text • Multi Line Text • Date • Date/Time

Catalog Wizard Question

Field	Description
Wizard section	Section with which the question must be associated with.
Map to set	Option to map the question to a question set. The **Set** field is enabled only when this option is selected.
Order	Order in which the question must appear inside a section.
Question	Option to associate a question to the section. **Note:** You can create a new variable to associate to a question or select an existing one. For information on creating a new variable, see Add a step, section, or question to a catalog item wizard.
Set	Option to associate a question set to the section if you have selected the **Map to set** option.

For information about adding a step, section, or question to a catalog item wizard, see Add a step, section, or question to a catalog item wizard.

Record Producer form

Description of the fields on the Record Producer form.

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Record Producers in the Service Catalog

Field	Description
Name	The descriptive name for the record producer. **Note:** The list shows only tables and database views that meet the scope protections for field styles.
Table name	The table in which the record producer creates records.
Active	A check box for making the record producer active. Only active record producers are available to users if they meet the role criteria.
Preview Link	A link that opens a preview of the item.
Post insert script	Script that operates on the submitted record, after the record is inserted in the associated table. **Note:** Post insert script overrides the target record values and record producer template values.
Accessibility	
Catalogs	The service catalog this record producer belongs to.
Category	The service catalog category this record producer belongs to. When users perform catalog searches, only items that are assigned to a category appear in search results.
View	The CMS view in which the item is visible.
Roles	The roles required to use the record producer.
Availability	The interface the record producer is available from: **Desktop and Classic Mobile**, **Desktop Only**, or **Classic Mobile Only**.
Can cancel	A check box for displaying a **Cancel** button on the record producer. Users can click **Cancel** to cancel the record producer and return to the last-viewed screen
What it will contain	
Short description	A short summary of the record producer.
Description	The full description of the record producer. You can embed videos, images, links to internal knowledge base (KB) articles, and links to external sources of information and instruction documentation. The description appears under a **More information** link on the record producer to give users any additional information they need.
Meta	Comma-separated list of tags used to search for the record producer. See Configure keyword search for catalog items.
Hide on Service Portal	If selected, the record producer is not available on Service Portal.

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Record Producers in the Service Catalog (continued)

Field	Description
Redirect To	Specifies the redirect behavior of the record producer after its generation. Possible values are: • **Generated Task record**: Redirects to the task record created using the record producer. • **Catalog Homepage**: Redirects to the service catalog where the order for the record producer is placed. The default value is based on the **Specifies the default behavior of record producer after record generation** property in the **Service Catalog** > **Catalog Administration** > **Properties** page.
Script	Scripts that are run to dynamically assign values to specific fields on the created record.
Icon	The small icon that appears on the list of service catalog items. Click the **Click to add** link and upload the photo.
Picture	The picture that appears at the top of the record producer form on the desktop view. Click the **Click to add** link and upload the photo.
Classic Mobile picture	The small picture that appears on the list of service catalog items. Click the **Click to add** link and upload the photo. This field is available when you select the **Classic Mobile** for the **Classic Mobile picture type**.
Classic Mobile picture type	The picture that the mobile interface uses on the list of service catalog items. Select one of the following: • Desktop: Uses the icon specified in the **Icon** field. Selecting this option hides the **Classic Mobile picture** field. • Classic Mobile: Uses the icon specified in the **Classic Mobile picture** field. • None: Does not use any picture on the mobile view. Selecting this option hides the **Classic Mobile picture** field.
Generated Record Data	
Template	Static assignments for fields on the created record.
Portal Settings	
Hide Attachment	If selected, the **Add attachments** button is not displayed for the record producer. **Note:** • Applicable for a catalog item and record producer. • An order guide inherits this setting from the included catalog item.
Hide 'Save as Draft'	If selected, the **Save as Draft** button isn't displayed for the record producer on the portals.

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Record Producers in the Service Catalog (continued)

Field	Description
	You can let requesters save a draft of a record producer while requesting it on the portals such as Employee Center and Service Portal, and Now Mobile app. The requesters can access the saved drafts from the My Request widget in the **Drafts** tab on the portals and edit the drafts.
Mandatory Attachment	If selected, adding an attachment is mandatory for the record producer. **Note:** Applicable for a catalog item and record producer.
Universal Request Config	
This section is available only when the Universal Request plugin (com.snc.universal_request) is activated. For information about this configuration, see Service Catalog configuration for Universal Request.	
UR certified/ enabled item	Option to specify that a universal request should also be created along with a task-based record. In the universal request, a reference is created to the associated task-based record, which becomes the primary task of the universal request.
Requires Additional Review	Option to automatically select the **Needs resolution review** check box on the corresponding universal request. For information about the universal request fields, see Universal Request form. The **Requires Additional Review** field appears only when the **UR certified/ enabled item** check box is selected.

For information about creating record producers, see Create a record producer.

Order guide form

Description of the fields on the Order guide form.

Order guide form

Field	Description
Name	Order guide name that appears in the catalog.
Active	Check box to indicate whether the order guide is active or not.
Category	Category heading under which the order guide appears in the catalog.
Two step	Check box to enable two step ordering instead of the default three-step ordering, omitting the final step. With two step ordering, selecting **Check out** submits the request immediately, then displays the order confirmation screen. This is not applicable for Service Portal.
Icon	A 16x16 pixel image to appear as an icon beside the order guide name in the catalog. If no image is uploaded, the default icon appears beside this order guide. To use your own default icon, upload an image, overwriting the image stored in images/service_catalog/generic_small.gif.

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Order guide form (continued)

Field	Description
Cascade variables	Check box to select whether the variables used cascade, which passes their values to the ordered items. If this check box is cleared, variable information entered in the order guide is not passed on to ordered items.
Ordered Item Link	Link to more information about an ordered item. Select a predefined link item to appear on the ordered item screen. Customers can click the link to access more information. This is not applicable for Service Portal.
Roles	Roles that users must have to access this order guide.
Short description	Summary of the order guide purpose.
Description	Description that appears on the first page of the order guide. Apply formatting with the HTML editor.
Meta	Comma-separated list of tags used to search for the order guide. See Configure keyword search for catalog items.
Hide on Service Portal	If selected, the order guide is not available on Service Portal.
Picture	[Optional] Image of the item.
Order to cart	Check box allowing users to add order guides to their cart, then continue shopping rather than checking out immediately. This is not applicable for Service Portal. **Note:** This setting only works when the *Two step* check box is also set to true.
Portal Settings	
Use these settings to configure the order guide behavior in Service Portal.	

Request method	Setting that controls the label displayed for the **Order Now** button and the order submission experience.
	
	• **Order**:
	  ○ Button label: **Order Now**
	  ○ Confirmation dialog box: Displayed
	  ○ Delivery information: Editable
	
	Note:
	This is the default setting.
	
	• **Request**:
	  ○ Button label: **Request**
	  ○ Confirmation dialog box: Displayed
	  ○ Delivery information: Not displayed.
	
	This setting can be used in scenarios such as a code access request where the delivery information is pre-determined.

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Order guide form (continued)

Field	Description
	• **Submit**: ○ Button label: **Submit** ○ Confirmation dialog box: Not displayed ○ Delivery information: Not displayed This setting can be used in scenarios such as reset password request where no further request information is required.
Hide 'Add to Cart'	If selected, the **Add to Cart** button is not displayed for the order guide. If the **Show Add to Cart** instance option of the widget is set to false, then this setting is ignored. This setting is selected by default if the **Request method** is **Request** or **Submit**. For upgrade scenarios, if the **No cart** field is selected in Platform, run the *CatalogPortalSettingsMigration* script include to update this setting to the **Hide 'Add to Cart'** field in the **Portal Settings** tab.
Show Include Toggle	If selected, a toggle is displayed for each catalog item in the **Choose Options** section in Service Portal. You can click this toggle to include or exclude the catalog item from the order guide request. For zBoot customers, this option is selected by default for existing order guides in the demo data and new order guides. For upgrade customers, this option is selected by default only for new order guides.

For information about creating an order guide, see Create an order guide.

Catalog Item form

Description of the fields on the Catalog Item form.

Catalog Item form

Field	Description
Name	Name to appear in the catalog.
Catalogs	Catalogs this item appears in.
Category	Category for the item. Categories can only be selected after the **Catalogs** field is populated. Catalog searches find only items that are assigned to a category in the Service Portal. For Employee Center, catalog searches find only items that are associated with a taxonomy topic. For more information, see Associate a catalog item with a taxonomy topic in Employee Center.

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Catalog Item form (continued)

Field	Description
Model	Product model to which the item is linked. This field is visible by default only for items created by publishing models. Click the reference icon to view the product model.
Active	Check box to make the item active (available to be ordered). **Note:** Inactive catalog items added to order guides do not appear in the order guide. Use **Visible On Guide**, **Visible elsewhere** to hide the item and show only in the order guide.
Fulfillment automation level	Option to specify the level of fulfillment automation for catalog item requests. The available options are: • Unspecified: Automation level of catalog item is not specified. • Manual: Catalog item is not automated. • Semi-automated: Catalog item is semi-automated. • Fully automated: Catalog item is completely automated.
Access Type	Option to specify if a request can be submitted for a user who does not have access to the catalog item. Possible options are: • Restricted: The request can only be submitted for users who have access to the catalog item. • Delegated: The request can be submitted even for users who do not have access to the catalog item. By default, this field is set to `Restricted`. For information about delegated request experience, see Delegated request experience. **Note:** This functionality is only applicable when the catalog item has a Requested For variable.
Owner	Owner of the catalog item who has edit access to it.
Template	Template using which the item is created.
Preview Link	Click **Preview Item** to preview in a new window how the current item definition would look in the catalog.
Ordered Item Link	Link to preview, as shown on the ordered item screen.
Hide on Service Portal	If selected, the catalog item is not available on Service Portal.
Availability	Devices to display the item: **Desktop and Classic Mobile**, **Desktop Only**, or **Classic Mobile Only**.

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Catalog Item form (continued)

Field	Description
	Note: Unsupported catalog item types are not displayed on Classic Mobile devices, even if **Availability** is set to show an item of this type.
Item Details	
Short Description	Text that appears on the service catalog homepage, search results, and the title bar of the order form.
Description	Full description of the item. This description appears in the catalog when a user selects the item or clicks the associated **Preview** link. You can embed videos, images, links to internal knowledge base (KB) articles, and links to external sources of information and instruction documentation.
Meta	Comma-separated list of tags used to search for the catalog item. Use commas between keywords for better results when searching. The Zing search engine removes common words from search queries that do not produce meaningful results. See Configure keyword search for catalog items.
Process Engine **Note:** You can specify a value for only one of these fields.	
Flow	Flow that defines how the item request is fulfilled.
Workflow	Workflow that defines how the item request is fulfilled.
Execution plan	Execution plan (formerly named delivery plan) that defines how the item request is fulfilled.
Picture	
Icon	Image to appear as an icon beside the item name in the catalog. Upload a 27x27 pixel image. If no image is uploaded, the default icon appears beside this item. To use your own default icon, upload an image. The uploaded image overwrites the default image stored in `images/service_catalog/generic_small.gif`.
Picture	Image of the item.
Classic Mobile	
Classic Mobile Picture Type	Type of picture to display for the item on mobile devices. Set to **Desktop** to use the standard desktop picture, **Classic Mobile** to use a specific image for the mobile device using the **Mobile picture** field, or **None** to not use a picture.
Classic Mobile Picture	Image file for the mobile picture. The field appears if **Classic Mobile picture type** is set to **Classic Mobile**.
Hide Price (classic	Check box to hide the item price on mobile devices. Clear the check box to display the price.

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Catalog Item form (continued)

Field	Description
mobile listings)	
Pricing	
Price	Price for the item. Select the currency from the choice list.
Recurring Price	Price that occurs repeatedly at a regular interval. For example, a printer maintenance service could have a $100.00 monthly recurring price.
Recurring Price Frequency	Time frame for recurrence, such as **Monthly** or **Annually**, only if the **Recurring Price** field has an entry.
Omit Price in Cart	Check box to hide the item price in the cart and the catalog listing.
Portal Settings	
Use these settings to configure the catalog item behavior in Service Portal.	
Request method	Setting that controls the label displayed for the **Order Now** button and the order submission experience. • **Order**: ◦ Button label: **Order Now** ◦ Confirmation dialog box: Displayed ◦ Delivery information: Editable **Note:** This is the default setting. • **Request**: ◦ Button label: **Request** ◦ Confirmation dialog box: Displayed ◦ Delivery information: Not displayed. This setting can be used in scenarios such as a code access request where the delivery information is pre-determined. • **Submit**: ◦ Button label: **Submit** ◦ Confirmation dialog box: Not displayed ◦ Delivery information: Not displayed This setting can be used in scenarios such as reset password request where no further request information is required.
Hide 'Add to Cart'	If selected, the **Add to Cart** button is not displayed for the item. If the **Show Add to Cart** instance option of the widget is set to false, then this setting is ignored. This setting is selected by default if the **Request method** is **Request** or **Submit**.

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Catalog Item form (continued)

Field	Description
	For upgrade scenarios, if the **No cart** field is selected in Platform, run the *CatalogPortalSettingsMigration* script include to update this setting to the **Hide 'Add to Cart'** field in the **Portal Settings** tab. **Note:** Applicable for a catalog item and order guide.
Hide 'Save as draft'	If selected, the **Save as Draft** button isn't displayed for the item on the portals. You can let requesters save a draft of a catalog item while requesting it on the portals such as Employee Center and Service Portal, and Now Mobile app. The requesters can access the saved drafts from the My Request widget in the **Drafts** tab on the portals and edit the drafts.
Hide Quantity	If selected, the **Quantity** list is not displayed for the catalog item. This is selected by default if the **Request method** is **Request** or **Submit**. For upgrade customers, if the **No quantity** field is selected in Platform, run the *CatalogPortalSettingsMigration* migration script to update this setting to the **Hide Quantity** field in the **Portal Settings** tab. **Note:** • Applicable for a catalog item. • An order guide inherits this setting from the included catalog item.
Hide Delivery time	If selected, the **Delivery Time** field is not displayed for the catalog item. This is selected by default if the **Request method** is **Submit**. **Note:** • Applicable for a catalog item. • An order guide inherits this setting from the included catalog item.
Hide 'Add to Wish List'	If selected, the **Add to wish list** button is not displayed for the catalog item. If the wish list is disabled for the catalog item or the portal widget instance option is set to false, then this setting is overridden for the item. **Note:** Applicable for a catalog item and record producer.
Hide Attachment	If selected, the **Add attachments** button is not displayed for the catalog item. **Note:** • Applicable for a catalog item and record producer. • An order guide inherits this setting from the included catalog item.

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Catalog Item form (continued)

Field	Description
Mandatory Attachment	If selected, adding an attachment is mandatory for the catalog item. **Note:** Applicable for a catalog item and record producer.
Universal Request Config	
This section is available only when the Universal Request plugin (com.snc.universal_request) is activated. For information about this configuration, see Service Catalog configuration for Universal Request.	
UR certified/ enabled item	Option to specify that a universal request should also be created along with a requested item. In the universal request, a reference is created to the associated requested item, which becomes the primary task of the universal request.
Requires Additional Review	Option to automatically select the **Needs resolution review** check box on the corresponding universal request. For information about the universal request fields, see Universal Request form. The **Requires Additional Review** field appears only when the **UR certified/ enabled item** check box is selected.
Fields that can be added by configuring the form	
Expand help for all questions	Check box to expand and display help information for all questions on loading the page. **Note:** • This field is also applicable in Service Portal. • If the **Expand help for all questions** check box is selected at the catalog item level, then the **Always Expanded** field setting at the variable level is overridden. • If the **Expand help for all questions** check box is deselected at the catalog item level, then the **Always Expanded** field setting at the variable level is applicable.
Template	Template to populate the generated record with predefined values. The field is available for **Record Producer** items only.
No Quantity	Check box to hide the quantity selector for the item.
No Cart	Check box to hide the shopping cart for the item.
No search	Check box to prevent this item from being listed in search results and also in the Service Catalog widget on the Service Portal. If this is selected: • In Service Portal, you can neither browse nor search for the item. • In Platform, you can browse to find the item.

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Catalog Item form (continued)

Field	Description
Order	Controls the ordering of items in category lists.
Domain	Domain in which the catalog item is created. Applicable when the domain separation is enabled in Service Catalog. For information about domain separation, see Domain separation and Service Catalog.
Domain Path	Series of three-character codes separated by a slash (/) delimiter to identify a domain. This path string is unique in the domain hierarchy. Applicable when the domain separation is enabled in Service Catalog.
Related Links	
Item Diagnostic	Generates a diagnostic report and score to identify possible issues within the Service Catalog data and configuration.
Edit checked out item in advanced view	Allows you to edit the catalog item in the advanced view. To add a catalog client script to a checked out item in the Draft state, you can click this related link and add the catalog client script using the Catalog Client Scripts related list. **Note:** This option is available only after you click **Edit in Catalog Builder** to edit an item in catalog builder.
Related Lists	
Variables	Variables for the item to provide options for ordering the item.
Variable Sets	Variable Set linked to the item. Link an existing variable set to the item to provide multiple options for ordering the item.
Approved By Group	Groups that must approve requests for this item.
Approved By	Users who must approve requests for this item.
Categories	Additional categories associated with this item.
Catalogs	Additional catalogs associated with this item.
Catalog Data Lookup Definitions	Catalog data lookup rules associated with the catalog item. For information on creating a data lookup rule, see Create a catalog lookup definition.
Catalog UI Policies	Catalog UI policies associated with this item.
Catalog Client Scripts	Catalog client scripts associated with this item.
Related Items	Related items for a catalog item to provide alternatives. These items are displayed in the catalog item page in Service Portal and Now Mobile.
Related Articles	Related articles for a catalog item to provide additional information. These articles are displayed in the catalog item page in Service Portal and Now Mobile.

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Catalog Item form (continued)

Field	Description
Service Fulfillment Steps	Associated service fulfillment steps.
Assigned Topics	Associate a catalog item to a taxonomy and topic. For information about how to add an item to a taxonomy, see Associate a catalog item with a taxonomy topic in Employee Center. **Note:** This field becomes available when you activate the Employee Experience Taxonomy plugin (sn_ect).

For information about creating or editing a catalog item, see Create or edit a catalog item.

Debugging Service Catalog

Debug user criteria of catalog items, UI customizations for Service Catalog pages, actions on catalog item variables, performance diagnostics of a catalog item, and so on.

Debug actions on catalog item variables

Analyze the client-side actions affecting the state and values of all variables. You can also get insights into the performance of each script working on the variables.

Before you begin

Role required: admin, catalog_admin, catalog_manager, or catalog_editor.

Note: You can perform this task with the catalog_manager or catalog_editor role only if you are assigned as the manager or editor of the catalog.

About this task

The variable action logger displays the chronology of actions that happen on all variables of a catalog item before it is submitted. These actions can happen due to catalog client scripts, catalog UI policies, or catalog data lookups. This client-side logger does not store any data in the database. Also, the information displayed is applicable only while you work on the catalog form. Features available for debugging Service Catalog issues including UI macro customization debugging; variable action logger; variable watcher; item diagnostic report

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Enable Variable Action Logger**. The UI Page Customization Diagnostics logger is enabled.

   Note: Perform this step before you run the logger.

2. Navigate to **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
3. In the Catalog Items list, select an item that you want to log .
4. On the Catalog Item form, click **Try it**.
5. On the catalog page for the item, right-click the header and select **Show Variable Action Logger**.

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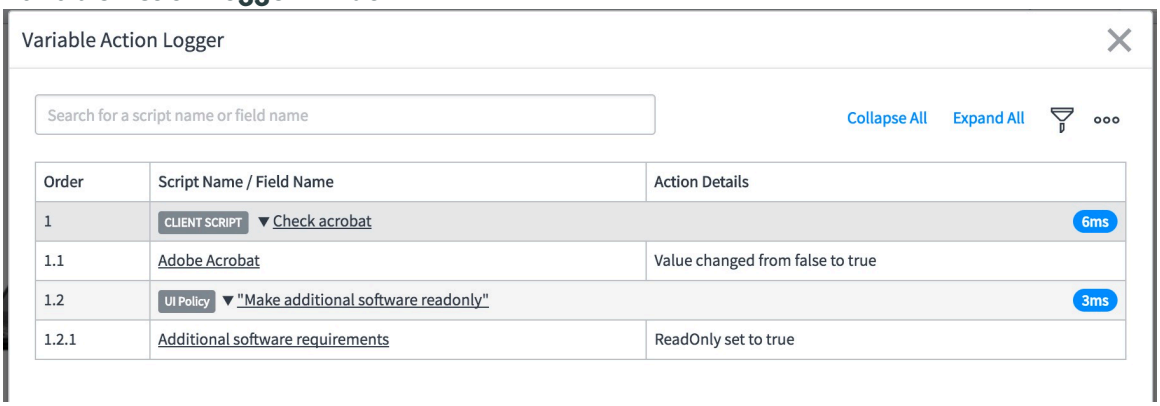
Note:
The variable logs are grouped by catalog UI policies, catalog client scripts, and data lookups.

The following information is displayed in the Variable Action Logger window:

- Order in which scripts and actions are executed. When a new action is triggered from an existing action, the order of the new action is tracked at a sublevel under the order of the existing action. For example, the order of a new action triggered from step 1.2 is 1.2.1.
- Source of the action taken on a variable and the variable name.
- Details of the action taken on the variable.

Variable Action Logger window



6. Review the results of the variable action logger.

Option	Description
Search	To search for a variable or script, use the **Search** field.
Collapse All	To collapse variable logs within a group, click **Collapse All**.
Expand All	To expand variable logs within a group, click **Expand All**.
Filter	To filter variable logs, click the Filter icon ( ) and select the required options.
Clear Logs	To clear variable logs, click the Actions icon ( ) and select **Clear Logs**.
Export to CSV	To export the variable logs to a .csv file, click the Actions icon ( ) and select **Export to CSV**.
Print Logs	To print variable logs, click the Actions icon ( ) and select **Print Logs**.

Debug user criteria of a catalog item

Debug whether a user can access a catalog item based on the matched user criteria and fix any issues.

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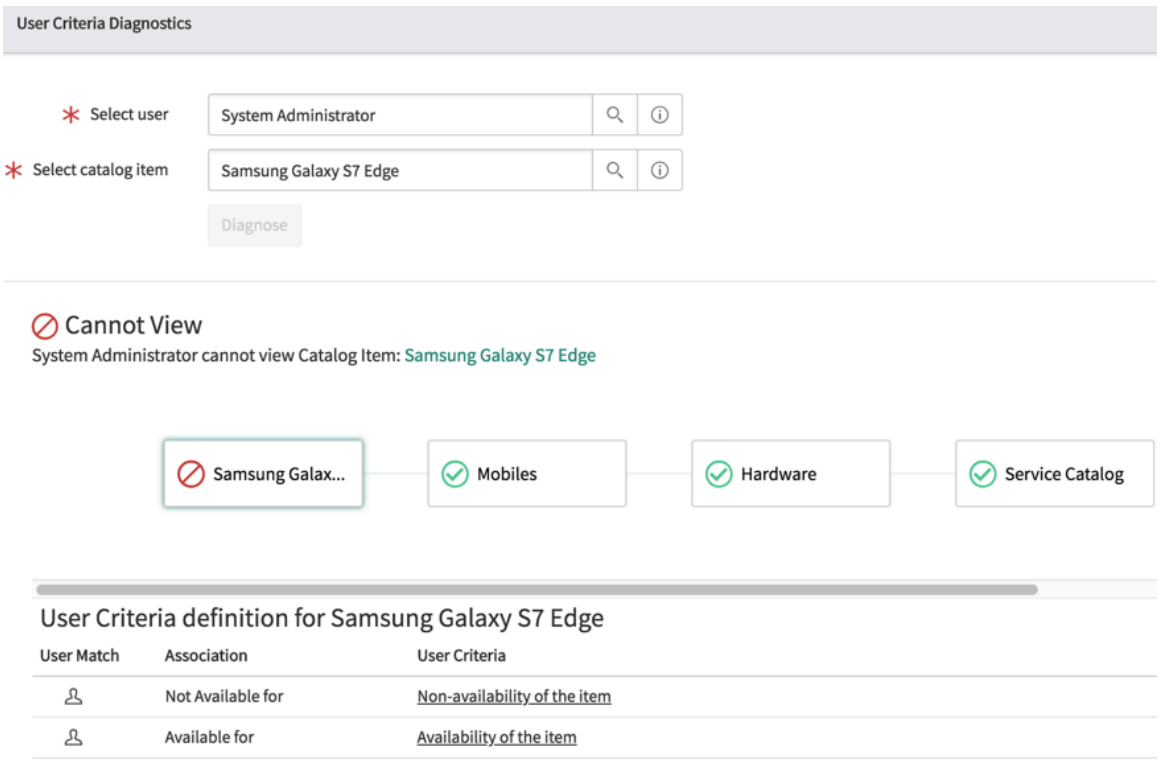
Before you begin
Role required: catalog_manager, catalog_admin, or admin

About this task
You can only debug access issues based on user criteria, but not based on access control list rules (ACLs). For information about user criteria, see Set security for items and categories.

For any scripted user criteria that uses a session api such as `gs.getUserID()`, the session of the logged-in user is used. Edit the behavior of the scripted user criteria using the pre-defined `user_id` variable in the **Script** field of a user criteria. For information about the Script field, see Create a user criteria record in Service Catalog.

Procedure
1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **User Criteria Diagnostics**.
   The User Criteria Diagnostics form is displayed.
2. In the **Select user** field, select the user whose access you want to debug.
3. In the **Select catalog item** field, select the required catalog item.
4. Click **Diagnose**.



   - The item hierarchy is displayed along with an indication of the user's access to each node (catalog, category, or catalog item) based on the user criteria associated with the node.

Note:

- If the item is available in multiple catalogs or nested categories, the corresponding catalogs and categories are displayed as nodes in a tree format.
- If the user matches multiple user criteria associated with the node, then the user can access the node only if the following conditions are met:
  - The user matches at least one of the user criteria in the **Available For** list.
  - The user does not match any user criteria in the **Not Available For** list.

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- All user criteria defined for the item is displayed. For each user criteria, the following information is available:

  User Match

  is displayed if the selected user matches the user criteria.

  Association

  Association of the node with the user criteria, that is, **Available for** or **Not Available for**.

  User Criteria

  Name of the user criteria.

5. To verify if the user can view a node of the hierarchy, click the node.
   User criteria defined at the node is displayed. For example, when you click a node representing a category, the user criteria defined for the category is displayed.
6. To edit the configuration of a user criteria, click its name under the **User Criteria** column.

Debug UI customizations for a Service Catalog page

Perform the health check of a Service Catalog page. The UI Page Customization Diagnostics window displays the UI macros applicable for the Service Catalog page and their corresponding states. For issues on a Service Catalog page due to customized UI macros, you can identify the source of broken functionality.

Before you begin

Role required: admin or catalog_admin.
Watch this seven-minute video to learn more about UI customization debugging, variable action logger, variable watcher, and the Item Diagnostic report. Features available for debugging Service Catalog issues including UI macro customization debugging; variable action logger; variable watcher; item diagnostic report

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Debug UI Customization**.
   The UI Page Customization Diagnostics window is enabled.
2. Navigate to a Service Catalog page that you want to debug.
3. Review the information in the UI Page Customization Diagnostics window at the bottom of the page.

   To maximize the UI Page Customization Diagnostics window, click . The following information is displayed:

   - Name of the current Service Catalog page.
   - State of the Service Catalog page.
   - All UI macros applicable for the Service Catalog page.
   - State of each UI macro. For details on possible states, click the Help icon ( ).
   - Number of occurrences of each UI macro in the Service Catalog page.

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Possible states for a UI macro and a Service Catalog page

State	Color indicator	Description
Unchanged	Green	Created by ServiceNow and one of the following scenarios is applicable: ○ It has never been customized by the customer. ○ It has been customized by the customer and then reverted to the latest ServiceNow upgrade.
Skipped	Red	Created by ServiceNow and then customized by the customer, and hence skipped the latest ServiceNow upgrade. The customer should resolve a skipped update after an upgrade.
Customized	Orange	Created by ServiceNow, and then customized by the customer after the latest ServiceNow upgrade. The customer can revert a customization to implement the latest ServiceNow upgrade.
New	Blue	Created by the customer. The top element of the UI macro should have the following attribute: `data-sn-macro-sys-id="${jvar_macro_sys_id}"` **Note:** The top element can be a div, span, or table.

Note:

- When you click the Service Catalog page name or the UI macro name, the corresponding UI page or the macro page is displayed.
- When you point to a macro in the UI Page Customization Diagnostics window, the corresponding UI elements are displayed with a pink border.
- The state-based color indication is applicable only for UI macros that have a visible UI.

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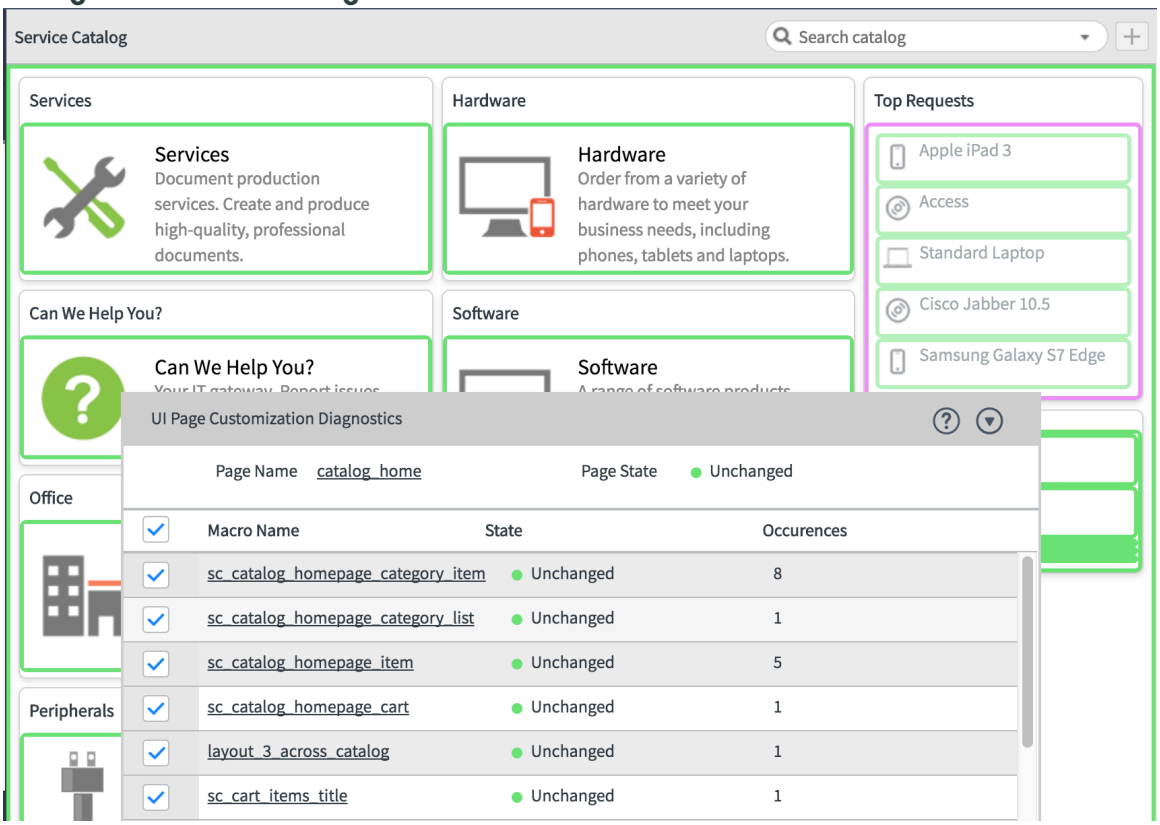
UI Page Customization Diagnostics window



4. To minimize the UI Page Customization Diagnostics window, click .

Related topics

UI macros

Upgrade History module: Track every upgrade

Debug performance diagnostics of a catalog item

Analyze the impact of the variable setup in a catalog item on its runtime performance, and identify any issues. You can review the processing time of the catalog item and its variables based on the triggered SQL queries.

Before you begin

Role required: admin or catalog_admin

About this task

The variable SQL debugger is not applicable for the following variables:

- Container Start
- Container End
- Container Split
- Break

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Procedure

1. Enable the variable SQL debugger by navigating to **Service Catalog** > **Catalog Variables** > **Enable Variable SQL Debugger**.

   Note:
   - The variable SQL debugger is applicable for catalog items and record producers.
   - After you enable the variable SQL debugger, if you disable the display of the troubleshooting information on a catalog page by navigating to **System Diagnostics** > **Session Debug** > **Disable All**, the variable SQL debugger is still active.
   - To disable the variable SQL debugger, navigate to **Service Catalog** > **Catalog Variables** > **Disable Variable SQL Debugger**.

2. Navigate to **Service Catalog** > **Catalog Definitions** > **Maintain Items**, select a catalog item that you want to debug, and click **Try It**.

3. Click the more options icon (⋮) and select **Show Variable SQL Debugger**.
   The following information is displayed in the Variable SQL Debugger window:
   - Number of variables included in the catalog item.
   - Number of SQL queries triggered for the catalog item.
   - Time taken to process and load the catalog item page.
   - Time taken to run all SQL queries of the catalog item.

   Variable SQL debugger fields

Field	Description
Variable	Catalog item variable for which the performance diagnostics are displayed.
Processing Time	Time taken to process and load the variable.
SQL Count	Number of SQL queries triggered for the variable.
SQL Time	Time taken to run SQL queries for the variable.
SQLs	Details of the SQL queries triggered for the variable.

4. To sort by any field, click the field name.

   Note:
   - By default, variables are sorted in descending order by their processing time.
   - Variables within a single-row or multi-row variable set are displayed in hierarchical order.

5. To view the configuration of a variable, click the variable name.
6. To view a detailed summary of all SQL queries triggered for a variable, click **View Details** in the **SQLs** field of the variable.
7. To change the sort order, Use the **Sort By** list.

   Note:
   By default, triggered SQLs are sorted in descending order by their execution order.

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Debug a Service Catalog variable

Monitor changes in the state and the value of a Service Catalog variable due to catalog client scripts, catalog UI policies, and catalog data lookups. You can diagnose and resolve issues related to such changes, and track client-side scripting errors on this tab.

Before you begin

Role required: admin or catalog_admin Features available for debugging Service Catalog issues including UI macro customization debugging; variable action logger; variable watcher; item diagnostic report

Procedure

1. Enable the JavaScript log and field watcher..

   a. In the banner, click the settings icon ().

   b. In the System Settings window, click the **Developer** tab.

   c. Enable the **JavaScript Log and Field Watcher** option.
   The **JavaScript Log** and **Field Watcher** tabs are displayed in a pane at the bottom of the page. For information about JavaScript logs and fields watcher, see JavaScript log and Field Watcher .

   d. Close the System Settings window.

2. Navigate to **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
3. In the Catalog Items list, select a catalog item to debug its variables, and click **Try it**.
4. On the form, right-click a variable field label and select **Watch Variable**.

   The debug icon () is displayed next to the variable, and the **Field Watcher** tab in the bottom pane is replaced with the **Variable Watcher** tab.
5. Edit the fields on the **Variable Watcher** tab.

Field	Description
Item	Current catalog item.
Variable	Variable that is being watched.
Type	Type of the variable.
Create roles	User type that can create values for the variable.
Write roles	User type that can edit values for the variable.
Read roles	User type that can read values for the variable.
Reference	Reference table for the variable. Applicable for reference variables.
Reference Qual	Qualifiers to restrict data that is available in the field. Applicable for list collector, lookup multiple choice, lookup select box, and reference variables.
Attributes	Attributes of the variable.

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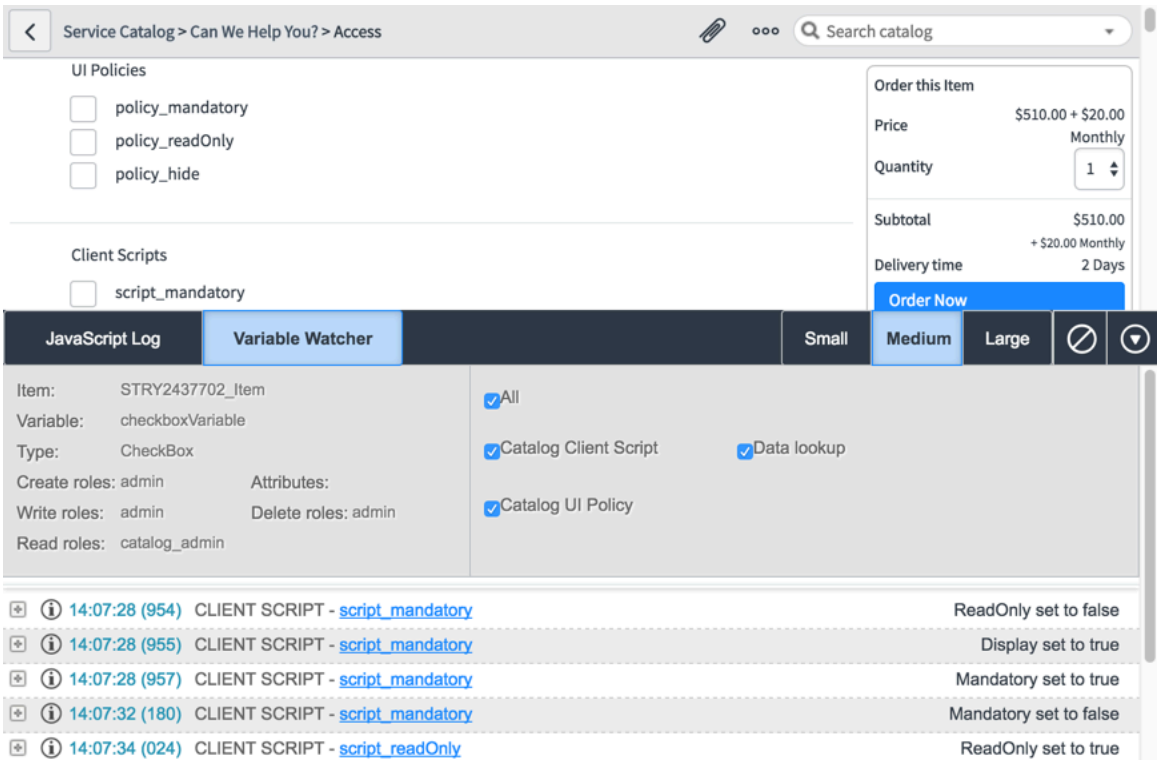
Field	Description
Delete roles	User type that can delete values for the variable.
All	If selected, displays the action log of the variable due to catalog client scripts, data lookups, and catalog UI policies.
Catalog Client Script	If selected, displays the action log of the variable due to catalog client scripts.
Data lookup	If selected, displays the action log of the variable due to data lookups.
Catalog UI Policy	If selected, displays the action log of the variable due to catalog UI policies.

Variable Watcher tab



6. To watch another variable, right-click that variable and select **Watch Variable**.

Note:
You can watch only one variable at a time.

7. To stop watching a variable, right-click the variable and select **Unwatch Variable**.
8. To clear the logs, click the Clear log icon ( ).
9. To resize the pane, click **Small**, **Medium**, or **Large**.
10. To close the pane, click the Close icon ( ).

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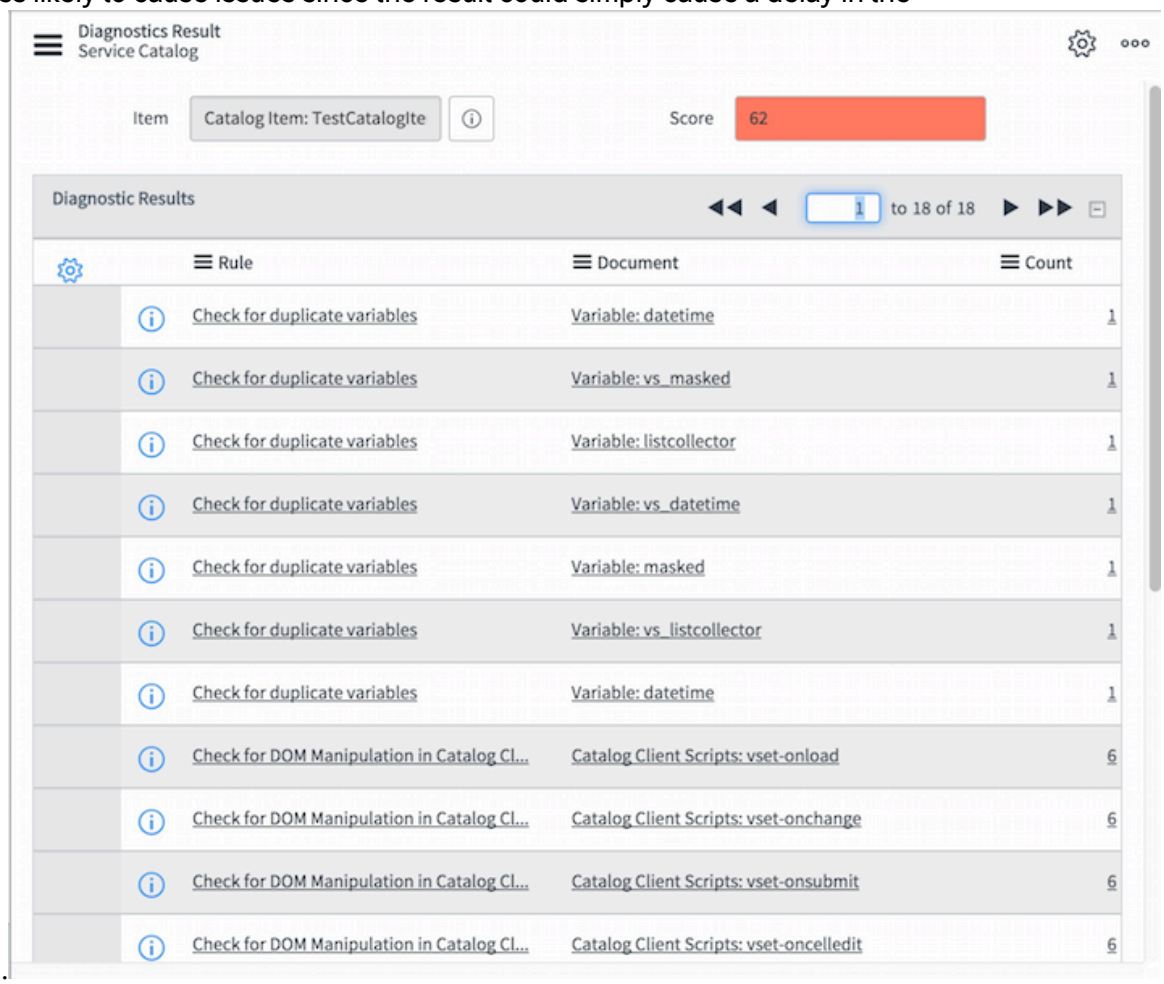
Item diagnostic report

For a catalog item data and configuration, you can identify possible violations from the ServiceNow recommended practices.

The item diagnostic report includes a score that measures the health of the item, and a list of diagnostic result entries. These entries consist of a rule, a document (record that violates the rule), and a count (the number of violations in the record).

Correct violations for best performance and to maintain expected behavior.

The lower the score, the better (0 is ideal). A higher score means that an item has more violations from the ServiceNow recommended practices. Each rule has a different weight and level of importance. For example, a violation of duplicate variables is more likely to result in user issues. An AJAX usage violation is less likely to cause issues since the result could simply cause a delay in the UI.



Default diagnostic rules

These diagnostic rules are designed as per ServiceNow recommended practices.

Default diagnostic rules

Rule	Description
checkUserCriteriaUsage	Identifies if the item is using entitlements instead of user criteria

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Default diagnostic rules (continued)

Rule	Description
checkBalancedContainers	Checks if the Container Start and Container End variables are balanced.
checkDuplicateVariables	Identifies variables with the same name associated to a catalog item (or an associated variable set).
checkDOMManipulation	Identifies any DOM violation in catalog client scripts. The DOM is not guaranteed to be the same between releases and can affect catalog client scripts during upgrades. Therefore, it is not recommended for customers to do any kind of DOM manipulation. You can view detailed information for each client script by clicking the information icon.
checkLookupVariableRowCount	Checks if the Lookup variable is run on tables with many records as it can lead to slower load times.
checkAJAX	Identifies all AJAX calls in catalog client scripts because, although AJAX calls in catalog client scripts are allowed, they must be asynchronous. All AJAX calls are listed because even asynchronous calls can cause some delay. You can view detailed information for each client script by clicking the information icon.
checkSelectBoxUnique	Identifies Select Box type variables that have the attribute enabled to show only unique entries in the select box.
checkOrderGuideRuleBaseCount	Checks for high number of active rule bases in an order guide as higher number of rule bases can lead to slower load times
checkFormatterVariablesUsage	Checks if the item has the following variable types: • Macro • Macro with label • UI Page For information on the variable availability across various channels, see Variable support in various channels.

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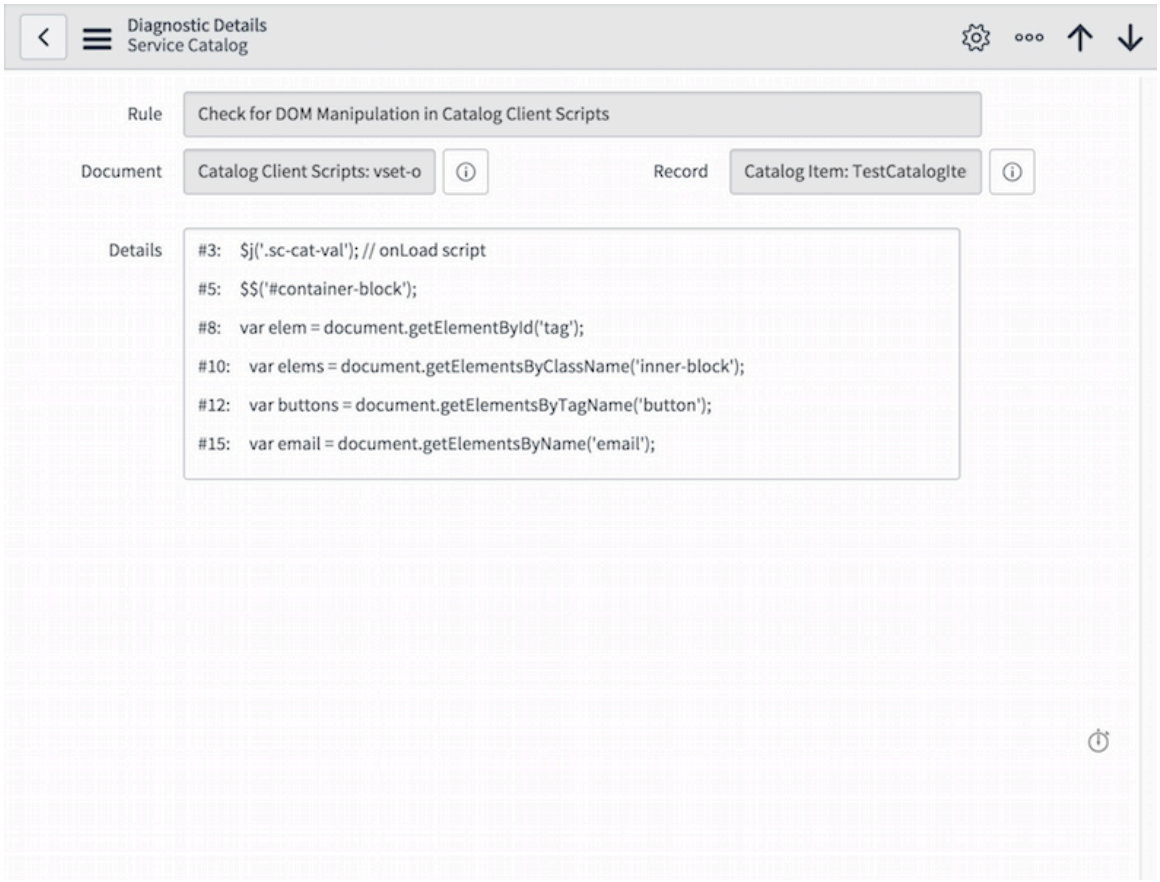

Run the Item Diagnostic Results report

Identify the catalog items that are not designed per ServiceNow recommended practices to run your catalog efficiently.

Before you begin

Role required: admin or catalog_admin

About this task

This report runs every weekend on all catalog items of all types.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Request Reports**.
2. Select the [Catalog] Item Diagnostics Results report.
   A report is displayed with all active catalog items with a non-zero score. These catalog items are grouped by score and each score has a different color.
3. Click the score to diagnose the associated catalog items.

   Note:

   - Any item with a score greater than zero indicates a recommended practice rule violation.
   - The higher the score, the more is the catalog item deviating from ServiceNow recommended practices.

4. Click the score of the required catalog item.

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Diagnostic results are displayed for the catalog item with violated rules. For information on default diagnostic rules per ServiceNow recommended practices, see Item diagnostic report.

5. To understand details of each violated rule, click the **Count** value for that rule.

Service catalog UI policy

UI policies can be used to define custom process flows for tasks.

Catalog UI policies control the behavior of catalog item forms when presented to your users. Catalog UI policies can be applied to a catalog item or a variable set.

UI policies are useful when applied to service catalog items. Keep the following points in mind when creating service catalog UI policies:

- A catalog UI policy applies to either a specific catalog item or any item that uses a specific variable set.
- A catalog UI policy can only contain and reference variables that are defined for the catalog item or variable set.
- Like UI policy conditions, the variables in a service catalog UI policy condition must be visible (even if hidden by UI policy or read-only) on the form for the condition to be tested. Also, ensure that the variables have names. For more information, see Create a catalog client script.
- Limited UI policy functionality applies to following variables:
  - The Mandatory and Read Only policy do not apply to the following variable types: Break, Container Split, Container End, UI Macro, UI Macro with Label, Label, UI Page.
  - The Set visible policy does not apply to the following variable types: Break, Container Split, Container End.
- Service catalog UI policies are applied to variables and variable sets of catalog items ordered in the service catalog. Policies can also be applied when the variables are present in a Requested Item or Catalog Task form.

  Note:
  The **Clear the variable value** UI policy action is not applicable on variable sets and containers.

- Catalog UI policy actions can be applied on a variable set. The actions on a variable set are applied on all variables within the variable set. If different catalog UI policy actions are applied on a variable or a variable set, the action with the lowest order is considered.
- The priority order for UI actions types is:

  1. Mandatory (highest)
  2. ReadOnly/Display

  If a variable is set to mandatory and does not have value, readonly or hide do not work on that variable. If a variable is hidden or readonly, and then set to mandatory, the variable field becomes visible or editable.

  This priority order is also applicable for variable sets and containers. If a variable set or container has a mandatory variable without any value, then the container or variable set cannot be hidden.

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- Catalog UI policies are supported for catalog items viewed in a service catalog wizard.

Note:
The UI policy for catalog items always takes precedence over UI policy for variable sets. You can change this behavior by editing the *glide.sc.ui_policy.variable_set_run_first* property.

Create a UI policy for catalog items

You can apply UI policies for catalog items ordered in the service catalog.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Catalog UI Policies**.
2. Select **New**.
3. In the **Applies to** field, select **A Catalog Item**.
4. Fill in the remaining fields.

Field	Description
Applies to	Select the type of item this UI policy applies to: ○ **A Catalog Item**: enables the **Catalog item** field. ○ **A Variable Set**: enables the **Variable set** field.
Catalog Item or Variable Set	Select the catalog item or a variable set this UI policy applies to. The field name and options available depend on the **Applies to**selection.
Short description	Enter a brief description (example, Out-of-state move).
Active	Select the check box to enable the UI policy. Clear the check box to disable it.
When to Apply	
Catalog Conditions	Create conditions for the UI policy using catalog item variables. The policy is applied if the conditions evaluate to be true. For example, a catalog item of **Schedule a Move** may have a condition of **move_from > is > San Diego**. The UI policy is applied when an employee schedules a move from San Diego to any other company location. **Note:** The label of a variable associated with a variable set reflects the variable set name. The format is *variable_set_name » variable_name*.
Applies on a Catalog Item view	Select the check box to apply the UI policy to catalog items within the order screen. Available in the requester view.
Applies on Catalog Tasks	Select the check box to apply the UI policy on a Catalog Task form. Available in the fulfiller view. See VEditor.

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Field	Description
Applies on Requested Items	Select the check box to apply the UI policy on a Requested Item form. Available in the fulfiller view. See VEditor.
Applies on the Target Record	Select the check box to support the catalog UI policy on a record created for task-extended tables via record producers. See Default variable editor.
On load	Select the check box to apply the UI policy when the form is loaded. Clear the check box to apply the policy only when the form is changed.
Reverse if false	Select the check box to reverse the UI policy if the **Catalog Conditions** statement evaluates to false.
Script	
Run scripts	Select the check box to use the **Execute if true** and **Execute if false** scripting fields. Scripts are necessary to apply a UI policy other than **Read Only**, **Mandatory**, or **Visible**. For example, you must create a script to apply a UI policy to a specific role.
Other fields	
Order	Enter the sequence in which this UI policy is evaluated if more than one matching UI policy exists. The order is evaluated from the lowest value to the highest value.
Global	This field isn't used for the service catalog.
Inherit	This field isn't used for the service catalog.
Catalog UI Policy Actions	
Variable name	Select the variable or variable set that belongs to the catalog item. When you apply catalog UI policy actions on a variable set, the actions are applied on all variables within the variable set. If different catalog UI policy actions are applied on a variable or a variable set, the action with the lowest order is considered. **Note:** ○ The set value UI policy action isn't applicable for the attachment and masked variables. Use the **Clear the variable value** option to clear the value for the attachment and masked variables. ○ For multi-row variable set, you can apply a UI policy action on the complete variable set but not on individual variables inside it. ○ The label of variables associated with a variable set reflects the variable set name. The format is *variable_set_name » variable_name*.
Order	Sequence in which the UI policy action is evaluated. The order is evaluated from the lowest value to the highest value. This is also applicable in Service Portal.
Mandatory	Choice list for specifying how the UI policy affects the mandatory state of the field. Choices are:

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Field	Description
	○ Leave alone ○ True ○ False
Visible	Choice list for specifying how the UI policy affects the visible state of the field. Choices are: ○ Leave alone ○ True ○ False
Read Only	Choice list for specifying how the UI policy affects the read-only state of the field. Choices are: ○ Leave alone ○ True ○ False
Value action	Choice list for specifying whether to set a value for the question, clear the value, or set nothing for the question. Here are the choices. ○ Leave alone ○ Set value: Option to set a value for the question in the catalog item. ○ Clear value: Option to clear the variable value.
Value	Enter a value for the question. This field appears only when you select **Set value** from the Value action list.
Field message type	Select any of the message types that you want to show for the question. ○ Info ○ Warning ○ Error **Note:** If you don't want any message, select **None**.
Field message	Enter a message that you want to show for the question when a specified condition is met. This field appears only when you select a value from the Field message type list.

5. Select **Submit**.

Note:
Configure the variable form to display all fields.

Service Catalog UI policy examples

The following is an example of how Service Catalog UI policies work.

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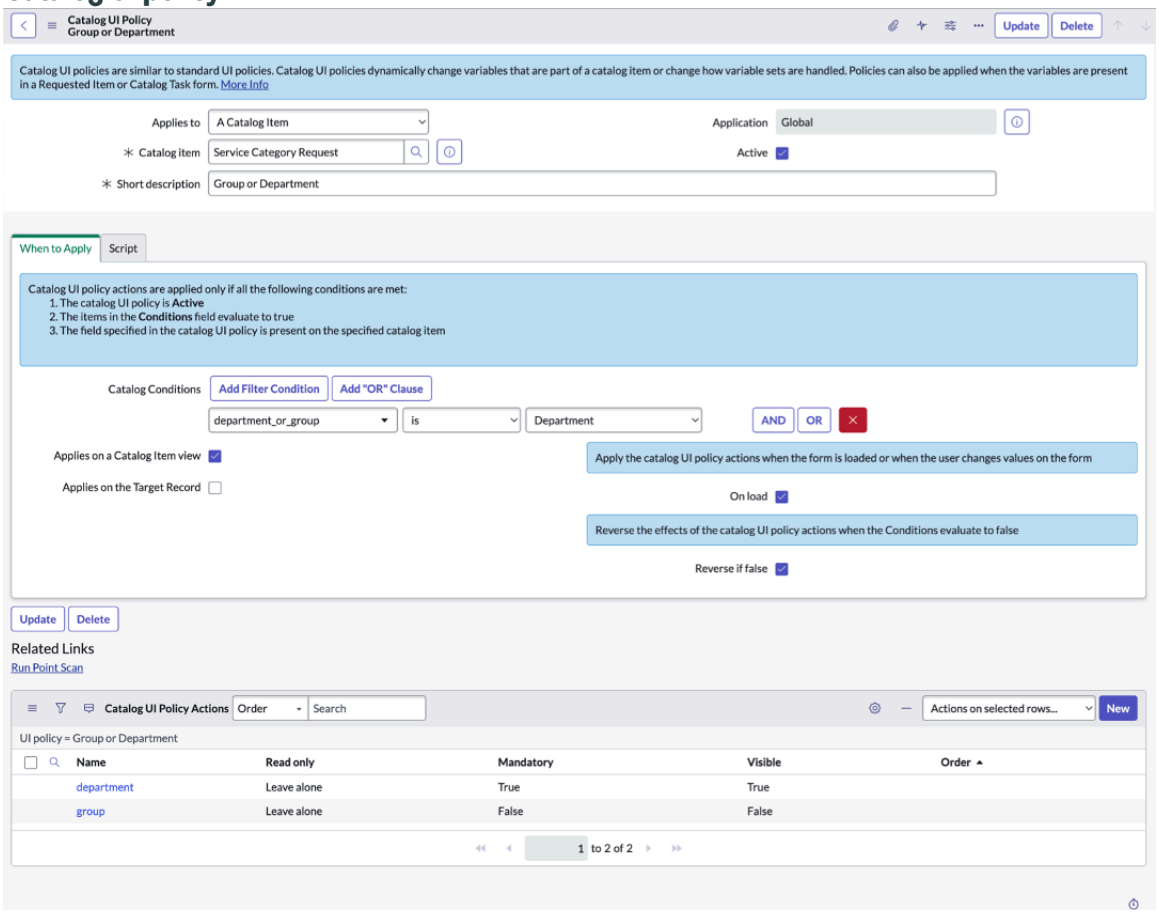
The following UI policy makes it mandatory for any department to specify the name of the department if **Department** is selected for the question **Department or group?**.

Catalog UI policy



Catalog Builder

You can create or edit a catalog item (catalog item or record producer) using a visual and guided experience along with specified restrictions. The catalog builder experience enables you to delegate the creation and maintenance of the catalog.

You can also create a template that can be used to create catalog items. While creating the template, you can specify values or restrictions for items created using the template, for example, restrictions to catalogs, categories, variable types, and portal settings.

From the home page of the catalog builder, you can do the following:

- Create a catalog item
- Create a catalog item template
- View the available catalog items
- View the available catalog item templates
- View catalog items that are recently updated
- View the configured content that describes the catalog building process in your organization

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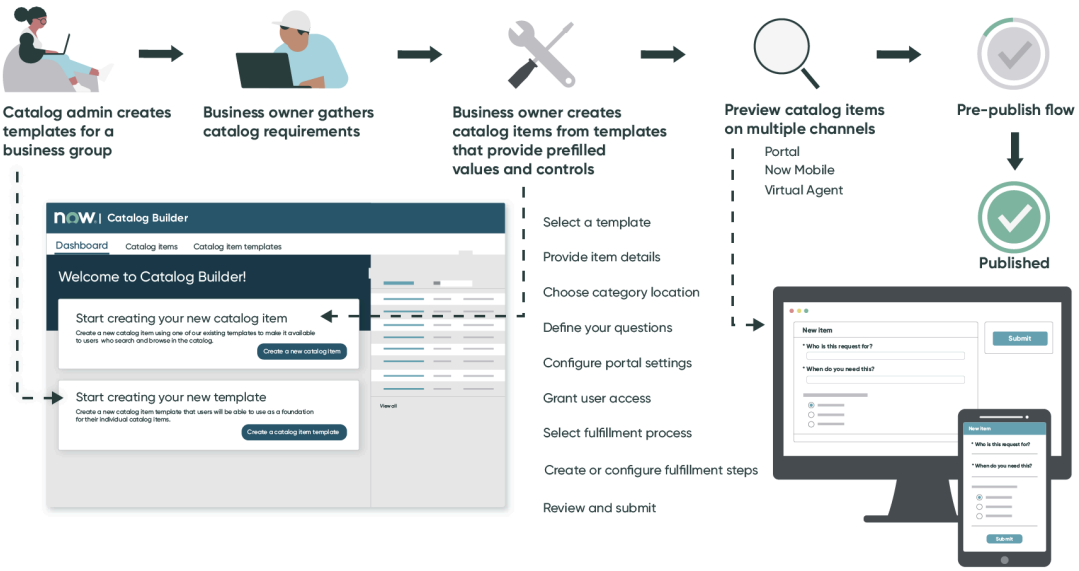
How does the catalog builder work

Catalog administrator creates templates for a business or service group. The business owner or service owner gathers catalog requirements and creates catalog items from these templates. All advanced capabilities are added by catalog administrators or developers.

Catalog builder overview

Catalog item creation process



Catalog item states

A catalog item goes through various states during the item creation and maintenance process.

Catalog item states

State	Description
Draft	A catalog item is in the Draft state in one of these scenarios: • A new item is being created in catalog builder. • An existing published item has been checked out for editing in catalog builder. When the item is being edited, catalog builder checks out the item and creates a copy of the item and its associated records(variables, UI policies, client scripts). The item copy is in the Draft state. The published item remains in the Published state and the **Checked out** field is set to **True**. Once the editing is done and the item is submitted, the edits to the draft item are merged with the associated published item and the draft item is deleted.

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Catalog item states (continued)

State	Description
	Note: • You can only edit a draft item but not a published item that has been checked out. • A draft item is always inactive and does not show up in the search or browse experience. • You cannot modify the **Active** flag of a draft item. • Any changes to the draft item are not available until it is submitted.
Publishing	A catalog item is in this transient state for a while just after its submission and before its state changes to Published. You cannot check out an item in the Publishing state.
Published	When a new item is submitted, the item finally moves to the Published state. This state indicates that it is the item version being used by the application and available in the catalog. When you edit a published item, it is checked out in catalog builder and the item's draft copy is created.

Limitations

Catalog builder is designed to support the most common and simple use cases so that it can easily be used by business users, while the complex functionality can be added to the item in ServiceNow AI Platform by catalog administrators.

When creating a record producer in a specific scope, you can select tables in that scope and tables in other scope if the objects from the other application scope are given read and create access for selecting a record submission table. For more information on making a table accessible to other applications, see Table design and runtime settings.

Catalog builder does not allow creation and editing of the following entities, but they can be set in ServiceNow AI Platform either for a draft item or a published item that has not been checked out.

- Catalog item
  - Meta tags
  - Execution plans. If an item is assigned an execution plan, the process engine cannot be changed in the catalog builder.
  - Price settings
- Variable settings
  - Tool tips
  - Advanced and dynamic reference qualifiers. If a variable has advanced or dynamic reference qualifiers, then the reference qualifier cannot be edited in the catalog builder.
  - Attributes
  - Permissions
  - Availability

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- Lookup label field (defaults to lookup value field)
- Lookup price fields
- Unique values only
- Always expanded help
- Help text
- Advanced reference qualifiers

- Question types. The following questions are supported in catalog builder, and they are grouped into types and subtypes. For the unsupported question types, you can view the questions but not edit them:
  - Text
    - Single-line. This is the Single-line text variable type in ServiceNow AI Platform.
    - Multi-line. This is the Multi-line text variable type in ServiceNow AI Platform.
    - Rich text. This is the HTML variable type in ServiceNow AI Platform
  - Option
    - Check box. This is the Check box variable type in ServiceNow AI Platform.
    - Yes/No. This is the Yes/No variable type in ServiceNow AI Platform.
  - Choice
    - Dropdown (fixed values). This is the Select Box variable type in ServiceNow AI Platform.
    - Dropdown (values from a table). This is the Lookup Select Box variable type in ServiceNow AI Platform.
    - Record reference. This is the Reference variable type in ServiceNow AI Platform.
    - Radio. This is the Multiple Choice variable type in ServiceNow AI Platform.
    - Multi-select. This is the List Collector variable type in ServiceNow AI Platform.
  - Date/Time
    - Date. This is the Date variable type in ServiceNow AI Platform.
    - Date &Time. This is the Date and time variable type in ServiceNow AI Platform.
  - Display label
    - Plain text. This is the Label variable type in ServiceNow AI Platform.
    - Rich text. This is the Rich Text Label variable type in ServiceNow AI Platform
- Catalog UI policy
  - **On Load** field (defaults to true)
  - **Script** field. When a catalog UI policy has a script, it does not show up in the question's behavior settings list in the catalog builder.
  - **Reverse if false** field. By default, it is set to true.
  - Multiple actions. When a catalog UI policy has multiple actions, it does not show up in the question's behavior settings list in the catalog builder.
- For a catalog item, the questions cannot be viewed and edited in the catalog builder in the following scenarios:
  - It has more than two levels of containers.
  - It has a two-column question set or two-column container within a container.

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- Catalog client scripts
- Data lookup rules

Related topics

Set up a service catalog

Setting up the Catalog Builder

Set up the catalog item building process.

Before you begin
Role required: admin

Procedure

1. To direct users from the Catalog Builder homepage to your organization-specific catalog building process documentation, perform the following steps.

   a. Navigate to sys_properties.list.

   b. Select the *glide.sc.builder.content_url property*.

   c. On the System Property form, in the **Value** field, specify the URL for the documentation of your choice.

      You can include both absolute and relative URLs. Following are the examples:

      - Absolute URL: https://www.youtube.com
      - Relative URL: sp?id=kb_article&sysparm_article=KBXXXXXX

   d. Click **Update**.

2. **Optional:** To preview a catalog item in a specific portal, perform the following steps.

   a. Navigate to sys_properties.list.

   b. Select the *glide.sc.builder.preview_portal_id*.

   c. On the System Property form, in the **Value** field, specify the portal name.

      (Optional) The default value is `swp`.

   d. Click **Update**.

3. Create or duplicate catalog item templates.

   For information on creating a template, see Creating or editing catalog item template.

4. **Optional:** To allow users with access to a catalog item template to edit all items created using that template, perform the following steps.

   a. Navigate to sys_properties.list.

   b. Select the *glide.sc.builder.template_access*.

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c. On the System Property form, in the **Value** field, set the value to `true`.

(Optional) The default value is `false`.

d. Click **Update**.

5. **Optional:** Define and configure a pre-publish subflow that is triggered after submitting the catalog item in Catalog Builder.

(Optional) This subflow is run after the catalog item has been submitted but before it gets published. For example, an approval flow after submitting the edited catalog item in Catalog Builder.

a. Create a pre-publish subflow by specifying the following input and output parameters.

(Optional) You can also copy the Template: Catalog Builder - Item review subflow and then define your subflow. For information about subflows, see Subflows.

Template: Catalog Builder - Item review subflow input parameters

Parameter	Type	Description
catalog_item	String	sys_id of the draft version of the catalog item.

Template: Catalog Builder - Item review subflow output parameters

Parameter	Type	Description
state	String	State of the pre-publish subflow. Possible values are: ▪ completed: Publishing process is triggered for the item in the **In review** state. ▪ failed: Reverts the state of the item from **In review** to **Draft**. **Note:** The **completed** and **failed** values are case sensitive and must be selected the same way.

For information about subflow field types, see Field types.

b. Create the *glide.sc.builder.item_review_flow* property.

i. Navigate to sys_properties.list.

ii. Click **New**.

iii. On the form, fill in the fields.

System Property form

Field	Description
Name	Unique identifier of the property. Specify *glide.sc.builder.item_review_flow*.
Type	Type of the property. Specify **string**.

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Field	Description
Value	sys_id of the review subflow.

iv. Click **Submit**.

6. **Optional:** To modify the content in feedback panels for Catalog Builder steps, perform the following steps.
   a. Navigate to sc_wizard_feedback.list.
   b. From the list of catalog wizard feedbacks, select the feedback panel content that you want to edit.
   c. On the Catalog Wizard Feedback form, in the **Content** field, edit the content.
   d. Click **Update**.
7. **Optional:** To determine which users can view and edit catalog items, specify a value in the *glide.sc.builder.item_filter_mode* property.
   a. Navigate to sys_properties.list.
   b. Select the *glide.sc.builder.item_filter_mode* property.
   c. On the System Property form, in the **Value** field, specify one of the following values:
      - **default**: All the catalog items for which the user has read access will be displayed. When set to **default**, the user cannot edit a catalog item unless the user has write access for that item.
      - **catalog_editor**: All the items where the user is the catalog editor or catalog manager are displayed and can be edited.
      - **owner_only**: All the items for which the user is the owner are displayed and can be edited.

      Note:
      If the user has the catalog_admin role, the user can view and edit all catalog items irrespective of what is selected in the property.

Configure a step-based service fulfillment flow

Define service fulfillment steps while creating a catalog item in Catalog Builder.

Before you begin

Role required: admin, catalog_builder_editor, or catalog_admin

About this task

In the base system, the Step-based request fulfillment flow is available. It includes the Service Fulfillment Steps base flow subflow that runs all steps defined in the service fulfillment flow. Following are the input and output parameters of the subflow.

Service Fulfillment Steps base flow input parameters

Parameter	Type	Description
task	Reference	RITM record

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Service Fulfillment Steps base flow output parameters

Parameter	Type	Description
state	String	State of the subflow. Possible values are: • completed: All steps are complete. • failed: At least one step failed because of invalid configurations such as missing subflow or step configurations.

For information about subflow field types, see Field types.

If your organization has processes to be run before or after the service fulfillment steps, create a flow and ensure that it is configured as a step-based service fulfillment flow.

Procedure

1. Create a Flow Designer flow (With the trigger type as Service Catalog).
   Ensure that the Service Fulfillment Steps base flow subflow is called from this flow.

   For information about creating a flow with Service Catalog trigger type, see Create a flow with a Service Catalog trigger.

2. Register the flow as service fulfillment flow.

   a. Navigate to **Service Catalog** > **Catalog Administration** > **Service Fulfillment Steps Registry**.

   b. Click **New**.

   c. On the form, fill in the fields.

   Service Fulfillment Flow Registry form

Field	Description
Service Fulfillment Flow Registry	Flow Designer flow for which you want to enable service fulfillment steps.
Application	Application scope in which the flow is supported for service fulfillment.
Active	Option to enable the service fulfillment support for the flow.

   d. Click **Submit**.

Create a service fulfillment step type

Expand the coverage of service fulfillment use cases beyond those supported by step types in base system. Using a service fulfillment step type, catalog item owners can define multiple steps that are part of the request fulfilment process.

Before you begin
Role required: admin

About this task
The following step types are available in the base system.

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- Task
- Custom approval
- Manager approval

Procedure

1. Set up a data store to store information needed for running the step.
   This information is provided by a catalog item owner while defining the request fulfillment process. Do one of the following.

2. Create a record producer to store the values provided by the catalog item owner to the data store (base table or extended table) of that step.
   For information about creating a record producer, see Create a record producer.

   Note:
   - The Service Fulfillment Steps - Properties set variable set is automatically added to the record producer and it should not be removed from the record producer.
   - All additional columns defined in the extended table should have corresponding variables mapped in the record producer.
   - Configure the Record Producer form to display the **Allow edit** option and **Save Options** field. Also, select the **Allow edit** option and set the value of the **Save Options** field to **Save in Destination**.
   - Ensure that the record producer is not restricted for the users with catalog_builder_editor role.

3. Create a subflow to perform a sequence of actions by copying the Template: Service Fulfillment Steps subflow and then defining your subflow.
   For information about subflows, see Subflows.

   Template: Service Fulfillment Steps subflow input parameters

Parameter	Type	Description
requested_item	Reference	RITM record
service_fulfillment_step_data	Reference	Step data record. Update the state to one of the following values before ending the subflow: ○ canceled ○ failed ○ completed
service_fulfillment_step	Reference	Step defined on a catalog item. It must refer to a table in which the record producer defined in the step configuration inserts a record. Do not update the step record.

   For information about subflow field types, see Field types.

4. Create a step configuration to define the behavior and display of a service fulfillment step type.

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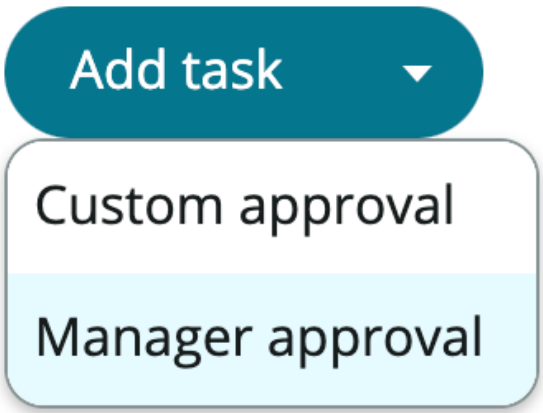
a. Navigate to **Service Catalog** > **Catalog Administration** > **Service Fulfillment Step Configurations**.

b. Click **New**.

c. On the form, fill in the fields.

Service Fulfillment Step Configuration form

Field	Description
Name	Name of the step configuration.
Application	Application scope in which the step configuration is supported.
Active	Option to enable the service fulfillment support for the flow.
Order	Order of the step configuration. Based on the order of step configurations, the corresponding service fulfillment step types are displayed in the list in the **Steps** region of the **Fulfillment** step. The step type corresponding to the step configuration with the least order is displayed beside the list and step types for all other step configurations are included in the list based on their order. **Order of service fulfillment step types** 
Hide	Hides the step type corresponding to this step configuration in the list in the **Steps** region of the **Fulfillment** step. No impact on existing steps.
Short description	Description of the step configuration.
Producer	Record producer that creates an instance of the step type in the step's data store.
Service fulfillment subflow	Subflow triggered during the request fulfillment process.
Dynamic title	Text that should be displayed for the corresponding service fulfillment step in the **Steps** region of the **Fulfillment** step. If you don't provide any value, the step configuration name is displayed.

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Field	Description
	To display dynamic text, you can include the field name from the step's data store (base table or the extended table) where the associated record producer creates a record. For example, in the base system, the **Dynamic title** field for the Custom approval step configuration contains the following value:`Approval from ${approval_title}` Here, *`approval_title`* is the field from the Service Fulfillment Approval Step [sc_service_fulfillment_approval_step] table where the associated record producer, Add custom approval, creates a record.

d. Click **Submit**.

Add a step, section, or question to a catalog item wizard

Add a step, section, or question to a catalog item wizard so catalog item editors can enter custom details while creating catalog items.

Before you begin

Role required: catalog_admin

About this task

This video shows you how to add a step, section, or question to a catalog item wizard. This video demonstrates how to add a step, section, or question to a catalog item wizard.

Procedure

1. Navigate to **All** > **Service Catalog Wizards** > **Maintain Wizards**.
2. Indicate the wizard you want to modify by selecting either **Create catalog item** or **Create record producer**.
3. Add steps, sections, or questions to the Catalog Builder wizard.

   For more information about the fields and their descriptions of the Catalog Wizard form, see Catalog Wizard form.

Now Assist in Catalog Builder

Use ServiceNow® Now Assist in Catalog Builder to create catalog items of your choice in Catalog Builder by giving text inputs.

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Get started

Explore



Learn about catalog generation by Now Assist.

Configure



Learn how to configure catalog item generation.

Generate



Learn how to create a catalog item using Now Assist.

Reference



Get details about form fields, roles, and more.

Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Further, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

Exploring Now Assist in Catalog Builder

Learn how the Now Assist in Catalog Builder application helps you to create catalog items by simply describing them. Now Assist generates catalog items with more detailed descriptions and question labels.

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Now Assist in Catalog Builder overview

In Catalog Builder, you can describe the catalog item you want, and Now Assist generates the catalog item for you.

The application uses the Catalog item generation skill to create catalog items. For more information about the skill, see Catalog item generation.

Note:
You must be assigned the catalog_builder_editor and now.assist.creator roles to create the items using Now Assist.

Now Assist in Catalog Builder benefits

Benefit	Feature	Roles
• Catalog items of your choice: Describe your item, and it's generated for you by Now Assist. • Tailored catalog items: Provide specific details, and Now Assist tailors catalog items to your needs. It's customizable, so you can ensure every items fits the specifications you need. • Professional descriptions: Get descriptions and question labels automatically. Now Assist crafts compelling narratives, enhancing your catalog's professionalism.	Create catalog items using Now Assist	catalog_builder_editor and now.assist.creator

Related topics

Configuring Now Assist settings and features

Catalog item generation

Configuring Now Assist in Catalog Builder

Install and configure Now Assist in Catalog Builder.

Configuration overview

Along with the installation of Now Assist in Catalog Builder application, you must activate the Catalog item generation skill.

Related topics

Install Now Assist plugins

Activate a Now Assist skill

Install Now Assist in Catalog Builder

Install the Now Assist for Creator application from the ServiceNow® Store to get Now Assist in Catalog Builder.

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Before you begin

- Review the Now Assist for Creator application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility. Now Assist for Creator installs the Now Assist for catalog generation application (com.snc.text2catalog).
- Role required: admin

About this task

Now Assist in Catalog Builder is a capability within the Now Assist for Creator application and to start using this capability, you must to first install the application.

Procedure

1. From the Now Assist for Creator application page on the ServiceNow Store, select **Request App**.
2. After approval has been granted, on your instance, navigate to **All** > **System Applications** > **All Available Applications** > **All**.
3. Using the search bar, search for the Now Assist for Creator application (sn_now_creator).
4. Select **Install**.
5. Verify that Now Assist for Creator is installed:

   a. Navigate to **All** > *Now Assist Admin* > **Features**.

   b. In the workflow list, select **Creator**.

   c. On the Service Catalog card, verify that the Catalog item generation skill is active.

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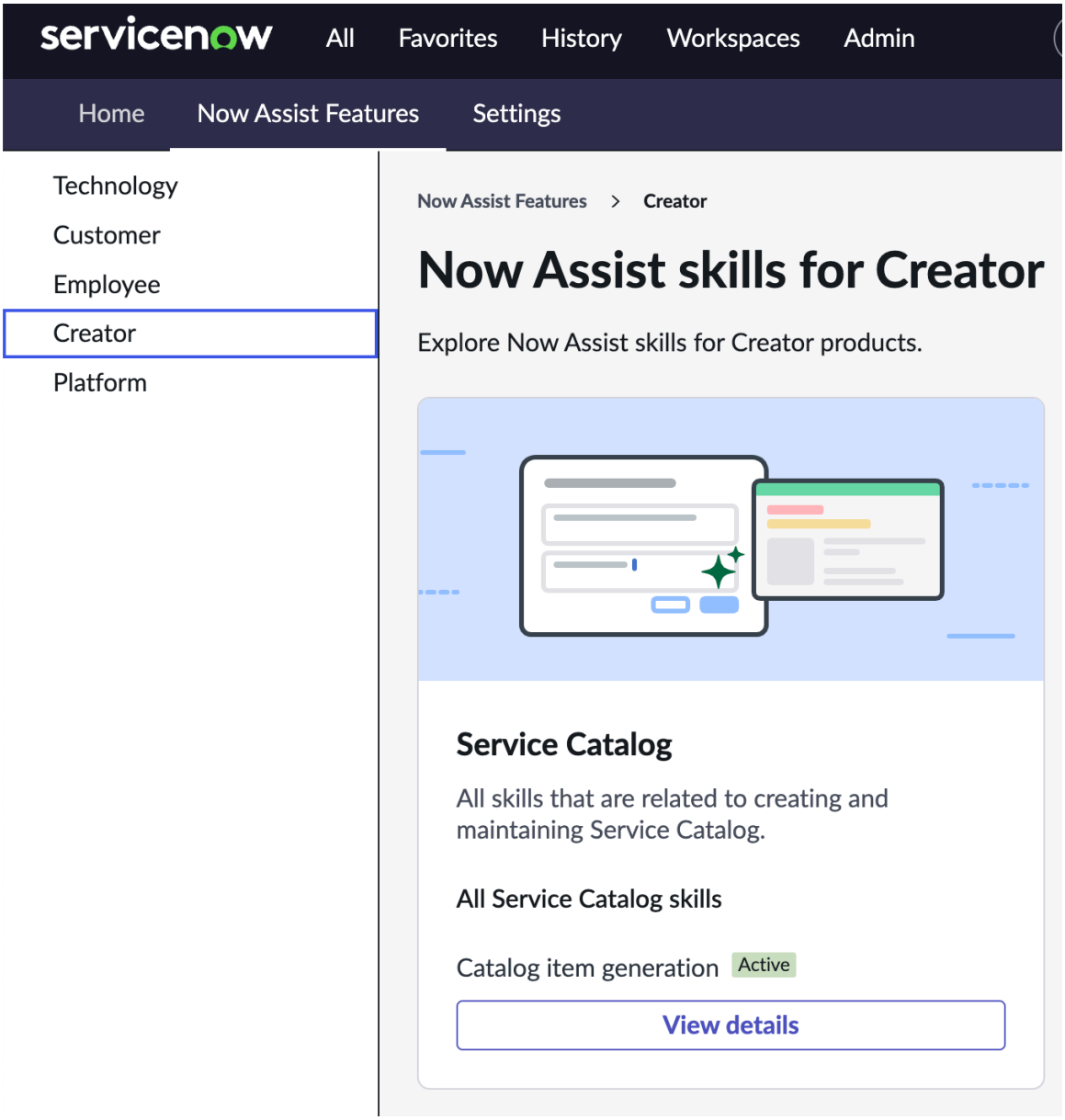

Note:
If the skill isn't active, select **View details**. Then on the Service Catalog page, turn on the Catalog item generation skill.

For more information about Now Assist Admin, see Now Assist.

What to do next
Grant the catalog_builder_editor and now.assist.creator roles to enable users to create catalog items using Now Assist.

Creating a catalog item using Now Assist

Create a catalog item by using Now Assist and make the item available in Service Catalog for catalog item requests.

Before you begin
Role required: catalog_builder_editor and now.assist.creator

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Dashboard** tab and select **Create a new catalog item**.
3. Review the steps involved in the creation process and select **Continue**.
4. Select a template from the list and select **Use this item template**.
5. In the Now Assist step, describe the catalog item you want.

   For more information about describing your catalog item, see How to describe a catalog item.
6. Select **Generate with *Now Assist***.
   Now Assist generates content for the Details and Questions steps of the catalog item.
7. Verify the content in the Details and Questions steps before you submit the item.

Note:
The AI sparkle (✨) icon displayed for these steps and their fields denotes that the content in the fields is AI-generated. If you change the content, the sparkle is removed.

Related topics

How to describe a catalog item

Catalog item generation reference

Reference topics provide additional information about configuration properties, roles, and more.

How to describe a catalog item

Now Assist uses the description that you write to generate a catalog item for you. If you're using Now Assist for creating a catalog item, use these points to describe your catalog item.

- Provide the necessary details of the catalog item that you want to build. For example, you can start with entering the following text:

  ```
  Create a travel visa request form.
  ```

- If you want, you can add details of one or more questions that you want to include in the catalog item. For accurate results, describe all aspects of the question, including type, properties such as mandatory, choices, and default value.
- Specify the exact table name for reference questions.
- For a record producer, provide the exact field name to which you want to map the question.

  For example, you can write the following text:

  ```
  Create a travel visa request form

  It must include a drop down menu offering three travel types: Internal, External, and Customer visit (with Customer visit as the default option). Add mandatory fields for the travel start date, country of birth, and country traveling to (these must be reference fields from the core_country table). Include an optional field for trip duration and a section prompting the user to provide a business justification.
  ```

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Catalog Conversational Coverage

ServiceNow® Catalog Conversational Coverage provides a dashboard to view a high-level overview of the conversational and non-conversational catalog items.

You can view this information in the Conversational catalog overview dashboard. The dashboard displays a graphical representation of various reports, such as the number of conversational and non-conversational catalog items, reasons that make the items non-conversational, and popular request channels. It also shows a list of the catalog items, their conversational status, and other details.

Drilling down the catalog items, you can view the details, for example, whether they're conversational or non-conversational and why the items are non-conversational. Explore the potential suggestions for non-conversational items that might help you make the items conversational.

If you have any of the following roles, you can view the dashboard:

- Catalog administrator [catalog_admin]
- Catalog manager [catalog_manager]
- Catalog editor [catalog_editor]

To access and view the dashboard, you must install and activate the Catalog Conversational Experience plugin (sn_catalog_con_cov). You can find the plugin in the ServiceNow® Store.

Note:
If you've installed Now Assist for conversation request submission plugin, you get the Catalog Conversational Experience plugin (sn_catalog_con_cov) by default.

The **Update catalog items conversational status** scheduled job pulls conversational data of catalog items. This scheduled job updates the reasons for the catalog items. The scheduled job runs once in three days automatically. But to get the latest data when you need, run this job manually.

Related topics

Configure Now Assist in Conversational Catalog Request

View the conversational catalog overview dashboard using Catalog Builder

Conversational catalog overview dashboard

The dashboard shows the information that you need in graphs and a table.

You can view the data of only those catalog items you have edit access to.

In the graphical representation of reports, you can view the following information:

Graphical representation of reports	Description
Conversational and non-conversational item count	The number of catalog items that are conversational and non-conversational.
Reasons that make items non-conversational	Reasons for catalog items to be non-conversational. For example, having unsupported questions or scripted UI policies make the item non-conversational.

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Graphical representation of reports	Description
Popular request channels - last 6 months	The channel distribution of catalog item requests that have been submitted in the last six months.

The Catalog items section shows the following information:

Column name	Description
Catalog item	Name of the catalog item. You can select the name to open the catalog item details page.
Conversational status	Conversational or non-conversational status of the catalog item.
VA render type	Type of catalog item rendering. Based on the configuration of the catalog item, the render type is determined to be conversation, window, or popup.
Number of reasons	The number of the reasons that are causing the item to be non-conversational. You can select the name of the non-conversational catalog item to view the reasons.
Number of requests	Number of requests that corresponds to the requests submitted in the last six months.
State	The status of the catalog item.
Owner	Name of the owner of the catalog item.
Updated	Date and time when the catalog item was last edited.

Related topics

- View the conversational catalog overview dashboard using Catalog Builder
- View the conversational catalog overview dashboard using the ServiceNow AI Platform
- Catalog item conversational details page overview
- Catalog Conversational Coverage

Catalog item conversational details page overview

View the details page for your catalog item. If your item is non-conversational, view why your catalog item isn't conversational and review the suggestions to know what you can do to make the item conversational.

You can view this page only if you have any of the following roles:

- Catalog administrator [catalog_admin]
- Catalog manager [catalog_manager]
- Catalog editor [catalog_editor]
- Catalog builder editor [catalog_builder_editor]

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Note:
The catalog manager, catalog editor, and catalog builder editor can view the details page only if they have edit access to the catalog item.

The page displays the following information related to conversational or non-conversational catalog items:

- Name of the catalog item
- Conversational status and render type
- Date and time when the catalog item was last updated
- The **Reasons and suggestions** and **Item details** tabs

  The **Reasons and suggestions** tab shows one or more reasons for the item being non-conversational and suggestions that might make the item conversational. If there's more than one reason, you can select each reason to view the suggestions for that particular reason.

  The **Item details** tab shows the details, such as a short description, description, and image of the item if available.

After going over the reasons and suggestions for the non-conversational items, select **Edit in advanced view** if you want to make changes. The catalog item opens in the ServiceNow AI Platform for editing.

Note:

- Only the catalog admin, catalog manager, and catalog editor can view the **Edit in advanced view** button.
- If you're viewing a catalog item that's in checked out state, you view its data that corresponds to the published version of the item. Any changes to the draft of the catalog item won't be reflected here until it's published.

Related topics

Conversational catalog overview dashboard

View the conversational catalog overview dashboard using Catalog Builder

View the conversational catalog overview dashboard using the ServiceNow AI Platform

Catalog Conversational Coverage

View the conversational catalog overview dashboard using the ServiceNow AI Platform

Use the ServiceNow AI Platform to view the dashboard that shows the catalog items that are conversational or non-conversational. Understand why catalog items aren't conversational, and explore the potential suggestions that might help make the items conversational.

Before you begin

Verify that you've installed the Catalog Conversational Experience plugin (sn_catalog_con_cov).

Role required: catalog_admin, catalog_manager, and catalog_editor

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. On the Catalog Items list page, select **Conversational Overview**.

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The Conversational catalog overview dashboard opens, and you can view only those catalog items you own or can edit.

Note:

- To view the dashboard, you can also navigate to **All** > **Service Catalog** > **Catalog Administration** > **Conversational catalog overview**.
- On a specific catalog item page, select **View conversational details** to open the catalog item's details page, which shows the reasons and suggestions.

Related topics

Catalog Conversational Coverage

Conversational catalog overview dashboard

Catalog item conversational details page overview

View the conversational catalog overview dashboard using Catalog Builder

Use Catalog Builder to view the dashboard that shows the catalog items that are conversational or non-conversational. Understand why catalog items aren't conversational, and explore the potential suggestions that might help make the items conversational.

Before you begin

Verify that you've installed the Catalog Conversational Experience plugin (sn_catalog_con_cov).

Role required: catalog_admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Dashboard** tab.
3. In the Conversational Coverage in VA section, select **View conversational coverage**.

The Conversational catalog overview dashboard opens. To view the conversational details page for a specific catalog item, on the dashboard, select the catalog item name. The details page opens.

Note:
You can also open a catalog item details page to view its conversational details. To do so, select the **Catalog items** tab, select an item that you want to view the details for, and select **View conversational details**.

Related topics

Catalog Conversational Coverage

Conversational catalog overview dashboard

Catalog item conversational details page overview

Edit a catalog item in Catalog Builder

Creating or editing catalog item template

Pre-specify values or provide restrictions for attributes such as catalogs, categories, variable types, and portal settings, which are applicable during the catalog item creation or editing process. You can create a template for a catalog item or record producer.

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Before you begin

Role required: admin or catalog_admin

Create a catalog item template in catalog builder

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Dashboard** tab and select **Create a catalog item template**.
3. Select any of the following options.
   - **Standard** for a catalog item.
   - **Record Producer** for a record producer
4. In the wizard, specify the information for each step.

Catalog item template creation wizard

Step	Description
Template Details	○ Basic info: Contains the template name, short description, and an option to use the template scope for creating records. If you select the **Use template scope for creating records** check box, the record producers or catalog items created using this template would be created in the scope of the template. ○ Template Available for: Specifies the user criteria for users who can use the template. Users matching the criteria must have the catalog_builder_editor role. **Note:** You can add up to a maximum of 50 user criteria.
Details	○ Basic info: Suggestions for the item name and short description. ○ Item details: Suggestions for the description of the item.
Destination	Destination table in which a record producer creates records. **Note:** This step is available for a record producer template.
Location	Catalogs, categories, and topics that the item can be associated with. Configure catalogs and categories to make the catalog item discoverable on the Service Portal. In the Topics card, select the taxonomy and its associated topics for a catalog item to make the catalog item discoverable on the Employee Center. **Note:** You can add up to a maximum of 50 catalogs or categories.
Questions	Question sets (variable sets) that should be included in the item. You can also restrict question types that can be used for items using the template by selecting the define owner permissions icon ( ).

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Step	Description
Settings	Settings to configure the catalog item behavior in portals, such as Employee Center and Service Portal. Determine whether to display the following buttons or options on the portals: ○ Add to cart ○ Save as draft ○ Quantity selector ○ Delivery time ○ Attachment ○ Make the attachment mandatory For example, if you don't want to display the **Save as draft** button on the portal for the catalog item, select the **Hide 'Save as draft'** option.
Access	User criteria to specify users for whom the item is available or not available.
Fulfilment	Flow or workflow that you want to associate with the item using this template.
Overrides	Restrictions that apply while creating the catalog item. ○ Can Edit: Only the attributes specified here can be edited. ○ Must specify: Editable attributes that should be answered. The following attributes must be made mandatory: ▪ Item name ▪ Record submission table ○ Restricted selections: For the attributes that enable selection of multiple values (for example, catalogs, categories, Available For, Not Available For), the user creating the item can only select or deselect the options from within the values specified in the template.
Review and submit	Review the template information and submit it.

Note:
For each step, you can review the information in the feedback panel to know more about that step.

5. Select **Submit**.
6. To edit the catalog item template, select the **Catalog item templates** tab, select the required template, and perform any of these actions.

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a. To edit the item, make the necessary changes, and select **Save**.

Note:

- The changes to the template don't automatically apply to existing items.
- While editing an existing catalog item, the new values in the template aren't automatically updated in the item but the new restrictions apply. For example, if a new category is added to the template, that category isn't automatically added to the catalog item. However, the restrictions to the categories apply.
- When question sets are added to the template, they don't have any impact on the existing catalog items using the template.

b. To duplicate the catalog item template, select **Duplicate**.

Note:
You can't delete a catalog item template in the catalog builder, but it can be deleted in ServiceNow AI Platform. After a template is deleted, it's disassociated from all catalog items using the template and the restrictions no longer apply to those items.

Create a catalog item using a template

Make an item available in service catalog for catalog item requests.

Before you begin
Role required: catalog_builder_editor, catalog_admin, or admin

About this task
You must create a catalog item using one of the available catalog item templates.

Demonstrates how business owners can create catalog items in Catalog Builder.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Dashboard** tab and click **Create a new catalog item**.
3. Review the steps involved in the creation process and click **Continue**.
4. Select a template from the list and click **Use this item template**.

Note:

- After you select the template, the preview of this template is available.
- You can only view templates assigned to you.
- Based on the template configuration, during the item creation or editing, few attributes have pre-specified values, are not editable, have limited options to select, and are mandatory.
- When selecting a record submission table for record producers, you can only select tables in that scope.

5. Based on how each step is defined in the template, specify the required information.

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Catalog builder steps

Step	Description
Details	○ Basic info: Item name and short description. ○ Item details: Description of the item.
Destination	Destination table in which a record producer creates records. **Note:** This step is available when using a record producer template.
Location	Catalogs, categories, and topics that the item can belong to. You can only view the catalogs, categories, and topics specified in the template. Configure catalogs and categories to make the catalog item discoverable on the Service Portal. In the Topics card, select taxonomy and its associated topics for a catalog item to make the catalog item discoverable on the Employee Center.
Questions	Question sets (variable sets) or questions for the item. By default, the question sets included in the template are added and cannot be removed. Available question types are restricted to those specified in the template. From the **Insert new question** list, you can include additional question sets, questions, deactivated questions, single-column container, two-column container, and line break. For information on creating a question and supported question types, see Create a question for a catalog item in Catalog Builder. You can also add dynamic form behavior for a question. For information on adding dynamic form behavior, see Edit a question in Catalog Builder. **Note:** ○ The questions within a question set cannot be edited. The question sets can be reordered by dragging and dropping them. ○ Question sets specified in the template cannot be removed, while the ones added by the user can be removed. ○ Removal of question sets simply removes the association with the item and does not delete the question set. ○ A single-column question set can be added to a single-column or a two-column container. Two-column question set cannot be added to a container. ○ The questions for a catalog item are available as options on which a condition can be applied for a step when you create service fulfillment steps for that catalog item.
Settings	Settings to configure the catalog item behavior in portals, such as Employee Center and Service Portal based on the request method.

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Step	Description
	For example, you can determine whether to display buttons or options for adding attachments, making them mandatory, or saving the draft of the items while requesting them.
Access	User criteria to specify users for whom the item is available or not available. **Note:** You can add up to a maximum of 50 user criteria.
Fulfilment	Flow or workflow that you want to associate with this item. It defines how this catalog item can be fulfilled. When a catalog item is associated with a Flow Designer flow that supports service fulfillment steps, the catalog item owner creating the item can configure steps within the flow. By default, the Step based request fulfillment flow is available in the base system. For information about defining service fulfillment steps, see Define a service fulfillment step. For information about Flow Designer flows, see Flows.
Review and submit	Review the item and submit it.

Note:
A dot beside the step name indicates it has a mandatory field.

6. To save your changes in each step, click **Save**.
   All edits to the item attributes are automatically saved when you navigate to the next step.
7. To preview a catalog item in Portal, Now Mobile, or a Virtual Agent conversation, click **Preview**.

   Note:
   When you preview an item, you can interact with it but not submit it.

   a. To preview the item in Portal, select **Portal** for the **View within** field.

      Note:
      Portal preview is based on portal URL configured for the catalog builder.

   b. To view an item representation in Now Mobile, select **Now Mobile** for the **View within** field.

   c. To preview a catalog item in a Virtual Agent conversation, select **Virtual Agent** for the **View within** field.

      The Service Management Virtual Agent Topic Blocks plugin (com.glideapp.cs.sm_topic_blocks) and one of these plugins must be installed.

      - Glide Virtual Agent (com.glide.cs.chatbot)
      - Glide Virtual Agent Lite (com.glide.cs.chatbot.lite)

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A Virtual Agent conversation whose sys_id is specified in the *glide.sc.builder.va_preview_topic_id* property is opened. By default, the property has the sys_id of the base system Catalog builder preview topic. For information about this topic, see Catalog builder preview topic conversation. If the base system topic is used, the following scenarios are possible:

- If the item is supported in the conversation mode, you can preview the item in the Virtual Agent conversation by answering the questions but cannot submit a request for the item. For information about when a catalog item is supported in the conversation mode, Service Catalog topic blocks in Virtual Agent powered by NLU.
- If the item is not supported in the conversation mode, a link is provided for the portal preview of the item.
- When the required plugins are not installed, an illustration displaying a sample conversational experience for the catalog item submission appears.

d. To open the preview in a new tab, click **Open preview in a new tab**.

Note:
When you make any changes to the item and save it, the preview is dynamically refreshed in the opened tab.

8. To delete an unpublished draft item, click **Delete**.

Note:
You cannot delete a published item but can make it inactive.

9. Click **Submit**.

Note:
Until you submit the item, it is in the Draft state and is not available in the catalog.

Define a service fulfillment step

Define how a catalog item request should be fulfilled by creating simple service fulfillment steps.

Before you begin
Role required: catalog_builder_editor or catalog_admin or admin

About this task
To configure fulfillment steps while creating a catalog item, associate it with a Flow Designer flow that supports service fulfillment steps.

Fulfillment process can contain multiple steps. These steps can run sequentially or can be grouped to run in parallel.

The following video demonstrates how business owners can define the fulfillment process of catalog items using service fulfillment steps.

Demonstrates how business owners can define the fulfillment process of catalog items using service fulfillment steps.

Procedure

1. In the **Fulfillment** step of creating a catalog item, for the **Selected flow** field, select a flow that supports service fulfillment steps.

2. In the **Steps** region, perform one of the following:

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a. To create a task, click **Add task**.

i. On the form, fill in the fields.

Task form

Field	Description
Task	
Short description	Brief description of the task. It appears in the **Steps** region.
Description	Detailed description of the task.
Assignment group	User group that the task should be assigned to.
Assigned to	User for which the task is assigned.
Priority	Priority of the task.
When to run	
Sequence	Sequence of this step relative to the previous step. Possible options are: ▪ With previous step: This step is grouped with the previous step or group. All grouped steps run simultaneously. ▪ After previous step: This step is placed after the previous step **Note:** This field is not editable if it is the first step.
Condition	Condition that defines whether the step must run. The options on which a condition can be applied are the questions that are available on the catalog item for which you're creating the service fulfillment steps. For information on questions, see the Create a catalog item using a template topic.

ii. Click **Add**.

b. To create a custom approval and define who can approve the step, perform the following:

i. From the list beside **Add task**, click **Custom approval**.

ii. On the form, fill in the fields.

Custom approval form

Field	Description
Custom approval	
Users	Users that can approve this step.
Groups	User groups that can approve this step.
Approval type	Type of the required approval.

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Field	Description
	▪ All approve: The step is approved only when all assigned users and user groups approve. ▪ Anyone approves: The step is approved when any of the assigned users or any user from the assigned user groups approve.
When to run	
Sequence	Sequence of this step relative to the previous step. Possible options are: ▪ With previous step: This step is grouped with the previous step or group. All grouped steps run simultaneously. ▪ After previous step: This step is placed after the previous step **Note:** This field is not editable if it is the first step.
Condition	Condition that defines whether the step must run. The options on which a condition can be applied are the questions that are available on the catalog item for which you're creating the service fulfillment steps. For information on questions, see the Create a catalog item using a template topic.

iii. Click **Add**.

c. To create a manager approval and define who can approve this step, perform the following:

i. From the list beside **Add task**, click **Manager approval**.

ii. On the form, fill in the fields.

Manager approval form

Field	Description
When to run	
Sequence	Sequence of this step relative to the previous step. Possible options are: ▪ With previous step: This step is grouped with the previous step or group. All grouped steps run simultaneously. ▪ After previous step: This step is placed after the previous step **Note:** This field is not editable if it is the first step.
Condition	Condition that defines whether the step must run. The options on which a condition can be applied are the questions that are available on the catalog item for which you're creating the service fulfillment steps. For information on questions, see the Create a catalog item using a template topic.

iii. Click **Add**.

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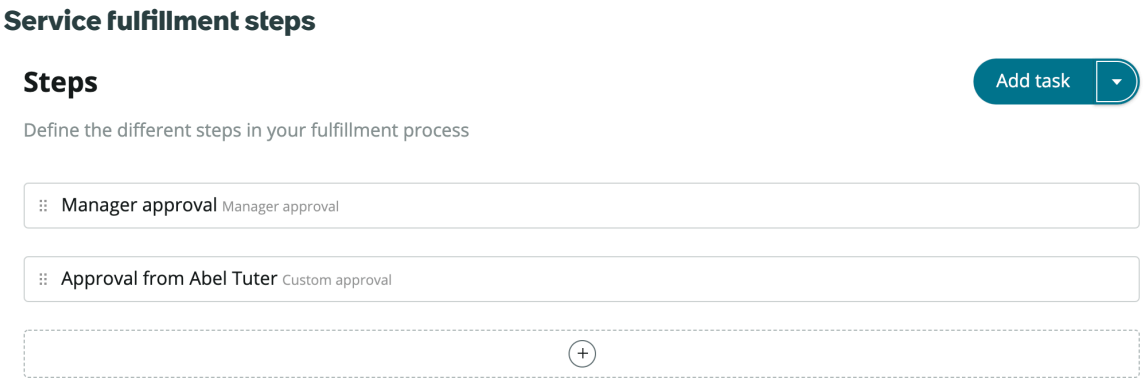
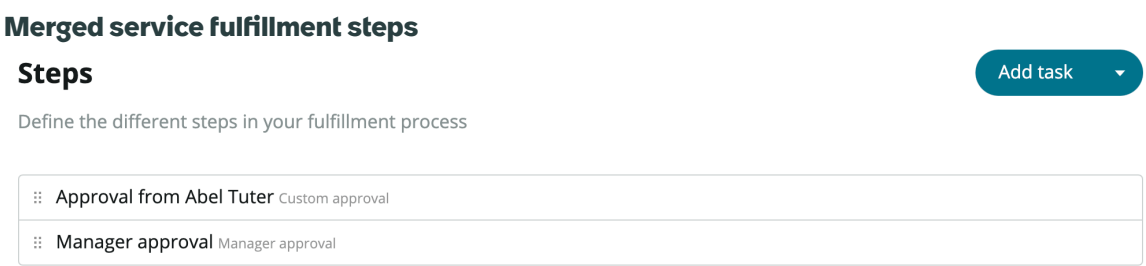


3. In the **Estimated time to deliver** region, for the **Days** field, specify the time by which the RITM should be fulfilled.

   The due date is calculated based on when the service fulfillment flow is triggered.

4. **Optional:** To edit a step, click the edit icon ( ).
5. **Optional:** To delete a step, click the delete icon ( ).
6. **Optional:** To rearrange steps, drag the steps.
7. **Optional:** To group steps together, perform one of the following tasks.
   - Drag a step and drop it on another step or group of steps.
   - To group this step with the previous step or group, click the merge icon ( ).



8. **Optional:** To separate a step from a group of steps, perform one of the following tasks.
   - Click the separate icon ( ). The step is placed after the group.
   - Drag a step out of the group and drop it at a location of your choice.

Catalog builder preview topic conversation

From the catalog builder, a user can preview a catalog item in a Virtual Agent conversation.

This conversation uses the Request Catalog Item topic block. For information on this topic block, see Service Catalog topic blocks in Virtual Agent powered by NLU.

The Service Management Virtual Agent Topic Blocks plugin (com.glideapp.cs.sm_topic_blocks) and one of these plugins should be installed.

- Glide Virtual Agent (com.glide.cs.chatbot)
- Glide Virtual Agent Lite (com.glide.cs.chatbot.lite)

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In catalog builder, when the user selects the required item and navigates to preview it, the following scenarios are possible:

- If the item is supported in the conversation mode, you can preview the item in the Virtual Agent conversation by answering the questions but cannot submit a request for the item. For information about when a catalog item is supported in the conversation mode, see Service Catalog topic blocks in Virtual Agent powered by NLU.
- If the item is not supported in the conversation mode, a link is provided for the portal preview of the item.
- When the required plugins are not installed, an illustration displaying a sample conversational experience for the catalog item submission appears.

Related topics

Service Catalog topic blocks in Virtual Agent powered by NLU

Create a question for a catalog item in Catalog Builder

Specify a question that the requester should answer before submitting the catalog item.

Before you begin

Role required: catalog_builder_editor, catalog_admin, or admin

About this task

If allowed in the template by the template owner (catalog_admin) while configuring the template, the following question types can be used in the item creation process in the catalog builder. These question types are grouped into types and subtypes:

- Text
  - Single-line. Single-line text variable type in ServiceNow AI Platform.
  - Multi-line. Multi-line text variable type in ServiceNow AI Platform.
  - Rich text. HTML variable type in ServiceNow AI Platform.
- Option
  - Check box. Check box variable type in ServiceNow AI Platform.
  - Yes/No. Yes/No variable type in ServiceNow AI Platform.
- Choice
  - Drop down (fixed values). Select Box variable type in ServiceNow AI Platform.
  - Drop down (values from a table). Lookup Select Box variable type in ServiceNow AI Platform.
  - Record reference. Reference variable type in ServiceNow AI Platform.
  - Radio. Multiple Choice variable type in ServiceNow AI Platform.
  - Multi-select. List Collector variable type in ServiceNow AI Platform.
- Date/Time
  - Date. Date variable type in ServiceNow AI Platform.
  - Date &Time. Date and time variable type in ServiceNow AI Platform.
- Display label
  - Plain text. Label variable type in ServiceNow AI Platform.
  - Rich text. Rich Text Label variable type in ServiceNow AI Platform.

For detailed information about these question types, see Types of service catalog variables.

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Procedure

1. Navigate to **Catalog Builder** > **Create a new catalog item** > **Question** and click **Insert new question**.
2. On the Create question form, specify the required details.

Note:

- The fields on the form vary based on the question type and subtype.
- While you configure each question, its preview is available.
- The question preview doesn't show interactions for the following questions types until the question is saved and then edited.
  - Record reference
  - Multi-select
  - Drop down (values from a table)
- The question preview doesn't show annotations.

a. Specify the details on the **Question** tab.

Question tab

Field	Description
Type	
Question type	Group under which the question type is categorized.
Question subtype	Subtype of the question. Only the question types allowed in the template are available.
Details	
Map to field	Maps the question to a specific field on the table for the record producer.
Question label	Question for a requester while ordering the catalog item. For the Rich text question subtype, you can specify a formatted label to be displayed on a catalog item form.
Name	Internal name to identify the question. The name should not contain spaces or special characters. Only the underscore character is allowed.
Mandatory	Option to specify if the question is mandatory.
Hidden	Option to specify if the question is hidden.
Read-only	Option to specify if the question is read-only.

b. Specify the details on the **Annotation** tab.

This tab is available for the following question subtypes:

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- Single-line
- Multi-line
- Rich text
- Yes/No
- Drop down (fixed values)
- Drop down (values from a table)
- Record reference
- Radio
- Date
- Date &Time
- Multi-select

Annotation tab

Field	Description
Instructions	
Show instructions	Option to specify if instructions should be displayed for the question.
Instructions label	Instruction for the requester while ordering the catalog item.
Instructions	Detailed instruction content.

c. Specify the details on the **Additional Details** tab.

This tab is available for the following question subtypes:

- Single-line
- Drop down (values from a table)
- Record reference
- Multi-select

Additional Details tab

Field	Description
Validation	
Available for the Single-line question type	
Text validation	Option to validate the specified text value based on the regular expression validations that have been set up in the system.
Source	
Available for the Dropdown (values from a table), Record reference, and Multi-select question subtypes	
Table	Table from which the choices are retrieved.
Field	Field that should be displayed as a choice. This field is not available for the Record reference and Multi-select subtypes.

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Field	Description
Filter conditions	Conditions to filter the choices.

d. Specify the details on the **Choices** tab.

This tab is available for the following question subtypes:

- Drop down (fixed values)
- Drop down (values from a table)
- Yes/No
- Radio

Choices tab

Field	Description
Settings	
Include none choice	Option to include **None** as a choice for the question.
Choice direction	Direction in which the choices should be displayed. Possible options are **Down** and **Across**. This option is available only for the Radio question subtype.
Do not select first choice	Option to ignore the first choice. This option is available only for the Radio question subtype.
Available Choices	
Available for the Drop down (fixed values) and Radio question subtypes. You can add a name-value pair for each choice.	
Display name	Label for a choice.
Value	Value of the choice.

e. Specify the details in the **Default Value** tab.

The default value specified here is pre-selected as the answer for the question when a requester opens the catalog item form for the item. This tab is available for the following question subtypes:

- Single-line
- Multi-line
- Yes/No
- Radio
- Date
- Date &Time
- Multi-select

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f. Specify the question details on the **Auto-populate** tab.

For more information about configuring auto-populate value, see Configure an auto-populate value for a question in Catalog Builder.

3. Click **Insert Question** to add the question to the item.

Note:

- If there are two consecutive check boxes, then a virtual container is created for a group of check boxes. Only check box variable types can then be added inside that group.
- Even if a check box variable is added immediately after a group of check boxes, it's automatically added to the group.

Configure an auto-populate value for a question in Catalog Builder

Configure the value of a question to populate automatically whenever the value of another question of the reference type changes.

Before you begin

Role required: catalog_builder_editor, catalog_admin, or admin

About this task

In a catalog item, for example, you can set up the value of the “Name of the manager” question to auto-populate whenever the value of the “Select the requester” question changes.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Catalog items** tab.
3. Select a catalog item and navigate to the **Questions** tab.
4. Select **Insert new question**.
5. On the **Questions** tab, do the following:
   a. In the **Question type** field, select **Choice**.
   b. In the **Question subtype** field, select **Record reference**.
   c. In the **Question label** field, enter `Name of the manager`.
   d. **Optional:** Select the **Read-only** option.
6. On the **Additional details** tab, in the Source table field, search for and select `User (sys_user)`.
7. On the **Auto-populate** tab, do the following:

   a. In the **Select the question this depends on** field, select the reference question that this question depends on.

   For example, select **Select the requester**.

   The list displays all the Reference and Requested For question types that belong to the current catalog item and the associated single-row variable sets.

   b. To select the field that contains the value that you want to set, select the Select the lookup field icon ().

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The list shows all the values in the sys_user table.

c. From the list, select **Manager**.

> **Note:**
> To search any value, enter what you're looking for, for example, `manager` or dot-walk to get the required value.

For more information about dot-walking, see Dot-walking to data in related tables.

8. Select **Insert question**.

Edit a question in Catalog Builder

Edit an existing question if you want to improve it by adding dynamic form behavior.

Before you begin

Role required: catalog_builder_editor, catalog_admin, or admin

About this task

Set values for the fields and condition-based field messages. Make the question mandatory, visible, or read-only based on your requirements. You can also deactivate the question.

You can't edit the questions that belong to single-row and multi-row variable sets.

- If the question is used in a published catalog item, you can't delete it but you can mark it as inactive. You can include such questions again in the catalog item by using the **Insert Deactivated questions** option.
- Removing a new question that has never been published deletes the question.
- You can't remove questions of types that aren't allowed in the template or supported in the Catalog Builder.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Catalog items** tab.
3. Select a catalog item and navigate to the **Questions** tab.
4. Deactivate a question.
   a. Point to the question and select the deactivate icon ( ).
   b. In the dialog box, select **Deactivate**.
5. Edit a question.
   a. Point to the question and select the edit icon ( ).
   b. Make the required changes and select **Save**.
6. Add dynamic form behavior to a question.
   a. Point to the question and select the UI policies icon ( ) for defining dynamic behavior.
   b. In the Dynamic behavior dialog box, select **Define new behavior**.
   c. On the **Actions** tab, fill in the required information.

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Actions tab

Field	Description
Outcome	
Specify the behavior of this question when the trigger conditions are met	
Make the question mandatory	Specifies how the dynamic behavior setting affects the mandatory state of the field. Available options: ▪ No action ▪ Yes ▪ No
Make the question visible	Specifies how the dynamic behavior setting affects the visible state of the field. Available options: ▪ No action ▪ Yes ▪ No
Make the question read-only	Specifies how the dynamic behavior setting affects the read-only state of the field. Available options: ▪ No action ▪ Yes ▪ No
Value	
Specify the value that should be set for this question when the condition is met.	
Do this action	Select any of the actions that you want to set for this question. ▪ No action. ▪ Clear value: Option to clear the question value. ▪ Set value: Option to set a value for the question.
Set this value to the question	Option to set a value for the question. For example, if you have a question related to storage with the question type **Choice**, and you set the available choices of storage as 1 TB, 256 GB, and 512 GB, then this field shows these values. You can select any one of these values for the question. This field appears only when you select **Set value** from the Do this action list.
Field message	
Specify the type and message that should be shown under this question when the condition is met.	
Set this field	Select any of these field message types.

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Field	Description
message type	▪ Info ▪ Warning ▪ Error **Note:** If you don't want a message, select **None**.
Set this message under the field	Option to set a message that you want to show when the condition is met.

d. On the **Conditions** tab, add conditions that trigger the action on this question.

e. On the **Settings** tab, fill in the required information.

Settings tab

Field	Description
Applicability	
Scenarios where this dynamic behavior applies	
Applies when the item is being requested	Option to specify if the dynamic behavior applies when the item is being requested.
Applies while viewing the catalog tasks after the request is submitted	Option to specify if the dynamic behavior applies while viewing the catalog tasks after the request is submitted.
Applies while viewing the requested item record after the request is submitted	Option to specify if the dynamic behavior applies while viewing the submitted record.

f. Select **Add behavior**.

Note:
When dynamic behavior is added, a catalog UI policy and action is created and a short description is automatically generated.

Edit a catalog item in Catalog Builder

Make changes to an existing catalog item if you have permissions to edit the item.

Before you begin

- You can edit a catalog item if you are a catalog admin.
- If you have the catalog_builder_editor role and you are the owner of the catalog item, you can edit it. If the template access property, *glide.sc.builder.template_access*, is set to **true** (which is **false** by default), any user with the catalog_builder_editor role with access to the template used for creating the catalog item can edit the item.
- Role required: catalog_builder_editor, catalog_admin, or admin

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About this task

When you edit a published item in the catalog builder, the system creates a draft copy of the item and its associated records such as variables, UI policies, and client scripts. The draft version is inactive until published. The published item remains in the published state and the **Checked out** field is set to **True**.

After you edit the item and submit it, the following scenarios are possible:

When a pre-publish subflow isn't configured

- The edits to the draft version are merged with the associated published item.
- The draft item and the associated records are deleted.
- The **Checked out** field of the published item is set to **False**.

When a pre-publish subflow is configured

- The state of the draft item is changed to **In review**.
- If the *state* variable of the subflow output returns **Completed**:
  - The state of the draft item is changed to **Reviewed** and edits made to the draft version are merged with the associated published item.
  - The state of the published item changes to **Publishing**, then to **Published**, and the **Checked out** field of the published item is set to **False**. The state change from **Publishing** to **Published** may not happen instantaneously.
  - The reviewed draft item and the associated records are deleted.
- If the *state* variable of the subflow output returns **Failed**, the state of the draft item is reverted to **Draft**, and the item is ready for editing.

For information about configuring a review subflow, see Setting up the Catalog Builder.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Catalog items** tab.

   Note:
   In the catalog item list view of the catalog builder, you can view items based on the value set in the *glide.sc.builder.item_filter_mode* property.

3. Select the item that you want to edit and select **Edit**.

   Note:
   - To edit an item in the **In review** state, you must cancel the review. After you cancel the review, the state of the item is reverted to **Draft**.
   - To view the conversational details of the catalog item, select **View conversational details**.

   To edit an item in the **In review** state, you must cancel the review. After you cancel the review, the state of the item is reverted to **Draft**.

4. Make the required changes and select **Save**.

   For information on editing a question and catalog item fields, see Edit a question in Catalog Builder and Create a catalog item using a template.

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5. To make an item inactive, clear the **Item is active** check box in the **Basic info** section of the **Details** step.
6. To publish the modified item, navigate to the **Review and submit** step and select **Submit**.

Related topics

View the conversational catalog overview dashboard using Catalog Builder

Add advanced capabilities to a catalog item

Add advanced capabilities, such as catalog client scripts, data lookup rules, and advanced reference qualifiers to a catalog item.

Before you begin

Role required: catalog_admin or admin

Procedure

1. Add advanced capabilities to a catalog item using any of these methods.
   - Using the **Edit in advanced view** button.
     a. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
     b. Select the **Catalog items** tab.
     c. Select the catalog item for which you want to add advanced capabilities or features.
     d. Select **Edit in advanced view**.

     Note:
     If you have the catalog item wizard open, and you want to edit it in advanced view, select the more actions icon ( ) on the wizard, and select **Edit in advanced view**.

   - Using the **Edit checked out item in advanced view** related link.
     a. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.

     Note:
     - The checked out item icon ( ) for the checked out item beside a catalog item indicates that it's the published version of the item that has been checked out for editing in the catalog builder.
     - A draft item icon ( ) for the draft item mark beside the item indicates that it's the draft version of the item that can be directly edited in ServiceNow AI Platform.

     b. Open the published item that you want to edit.
     c. Select the **Edit checked out item in advanced view** related link.

     Note:
     - When a published item is checked out for editing, you can't edit the published version of the item in ServiceNow AI Platform, unless you cancel the checkout in ServiceNow AI Platform. Canceling the checkout cancels all changes made after the item was checked out.
     - To edit an item in the **In review** state, you must cancel the review. After you cancel the review, the state of the item is reverted to **Draft**.

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2. Make the required changes and select **Update**.
3. To edit the same item in the catalog builder, select **Edit in Catalog Builder**.
   If the item has not already been checked out, this step checks out the item.

Discard a catalog item

Discard a catalog item that's in the Draft state in Catalog Builder.

Before you begin

Role required: catalog_builder_editor, catalog_admin, or admin

About this task

If you no longer want a draft item, you can discard it in Catalog Builder. When you discard a draft item that doesn't have a published item associated with it, that draft item is deleted. If a draft item has a published item associated with it, the draft item is deleted while the published item remains intact. The data of the catalog item is reverted to the state that it was in before you started editing it.

Procedure

1. Navigate to **All** > *Service Catalog* > **Catalog Builder**.
2. Select the **Catalog items** tab.
3. Select the catalog item that you want to discard.

   Note:
   You can discard only those catalog items that are in the **Draft** state. After you select any draft item, the **Discard draft** button becomes active.

4. Select **Discard draft**.

   Note:
   If a catalog item wizard is already open for editing, and you want to discard it, select the more actions icon () on the wizard, and select **Discard draft**.

Transfer catalog items using update sets

Transfer catalog items published through Catalog Builder from one instance to another easily by using update sets automatically created for the catalog item. For example, you can transfer catalog items created by a business user from a non-production to production instance.

Before you begin

You can access update sets for a catalog item only if it is created or modified in Catalog Builder.

For information on creating a catalog item in Catalog Builder, see Create a catalog item using a template.

For information on editing a catalog item in Catalog Builder, see Edit a catalog item in Catalog Builder.

Role required: catalog_admin, catalog_builder_editor

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Procedure

1. Access an update set for a catalog item by navigating to **All > System Update Sets > Local Update Sets**.
2. Search for the update set by the name, `CB_<Template Name>_<Catalog Item Name>_<Date and Time Stamp>`.

   Note:
   If a catalog item contains related records such as Variables, Variable Sets, Available For, or Not Available For in a scope other than the current item scope, then such items are transferred in a batch where the related record update set's parent field is set as the update set of the parent catalog item. For more information, see Update set batching.

3. Transfer the completed update sets from the source instance to the target instance. For more information, see Update set transfers.

Localization Framework integration with Catalog Builder

The **Translation Status** tab in the Catalog items tab on the Catalog Builder dashboard enables you to view the translation status of catalog items, and translate catalog items on the fly using manual or machine translation methods.

Ensure that the following plugins are installed before you start using Localization Framework in Catalog Builder:

1. Localization Framework Installer plugin for Service Catalog: The plugin enables the Localization Framework capabilities in Service Catalog and Catalog Builder.
2. Dynamic Translation plugin: Enables on-the-fly machine translation capabilities.

Translate catalog items information using one of the following modes:

- Request Translation mode
- Self-translation (ad hoc) mode

Request translation mode for new catalog items

Set the glide.sc.catalog_builder.localization.enable_request_translation_mode property to **True**, to enable the Request translations mode.

When you create a new item, the **Request translations** step appears in the wizard steps region. Click **Browse** to view and select the languages you want to translate the catalog item information to.

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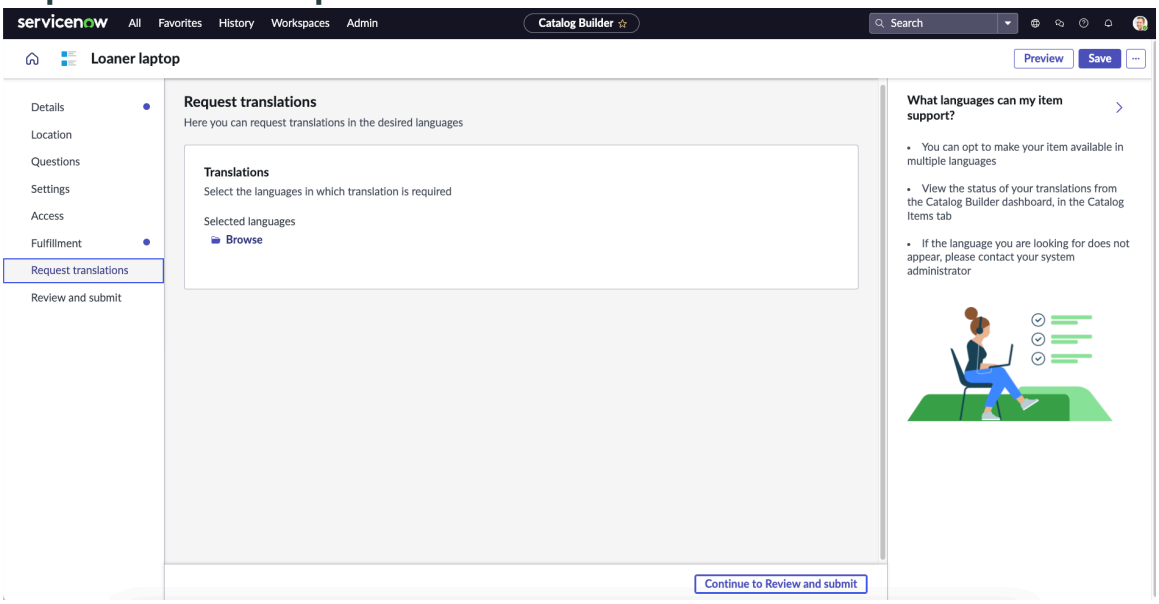
Request translations step



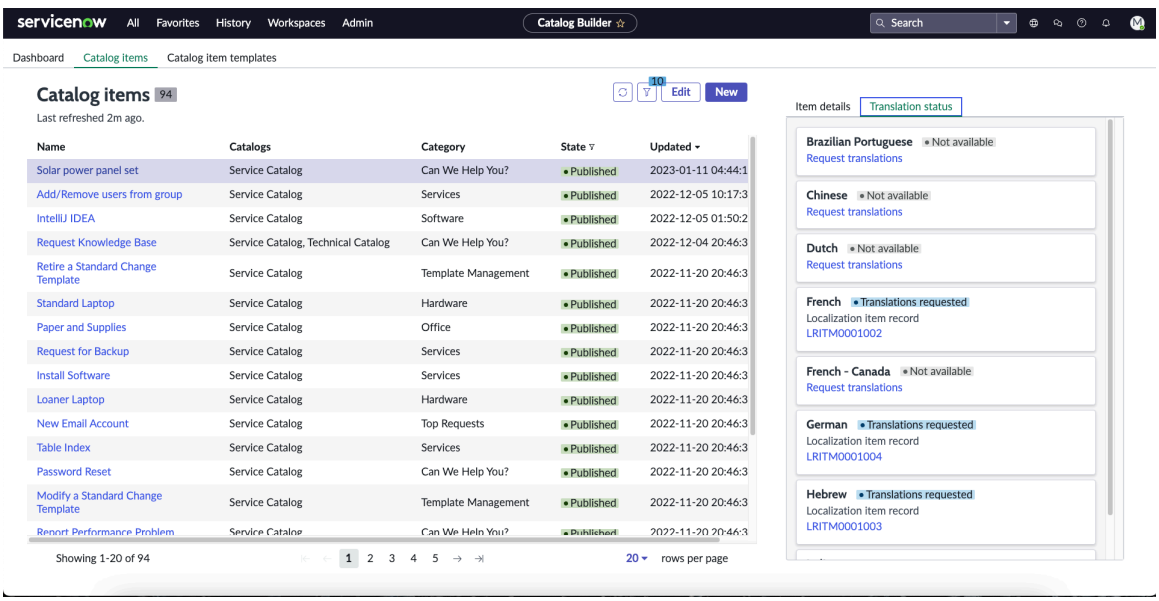
For more information, see Request translations for Service Catalog items.

Request translation mode for existing items

Set the glide.sc.catalog_builder.localization.enable_request_translation_mode property to **True**, to enable the Request translations mode is enabled.

On the **Catalog Items** tab, click the existing item that you want translated, then click the **Translation status** tab on the right pane (next to the **Item details** tab). You would see the list of languages configured in the system along with the state of that language for the catalog item and a **Request translations** link to request for a translation.

Translation status tab



Click the **Request translations** link below the language you want the translations for. A dialog appears prompting you to confirm the translation request. When you confirm the translation request on the **Translation status** tab, a localization task gets generated and its corresponding Localization item record ("LRITMXXXXXXX") shows up in place of the **Request translations** link. The state for that specific language changes to **Translations requested**.

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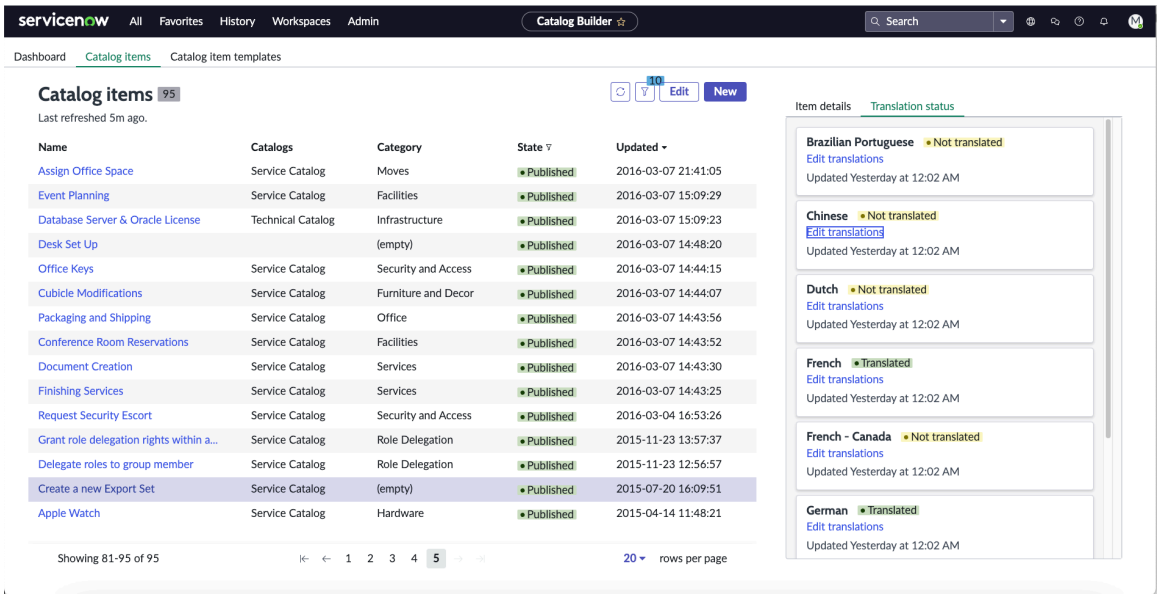
When the localization task completes in Localization Framework, the **Request translations** link comes back which you can use to request for translations again. The state changes to **Translated**, **Partially translated**, or **Not translated** on the **Translation status** tab, depending on whether the translations occur for all fields, some fields, or no fields in the table.

For more information, see Request translations for Service Catalog items.

Self-translation (ad hoc) mode

Translation status tab with self-translation mode



Set the glide.sc.catalog_builder.localization.enable_request_translation_mode property to **False** to enable self-translation mode. The default value for this property is **False**.

In the **Catalog Items** tab, click the existing item you want translated, then click the **Translation status** tab on the right pane (next to the **Item Details** tab). The list of languages configured in the system is displayed, along with the state of that language for the catalog item and an **Edit translations** link to edit the translation.

Click the **Edit translations** link to open another tab that contains two comparison UI regions: The left region is the source language, and the right region is the target or translated language. You can compare the language translation side by side in the page, and make changes if required.

For more information, see Request ad hoc translation for Service Catalog items.

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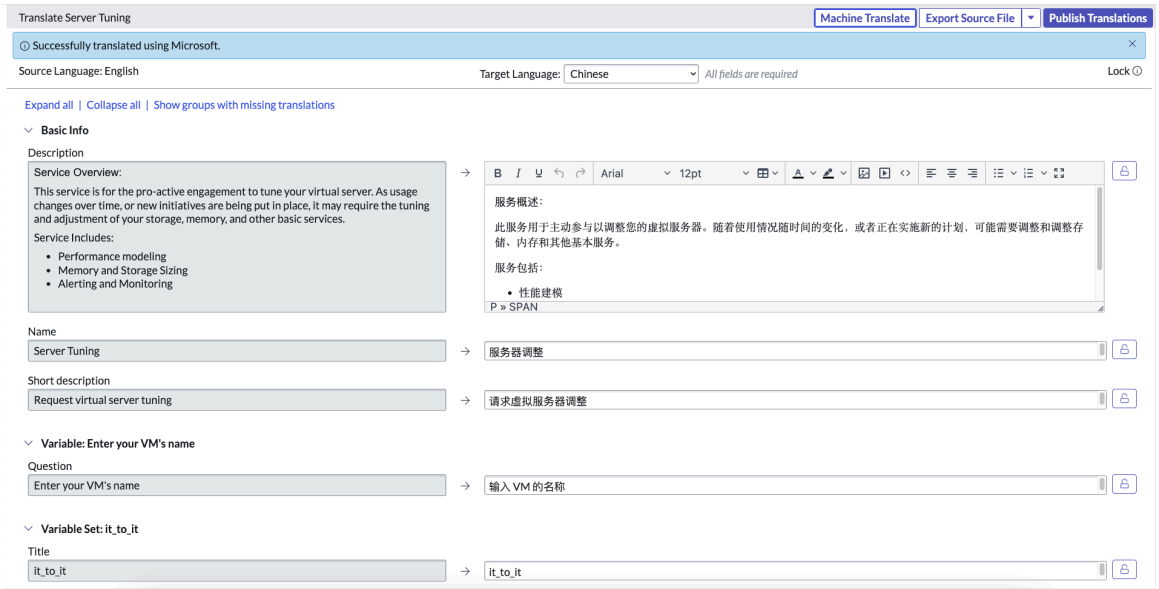
Self-translation



Translation States

Translation states for both modes

State	Mode	Description
Not available	Request translation and Self-translation	If the Localization Framework Insights record is not available, the translation state displayed by the system is **Not Available**, and the state appears near the language name.
Not translated	Request translation and Self-translation	If there are no translations in the system for that specific catalog item for that language, the state **Not Translated** appears near the language name.
Translations requested	Request translation	If there is an active LRTIM associated with a language for the item, the state **Translations requested** appears near the language name.
Partially translated	Request translation and Self-translation	If there are partial translations in the system for that specific catalog item for that language, the state **Partially Translated** appears near the language name.
Translated	Request translation and Self-translation	If all translations for that specific catalog item for that language exist in the system,

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Translation states for both modes (continued)

State	Mode	Description
		the state **Translated** appears near the language name.

Hermes Messaging Service

The Hermes Messaging Service enables you to integrate your Apache Kafka environment with your ServiceNow® instance.

Get started

Explore  Learn about Hermes Messaging Service benefits, use cases and limitations.	**Configure**  Learn about activation and set up a secure connection.	**Exchange data**  Learn about producing and consuming Kafka messages.
Manage  Manage namespaces and topics in Hermes.	**Administer**  View diagnostics and inspect topics.	**Reference**  Learn about Hermes Messaging Service components and the security model.

Helpful resources

Some ServiceNow resources that can provide you with helpful information are:

ServiceNow Community

ServiceNow Community

Support

- https://support.servicenow.com/now
- Known Error Portal

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Exploring Hermes Messaging Service

Learn about the Hermes Messaging Service and how it helps you manage the flow of data between your Kafka environment and your instance.

Hermes Messaging Service overview

Apache Kafka is an open-source data streaming platform that provides a single integration point for exchanging data across business systems in your organization. The Hermes Messaging Service enables you to integrate your Apache Kafka environment with your ServiceNow® instance to exchange data with these business systems.

The Hermes Messaging Service is a multi-tenant, multi-cluster, data transport, and queuing service built on Apache Kafka that enables your instance to produce and consume large volumes of Kafka events.

- Simplify and standardize asynchronous data transport between your Kafka environment and your ServiceNow instance.
- Publish and process Kafka events at scale. Publish events to your Kafka environment from your ServiceNow instance and consume Kafka events from your external systems at a high volume with low latency.
- Effectively process spikes and bursts in message volume to minimize performance impacts on your instance.
- Manage the health and performance of message delivery using Hermes diagnostic tools.

Hermes Messaging Service users

Users

User	Description
Hermes administrator	The Hermes admin defines namespaces for each Kafka cluster or domain and creates topic records in the instance or through the command-line interface (CLI). The Hermes admin monitors topics and views the payload of a message in a Hermes topic using the Hermes Messaging Service topic inspector.

Hermes Messaging Service workflow

1. In a domain-separated instance, the Hermes admin creates namespace records for different domains.
2. The Hermes admin creates topic records in the instance or through the CLI.
3. The Hermes admin updates or rescans topic records as needed in the instance.
4. The Hermes admin monitors topics and views message payloads using the Hermes Messaging Service topic inspector.

Benefits

Different integration points and applications in the ServiceNow platform can use the Hermes Messaging Service to publish and ingest events.

The Hermes Messaging Service is a ServiceNow AI Platform capability that is available as part of Stream Connect, Log Export Service (LES), and Instance Data Replication (IDR).

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Benefit	Application	Users
Export data from your ServiceNow instance to an external application using the Hermes Messaging Service with Flow Designer.	Flow Designer	Administrator
Export log data securely from your instance to your external data lake for reporting, auditing, or regulatory purposes by using the Hermes Messaging Service with the Log Export Service.	Log Export Service (LES)	Administrator
Trigger flows from incoming Kafka events and trigger outgoing messages to your Kafka environment using the Hermes Messaging Service with Stream Connect.	Using Stream Connect for Apache Kafka	Administrator
Improve the performance and processing efficiency of Instance Data Replication (IDR) by upgrading replication sets that you created prior to the Utah release to use the Hermes Messaging Service.	Instance Data Replication	Administrator

Limitations

- Maximum message size: 2 MB
- Maximum message size per second: 2 MB (produced or consumed)
- Number of topics: 30 topics per instance
- Maximum number of partitions: 32 partitions per topic
- Retention policy: 36 hours
- Supported compression types for producing messages to Hermes: GZIP, LZ4, and NONE.

What to explore next

To learn more about configuring and using the Hermes Messaging Service, see:

- Configuring Hermes Messaging Service
- Exchanging data using the Hermes Messaging Service
- Managing namespaces and topics in Hermes
- Hermes Messaging Service administration
- Hermes Messaging Service reference

Configuring Hermes Messaging Service

Learn how the Hermes Messaging Service is activated. Set up a secure connection to the Hermes Messaging Service.

Hermes Messaging Service activation

The Hermes Messaging Service is enabled when the Glide Hermes Message Queue plugin (com.glide.hermes) is activated.

This plugin isn't activated directly. Instead, the plugin is activated by any of the following actions:

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- Activation of the Stream Connect plugins: (com.glide.hub.flow_trigger.kafka or com.glide.hub.action_step.kafka)
- Installation of the Log Export Service application.
- Activation of the IDR plugin (com.glide.idr) in Utah or higher
- Activation of the IDR plugin (com.glide.idr), and then a subsequent upgrade to Utah or higher

Note:
Stream Connect requires an Automation Engine subscription and a Stream Connect subscription. For more information, see https://www.servicenow.com/products/automation-engine.html.

Set up a secure connection to the Hermes Messaging Service

Secure your Kafka topics by generating a ServiceNow® instance-signed certificate.

Before you begin

Setting up the Hermes Messaging Service requires coordination with your network administrator and with your Kafka administrator. Work with your network administrator to obtain required security certificates and open the required ports. Work with your Kafka administrator to ensure that your Kafka environment is configured correctly and that your applications can connect to the Hermes Messaging Service using the standard Kafka protocol.

Make sure the following setup is in place:

- The Hermes Messaging Service is activated. See Hermes Messaging Service activation.
- The Key Management Framework plugin (com.glide.kmf.global) is activated.
- The Certificates [sys_kmf_certificate] table contains a ServiceNow instance root CA certificate.
- The instance isn't configured with a Custom URL. Custom URLs are not supported with the Instance PKI Certificate Generator.

Role required: hermes_admin, sn_kmf.cryptographic_manager, or admin

For details on assigning KMF roles, see Roles installed with Key Management Framework.

Procedure

1. Navigate to **All** > **Certificate Generator** > **Instance PKI Certificate Generator**.
2. **Optional:** Control access to topics by configuring Access Control Lists (ACLs) at the namespace or topic-level.
   The bearer of the certificate is granted read or read/write access to the topics in the namespace or the existing topic that you selected.
3. Set up security for the Hermes Messaging Service.
   a. Navigate back to the Instance PKI Certificate Generator page.
   b. Enter a keystore password in the **Certificate Password** field.
   c. Select **Generate**.
   The system generates an instance-signed certificate in the Certificates [sys_kmf_certificate] table, creates a keystore, and creates a truststore.

   If Restricted Caller Access isn't approved for the IPKI Certificate Generator, a cross scope access error appears. Contact Customer Service and Support for assistance with approving Restricted Caller Access.

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4. Save a copy of the keystore by selecting **Download Keystore**.
5. Save a copy of the truststore by selecting **Download Truststore**.
6. Copy the keystore and truststore files to each producer and consumer client that will connect to the Hermes Messaging Service.

Result
You can now create a secure connection to the Hermes Messaging Service.

Note:
You must use the keystore that you generated using the Instance PKI Certificate Generator to connect to Hermes. Custom-generated keystores that aren't created according to the ServiceNow documentation aren't supported.

What to do next
- Review the guidance in Exchanging data using the Hermes Messaging Service.
- Prepare your Apache Kafka client environment
- Configure the SSL connection to Hermes in the producer and consumer properties files using the truststore and keystore files that you generated. For more information, refer to the following topics:
  - Create a test topic in Hermes using the Kafka client
  - Produce test messages to a Hermes topic using the Kafka client
  - Consume test messages from a Hermes topic using the Kafka client

Revoke a Hermes Messaging Service certificate

Revoke a ServiceNow® instance-signed certificate so that it can't be used in secure connections to the Hermes Messaging Service.

Before you begin
Role required: hermes_admin or sn_kmf.cryptographic_manager

Procedure
1. Navigate to **All** > **Certificate Generator** > **Instance PKI Certificate Generator**.
2. Select **Manage Certificates**.
3. In the **Hermes IPKI Certificates** dialog box, select one or more certificates that you want to revoke.
4. Select **Revoke**.
5. Select a reason for the revocation and then select **OK**.

Result
The certificates are revoked and can no longer be used in secure connections to Hermes. You can view the revocation date and the reason it was revoked in the Certificates [sys_kmf_certificate] table.

Exchanging data using the Hermes Messaging Service

You can produce and consume Kafka messages in your ServiceNow instance using the Hermes Messaging Service.

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There are several methods for exchanging data between your ServiceNow instance and your Kafka environment using the Hermes Messaging Service. In all cases, data is produced from one entity and consumed by another.

- Using Stream Connect, you can produce messages from your ServiceNow instance using a Producer step from a flow action or the Producer API, and then consume the messages in your external application.

  You can also produce messages from an external application and then consume the messages in your ServiceNow instance via any of the following methods:

  - Kafka flow trigger
  - RTE consumer
  - Transform map consumer
  - Script consumer

  See Stream Connect for Apache Kafka for more information.

- Using the Log Export Service, you can produce logs from your ServiceNow instance, and then consume the logs in your external application. For details on producing and consuming logs for Log Export Service, see Log Export Service (LES).
- Using the Kafka standard protocol, you can exchange messages with any application that produces messages. For example, you can produce messages from a Java application using the standard Kafka protocol and then consume them in your ServiceNow instance and vice versa.

Producing and consuming messages

To start exchanging messages, create a topic in the Hermes Kafka cluster. After you successfully create the topic, you create a total of three processes to communicate with the Hermes Kafka cluster.

- One process is required to produce messages to Hermes.
- Two processes are required to consume messages from Hermes. Two processes are required because Hermes uses a pair of Kafka clusters for failover purposes. If one cluster goes down, data is produced to the other Hermes Kafka cluster.

> **Important:**
> You must configure two distinct consumer bootstrap addresses, one for each consumer client.

When using the `list` command to view a list of topics, a list of current topics are returned from one or both clusters. Topics might be returned from only one cluster, depending on when the last synchronization occurred. Topics created for failover purposes are differentiated by a three-letter cluster identification prefix.

When accessing the Hermes clusters using the CLI, internal topics appear in addition to any topics you've created. For details, see KB1705399.

You can't delete a topic from both Kafka clusters using a single command in the command-line interface (CLI). However, you can delete the topic from both clusters by deleting the topic record in your instance. See Delete a topic in Hermes.

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Required port ranges

Work with your network administrator to ensure that the following port ranges are open before you begin exchanging messages using Hermes:

- Producer: 4000-4050
- Consumer1: 4100-4150
- Consumer2: 4200-4250

Bootstrap addresses

Use the following port mappings to connect producers and consumers to the Kafka cluster bootstrap addresses. All Application Delivery Controllers used by Hermes follow this same convention.

Important:
The following Hermes bootstrap address examples use ports 4000-4003, 4100-4103, and 4200-4203. However, you must open the following port ranges to ensure connectivity as additional clusters are added to the Hermes Messaging Service.

- Producer: 4000-4050
- Consumer1: 4100-4150
- Consumer2: 4200-4250

Producer clients use ports ranging from 4000 to 4050. For example:

```
Producers
 = "<instance_name>.service-now.com:4000,<instance_name>.service-now.com:4001,<instance_name>.service-now.com:4002,<instance_name>.service-now.com:4003"
```

Because Hermes uses a pair of Kafka clusters, you must configure two consumer clients with separate consumer bootstrap addresses.

Important:
You must configure two distinct consumer bootstrap addresses, one for each consumer client.

- The first consumer client uses ports ranging from 4100 to 4150. For example:

```
Consumer A
 = "<instance_name>.service-now.com:4100,<instance_name>.service-now.com:4101,<instance_name>.service-now.com:4102,<instance_name>.service-now.com:4103"
```

- The second consumer client uses ports ranging from 4200 to 4250. For example:

```
Consumer B
 = "<instance_name>.service-now.com:4200,<instance_name>.service-now.com:4201,<instance_name>.service-now.com:4202,<instance_name>.service-now.com:4203"
```

When you configure producer and consumer properties for your own Kafka client, use this string pattern.

Prepare your Apache Kafka client environment

Install the Apache Kafka binaries on your Unix or Windows client machine.

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Before you begin

Confirm that you have Java 11.0 or higher installed by running the following command:

```
java --version
```

Role required: admin

Procedure

1. Download and install Apache Kafka.

   a. Download the Apache Kafka binaries.
   Ensure that you download the binaries, not the source code, from the Apache Kafka website.

   b. Unzip the Apache Kafka package.
   For example:

   ```
   tar -zxvf kafka_2.13-3.2.0.tgz
   ```

2. Navigate to the parent directory where you extracted the Apache Kafka package.
   - For example, on Unix:

     ```
     cd /home/user/Software
     ```

   - For example, on Windows:

     ```
     cd C:\Software
     ```

3. Simplify the Apache Kafka directory name by renaming it to `kafka`.
   - For example, on Unix:

     ```
     mv kafka_2.13-3.2.0 kafka
     ```

   - For example, on Windows:

     ```
     rename kafka_2.13-3.2.0 kafka
     ```

Result

The Apache Kafka client is installed in a simplified directory on your local machine.

What to do next

Create a test topic in Hermes using the Kafka client

Create a test topic in Hermes using the Kafka client

Create a topic for sending and receiving test messages in the Hermes Kafka cluster.

Before you begin

- Secure your Kafka topics by generating a ServiceNow® instance-signed certificate and keystore. You must provide truststore and keystore details when you configure a producer to create a topic in Hermes. See Set up a secure connection to the Hermes Messaging Service.
- Download and install Apache Kafka. See Prepare your Apache Kafka client environment.

Role required: admin

About this task

The full Hermes Kafka topic name is composed of the following elements:

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```
snc.<instance_name>.<namespace>.<app_id>.<topic_name>
```

where:

- `<instance_name>` is the name of your instance
- `<namespace>` is the namespace of the domain your Kafka topic belongs to (optional)
- `<app_id>` is your application ID

  The topic you create belongs to this application. Specify either of the following:

  - `sn_logstoanalytics` for Log Export Service topics
  - `sn_streamconnect` for Stream Connect topics
- `<topic_name>` is the unique name for your topic

Note:
The full topic name is case-sensitive and limited to 200 characters.

Procedure

1. Navigate to the `config` directory where you extracted Kafka.
   - For example, on Unix:

     ```
     cd /home/user/Software/kafka/config
     ```

   - For example, on Windows:

     ```
     cd C:\Software\kafka\config
     ```

2. Configure a producer.

   a. Open the `producer.properties` file.

   b. Configure the following SSL properties:

   ```
   security.protocol=SSL

   ssl.truststore.password=<truststore password>

   ssl.truststore.location=<path to truststore.p12>

   ssl.truststore.type=PKCS12

   ssl.keystore.password=<keystore password>

   ssl.keystore.location=<path to keystore.p12>

   ssl.keystore.type=PKCS12

   ssl.key.password=<keystore password>
   ```

   Replace the following placeholder variables:

   - `<truststore password>` with your truststore password
   - `<path to truststore.p12>` with the path to your truststore file

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- `<keystore password>` with your keystore password
- `<path to keystore.p12>` with the path to your keystore file

c. Save your changes in plain text.

3. Navigate to your Kafka directory.
4. Create a test topic by running the following command:
   - Unix:

```
./bin/kafka-topics.sh --create --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --command-config ./config/producer.properties
 --bootstrap-server
 <instance_name>.service-now.com:4000,<instance_name>.service
-now.com:4001,<instance_name>.service-now.com:4002,<instance_
name>.service-now.com:4003
```

   - Windows:

```
bin/windows/kafka-topics.bat --create --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --command-config config/producer.properties
 --bootstrap-server
 <instance_name>.service-now.com:4000,<instance_name>.service
-now.com:4001,<instance_name>.service-now.com:4002,<instance_
name>.service-now.com:4003
```

   Replace the following placeholder variables:
   - `<instance_name>` with your instance name (case-sensitive)
   - `<namespace>` with the namespace of the domain your Kafka topic belongs to (optional)
   - `<app_id>` with the application ID (case-sensitive)
   - `<topic_name>` with the unique topic name you want to use (case-sensitive)

Result
A test topic is created in the Hermes Kafka cluster.

What to do next
Produce test messages to a Hermes topic using the Kafka client

Produce test messages to a Hermes topic using the Kafka client

Produce test messages to a Hermes topic by configuring a producer client.

Before you begin

- Secure your Kafka topics by generating a ServiceNow® instance-signed certificate and keystore. You must provide truststore and keystore details when you configure the Hermes producer. See Set up a secure connection to the Hermes Messaging Service.
- Download and install Apache Kafka. See Prepare your Apache Kafka client environment.
- Create a test topic to store the test messages that you produce. For details, see Create a test topic in Hermes using the Kafka client.

Role required: admin

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About this task

The following steps describe how to configure a producer client and send test messages to the Hermes Kafka cluster. Refer to these steps when you're ready to produce messages to Hermes for business or production purposes.

Procedure

1. Navigate to the `config` directory where you extracted Kafka.
   - For example, on Unix:

     ```
     cd /home/user/Software/kafka/config
     ```

   - For example, on Windows:

     ```
     cd C:\Software\kafka\config
     ```

2. Configure a producer.

   a. Open the `producer.properties` file.

   b. Configure the following SSL properties:

   ```
   security.protocol=SSL

   ssl.truststore.password=<truststore password>

   ssl.truststore.location=<path to truststore.p12>

   ssl.truststore.type=PKCS12

   ssl.keystore.password=<keystore password>

   ssl.keystore.location=<path to keystore.p12>

   ssl.keystore.type=PKCS12

   ssl.key.password=<keystore password>
   ```

   Replace the following placeholder variables:

   - `<truststore password>` with your truststore password
   - `<path to truststore.p12>` with the path to your truststore file
   - `<keystore password>` with your keystore password
   - `<path to keystore.p12>` with the path to your keystore file

   c. Save your changes in plain text.

3. Produce a test topic.

   a. Navigate to the Kafka directory.

   b. Run the following command:
   Unix:

   ```
   ./bin/kafka-console-producer.sh --topic
    snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
   ```

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```
 --producer.config ./config/producer.properties
 --bootstrap-server
 <instance_name>.service-now.com:4000,<instance_name>.service
-now.com:4001,<instance_name>.service-now.com:4002,<instance_
name>.service-now.com:4003
```

Windows:

```
bin/windows/kafka-console-producer.bat --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --producer.config config/producer.properties
 --bootstrap-server
 <instance_name>.service-now.com:4000,<instance_name>.service
-now.com:4001,<instance_name>.service-now.com:4002,<instance_
name>.service-now.com:4003
```

Replace the following placeholder variables:

- `<instance_name>` with your instance name
- `<namespace>` with the namespace of the domain your Kafka topic belongs to (optional)
- `<app_id>` with the application ID
- `<topic_name>` with a unique test topic name

Note:
Each part of the topic name is case-sensitive.

c. Send test messages to the test topic.
For example:

```
test1
test2
test3
```

Result
Test messages are produced to the test topic in the Hermes Kafka cluster.

What to do next
Consume test messages from a Hermes topic using the Kafka client

Consume test messages from a Hermes topic using the Kafka client

Consume test messages from a Hermes topic by configuring two consumer clients.

Before you begin

- Secure your Kafka topics by generating a ServiceNow® instance-signed certificate and keystore. You must provide truststore and keystore details when you configure the Hermes consumers. See Set up a secure connection to the Hermes Messaging Service.
- Download and install Apache Kafka. See Prepare your Apache Kafka client environment.
- Create a topic and produce test messages in the Hermes Kafka cluster before you can consume messages. For details, see Create a test topic in Hermes using the Kafka client and Produce test messages to a Hermes topic using the Kafka client.

Role required: admin

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About this task

The following steps describe how to configure two consumer clients and receive test messages from the Hermes Kafka cluster. Because Hermes uses a pair of Kafka clusters, you must configure two consumer clients with separate consumer bootstrap addresses. This ensures messages are consumed from both clusters without dropping any messages.

Important:
You must configure two distinct consumer bootstrap addresses, one for each consumer client.

Refer to these steps when you are ready to consume messages from Hermes for business or production purposes.

Procedure

1. Navigate to the `config` directory where you extracted Kafka.
   - For example, on Unix:

     ```
     cd /home/user/Software/kafka/config
     ```

   - For example, on Windows:

     ```
     cd C:\Software\kafka\config
     ```

2. Configure the consumers.

   a. Open the `consumer.properties` file.

   b. Configure the following SSL properties:

   ```
   security.protocol=SSL

   ssl.truststore.password=<truststore password>

   ssl.truststore.location=<path to truststore.p12>

   ssl.truststore.type=PKCS12

   ssl.keystore.password=<keystore password>

   ssl.keystore.location=<path to keystore.p12>

   ssl.keystore.type=PKCS12

   ssl.key.password=<keystore password>
   ```

   Replace the following placeholder variables:

   - `<truststore password>` with your truststore password
   - `<path to truststore.p12>` with the path to your truststore file
   - `<keystore password>` with your keystore password
   - `<path to keystore.p12>` with the path to your keystore file

   c. Save your changes in plain text.

3. Consume a message using each consumer.

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a. Run the following command for the first consumer client:
Unix:

```
./bin/kafka-console-consumer.sh
 --consumer.config ./config/consumer.properties --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --group snc.<instance_name>.<consumer_group_id>
 --from-beginning --bootstrap-server
 <instance_name>.service-now.com:4100,<instance_name>.service
-now.com:4101,<instance_name>.service-now.com:4102,<instance_
name>.service-now.com:4103
```

Windows:

```
bin/windows/kafka-console-consumer.bat
 --consumer.config config/consumer.properties --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --group snc.<instance_name>.<consumer_group_id>
 --from-beginning --bootstrap-server
 <instance_name>.service-now.com:4100,<instance_name>.service
-now.com:4101,<instance_name>.service-now.com:4102,<instance_
name>.service-now.com:4103
```

Replace the following placeholder variables:

- `<instance_name>` with your instance name
- `<namespace>` with the namespace of the domain your Kafka topic belongs to (optional)
- `<app_id>` with the application ID
- `<topic_name>` with a test topic name
- `<consumer_group_id>` with a label of your choice for the group that the consumer belongs to

Note:
Each part of the topic name is case-sensitive.

b. Open a new terminal window.

c. Navigate to the Kafka directory.

d. Run the following command for the second consumer client:
Unix:

```
./bin/kafka-console-consumer.sh
 --consumer.config ./config/consumer.properties
 --topic snc.<instance_name>.<namespace>.<topic_name>
 --group snc.<instance_name>.<consumer_group_id>
 --from-beginning --bootstrap-server
 <instance_name>.service-now.com:4200,<instance_name>.service
-now.com:4201,<instance_name>.service-now.com:4202,<instance_
name>.service-now.com:4203
```

Windows:

```
bin/windows/kafka-console-consumer.bat
 --consumer.config config/consumer.properties
 --topic snc.<instance_name>.<namespace>.<topic_name>
```

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```
 --group snc.<instance_name>.<consumer_group_id>
 --from-beginning --bootstrap-server
 <instance_name>.service-now.com:4200,<instance_name>.service
-now.com:4201,<instance_name>.service-now.com:4202,<instance_
name>.service-now.com:4203
```

Replace the following placeholder variables:

- `<instance_name>` with your instance name
- `<namespace>` with the namespace of the domain your Kafka topic belongs to (optional)
- `<topic_name>` with a test topic name
- `<consumer_group_id>` with a label of your choice for the group that the consumer belongs to

Note:
Each part of the topic name is case-sensitive.

Result
Test messages are consumed from the Hermes Kafka cluster.

Managing namespaces and topics in Hermes

Organize and manage namespaces and topics in the Hermes Kafka cluster using the Hermes Messaging Service.

Managing namespaces in Hermes

Group Kafka topics together for simplified topic management and access control specification using namespaces.

In ServiceNow, all Kafka topics link to a namespace. You can use namespaces to organize topics in logical ways. For example, you can group topics together based on their Kafka cluster. You can also use namespaces to configure which domains can access which topics on a domain-separated instance. You assign topics to ServiceNow domains using the topic's namespace.

Namespace records

Namespace records are stored in the Kafka Namespaces [sys_kafka_namespace] table. This table shows a list of namespace records with each namespace's related topic prefix. An administrator with the kafka_namespace_admin role creates namespace records in the Kafka Namespaces [sys_kafka_namespace] table.

Namespaces and topic prefixes

A topic is assigned to a namespace based on the topic name's prefix. A scheduled job regularly checks Hermes for new topics. When it finds one, it creates a ServiceNow topic record for the topic and links the topic to a namespace. The prefix assigned to the topic is the basis for its namespace assignment in ServiceNow.

This image shows an example of using the Kafka cluster name prefix to organize topics into different namespaces in ServiceNow.

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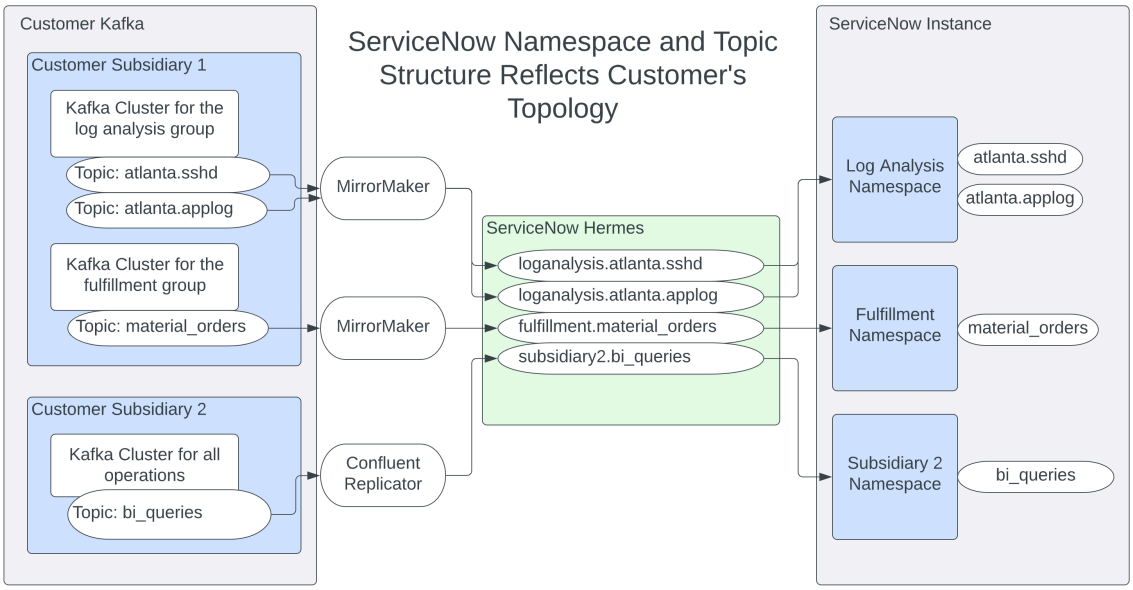
Kafka prefixes and topic namespaces



In this example:

1. An instance administrator with the kafka_namespace_admin role creates namespace records for the Log Analysis group, the Fulfillment group, and another subsidiary in the ServiceNow instance.
2. The instance administrator works with the Kafka administrator to replicate topics to Hermes using the Kafka cluster name as the namespace prefix.
3. The Kafka cluster for the fulfillment group has a topic named `material_orders`. The topic is replicated to Hermes using `fulfillment` as the namespace prefix. A new topic is created in Hermes called `fulfillment.material_orders`.
4. A scheduled job finds the `fulfillment.material_orders` topic in Hermes, creates a topic record, and assigns the record to the Fulfillment namespace to match its prefix.

Prefix matching rules

Topic name prefixes are matched to namespaces according to the following rules.

- The namespace is selected based on the longest matching namespace prefix. If there's a matching namespace, the topic record is assigned to that namespace and that namespace's domain.
- If there isn't a longer namespace prefix that matches, the zero-length prefix of the Default Namespace will match. The topic record is assigned to the Default Namespace in the global domain.
- If the Default Namespace has been deleted or modified, so there’s no matching namespace at all, then no topic record is created.

Namespace design considerations

Plan how want to organize your namespaces and topics before you start creating them. Once you add a topic to a namespace, you can't delete the namespace without deleting the topics that are associated with it.

Have a namespace for each domain on a domain-separated instance

Create one namespace per ServiceNow domain.

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Use namespaces to organize topics by domain and Kafka installation

Use namespaces to separate both topics that belong in separate ServiceNow domains and topics from separate Kafka installations.

After you've configured your namespaces, consider deleting or deactivating the Default Namespace

Keeping the Default Namespace could lead to configuration issues, such as a mismatched topic prefix. This mismatch could result in a topic that should have been created in one domain being created in the global domain.

You can enforce tighter constraints on where topics are created by deleting the Default Namespace. For example, if you decide that all topics must have a prefix that matches a namespace, deleting the Default Namespace ensures that topics without a matching prefix aren't created.

For details on using domain separation with namespaces in Hermes, see Hermes Messaging Service domain separation.

Create a namespace in Hermes

Organize your Kafka topics by creating a namespace.

Before you begin

Role required: hermes_admin or kafka_namespace_admin

About this task

Use namespaces to organize Kafka topics in logical ways. For example:

- Create namespace records for each Kafka cluster that replicates messages to Hermes.
- Create namespace records for each domain in a domain-separated instance. For more information, see Hermes Messaging Service domain separation.

Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Namespaces**.
2. Select **New**.
3. On the form, fill in the fields.

Kafka namespace form

Field	Description
Name	Name of the namespace.
Topic Prefix	Prefix assigned to all topics in this namespace. Topics are assigned to namespaces based on the topic prefix. A scheduled job checks for new topics in Hermes. When it finds one, it creates a topic record and links the topic to the namespace.

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Field	Description
	Warning: To avoid conflicts between the app ID and the namespace that could result in unexpected behavior, don't specify a topic prefix beginning with `sn_` when creating a namespace record.
Allowed Application Scopes	List of application scopes that have access to this namespace.

4. Select **Submit**.

Result
A namespace record is created in the Kafka Namespace [sys_kafka_namespace] table. Topics created in or replicated to Hermes are assigned to the namespace based on the topic prefix.

What to do next
- Organize topics yourself by creating one or more topic records and linking them to this namespace. See Create a topic in Hermes.
- Manage access to Kafka topics in the Hermes Kafka cluster by configuring Access Control Lists (ACLs) for this namespace in the certificate generator. See Set up a secure connection to the Hermes Messaging Service.

Delete a namespace in Hermes

Prevent topics from being added to a namespace by deleting the namespace in Hermes.

Before you begin
Role required: hermes_admin or kafka_namespace_admin

About this task
You can't delete a namespace if any active topics belong to it. You must delete or deactivate the topics in a namespace before you can delete the namespace.

Procedure
1. Navigate to **All** > **Hermes Messaging Service** > **Namespaces**.
2. Select a namespace that you want to delete.
3. Select **Delete**.

Result
The namespace record is deleted from the Kafka Namespace [sys_kafka_namespace] table.

Managing topics in Hermes

Manage topic records in your instance and Kafka topics in the Hermes Kafka cluster using the Hermes Messaging Service.

Topic records

Messages are organized and stored in Kafka topics in the Hermes Kafka cluster. Topic records are stored in the Kafka Topics [sys_kafka_topic] table in your instance. This table shows a list of

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topics records with a reference to each topic's namespace. Each topic record has a field for the topic's name, related namespace, and whether the topic is active.

Values in the Name column of the Kafka Topics [sys_kafka_topic] table aren't inherently unique. For example, topic records might have the same Name value when they belong to different namespaces or exist in different clusters. However, values in the Full Name column are always unique.

A scheduled job runs regularly to synchronize topic records with the topics found in Hermes. This job performs the following functions:

- Creates topic records for any discovered topics, assigning them to the appropriate namespace based on the prefix for the topic name.
- Synchronizes topics created from external sources, such as the Kafka command-line interface (CLI). For example, when a topic is created from an external source on the near cluster, the job runs and creates the topic on the far cluster as well.
- Logs a warning message if a topic can't be matched to any namespace. If a topic can't be matched to any namespace, the topic record isn't created. There's a default, prefix-less namespace called the Default Namespace that matches all topics. The only time a topic doesn't match any namespace is when the Default Namespace has been deleted or modified.
- Marks topics as inactive if no Kafka topic was found for them.

You can monitor and view topics in the Hermes Kafka cluster using the topic inspector. For more information, see Monitoring topics in the Hermes Kafka cluster.

Kafka topics are specific to a particular instance. This means you can't migrate a topic record from the Kafka Topics [sys_kafka_topic] table to another instance using an update set. Instead, you must manually create the topic in the target instance.

Creating topics

You can create topics in the Hermes Kafka cluster using either of the following methods:

- Create the topic from your instance. This creates a record the Kafka Topics [sys_kafka_topic] table and creates a Kafka topic in the Hermes Kafka cluster. See Create a topic in Hermes.
- Create the topic externally. For example, create the topic using the Kafka command-line interface (CLI).

> **Note:**
> To avoid syncing issues between the cluster and your instance, include the application ID when creating topics externally. For example, without the application ID, a topic created from the CLI with a name like `snc.instancename.fulfillment.topicname` is created in the default namespace instead of the `fulfillment` namespace. To ensure the topic is created in the `fulfillment` namespace, include the application ID in the name using the format `snc.instancename.fulfillment.app_id.topicname`. Replace `app_id` with the application ID of your choice.

If, for some reason, a topic can't be created in the Hermes Kafka cluster, it won't be created in the Kafka Topics [sys_kafka_topic] table either.

Updating topics

If necessary, you can change the number of partitions in a topic. Note that you can only increase the number of partitions in a topic. For more information, see Update a topic in Hermes.

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After it's created, the namespace assigned to a topic record is permanent. If you create a namespace record and want to move existing topics to it, you must delete the topics and recreate them in the Hermes Kafka cluster with the new namespace prefix. If the topics weren't created through the instance, new topic records will be created and assigned to the matching namespace record after a rescan.

Deleting topics

You can delete topics from the Hermes Kafka cluster using either of the following methods:

- Delete the topic directly from the Kafka Topics [sys_kafka_topic] table in your instance. This method automatically deletes the topic from all the Hermes Kafka clusters in one action. See Delete a topic in Hermes
- Delete the topic externally. For example, delete the topic using the Kafka command-line interface (CLI).

> **Important:**
> Deleting the topic externally requires that you delete the topic from both Hermes clusters manually by specifying each set of ports (410x and 420x). If possible, delete the topic through the instance instead.

You can't delete a topic if it has subscriptions in Stream Connect.

Rescanning topics

Rescanning creates topic records for any topics in the Hermes Kafka cluster that don't already have corresponding topic records. For example, if you create topics in Hermes using the CLI, you can rescan to create corresponding topic records in the Kafka Topics [sys_kafka_topic] table immediately instead of waiting for the scheduled job to create them.

- The rescan occurs automatically every ten minutes.
- Created topic records are assigned to existing namespaces based on prefix matching rules.

Sometimes topic records in your instance don't match what's in Hermes. This situation can happen in the following cases:

- When the ServiceNow Integration Hub Kafka Consumer (com.glide.hub.kafka_consumer) plugin is enabled after there are already topics in Hermes.
- When topic records are deleted accidentally.
- When namespace definitions are changed, and you want to assign existing topics to the new namespaces.

Create a topic in Hermes

Create a topic from within ServiceNow. Creating a topic from your instance adds a topic record to the Kafka Topics [sys_kafka_topic] table and adds a Kafka topic to Hermes.

Before you begin

Role required: kafka_admin

Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Topics**.
2. Select **New**.
3. On the form, fill in the fields.

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Kafka Topic Form

Field	Description
Name	Name of the topic. The string that you enter is combined with the application ID and namespace to create the full Kafka topic name. **Note:** Don't include the `snc.<instance_name>` prefix with the topic name.
Application ID	Application associated with the topic. Default is Stream Connect.
Namespace	Namespace associated with the topic. You can either select a namespace created by the Kafka namespace administrator or select the Default Namespace if separate namespaces aren't configured for your instance. In ServiceNow, all Kafka topics link to a namespace. Namespaces are used to organize topics and, on a domain-separated instance, for domain separation. When a namespace is assigned to a particular domain, all the topics created in that namespace have the same domain.
Partitions	Number of partitions to create for the topic. ○ Minimum value: 1 ○ Maximum value: 32 ○ Default value: 1
Active	Option to activate the topic.

4. Select **Submit**.

Result
The topic appears in both the Kafka Topics [sys_kafka_topic] table and in Hermes. If, for some reason, a topic can't be created in Hermes, it won't be created in the Kafka Topics [sys_kafka_topic] table either.

Update a topic in Hermes

Update a Kafka topic in Hermes by modifying the topic record.

Before you begin
Role required: kafka_admin

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Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Topics**.
2. Select the topic record that you want to update.
3. **Optional:** Change the number of partitions in the topic.
   Note the following restrictions:
   - You can only increase the number of partitions.
   - A topic can have up to 32 partitions.
4. **Optional:** Change the topic's activation status.
5. Select **Update**.

Result

The topic record and the Kafka topic in the Hermes Kafka cluster are updated.

If an error occurs when updating the partition count, you can synchronize the topic's partition count across Hermes Kafka clusters by selecting **Synchronize Partition Count**.

Delete a topic in Hermes

Remove a topic and its messages by deleting it from Hermes. Deleting a topic record deletes it from your instance and from the Hermes Kafka cluster.

Before you begin

Role required: kafka_admin

Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Topics**.
2. Select the topic that you want to delete.
3. Select **Delete**.

Result

The topic record is deleted from the Kafka Topics [sys_kafka_topic] table. The corresponding Kafka topic is deleted from the Hermes Kafka cluster.

Rescan topics in Hermes

Synchronize topic records in your instance with topics in the Hermes Kafka cluster by rescanning.

Before you begin

Role required: kafka_admin

Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Rescan Topics**.
2. Synchronize topics by selecting **Confirm**.
3. **Optional:** After the rescan finishes, view the script execution history.

Result

Topic records are added to the Kafka Topics [sys_kafka_topic] table for each topic discovered in the Hermes Kafka cluster. The topic refresh date and time that appears in **All** > **Hermes Messaging Service** > **Topics** is updated.

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Monitoring topics in the Hermes Kafka cluster

Monitor message processing and view topics in the Hermes Kafka cluster that belong to you using the Hermes Messaging Service topic inspector.

Tracking messages in partitions

You can track messages in the Hermes Kafka cluster by viewing partition information.

- Determine whether your messages are reaching the Hermes Kafka cluster by checking whether the end offset value changes when you produce messages to a topic.
- Determine whether messages have expired by noting the beginning offset value, which increases as messages expire. If you send messages to a topic but the beginning offset is higher than you expect, some of the messages have already expired. Messages expire in the Hermes Kafka cluster after 36 hours.

Tracking consumer progress

You can track the progress of processing messages for each consumer by viewing consumer information.

- View the consumers for each partition in a topic, including the group ID and consumer ID for each consumer.
- Determine which message a consumer is processing by viewing the **Current Offset** column.
- Determine whether the consumer is delayed by checking the **Lag** column. The lag is the difference between the current offset and the end offset that indicates how many messages remain.

Inspecting message details

You can detect problems with consuming messages using the topic inspector. For example, if a message that you produced isn't consumed from the Hermes Kafka cluster, you can validate the payload and message key by inspecting the topic. You can also download the full payload and save it as a file on your local machine.

You can view messages as binary data in base-64 encoding instead of UTF8 strings by adding a system property. See Hermes Messaging Service properties.

View a message in a Hermes topic

View the payload of a message in a Hermes topic using the Hermes Messaging Service topic inspector.

Before you begin

Role required: hermes_admin, kafka_namespace_admin, or admin

Important:
Administrators with the kafka_namespace_admin role can view message data across different domains.

About this task

Note:
Messages expire after 36 hours.

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Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Topic inspector**.
2. **Optional:** View topics from a specific cluster by selecting a datacenter in the **Select Datacenter** drop-down list.
   The near cluster, the far cluster, and the number of topics on the instance are listed above the table of topics.
3. **Optional:** View messages in a specific partition.
   a. Select **Load Partition Info**.
   b. In the **Read from Partition** drop-down list, select a partition.
4. Retrieve messages from a topic that you want to inspect.
   a. Select **Inspect Topic**.
   b. Select a topic in the table.
   c. Select the number of messages that you want to view in the **Number of messages** list.
   d. Enter a date in the past to use a starting point for retrieving messages in the **Message start date (UTC)** field.
5. View the message details and payload.

Note:
To view headers, keys, or messages that are greater than 20 characters, select the **View** link or download the data.

Message details

Field	Description
Offset	The Hermes Kafka cluster's datacenter identifier and the position of the message in the partition.
Partition	Partition of the topic where the message is stored.
Timestamp	Date and time when the message was created.
Headers	Message header.
Key	Message key.
Payload	Message body contents. Note the following information about the message payload: ○ The topic inspector automatically replaces some characters with escape characters in message payload text data. ○ The message size that is displayed is the size of the payload as viewed in the topic inspector and not necessarily the size of the message as it exists in the Hermes Kafka cluster.

Hermes Messaging Service administration

Monitor the Hermes Messaging Service by viewing diagnostics and inspecting topics.

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Check the status of and connection to the Hermes Kafka cluster

Check the status of and test the connection to the Hermes Kafka cluster by sending and receiving test messages.

Before you begin

Role required: admin or hermes_admin

Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Diagnostics**.
   The dashboard loads and Hermes diagnostic tests are run automatically verifying instance public key infrastructure (PKI) configuration, external port status, and Glide Hermes Message Queue plugin (com.glide.hermes) activation.

   If any of the tests fail, contact Customer Service and Support.

2. View the producer and consumer bootstrap addresses that you can use to connect to Hermes in the Setup Information section.
   Use these port mappings to connect producer and consumer clients to the Kafka cluster bootstrap addresses, as described in Exchanging data using the Hermes Messaging Service.

   Note:
   When configuring consumer clients, you must configure two clients using ports in separate ranges: one in 4100-4150 and another in 4200-4250.

3. Verify that the instance can act as an issuer in an x.509 trust hierarchy.
   a. Expand the **Instance PKI** container.
   b. View the configuration status.
   c. View additional instance PKI details on the Key Management Framework Health page by selecting **View more**.
   The instance PKI configuration status is displayed. If the configuration is valid, you can secure connections to Hermes by following the steps in Set up a secure connection to the Hermes Messaging Service. If the configuration is invalid, contact Customer Service and Support.
4. Confirm availability of the external ports used to connect to the Hermes Kafka cluster.
   a. Expand the **Bootstrap Connectivity** container.
   b. Select **Run Test**.

   In the range of ports required for Hermes, the following ports are checked:

   - 4000, 4001, 4002, 4003 producer client ports
   - 4100, 4102, 4102, and 4103 consumer client ports
   - 4200, 4201, 4202, and 4203 consumer client ports

   If the ports aren't open, contact Customer Service and Support.

5. Confirm that the instance is able to send messages to and receive messages from the Hermes Kafka cluster.
   a. Expand the **Instance Connectivity** container.
   b. Select **Run Test**.
   Test Message Send and Test Message Receive results are displayed including the elapsed time, datacenter, and bootstrap information for each operation. If the tests fail, contact Customer Service and Support.
6. Verify the timestamp of the most recent message from a topic in the Hermes Kafka cluster.

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a. Expand the **View Topics** container.

b. View the timestamp for an external topic's last known message by selecting the topic name in the **External Topics** column.

c. View the timestamp for an internal topic's last known message by selecting the topic name in the **Internal Topics** column.

The message's timestamp is displayed. To view full details for a topic, use the Hermes Topic Inspector. See Monitoring topics in the Hermes Kafka cluster.

Tracking Hermes Messaging Service Message usage

Message usage through the Hermes Messaging Service is tracked for monitoring and management purposes through the Kafka topic name.

You access the Hermes Messaging Service exclusively through integrations with other applications, such as Stream Connect and Log Export Service.

You can access Kafka topics in your namespace using the following naming convention:

```
snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
```

where:

- `snc.<instance_name>` is your namespace prefix
- `<namespace>` is the namespace of the domain your Kafka topic belongs to (optional)
- `sn_<app_id>` is your application ID
- `<topic_name>` is your unique topic name

Note:
The full topic name is case-sensitive and limited to 200 characters.

Kafka message usage and licensing impact vary by application. License usage is tracked at the application level.

Cloning with Hermes Messaging Service enabled

To clone your database from one instance to another successfully with Hermes enabled, you must ensure that certain Hermes tables are preserved and excluded. The list of tables in the preserve list should match those in the exclude list and vice versa.

Before you request a clone, verify the Hermes tables in the preserve and exclude lists. For example, make sure the sys_kafka_topic table is in the preserve list to maintain the current Hermes topics in the target instance. If the sys_kafka_topic table is not preserved, it is overwritten when the clone operation occurs.

The following sections assume that Hermes is installed on both the source and target instances before the clone. For example, if Hermes is not installed on the target instance, there are no Hermes tables to preserve.

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Important:
If you clone an instance without Hermes installed to an instance with Hermes installed, the Hermes tables in the target instance are removed.

To avoid losing this data, capture the data in the following Hermes tables using an update set:

- hermes_cluster_config
- hermes_topics_state
- hermes_topic_location
- hermes_topics_metrics
- hermes_metrics

You must ensure the hermes_cluster_config and hermes_topic_location tables are preserved to ensure the Hermes Messaging Service is functional.

Hermes tables to preserve

Add the following Hermes tables to the Clone Data Preservers list if they're missing. Remove any Hermes tables that aren't in this list.

- hermes_cluster_config
- hermes_metrics
- hermes_topics_metrics
- hermes_topics_state
- hermes_topic_location
- sys_kafka_namespace
- sys_kafka_topic

Hermes tables to exclude

Add the following Hermes tables to the Clone Exclude Tables list if they're missing. Remove any Hermes tables that aren't in this list.

- hermes_cluster_config
- hermes_metrics
- hermes_topics_metrics
- hermes_topics_state
- hermes_topic_location
- sys_kafka_namespace
- sys_kafka_topic

View Hermes Messaging Service log messages

Review Hermes event details by viewing log messages.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **System Log** > **All**.
   The Log [syslog] table displays all system log messages.
2. View logs only related to Hermes by adding a filter.

   a. Select the filter icon ( ).

   b. Set a condition with a field, operator, and search string.

   Example
   For example, **[Source] [contains] [Hermes]**.

   c. Select **Run**.

Result
The Log [syslog] table displays only the Hermes Messaging Service log messages.

Hermes Messaging Service reference

Reference topics provide details on the Hermes Messaging Service components and the security model.

Hermes Messaging Service components

The Hermes Messaging Service architecture is built on the following components.

Hermes Messaging Service components

Component	Description
Hermes Message Queue	A dedicated multi-tenant message queue in the ServiceNow Hermes Kafka cluster for managing the flow of data to and from the instance. The message queue uses certificate-based authentication that supports bi-directional traffic. The Hermes Message Queue is available to ServiceNow applications via the Hermes Glide API.
Hermes Gateway	Part of the ServiceNow datacenter that enables you to connect to a ServiceNow endpoint to read and write data to the Hermes Message Queue.
Hermes Glide connector	Connector that integrates instance functionality (for example, flows, data export, and data replication) with the Hermes Message Queue via the API.

Hermes Messaging Service security model

The Hermes Messaging Service security model relies on the following capabilities.

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Hermes Messaging Service security model

Capability	Description
Namespaces and data isolation	All Kafka topics are namespaced per customer. You can only view topics that belong to you and your topics aren't visible to anyone else.
Authentication and authorization	The Hermes Messaging Service requires certificate-based authentication using mTLS endpoint authentication with trusted identities and authorization based on identity.
Domain separation	Domain separation is supported with the Hermes Messaging Service. See Hermes Messaging Service domain separation.
High-availability	Failover is provided by multiple Kafka clusters running in separate ServiceNow datacenters.

Hermes Messaging Service properties

These system properties control the behavior of the Hermes Messaging Service.

To set Hermes Messaging Service system properties, navigate to the System Properties [sys_properties] table and add the property.

System properties

Encoding format for message payload in the Hermes Messaging Service topic inspector `glide.hermes.topic.inspector.payload.format`	By default, messages in the **Payload** column are displayed as strings in UTF8. You can display binary data using base-64 encoding by adding this system property and setting the value to binary. • string: display message payload in UTF8 • binary: display message payload in base64
Encoding format for message keys in the Hermes Messaging Service topic inspector `glide.hermes.topic.inspector.key.format`	By default, identifiers in the **Keys** column are displayed as strings in UTF8. You can display binary data using base-64 encoding by adding this system property and setting the value to binary. • string: display keys in UTF8 • binary: display keys in base64

Hermes Messaging Service roles

Hermes Messaging Service is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

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Hermes Messaging Service administrator [hermes_admin]

Enables users to access the Hermes Messaging Service Topic Inspector.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Kafka administrator [kafka_admin]

Enables users to manage the integration with Apache Kafka, including topics and settings related to Kafka subscriptions.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Kafka namespace administrator [kafka_namespace_admin]

Enables users to manage Kafka namespace definitions.

Contains Roles

List of roles contained within the role: kafka_admin.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

Stream Connect administrators with the kafka_namespace_admin role can view message data across different domains.

For example, in a Managed Service Provider (MSP) instance with Kafka integrations in multiple domains, managing namespace definitions properly is important to maintain separation between domains, so don't grant this role to administrators within a single domain.

Hermes Messaging Service domain separation

Domain separation is supported for the Hermes Messaging Service. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

Overview

On a domain-separated instance, you can use namespaces to configure which domains can access specific topics in the Hermes Kafka cluster. You assign topics to ServiceNow domains using the topic record's namespace.

How domain separation works with the Hermes Messaging Service

On a domain-separated instance, a user with the kafka_namespace_admin role can assign namespaces to specific ServiceNow domains. When the Kafka namespace admin assigns a namespace to a particular domain, all the topics created in that namespace will have the same domain. Users can only see and interact with the topics and namespaces they have access to, based on domain visibility and access control lists (ACLs). Topics created with the Default Namespace are created in the global domain.

Both the Kafka Topics [sys_kafka_topic] table and the Kafka Namespaces [sys_kafka_namespace] table are domain-separated tables. Domain separation rules filter which records are available in each domain. In addition to being domain-separated, these tables can also be protected with ACLs, just like any other table.

All domain support features require the Domain Support - Domain Extensions Installer (com.glide.domain.msp_extensions.installer) plugin.

Related topics

Domain separation for service providers

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Password Reset

The ServiceNow® Password Reset application enforces strong and secure passwords by enabling end users to reset or change their passwords either by using the self-service process or by requesting the assistance of a service desk agent.

Password Reset for Virtual Agent

Augment an end-user experience with Password Reset for ServiceNow® Virtual Agent that handles common support issues, using pre-built conversations.

Password Reset Windows Application

The Password Reset Windows Application enables a user, who forgets the password or is locked out of a Windows computer, to reset the password directly from the Windows login screen.

Watch this video to get an overview of the Password Reset application.

Overview of the ServiceNow Password Reset application, as well as the Password Reset for Virtual Agent, Password Reset Windows Application, and Password Reset Interactive voice response (IVR).

Get started

Explore



Learn about Password Reset concepts and features.

Set up and configure



Set up and configure Password Reset for your users.

Enroll for Password Reset



Enroll for Password Reset.

Reference



Get details about components like fields and properties.

Exploring Password Reset

Get an overview of Password Reset, Password Reset Windows Application, and Password Reset for Virtual Agent.

Understand how to set up, configure, and use Password Reset and Password Reset Windows Application for your organization.

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Password Reset The Password Reset application enforces strong and secure passwords by enabling end users to reset or change their passwords either by using the self-service process or by requesting the assistance of a service desk agent.

Password Reset for Virtual Agent Augment an end-user experience with Password Reset for Virtual Agent that handles common support issues, using pre-built conversations.

Password Reset Windows Application The Password Reset Windows Application enables a user, who forgets the password or is locked out of a Windows computer, to reset the password directly from the Windows login screen.

Related topics

Installed with Password Reset

Domain separation and the Password Reset application

Password Reset

The Password Reset application enforces strong and secure passwords by enabling end users to reset or change their passwords either by using the self-service process or by requesting the assistance of a service desk agent.

Password Reset application features

Manage enrollment

Automatically enrolls end users or allows manual enrollment.

Verification types

Validates user authenticity with the help various verifications.

Integrated plugins

Resets passwords directly from the Windows application and Microsoft Azure active directory (AD).

Enrollment types

Enables end users to enroll in different password reset programs at their convenience.

Homepages with a dashboard view

Password Reset has a new, modernized look and feel. For more information, see Next Experience UI.

Password Reset processes

Users with the password_reset_admin role configure how the process of resetting a password works for an end user.

- Self-service process:

  Users reset passwords over the internet using a browser on any supported interface, including mobile devices.

- Service Desk assisted process:

  Users request the assistance of a service desk agent, over the phone or in person. In this process, users don't reset passwords.

For more information, see Configuring Password Reset and Plan your Password Reset processes.

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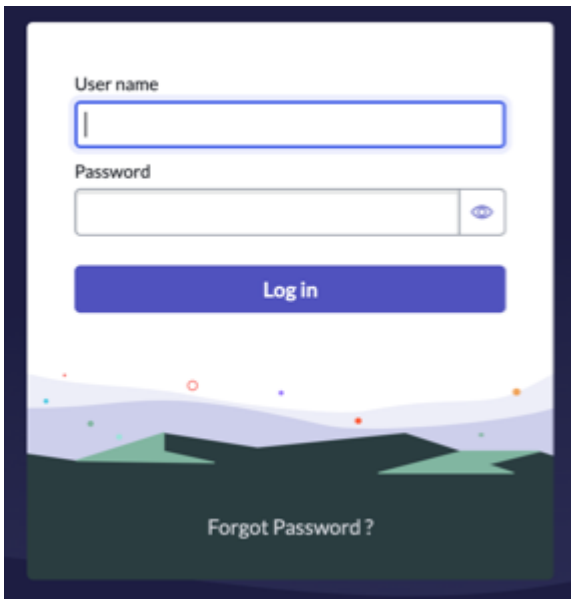
Self-service and Service Desk - assisted processes

In addition to configuring the connections, user groups, and verifications, you can specify one of the following operational methods for the organization:

Self-service process

End users reset passwords using a browser on any supported interface, including mobile devices. They can provide the identifying information and answer questions or submit a securely delivered code number. The following example shows the default self-service process Password Reset flow:

1. If a user doesn't remember their password, the user clicks **Forgot Password** on the Login page.



2. The Password Reset application starts. On the Identify page, the user enters their identifying information (generally the user name or email address). The example includes the default CAPTCHA security feature. The user provides identification by entering a user name and CAPTCHA, and clicks **Next**.

Note:
Users can hear characters displayed in CAPTCHA by clicking the Speak the CAPTCHA icon ( ) displayed in the pop-up window for the Identify step.

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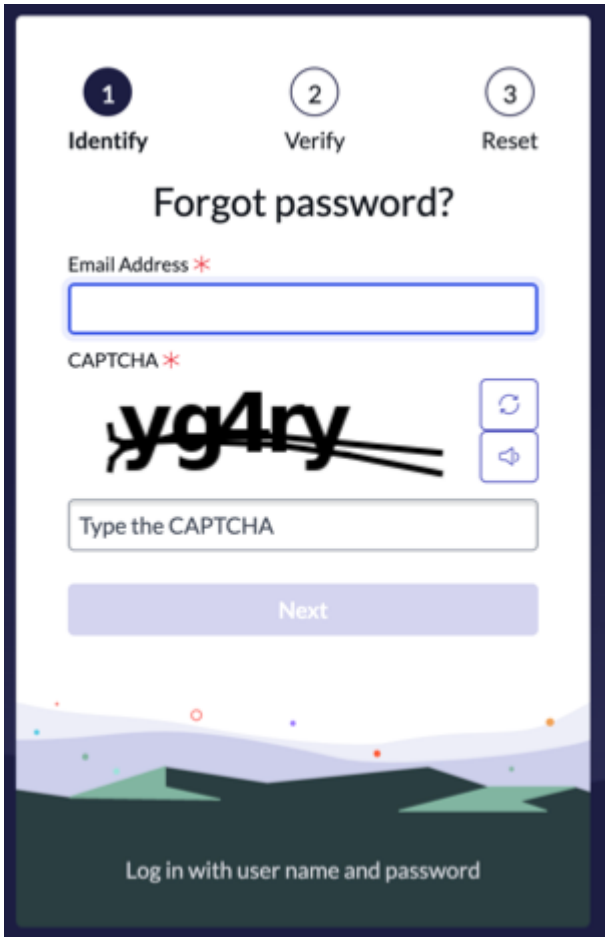

3. On the **Verify** tab, the user provides personal data associated with their user name. For example, the user can either enter the email address associated with the user profile or answer the security question that an administrator has configured. This information is specified while enrolling in the Password Reset process. The administrator can configure a different verification method. For example, a personal question that only the user can answer.

   Note:
   Other possible verifications require the user to enter a code number that was sent to a mobile device by SMS text, through the Google Authenticator app, or by email.

4. The Reset page tells the user to check email for instructions.
5. The user opens the email and clicks the link in the email to reset the password. The link is valid for a period of time that an administrator specifies by using the **password_reset.request.expiry** property.
6. The Reset Password page guides the user to reset the password.
7. The system checks the credential store to verify the identity and then displays the new password on the Reset page.

Service desk-assisted process

An end user requests the assistance of a Service Desk agent, over the phone or in person. The agent processes the request. Each Service Desk agent has the Password Reset admin Service Desk role. The Reset request form that the agent

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contains a **Select user** field and a **Select process** field. On the form, the agent can view all processes in the end user's domain.

Next steps

Based on your role, do these steps:

- If you're an administrator, start configuring Password Reset for your users.
- If you're an end user who wants to reset a password, start enrolling to reset your password.

Password Reset for Virtual Agent

Augment an end-user experience with Password Reset for Virtual Agent that handles common support issues, using pre-built conversations.

For more information about the Virtual Agent, see Virtual Agent.

Your end users can perform the following actions through the Virtual Agent conversations:

- Reset a password
- Change a password
- Unlock an account
- Enroll to reset passwords

The end users can reset passwords and unlock accounts even if they aren't logged in. When the users are logged in, they can do all the actions including changing passwords. After changing or resetting a password, the users can't change or reset the password for the next 24 hours.

Related topics

Password management topics for ITSM Virtual Agent

Password Reset Windows Application

The Password Reset Windows Application enables a user, who forgets the password or is locked out of a Windows computer, to reset the password directly from the Windows login screen.

How the Password Reset Windows Application works

Administrators download and run an EXE or MSI file to install or distribute the application to user computers. The application installs a link on the Windows login screen. The user clicks the link (**Forgot Password** as depicted in the examples on various Windows versions) and is then guided through the process of resetting the password.

If your user is using Windows, 8.1, 10, or 11 operating system on the computer, a pop-up window opens after the user clicks the **Forgot Password** link. On the pop-up window, the user enters the user name. For the multi-identification type, the user enters a user name and email address and enters the displayed CAPTCHA if enabled for the process. If the CAPTCHA is incorrect, the user gets an error message.

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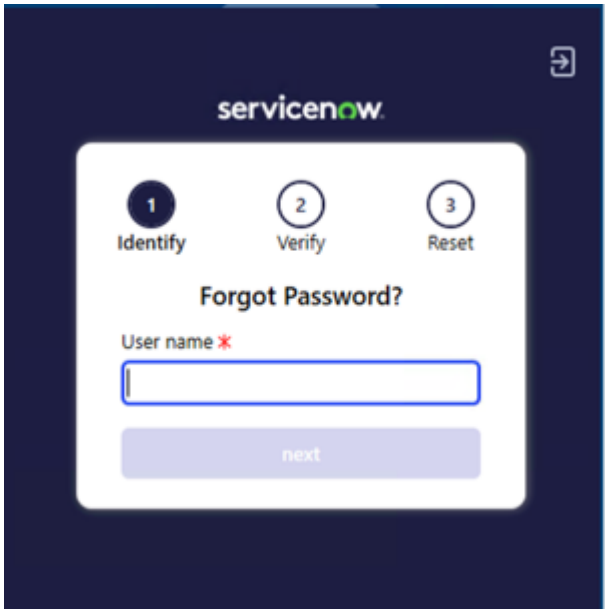

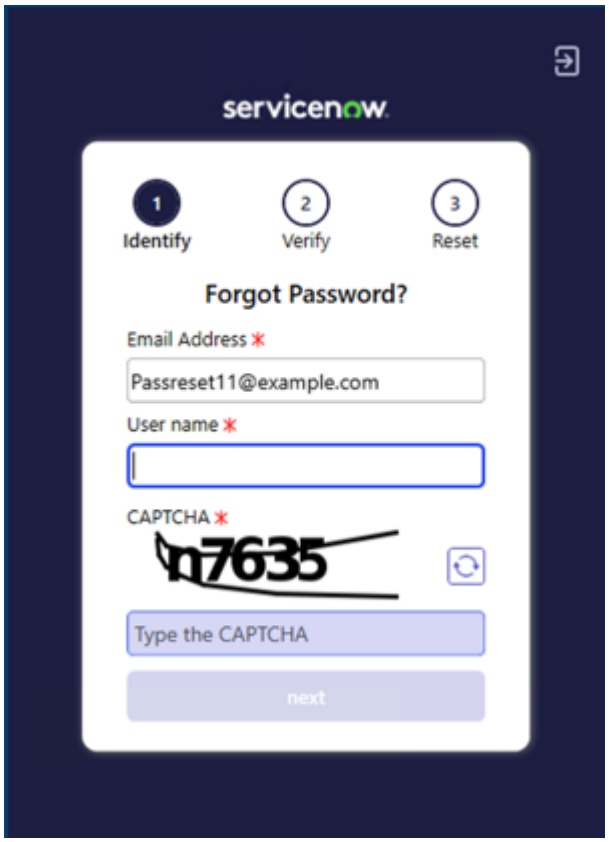

This is an identification step, which takes the user to the verification step after clicking **next** on the pop-up window.

In the Verify step, the users can verify themselves using one of the following configured verification types for security:

- Personal data: The user enters a user name or email. The personal data verifications compare the user's answers with the available details. For example, the email address entered by the user must match with the available registered email address.
- Authenticator app: The user enters the code generated by an authenticator app.
- Security Questions: The user enters the answers to the security questions.

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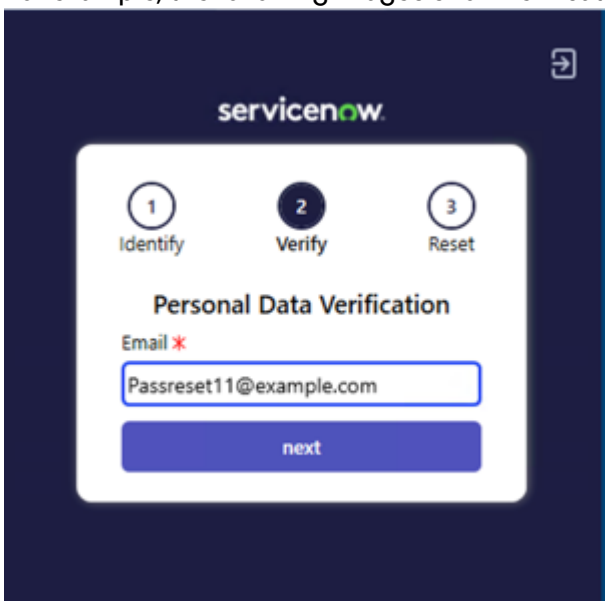
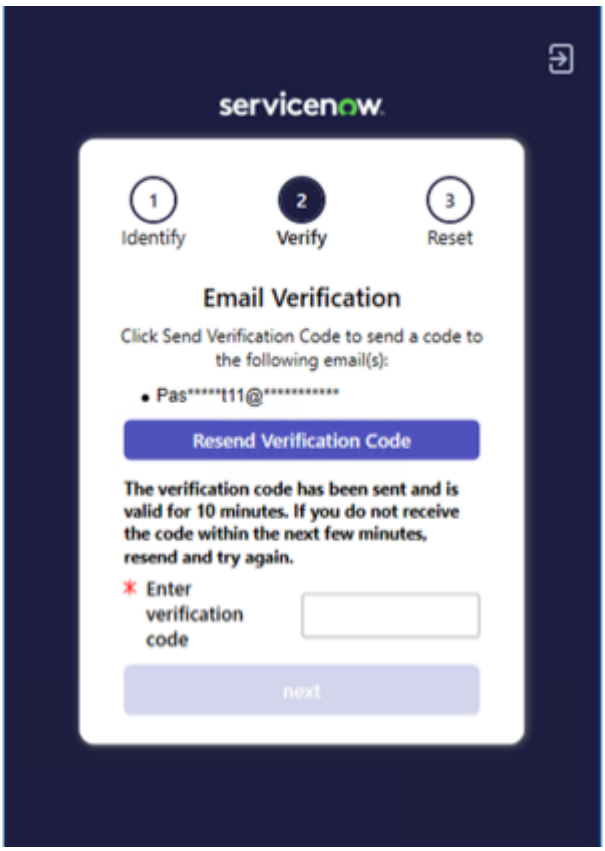
- SMS: The user enters the verification code sent to the registered mobile number.
- Email: The user enters the verification code sent to the registered email address.
- Soft PIN: The user enters a soft PIN.

For example, the following images show verification using email.





After the successful verification, the users go to the Reset step. Based on the status of the user account and email provided, the reset step contains various types.

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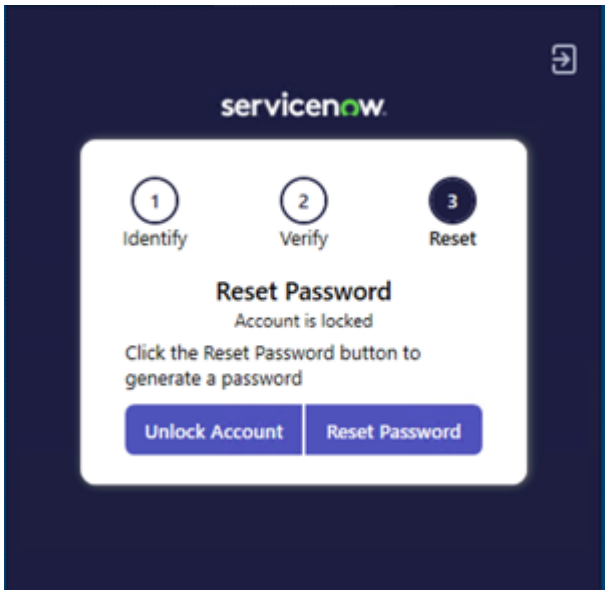
- If the user account isn't locked, the user enters a new password, enters the same password again in the **Retype password** field, and clicks **Reset Password**.
- If the user account is locked, the user gets a message stating the account is locked, and if enabled, the user can view an option to unlock the account, or the user can continue resetting the password. For example, the following image shows both the **Unlock Account** and **Reset Password** buttons.



- After the reset password process is complete, based on the configured type, the user either gets the auto-generated password on the pop-up window or an email containing the instructions to reset the password is sent to the user.

Setting up Password Reset

The Password Reset application is active by default and includes example verifications. The base system enables connections only to the local ServiceNow instance credential store types.

Requirements

Role required: admin

Note:
The Password Reset application is not available during an upgrade.

Active and available plugins

- To enable connections to Active Directory (AD) and Remote (SOAP) ServiceNow Instance credential store types, activate the Password Reset Windows App (Password Reset Orchestration) (com.glideapp.password_reset_desktop) plugin and Microsoft AD for Password Reset store app. No other components are installed. Orchestration is available as a separate subscription. See Request the Password Reset Windows App plugin.
- To enable connections to Microsoft Entra ID Integration for Password Reset, Integrate Microsoft Entra ID Integration with Password Reset and Configure the connection to Microsoft Entra ID Credential Store.

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Next steps

Plan and configure the Password Reset processes for your organization. See the Configuring Password Reset.

Set up Microsoft Entra ID for Password Reset

Set up Microsoft Entra ID for Password Reset by activating the plugin and configuring the Microsoft Entra ID instance. The Microsoft Entra ID plugin is activated with the help of this plugin. Microsoft Entra ID for Password Reset is also available in the ServiceNow store.

Related topics

Request the Microsoft Entra ID Integration for Password Reset app

Request the Microsoft Entra ID Integration for Password Reset app

Microsoft Entra ID users can reset passwords with the Microsoft Entra ID Integration for Password Reset app.

Before you begin

Role required: admin

About this task

You can request the plugin from Now Support (HI) or from your instance.

In Now Support, navigate to **Service Catalog Activate Plugin**.

Or you can complete the following procedure.

Procedure

1. In your instance, navigate to **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the request form on Now Support.
3. On Now Support, select to be redirected to the HI Service Portal Service Catalog.
4. On the Activate Plugin request form, fill in the fields.

Field	Description
Target Instance	Instance on which to activate the plugin.
Plugin Name	Name of the plugin to activate.
Specify the date and time you would like this plugin to be enabled	The date and time must be at least two business days from the current date. **Note:** By default, plugins are activated in two batches each business day: once in the morning and once in the evening, Pacific (U.S.) time. If you need your plugin activated at a specific time, enter a request for this in the Reason/Comments field.
Reason/Comments	Information that would be helpful for ServiceNow personnel who will activate the plugin. For example, if you need the plugin

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Field	Description
	activated on a specific day or time instead of during one of the default activation windows, specify it in the comments.

5. Click **Submit**.
   The Microsoft Entra ID Integration for Password Reset app is activated.

What to do next

Plan, create, and customize the Password Reset process for your organization.

Set up Microsoft Active Directory for Password Reset

Enable connections to Active Directory (AD) by activating the Password Reset Windows App and Microsoft AD for Password Reset available in the ServiceNow Store.

Set up Password Reset integration with Okta

Enables end users to reset or change their Okta passwords using Password Reset and Okta spoke.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This application requires an Integration Hub or Automation Engine subscription. For more information, see Legal schedules - Integration Hub overview.

Application version

Password Reset integration with Okta 1.1.2 is the latest version.

Dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Okta spoke v 4.1.3
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note:
Some of these plugins are licensable features and require appropriate licenses, if used outside the application implementation.

Subflows

The Password Reset integration with Okta application provides these subflows that automate the Password Reset tasks:

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Subflow	Description
Password Change	Changes password of the required Okta user.
Password Connection Test	Tests connection to Okta.
Password Lock State	Checks the lock status of the specified user account in Okta.
Password Reset	Resets the password of the specified Okta user.
Password Unlock	Unlocks the required user account in Okta.
Send Email After Change Password	Sends a password change notification email to the user. This subflow is used in the Password Change subflow.

Actions

The Password Reset integration with Okta provides the Get Configuration Variables for Okta Reset Process action to retrieve the user name of the required Okta user and the details of all variables.

Set up the Password Reset integration with Okta

Customize the default credential store records and password reset processes to integrate Password Reset with Okta.

Before you begin

- Request Integration Hub subscription.
- Activate Password Reset
- Activate and set up the Okta spoke.
- Activate Password Reset integration with Okta.
- Role required: admin

Procedure

1. Navigate to **Password Reset** > **Credential Stores**.
2. Open the record for Password Reset integration with Okta.
   For example, **Sample Okta Credential Store**
3. Customize the default record as per your requirement.
   For more information, see Configure the connection to a credential store for the Password Reset processes.
4. Navigate to **Password Reset** > **Processes**.
5. Customize the default records, **Service-Desk Process for Okta** and **Employee Self-Service Process for Okta** , as per your requirement..

   Note:
   The **User must reset password** check box isn't supported in this integration. That is, you can't enforce users to reset their password upon first login after they reset password using the auto-generated password.

   For more information, see Configure your Password Reset process.

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Set up Password Reset integration with Google Directory

Enables end users to reset their Google passwords using Password Reset and Google Directory spoke.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This application requires an Integration Hub or Automation Engine subscription. For more information, see Legal schedules - Integration Hub overview.

Application version

Password Reset integration with Google Directory 1.0.3 is the latest version.

Dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Google Directory spoke v 1.3.1 or higher
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note:
Some of these plugins are licensable features and require appropriate licenses, if used outside the application implementation.

Subflows

The Password Reset integration with Google Directory application provides these subflows that automate the Password Reset tasks:

Subflow	Description
Password Connection Test	Tests connection to Google Directory.
Password Lock State	Checks the lock status of the specified user account in Google Directory.
Password Reset	Resets the password of the specified Google Directory user.
Password Unlock	Unlocks the required user account in Google Directory.

Actions

The Password Reset integration with Google Directory provides the Get Configuration Variables for Google Directory Reset Process action to retrieve the user name of the required Google Directory user and the details of all variables.

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Set up the Password Reset integration with Google Directory

Customize the default credential store records and password reset processes to integrate Password Reset with Google Directory.

Before you begin

- Request Integration Hub subscription.
- Activate Password Reset
- Activate and set up the Google Directory spoke.
- Activate Password Reset integration with Google Directory.
- Role required: admin

Procedure

1. Navigate to **Password Reset** > **Credential Stores**.
2. Open the record for Password Reset integration with Google Directory.
   For example, **Sample Google Directory Credential Store** .
3. Customize the default record as per your requirement.
   For more information, see Configure the connection to a credential store for the Password Reset processes.
4. Navigate to **Password Reset** > **Processes**.
5. Customize the default records, **Sample Service-Desk Process for Google Directory** and **Sample Employee Self-Service Process for Google Directory**, as per your requirement.
   For more information, see Configure your Password Reset process.

> **Note:**
> Google Directory doesn't support password change. Hence, the **Password change** check box on the process records isn't supported in this integration.

Configuring Password Reset

The Password Reset application enables an end user to reset or change a password using a self-service process. Alternatively, your organization can implement a process that requires a service desk agent to reset passwords for end users.

Watch the video: Introducing Password Reset (video)

Elements of the Password Reset process

You configure the following elements of the process for your organization:

- A connection to the credential store for your organization where user credentials, like user name and password, are securely stored.
- One or more user groups on the ServiceNow instance that can use the password reset process.
- The type of identification that users must enter to identify themselves (generally user name or email address).
- One or more verifications — Methods to verify the identity of the user. Here are some examples of the verifications:

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- Question and answer: Answer a question that only the user knows (based on the **Security Question verification** type).
- Email: Enter a code number that was emailed to the user.
- SMS: Enter a code number that was texted to a mobile device.
- Authenticator app: Enter a code that is displayed on your Authenticator app on a mobile device.

Note:
Password Reset supports the following authenticator apps:

- Google Authenticator
- Microsoft Authenticator
- Cisco Duo

Implementing a Password Reset process

1. Plan your implementation: Consider all applicable organizational guidelines, security policies, and areas of the organization.
2. Set up the elements of the password reset and password change processes according to the plan:
   - Connection to the credential store.
   - User groups that use the password reset process.
   - Identification type to use.
   - Verifications to use.
3. In the service desk-assisted model, assign service desk agents to monitor and reset passwords as needed.
4. Monitor password reset activity to identify security threats and to ensure compliance with the password policy requirements of your organization.

Password Reset Windows Application

If a user forgets the password or gets locked out of a Windows computer, the user can reset the password directly from the Windows login screen. The user clicks the **Forgot Password?** link and is then guided through the process of resetting the password. To learn more, see Password Reset Windows Application.

Password Change application

The Password Change application extends the Password Reset application by letting admins define how users change their passwords. Users can change their passwords by using a self-service process.

1. The user logs in to the instance and then selects the **All** > **Password Reset** > **Change Password** module or link from the user profile record. The user can also use the Password Change application on mobile devices.

Note:
By default, the dark theme doesn't apply to the Change Password form. Users can change the theme to the dark theme. For more information about the dark theme, see Exploring themes in Next Experience.

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2. On the Change Password form, the user selects a Password Reset process related to a credential store for which the user wants to change the password.
3. The user enters the old password and the new password.

   Note:

   As the user enters a password, the **New Password** field shows a message indicating whether the characters entered in the field are correct or not. For example, if a user enters a character that doesn't fit the password policy, the **New Password** field shows an error message. The strength bar also shows the strength of the new password that the user has entered.

   The password policy (granular password complexity) helps create a correct, strong password on the Change Password form in the Next Experience and the Core UI.

4. After all the password rules are met, the workflows validate the old password, and then implement the new one.
5. The user types the new password again in the **Retype password** field, and selects **Change Password**.
6. The system notifies the user that the password was changed.

Plan your Password Reset processes

To ensure security and efficiency, take the time to plan your Password Reset implementation.

Before you begin

Role required: password_reset_admin or admin

Procedure

1. Decide on the password reset process:
   - **Self-service process:** Users reset their password over the Internet using a browser on any supported interface, including mobile devices. To make the Password Reset application with Orchestration available to all users publicly, create a new Password Reset process only for this purpose and make it accessible to all users by setting the **Public access** property. See Example: The default self-service Password Reset process.
   - **Service desk-assisted process:** Users reset passwords by requesting the assistance of a service desk agent, over the phone or in person. Only service desk agents with the password_reset_service_desk role can reset user passwords. Watch the videos: Resetting User Passwords (Video) and How to Set Up a Service Desk-Assisted Password Reset Process (Video).
2. Decide how groups and roles differ in access and security needs.
   Analyze and assess how members of each group in your organization access the system. For example, if members of the sales group primarily access the system remotely, consider using a stronger method or multiple methods to verify the identity of each user.

   Identify user roles that have access to critical information and resources. For example, stronger verifications might be required for roles that have access to employee data, accounting information, or network configurations.

   Based on your analysis of groups and roles, determine the number and variety of verifications needed for the different Password Reset processes.
3. Decide how to manage credentials.
   Determine whether single sign-on is enabled with the type of directory service or other credential store used. If the directory service is configured for single sign-on, consider

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increasing the level of security by using multiple methods to verify identity of a user. A compromised user name and password can easily allow access to associated systems in a single sign-on environment.

4. Decide how to implement enrollment in the Password Reset program.
   For example, will enrollment be optional or required? Will users be auto-enrolled? How will users be notified to enroll in the program? The answers to these questions will help you determine the appropriate verification types to use.
5. Decide which Password Reset options to offer to users.
   - If your organization uses single sign-on, how will users reset their password if they are unable to log on?
   - What options are available to users working off-site?

Related topics

Configure your Password Reset process

Configure your Password Reset process

To implement the process, you configure credentials, verification methods and settings, and enrollment settings. You also specify to which users the process applies.

Before you begin

Role required: password_reset_admin or admin

1. Be sure to Plan your Password Reset processes.
2. Create the credential store record for user names and passwords that are managed.

   Note:
   For LDAP integrations: If the Active Directory settings require users to reset the password when logging in, the results depend on the installed Password Reset plugin.
   - The Password Reset plugin cannot change an AD password. End users will not be able to log in to the instance.
   - The Self Service Password Reset plugin depends on the Password Reset Basic plugin. Self service is intended for password reset only on the local ServiceNow instance and cannot change an AD password. In order to change AD password, you must install the **Microsoft AD spoke for Password Reset**.
   - The Password Reset Windows App (com.glideapp.password_reset_desktop) plugin supports changing the AD password.
3. Define the verifications that the process can use.
4. Configure Password Reset to auto-enroll users or to enable users to enroll for the program.
   See Configure your Password Reset process to auto-enroll users and Enable users to enroll for Password Reset.

About this task

A Password Reset process consists of the following elements:

- The credential store that contains user login credentials.
- Optionally, the user groups that are authorized to use the Password Reset process.
- The verifications that verify the identity of the requesting user and that enable the service desk agents to authorize reset of the password. (Verifications are implemented by script includes.)
- Process strength configuration that helps view the security score of the process. You see the score in digits and colors based on the verification methods you select for the process. If

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enabled, notifications can be sent for potential configuration improvements to the process. If there are any deviations between the maximum attainable and current scores, an email with an actionable list of recommendations to improve the configuration is sent.

Procedure

1. Navigate to **All** > **Password Reset** > **Processes**.
2. Click **New** and then specify a meaningful **Name** and **Description** for the process.
3. Select the **Credential store** that contains the user credentials that the process applies to.
4. Specify the process that you are defining: Select the **Password reset** check box, the **Password change** check box, or both check boxes.
5. Specify the **Apply to all users** setting.
   For more information about the fields on the Password Reset Process form, see Password Reset Process form.
6. For Password Reset, configure settings on the **Password Reset Details** tab.
   For information about the settings and fields on the **Password Reset Details** tab, see Description of the fields on the **Password Reset Details** tab.
7. For Password Reset, configure settings of interest on the **Advanced** tab.
   For information about the fields on the **Advanced** tab, see Description of the fields on the **Advanced** tab.
8. For Password Reset, fill in any fields of interest on the **Enrollment Reminder** tab.
9. Save your changes on the Password Reset Process form.
   The form refreshes, and additional related lists appear.
10. From the **Password Reset Process Verifications** related list, select one or more verifications.
11. **Optional:** From the **Password Reset Process Groups** related list, select the user groups that use the process that you are defining.
    The **Password Reset Process Groups** related list appears only if the **Apply to all users** check box is not selected.
12. Save the record and then select the **Active** check box to enable the Password Reset process that you configured.
    The check box is available only after the record has been saved.
13. Click **Update**.
14. Navigate to **Password Reset** > **Properties** to set the properties that configure the Password Reset experience for end users.

Related topics

Plan your Password Reset processes

Configure the required strength for passwords

Calculating the security score for password reset process

The security score of the password reset process is a critical metric for the password reset administrators to assess the strength and configuration of the password reset process.

Password reset calculation

The password reset process score provides a quantitative measure of how well the process is configured to protect against unauthorized access and confirm that only legitimate users can reset their passwords. The score is based on the following categories:

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- Identification score (Max: 20 points)
- Verification score (Max: 40 points)
- Configuration score (Max: 20 points)
- Password policy score (Max: 20 points)

Identification score

To increase your identification score, you must enable multiple identification methods. If you're currently using only one method, such as a username, adding another method like an email can increase your score by approximately five points. Additionally, enabling CAPTCHA adds 10 points to your score and help to prevent the bots from exploiting the password reset flow.

Verification score

To achieve a high score, you must use at least two verification methods with medium or high security levels. Each method adds up to 15 points (medium) or 25 points (high).

For the custom verification types, you must assign the security level. By default the custom verification is set as **low**.

Configuration score

To optimize your score, enable either the Email/SMS Password Reset URL or auto-generate passwords. If neither is enabled, the score is set at 10 points. Enabling either of these options fetches 20 points.

Password Policy Score

To maximize your Password Policy Score, enable the Password Policy on the Credential Store if it isn't active. Implement the Enforce History Policy to prevent users from reusing their last five passwords as defined in the *`password_history_limit`* property. Use a **High** strength password policy and enable the following settings:

`Send password reset process security score notification` is a weekly job that send reminders to the password admin about the score and recommendations to improve the score. An email notification is sent to the Process Owners of all the active processes if **Enable security score notification** option is selected in Password Reset Process form.

Configure password expiration reminder

You can configure the password reset expiration reminder feature to send notifications to change or reset a user's password whenever it is going to expire.

Before you begin
You must enable the *`pwd_reset.enable.password_expiration_reminder`* property to configure password expiration reminder. By default, this property is turned off.

Role required: admin

About this task
Configure password expiration reminder for any credential stores, such as Microsoft Active Directory, Windows Active Directory, and Okta Active Directory.

Note:
Password expiration reminder doesn't support the local ServiceNow credential store.

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After configuring password expiration reminder, notifications are sent to users by different channels, such as emails, text messages, or actionable virtual agent notifications. Users get an option to reset or change the password through notifications, such as a link that users can select to reset or change the password.

Procedure

1. Navigate to **All** > **Password Reset** > **Processes**.
2. On the Password Reset Process page, select the process for which you want to configure password expiration.
3. On the form for the selected process, select the **Password Expiration Configuration** tab.
4. Select the **Send expiration reminder** option.
5. On the form, fill in the fields.

   For information about the fields on the Password Expiration Configuration form, see Password Expiration Configuration form.

6. Save the form.

   After enabling password expiration reminder for a process, a sync expiration data scheduled job runs after an hour. The scheduled job creates records in the password expiration table for every user entitled for that process. The schedule job creates records for the process for which you configured password expiration and users who belong to this process.

   If you find that the data in the password expiration table is not in sync, select **Sync Expiration data** to sync the data. Otherwise, the sync is an automated process.

   Note:
   After you select **Sync Expiration data**, the scheduled job runs after an hour. The **Sync Expiration data** button appears only for those processes that are active and the processes for which the **Send expiration reminder** option is selected.

Related topics

System properties for password expiration

View scheduled jobs

You can view scheduled jobs for the process that you configured password expiration for. When you configure password expiration for a process, two scheduled jobs are created automatically.

Before you begin
Role required: admin

About this task
One scheduled job creates a record in the password expiration table, which has the prefix as *`Sync password expiration records for pwd_process_`* followed by a sys_id.

Note:
This job runs only once. This scheduled job only creates a record in the password expiration table. It doesn't fetch information about each user's password expiration by calling the external credential store. For example, the values for the **Last Password Reset Date** or **Password Expiration Date** field remain empty. The expiration reminder scheduled job retrieves the dates for all the expiration records with empty dates before sending the expiration notifications.

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The second scheduled job runs periodically based on configuration. The scheduled job that has a prefix as *pwd_expiration_reminder_* followed by a sys_id does the following two actions:

- Fetches the latest information about the user's password expiration.
- Sends a notification when the user's password is going to expire.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.

   The Scheduled Jobs page shows the scheduled jobs, which are created after you configure the password expiration.

2. Select any of the scheduled jobs with the following prefixes:
   - *Sync password expiration records for pwd_process_*
   - *pwd_expiration_reminder_*

   These prefixes are followed by the sys_id of the password reset process.

View a password expiration table

You can view a password expiration table and validate whether a record is created in it.

Before you begin
Role required: admin

About this task
This table contains the password expiration information of an individual user in each process that the user is entitled to. The expiration framework uses this table information to send the expiration notification reminders across the credential stores. You can also view details of the record, such as if there are any errors, error logs, or password expiration dates.

Procedure

1. Select **All** and then enter *pwd_expiration.list* in the navigation filter.

   The Password Expirations page shows the table with the generated records.

2. View the various columns that you want to use in the table and validate the information.

Password expiration table

Column Name	Description
Users	Shows the reference to the sys_user table.
Password Reset Process	Shows the reference to the password reset process table. The process that a user belongs to and for which you have configured password expiration.
Last Password Reset Date	Shows the last date when the user reset the password.
Password Expiration Date	Shows the date that indicates when the password is going to expire.

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Column Name	Description
Send Notification	Shows whether password expiration notifications are to be sent or not.
Active	Shows the status of the password expiration record. For example, suppose that a user is no longer associated with the process. In that case, the record shows the value as **false**. It means that the record is inactive and the scheduled process does not fetch the data for that user. The **true** value indicates that the record is active.
Error Count	Shows whether there is any error while getting information about the user password expiration. For example, when getting information about a user's password expiration while calling an external credential store, an error might occur.
Last Refresh Date	Shows the last date when the record was refreshed from an external system.
Last Error Log	Shows the last error log if there is any error while getting information about the user's password expiration.

Note:
The password expiration table stores the password expiration information of different users for different password reset processes because both the tables are data domain separated. The password expiration table is also data domain separated. For more information about domain separation, see Domain separation and the Password Reset application.

Credential stores for Password Reset

Credential stores hold user information such as user names and passwords that can be used as login credentials. Examples include the User table [sys_user] or an Active Directory server.

Users with the password_reset_admin or password_reset_credential_manager role can create and modify connections to credential stores.

Credential store types installed with the base system

A credential store type is a set of workflows that specify how to connect to a credential store. Navigate to **Password Reset** > **Credential Store Types** to view the list of example credential stores that are based on the base-system types. The base system includes the following credential store types:

Name	Description
Local ServiceNow Instance	Represents the current (local) ServiceNow instance.

Credential store types included in Store apps

Name	Description
Microsoft AD Credential Store	Represents a Microsoft Active Directory credential store. See Set up Microsoft Active Directory for Password Reset.

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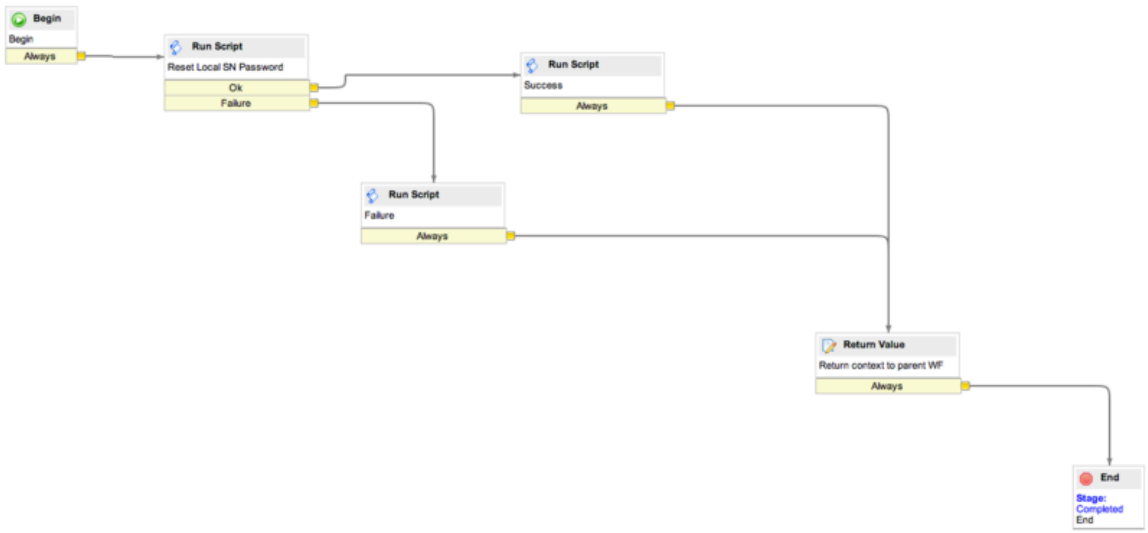
Name	Description
Microsoft Entra ID Credential Store	Represents a Microsoft Entra ID credential store.
Okta credential store	Represents an Okta credential store.
Google credential store	Represents a Google Directory credential store.

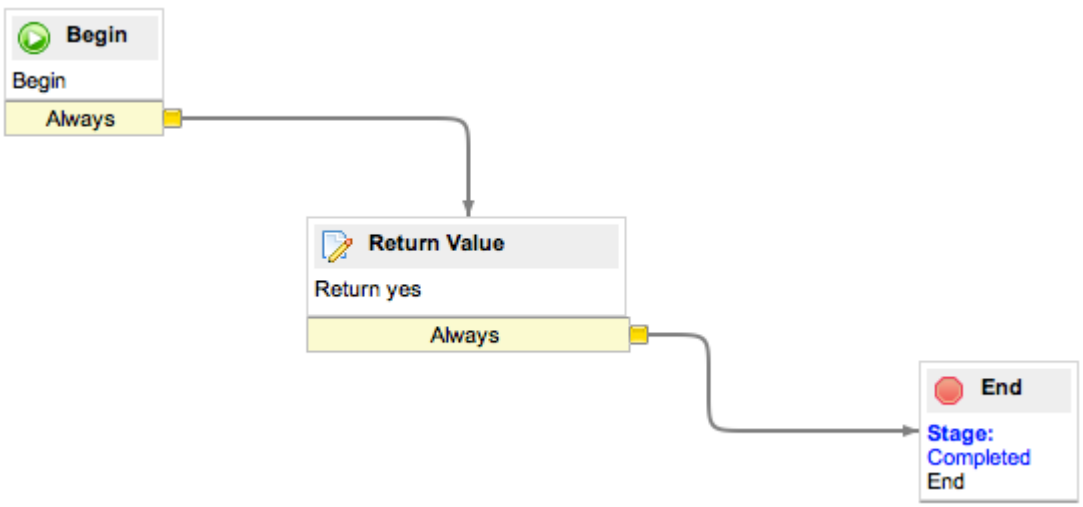
Connection subflows for credential store types

A credential store type workflow requires a subflow that defines how to connect to the store, and can include an optional subflow that defines how to test the connection. Use the **Pwd reset – AD** and **Pwd Reset - Local** subflows as models for your custom connection workflows.

Pwd Reset Local sub workflow



Pwd connection test local SN sub workflow



Creating a custom credential store type

You can use a credential store type as a model to create a custom type. See Create a credential store type for Password Reset.

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Configure the connection to a credential store for the Password Reset processes

You create a Password Reset credential store record to configure access to your credential store server while a user is changing or resetting a password. In addition to host connection information, you can specify the password hints that users should see, restrictions on password reuse, the allowed number of failed reset attempts, and other settings.

Before you begin

Role required: none

About this task

- For an AD credential store, skip this procedure and instead follow the instructions in Integrate Password Reset with your Active Directory service. The Password Reset Windows Application supports only AD credential stores.
- Configuration for multiple connections using a child alias. You can configure a connection credential alias with multiple child connections and map the child connection to a password reset credential store. The connections are used during the run time in the password reset flows. With this configuration password reset flows can support multiple Active Directory server credentials in Flow Designer.

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores**.
2. Select the following sample credential store.

   Local ServiceNow Instance credential store

3. Enter a unique and meaningful **Name** and **Description**, and then on the Password Reset Credential Store form, fill in the fields.
   For information about the fields on the Password Reset Credential Store form, see Password Reset Credential Store form.
4. Click **Submit**.
5. If you use the Local ServiceNow Instance credential store and you selected the **Enforce history policy** check box, then follow these steps:
   a. Open the Password Reset process that is associated with the credential store: **Password Reset** > **Processes**.
   b. On the **Password Reset Details** tab of the Password Reset Process form, clear the **Auto-generate password** check box and then save the process definition.
6. Select Enable password policies on your instance
7. Test the connection to the credential store.

Related topics

Configure the required strength for passwords

Credentials Store for Password Reset for Active Directory

A credential store type is a set of workflows that specify how to connect to a credential store. You can connect to **Password Reset Credential Stores** to view the list of example credential stores that are based on the base-system types.

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Overview

Navigate to **Password Reset** > **Credential Stores** to view the list of example credential stores that are based on the base-system types. You can also use subflows and integration hub IntegrationHub.

Related topics

Integrate Password Reset with your Active Directory service

Configure the connection to an AD credential store

Integrate Password Reset with your Active Directory service

The Password Reset application can change passwords on an Active Directory credential store. The application changes passwords by referencing an Active Directory user role with the appropriate password change privileges.

Before you begin

Role required: admin
Active Directory must have a user role with the following privileges:

Descendent User objects:

- Reset password
- Read/Write pwdlastset
- Read/Write UserAccountcontrol
- Write Account Restrictions
- Read/Write lockouttime
- Read MemberOf

Descendent Group objects:

- Read Members
- Read MemberOf

Procedure

1. Install a MID Server on a Windows computer that can connect to Active Directory.
2. Configure the MID Server.
3. If using the Workflow and Orchestration add-ons, in the ServiceNow instance, navigate to **Orchestration** > **Credentials**.
4. Click **New**, complete the form with the following values for the AD credential, and then click **Submit**.

Field	Description
Type	Select Windows.
User name	Enter your Active Directory domain user. For example, **domain \admin**.
Password	Enter your Active Directory domain user password.

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Field	Description
Applies to	Select the MID Server that you use to access the Active Directory server.

Note:
If you are using Integration Hub, from the Microsoft AD Credential store, click **Microsoft AD Connection Alias** to create a new connection. To learn more, see Set up the Microsoft AD v2 spoke.

What to do next
Create a connection to the credential store as described in Configure the connection to an AD credential store.

Configure the connection to an AD credential store

You can create a Password Reset credential store record to configure access to your Active Directory server while a user is changing or resetting a password. In addition to host connection information, you can specify the password hints that users should see, restrictions on password reuse, the allowed number of failed reset attempts, and other settings.

Before you begin
Role required: none

About this task
The Microsoft AD Spoke for Password Reset add-on installs the AD Credential store type. The Password Reset Windows Application supports only **Microsoft AD Credential Store**.

Procedure
1. Navigate to **All** > **Password Reset** > **Credential Stores** and select **Sample Microsoft AD Credential Store** to use as a template.
2. Enter a unique and meaningful **Name** and **Description** and then fill in the form.

Type	Select **Microsoft AD Credential Store type**. A ServiceNow credential store type is a template that provides the required set of capabilities for a particular type of credential store. Credential stores inherit the functionality of the credential store type.
Auto-generate password	Specify a script include that generates a temporary password for use during the reset process. **Note:** If you select the **Enforce history policy** check box, then you must specify a value for **Auto-generate password** that is compliant with the password policy. There are several options to choose from: ○ An auto-generated password that is compliant with the policy you selected. ○ An auto-generated password that is Crypto-secure. ○ A default auto-generated password.
Enforce history policy	Appears only if you select a **Microsoft AD Credential Store type** or **Local ServiceNow Instance** credential store type.

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	The Microsoft AD Credential Store type supports history check. The **Enforce history policy** option appears only when the **Supports history check** option is selected for the **Microsoft AD Credential Store type**. For information on configuring the setting for credential store types other than AD, see Configure the connection to a credential store for the Password Reset processes. Select the **Enforce history policy** check box to enforce the history policy (password reuse). History policy (password reuse): Active Directory domains can be configured to include a history policy that ensures that users don't reuse passwords. For example, the history policy might be configured to not allow the user to reuse any of the previous 10 passwords when resetting a password. This history policy limit is managed by the password_history_limit verification parameter.
Hostname	Specify the URL or IP address of the credential store.
User account lookup	Specify the script include that maps the user ServiceNow platform ID to the user credential store ID. The default script, *PwdDefaultUserAccountLookup*, returns the user ServiceNow platform user name.
Password rule hint	Specify the text that appears on the password reset page to help the user to create a password that meets all requirements. The **Password rule** script enforces the requirements. **Note:** The Password Reset Windows Application supports newline characters in the hint. Other formatting is not supported (bold, underline, hyperlink, and so on).
Password rule	Specify the client script that validates the new password that the user enters. The script is invoked when the user enters a new password and clicks **Password Reset**. You can use the script to enforce password strength/complexity requirements.
Enable Password Strength	Select the check box to: ○ Display the text box for the **Strength rule** script so you can update the script. ○ Display the graphical **Password Strength** bar to the user while the user changes or resets the password. **Note:** The Password Reset Windows Application does not support Password Strength.
Strength rule	This text box appears only if you select **Enable Password Strength**. Specify the client script that calculates the strength/complexity of the password that the user enters. The script is invoked when the user begins to enter a new password during the reset process. Default settings:

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- Selected for local ServiceNow credential stores
- Not selected for other credential stores

Note:

- To guide the user during the reset process, the system displays a graphical bar labeled **Password Strength** under the **New password** field.



- The Password Reset Windows Application does not support Password Strength.

---

3. Click **Submit**.
4. On the domain controller, set **Password Aging** (*MIN_PASSWORD_AGE*) to zero.
5. To enforce the history policy that is configured for the AD credential store, follow these steps:
   a. Open the Password Reset process that is associated with the credential store: **Password Reset** > **Processes**.
   b. On the **Password Reset Details** tab of the Password Reset Process form, clear the **Auto-generate password** check box and then save the process definition.
6. To enforce the maximum number of attempts to reset the password, in the Password Reset Credential Store Parameters related list, set the value of the *max_reset_attempts* parameter to the number of allowed failed attempts.

   The default value of 0 (zero) enables an unlimited number of reset attempts.

   Note:
   The *max_reset_attempts* setting applies only to Password Reset processes that use AD credential stores.

7. Click **Submit**.
8. Set up the Microsoft AD v2 spoke
9. Test the connection to the credential store.

Related topics

Configure the required strength for passwords

Credential Store for Password Reset for Microsoft Entra ID

A credential store type is the set of flows to manage password and account of Microsoft Entra ID user. Navigate to **Password Reset** > **Credential Stores** to view the list of example credential stores that are based on the base-system types.

Related topics

Integrate Password Reset with your Microsoft Entra ID

Configure the connection to the Microsoft Entra ID Credential Store

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Integrate Password Reset with your Microsoft Entra ID

When the Microsoft Entra ID Integration for Password Reset store app is activated, the Password Reset application can manage passwords of a Microsoft Entra ID application. The application manages passwords by referencing a Microsoft Entra ID user with appropriate roles and password change privileges.

Before you begin
Role required: admin

Procedure

To integrate Password Reset with your Microsoft Entra ID, you must set up the Microsoft Entra ID spoke.
For more information about setting it up, see Set up Microsoft Entra ID spoke.
The Microsoft Entra ID Integration for Password Reset is integrated.

What to do next
Create a connection to the credential store as described in Configure the connection to an AD credential store.

Configure the connection to the Microsoft Entra ID Credential Store

Create a Password Reset credential store record to configure access to your Microsoft Entra ID server while a user is changing or resetting a password. In addition to host connection information, you can specify the password hints that users should see and other settings.

Before you begin
Role required: none

About this task
The Microsoft Entra ID Integration for Password Reset installs the Microsoft Entra ID Credential Store type. The Microsoft Entra ID application supports only the **Microsoft Entra ID Credential Store**.

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores** and select **Sample** *Microsoft* **Credential Store** that you can use out of the box or as a template.
2. Enter a unique **Name** and **Description** and then complete the form.

Type	Select **Sample Microsoft Entra ID Credential Store**. A ServiceNow credential store type is a template that provides the required set of capabilities for a particular type of credential store. Credential stores inherit the functionality of the credential store type.
Auto generate password	Specify a script include that generates a temporary password for use during the reset process.
Hostname	Specify the domain name of the Entra ID application in this column.
User account lookup	Specify the script include that maps the user ServiceNow platform ID to the user credential store ID. The default script, *PwdDefaultUserAccountLookup*, returns the user ServiceNow platform user name.

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Password rule hint	Specify the text that appears on the password reset page to help the user to create a password that meets all requirements. The **Password rule** script enforces the requirements.
Password rule	Specify the client script that validates the new password entered by the user. The script is invoked when the user enters a new password and selects **Password Reset**.
Enable Password Strength	Select the check box to: ○ Display the text box for the **Strength rule** script so you can update the script. ○ Display the graphical **Password Strength** bar to the user while the user changes or resets the password.
Strength rule	This text box appears only if you select **Enable Password Strength**. Specify the client script that calculates the strength/complexity of the password that the user enters. The script is invoked when the user begins to enter a new password during the reset process. Default settings: ○ Selected for local ServiceNow credential stores ○ Not selected for other credential stores **Note:** To guide the user during the reset process, the system displays a graphical bar labeled **Password Strength** under the **New password** field.
Enable password policy	Check this option to select either a default password policy or one you created yourself previously.

3. Click **Submit**.
   Password Reset Credential store record to access your Microsoft Entra ID server is configured.

Note:

- The **Enable Password Policy** option was added in the Quebec release. Checking the option displays your password policy choices right from your instance. To learn more, see Enable password policies on your instance.
- Since the Microsoft Entra ID doesn't support the history policy, the **Enforce history policy** option is hidden.

Test the connection to a credential store

You should test the connection to a credential store after you configure a new credential store or when users experience problems that might involve the connection.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores** and then open the credential store record.
2. In the header bar, click **Save and Test Connection**.
   A progress page displays the result of the test.

Delete a connection to a credential store for Password Reset

Important: Before you delete the connection to a credential store, check all Password Reset processes to ensure that the credential store is not in use. If the credential store is being used by a process, update the process before deleting the credential store.

Before you begin

Role required: password_reset_admin or password_reset_credential_manager

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores** and then select the check box for the credential store.
2. In the *Actions* choice list, select **Delete**.

Password Reset verifications

Each verification specifies the method and process for verifying the identity of the user that is requesting a password reset.

Verifications included with Password Reset

The Password Reset application includes the following verifications in the base system. You can create a verification based on either a base-system verification or a verification type (a template).

Note:
The Password Reset Windows Application doesn't support custom verifications.

Password Reset verifications	
QA verification	Implements a self-service Password Reset model with questions that are included with the base system or custom questions that the admin defines. While enrolling for the process, the user decides which questions to provide answers for. Questions are presented in the language that the user requested during login. When a user requests a password reset, the system poses a specified number of the questions that the user selected during enrollment. The user must answer all questions correctly to verify their identity.

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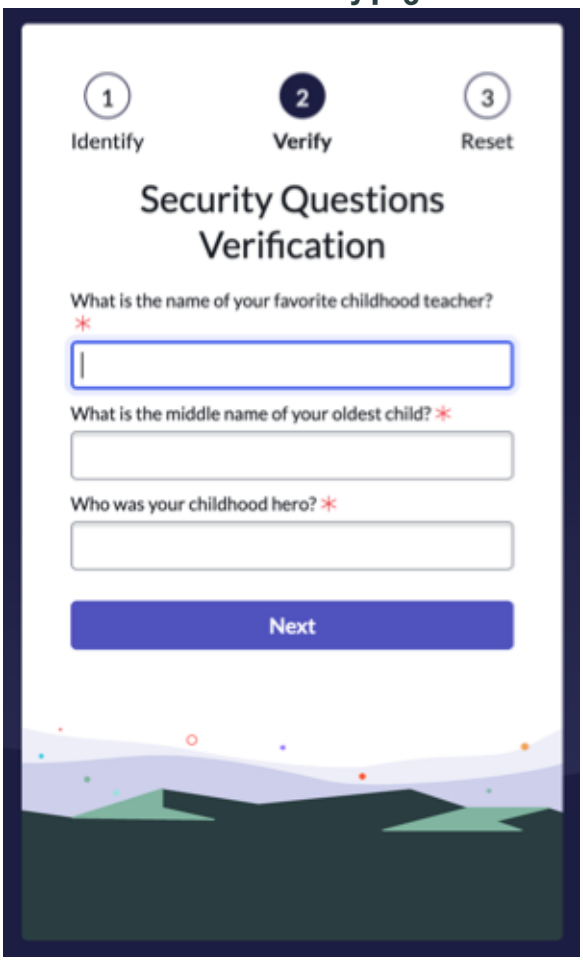
Password Reset verifications (continued)

	QA verification on the Verify page  For information on the user enrollment experience, see Enroll for the Password Reset program using questions and answers. This verification is based on the **Security Questions** verification type.
Email verification	This verification relies on auto-generated code numbers. You typically implement email verification as a self-service Password Reset model. When a user requests a password reset, the system sends a verification code to an email address that the user authorized during enrollment. To verify identity, the user then submits the code on the Password Reset Verify page. For information on the user enrollment experience, see Enroll for the Password Reset program using emailed codes. The Password Reset Windows Application supports email verification. This verification is based on the **Email Code** verification type. By default, a six-digit email verification code is sent to the user through email. The code expires in 10 minutes. Users can attempt

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Password Reset verifications (continued)

	to send another code after two minutes. A maximum of 10 email verification codes can be sent to a user in one day.
SMS verification	Implements a self-service or service desk-assisted Password Reset model that relies on auto-generated code numbers. When a user requests a password reset, the system sends a code to an SMS-capable device that the user has authorized. To verify identity, the user then submits the code on the Password Reset Verify page. You can use the ServiceNow Notify feature to send the codes. For information on the user enrollment experience, see Enroll for the Password Reset program using SMS codes. This verification is based on the **SMS Code** verification type. When users enroll for email or SMS verification on the Password Reset Enrollment page, they get a code to verify their email address or device. After the users enter the code and select **Verify**, an associated record is automatically created in the Password Reset Enrollment for Verifications [pwd_enrollment] table even before they select **Submit**. By default, a six-digit verification code is sent to the user's mobile device. The code expires in five minutes. Users can attempt to send another SMS verification code to the device after two minutes. A maximum of 10 codes can be sent to a particular device in one day. **Note:** While the record is created automatically in the Password Reset Enrollment for Verifications [pwd_enrollment] table for the email or SMS verification, the associated enrollment check script doesn't get processed unless users select **Submit**.
Authenticator verification	Password Reset model that relies on auto-generated code numbers. Users typically implement authenticator verification as a self-service Password Reset model. When a user requests a password reset, the user reads a code from the authenticator app on a device that the user has paired. To verify identity, the user then submits the code on the Password Reset Verify page. For information on the user enrollment experience, see Enroll for the Password Reset program using an authenticator. The Password Reset Windows Application supports Google Authenticator verification. This verification is based on the authenticator verification type.

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Password Reset verifications (continued)

Personal Data — Confirm Email Address	Implements a self-service Password Reset model that relies on user information that is available in the user profile on the instance. This verification is based on the **Personal Data Confirmation** verification type. **Note:** Users can't configure this verification for the processes with the active public access.
Personal Data — Enter User Name	Implements a self-service Password Reset model that relies on user information that is available in the user profile on the instance. This verification is based on the **Personal Data** verification type.
Soft PIN Verification	Implements a self-service Password Reset model that relies on a Soft PIN that's a six-digit number. Users can enroll for the Soft PIN verification for a process and reset the Soft PIN. ServiceNow® Virtual Agent supports the Soft PIN verification method.

Related topics

- Create a custom Password Reset verification
- Create a Password Reset verification from an existing verification

Personal data identification types and confirmation type verifications

Personal data verifications allow users to verify their identity by providing answers to questions that are generated from personal information stored in the User table `[sys_user]`.

User experience

For an example of how a user might enroll for Personal data verification, see Enroll for the Password Reset program using questions and answers.

Personal data identification types

The Password Reset application provides the email and username identification types. You can use either type as provided or as a model to create a custom identification type.

Name	Description
Email Identification	Identifies users by their email addresses.
Username Identification	Identifies users by their user names.

Personal data confirmation verifications

- **Personal data verification:** If users are associated with a Password Reset process that uses a personal data verification, the users are typically not required to enroll for Password Reset.
- **Personal data confirmation verifications** allow employees with the password_reset_service_desk role to access personal data from the sys_user table when assisting a user with a password reset request.

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To configure personal data and personal data confirmation verifications, you specify parameters as name/value pairs that correspond to a particular piece of user information. For example, to verify users by their email address:

1. Set the **label** parameter (the text that the end user should see) to *Email* (that is, `label=Email`).
2. Set the **column** parameter (the column in the table that holds the verification data) to *email* (that is, `column=email`).

Note:
You can use only one set of name/value pair parameters per verification. Additional parameters are ignored.

To use multiple pieces of personal information for user verification, create more personal data or personal data confirmation verifications and add the verifications to the related Password Reset process.

Personal data and personal data confirmation type verifications

Parameter Name	Description
label	Text to display as a label for the field that the user fills in during the password reset request. Data Type: string Default Value: n/a
column	Column of the sys_user table that provides the data that is used to verify the identity of the user. Data Type: string Default Value: n/a

Related topics

Create a custom identification type for Password Reset

SMS Code Verification type for Password Reset

Using the Simple Message Service (SMS) Code Verification type, a user can verify identity with the help of any SMS-enabled device, like a cell phone that accepts text messages. When a user requests password reset, the system sends a numerical code to the device and the user then enters the code on the Password Reset Verification page.

You can change the default behavior of an SMS code verification using either of the following methods:

- Set parameter values, as shown in the table.
- Update property settings for the Password Reset application.

Note:
The system allows only one instance of each SMS code parameter.

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SMS Code Verification type parameters

Parameter name	Description
expiry	Number of minutes the verification code is valid. **Data Type**: integer (any positive integer) **Default Value**: 5
complexity	Number of digits in the numerical verification code. **Data Type**: integer (any positive integer) **Default Value**: 6
pause_window	Number of minutes before the user can request another SMS code for verification. **Data Type**: integer (any positive integer) **Default Value**: 2
max_per_day	Maximum number of codes sent for verification in one day. **Data Type**: integer (any positive integer) **Default Value**: 10

User experience

For information on how users enroll for SMS verification, see Enroll for the Password Reset program using SMS codes.

Use Notify to send SMS codes for enrollment and verification

You can configure the Password Reset application to send SMS codes for enrollment and verification using the ServiceNow Notify application (via the Twilio SMS Messaging system). Notify is tightly integrated with the workflow engine and business rules and delivers a highly configurable and trusted way to deliver SMS messages.

Before you begin
Role required: admin

About this task
Notify requires a separate contract with Twilio.

Procedure

1. Enroll for a Twilio account and telephone number at https://www.twilio.com/
2. Activate the **Notify** plugin.
3. Associate the Twilio account with Notify.

Result
No other configuration is required. Users who request password change or password reset receive SMS codes through Notify.

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Related topics

Activate a plugin

Specify the number of required security questions

When designing a Security Questions verification for Password Reset, you can specify the number of questions to display when users enroll. You can also specify the number to display when a user is verifying identity while resetting the password.

Before you begin

Role required: password_reset_admin or admin

Procedure

1. Navigate to **All** > **Password Reset** > **Verifications** and then open a verification that uses the **Security Questions Verification Type**.
2. Configure the parameters in the **Password Reset Verification Parameters** related list.

Parameters for Security Questions Verification

Parameter Name	Description
num_enroll	Number of questions that a user must provide answers to while enrolling for the Password Reset process. The value that you specify here overrides the setting of the **Number of security questions required during enrollment** property. See Configuring Password Reset properties. **Data Type**: Positive integer that does not exceed the number of questions in the security questions list (**Password Reset** > **Security Questions**). **Default Value**: 5
num_reset	Number of security questions that are displayed on the Verify page while a user is attempting to reset the password. The user must answer all questions correctly to verify identity. The questions are selected at random and are presented in random order. The value that you specify here overrides the setting of the **Number of security questions required during the password reset request** property. See Configuring Password Reset properties. **Data Type**: Positive integer that does not exceed the value of the num_enroll parameter **Default Value**: 3

3. Click **Update**.

Related topics

Add a custom question to the Security Questions verification

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Configure your Password Reset process to auto-enroll users

To simplify management, many organizations auto-enroll users in the Password Reset program. Every base-system verification type enables you to specify automatic enrollment for your process.

Before you begin

Role required: password_reset_admin or admin

About this task

To enable automatic enrollment, you configure settings for the verification type that your Password Reset process is based on.

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Verification Types**.
2. Click the verification type for the verification that your Password Reset process uses. The verification type for each base-system verification is identified in Password Reset verifications.
3. On the **Verification Types** page, specify the following settings:

Field	Description
Enrollment check	Script that determines whether a user is enrolled for verification. **Note:** For automatic enrollment to work, the **Enrollment check** script must return true. This may require additional setup by the admin to ensure that the preconditions are met. For example, for the **SMS Code** verification type, records must be populated in particular tables. If no script is specified when **Automatic Enrollment** is selected, a default script is provided.
Automatic enrollment	Select the check box to auto-enroll users. **Note:** If **Automatic enrollment** is not selected, then you must provide an enrollment UI macro and enrollment processor script as described in Create a custom Password Reset verification type.

4. Repeat the procedure for all verifications that your Password Reset process uses.

Enable users to enroll for Password Reset

To enable users to enroll for the Password Reset program, you specify a UI macro that takes the user through the enrollment process and a script that processes the enrollment data that the user entered. The base system includes a functioning macro and script.

Before you begin

Role required: password_reset_admin or admin

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About this task

To enable users to enroll, you configure settings for the verification type that your Password Reset process is based on.

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Verification Types**.
2. Click the verification type for the verification that your Password Reset process uses.
   The verification type for each base-system verification is identified in Password Reset verifications.
3. On the **Verification Types** page, specify the following settings:

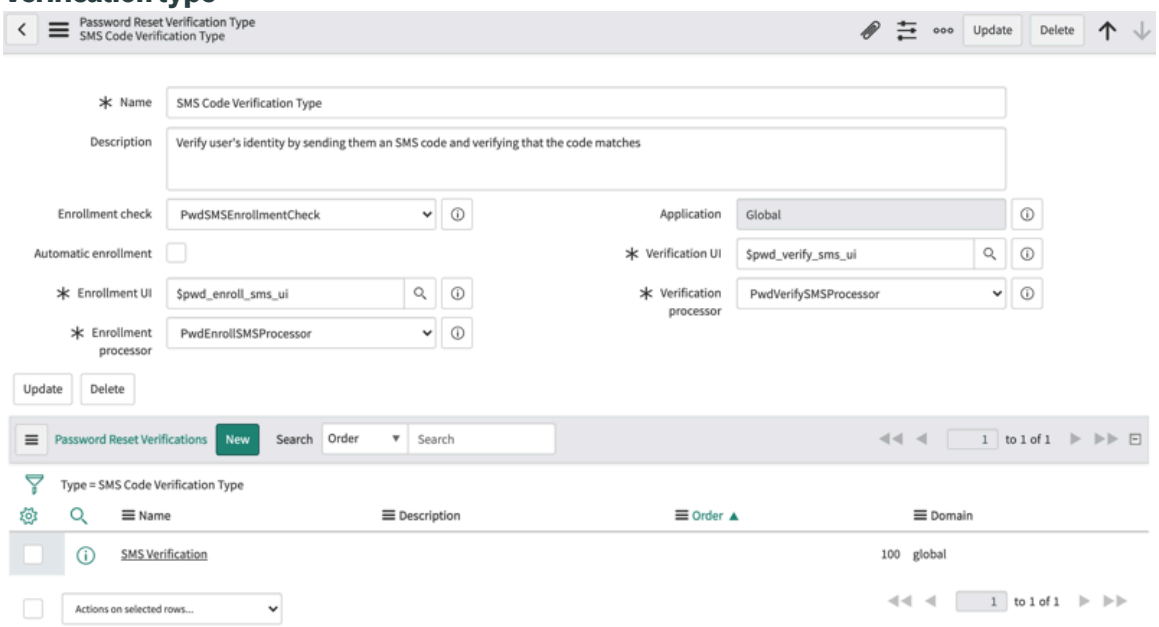
Field	Description
Automatic enrollment	Clear the check box to disable automatic enrollment.
Enrollment UI	Enrollment UI macro that takes the user through the enrollment process.
Enrollment processor	Enrollment processor script that processes enrollment data.

4. Repeat the procedure for all verifications that your Password Reset process uses.

Example: Enabling user enrollment

This example verification type uses the *pwd_enroll_sms_ui* enrollment UI macro and the *PwdEnrollSMSProcessor* enrollment processor script.

Verification type



A verification type must also define a verification UI macro and a corresponding verification processor script. The example uses the *pwd_verify_sms_ui*verification UI macro and the *PwdVerifySMSProcessor* verification processor script.

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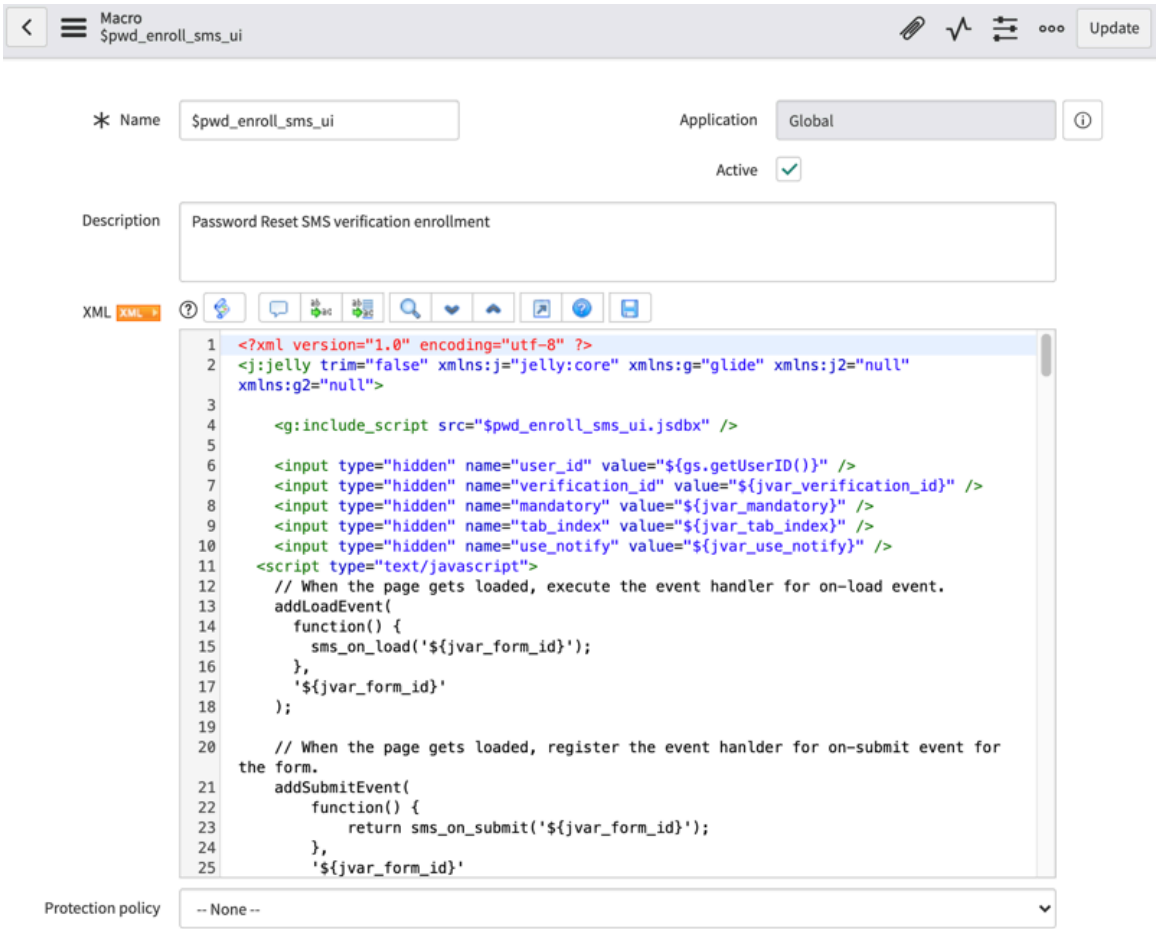
Verification UI macro



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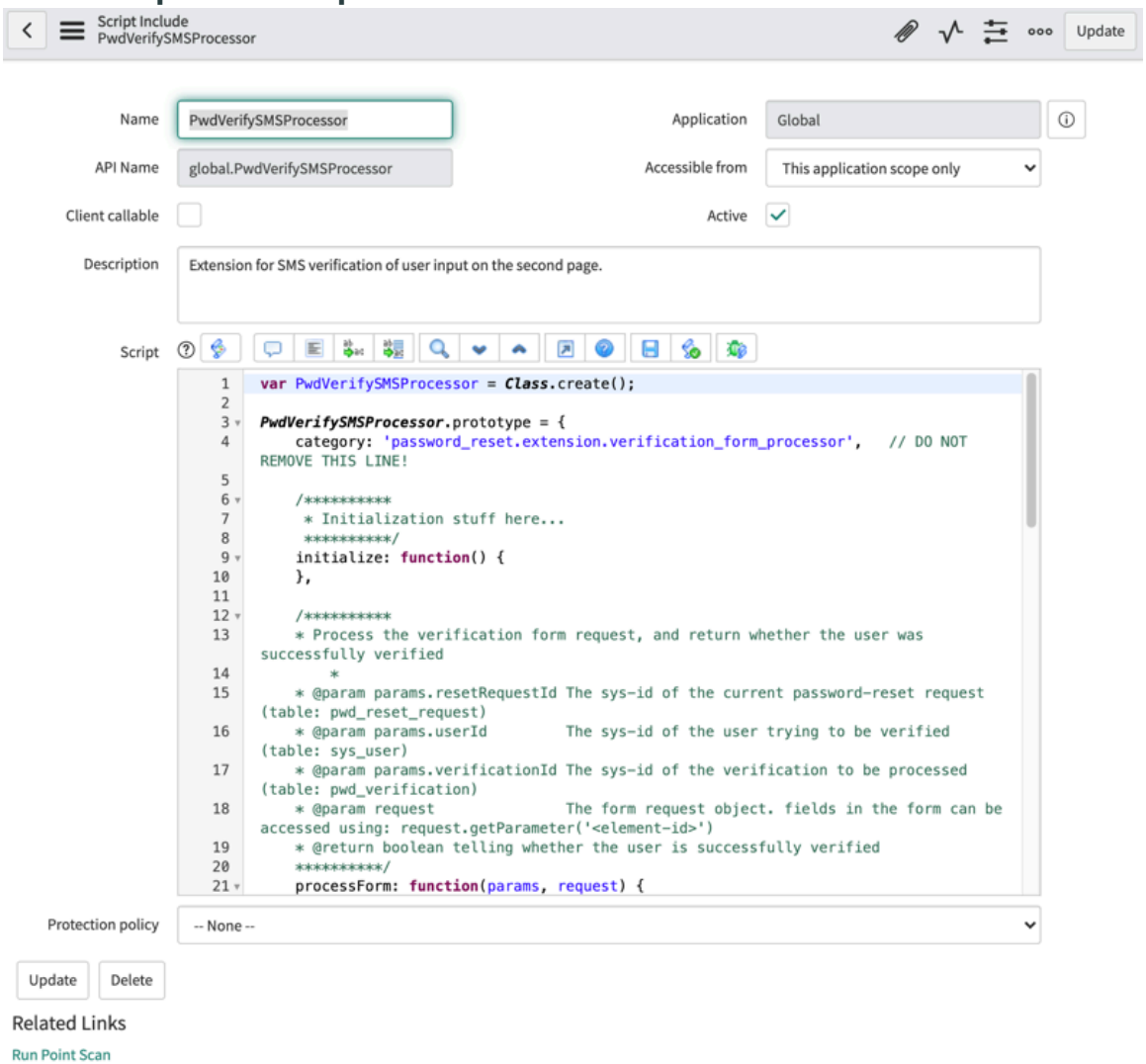
Verification processor script



Configuring Password Reset properties

You can specify properties that configure the Password Reset experience for end users.

Before you begin

Role required: password_reset_admin

About this task

While there are no range limits for the values you can enter for properties, consider using only positive integer values starting at 1. When you determine the limit for the upper range of a property, consider the task that the user is performing.

For example, you would not want to allow 100 attempts for users to verify their identity. A more common value is 3 attempts. Similarly, you may not want to force users who are completing the enrollment process to spend time selecting and answering 30 security questions. The more commonly used number of security questions is between 5 and 7.

Procedure

1. Navigate to **All** > **Password Reset** > **Properties**.
   For information about the Password Reset properties, see Password Reset global properties.
2. Update settings as needed and then click **Save**.

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Send email to remind users to enroll for Password Reset

You can automatically send messages that remind users to enrolled in the Password Reset process. You specify the text of the message and can configure the messages to repeat at intervals.

Before you begin

Role required: password_reset_admin

About this task

The default email content is:

- Subject: Reminder: Enroll in the Password Reset program
- Body: Click here to enroll in the Password Reset program.

To customize the email, see Customize the Password Reset enrollment reminder email.

Procedure

1. Navigate to **All** > **Password Reset** > **Processes** and select your process.
2. Click the **Enrollment Reminder** tab, configure the following settings, and then click **Update**.

> **Note:**
> The tab appears only when the **Password reset** check box is selected.

Field	Value
Send reminder	Select the check box to send reminder emails to users (either all users or users in the specified groups, as you configured). Clear the check box to send no reminders.
Sender alias	Enter a non-functional email alias that should appear in both the **To** and **From** fields of the message. For example, `do-not-reply@myCompany.com`. Users will not be able to respond to the alias. The alias is required by the email system to use the **bcc** field for all of the users who receive the message. The intent is that the users should not see the other addressees. Default: do-not-reply@ServiceNow.com
Send, Day, and Time	Specify a schedule of one message each month or one message each week. ○ If you set **Send** to **Monthly**, then enter the day of the month and optionally the time of day when the message should be sent. ○ If you set **Send** to **Weekly**, then enter the day of the week and optionally the time of day when the message should be sent. Default: Weekly message at 00:00 on Monday
Starting	Date and time to send the first message. Click the calendar button to specify the setting. Default: [Now]

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Customize the Password Reset enrollment reminder email

The email message that reminds users to enroll for the Password Reset process is based on an email template. To customize the message, you can modify the default template or create a custom template.

Before you begin

Role required: password_reset_admin

About this task

The default email content is:

- Subject: Reminder: Enroll in the Password Reset program
- Body: Click here to enroll in the Password Reset program.

Procedure

1. To modify the email subject text:
   a. Navigate to **System Policy** > **Email** > **Templates**.
   b. Open the *`Password reset enrollment reminder`* template.
   c. Update the **Subject** field as needed.
   d. In the **Message HTML** text box, you can add code as needed, but do not modify the default text.
2. To modify the email body content:
   a. Navigate to **System Notifications** > **Email** > **Notification Email Scripts**.
   b. Open the *`pwd.enrollment_reminder`* script.
   c. Modify only the indicated portion of the script.

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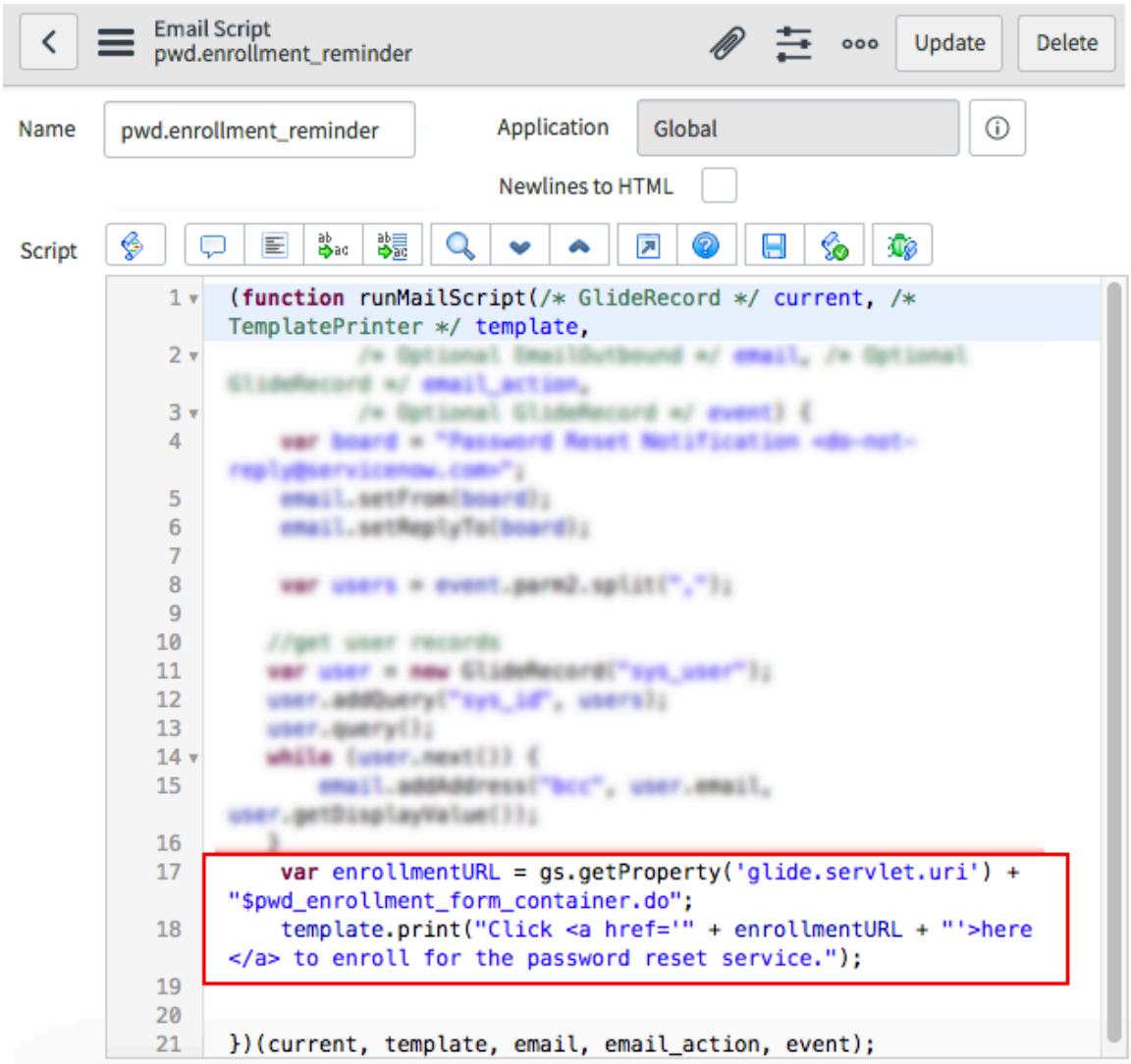

3. To create a custom email template:
   a. Make a copy of the *`Password reset enrollment reminder`* template and edit as described above.
   b. Navigate to **Password Reset** > **Properties** and enter the template name in the **Email template for enrollment reminder emails** field.

Configure the required strength for passwords

The password that a user defines must meet certain requirements — for example, it must contain at least 12 characters, it must include a numeral, and so on. You can configure the requirements as needed for your organization.

Before you begin

Role required: password_reset_admin

About this task

The base system includes example credential stores with various password requirements. You can modify password requirements and provide users with hints for creating a password. The default requirements are:

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- At least eight characters
- At least one uppercase and one lower case letter
- At least one numeral

Note:
In addition to configuring password strength requirements, you can configure several other settings for the credential store, as described in Configure the connection to a credential store for the Password Reset processes.

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores**.
2. Select the credential store in the list and then configure the following settings:

Field	Description
Password rule hint	Specify the text that appears on the password reset page to help the user to create a password that meets all requirements. The **Password rule** script enforces the requirements. **Note:** The Password Reset Windows Application supports newline characters in the hint. Other formatting is not supported (bold, underline, hyperlink, and so on).
Password rule	Specify the client script that validates the new password that the user enters. The script is invoked when the user enters a new password and clicks **Password Reset**. You can use the script to enforce password strength/complexity requirements.
Enable Password Strength	Select the check box to: ○ Display the text box for the **Strength rule** script so you can update the script. ○ Display the graphical **Password Strength** bar to the user while the user changes or resets the password. **Note:** The Password Reset Windows Application does not support Password Strength.
Strength rule	This text box appears only if you select **Enable Password Strength**. Specify the client script that calculates the strength/complexity of the password that the user enters. The script is invoked when the user begins to enter a new password during the reset process. Default settings: ○ Selected for local ServiceNow credential stores ○ Not selected for other credential stores

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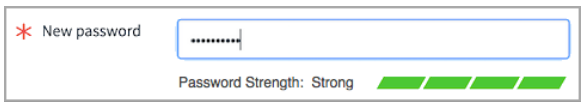
Field	Description
	Note: ○ To guide the user during the reset process, the system displays a graphical bar labeled **Password Strength** under the **New password** field.  ○ The Password Reset Windows Application does not support Password Strength.

3. Click **Submit**.
   You should test the connection to a credential store after you configure a new credential store or when users experience problems that might involve the connection.
4. Navigate to **Password Reset** > **Credential Stores** and then open the credential store.
5. In the header bar, click **Save and Test Connection**.
   A progress page displays the result of the test.

Specify lockout for failed login attempts

The system provides inactive script actions that enable you to specify the number of failed login attempts before a user account is locked and to reset the count after a successful login.

Before you begin

Role required: admin

Procedure

Navigate to **All** > **System Policy** > **Script Actions** to view or activate the scripts.

Note:
Starting with the Kingston release, following a zBoot, the script actions **SNC User Lockout Check with Auto Unlock** and **SNC User Clear** are activated.

To learn more about properties that affect failed login attempts, see Managing failed login attempts (instance security hardening) in the Instance Security Hardening Settings.

Script action	Description
SNC User Lockout Check with Auto Unlock	• Uses the value of the `glide.user.max_unlock_attempts` property to set the limit for failed login attempts. • Unlocks the user account after the time period that is specified for the `glide.user.unlock_timeout_in_mins` property. If no value is specified, then the system unlocks the user account after the default period of 15 minutes.

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Script action	Description
SNC User Lockout Check	Tracks the number of failed login attempts and locks the user account after a specified number of failed login attempts (default: 5).
SNC User Clear	Updates the user record after a successful login: Resets the number of failed login attempts and updates the date of the last login.

What to do next

Each time a user attempts to log in, the action is recorded in an event log. You can view a log of failed login attempts.

1. Navigate to **System Policy** > **Event Logs**.
2. Filter for **login.failed** in the **Name** field. You can view the attempted login name, date, and IP address logged for the attempt.

Configure Google reCAPTCHA for the password reset process

To use the Google reCAPTCHA service, instances that are running on a domain other than `service-now.com` require an API key pair from Google.

Before you begin

Role required: admin

About this task

- The procedure described in this topic is optional for instances that are running on the `service-now.com` domain.
- Because on-premises instances do not have access to the Internet, they cannot use the Google reCAPTCHA service. Do not follow the procedure described in this topic. Instead, set the *password_reset.captcha.google.enabled* system property to **false**. This setting enables the CAPTCHA service that is provided with the base system.
- The Password Reset Windows Application uses the base-system CAPTCHA service even if the Password Reset application is configured to use Google reCAPTCHA.

Procedure

1. Request an API key pair (a site key and a secret) from Google at https://www.google.com/recaptcha.
2. Set the following system properties:

Property	Value
password_reset.captcha.google.enable	Set to `true`. Type: string Default: true
google.captcha.site_key	Set to the site key that Google provided. Type: string

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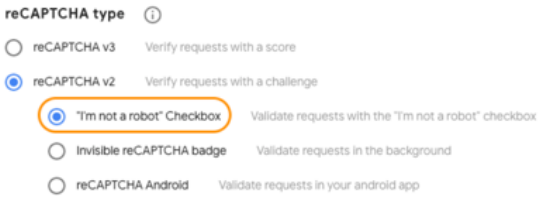
Property	Value
	Default: A site key that Google provided to ServiceNow
google.captcha.secret	Set to the secret that Google provided. Type: password2 Default: An encrypted secret that Google provided to ServiceNow **Note:** Select reCAPTCHA v2, **I'm not a robot** option. (reCAPTCHA v3 is not currently supported). 

Customizing Password Reset processes

Password Reset scripts enable you to customize Password Reset by creating your own credential store, verification, and identification types, and extend them by defining extension scripts. You can also create a custom credential store type, custom verification type, or verification.

Legacy

Password Reset scripting is available to users with the password_reset_admin role. The easiest way to customize Password Reset is:

1. Create custom types and scripts as described in Password Reset extension script categories.

   Extension scripts are example script includes that enable you to extend functionality in a password reset process. The extension script category refers to the specific types of behavior for an extension script (for example, credential store, verification, identification type, or as a post-processor).

2. Follow the configuration steps described in Configure your Password Reset process.
3. Select the new types that you created. You can customize the following components:
   - Credential store types: Define new types for how to connect to your credential stores by creating custom workflows for connection and testing. See Create a credential store type for Password Reset.
   - Verification types: Define new types for how users are verified. See Create a custom Password Reset verification type.
   - Identification types: Define new types for how users can identify themselves. See Create a custom identification type for Password Reset.

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Advanced password reset configuration

You can customize the Password Reset and Password Change applications to meet your organization's needs. See Password Reset and Password Change applications for more information. Also see Configuring Password Reset properties for a list of properties that control several aspects of password reset.

Customize password reset processes and integrate third-party credential services

To customize password reset processes or to integrate them with third-party credential services such as Okta or Microsoft Entra ID, use Integration Hub capabilities. Use Action Designer to create or modify actions like user unlock, change password, and get user status. Use Flow Designer to create or modify subflows that perform the actions.

Before you begin

Role required: admin, password_reset_admin, or password_reset_credential_manager

About this task

- The base system provides actions, subflows, and credential store types for the "Local ServiceNow Instance" identity provider.
- For Microsoft Active Directory, the subflows are available when you activate the Microsoft AD Spoke for Password Reset app.
- To use any other identity provider such as Okta, you must use Integration Hub to create the required actions, subflows, and custom credential store types.
- For Microsoft Entra ID, the subflows are available when you activate the Microsoft Entra ID Integration for Password Reset app.

Procedure

1. Use Action Designer to create password reset actions like user unlock, change password, and get user status.
   For more information about Action Designer, see Action Designer.
2. Use Flow Designer to create the following subflows.

   Use the specified names, inputs, and outputs for the subflows. For more information about the subflows, see Subflows.

Subflow name	Input	Input type	Output	Output type
<Provider Name> Password Unlock	Password Reset Request	Record.Password Reset Request	Error Message	String
			Status	Choice
<Provider Name> Password Reset	Password	Password (2 Way Encrypted)	Status	Choice
	Password Reset Request	Record.Password Reset Request	Error Message	String
<Provider Name> Password Change	Password Reset Request	Record.Password Reset Request	Status	Choice
	Current Password	Password (2 Way Encrypted)	Error Message	String

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Subflow name	Input	Input type	Output	Output type
		Note: **Name** under **Advanced options** is `old_password`.		
	New Password	Password (2 Way Encrypted) **Note:** **Name** under **Advanced options** is `new_password`.		
<Provider Name> Password Lock State	Password Reset Request	Record.Password Reset Request	Error Message	String
			Locked	Choice
			Status	Choice
<Provider Name> Password Connection Test	Not Applicable	Not Applicable	Error Message	String
			Status	Choice

3. For third party providers, create a credential store type.
   a. Select the **Use Flow** check box.
   b. Select the password reset subflows that you created for the provider. See Password Reset application for more information.
4. Create password reset credential store.
5. Create a password reset process.
6. Select the credential store type created for the provider.

Result
The password reset mechanism for the required third-party application is set up.

Add a custom question to the Security Questions verification

To enroll for the 'Security Questions' verification, the user selects several questions and supplies confidential answers that only the user knows. You can add a custom question to the set of questions that are included with the base system.

Before you begin
Role required: password_reset_admin or admin

About this task
The base system provides a large set of default questions in all supported languages. Questions are presented to each user in the language that the user requested during login. Creating a custom English language question is a one-step process. To create a custom question in a non-English language, you can use either of the following options:

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- Create a custom question in the non-English language.
- Create a custom English language question plus one or more translations of the question into other languages.

Procedure

1. Navigate to **All** > **Password Reset** > **Security Questions**.

   Note:
   Each question in the list is presented to users when they enroll for the Password Reset process. The user selects each question to use by providing a confidential answer to the question.

2. Follow this procedure to create a custom question in a single language.

   Note:
   To enter non-English question text, you must request the language when logging in.

   a. On the Password Reset Questions page, click **New**.

   b. Enter the text in the **Question (Translated field)** field and then click **Submit**.
   The question is added to the list of questions that is presented to users when they enroll. No additional steps are needed and you can skip the remaining steps.

3. Follow this procedure to create a custom question in English and the same question in one or more other languages:

   a. Click **New**, enter English language text in the **Question (Translated field)** field, and then click **Submit**.

   b. Create a record in the *sys_translated* table for the non-English language question.

   Details appear at Translated Name / Field table and Languages table.

Field	Description
Label (translate)	Non-English equivalent of the English text in the **Value** field.
Element	Name of the field in the Password Reset Question [pwd_question] table: `question_translated`
ID	ISO 639.2 code for the language.
Table	Table that you are adding the translated question to: the **Password Reset Question [pwd_question]** table.
Language	Language code for this translated text.
Value	English-language question that you added in the Security Questions table.

   c. Repeat the process for each language that users might request.

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Add a custom header or footer to the user pages for Password Reset

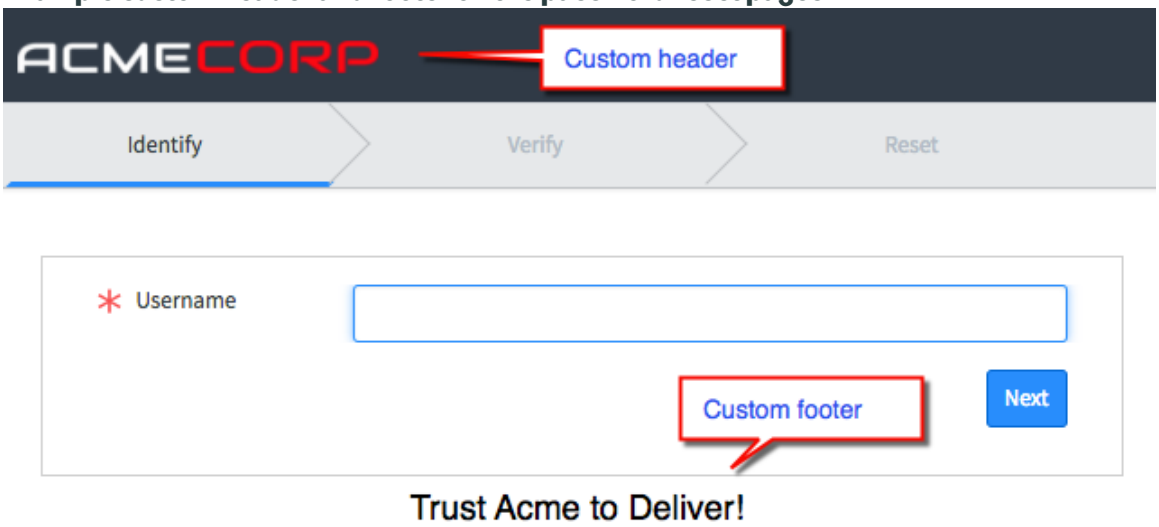
You can specify UI macros that add a header or footer to the pages that end users work in while resetting a password (the Identify, Verify, and Reset pages).

Before you begin

Role required: password_reset_admin

About this task

Example custom header and footer on the password reset pages



Procedure

1. Configure a UI macro for the header or footer: Navigate to **All** > **System UI** > **UI Macros**, click **New**, and then enter a meaningful **Name** and **Description**.
2. In the **XML** text box, enter the macro text.

   The example macro adds the text "Trust Acme to Deliver!" to the footer of the page that users work in while resetting a password.

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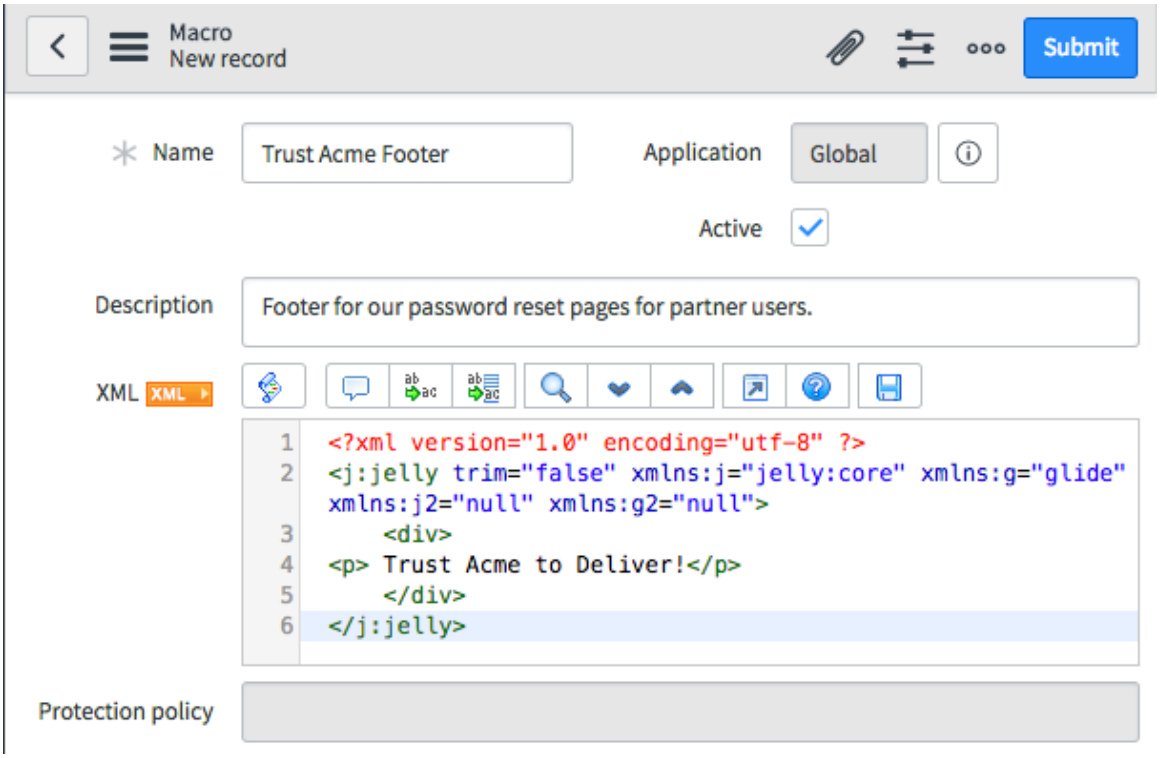

3. Select the **Active** check box and then click **Submit**.
4. Navigate to **Password Reset** > **Processes** and select the process to update.
5. On the **Advanced** tab, click ( ) for the **Header UI macro** or **Footer UI macro** and select the macro that you created.
6. Click **Save**.
7. Verify the appearance of the end-user pages.

Option	Description
If the reset pages are Public Access	On the **Password Reset Details** tab, click the **Public URL**.
If the reset pages are not Public Access	Log in as an end user and request password reset.

Create a Password Reset verification from an existing verification

The Password Reset application includes several example verifications that you can use as they are or as the basis for a custom verification. If the verification types in the base system do not meet your needs, you can create a custom verification type.

Before you begin

Role required: password_reset_admin

About this task

Note:
The Password Reset Windows Application does not support custom verifications.

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Procedure

1. Navigate to **All** > **Password Reset** > **Verifications** and select a verification.
2. If needed, modify the parameters on the **Password Reset Verification Parameters** tab. The parameters are described in the instructions for the type of verification that you are working on.
3. Click **Submit**.

> **Note:**
> Each verification type has properties that control the user experience. Review the property settings and update as needed.

Create a custom Password Reset verification type

Each verification in Password Reset is based on the settings for a verification type. If the verification types in the base system do not meet your needs, you can create a custom verification type.

Before you begin

Role required: password_reset_admin or admin

Review the verification types that are provided in the base system to determine whether to create a custom verification type. Then review the verification type components to develop. For more information about verification types in the base system, see Verification types in the base system.

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Verification Types**.
2. Click **New**, enter a unique and meaningful **Name** and **Description**, and then fill in the form. For information about the fields on the Password Reset Verification Type form, see Password Reset Verification Type form.
3. Click **Submit**.

Related topics

- Password Reset script includes
- Password Reset extension script categories
- Installed with Password Reset

Create a custom Password Reset verification

Use a verification type in the base system as a template to design a custom verification. The Password Reset Windows Application does not support custom verifications.

Before you begin

Role required: password_reset_admin

Review the verification types that are provided in the base system to determine whether to create a custom verification type. Then review the verification type components to develop. For more information about verification types in the base system, see Verification types in the base system.

Procedure

1. Navigate to **All** > **Password Reset** > **Verifications**.
2. Click **New**, enter a unique and meaningful **Name** and **Description**, and then fill in the form.

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For information about the fields on the Password Reset Verification form, see Password Reset Verification form.

3. Click **Submit**.

> **Note:**
> Each verification type has properties that control the user experience. Review the property settings and update as needed.

Create a custom identification type for Password Reset

A custom identification type enables the user to enter alternative verification information such as an employee ID while resetting the password.

Before you begin
Role required: password_reset_admin or admin

About this task

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Identification Types**.
2. Click **New**, enter a unique and meaningful **Name** and **Description**, and then fill in the form.

Identification field label	Text to display as a label for the **Identification** field.
Identification processor	Identification processor script. Choose an existing script or create your own using the Identification form processor category (extension script).

3. Click **Submit**.

Related topics

Create a Password Reset extension script

Configure a credential store type to support third-party password auto-generation

Enable the subflows in credential store type to support third-party password auto-generation.

Before you begin
Role required: password_reset_credential_manager, password_reset_admin, or admin

About this task
Users can easily reset their passwords for the credential stores that don't have REST APIs to reset the password. For example, the password reset subflows support Robotic Process Automation. The Password Reset process can be automated with a Robotic Process Automation robot to reset the password of an application that does not have an API to reset the password.

For more information about Robotic Process Automation, see Robotic Process Automation (RPA) Hub.

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Credential Store Types**.
2. Open the credential store type.

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3. To use password reset subflows in the Integration Hub, leave the **Use Flow** check box selected.
4. In the **Password reset flow** field, enter a required value for the password reset subflow.
5. From the **Password Delivery Mechanism** list, select **Reset flow doesn't accept password as input**.
6. If you want your users to change the password immediately after signing in post password reset, select the **Supports Force Password Change On First Log In** check box.

   Note:
   Ensure that the **User must reset password** check box is selected on the Password Reset Process form of the associated process. But these settings of changing passwords after first sign-in post reset work only if the credential store you are configuring supports the settings.

7. Click **Update** or save the changes.

Asynchronous password reset subflow

When a user requests a password reset, based on the application for which the password reset is requested, the process works either synchronously or asynchronously.

When a user requests a password reset for a credential store for which the REST APIs are available to reset the password, the password is reset immediately. This process is synchronous.

In the asynchronous process, when a user requests a password reset for credential stores that don't provide REST APIs, you can configure such credential stores to reset passwords using an external system, such as Robotic Process Automation.

For more information about Robotic Process Automation, see Robotic Process Automation (RPA) Hub.

When a user requests a password reset, the password doesn't get reset immediately. The user receives a message that shows the request has been submitted, and the request status is displayed as **Pending With External System** on the Password Reset Requests page for that request.

When the process completes, the password is reset. The user receives an appropriate message based on the success or failure of the password reset action from the external system, which resets a password for the user. If the password reset is successful, the user receives an email containing the new password from the external system if the credential store doesn't accept the password.

If a credential store processes a password reset request asynchronously, then to update the corresponding password reset request status from pending to either **Completed With Success** or **Completed With Failure**, the process must use the **Update Password Reset Request** subflow as a callback.

Note:
To open the **Update Password Reset Request Status** subflow, navigate to **All** > **Process Automation** > **Flow Designer**, and click the **Subflows** tab. Then search for and select the **Update Password Reset Request Status** subflow.

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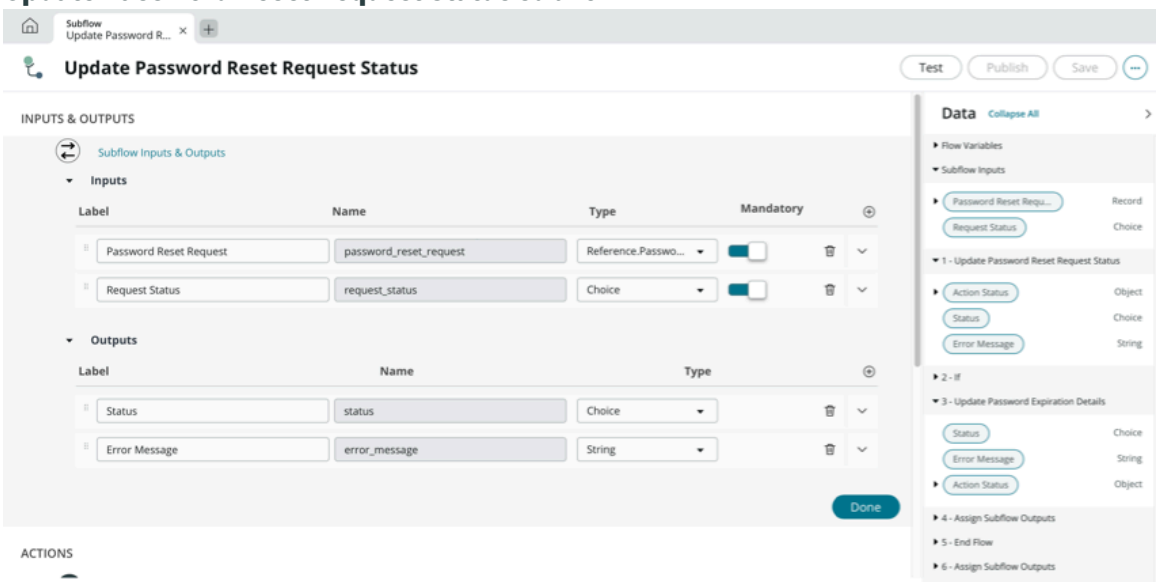
Update Password Reset Request Status subflow input parameters

Input Parameters	Description
Password Reset Request	Glide record of the password reset request.
Request Status	Determines which choices are available as input. For example, **Completed With Success** or **Completed With Failure**.

When this subflow is used, the input parameters are considered in this subflow to set the corresponding password reset status.

Update Password Reset Request Status subflow



Create a credential store type for Password Reset

Create a custom credential store type when the base-system types do not meet your needs.

Before you begin

Role required: password_reset_credential_manager

About this task

You can also configure a credential store type to work independently with the password reset, password change, and unlock password actions.

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Credential Store Types**.
2. Click **New**.
3. In the **Name** field, enter the name for the credential store type.
4. In the **Description** field, enter the description for the credential store type.
5. To use password reset subflows in Integration Hub, leave the **Use Flow** check box selected.

Note:
See Customize password reset processes and integrate third-party credential services for information on creating provider-specific subflows.

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6. Select the **Supports history check** check box to determine whether the credential store supports the history policy capability.

   If selected, only then the password_reser_admin can disable or enable this feature through a credential store record.

7. Select the subflows created for the third-party application.

   Note:
   See Customize password reset processes and integrate third-party credential services for information on creating provider-specific subflows.

Subflow	Description
Base Alias	A connection and credential alias that is used in the subflows of this credential store type. This is the default alias used by the subflows while making an external call. **Note:** If you want to override the default alias, use the child alias property of the credential store.
Password change flow	Changes the password of an authenticated and unlocked user account to the provided new password. Verifies that the new password conforms to the password format and history policies. Displays an error if the user is not authenticated or is locked out. Use the Password Reset flow to unlock a locked user account and require a password change.
Unlock user flow	Defines the process to unlock a user. If a credential store supports the unlock user flow, the **Get user lock state flow** field becomes a required field. But when a credential store doesn't support the unlock user flow, you can still set up the user lock state flow.
Get user lock state flow	Retrieves the lock status of an account specific to the credential store.
Connection test flow	Defines how to test the connection.
Password reset flow	Unlocks the specified user account. Expires the current password and changes the password to the provided new password if it conforms to the password format and history policies. If it doesn't conform, a warning is displayed. **Note:** In the case of an Robotic Process Automation setup, the subflow doesn't reset the password immediately but only pushes the request into the Robotic Process Automation queue and the status is displayed as **Pending**.

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Subflow	Description
Password Delivery Mechanism	Sets the mechanism such as whether to accept the password as input or not. For example, in the case of the credential store for which Robotic Process Automation functionality is required, Robotic Process Automation can't accept the password from the Password Reset application for security purposes. So, for Robotic Process Automation subflows, the **Reset flow doesn't accept password as input** value must be selected. That means, while users create a reset password request, they are not asked to enter passwords of their choice. **Note:** This feature is applicable only to the password reset action. If for a credential store, the reset flow doesn't accept a password, which is configured through the password delivery mechanism, then all the fields for password policy and password generation are hidden on the related credential store form. For example, **Enable password policy**, **Password policy**, **Enable Password Strength**, **Strength rule**, and **Auto-generate password**.
Supports Force Password Change On First Log In	When selected, notifies the user to change the password when the user signs in for the first time with the new password that the user receives after the password reset action is completed. **Note:** Based on this setting, the fields on the Password Reset Process form change. For example, when a password reset administrator selects the **Auto-generate password** check box on the Password Reset Process form, the form displays the **User must reset password** field. So, it depends on the password reset administrator whether to prompt users to change their auto-generated password or not even if the **Supports Force Password Change On First Log In** check box is selected.

8. If you want to use workflows, clear the **Use Flow** check box to use the password reset workflows in Orchestration.

Note:

- The workflows have been deprecated. Use the subflows by leaving the **Use Flow** check box selected.
- The workflows are available only if you have upgraded from the previous releases.

Field	Description
Password Reset workflow	Defines the credential store processing. Password Reset workflows are available to use as a model. Provide scripts for each of the activities defined for the subflow. For more information about how to create a workflow, see Create a workflow. For installed workflows, see Installed with Password Reset.
Connection test workflow	Defines how to test the connection. Connection test workflows are available to use as a model. If you create a connection test subflow, provide scripts for each of the activities defined for the subflow. For installed workflows, see Installed with Password Reset.
Get user lock state workflow	Defines how to get the user lock state. Get user lock state workflows are available to use as a model. Provide scripts for each of the activities defined for

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Field	Description
	the subflow. For more on how to create a workflow, see Create a workflow. For installed workflows, see Installed with Password Reset.
Unlock user workflow	Defines how to unlock a user. Unlock user workflows are available to use as a model. If you create a connection test subflow, provide scripts for each of the activities defined for the subflow. For installed workflows, see Installed with Password Reset.

9. Click **Submit**.

Reset a password or unlock a user account with service desk assistance

Reset a password or unlock a user account by requesting the assistance of a service desk agent.

Before you begin

Watch this video example of service desk agents resetting passwords: Resetting User Passwords (Video).

Note:

- You must clear the **Public access** property to enable the service desk-assisted process. See Configure your Password Reset process.
- You can perform this activity on a mobile device.
- You can change the theme of the service desk page to the dark theme. For more information about the dark theme, see Exploring themes in Next Experience.

Role required: password_reset_admin or password_reset_service_desk

About this task

In a service desk-assisted Password Reset process, only the service desk agents with the password_reset_service_desk role can reset user passwords. Users can't reset passwords.

Procedure

1. Navigate to **All** > **Password Reset** > **Service Desk**.
2. Select a user and the Password Reset process to use.
3. Click **Verify Identity**.
4. On the Verify Identity form, enter the answers provided by the user, and then click **Continue**. If the user's identity is verified, the Reset Password form displays the identity verification and status of the account lock.
5. Perform one of the following actions.
   - If the user isn't locked, the form displays the **Reset password** button. Enter the new password and click **Reset password**.
   - If the user's account is locked, the form displays the **Reset password** and **Unlock account** buttons. You can enter a new password and click **Reset password** to reset the password and unlock the account. If the **Enable account unlock** option is selected for the password process, you can unlock the account without resetting the password by clicking **Unlock account**.
6. To reset the password for a different user, you must first navigate away from the **Service Desk** and then navigate to **Password Reset** > **Service Desk**.

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View user requests for password reset

The **Reset Requests** module displays the status of each password reset request from the Password Reset Request table [pwd_reset_request].

Before you begin

Role required: password_reset_admin or password_reset_service_desk

Procedure

Navigate to **All** > **Password Reset** > **Reset Requests**.

Password Reset request fields

Field	Description
User	User whose password is being reset or changed.
Process	Process that implements this password reset request.
Type	Type of Password Reset request: • **Change Password**: Request to change a password. • **Help Desk**: Request opened on behalf of the requesting user by a service desk agent. • **Self Service**: Requesting user opened the reset request.
Action Type	Corrective action performed during the Password Reset request. • **Change Password**: Update the credential store with the new password. • **Reset and Unlock Account**: Generate a new password for the user and unlock the user account. • **Reset Password**: Generate a new password for the user. • **Unlock Account**: Unlock the user account.
Status	Result of the Password Reset request: • **Completed With Failure**: User completed all steps in the Password Reset process, but the password was not reset in the credential store. • **Completed With Success**: User completed all steps in the Password Reset process and the password was reset in the credential store. • **Expired**: User did not complete all steps in the Password Reset process in the time allowed. • **In Progress**: User is working through the steps to reset the password. • **Max Number of Attempts**: User failed to answer the security questions correctly during the identity verification step and has exceeded the maximum number of attempts allowed. • **Verified**: User has completed the identity verification step and is verified. The user can move to the Password Reset step.
Active	Whether the request is open or closed.
Retry	Total number of times the user has attempted to complete a password reset request.

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Unblock a Password Reset user

If a user is manually banned or is flagged as exceeding max attempts, the user can be blocked (not allowed to use the Password Reset application). You can unblock a blocked user.

Before you begin

Role required: password_reset_admin or password_reset_service_desk

About this task

Blocking events include:

- The user exceeded the limit for the number of failed password attempts.
- The most recent password reset occurred before the wait time required until the next reset.
- The user failed to provide the correct information while attempting to reset the password.

If the number of blocked or locked users exceeds the limit within a defined time interval, it triggers a system log event. You can configure the number of blocked or locked users and the time interval required to generate the log event by setting the *password_reset.activity_monitor.incident_threshold* and *password_reset.activity_monitor.incident_window* properties.

Procedure

1. To view the list of blocked users, navigate to **Password Reset** > **Blocked Users**.
2. To unblock a self-service user:
   a. Navigate to **Password Reset** > **Blocked Users**.
   b. Select a user from the list.
   c. Select **Delete** on the **Actions on selected rows** list.
3. To unblock a user whose password was reset by a service desk agent:
   If a user is manually banned or flagged as exceeding max attempts, the user can be blocked (not allowed to use the Password Reset application). When the password reset request is made through self-service, the user is unblocked when the password is successfully reset.

   In contrast, service desk agents are allowed any number of retries. The *max_attempt_reached* limit does not apply and the **Blocked** status for the user is not reset after the password is reset. As a result, after you successfully reset a user password, you must unblock the user manually.

   If the user is not unblocked manually, then the system resets the blocked state only when the *max_attempt_window* time period elapses and the user tries to reset the password using self-service.

   a. After you successfully reset a user password, navigate to **Password Reset** > **Blocked Users**.
   b. Change the **Blocked** setting for the user from true to false.

Related topics

Configuring Password Reset properties

Password Reset and Password Change reports and logs

Integrate Password Reset with a Service Portal widget

You can enable a Password Reset process in a Service Portal page by adding a widget that opens the password reset pages inside the portal.

Before you begin

Role required: admin or sp_admin

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Procedure

1. On the Service Portal Designer for the portal, create a new page — the page where the user will perform the password reset process.
2. On the **Widget** tab, under Layouts, select the 12-column layout and drop it onto the page.
3. Drop the **Pwd reset** widget into the 12-column layout and then save the page.
   The three tabs of the password reset process appear in the layout.
4. In the **Reset my password** link on the login page for the portal, specify the URL of the new password reset page.
   The URL must include one required parameter and may contain one optional parameter:
   - Required: `sysparm_show_custom_header_footer=false`. This parameter disables the native header and footer feature of the password reset page.
   - `sysparm_redirect_url=<portalName>?id=<pageName>`. This parameter specifies the page to go to after a successful reset — typically the login page for the portal.

   For example, `https://server.acme.com/acme_community?id=password_reset_page&sysparm_show_custom_header_footer=false&sysparm_redirect_url=acme_communityid=communities_login`

Integrate Password Reset with a CMS integration

You can configure a site in the ServiceNow content management (CMS) application to define a single-site access point that includes the Password Reset service. For example, you can create an employee self-service site that provides Password Reset service.

Before you begin
Role required: content_admin

About this task
Each Password Reset process requires a separate CMS page.

Procedure

1. Navigate to **All** > **Content Management** > **Specialty Content** > **iFrames** and create an iFrame record.
2. Go to **Content Management** > **Sites** and create a site that has no login page.

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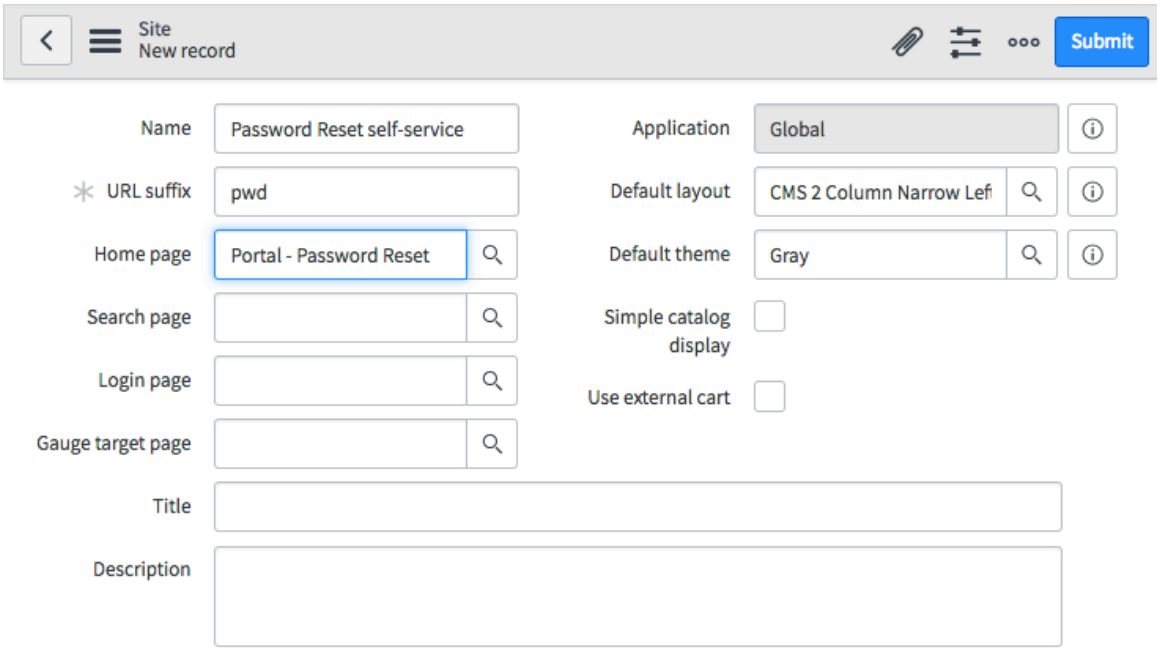

3. Go to **Content Management** > **Pages** and create a password reset page.
4. Enter the name of the site that you created in the **Content site** field (**Password Reset self-service** in the example).
5. Right-click the form header and click **Save**.
6. Click the **Edit Page** related link and then click **Add content**.
7. In the **Content Blocks** section, select the iFrame that you created and add more content as needed.
8. Click **Update**.

Installing and configuring Password Reset Windows Application

Request the Password Reset Windows App (Password Reset Orchestration) (com.glideapp.password_reset_desktop) plugin that enables connections to the Active Directory (AD) credential store types.

Administrators download and run an EXE or MSI file to install or distribute the application to user computers. The application installs a link on the Windows login screen.

Password Reset Windows Application installation requirements

Activate the Password Reset Windows App (Password Reset Orchestration) (com.glideapp.password_reset_desktop) plugin and activate the Microsoft AD for Password Reset store app to use the Password Reset Windows Application.

Requirement	Description
Required ServiceNow release	Password Reset Windows Application version 5.0 is supported on the San Diego, Tokyo, and Utah releases.
Required hardware	• 1 GHz or faster processor • 512 MB of RAM

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Requirement	Description
	• 10 MB of available hard disk space (x86) • 10 MB of available hard disk space (x64)
Required software	• Version of Password Reset Windows Application: 5.0 • Microsoft .NET Framework: 4.7.1 and newer • Microsoft Visual C++: Redistributable Visual Studio 2017
Supported operating systems	• Windows 8.1 • Windows 10 Enterprise • Windows 10 Pro • Windows 11
Supported processor architecture	• X86 • X64
Supported network architecture	• Password Reset Windows Application clients must have direct access to both the internet and the ServiceNow instance where the Password Reset Windows Application is configured • For Password Reset Windows Application versions that use an SHA certificate, the corporate network must not block the SHA certificate. • To reset an AD password, the client must be on the corporate network.

Request the Password Reset Windows App plugin

Request the Password Reset Windows App (Password Reset Orchestration) (com.glideapp.password_reset_desktop) plugin that enables connections to the Active Directory (AD) credential store types. No other components are installed.

Before you begin

Role required: admin

About this task

There are two ways to request a plugin:

- Access the Now Support Service Catalog directly by selecting **All** > **Service Catalog** > **Activate Plugin** on Now Support. For more information about the list of plugins, see List of Plugins.
- Access the Now Support Service Catalog through the All Applications page on your instance by following these steps.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the Request form on HI.

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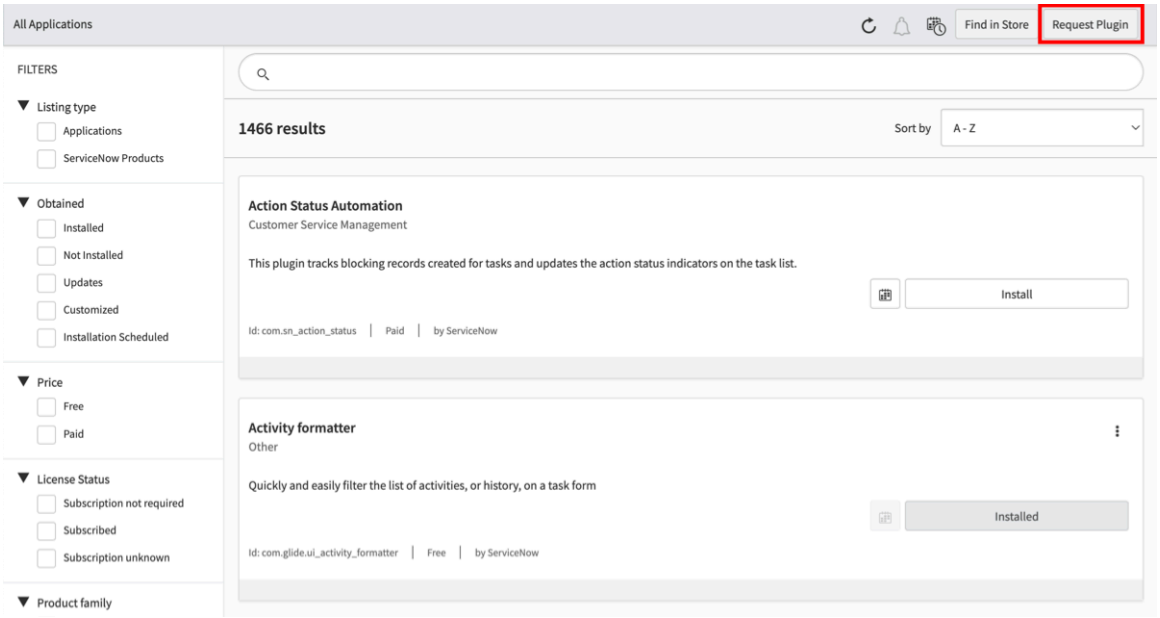
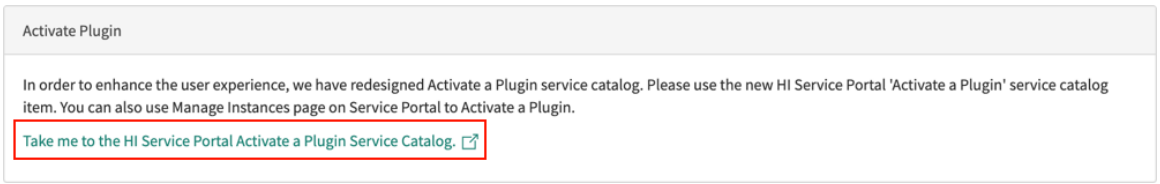


3. On Now Support, select the redirect link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the form, fill in the fields.

Activate Plugin request form

Field	Description
Target Instance	Instance on which to activate the plugin.
Plugin Name	Name of the plugin to activate.
Specify the date and time you would like this plugin to be enabled	The date and time must be at least two business days from the current time. **Note:** Plugins are activated in two batches, in the morning and in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.
Reason/Comments	Information that would be helpful for the ServiceNow personnel who are activating the plugin. For example, if you need the plugin

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Field	Description
	activated at a specific time instead of during one of the default activation windows, specify that in the comments.

7. Select **Submit**.

Download the Password Reset Windows Application installer

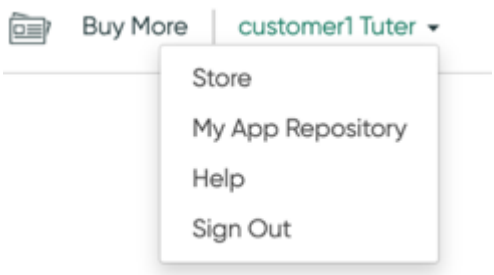
Download the Password Reset Windows Application installer.

Before you begin

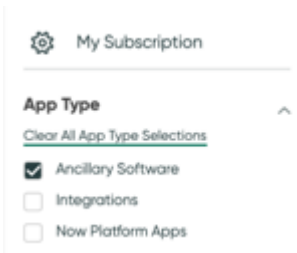
Role required: any user

Procedure

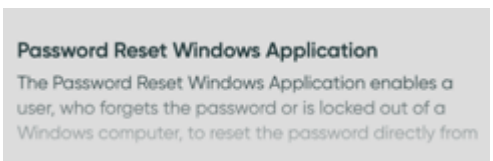
1. Log in to the ServiceNow Store Publisher Portal.
2. Click your user menu and select **Store**.



3. Set the filter for the **Ancillary Software** app type.



4. Click **Password Reset Windows Application**.
   The application download location appears.



5. Click **Download**.

Install Password Reset Windows Application

Install Password Reset Windows Application using different available methods.

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Use an EXE file from the command line

As an alternative to command-line installation, you can use a wizard.

Before you begin

Role required: security_admin elevated privilege
Privilege required: Windows local administrator

Procedure

1. Ensure that the user with the ServiceNow security_admin role configures the security properties.
   For more information about the security properties, see Configure security settings for the Password Reset Windows Application
2. Copy the following command into a text editor as one line with no breaks.

```
PasswordResetWinAppInstall.exe /VERYSILENT /
PasswordResetLinkURL
 https://<YourServerName>/$pwd_reset.do?sysparm_url=default /
PasswordResetLinkName "Forgot password?"
```

3. Add arguments and replace the default parameter values with the correct values for your organization.

Argument	Example	Description
`/Log`	`/Log=c:\temp\PwdResetInstallLog.log`	Optional. To generate a log file, you must first create the directory that the file is written to. In this example, you would create the `c:\temp` directory before running the installation.
`/NORESTART`	`/NORESTART`	Optional. Include `/NORESTART` to prompt the user to restart the computer after installation.

Parameter	Default	Description
PasswordResetLinkURL	`https://<YourServerName>/$pwd_reset.do?sysparm_url=default`	URL of the page that users access when resetting a password. Be sure to substitute your ServiceNow server name and the URL suffix for the desired Password Reset process.
PasswordResetLinkName	`"Forgot password?"`	Text to display for the Password Reset link on the Windows login page. Update the text as needed. You must enclose the text in double-quote characters

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Parameter	Default	Description
		as shown. To ensure that the correct characters are used, do not copy/paste the example text. Instead, type the characters at the command line.
CredentialProviderGUID		Most installations do not need to specify this parameter value. Provide this value only if you use a customized credential provider and can provide a valid credential provider GUID.

4. Navigate to the directory that holds the `PasswordResetWinAppInstall.exe` file.
5. Run the updated command at the command line.
6. After installation and depending on the setting for the `/NORESTART` argument, you might need to restart the computer.
   See Install Password Reset Windows Application using a wizard.

Use an MSI file from the command line

Use the MSI file to install the Password Reset Windows Application on multiple computers over a network. As an alternative to MSI installation, you can also install from the command line.

Before you begin

Role required: Windows local administrator

Procedure

1. Ensure that the user with the ServiceNow security_admin role configures the security properties.
   For more information about security properties, see Configure security settings for the Password Reset Windows Application.
2. Copy the following command into a text editor as one line with no breaks.

```
msiexec.exe /i PasswordResetWinAppInstall.msi /quiet
 WRAPPED_ARGUMENTS="/SUPPRESSMSGBOXES /VERYSILENT /NORESTART /
PasswordResetLinkURL
 https://<YourServerName>/$pwd_reset.do?sysparm_url=default /
PasswordResetLinkName ""Forgot password?"""
```

3. Add arguments and replace the default parameter values with the correct values for your organization.

Argument	Example	Description
`/Log`	`/Log=c:\temp\PwdResetInstallLog.log`	Optional. To generate a log file, you must first create the directory that the file is written to. In this example, you would create the `c:`

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Argument	Example	Description
		`\temp` directory before running the installation.
`/NORESTART`	`/NORESTART`	Optional. By default, MSI installations restart the computers. Include `/NORESTART` not to restart the computers after installation. You might want to communicate with end users that they must restart their computer to enable the Password Reset Windows Application.

Parameter	Default value to replace	Description
PasswordResetLinkURL	`https://<YourServerName>/$pwd_reset.do?sysparm_url=default`	URL of the page that users access when resetting a password. Be sure to substitute your ServiceNow server name and the URL suffix for the desired Password Reset process.
PasswordResetLinkName	`""Forgot password?""`	Text to display for the Password Reset link on the Windows login page. You must enclose the text in two double-quote characters as shown. To ensure that the correct characters are used, do not copy/paste the example text. Instead, type the characters at the command line.
Optional: CredentialProviderGUID		Most installations do not need to specify this parameter value. Provide this value only if you use a customized credential provider and can provide a valid credential provider GUID.

4. Navigate to the directory that holds the `PasswordResetWinAppInstall.msi` file.
5. Run the updated command at the command line.

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6. After installation and depending on the setting for the `/NORESTART` argument, you might need to restart computers.
   See Install Password Reset Windows Application using a wizard and Install the Password Reset Windows Application using an EXE file from the command line.

Use a wizard

As an alternative to wizard installation, you can run commands directly at the command line.

Before you begin

Role required: Windows local administrator

Procedure

1. Ensure that the user with the ServiceNow security_admin role configures the security properties.
   For more information about the security properties, see Configure security settings for the Password Reset Windows Application.
2. Right-click the `PasswordResetWinAppInstall.exe` installation file that you downloaded and select **Run as administrator**.
3. On the **Configure Password Reset Web page and credential provider** page, configure the following settings and then click **Next**:

Field	Description	Default
URL of the Password Reset page	URL of the page on your ServiceNow instance that users access when resetting a password. Be sure to substitute your ServiceNow server name and the URL suffix for the desired Password Reset process.	`https://<YourServerName>/$pwd_reset.do?sysparm_url=default`
Text to display for the Password Reset link	Text to display for the Password Reset link on the Windows login page. Update the text as needed.	`Forgot password?`
GUID of the credential provider	Most installations do not need to specify this parameter value. Provide this value only if you use a customized credential provider and can provide a valid credential provider GUID.	[Accept the default.]

4. For the remaining pages, perform the following actions:

Page title	Action
License Agreement	Select **I accept the agreement**.

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Page title	Action
Select Destination Location	Accept the default installation location.
Select Start Menu Folder	Accept the default "ServiceNow".
Ready to Install	Click **Install**.

5. Restart the computer.
   See Use an EXE file from the command line.

Configure security settings for the Password Reset Windows Application

Configuring security settings for the Password Reset Windows Application.

Security settings

- The *glide.security.use_csrf_token* property setting allows the Password Reset Windows Application to retrieve a token for a secure communication with the datacenter instance.
- The *CheckCertificateRevocationList* registry key default setting of **true** causes the Password Reset Windows Application to validate the server certificate before every communication. See Customize the Password Reset Windows Application for details.
- The *ServiceNowCertPublicKey* registry key contains the public key for the app. See Customize the Password Reset Windows Application for details.

Configure the glide.security.use_csrf_token property

To configure the *glide.security.use_csrf_token* property, a security_admin elevated privilege is required.

Set the *glide.security.use_csrf_token* property to true (Yes). See the topic titled "High Security Settings" in https://servicenow.com/docs.

The Windows local administrator performs the remainder of the installation procedure.

Configure the Password Reset Windows Application to use a proxy server

The Password Reset Windows Application supports the use of a proxy server. There are three options for configuring the proxy server.

Before you begin

Role required: Windows system administrator

Procedure

Use any one of the following configuration options to enable the Password Reset Windows Application to use a proxy server.

Configure an exception policy on your proxy server

You can configure an exception policy on your proxy server to allow unauthenticated access to the *service-now.com* domain.

Before you begin

Role required: Windows system administrator

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Procedure

1. On a machine in the network, back up the following registry key: `HKEY_USERS\.DEFAULT\Software\Microsoft\Windows\CurrentVersion\Internet Settings`
2. Download and install the Sysinternals Suite from `https://technet.microsoft.com/en-us/sysinternals/bb842062.aspx`
3. At the command prompt, navigate to the extracted `sysinternals` folder.
4. Run the following command to launch Internet Explorer:
   `psexec -s -i "C:\Program Files\Internet Explorer\iexplore.exe"`
5. On the Internet Explorer **Tools** menu, select **Internet options**.
6. On the **Connections** tab, click **LAN settings**.
7. In the **Proxy server** section, select **Use a proxy server for your LAN** and then fill in the **Address** field using the following format: `<proxy_server>:<port>`
8. Click **OK** to close the **LAN Settings** page and then click **OK** to close **Internet options**.
9. Export the following registry key to all clients that use the Password Reset Windows Application:`HKEY_USERS\.DEFAULT\Software\Microsoft\Windows\CurrentVersion\Internet Settings`

Configure a proxy server using client credentials method

If you cannot configure an exception policy, you must configure all Windows clients that use the Password Reset Windows Application to pass valid credentials to the proxy server.

Before you begin

Role required: Windows system administrator

About this task

If you choose not to use the method described in this topic, there are other methods to configure a proxy server:

- Configure registry keys. See Configure registry keys on your proxy server.
- Configure an exception policy on your proxy server to allow unauthenticated access to the *`service-now.com`* domain. See Configure an exception policy on your proxy server.

Procedure

1. On a machine in the network, back up the following registry key: `HKEY_USERS\.DEFAULT\Software\Microsoft\Windows\CurrentVersion\Internet Settings`
2. Download and install the Sysinternals Suite from `https://technet.microsoft.com/en-us/sysinternals/bb842062.aspx`
3. At the command prompt, navigate to the extracted `sysinternals` folder.
4. Run the following command to launch Internet Explorer:
   `psexec -s -i "C:\Program Files\Internet Explorer\iexplore.exe"`
5. On the Internet Explorer **Tools** menu, select **Internet options**.
6. On the **Connections** tab, click **LAN settings**.
7. In the **Proxy server** section, select **Use a proxy server for your LAN** and then fill in the **Address** field using the following format: `http://<userID>:<password>@<proxy_server>:<port>`

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8. Click **OK** to close the **LAN Settings** page and then click **OK** to close **Internet options**.
9. Export the following registry key to all clients that use the Password Reset Windows Application:HKEY_USERS\.DEFAULT\Software\Microsoft\Windows\CurrentVersion\Internet Settings

Configure registry keys on your proxy server

You can configure registry keys to enable the Password Reset Windows Application to use a proxy server.

Before you begin

Role required: Windows system administrator

About this task

If you choose not to use the method described in this topic, there are other methods to configure a proxy server:

- Configure an exception policy on your proxy server to allow unauthenticated access to the *service-now.com* domain. See Configure an exception policy on your proxy server.
- Configure all Windows clients that use the Password Reset Windows Application to pass valid credentials to the proxy server. See Configure a proxy server using client credentials method.

Procedure

1. Open the Registry Editor on your Windows computer.
2. Go to **Computer** > **HKEY_LOCAL_MACHINE** > **SOFTWARE** > **Microsoft** > **Windows** > **CurrentVersion** > **Authentication** > **Credential Providers** > **0780AF60-65C2-4718-942D-E0C56E89EF9B**.
3. Set the following registry keys:

   Note:
   You can modify any of the listed string values.

   ```
   "ProxyServer"="<YourProxyName>:<PortNumber>"
   "ProxyEnable"="true"
   "ProxyUser"="<YourProxyUserName>"
   "ProxyPassword"="<YourProxyPassword>"
   "ProxyDomainName"="<YourProxyDomainName>"
   "ByPassProxyOnLocal"="false"
   ```

   - ProxyServer: Set the proxy server name or IP address with port
   - ProxyUser: User name associated with the credentials, in case proxy is enabled with basic authentication
   - ProxyPassword: Password for the user name associated with the credentials
   - ProxyDomainName: Domain name that verifies the credentials
   - ByPassProxyOnLocal: Set to true if you want to bypass a proxy server for local calls.

Configure a proxy server using PAC file (automatic configuration script method)

Configure the Proxy Auto-Configuration (PAC) file or Windows proxy auto detection (WPAD) using the Internet Explorer (IE) settings.

Before you begin

Role required: Windows system administrator

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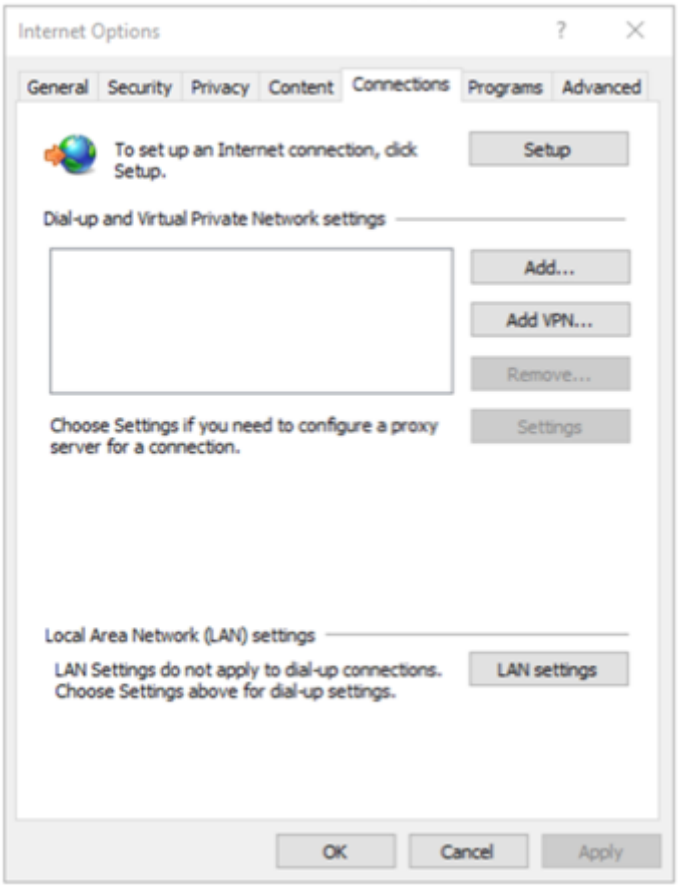
About this task

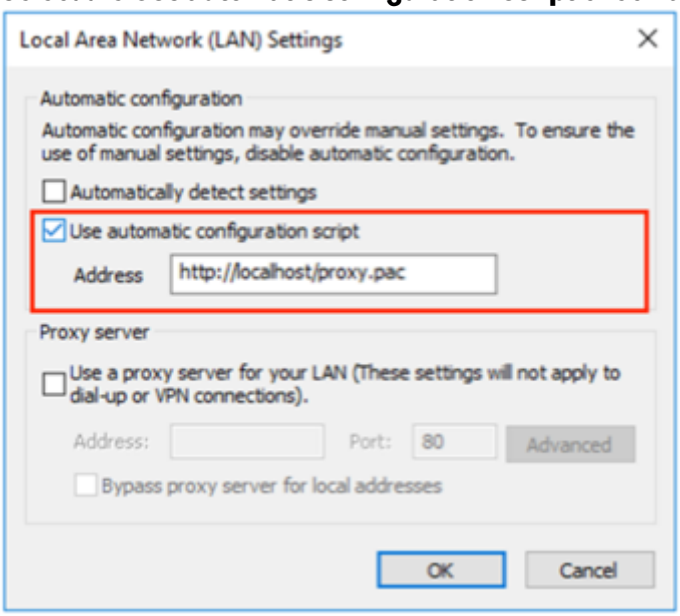
The Password Reset Windows Application internal classes automatically pick the configuration that is done using **Use automatic configuration script** at the Internet Explorer level. If you configure the proxy at Internet Explorer, level all the changes done at a remote proxy level are applicable in the Password Reset Windows Application as well.

Procedure

1. On the Internet Explorer Tools menu, select **Internet options**.
2. On the **Connections** tab, click **LAN settings**.



3. Select the **Use automatic configuration script** check box.



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4. In the **Address** field, enter the PAC file location on the network.
5. Click **OK**.

PAC file with registry setting

In this proxy configuration, the Proxy Auto-Configuration (PAC) file can be configured in Password Reset Windows Application registry settings.

The name of the registry setting enables the proxy via PAC file is *UseProxyAutoConfigScript*. The PAC script location (URL) can be provided in the *ProxyServer* setting. The reference configuration is provided as shown in the following image:

Name	Type	Data
(Default)	REG_SZ	PasswordResetCredentialProvider
AppDir	REG_SZ	C:\Program Files\ServiceNow
AppFormIconFile	REG_SZ	C:\Program Files\ServiceNow\bin\servicenow.ico
AppFormTitle	REG_SZ	Password Reset Windows Application
ByPassProxyOnLocal	REG_SZ	false
CheckCertificateRevocationList	REG_SZ	true
CompanyName	REG_SZ	ServiceNow Inc.
CredentialProviderGUID	REG_SZ	{60b78e88-ead8-445c-9cfd-0b87f74ea6cd}
DebugFlag	REG_SZ	0
PasswordResetLinkName	REG_SZ	Forgot password?
PasswordResetLinkURL	REG_SZ	https://pwdsand300622.service-now.com/$pwd_reset.do?sysparm_url=ms_ad_ss_de...
ProxyDomainName	REG_SZ	YourProxyDomainName
ProxyEnable	REG_SZ	true
ProxyPassword	REG_SZ	YourProxyPassword
ProxyServer	REG_SZ	http://localhost/proxy.pac
ProxyUser	REG_SZ	YourProxyUser
ServiceNowCertPublicKey	REG_MULTI_SZ	13EFB39A2F6654E8C67BD04F4C6D4C90CD6CAB5091BCEDC73787F6B77D3D3FE7
ServiceNowServerVersion	REG_SZ	4
ServiceNowWinAppVersion	REG_SZ	4.5
UseProxyAutoConfigScript	REG_SZ	true
UserAccountPictureLoc	REG_SZ	C:\Program Files\ServiceNow\bin\tileimage.bmp
VerifyEmbeddedFileSignature	REG_SZ	true
WorkingDir	REG_SZ	C:\Program Files\ServiceNow\bin

Registry setting to configure proxy via PAC

- ProxyEnable – <true>

  Enables the proxy on application level.

- ProxyServer – <PAC file URL>

  Initialize the PAC file location here.

- UseProxyAutoConfigScript – <true>

  If set to true, it indicates that the address provided in the *ProxyServer* registry setting is PAC script.

How it works

The PAC file provided in the *ProxyServer* registry setting is used to get the actual target proxy server address for a URL (In this case, the ServiceNow instance) based on the PAC file script configuration. The PAC file script must return a valid Proxy server address for a provided ServiceNow URL to make the application work.

The target proxy address is cached for a URL in the machine. The caching behavior is applicable for the browsers as well. The ServiceNow® Password Reset Windows Application behaves the

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same as the Internet Explorer browser. That is, if the URL is accessible via a browser, then it's accessible via the app as well.

Note:
It is not necessary to configure the proxy setting in Internet Explorer as the APP is reading the PAC file script via a registry.

Enable the Password Reset Windows Application to set the display language for the session

When the Password Reset Windows Application starts, the application passes the Windows language code to the instance. The instance then dynamically sets the language for the guest user session.

Before you begin
Role required: admin

Procedure

1. On the Windows computer: Set the **Welcome screen display language** property to the preferred language.
2. On the instance:
   a. Activate the plugin for the preferred language.
   b. Ensure that no record in the [sys_user_preference] table specifies a particular **user.language** for *guest* user.
   You clear the setting for a *guest* user to enable the instance to dynamically set the language during the session.

Integrate McAfee disk encryption with the Password Reset Windows Application

You use ePolicy Orchestrator (ePO) to enable McAfee MDE 7.2 on a Windows desktop computer to support the Password Reset Windows Application.

Before you begin

- Role required: admin
- Required: MDE version 7.2x

Procedure

1. Log in to ePO.
2. On the Policy Catalog, select **Product** > **Drive Encryption 7.2.0** and select **Category** > **Product Settings**

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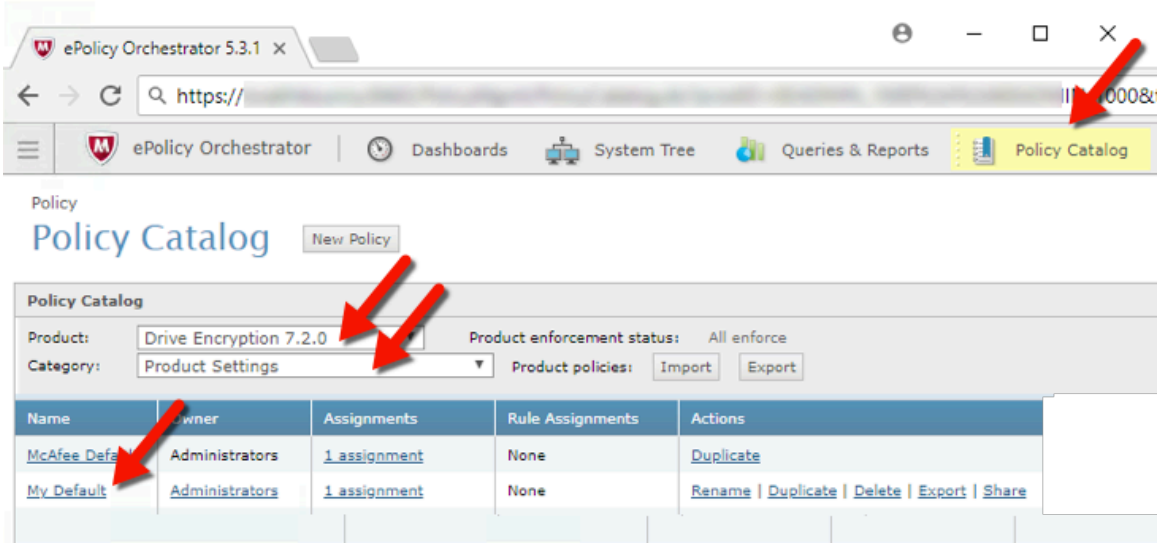
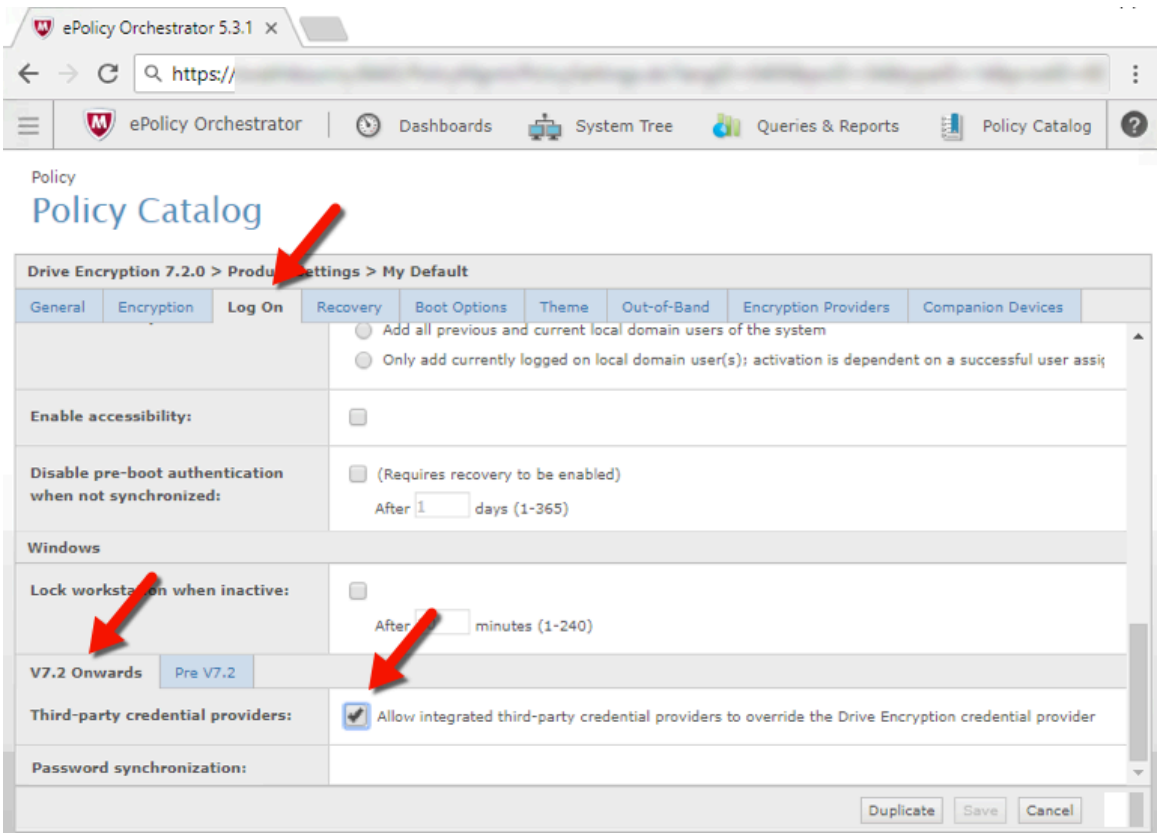


3. Click the **Name** of your policy catalog (**My Default** in the example).
4. On the **Log On** tab, select the **V7.2 Onwards** tab and then select the **Allow integrated third-party credential providers ...** check box.



5. Click **Save** and then log out of ePO.
6. On the end-user computer, create the following registry keys (client-side ePO setting):

```
Windows Registry Editor Version 5.00
[HKEY_LOCAL_MACHINE\SOFTWARE\McAfee EndPoint
 Encryption\IntegratedCredentialProviders\{0780AF60-65C2-4718-942D-E0C56E89EF9B}]
```

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```
"Vendor"="ServiceNow, Inc"
"Product"="ServiceNow PasswordReset WinApp"
"Version"="<PasswordReset WinApp version>" (for example,
 "Version"="4.5")
"BuiltAgainst"="<MDE version>" (for example,
 "BuiltAgainst"="7.2.3.28")
```

7. Restart the computer.

Customize the Password Reset Windows Application

You can customize the appearance and other aspects of the application.

Before you begin

Role required: Windows system administrator

Procedure

1. Open the Registry Editor on your Windows computer.
2. Go to **Computer** > **HKEY_LOCAL_MACHINE** > **SOFTWARE** > **Microsoft** > **Windows** > **CurrentVersion** > **Authentication** > **Credential Providers** > **0780AF60-65C2-4718-942D-E0C56E89EF9B**.
3. Modify any of the listed string values:

Note:
Registry keys that begin with the text `"proxy"` enable use of a proxy server. SeeConfigure registry keys on your proxy server.

Registry configuration options

File name	Description	Default string
AppDir	Directory that holds the Password Reset Windows Application application files.	`C:\Program Files \ServiceNow`
AppFormIconFile	Icon that is associated with the Password Reset application.	`C:\Program Files \ServiceNow\bin \ServicenowLogo.png` You can change the icon that's associated with your company. Replace the `ServicenowLogo.png` with your company logo and change the `AppFormIconFile` path in the registry.
AppFormTitle	Displayed name of the application.	Password Reset Windows Application
CheckCertificateRevocationList	By default, before every communication, the Password Reset Windows Application validates that the server certificate has not been revoked by checking	Default: "true" ○ **true**: When a user requests reset, the application first checks

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File name	Description	Default string
	the Certificate Revocation List (CRL). If the Password Reset Windows Application is slow to load after a user requests reset, you can choose to skip checking the CRL.	the CRL to validate the certificate. The application does not proceed without a valid certificate. ○ **false**: The application starts immediately and does not validate the certificate.
CredentialProviderGUID	GUID of the credential provider that is in use.	""="{6f45dc1e-5384-457a-bc13-2cd81b0d28ed}"
DebugFlag	Write entries in the ServiceNowPwdReset event log.	"0"
PasswordResetLinkName	Text to display for the Password Reset link on the Windows login page.	"Forgot password?"
PasswordResetLinkURL	URL of the Password Reset application on your ServiceNow instance.	https://<YourServerName>/$pwd_reset.do?sysparm_url=default
Proxy	Keys that configure proxy settings	Registry keys that begin with the text `"proxy"` enable use of a proxy server. See Configure registry keys on your proxy server.
ServiceNowCertPublicKey	By default, before every communication, the Password Reset Windows Application validates the server certificate.	Copy the certificate public key from the browser. See the example that follows the table. Paste the whole public key into the registry key text box. You can add multiple public keys in the text box (each on a new line).
ServiceNowServerVersion	Version of your production instance.	"<YourInstanceVersion>" (For example, "Kingston")
ServiceNowWinAppVersion	Version of the Password Reset Windows Application.	"<YourWindowsAppVersion>" (For example, "4.5")
UserAccountPictureLoc	Image that appears on the Login screen.	`%programdata%\Microsoft\User Account Pictures\user.bmp`
WorkingDir	Directory that holds the library files.	`C:\Program Files\ServiceNow\bin`

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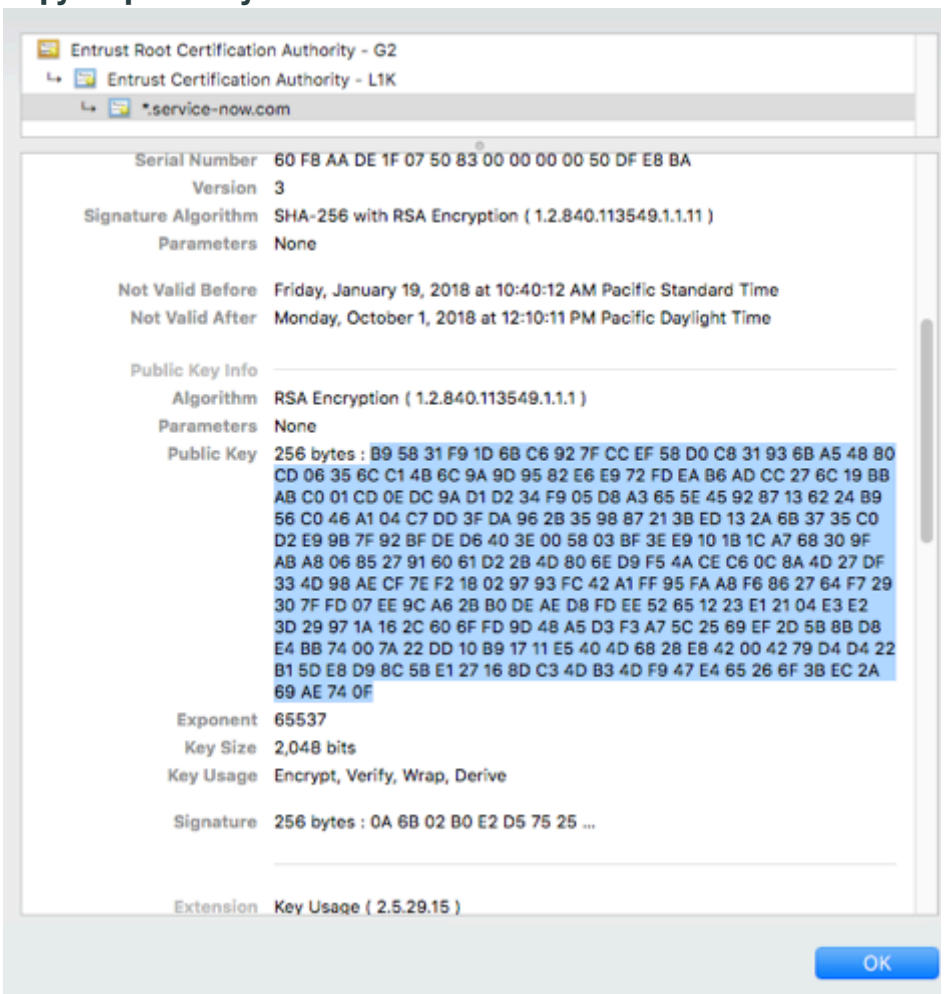
Copy the public key from the browser



Example registry settings

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\A
uthentication\Credential
 Providers\{078OAF60-65C2-4718-942D-EOC56E89EF9B}]
@="PasswordResetCredentialProvider"
"AppFormTitle"="Password Reset Windows Application"
"PasswordResetLinkName"="Forgot password?"
"CredentialProviderGUID"="{60b78e88-ead8-445c-9cfd-0b87f74ea6c
d}"
"AppFormIconFile"="C:\\Program
 Files\\ServiceNow\\bin\\servicenow.ico"
"UserAccountPictureLoc"="%programdata%\\Microsoft\\User Account
 Pictures\\user.bmp"
"DebugFlag"="0"
"CheckCertificateRevocationList"="true"
"ProxyServer"="YourServerName:PortNo"
"ProxyEnable"="false"
"ProxyUser"="YourProxyUser"
"ProxyPassword"="YourProxyPassword"
"ProxyDomainName"="YourProxyDomainName"
"ByPassProxyOnLocal"="false"
```

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```
"ServiceNowCertPublicKey"="EC 3F 18 BB D3 9A D7 8D A7 7E 99 77
 E0 E6 73 5E 38 30 3F 8C E1 8A EF 23 CC 56 D8 FD B1 54 B5 0E 54
 81 42 86 B1 D5 E4 47
"AppDir"="C:\\Program Files\\ServiceNow"
"ServiceNowServerVersion"="Kingston"
"ServiceNowWinAppVersion"="4.5"
"WorkingDir"="c:\program files\servicenow\bin"
"PasswordResetLinkURL"="https://
yourserver.service-now.com/$pwd_reset.do?sysparm_url=demo1"
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\A
uthentication\Credential
 Providers\{078OAF60-65C2-4718-942D-E0C56E89EF9B}\HideGUIDs]
```

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\A
uthentication\Credential
 Providers\{078OAF60-65C2-4718-942D-E0C56E89EF9B}]
@="PasswordResetCredentialProvider"
"AppFormTitle"="Password Reset Windows Application"
"PasswordResetLinkName"="Forgot password?"
"CredentialProviderGUID"="{60b78e88-ead8-445c-9cfd-0b87f74ea6c
d}"
"AppFormIconFile"="C:\\Program
 Files\\ServiceNow\\bin\\servicenow.ico"
"UserAccountPictureLoc"="%programdata%\\Microsoft\\User Account
 Pictures\\user.bmp"
"DebugFlag"="0"
"CheckCertificateRevocationList"="true"
"ProxyServer"="YourServerName:PortNo"
"ProxyEnable"="false"
"ProxyUser"="YourProxyUser"
"ProxyPassword"="YourProxyPassword"
"ProxyDomainName"="YourProxyDomainName"
"ByPassProxyOnLocal"="false"
"ServiceNowCertPublicKey"="EC 3F 18 BB D3 9A D7 8D A7 7E 99 77
 E0 E6 73 5E 38 30 3F 8C E1 8A EF 23 CC 56 D8 FD B1 54 B5 0E 54
 81 42 86 B1 D5 E4 47
"AppDir"="C:\\Program Files\\ServiceNow"
"ServiceNowServerVersion"="Kingston"
"ServiceNowWinAppVersion"="4.5"
"WorkingDir"="c:\program files\servicenow\bin"
"PasswordResetLinkURL"="https://
yourserver.service-now.com/$pwd_reset.do?sysparm_url=demo1"
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\A
uthentication\Credential
 Providers\{078OAF60-65C2-4718-942D-E0C56E89EF9B}\HideGUIDs]
```

Limitations of the Password Reset Windows Application

The Password Reset Windows Application has a few limitations.

- The Password Reset Windows Application doesn't support custom verifications.
- The Password Reset Windows Application uses the base-system CAPTCHA service even if the Password Reset application is configured to use Google reCAPTCHA with the web interface.
- The Password strength indicator is not supported.

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- For some verification types, you can use only one verification. Custom verifications are not supported. For more information, see Password Reset verifications.
- Custom UI macros configured on the **Process** > **Advanced** page are not supported (for example, entry, success, or failure macros). The system displays only the default success and failure messages.
- The Password Reset Windows Application supports newline characters in the **Password rule hint** text. Other formatting is not supported (bold, underline, and hyperlink). For more information, see Configure the connection to a credential store for the Password Reset processes.

Uninstall the Password Reset Windows Application

You can run either an EXE or an MSI file to uninstall the application.

Before you begin

Role required: Windows Local Administrator

Procedure

Follow either procedure.

Option	Description
Use an EXE file from the command line	**a.** Navigate to the uninstall directory that you created during installation, for example: `C:\Program Files\ServiceNow\uninstall\` **b.** Double-click the `unins000.exe` file.
Use an MSI file from the command line	**a.** Navigate to the directory that holds the `PasswordResetWinAppInstall.msi` file. **b.** Run the following command at the command line: `msiexec.exe /x PasswordResetWinAppInstall.msi /quiet`

Enrolling in the Password Reset application to reset your password

The self-service process is a typical process that you might follow to reset your password. Your experience might differ.

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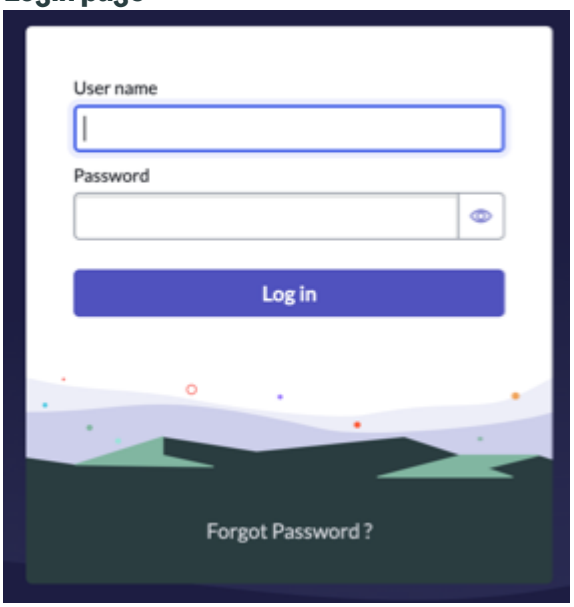
Example experience of the self-service process

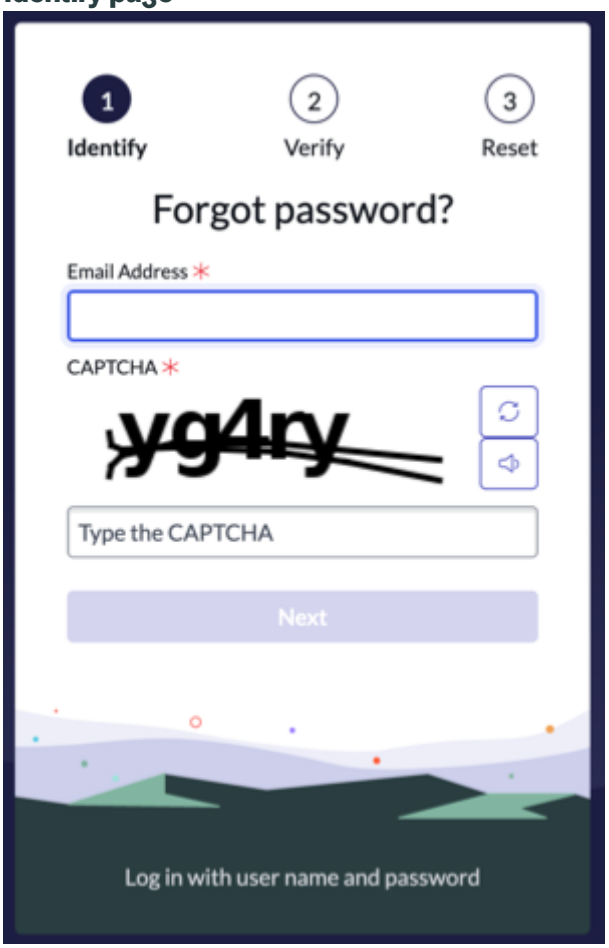
1. On the Login page, click the **Forgot Password** link to start the process.

Login page



2. On the Identify page, enter your identifying information (generally your user name or email address). The example includes the CAPTCHA security feature.

Identify page



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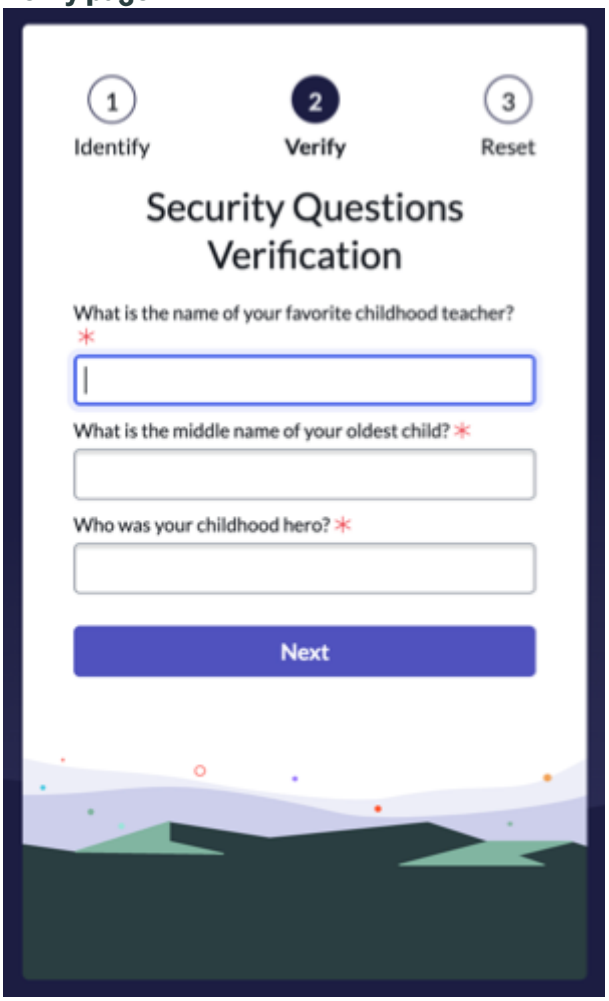
3. On the Verify page, verify your identity by providing your verification information. The admin configured the method of verification and can require multiple verifications. In the following example, the admin has configured the Security Questions verification. You must answer questions to prove your identity. (Earlier, while enrolling for the password reset process, you selected these questions and provided secure, private answers.) Other possible verifications require you to enter a code that was sent to a mobile device by SMS text, through the authenticator app, or by email.

Verify page



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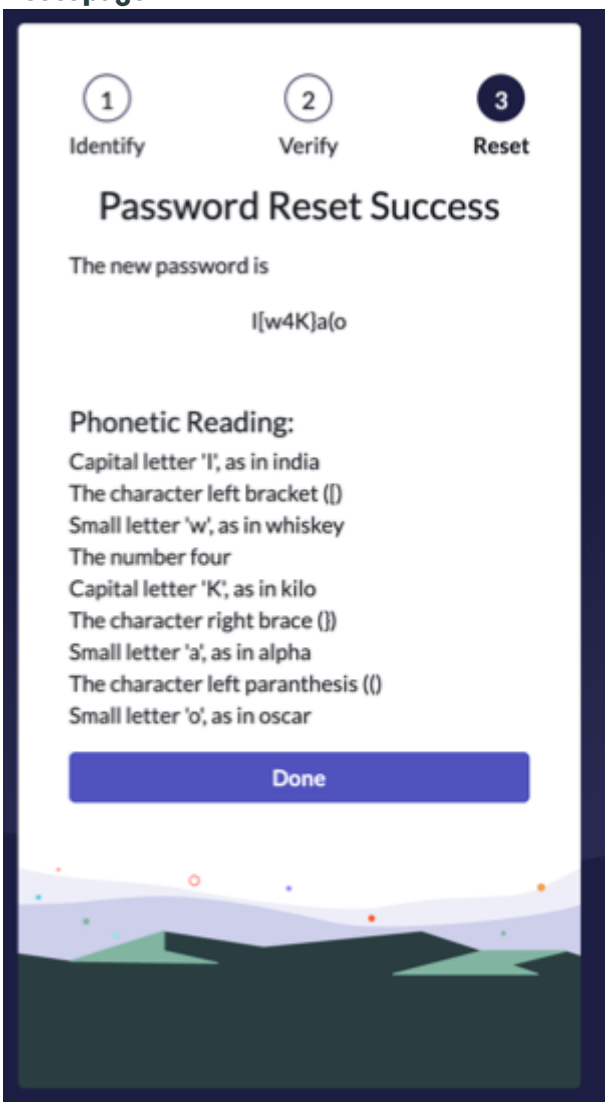
4. The system checks the credential store to verify your identity and then displays the new password on the Reset page.

Reset page



Enroll in the Password Reset program

Some organizations auto-enroll users in a Password Reset program. Your organization could offer end users the option to enroll for one or more methods of verifying your identity when resetting the password. End users can enroll for most Password Reset programs on a mobile device.

Note:
By default, the dark theme doesn't apply to the Password Reset Enrollment form. Users can change the theme to the dark theme. For more information about the dark theme, see Exploring themes in Next Experience.

End users might enroll for any combination of the following methods:

Verify your identity using an authenticator app

- You enroll on a computer that you normally use to access the instance (you use an authenticator app to reset your password, but can't use an authenticator to enroll for Password Reset Windows Application.). After you've enrolled, you install

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an authenticator app on one or more devices and then authorize the devices for authenticator verification.

- Later, when you want to reset your password, read the authenticator code on your device and then enter the code on the web page to verify your identity.

Verify your identity using an SMS code (SMS verification)

- To enroll, you authorize a mobile device for SMS verification.
- Later, when you want to reset your password, you get a code on the device and enter the code on the web page to verify your identity.

Verify your identity using an emailed code

- To enroll, you authorize one or more email addresses.
- Later, when you want to reset your password, the system sends a code to the email address. You then enter the code on the web page to verify your identity.

Verify your identity using security questions verification

- To enroll, you choose multiple questions that only you can answer (like the name of your first pet) and then supply answers. The system stores your answers securely.
- Later, when you want to reset your password, the system presents one or more of the questions. You answer the questions to verify your identity.

Enroll for the Password Reset program using an authenticator

Verify your identity while resetting your password by enrolling for the Password Reset program using a third-party authenticator app.

Before you begin

Role required: none

About this task

To verify your identity while resetting your password, you get a code from an authenticator app on your mobile device and then enter the code on the Password Reset web page.

Password Reset supports the following authenticator apps:

- Google Authenticator
- Microsoft Authenticator
- Cisco Duo
- Okta Verify

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll**.
2. Click the **Authenticator App Verification** tab.

   Note:
   If your organization requires you to enroll for the Password Reset Authenticator verification method, the tab is marked with an asterisk (*).

3. Download the authenticator app to your device.

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4. Open the app and then use the device to scan the QR code on the tab.
5. When the device generates a code, enter the code in the text box, and then click **Pair Device**.
6. Select **Submit**.
7. **Optional:** If the system displays a success message, select **Submit**.
8. **Optional:** If the system displays a failure message, enter the code again, click **Pair Device**, and then select **Submit**.

   When you submit the enrollment, the tab displays the following options:

Option	Description
Generate New QR Code	Enables you to pair a device with a new code. This option is useful if you have a new device. New data replaces the existing secure verification data.
Disable Multi-factor Authentication	Deletes existing secure verification data. The Google Authenticator verification is no longer available.

9. **Optional:** Enroll for an additional identity verification using any of the other methods that your organization offers.
   For more information about enrolling using different methods, see the following topics:
   - Enroll for the Password Reset program using questions and answers
   - Enroll for the Password Reset program using SMS codes
   - Enroll for the Password Reset program using emailed codes

Enroll for the Password Reset program using SMS codes

To verify your identity while resetting your password, you can use a code (the SMS code) that was delivered to your mobile phone or device. You can enroll on a mobile device.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll** and then click the **SMS Verification** tab.
   If your organization requires you to enroll for the SMS verification method, then the tab is marked with an asterisk (*).
2. To add and verify a device, click **Add Device** and then follow the instructions.

   Note:
   If you had previously added an SMS-enabled device to your Password Reset profile, the device is listed.

3. Provide a meaningful name for each device, and if you want to add multiple devices, then repeat the process.
4. After you verify each device, select the **Authorized** check box for each device that you expect to use to change or reset your password.

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Note:
You can deauthorize a device at any time by clearing the **Authorized** check box.

5. Select **Submit**.
6. **Optional:** Enroll for an additional identity verification using any of the other methods that your organization offers.

   (Optional) For more information about enrolling in the Password Reset program, see the following topics:

   - Enroll for the Password Reset program using questions and answers
   - Enroll for the Password Reset program using an authenticator
   - Enroll for the Password Reset program using emailed codes

Enroll for the Password Reset program using emailed codes

To verify your identity while resetting your password, you enter a code that was sent to your email address. You can enroll for this program on a mobile device.

Before you begin
Role required: none

About this task
During this enrollment process, you add the email address, the system sends you a code so you can verify the address, and then you authorize the address to be used for the Password Reset process. By default, the system sends the code to the email address that is associated with your ServiceNow profile. You can send the code to additional email addresses.

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll** and then click the **Email Verification** tab.
   If your organization requires you to enroll for the Email verification method, then the tab is marked with an asterisk (*). Email addresses that were added previously are listed on the tab.
2. Click **Add Email**, enter the email address and a meaningful email name to associate with the address and then click **Add Email**.
   Repeat the process for as many email addresses as you need.
3. On the **Email Verification** tab, for each email that should receive Password Reset codes, click **Verify**.
   The system sends an email message with a code and then displays the **Verify the Email Address** pop-up.
4. On the **Verify the Email Address** pop-up, enter the code and click **Verify**.

   Note:
   If this process fails, click **Send a New Code** to send a different code and try again.

5. After you verify each email address, select the **Authorized** check box for each address that you expect to use to change or reset your password.

   Note:
   To deauthorize an email address so that it does not receive Password Reset codes, clear the **Authorized** check box.

6. Click **Submit**.

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7. **Optional:** Enroll for an additional identity verification using any of the other methods that your organization offers.
   For more information about enrolling using different methods, see the following topics:
   - Enroll for the Password Reset program using questions and answers
   - Enroll for the Password Reset program using SMS codes
   - Enroll for the Password Reset program using an authenticator

Enroll for the Password Reset program using questions and answers

Your organization might ask you to select the questions to use when resetting your password. You select the questions and provide answers that only you know. At another time, when you reset your password, your answers verify your identity. You can enroll on a mobile device.

Before you begin
Role required: none

About this task
The list of questions is presented in the language that you requested while logging in.

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll** and then click the **QA Verification** tab.
   If you are required to enroll for the QA verification method, then the tab is marked with an asterisk (*).
2. For each **Question** field, select a question from the list and then enter the answer in the **Answer** field.
   Repeat the process until the required number of **Question** and **Answer** fields are filled in.
3. Click **Submit**.
4. **Optional:** Enroll for an extra identity verification using any of the other methods that your organization offers.
   For more information about enrolling using different methods, see the following topics:
   - Enroll for the Password Reset program using SMS codes
   - Enroll for the Password Reset program using an authenticator
   - Enroll for the Password Reset program using emailed codes

Enroll for the Password Reset program using Soft PIN

Verify your identity while resetting your password by using a Soft PIN. To use it, you must enroll for the verification using a Soft PIN.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll**.
2. Select the **Soft PIN Verification** tab.

Note:

If your organization requires you to enroll for the Soft PIN verification, then the tab is marked with an asterisk (*).

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3. In the **Enter the Soft PIN** field, enter a six-digit number of your choice.

   Make sure that you follow these rules while enrolling for the Soft PIN verification.

   - The length of the Soft PIN must be six digits.
   - The soft PIN repetition threshold is two.
   - The soft PIN sequence threshold is two.
   - You can't use your previous five Soft PINs.

   Note:
   Based on the configuration set by your admin, these rules might change.

4. Select **Submit**.
   You're enrolled for the Soft PIN verification.

Reset your password on Windows systems

If your organization uses the Password Reset Windows Application, you can reset your password directly from your Windows login screen.

Before you begin
Role required: none

Procedure

1. Start your computer or press **Ctrl**+**Alt**+**Delete** to go to the Windows login screen.
2. Click the **Forgot Password?** link.

   Note:
   Your administrator may configure different text for the link.

3. On the **Identify** page, enter the requested information and then click **Next**.
4. On the **Verify** page, enter the requested information, and then click **Next**.

   Note:
   You might be given the option to choose the method used to verify your identity.

   If your identity is verified, the **Reset** page displays whether you were successfully verified and the state of your account (either locked or unlocked).
5. Based on your locked/unlocked state, perform one of the following actions:
   - If your account is not locked, the page displays the **Reset Password** button. Enter and reenter the new password and then click **Reset Password**.
   - If your account is locked, the page displays the **Reset Password** and **Unlock Account** buttons.
     - You can enter a new password and click **Reset password** to reset the password and unlock the account.
     - If your administrator has selected **Enable account unlock** for the password process, you can unlock the account without resetting the password by clicking **Unlock account**.

Password Reset reference

Reference topics provide additional information about the lists and forms that you use to configure and administer Password Reset.

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To view reference information, check the next topics, such as Installed with Password Reset.

Installed with Password Reset

Tables, roles, business rules, scripts, and workflows are installed with the Password Reset application.

Password Reset tables

Table name	Description
Password Reset Active Answer [pwd_active_answer]	Security questions and associated answers, in an encrypted state, that users selected while going through the enrollment process.
Password Reset Active Question [pwd_active_question]	Security questions that users selected while going through the enrollment process.
Password Reset Activity Log [pwd_reset_activity]	All Password Reset requests.
Password Reset Activity Monitor [pwd_activity_monitor]	Password Reset lockout activity.
Password Reset Credential Store [pwd_cred_store]	Password Reset credential stores that are available.
Password Reset Credential Store Parameters [pwd_cred_store_param]	User-created credential store parameters.
Password Reset Credential Store Types [pwd_cred_store_type]	Password Reset credential store types that are available.
Password Reset Desktop Access Control [pwd_access_control]	Password Reset Windows Application access control.
Password Reset Desktop Access Log [pwd_access_log]	Password Reset Windows Application access logs.
Password Reset Device Enrollment Code [pwd_dvc_enrollment_code]	Device enrollment codes that were sent to users during SMS code enrollment.
Password Reset Devices [pwd_device]	User SMS devices that are in a state of verified.

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Table name	Description
Password Reset Email Verification Code [pwd_email_code]	Verification codes that were sent to users via email for password reset or email address enrollment.
Password Reset Enrollment for Verification [pwd_enrollment]	Information about user enrollment by verification.
Password Reset Enrollment Snapshot [pwd_enrollment_snapshot]	Snapshot of user enrollment by verification. This table is used for the reporting purpose. The Sync Password Reset Enrollment Snapshot Data Monthly scheduled job runs once a month to generate or sync snapshot data in this table. The data, such as sys_user creation or deletion, verification to process creation or deletion, and so on, is synchronized. Password Reset DB listener is used to create or update the data in this table which is managed by the *pwd_reset.enable.dbListener* property with default value as true. If you're an admin and want to manually sync the data in this table related to an active process, select **Sync Enrollment Snapshot Data** on that Password Reset process. You can turn off the data synchronization in this table through the DB listener or the monthly scheduled job by setting the *pwd_reset.enable.enrollment_snapshot* property to false. **Note:** Initially, an inactive record is created by the DB listener for a user-verification pair. When the users enrol themselves on the Password Reset Enrolment page, the record becomes active in this table.
Password Reset Extension Type [pwd_extension_type]	Extension types that are available.
Password Reset History [pwd_history]	History of passwords that users reset.
Password Reset Identification Type [pwd_identification_type]	Password Reset identification types that are available.
Password Reset Process	Password Reset processes that are available.

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Table name	Description
[pwd_process]	
Password Reset Process Credential Store [pwd_map_proc_to_cred_store]	Credential stores and the associated Password Reset processes that the application is using.
Password Reset Process User Group [pwd_map_proc_to_group]	Groups and the associated Password Reset processes that the application is using.
Password Reset Process Verification [pwd_map_proc_to_verification]	Verifications and the associated Password Reset processes that the application is using.
Password Reset Question [pwd_question]	Questions that the application uses for security question verifications.
Password Reset Request [pwd_reset_request]	Information about Password Reset requests.
Password Reset Request Verification [pwd_map_request_to_verification]	Password reset requests and the associated verification that the application is using.
Password Reset SMS Verification Code [pwd_sms_code]	SMS verification codes that were sent to users for a password reset.
Password Reset User Lockout [pwd_user_lockout]	Users that are locked out of Password Reset.
Password Reset Verification [pwd_verification]	Verifications that are available.
Password Reset Verification Param [pwd_verification_param]	User-created verification parameters.
Password Reset Verification Type [pwd_verification_type]	Password Reset verification types that are available.

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Password Reset roles

Role	Description
password reset administrator [password_reset_admin]	Configures and maintains Password Reset and Password Change.
service desk agent [password_reset_service_desk]	Resets passwords on behalf of users, tracks password reset requests, and views logs.
credentials manager [password_reset_credential_manager]	Determines which credential stores are valid for use with Password Reset.

Password Reset business rules

Business rule	Table	Description
Abort if password history limit exceeds	Password Reset Credential Store Parameters [pwd_cred_store_param]	Prevents setting password history limit that exceeds the value of the *password_reset.history.limit* property. You can set a password reset history value in the *password_reset.history.limit* property. This system property checks the history of previous passwords based on the specified value. By default, the value is 10. But you can set it based on your organizational needs. **Note:** Currently, this property is applicable only to the ServiceNow credential store.
Add default parameters QA verification	Password Reset Verification [pwd_verification]	If no parameters for Security Question verifications are specified, generates parameters.
Add default parameters SMS verification	Password Reset Verification [pwd_verification]	If there are no parameters specified, generates SMS code verifications parameters.
Add params personal confirm verification	Password Reset Verification [pwd_verification]	If there are no parameters specified, generates personal data confirmation verifications parameters.
Add params personal verification	Password Reset Verification [pwd_verification]	If there are no parameters specified, generates parameters for personal data verification.

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Business rule	Table	Description
Check unique verifications	Password Reset Process Verification [pwd_map_proc_to_verification]	Prevents a verification from being assigned multiple times to a specific Password Reset process.
Clear parameters for Mock verification	Password Reset Verification [pwd_verification]	Clears parameters for the Mock verification.
Deactivate process with no group	Password Reset Process User Group [pwd_map_proc_to_group]	Deactivates the process if it does not apply to all users or if the groups associated with it are removed.
Deactivate process with no min ver	Password Reset Process Verification [pwd_map_proc_to_verification]	Deactivates the process if the verifications associated with the process are less than the minimum value for the process.
Deactivate process with no verification	Password Reset Process Verification [pwd_map_proc_to_verification]	Deactivates the process if the verifications associated with it are removed.
Delete history passwords if needed	Password Reset Credential Store [pwd_cred_store]	Deletes history passwords if needed.
Enforce password history message	Password Reset Credential Store [pwd_cred_store]	Passes enforce password history related messages to the client side.
Google Auth Enabled Check	Password Reset Process [pwd_process]	Deactivates the process with Google Authenticator verification if the Google authenticator is disabled.
GoogleAuthSysPropertyCheck	Password Reset Process Verification [pwd_map_proc_to_verification]	Deactivates the process with the Google Authenticator verification if the Google authenticator is disabled.
Handle req_enroll validation/ default val	Password Reset Process Verification [pwd_map_proc_to_verification]	Handles requires_enrollment and auto_enroll values for the process.
Insert/update scheduled job for reminder	Password Reset Process [pwd_process]	Inserts/updates the scheduled job for enrollment reminder.
Order must be unique	Password Reset Desktop Access Control [pwd_access_control]	Enforces order to be unique.

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Business rule	Table	Description
Parameter Names Cannot Be Updated	Password Reset Verification Param [pwd_verification_param]	Prevents parameter name changes.
Password Reset Activity Monitor	Password Reset User Lockout [pwd_user_lockout]	Creates an event when the number of users locked out of Password Reset during a specific interval exceeds the threshold value.
Password Reset Validate Auto-generate	Password Reset Process [pwd_process]	Checks that either **Email/SMS password** or **Display password** is selected when the **Auto-generate password** check box is selected.
Personal Data Confirm Param Validation	Password Reset Verification Param [pwd_verification_param]	Checks that a column exists in the sys_user table for the parameter used in a personal data confirmation verification.
Personal Data Param Validation	Password Reset Verification Param [pwd_verification_param]	Checks that a column exists in the sys_user table for the parameter used in a personal data verification.
Prevent against deletion	Password Reset Credential Store [pwd_cred_store]	Checks whether the credential store is part of an active process before allowing deletion.
Prevent against deletion	Password Reset Identification Type [pwd_identification_type]	If an identification type is part of an active process, prevents the identification type from being deleted.
Prevent against deletion	Password Reset Verification [pwd_verification]	If the verification is part of an active process, prevents it from being deleted.
Prevent against deletion when in use	Password Reset Credential Store Types [pwd_cred_store_type]	Prevents deletion when the type is in use.
Prevent against deletion when in use	Password Reset Verification Type [pwd_verification_type]	Prevents deletion when the type is in use.
Queue event if history limit decreases	Password Reset Credential Store Parameters [pwd_cred_store_param]	Queues the pwd.credStore.history.limit.decrease event if history limit decreases.
Security Questions Param Validation	Password Reset Verification Param	Checks for valid parameters in security question verifications.

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Business rule	Table	Description
	[pwd_verification_param]	
Send SMS code	Password Reset Device Enrollment Code [pwd_dvc_enrollment_code]	Sends an enrollment code to a device.
Set new record flag	Password Reset Process [pwd_process]	Sets a new record flag for the client to take appropriate action.
Send SMS Verification Code Via Notify	Password Reset SMS Verification Code [pwd_sms_code]	Sends out SMS authentication code via Notify if the Notify plugin is active.
Single credential store per process	Password Reset Process Credential Store [pwd_map_proc_to_cred_store]	Prevents having more than one credential store per process.
SMS Code Param Validation	Password Reset Verification Param [pwd_verification_param]	Checks for valid parameters in SMS code verifications.
Update action based on access conditions	Password Reset Desktop Access Log [pwd_access_log]	Updates the “action” field of this log record based on the access control conditions.
Update proc_to_cred_store	Password Reset Process [pwd_process]	Enforces a one-to-one relation between a Password Reset process and a credential store.
Validate Process	Password Reset Process [pwd_process]	Verifies that a Password Reset process is configured correctly.
Validate Pwd Cred Store Name	Password Reset Credential Store [pwd_cred_store]	Enforces the name to be unique.
Validate Pwd Cred Store Type Name	Password Reset Credential Store Types [pwd_cred_store_type]	Enforces the name to be unique.
Validate Pwd Extension Type Name	Password Reset Extension Type [pwd_extension_type]	Enforces the name to be unique.
Validate Pwd Identification Type Name	Password Reset Identification Type [pwd_identification_type]	Enforces the name to be unique and not empty.

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Business rule	Table	Description
Validate Pwd Process Name	Password Reset Process [pwd_process]	Enforces the name to be unique.
Validate Pwd Verification Name	Password Reset Verification [pwd_verification]	Enforces the name to be unique.
Validate Pwd Verification Type Name	Password Reset Verification Type [pwd_verification_type]	Enforces the name to be unique.
Validate Security Question	Password Reset Question [pwd_question]	Validates rules for security questions such as no duplicates or empty questions.
Verify Account Lookup Script	Password Reset Credential Store [pwd_cred_store]	Checks whether the account lookup script has the correctly named function.
VerifyAutoEnroll	Password Reset Verification Type [pwd_verification_type]	Checks whether auto-enroll is selected and ensures that an enrollment check script is provided.

Password Reset UI pages

Name	Description
$pwd_reset	First page of self-service reset process (asks for user ID).
$pwd_reset_serviceDesk	First page of service desk assisted reset process (asks for user ID).
$pwd_verify	Second page of reset process (asks user to verify identity).
$pwd_new	Last page of password change process (asks for new password).
$pwd_success	Page that appears when password is reset successfully.
$pwd_error	Page that appears on error during reset process.
$pwd_confirm	For processes configured to email or SMS password reset URL: After successful verification, this page displays message about sending link to user.
$pwd_change	Page for changing password.
$pwd_change_success	Page that appears when password is changed successfully.
$pwd_change_error	Page that appears on error during password change process.
$pwd_enrollment_form_container	Enrollment page for all verifications.
$pwd_enrollment_success	Page that appears when enrollment is successful.

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Name	Description
$pwd_enroll_error	Page that appears when any error happens during enrollment.
$pwd_unlock_success	Page that appears when locked user is successfully unlocked.
$pwd_reset_downloads_ui	Page for downloading Password Reset Windows Application.

Password Reset UI macros

Name	Description
$pwd_csrf_validation	CSRF validation for Password Reset Application. If violation is detected, the page will be redirected to the error page.
$pwd_display_password	Displays a temporary password on the success page if the process is configured to auto-generate.
$pwd_enroll_email_ui and $pwd_verify_email_ui	UI for email enrollment and verification.
$pwd_enroll_google_auth_ui and $pwd_verify_google_auth_ui	UI for Google Authentication enrollment and verification.
$pwd_enroll_questions_ui	UI for question and answer security validation enrollment.
$pwd_enroll_questions_ui_js	JavaScript code that requires server-side data for security question and answer enrollment.
$pwd_enroll_sample_ui	Sample UI macro for enrollment for Mock Verification Type.
$pwd_enroll_sms_ui and $pwd_verify_sms_ui	UI for SMS enrollment and verification.
$pwd_enrollment_form_title	Jelly macro function that prints the title for the enrollment form. A verification ID is mandatory.
$pwd_error_message	UI for displaying error messages.
$pwd_process_flow	UI for indicating current stage.
$pwd_process_footer	JavaScript code to get the footer macro name.
$pwd_reset_stylesheet	JavaScript code to get the default CSS file ID.
$pwd_verify_personal_data_ui and $pwd_verify_personal_data_confirmation_ui	UI for verifying personal data and for confirming personal data.
$pwd_verify_questions_ui	UI for verifying questions.
$pwd_verify_simple_ui	Input section for a simple verification method. This field is a single input field.

UI scripts installed with Password Reset

You can create a UI script and reference the script from a UI macro or UI page by using a `<g:include_script>` Jelly tag. The following example shows

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how the *$pwd_enroll_questions_ui* UI macro can reference the *$pwd_enroll_questions_ui* script. In the example, *[UI Script Name]+".jsdbx"* is the name of the script:

```
<g:include_script src="$pwd_enroll_questions_ui.jsdbx" />
```

By referencing an external script, you can maintain separation between client JavaScript code and Jelly code, which simplifies maintenance. You can use the following installed scripts with Password Reset UI macros:

Name	Description
$pwd_csrf_common_ui_script	Common UI script for handling a Cross-site Request Forgery (CSRF).
$pwd_enroll_email_ui	JavaScript code for the $pwd_enroll_questions_ui UI macro.
$pwd_enroll_google_auth_ui	JavaScript code for the $pwd_enroll_google_auth_ui UI macro.
$pwd_enroll_questions_ui	JavaScript code for the *$pwd_enroll_questions_ui* UI macro.
$pwd_enroll_sample_ui	Included sample client JavaScript for the *$pwd_enroll_sample_ui* UI macro.
$pwd_enroll_sms_ui	SMS enrollment UI script.
$pwd_enrollment_submit_event	UI script for an enrollment submission event.
$pwd_util	Utilities for password reset UI pages and UI macros.
$pwdWfManager	Helper class to handle workflow activities and post-processing.

Password Reset workflows

The Password Reset plugin adds workflows that you can use as examples to create custom workflows for Password Reset processes.

Workflows that connect to a credential stores

Workflow	Description
Pwd Reset - AD	Connects to an AD server.
Pwd Reset - Local ServiceNow	Current (local) instance.
Pwd Reset - Master	Password Reset primary workflow.
Pwd Reset - Mock Fatal	Example workflow to use in Password Reset testing to simulate a fatal error. No retries.
Pwd Reset - Mock Non Fatal	Example workflow to use in Password Reset testing to simulate a non-fatal error.
Pwd Reset - Mock Success	Example workflow to use in Password Reset testing to simulate a successful completion.
Pwd Reset - Remote ServiceNow	Connects to a remote(SOAP) ServiceNow instance.

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Workflows that test the connection to a credential store

Workflow	Description
Pwd Connection Test - AD	Tests connection to an AD server.
Pwd Connection Test - Local SN	Tests connection to local instance.
Pwd Connection Test - Master	Master workflow to test credential store connectivity.
Pwd Connection Test - Mock Failure	Example credential store connection test that simulates a failed connection.
Pwd Connection Test - Mock Success	Example credential store connection test that simulates a successful connection.
Pwd Connection Test - Remote SN	Tests connection to a remote(SOAP) ServiceNow instance.

Workflows that determine the lock state of a user account

Workflow	Description
Pwd Get Lock State - AD	Gets a user account lock state for the AD server.
Pwd Get Lock State - Local SN	Workflow to get a user account lock state for the local instance.
Pwd Get Lock State - Master	Primary workflow to get a user account lock state.
Pwd Get Lock State - Remote SN	Gets a user account lock state for the remote(SOAP) ServiceNow instance.

Workflows that unlock a user account

Workflow	Description
Pwd Unlock Account – AD	Unlocks a user account for a local instance.
Pwd Unlock Account - Local SN	Workflow to unlock a user account for a local instance.
Pwd Unlock Account - Master	Master workflow to unlock a user account.
Pwd Unlock Account – Remote SN	Unlocks a user account for a remote(SOAP) ServiceNow instance.

Workflows that change a password

Workflow	Description
Pwd Change - Master	Password change primary workflow.
Pwd Change – Local ServiceNow	Connects to a local instance to change a password.
Pwd Change – AD	Connects to an AD server to change a password.
Pwd Change – Remote ServiceNow	Connects to a remote(SOAP) ServiceNow instance to change a password.

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Password Reset notifications

Name	Fired by event name	Description
Password Reset – Send SMS Code	pwd.send_sms_code.trigger	Sends out SMS authentication code for verification.
[K] Password Reset – Send Email Code	pwd.send_email_code.trigger	Sends out authentication code via Email for verification.
Password Reset - Enrollment Reminder	pwd.enrollment_reminder.trigger	Sends emails to remind users to enroll in the required verifications.
Password Reset - New Password Confirmation	pwd.email.trigger	For the Email/SMS Password process, sends an email or SMS (if configured) that includes the new password.
Password Reset - Send Verify Code	pwd.send_verify_code.trigger	Sends authentication code to users using email or SMS for password reset or enrollment. **Note:** If the Notify plugin is active, SMS code is sent via Twilio instead of ServiceNow Notification.
Password Reset URL	password.reset.url	For the Email/SMS Password Reset URL process: Sends email or SMS (if configured) that includes a link to the password reset URL. **Note:** Check the following items if the instance does not send the email notification to the user: • Check the System Event [sys_event] table to see if the email was sent. • Verify that the user is subscribed to the notification. • Verify that the Default Self Service password reset process and password reset properties are configured correctly.

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SOAP messages for Password Reset

SOAP Message	Description
Change Password	When the Orchestration Add-on plugin is active, the system can use the SOAP protocol to change passwords on remote credential stores such as a remote ServiceNow instance.
Password Reset Request	When the Orchestration Add-on plugin is active, the system can use the SOAP protocol to reset passwords on remote credential stores such as a remote ServiceNow instance.

REST API

- Name: Pwd Reset
- API ID: pwd_reset
- Base API path: /api/now/pwd_reset

Resources (Version v1)

Name	Resource path	API Version	Description
pwd_init	/api/now/v1/pwd_reset/init	v1	Initial request to establish session, write logs, and fetch UI messages.
pwd_identify	/api/now/v1/pwd_reset/identify	v1	Get identification page components.
pwd_verify	/api/now/v1/pwd_reset/verify	v1	Get verification page components.
pwd_new	/api/now/v1/pwd_reset/reset	v1	Get resetting password page components.
pwd_success	/api/now/v1/pwd_reset/success	v1	Get success page components.
pwd_failure	/api/now/v1/pwd_reset/failure	v1	Get failure page components.

Resources (Version v2)

Name	Resource path	API Version	Description
pwd_init	/api/now/v2/pwd_reset/init	v2	Initial request to establish session, write logs, and fetch UI messages.
pwd_identify	/api/now/v2/pwd_reset/identify	v2	Get identification page components.
pwd_verify	/api/now/v2/pwd_reset/verify	v2	Get verification page components.

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Resources (Version v2) (continued)

Name	Resource path	API Version	Description
pwd_new	/api/now/v2/pwd_reset/reset	v2	Get reset password page components.
pwd_success	/api/now/v2/pwd_reset/success	v2	Get success page components.
pwd_failure	/api/now/v2/pwd_reset/failure	v2	Get failure page components.

Domain separation and the Password Reset application

Domain separation is supported in the Password Reset application. A password reset process that you define in any domain is isolated from a process that you create in any other domain. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

How domain separation works in Password Reset

Domain separation for Password Reset is applied at the process level. The admin configures the following elements to define a password reset process: A connection to a credential store, user groups that can use the process, method of identification, and verifications to use during the process.

- A connection to the credential store where user credentials (like username/password) are securely stored. Each connection inherits the domain setting from a template called a connection type. Each connection type is tied to a domain (the connection type record has a domain field). There are uniqueness constraints on connection names within a domain.
- One or more user groups on the ServiceNow instance that can use the password reset process. User accounts are members of one or more domains — they use the standard ServiceNow domain separation. When a user enrolls to use one of the password reset processes that is configured for the organization, the user is allowed to choose only from the processes in the user's domain.
- The identification — the method that the end user employs to claim identity for the public password reset or password change process. Each identification inherits the domain setting

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from a template called an identification type. Each identification type is tied to a domain (the identification type record has a domain field). There are uniqueness constraints on identification names within a domain.

- One or more verifications — methods to verify the identity of the person who is attempting to reset the password. Each verification inherits the domain setting from a template called a verification type. Each verification type is tied to a domain (the verification type record has a domain field). There are uniqueness constraints on verification names within a domain.
- All Password Reset tables have a domain column.
- Password Reset process tables include a *sys_overrides* column on business rules, UI actions, and so on.
- The Password Reset application is built using Orchestration. Orchestration supports "Data only" domain separation — the data security model of separating visibility of data from one domain to another.

Password Change process

The Password Change application extends the Password Reset application by letting admins define how users change their passwords. A service desk-assisted process is not supported. An admin must publish the URL for the self-service password change form.

The Password Change application enables an end user to change a password over the Internet using a browser on any supported interface, including mobile devices. The end user can select from any configured process in the end user's domain (or child domain of an end user's domain).

A password change process uses the same elements as a password reset process (connections, user groups, identifications, and verifications), with the same domain-separation features.

Related topics

Domain separation for service providers

Password Reset Process form

Description of the fields on the Password Reset Process form.

Fields in the Process Strength Configuration section on the Password Reset Process form

Field	Description
Security score	View the security score in digits. As the security score changes, the color of the field changes. The following are three ranges of the security score: • 0 to 40: The color is red and the security is low. • 40 to 75: The color is orange and the security is medium. • 76 to 100: The color is green and the security is high.
Enable security score notification	Send security score notifications to process owners. If this field is selected, a weekly scheduled job sends emails containing the security score for all the active public processes. **Note:** The email notifications aren't sent for the service-desk processes and the processes for which only Change Password is configured.

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Fields in the Process Strength Configuration section on the Password Reset Process form (continued)

Field	Description
Process owner	Designate one or more users as owners for the process you're creating. You can add only the users with the password reset admin role to this field. If you select **Enable security score notification**, the Process owner field becomes a required field.

Note:
The Process Strength Configuration section is displayed only when you select the **Public access** check box in the Password Reset Details tab.

Description of the fields on the Password Reset Details tab

Field	Value
Public access	The check box is available only when **Password reset** is selected. • Select the check box to enable a self-service process with public user access to the Password Reset or Password Change form through a URL. • Clear the check box to define a Service desk-assisted process in which only service desk agents can reset a password at the request of a user.
Public URL	The field is available only when **Public access** is selected. URL of the page where users go to reset or change the password. The value from the URL suffix field is appended to the URL when you tab out of the URL suffix field. For the Default self-service Password Reset process, this value must be `/$pwd_reset.do?sysparm_url=ss_default`.
URL suffix	The field is available only when **Public access** is selected. Suffix used to create a unique URL for the Password Reset or Password Change form.
Display CAPTCHA	The check box is available only when **Public access** is selected. Select the check box to display a CAPTCHA on the user identification page. The Password Reset application uses Google reCAPTCHA as the default CAPTCHA service. See Configure Google reCAPTCHA for the password reset process. **Note:** The Password Reset Windows Application uses the base-system CAPTCHA service even if the Password Reset application is configured to use Google reCAPTCHA. Because on-premises instances do not have access to the internet, the instances cannot use the Google reCAPTCHA service. Set the

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Description of the fields on the Password Reset Details tab (continued)

Field	Value
	password_reset.captcha.google.enabled system property to **false** for on-premises instances. To use the base system CAPTCHA, change the *password_reset.captcha.google.enabled* system property to false.
Identification type	Method that the user employs to claim identity for the public Password Reset or Password Change process. Any selection overrides the default identification that is associated with the process. The base system includes the Email and Username Identification identification types. You can create a custom identification type (some knowledge of JavaScript is recommended). See Personal data identification types and confirmation type verifications.
Redirect URL	URL to go to after a successfully resetting a password — typically, the URL of the original login page. Enter a complete path, including the protocol (for example, https://myDomain.myURL.com). If the path is under the same domain as the **Public URL**, then start the path with the / character.
Minimum verifications	Number of verifications that a user must successfully submit to reset the password. If the number exceeds the number of required verifications, then the user must submit enough additional optional verifications to meet the number specified for **Minimum verifications**. **Note:** Each user must submit all mandatory verifications regardless of the number specified. By default, during the password reset process, the system presents optional verifications to the user based on the **Order** values for the verifications. If you selected **Allow user to choose from optional verifications**, then the Verification page presents all optional verifications to the user. The user then selects the appropriate number of verifications. In this example, the **Minimum verifications** value is 1. Because no mandatory verifications are configured, the user can choose an optional verification. Also, see **Allow user to choose from optional verifications**.
Allow user to choose from optional verifications	Select the check box to enable a user, on the Verifications page during the process of resetting the password, to select which optional verifications to use. The choice of optional verifications appears only if the **Minimum verifications** setting is greater than the number of mandatory verifications. The number that you specify for **Minimum verifications** determines how many optional verifications that the user is allowed to select.

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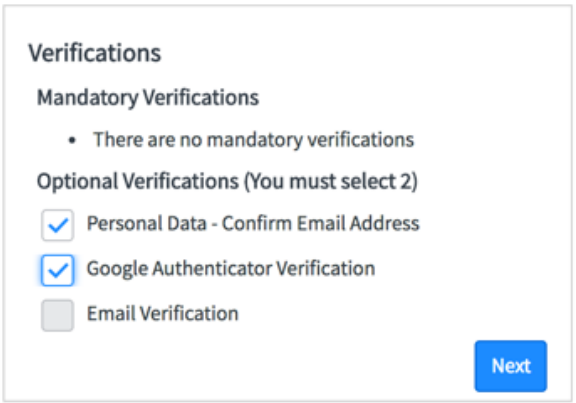
Description of the fields on the Password Reset Details tab (continued)

Field	Value
	In the example, the **Minimum verifications** setting is **2** and there are no mandatory verifications. The user has selected two optional verifications, so cannot select a third verification. 
Email/SMS Password Reset URL	Select the check box to enable users to reset the password by clicking a link in an email that the instance sends to them. This is the secured method of resetting a password. If configured, the instance also sends the URL to the users through SMS on mobile devices. By default, the self-service Password Reset processes enable this option. When you select this option, the **Auto-generate password** check box is not available. See Example: The default self-service Password Reset process for an outline of the process that is enabled by default. If you don't select the **Email/SMS Password Reset URL** option and try to save the record, you get a message that suggests you select the verification options to configure with secure verification. You can't set the QA verification as the only verification for this process as the process becomes less secure. You must either enable the **Email/SMS Password Reset URL** option or configure this process with multi-factor authentication. Also, you can't configure the process only with personal data and QA verifications. You must configure any other verification along with these two. If you still don't select the **Email/SMS Password Reset URL** option with a weak security verification configuration, it might allow unauthenticated users to reset any user's password using any user ID or email address.
Enable account unlock	This check box is available only when **Password reset** is selected. Select the check box to allow user accounts on credential stores to be unlocked without resetting the password. **Note:** Not supported by the default self-service Password Reset process.
Unlock user account	Select the check box to unlock user accounts on credential stores after a password reset.

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Description of the fields on the Password Reset Details tab (continued)

Field	Value
Auto-generate password	Select the check box to auto-generate a new password for the user. When this check box is selected, you must select the **Email/SMS password** or **Display password** check box, or both. This setting is useful for Service Desk assisted processes. This check box is available only when: • The **Password reset** check box is selected. • The **Email/SMS Password Reset URL** check box is cleared. **Note:** If you use the credential store on your local ServiceNow instance or an Active Directory credential store: Clear the check box to enable the **Enforce history policy** option for a credential store. See Configure the connection to a credential store for the Password Reset processes.
User must reset password	This check box is available only when **Auto-generate password** is selected. Select the check box to require users to reset their password immediately after logging in with the auto-generated password. **Note:** Users whose credentials are held in the local ServiceNow instance credential store are prompted to change their password the first time that they log in. Users whose credentials are held in an Active Directory credential store are not prompted to change their passwords in the instance. Such users must change their passwords from a computer on the domain.
Display password	This check box is available only when **Auto-generate password** is selected. Select the check box to display the new password on the screen. In a self-service process, the password appears on the user screen. In a service desk-assisted process, the password appears on the service desk agent screen.
Email/SMS password	This check box is available only when **Auto-generate password** is selected. Select the check box to email or SMS the new password to the user. The setting is useful in both self-service and Service Desk assisted processes. The setting can add a layer of security by requiring that users access their email or SMS to view the password. In a Service Desk assisted process, sending password through email or SMS to users ensures that only the user requesting the password reset can view the password.

Related lists on the Password Reset Details tab

List	Description
Verifications	One or more verifications that the Password Reset process uses. See Password Reset verifications.

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Related lists on the Password Reset Details tab (continued)

List	Description
	The Verifications related list is available only after the record has been saved.
Groups	ServiceNow user groups to associate with the Password Reset process. The Groups related list is available only after the record has been saved and if the **Apply to all users** check box is cleared.

Description of the fields on the Advanced tab

Field	Description
Entry UI macro	UI macro that displays a customized message to users when they access the initial Password Reset screen.
Success UI macro	UI macro that displays a customized message to users on the final Password Reset screen when their password is successfully reset.
Failure UI macro	UI macro that displays a customized message to users on the final Password Reset screen when their password reset fails.
Post reset script	Script include that performs actions after the Password Reset process completes whether the outcome is success or failure. For more information on customizing post processor scripts, see the **Post reset** script category as described in Password Reset extension script categories.
Header UI macro or Footer UI macro	Macros that add a header or footer to customize the appearance of the pages that end users work in while resetting a password (the Identify, Verify, and Reset pages. See Add a custom header or footer to the user pages for Password Reset.

Related topics

Configure your Password Reset process

Password Expiration Configuration form

Description of the fields on the Password Expiration Configuration form.

Password Expiration Configuration form

Field	Description
Days password is valid	The number of days that you want a password to be set as valid. The default value is **90**.
Days prior to start reminders	The number of days required to send notifications before password expiration. For example, if you set it to 5 days, a notification is sent 5 days prior to password expiration. The default value is **10**.

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Password Expiration Configuration form (continued)

Field	Description
Schedule Frequency	Frequency to send reminders, such as daily or periodically. The default value is **Daily**. If you select **Periodically**, then notifications are sent based on the period, for example, alternate days or once in three days.
Time zone	The time zone to send reminders.
Time	The time when you want reminder notifications to be sent.
Repeat Interval	The days and the time that you want to use to send reminders with a specific interval. For example, when you enter 2 days and time, the notification is sent alternate days on the time you specified. This field appears only when **Periodically** is selected from the **Schedule Frequency** field.
Start time	The time when you want a notification reminder to be started.

Related topics

Password Expiration Configuration form

System properties for password expiration

You can configure the system properties that support operations in password expiration.

To navigate to the system properties, you can select **All** and then enter *`sys_properties.list`* in the navigation filter.

Properties for password expiration

Property	Description
pwd_reset.enable.password_expiration_reminder	Use this property to enable or turn off a password expiration feature. By default, the value of this property is **false**, which means that password expiration is turned off by default.
pwd_reset.enable.dbListener	Use this property to enable or turn off the password reset DB listener (to raise events). The default value is **true**, which means that the property is enabled by default.

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Properties for password expiration (continued)

Property	Description
	Note: If this property is enabled, the password expiration records are managed automatically while inserting or deleting user data. While importing bulk data, for each sys_user or sys_user_grmember insertion or deletion, password expiration records are inserted or updated for each password reset process that users are entitled to. Even if updating the expiration data is an asynchronous activity, this activity might impact the performance, if the number of users is high. In that case, disable the *pwd_reset.enable.dbListener* property by setting it to **false** so that there is not an event on insertion or deletion of sys_user or sys_user_grmember.
pwd_reset.password_expiration.error_count	Number of maximum attempts (if there is failure) while retrieving the expiration details from the external credential store for a user. The default value is **5**. The expiration record is deactivated if the error count exceeds the value of this property. This property is not available by default. To use the property, you must create it.
pwd_reset.refresh_expiration_data.duration	Duration, in days, to refresh the expiration details for a user whose password never expires. The default value is **30 days**. This property is not available by default. To use the property, you must create it.

Related topics

Configure password expiration reminder

Password Reset Credential Store form

Description of the fields on the Password Reset Credential Store form.

Type	Type of credential store that you are connecting to. A ServiceNow credential store type is a template that provides the required set of capabilities for a particular kind of credential store. Credential stores inherit the functionality of the credential store type.

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> **Note:**
> For an AD credential store, skip this procedure and see Integrate Password Reset with your Active Directory service. The Password Reset Windows Application supports only AD credential stores.

Auto generate password	Script include that generates a temporary password for use during the reset process. If you select the **Enforce history policy** check box, then you must specify a value for **Auto-generate password** that is compliant with the password policy.
Enforce history policy	Appears only if you select a credential store **Type** of **AD Credential Store** or **Local ServiceNow Instance**. For information on configuring the setting for an AD credential store, see Configure the connection to an AD credential store. Select the **Enforce history policy** check box to ensure that users do not reuse passwords. For example, you might configure the history policy to not allow the user to reuse any of the previous 10 passwords. Follow this procedure: **1.** Select the **Enforce history policy** check box. **2.** In the Password Reset Credential Store Parameters related list, create a *password_history_limit* parameter. **3.** Set the value of the parameter to the number of previous passwords that cannot be used (maximum **10**). The default value of 0 (zero) enables use of any previous password.
Child Alias	Child aliases are associated with the base alias. After creating a connection and credential alias, you can create a child alias to configure multiple connections for a password reset credential store. When a password reset request is made, the flow checks whether there are child alias connections at the process level. If the child alias is configured at the credential store level, the flow picks the aliases connections and proceeds with the request.
Enable password policy	See Enable password policies on your instance
Password policy	You can use the default policy or define your own.
Hostname	URL or IP address of the credential store.
User account lookup	Script include that maps the user ServiceNow platform ID to the user credential store ID. A default script, *PwdDefaultUserAccountLookup*, returns the user ServiceNow platform user name.
Password rule hint	Specify the text that appears on the password reset page to help the user to create a password that meets all requirements. The **Password rule** script enforces the requirements. **Note:** The Password Reset Windows Application supports newline characters in the hint. Other formatting is not supported (bold, underline, hyperlink, and so on).
Password rule	Specify the client script that validates the new password that the user enters. The script is invoked when the user enters a new password and clicks

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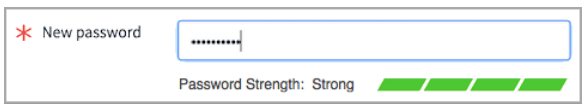
	Password Reset. You can use the script to enforce password strength/ complexity requirements.
Enable Password Strength	Select the check box to: • Display the text box for the **Strength rule** script so you can update the script. • Display the graphical **Password Strength** bar to the user while the user changes or resets the password. **Note:** The Password Reset Windows Application does not support Password Strength.
Strength rule	This text box appears only if you select **Enable Password Strength**. Specify the client script that calculates the strength/complexity of the password that the user enters. The script is invoked when the user begins to enter a new password during the reset process. Default settings: • Selected for local ServiceNow credential stores • Not selected for other credential stores **Note:** • To guide the user during the reset process, the system displays a graphical bar labeled **Password Strength** under the **New password** field.  • The Password Reset Windows Application does not support Password Strength.

Related topics

Configure the connection to a credential store for the Password Reset processes

Password Reset global properties

You can configure the Password Reset global properties.

Password Reset properties

Property Label	Property Name	Description
Password Reset Global Properties		
Email template for enrollment reminder emails	password_reset.enroll _reminder.email_template	The instance can send email reminders to users who are not yet enrolled in the Password Reset process.

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Password Reset properties (continued)

Property Label	Property Name	Description
		Template to use for the email messages that remind users to enroll for the password reset process. See Send email to remind users to enroll for Password Reset.
Workflow polling frequency	password_reset.wf.refresh_rate	Time period in milliseconds between checks on status of the Password Reset workflow. • Type: integer • Default value: 500
Workflow expiration	password_reset.wf.timeout	Maximum wait time in milliseconds for the workflow to complete. The workflow is triggered during the password reset request when the user clicks **Submit**. • Type: integer • Default value: 90000
Disable CAPTCHA validation functionality	password_reset.captcha.ignore	Enables or disables CAPTCHA functionality. • Type: true|false • Default value: false The Password Reset application uses Google re-CAPTCHA as the default CAPTCHA service. To use the base system CAPTCHA, change the *password_reset.captcha.google.* system property to *false*. See Configure Google reCAPTCHA
Password Reset Request Properties		
Number of unsuccessful attempts allowed to resetting/ changing password	password_reset.request.max_attempt	Number of password reset attempts a user is allowed before they are locked out for a period determined by the value in *max_attempt_window*.

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Password Reset properties (continued)

Property Label	Property Name	Description
		• Type: integer • Default value: 3 (attempts)
Number of minutes a user needs to wait for resetting/ changing password after exceeding the maximum allowed unsuccessful attempts	password_reset.request.max_attempt_window	Time period that users are blocked or prevented from changing their passwords after trying the maximum number of times. • Type: integer • Default value: 1440 (minutes)
Number of minutes a user needs to wait to reset/change password after the last successful reset/ change	password_reset.request.success_window	Time period that a user must wait after successfully resetting the password to reset the password again. • Type: integer • Default value: 1440 (minutes)
Number of minutes a user needs to wait to start a reset request after the last successful unlock account.	password_reset.request.unlock_window	Time period that a user must wait after a successful unlock operation before starting a new request. • Type: integer • Default value: 1440 (minutes)
Number of minutes before a password reset request expires	password_reset.request.expiry	Time period during which a user must perform the Password Reset process. • Type: integer • Default value: 10 (minutes)
Number of hours before the password reset one time token validity expires	glide.pwd_reset.onetime.token.validity	Time period during which a user must perform the Password Reset process using the email link. • Type: integer • Default value: 12 (hours)

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Password Reset properties (continued)

Property Label	Property Name	Description
		Note: The setting for the `glide.pwd_reset.onetime.tok` property takes precedence over the setting for `password_reset.request.expi` when the **Email Password Reset URL** check box on the process record is selected.
Maximum number of times that a user can receive "Reset Password" link via email, in a span of 24 hours. The upper limit is 5.	password_reset.request.max_email	Maximum number of times a user can receive emails containing a link for resetting a password in a duration of 24 hours. For example, when you set the maximum number to 3, users would receive 3 emails in the duration of 24 hours. The maximum number you can set is 5.
Password Reset Security Question Properties		
Number of security questions required during the password reset request	password_reset.qa.num_reset	Number of security questions that are displayed on the Verify page while a user is attempting to reset the password. The user must answer all questions correctly to verify identity. The questions are selected at random and are presented in random order. • Type: integer • Default value: 3 (questions) • Possible values: Integers that are less than the number specified for the **Number of security questions required during enrollment** property (the *num_enroll* parameter).

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Password Reset properties (continued)

Property Label	Property Name	Description
		Note: You can override this property setting for a Password Reset process by configuring the *num_reset* parameter. See Specify the number of required security questions.
Number of security questions required during enrollment	password_reset.qa.num_enroll	Number of questions that a user must provide answers to while enrolling for the Password Reset process. • Type: integer • Default value: 5 • Possible values: Integers that are greater than or equal to the number specified for the **Number of security questions required during enrollment** property (the *num_reset* parameter).

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Password Reset properties (continued)

Property Label	Property Name	Description
		Note: • While attempting to verify identity, if a user answers a question incorrectly, the application refreshes with a random set of the specified questions in random order. You should, therefore, require more questions than specified for the **Number of security questions required during enrollment** property (the *num_reset* parameter). • You can override this property setting for a Password Reset process by configuring the *num_enroll* parameter. See Specify the number of required security questions.
Minimum length requirement for security answers	password_reset.qa.ans_min_len	Minimum number of alphanumeric characters that the user must enter in the answer text box for any security question. Default value: 3 characters
Password Reset SMS Code Properties		
Maximum number of SMS codes sent for verification per day	password_reset.sms.max_per_day	Maximum number of SMS codes that are sent to a user within one 24-hour period. The 24-hour period begins when a user clicks **Send Code**.

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Password Reset properties (continued)

Property Label	Property Name	Description
		• Type: integer • Default value: 10 (per day) **Note:** You can override this SMS code property by adding the *max_per_day* parameter in the SMS code verification.
Number of minutes before the user can attempt to send another SMS code for verification	password_reset.sms.pause_window	Time that must pass before another SMS code can be sent to a user. • Type: integer • Default value: 2 (minutes) **Note:** You can override this SMS code property by adding the *pause_window* parameter in the SMS code verification.
Number of digits in the SMS code sent to the user	password_reset.sms.default_complexity	Number of characters required for a user to reset their password. • Type: integer • Default value: 4 (digits) You can override this SMS code property by adding the *complexity* parameter in the SMS code verification.
Number of minutes before the SMS code expires	password_reset.sms.expiry	Time, in minutes, until the SMS code sent to the user expires. • Type: integer • Default value: 5 (minutes)

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Password Reset properties (continued)

Property Label	Property Name	Description
		Note: You can override this SMS code property by the *expiry* parameter in the SMS code verification.
Use Notify for SMS code notification for enrollment and verification	password_reset.sms.use_notify	Support for SMS channel used for notifying users for password reset enrollment and verification. If selected, the users would receive notifications through Notify. • Type: Yes|No • Default value: Yes **Note:** To use Notify, you must activate the Notify plugin (com.snc.notify).
Password Reset Soft PIN Properties		
Enable Soft PIN expiration	password_reset.softpin.expiration_enabled	Enables or turns off Soft PIN expiration for users. • Type: Yes|No • Default value: Yes Use this property when you want to let users know that their Soft PIN is expiring. You can enable sending reminders for Soft PIN expiration. If the users are resetting Soft PIN using the Virtual Agent,they view the corresponding messages with the number of days when the Soft PIN is going to expire.
The number of days after which the Soft PIN expires	password_reset.softpin.expiration_day	Number of days after which the Soft PIN expires. For example, if you set the number to 90, the Soft PIN

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Password Reset properties (continued)

Property Label	Property Name	Description
		will expire after 90 days are completed. The minimum limit is 30 days. Default value: 90
Enable Soft PIN expiration reminder	password_reset.softpin.expiration_reminder_enabled	Enables or turns off the Soft PIN expiration reminders. If selected, the users will not get any email notifications stating that their Soft PIN is expiring. • Type: Yes|No • Default value: Yes
The time at which the Soft PIN expiration reminder is sent. Format: HH:MM	password_reset.softpin.expiration_reminder_time	The time at which you want the users to receive the reminders. You must enter the value in the HH:MM format. Default value is 00:00 at system time zone.
The number of days that specify when to send a reminder before the Soft PIN expires	password_reset.softpin.expiration_reminder_warn_days	Number of days that specify when to send a reminder before the Soft PIN expires. For example, if you set the value to 5, users would get the reminder 5 days before their Soft PIN expires. Default value: 10
The number that sets a history limit on reusing previously used Soft PINs for the enrollment. Use any value from 1 to 30	password_reset.softpin.history_limit	Number of previous Soft PINs which can’t be reused for the enrollment. For example,if you set the number to 3, the users won't be able to use the same Soft PIN that's used in the previous 3 Soft PINs. You must use the number between 1 and 30. Default value: 5

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Password Reset properties (continued)

Property Label	Property Name	Description
Password Reset Monitoring and Reporting Properties		
Time interval, in minutes, for counting blocked users	password_reset.activity_monitor.incident_window	Time window to count the number of blocked users. • Type: integer • Default value: 60 (minutes)
Number of blocked users, in the defined time interval, that triggers a system log event	password_reset.activity_monitor.incident_threshold	Number of blocked (or locked) users, within the specified time window, that triggers a system log event. • Type: integer • Default value: 10 (blocked users)
Password Reset Style Sheet		
Style sheet to apply to end-user pages during the password reset process.	password_reset.stylesheet	Name of a custom CSS style sheet in the Style Sheet [content_css] table. You can use the default style sheet as a template for the custom style sheet. You cannot add element definitions to the style sheet. • Type: string • Default value: **css_pwd_reset_default**

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Note:
Several components in the Self Service Password Reset (`com.snc.password_reset`) plugin and the Password Reset (`com.glideapp.password_reset`) plugin control the password reset flow. The following properties affect Password Reset, but do not appear on the **Password Reset** > **Properties** page:

You can add the `glide.pwd_reset.onetime.token.validity` property to the System Properties [sys_properties] table to specify the number of hours that the Password Reset token should be valid. Default: 12.

Note:
The setting for the `glide.pwd_reset.onetime.token.validity` property takes precedence over the setting for `password_reset.request.expiry` when the **Email Password Reset URL** checkbox on the process record is selected.

Properties accessible from the System Properties [sys_properties] table:

- For Password Reset on mobile devices, you can specify the URL that the user is taken to when user taps the **Forgot password?** button. See the `glide.security.password_reset.uri` property in High Security Settings . Default: */$pwd_reset.do?sysparm_url=ss_default*
- If `glide.security.forgot_password.display.link` is set to **true**, displays the **Forgot Password?** link on the login page.

Related topics

Configuring Password Reset properties

Verification types in the base system

Use a verification type in the base system as a template to design a custom verification.

Verification types in the base system

Verification type	Description
Personal Data Confirmation	Verifies user identity using data from the User [sys_user] table. The user data is displayed to a service desk agent. The agent verifies the data. Enrollment is not required for this type. Recommended for service desk-assisted processes. **Note:** The Password Reset Windows Application does not support the Personal Data Confirmation Verification type. See Personal data identification types and confirmation type verifications.
Personal Data	Verifies user identity using data from the User [sys_user] table. The user is required to answer questions. Enrollment is not required for this type. **Note:** The Password Reset Windows Application allows you to define and use multiple verifications of the Personal Data type.

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Verification types in the base system (continued)

Verification type	Description
	See Personal data identification types and confirmation type verifications.
Email Code	When a user requests password reset, the system sends a verification code to the email address in the user profile or to an email address that the user authorized during enrollment. To verify identity, the user then submits the code on the Password Reset **Verify** page. **Note:** The Password Reset Windows Application allows you to define and use multiple verifications of the Email Code type. See Personal data identification types and confirmation type verifications.
Google Authenticator	While requesting password reset, the user reads a code from the Google Authenticator app on a device that the user has paired. To verify identity, the user then submits the code on the Password Reset **Verify** page. **Note:** The Password Reset and Password Reset Windows Application support only a single verification of the SMS Code type.
Security Questions	Verifies user identity by presenting personal security questions that the user must answer correctly. **Note:** The Password Reset and Password Reset Windows Application support only a single verification of the Security Questions type. See Add a custom question to the Security Questions verification.
SMS Code	When a user requests password reset, the system sends a code to an SMS-capable device that the user has authorized. To verify identity, the user then enters the code on the Password Reset web page. **Note:** The Password Reset and Password Reset Windows Application support only a single verification of the SMS Code type. See SMS Code Verification type for Password Reset.
Mock	Not a functional identity verification. Demonstrates how to add a verification type in a Password Reset process. **Note:** The Password Reset Windows Application does not support the Mock verification type.

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Verification types in the base system (continued)

Verification type	Description
	• The enrollment UI macro for this verification gets the user input and returns the entered value in the enrollment processor. • The Password Reset UI macro for this verification gets input from the user and returns the entered value through the verification processor.

Related topics

Create a custom Password Reset verification

Create a custom Password Reset verification type

Password Reset Verification Type form

Description of the fields on the Password Reset Verification Type form.

Field	Description
Enrollment check	Script that determines whether a user is enrolled for verification. Automatic enrollment requires an enrollment check. If no script is specified when **Automatic Enrollment** is selected, a default script is provided.
Automatic enrollment	Select the check box to auto-enroll users. If **Automatic enrollment** is not selected, then you must provide an enrollment UI macro and enrollment processor script. For SMS and email verification, if the **Automatic enrollment** check box is selected and the user's mobile number and email address already appear in the sys_user table record, the user is enrolled for the corresponding verification. If the user's mobile number and email address aren't mentioned in the sys_user table, the user is not enrolled. **Note:** If the **Automatic enrollment** check box isn't selected, then even if the user's mobile number and email address appear in the sys_user table record, the user is not enrolled. The user must enroll manually by using the password reset enrollment process.
Enrollment UI	Enrollment UI macro that provides the UI for the enrollment.
Enrollment processor	Enrollment processor script that processes the enrollment.
Verification UI	Verification UI macro that provides the UI for the verification.
Verification processor	Verification processor script (extension scripts) that processes the verification.

Related topics

Create a custom Password Reset verification type

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Password Reset Verification form

Description of the fields on the Password Reset Verification form.

Field	Description
Type	Create verifications based on one of the verification types in the base system. Password Reset supports the following types. You can create multiple instances of any type. • Personal Data Confirmation Verification • Personal Data Verification • Security Question Verification • SMS Code Verification The Password Reset Windows Application supports the following types: • Personal Data Verification. You can create only a single instance. • Security Question Verification. You can create multiple instances. • SMS Code Verification. You can create only a single instance.
Order	Position of the verification as it appears on the Enrollment form and Password Reset form.
Password Reset Verification Parameters	Parameters used by a verification to configure specific behaviors, like number of questions required to enroll, request expiration time, and columns used. Set parameters for any behavior that should be different from the value that is specified in the Password Reset properties. The available parameters are described separately for each verification type.

Related topics

Create a custom Password Reset verification

Password Reset script includes

The Password Reset plugin installs script includes that implement password reset processes. To enable you to extend functionality, each base-system script include provides extension points that you can use to invoke "extension scripts" that you customized.

The extension script category refers to the specific types of behavior for an extension script (for example, credential store, verification, identification type, or as a post-processor).

'Enrollment check' script includes

All enrollment check script includes take the following parameters and return a boolean indicating whether the user is enrolled for Password Reset.

- `params.userId`: The sys_id of the user being checked (table: [sys_user]).
- `params.verificationId`: The sys_id of the verification being checked (table: [pwd_verification]).

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Name	Description
PwdAlwaysEnrolled	Default check of whether a user is enrolled that always returns true.
PwdMockIsEnrolled	Default check of whether a user is enrolled that always returns true.
PwdQuestionsEnrollmentCheck	Determines whether a user has enrolled for Password Reset using security question verification.
PwdSMSEnrollmentCheck	Determines whether a user has enrolled for Password Reset using SMS verification.

'Identification form processor' script includes

Identification form processor script includes provide functionality for extending identification processing.

All identification form processor script includes take the following parameters, and return the sys_id of the user that corresponds to the requested input. If the user was not identified, it returns null.

- `params.processId`: The sys_id of the calling Password Reset process (table: [pwd_process]).
- `param request`: The form request object. Fields in the form can be accessed with `request.getParameter('<element-id>')`. The supported request parameter is `sysparm_user_id`, the user identifier value entered in the form.

Name	Description
PwdIdentifyViaEmail	Verifies a user's identity by checking the email address.
PwdIdentifyViaUsername	Verifies a user's identity by checking the user name.

'Enrollment form processor' script includes

Enrollment form processor script includes provide functionality for extending enrollment form processing.

All enrollment form processor script includes take the following parameters, and return a boolean indicating whether the user was successfully enrolled.

- `params.userId`: The sys_id of the user trying to enroll (table: [sys_user]).
- `params.verificationId`: The sys_id of the verification used to enroll (table: [pwd_verification]).
- `params.enrollmentId`: The sys_id of this enrollment process.
- `request`: The form request object. Fields in the form can be accessed with `request.getParameter('<element-id>')`.

You should add the following information to the state of the enrollment process:

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- `gs.getSession().putProperty("result.status",status)`: Whether the user was successfully enrolled.
- `gs.getSession().putProperty("result.message",message)`: An associated message to be returned to the UI, such as a detailed error message.
- `gs.getSession().putProperty("result.value",value)`: A custom value associated with the enrollment.

Name	Description
PwdEnrollQuestionsProcessor	Handles questions and answers for verification.
PwdEnrollSampleProcessor	Provides an enrollment processor for sample verification.
PwdEnrollSMSProcessor	Provides an enrollment processor for SMS verification.

'User account lookup' script includes

User account lookup script includes return the credential store account_id for a given user.

The following parameter returns the credential store account_id for a given user.
`params.userId`: The sys_id of the user being checked (table: [sys_user]).

Name	Description
PwdDefaultUserAccountLookup	Provides a default script for user account lookup from a user_id to the account in a credential store. The default mapping is to use the user name as the account name.

'Password generator' script includes

Password generator script includes take the following parameter, and return an auto-generated string password.

`params.credentialStoreId`: The sys_id of the calling Password Reset process (table: [pwd_process]).

Name	Description
PwdDefaultAutoGenPassword	Generates a password from a random word and 4 digits.

'Verification processor' script includes

If the user identity is verified, the verification processor script includes return `true`.

Verification processor script includes take the following parameters:

- `params.resetRequestId`: The sys_id of the current Password Reset request (table: [pwd_reset_request]).
- `params.userId`: The sys_id of the user to be verified (table: [sys_user]).
- `params.verificationId`: The sys_id of the verification (table: [pwd_verification]).
- `request`: The form request object. Access the fields in the form with `request.getParameter('<element-id>')`.

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Name	Description
PwdVerifyPersonalDataConfirmationProcess	Verifies that the user accepts the answer.
PwdVerifyPersonalDataProcessor	Verifies that the user's answers match the expected data in the system.
PwdVerifyQuestionsProcessor	Provides question and answer verification of user input on the second page of the verification form.
PwdVerifySimpleProcessor	Provides simple verification of user input on the second page of the verification form.
PwdVerifySMSProcessor	Provides SMS verification of user input on the second page of the verification form.

'Post processor' script includes

Post processor script includes execute custom actions after the Password Reset process has completed.

All post processor script includes take the following parameters.

- `params.resetRequestId`: The sys_id of the current Password Reset request (table: [pwd_reset_request]).
- `params.wfSuccess`: A flag indicating whether the workflow completed successfully: True if, and only if, successful.

Name	Description
PwdPostProcessor	Executes actions after the process completes for success, failure, or both conditions.

Related topics

- Using extension points to extend application functionality
- Using scripted extension points in server-side scripts
- Using UI extension points in server-side UI macros
- Using client extension points in client-side UI scripting

Example custom scripts for Password Reset

The example scripts perform a user account lookup and processes an identification form, define a credential store, and create an identification type.

Perform a user account lookup and process an identification form

The main script calls two extension scripts, one to perform the user account lookup, and the other to process the identification form.

```
// User account lookup
var lookupExtensionSysId =
 getExtensionScriptSysId('SampleUserAccountLookupExtension',
 'user_account_lookup');
var lookupExtension = new
 SNC.PwdExtensionPoint(lookupExtensionSysId);
```

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```
// Setup parameters required for this extension type - userId
var params = new SNC.PwdExtensionPointParameter() ;
params.userId= 'joe.employee';

// Invoke the extension
var answer = lookupExtension.process(params);
gs.print('user: ' + answer);

//Form processor sample - Identification form processor
var identExtensionSysId =
 getExtensionScriptSysId('SampleIdentificationProcessorExtensio
n', 'identification_form_processor');
var identificationExtension = new
 SNC.PwdExtensionPoint(identExtensionSysId);

// Setup parameters required for this extension type - processId
var params = new SNC.PwdExtensionPointParameter() ;
params.processId = 'pwdreq1234';

// Simulate the posted form parameter for the indentification
 processor
var request = new SNC.PwdExtensionPointParameter() ; // A real
 life case will inject it's own request object
request.setParameter('sysparm_user_id', 'joe.employee');

var userIdentity = identificationExtension.processForm(params,
 request);
gs.print('identity: ' + userIdentity);

// Simple helper to return the sys-id for a given extension
 script
function getExtensionScriptSysId(scriptName, category) {
   var result;
   var now_GR = new GlideRecord('sys_script_include');
   gr.addQuery('name', scriptName);
   gr.addQuery('script', 'CONTAINS', 'category:
 \'password_reset.extension.' + category + '\'');
   gr.query();

   if (gr.next() ) {
     result = gr.getValue('sys_id');
   }
   return result;
}
```

Define a credential store

The following is an example of an extended process function in the User Account Lookup category used to define a credential store. To create this extension script, go to **Password Reset** > **Extensions** > **New extension script** and create a new script as described in Create an Extension Script. To configure the User Lookup in a Password Reset process, see Credential Stores.

```
<?xml version="1.0" encoding="UTF-8"?>
<record_update table="sys_script_include">
  <sys_script_include action="INSERT_OR_UPDATE">
```

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```
    <active>true</active>
    <client_callable>false</client_callable>
    <description>Simple account lookup that returns the supplied
 user id</description>
    <name>SampleUserAccountLookupExtension</name>
    <script><![CDATA[var SampleUserAccountLookupExtension =
 Class.create();
SampleUserAccountLookupExtension.prototype = {
  category: 'password_reset.extension.user_account_lookup', //
 DO NOT REMOVE THIS LINE!

  /**********
   * Returns the credential-store account id for a given user
   *
   * @param params.userId  The sys-id of the user being checked
 (table: sys_user)
   * @return              The credential-store account-id
 (string) for a given user
   **********/
  process: function(params) {
    return params.userId;
  },

  type: 'SampleUserAccountLookupExtension'

};]]></script>
    <sys_created_by>admin</sys_created_by>
    <sys_created_on>2013-07-30 16:44:55</sys_created_on>
    <sys_id>2df5a103d73201002bb9af728e610333</sys_id>
    <sys_mod_count>1</sys_mod_count>
    <sys_updated_by>admin</sys_updated_by>
    <sys_updated_on>2013-07-30 16:46:00</sys_updated_on>
  </sys_script_include>
  <sys_app_file action="INSERT_OR_UPDATE">
    <customer_update>false</customer_update>
    <publish_override/>
    <replace_on_upgrade>false</replace_on_upgrade>
    <restore/>
    <sys_app/>
    <sys_code>!!1W4/</sys_code>
    <sys_created_by>admin</sys_created_by>
    <sys_created_on>2013-07-30 16:44:55</sys_created_on>
    <sys_id>8306e143d73201002bb9af728e6103d3</sys_id>
    <sys_mod_count>0</sys_mod_count>
    <sys_name>SampleUserAccountLookupExtension</sys_name>
    <sys_parent/>
    <sys_path>!!1W4/</sys_path>
    <sys_policy/>
    <sys_source_deleted>false</sys_source_deleted>

 <sys_source_id>2df5a103d73201002bb9af728e610333</sys_source_id>
    <sys_source_table>sys_script_include</sys_source_table>
    <sys_type>code</sys_type>

 <sys_update_name>sys_script_include_2df5a103d73201002bb9af728e6
10333</sys_update_name>
    <sys_updated_by>admin</sys_updated_by>
```

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```
    <sys_updated_on>2013-07-30 16:46:00</sys_updated_on>
  </sys_app_file>
</record_update>
```

Create an identification type

The following is an example of an extended processForm function in the Identification Form Processor category that can be used to create an identification type. To create this extension script, go to **Password Reset** > **Extensions** > **New extension script** and create a new script as described in Create an Extension Script.

```
<?xml version="1.0" encoding="UTF-8"?>
<record_update table="sys_script_include">
  <sys_script_include action="INSERT_OR_UPDATE">
    <active>true</active>
    <client_callable>false</client_callable>
    <description>Script that processes an identification
 form.&#13;
Returns the sys-id of the user that corresponds to the requested
 input; if no user was found, null should be returned.&#13;
</description>
    <name>SampleIdentificationProcessorExtension</name>
    <script><![CDATA[var SampleIdentificationProcessorExtension
 = Class.create();
SampleIdentificationProcessorExtension.prototype = {
  category:
 'password_reset.extension.identification_form_processor', // DO
 NOT REMOVE THIS LINE!

  /**********
    * Process the identification form request, and returns the
 user's sys_id.  if user was not identified return null.
    *
    * @param params.processId   The sys-id of the calling
 password-reset process (table: pwd_process)
    * @param request           The form request
 object. fields in the form can be accessed using:
 request.getParameter('<element-id>')
    *                          Supported request paramters:
    *                              sysparm_user_id - the user
 identifier value entered in the form.
    * @return The sys-id of the user that corresponds to the
 requested input; if no user was found, null should be returned.
    **********/
  processForm: function(params, request) {
    return request.getParameter('sysparm_user_id') + '_' +
 params.processId;
  },

  type: 'SampleIdentificationProcessorExtension'

};]]></script>
    <sys_created_by>admin</sys_created_by>
    <sys_created_on>2013-07-30 17:00:28</sys_created_on>
    <sys_id>3a79a503d73201002bb9af728e610349</sys_id>
    <sys_mod_count>1</sys_mod_count>
```

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```
    <sys_updated_by>admin</sys_updated_by>
    <sys_updated_on>2013-07-30 17:08:41</sys_updated_on>
  </sys_script_include>
  <sys_app_file action="INSERT_OR_UPDATE">
    <customer_update>false</customer_update>
    <publish_override/>
    <replace_on_upgrade>false</replace_on_upgrade>
    <restore/>
    <sys_app/>
    <sys_code>!!1W5/</sys_code>
    <sys_created_by>admin</sys_created_by>
    <sys_created_on>2013-07-30 17:00:28</sys_created_on>
    <sys_id>4799ed03d73201002bb9af728e610333</sys_id>
    <sys_mod_count>0</sys_mod_count>
    <sys_name>SampleIdentificationProcessorExtension</sys_name>
    <sys_parent/>
    <sys_path>!!1W5/</sys_path>
    <sys_policy/>
    <sys_source_deleted>false</sys_source_deleted>

 <sys_source_id>3a79a503d73201002bb9af728e610349</sys_source_id>
    <sys_source_table>sys_script_include</sys_source_table>
    <sys_type>code</sys_type>

 <sys_update_name>sys_script_include_3a79a503d73201002bb9af728e6
10349</sys_update_name>
    <sys_updated_by>admin</sys_updated_by>
    <sys_updated_on>2013-07-30 17:08:41</sys_updated_on>
  </sys_app_file>
</record_update>
```

Use the process and processForm extensions

This example shows a script that uses two sample extensions, one *process* extension and one *processForm* extension.

```
// User account lookup
var lookupExtensionSysId =
 getExtensionScriptSysId('SampleUserAccountLookupExtension','use
r_account_lookup');
var lookupExtension =new
 SNC.PwdExtensionPoint(lookupExtensionSysId);

// Setup parameters required for this extension type - userId
var params =new SNC.PwdExtensionPointParameter();
params.userId='joe.employee';

// Invoke the extension
var answer = lookupExtension.process(params);
gs.print('user: '+ answer);


//Form processor sample - Identification form processor
var identExtensionSysId =
 getExtensionScriptSysId('SampleIdentificationProcessorExtension
','identification_form_processor');
```

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```
var identificationExtension =new
 SNC.PwdExtensionPoint(identExtensionSysId);

// Setup parameters required for this extension type - processId
var params =new SNC.PwdExtensionPointParameter();
params.processId='pwdreq1234';

// Simulate the posted form parameter for the indentification
 processor
var request =new SNC.PwdExtensionPointParameter();// A real life
 case will inject it's own request object
request.setParameter('sysparm_user_id','joe.employee');

var userIdentity = identificationExtension.processForm(params,
 request);
gs.print('identity: '+ userIdentity);

// Simple helper to return the sys-id for a given extension
 scriptfunction
getExtensionScriptSysId(scriptName, category){
var result;
var now_GR =new GlideRecord('sys_script_include');
   gr.addQuery('name', scriptName);
   gr.addQuery('script','CONTAINS','category:
 \'password_reset.extension.'+ category +'\'');
   gr.query();

   if(gr.next()){
     result = gr.getValue('sys_id');}return result;}
```

process function:

```
<?xml version="1.0" encoding="UTF-8"?><record_update
 table="sys_script_include"><sys_script_include
 action="INSERT_OR_UPDATE"><active>true</active><client_callable
>false</client_callable><description>Simple
 account lookup that returns the supplied user
 id</description><name>SampleUserAccountLookupExtension</name><s
cript><![CDATA[var SampleUserAccountLookupExtension
 =Class.create();
SampleUserAccountLookupExtension.prototype={
  category:'password_reset.extension.user_account_lookup',// DO
 NOT REMOVE THIS LINE!

  /**********
   * Returns the credential-store account id for a given user
   *
   * @param params.userId  The sys-id of the user being checked
 (table: sys_user)
   * @return              The credential-store account-id
 (string) for a given user
   **********/
  process:function(params){return params.userId;},

  type:'SampleUserAccountLookupExtension'
```

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```
};]]></script><sys_created_by>admin</sys_created_by><sys_created
_on>2013-07-3016:44:55</sys_created_on><sys_id>2df5a103d73201002
bb9af728e610333</sys_id><sys_mod_count>1</sys_mod_count><sys_upd
ated_by>admin</sys_updated_by><sys_updated_on>2013-07-3016:46:0
0</sys_updated_on></sys_script_include><sys_app_file
 action="INSERT_OR_UPDATE"><customer_update>false</customer_upda
te><publish_override/><replace_on_upgrade>false</replace_on_upgr
ade><restore/><sys_app/><sys_code>!!1W4/</sys_code><sys_created_
by>admin</sys_created_by><sys_created_on>2013-07-3016:44:55</sys
_created_on><sys_id>8306e143d73201002bb9af728e6103d3</sys_id><sy
s_mod_count>0</sys_mod_count><sys_name>SampleUserAccountLookupEx
tension</sys_name><sys_parent/><sys_path>!!1W4/</sys_path><sys_p
olicy/><sys_source_deleted>false</sys_source_deleted><sys_source
_id>2df5a103d73201002bb9af728e610333</sys_source_id><sys_source_
table>sys_script_include</sys_source_table><sys_type>code</sys_t
ype><sys_update_name>sys_script_include_2df5a103d73201002bb9af72
8e610333</sys_update_name><sys_updated_by>admin</sys_updated_by>
<sys_updated_on>2013-07-3016:46:00</sys_updated_on></sys_app_fil
e></record_update>
```

processForm function:

```
<?xml version="1.0" encoding="UTF-8"?><record_update
 table="sys_script_include"><sys_script_include
 action="INSERT_OR_UPDATE"><active>true</active><client_callable
>false</client_callable><description>Script that processes an
 identification form.&#13;
Returns the sys-id of the user that corresponds to the
 requested input;if no user was found,null should be
 returned.&#13;</description><name>SampleIdentificationProcessor
Extension</name><script><![CDATA[var
 SampleIdentificationProcessorExtension =Class.create();
SampleIdentificationProcessorExtension.prototype={

 category:'password_reset.extension.identification_form_processo
r',// DO NOT REMOVE THIS LINE!

  /**********
   * Process the identification form request, and returns the
 user's sys_id.  if user was not identified return null.
   *
   * @param params.processId   The sys-id of the calling
 password-reset process (table: pwd_process)
   * @param request           The form request
 object. fields in the form can be accessed using:
 request.getParameter('<element-id>')
   *                          Supported request paramters:
   *                              sysparm_user_id - the user
 identifier value entered in the form.
   * @return The sys-id of the user that corresponds to the
 requested input; if no user was found, null should be returned.
   **********/
  processForm:function(params, request){return
 request.getParameter('sysparm_user_id')+'_'+
 params.processId;},

  type:'SampleIdentificationProcessorExtension'
```

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```
};]]></script><sys_created_by>admin</sys_created_by><sys_created
_on>2013-07-3017:00:28</sys_created_on><sys_id>3a79a503d73201002
bb9af728e610349</sys_id><sys_mod_count>1</sys_mod_count><sys_upd
ated_by>admin</sys_updated_by><sys_updated_on>2013-07-3017:08:4
1</sys_updated_on></sys_script_include><sys_app_file
 action="INSERT_OR_UPDATE"><customer_update>false</customer_upda
te><publish_override/><replace_on_upgrade>false</replace_on_upgr
ade><restore/><sys_app/><sys_code>!!1W5/</sys_code><sys_created_
by>admin</sys_created_by><sys_created_on>2013-07-3017:00:28</sys
_created_on><sys_id>4799ed03d73201002bb9af728e610333</sys_id><sy
s_mod_count>0</sys_mod_count><sys_name>SampleIdentificationProce
ssorExtension</sys_name><sys_parent/><sys_path>!!1W5/</sys_path>
<sys_policy/><sys_source_deleted>false</sys_source_deleted><sys_
source_id>3a79a503d73201002bb9af728e610349</sys_source_id><sys_s
ource_table>sys_script_include</sys_source_table><sys_type>cod
e</sys_type><sys_update_name>sys_script_include_3a79a503d7320100
2bb9af728e610349</sys_update_name><sys_updated_by>admin</sys_upd
ated_by><sys_updated_on>2013-07-3017:08:41</sys_updated_on></sys
_app_file></record_update>
```


Password Reset extension script categories

You can use a custom extension script to extend Password Reset functionality for credential store, verification, or identification types.

Note:
To use a script include as an extension script, you must set it to **Active** status.

Password Reset extension script categories

Extension scripts must specify a category that indicates which script include is being extended, for example, `category: 'password_reset.extension.enrollment_check'`. The ServiceNow platform installs several scripts in each category. A script in the **Enrollment check** category can perform the enrollment check for a verification. Detailed information on each extension script appears in Password Reset extension scripts.

Extension script category	Description
Enrollment check	Defines how to check that a user is enrolled in the Password Reset process. Scripts of this category are available in the **Enrollment check** field when you define a verification type (Password Reset Verification Type form).
Enrollment form processor	Defines how an enrollment form is processed (if automatic enrollment is not configured). Scripts of this category are available in the **Enrollment form processor** field when you define a verification type (Password Reset Verification Type form).
Identification form processor	Defines how a user identification is processed. Scripts of this category are available in the **Identification processor** field when you define a verification type (Password Reset Identification Type form).
Password generator	Defines how to generate a password. Scripts of this category are available in the **Auto generate password** field when you configure a credential store (Password Reset Credential Store Type form).

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Extension script category	Description
Post reset script	Executes at the end of a Password Reset process. Scripts of this category are available in the **Post reset script** field when you configure a process (Password Reset Process form).
User account lookup	Defines how to look up a user account. Scripts of this category are available in the **User account lookup** field when you configure a credential store (Password Reset Credential Store form).
Verification form processor	Defines how a verification form is processed. Scripts of this category are available in the **Verification processor** field when you define a verification type (Password Reset Verification Type form).

Related topics

Password Reset extension scripts

Password Reset extension scripts

Extension scripts allow you to extend Password Reset functionality in credential store, verification, or identification types.

Password Reset extension script includes

Each script include is associated with a specific category, which is available in the appropriate field of a Password Reset form.

Note:
Create extension scripts only from the Password Reset Extension Script form (**Password Reset** > **Extensions** > **New extension script**). Extension scripts are special purpose script includes that are not created in the **System Definition** > **Script Includes** interface. To use a script include as an extension script, you must set it to **Active** status.

'Enrollment Check' script include category

Script include category	Description	Method signature	Input fields	Output fields
Enrollment Check	Checks whether a user is enrolled for a given verification.	process(params)	Parameters: • `params.userId` - The sys_id of the user to check (table: sys_user). • `params.verificationId` - The sys_id of the verification to check (table: pwd_verification).	Returns: (boolean) true, if the user is enrolled in the specified verification; otherwise, false.

This Enrollment Check example signals that the user is enrolled if both expected parameters are supplied. The code would be contained in the **Script** field of an extension script named `SampleEnrollmentCheck`:

```
var SampleEnrollmentCheck = Class.create ();
SampleEnrollmentCheck. prototype = {
```

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```
 category:'password_reset.extension.enrollment_check', // DO
NOT REMOVE THIS LINE!

  /**********
  * Returns boolean telling whether the user is enrolled.
  * This sample returns true if both parameters are supplied,
false otherwise
  *
  * @param params.userId         The sys-id of the user being
checked (table: sys_user)
  * @param params.verificationId The sys-id of the verification
being checked (table: pwd_verification)
  * @return Boolean indicating whether the user is enrolled
into the specified verification
  **********/
 process:function (params) {return (params.userId &&
params.verificationId)? true:false; },

 type:'SampleEnrollmentCheck'};
```

'Enrollment Form Processor' script include category

Script include category	Description	Method signature	Input fields	Output fields
Enrollment Form Processor	Checks whether all necessary information has been collected from the user. Stores the information so it can be used for verification when the user resets their password.	process(params)	Parameters: • *params.resetRequestId* - The sys_id of the current Password Reset request (table: pwd_reset_request). • *params.userId* - The sys_id of the user to be verified (table: sys_user). • *params.verificationId* - The sys_id of the verification to be processed (table: pwd_verification). • *request* - The form request object. Fields in the form can be accessed with request.getParameter('<element-id>'). The following information should be added to the state of the enrollment process: • gs.getSession().putProperty("result.status",status) - Whether the user was successfully enrolled. • gs.getSession().putProperty("result.message",message) - An associated message to be returned to the UI, such as a detailed error message. • gs.getSession().putProperty("result.value",value) - A custom value associated with the enrollment.	Returns: (boolean true, if th user is enrolled in the specifie verificati otherwis false.

This example processes an enrollment form submission successfully if the user-submitted response was success. The code would be contained in the **Script** field of an extension script named *SampleEnrollmentProcessor*.

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```
var SampleEnrollmentProcessor = Class.create ();
SampleEnrollmentProcessor.prototype = {
    category:
 'password_reset.extension.enrollment_form_processor', // DO NOT
 REMOVE THIS LINE!

     /**********
    * Process the enrollment form request, and return whether
 the user was successfully enrolled.
    *
    * @param params.userId         The sys_id of the user trying
 to enroll (table: sys_user)
    * @param params.verificationId The sys_id of the
 verification to be enrolled into (table: pwd_verification)
    * @param params.enrollmentId   The sys_id of this enrollment
 process
    * @param request               The form request object.
 Felds in the form can be accessed with
    *
 request.getParameter('<element-id>')
    * @return boolean telling whether the user was successfully
 enrolled
    * The following information should be added to the state of
 the enrollment process
    *     gs.getSession().putProperty("result.status",status) -
 whether the user was successfully enrolled
    *     gs.getSession().putProperty("result.message",message)
 - an associated message to be returned
    *             to the UI. Eg. a detailed error message
    *     gs.getSession().putProperty("result.value",value) -
 custom value associated with the enrollment
    **********/
    processForm:function (params, request) {var verificationId =
 params.verificationId; var sampleInput = request.getParameter
 ('sample_input');

  if (gs.nil (verificationId) || (sampleInput!= 'success'))
 { return false; }

  var now_GR = new GlideRecord ('sys_user');
 now_GR.get (params. userId);
 now_GR.print ('User:' + now_GR.getValue ('user_name') + '
 successfully enrolled'); return true; },
    type: 'SampleEnrollmentProcessor' };
```

'Identification Form Processor' script include category

Script include category	Description	Method signature	Input fields
Identification Form Processor	Processes an identification form request.	processForm(params, request)	Parameters: • *params.processId* - The sys_id of the calling Password Reset process (table: pwd_process). • *request* - The form request object. Fields in the form can be accessed with

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Script include category	Description	Method signature	Input fields
			`request.getParameter('<element-id>')`. Use `request.getParameter('sysparm_user_id')` to get the user ID that was entered into the form.

This example attempts to identify the user within the sys_user table given a user name submitted from the identification form. The code would be contained in the **Script** field of an extension script named *`PwdIdentifyViaUsername`*:

```
var PwdIdentifyViaUsername = Class.create ();
PwdIdentifyViaUsername. prototype = {
    category:
 'password_reset.extension.identification_form_processor', // DO
 NOT REMOVE THIS LINE!

    initialize: function () { },

   /**********
   * Process the identification form request, and returns the
 user's sys_id. If user was not identified return null.
   *
   * @param params.processId   The sys_id of the calling Password
Reset process (table: pwd_process)
   * @param request            The form request object. fields
 in the form can be accessed with
   *  request.getParameter('<element-id>')
   *  Supported request parameters: sysparm_user_id - the user
 identifier value entered in the form
   * @return The sys_id of the user that corresponds to the
 requested input;
   *  if no user was found, null should be returned
   **********/
  processForm: function (params, request) {var processId =
 params. processId; var sysparm_user_id = request.getParameter
 ('sysparm_user_id');
     now_GR = new GlideRecord ('sys_user') ;
     now_GR.addQuery ('user_name', sysparm_user_id) ;
     now_GR.query (); if (!now_GR.next ()) {return null; }
 return now_GR.sys_id;},

    type:'PwdIdentifyViaUsername' }
```

'Password Generator' script include category

Script include category	Description	Method signature	Input fields	Output fields
Password Generator	Returns an auto-generated password.	process(params)	Parameters:*`params.processId`* - The sys_id of the calling Password Reset process (table: pwd_process).	Returns: (String) an auto-

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Script include category	Description	Method signature	Input fields	Output fields
				generated password.

This example randomly generates a password from a base word and numbers. The base word is selected depending on the credential store. The code would be contained in the **Script** field of an extension script named *SamplePasswordGenerator*:

```
var SamplePasswordGenerator = Class.create ();
SamplePasswordGenerator. prototype = {
  category: 'password_reset.extension.password_generator', // DO
 NOT REMOVE THIS LINE!

   /**********
   * Returns an auto-generated string password.
   * This sample randomly generates 4 digits to add to the
 password.
   *
   * @param params.credentialStoreId The sys_id of the
 target Password Reset credential store to generate
   *  a password for (table: pwd_cred_store)
   * @return An auto-generated string password
   **********/
  process:function (params) { var basePassword ;

  var now_GR = new GlideRecord ('pwd_cred_store');
 now_GR.addQuery ('name', 'Local ServiceNow Instance');
 now_GR.query (); if (now_GR.next ()) { if
 (params.credentialStoreId = now_GR.getValue ('sys_id'))
   basePassword = "Password"; else
   basePassword = "Dorwssap"; } return this. generateSimple
 (basePassword); },

  generateSimple:function (base) {var pwd = base; var numbers =
 '0123456789'; var length = 4;

     for (var i  = 0 , n  = numbers. length ; i  < length ; i
 ++) {
        pwd += numbers.charAt (Math.floor (Math.random () * n) +
 1); } return pwd;},

  type:'SamplePasswordGenerator'} ;
```

'Post Reset' script include category

Script include category	Description	Method signature	Input fields	Output fields
Post Reset	Performs additional operations after the completion of the	process(params)	Parameters:	Returns: void

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Script include category	Description	Method signature	Input fields	Output fields
	Password Reset process.		• *params.resetRequestId* - The sys_id of the calling Password Reset process (table: pwd_process). • *params.wfSuccess* - A flag indicating whether the workflow completed successfully. True if, and only if, successful.	

This example adds failed reset requests to the system log. The code would be contained in the **Script** field for an extension script named *PwdPostProcessor*':

```
var PwdPostProcessor = Class.create ();

PwdPostProcessor. prototype = {
    category: 'password_reset.extension.post_reset_script', //
 DO NOT REMOVE THIS LINE!

    initialize:function () { },

     /**********
     * Execute custom actions after the Password Reset process has
 completed.
    *
    * @param params.resetRequestId The sys_id of the
 current Password Reset request (table: pwd_reset_request)
    * @param params.wfSuccess      A flag indicating if the
 workflow completed sucessfully.
    *  True if (and only if) successful.
    * @return no return value
    **********/
    process: function (params) {if (!params. wfSuccess) {
           now_GS.log ('[PwdPostProcessor.process] failure post
 processing for request [' + params. resetRequestId + ']'); }

         // We could place actions here that we always want
 executed return; },

    type:'PwdPostProcessor' }
```

'User Account Lookup' script include category

Script include category	Description	Method signature	Input fields	Output fields
User Account Lookup	Gets the credential store account ID for a given user.	process(params)	Parameters:*params.userId* - The sys_id of the user being checked (table: sys_user).	Returns: (String) the credential store account ID for the given user.

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This example gets the credential store account for a user. This code would be contained in the **Script** field of an extension script named *SampleUserAccountLookupExtension*:

```
var SampleUserAccountLookupExtension = Class.create ();
SampleUserAccountLookupExtension. prototype = {
  category:'password_reset.extension.user_account_lookup', // DO
 NOT REMOVE THIS LINE!

   /**********
  * Returns the credential store account id for a given user.
  * This sample echoes the user_id supplied as the credential
 store account id for that user.
  *
  * @param params.userId  The sys_id of the user being checked
 (table: sys_user)
  * @return              The credential store account id
 (string) for a given user
  **********/
  process:function (params) {return params.userId;},

  type:'SampleUserAccountLookupExtension' }
```

'Verification Form Processor' script include category

Script include category	Description	Method signature	Input fields	Output fields
Verification Form Processor	Processes a verification form request and indicates whether the user was verified or not.	processForm(params, request)	Parameters: • *params.resetRequestId* - The sys_id of the current Password Reset request (table: pwd_reset_request). • *params.userId* - The sys_id of the user to be verified (table: sys_user). • *params.verificationId* - The sys_id of the verification to be processed (table: pwd_verification). • *request* - The form request object. Fields in the form can be accessed with request.getParameter('<element-id>').	Returns: (boolean) true, if the user is verified; otherwise, false.

This example shows a verification processor that returns true only if the user sent **ok** in the input field; otherwise, it returns false. The code would be contained in the *Script* field of an extension script named *SampleVerificationFormProcessor*.

```
var SampleVerificationFormProcessor = Class.create ();
SampleVerificationFormProcessor.prototype = {
```

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```
 category:'password_reset.extension.verification_form_processor'
, // DO NOT REMOVE THIS LINE!

   /**********
   * Process the verification form request, and return whether
 the user was successfully verified.
   * This is a sample verification processor returns true only
 if the user sent "ok" in the input field;
   * otherwise, it returns false.
   *
   * @param params.resetRequestId The sys_id of the
 current Password Reset request (table: pwd_reset_request)
   * @param params.userId         The sys_id of the user trying
 to be verified (table: sys_user)
   * @param params.verificationId The sys_id of the verification
 to be processed (table: pwd_verification)
   * @param request               The form request object.
 Fields in the form can be accessed with
   * request.getParameter('<element-id>')
   * @return Boolean indicating whether the user is successfully
 verified
   **********/
  processForm:function (params, request) {if
 (request.getParameter ("sysparm_simple_input") == "ok") return
 true; else return false; },

  type:'SampleVerificationFormProcessor'};
```

Related topics

Extension points

Create a Password Reset extension script

Create extension scripts only from the Password Reset Extension Script form. Do not create extension scripts in the **System Definition** > **Script Includes** interface.

Before you begin

Role required: password_reset_admin or admin

Note:
To use a script include as an extension script, you must set it to **Active** status.

Procedure

1. Navigate to **Password Reset** > **Extensions** > **New extension script**.
2. Enter a name in the **Extension script name** field.
   Use CamelCase to construct a name without spaces, for example, `PwdEnrollmentCustom`.
3. Select an **Extension script category**.
   - Enrollment check
   - Enrollment form processor
   - Identification form processor
   - Password generator

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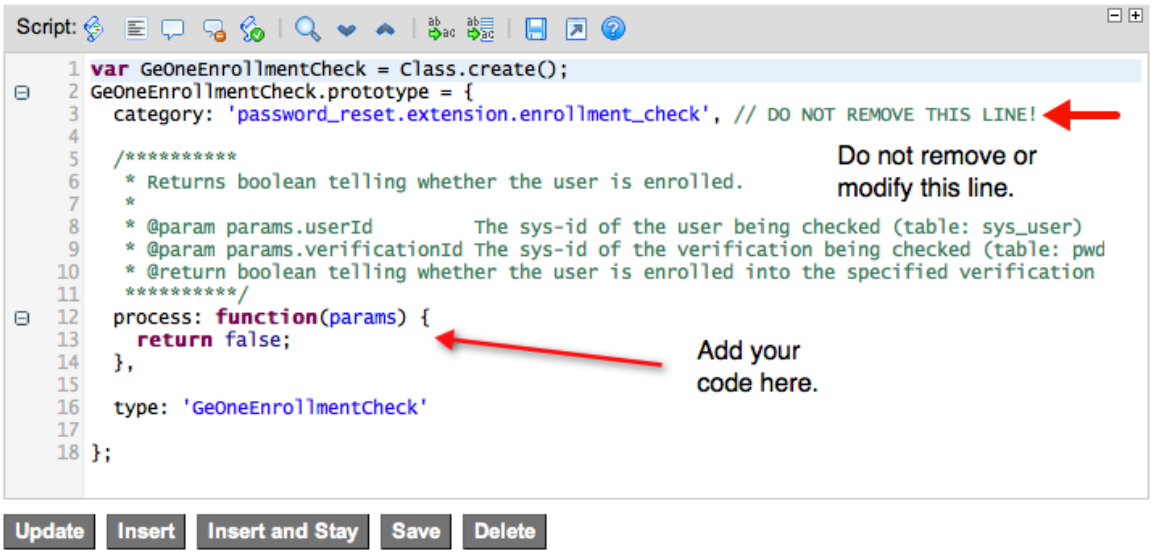
- User account lookup
- Verification form processor

4. Click **Submit**.
   A new instance of the script include for the selected category opens.
5. Edit the script by providing an implementation in the body of the process or `processForm` function, depending on the script category.
   You can add additional functions as long as the process or `processForm` function accepts the defined parameters and returns the expected results.

Note:
Do not edit or delete the `Category` declaration.



6. Click **Update**.

Password Reset and Password Change reports and logs

The Password Reset application provides several tools for monitoring and troubleshooting password reset activities.

Users with the password_reset_credential_manager or password_reset_admin role can view the status of password reset activities, identify potential security threats, and monitor for compliance with password security policies.

The **Reset Requests**, **Activity Log**, and **Blocked Users** modules are useful for monitoring password reset activities and for troubleshooting password reset issues. They also provide access to more detailed information than is provided on the Overview module.

To make room for new data, the system periodically purges the data that is used for password reset monitoring and reporting.

Password Reset Overview module

The **Password Reset** > **Overview** module displays reports on password reset and password change activities. Users with the password_reset_admin role can customize the layout of the reports that appear in the Overview module.

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Password Reset reports

Title	Description
Password Requests (last 7 days)	Number of password reset requests by type during the last 7 days.
Blocked Users (last 7 days)	Number of users blocked over the last 7 days.
Password Reset Request Status (last 7 days)	Status of all password reset requests by process.
Password Reset Request by Action (last 30 days)	Number of password reset requests by action type: **Reset Password**, **Unlock Account**, or **Reset and Unlock**.
Password Reset Top Users (last 30 days)	Number of password reset requests per user. Many password reset requests from a single user could indicate a security issue.
Password Reset Failed Verifications (last 7 days)	Number of failed verification attempts, by verification instance. A failed verification occurs when a user attempts to reset the password, but fails for one reason or another, during the identity verification step. Many failed verification attempts for a specific type of verification could indicate that the process is too complicated or unclear.
Password Reset Enrollment By Verification	Number of users by verification type who enrolled and did not enroll in the password reset program. A large number for users who did not enrolled could indicate a compliance or communication issue within the organization.
Password Change Top Users (last 30 days)	Number of password change requests per user. Many password change requests from a single user could indicate a security issue.

Password Reset activity log

The activity log (**Password Reset** > **Activity Log**) provides detailed information that you can use to troubleshoot and to generate reports on password reset metrics. Information contained in the activity log is stored in the Password Reset activity log [pwd_reset_activity] table.

You must have the password_reset_credential_manager or password_reset_admin role to view the log.

Password Reset event log

The event log is a valuable resource for troubleshooting. On the **Start** menu, click **Programs (or All Programs)** > **Administrative Tools** > **Event Viewer**.

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If the log does not appear, then, on the **Windows Logs** menu, click **Applications** > **Service Logs**.

You must have the admin role to view the log.

To write to the Password Reset event log

Edit the `DebugFlag` registry key entry at: `Computer > HKEY_LOCAL_MACHINE > SOFTWARE > Microsoft > Windows > CurrentVersion > Authentication > Credential Providers > {B6EFF27D-C1C4-481F-B81B-F3547C47D58A}`

By default, the key is set to 0. Set the key to 1 to write log entries to the `ServiceNowPwdReset` event log.

You must have the password_reset_credential_manager or password_reset_admin role to write to the log.

Password Reset blocked user notification

You can receive email notifications when the number of users that are blocked or locked exceeds the password blocked threshold. Notifications can alert you to suspicious activities. The default threshold is 10.

To subscribe: Add an email notification device or modify an existing device and then subscribe to the **Password Reset-Activity Monitor Lockout** notification.

You must have the password_reset_credential_manager or password_reset_admin role to subscribe.

Schedule for purging Password Reset data

To make room for new data, the system periodically purges the data that is used for password reset monitoring and reporting. Information contained in reports and monitoring tools could change dramatically immediately after a data purge.

Users with the password_reset_credential_manager or password_reset_admin role can follow this procedure to modify the purge interval:

1. On a non-production instance: Navigate to **Automated Test Framework** > **Administration** > **Table Cleanup**.
2. Modify the designated tables.
3. Test all changes on the non-production instance.
4. Modify the tables on your production instance and test.

Alternatively, contact ServiceNow Technical Support to modify the purge interval.

Purge intervals for Password Reset tables

Table name	Purge interval
[pwd_reset_request]	90 days (7,776,000 seconds). Depending on your organizational data monitoring requirements, you could configure the rule to: • Purge successful requests after 90 days • Keep failed requests for 120 days
[pwd_user_lockout]	90 days (7,776,000 seconds).

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Purge intervals for Password Reset tables (continued)

Table name	Purge interval
	Depending on your organizational data monitoring requirements, you could configure the rule to: • Purge successful requests after 90 days • Keep failed requests for 120 days
[pwd_reset_activity]	90 days (7,776,000 seconds).
[pwd_activity_monitor]	90 days (7,776,000 seconds).
[pwd_dvc_enrollment_code]	1 day (86,400 seconds).
[pwd_sms_code]	1 day (86,400 seconds).

Related topics

View user requests for password reset

Unblock a Password Reset user

Actions in Password Reset for Virtual Agent

The actions in the Virtual Agent use plugins.

- Password Reset (com.glideapp.password_reset): This plugin is active by default.
- Password Reset for Virtual Agent (com.snc.password_reset.virtual_agent): You must install this plugin to use Password Reset for Virtual Agent.

For more information about creating your password reset process, see Password Reset.

End users can initiate a password reset conversation with Virtual Agent by entering specific keywords. For example, when a user enters the keyword `Reset`, the Virtual Agent shows the **Reset Password** action. The users can select the action to initiate the password reset.

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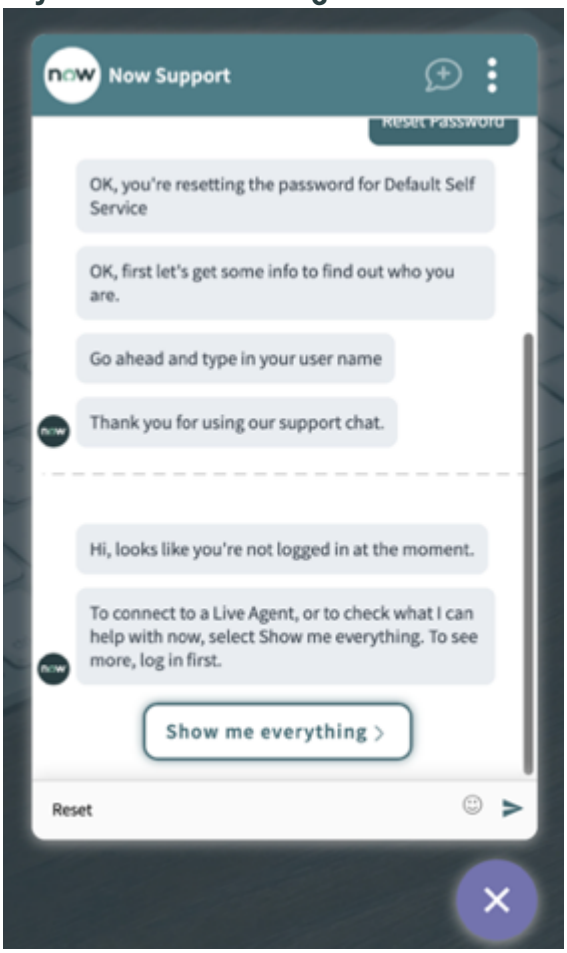
Keyword in the Virtual Agent



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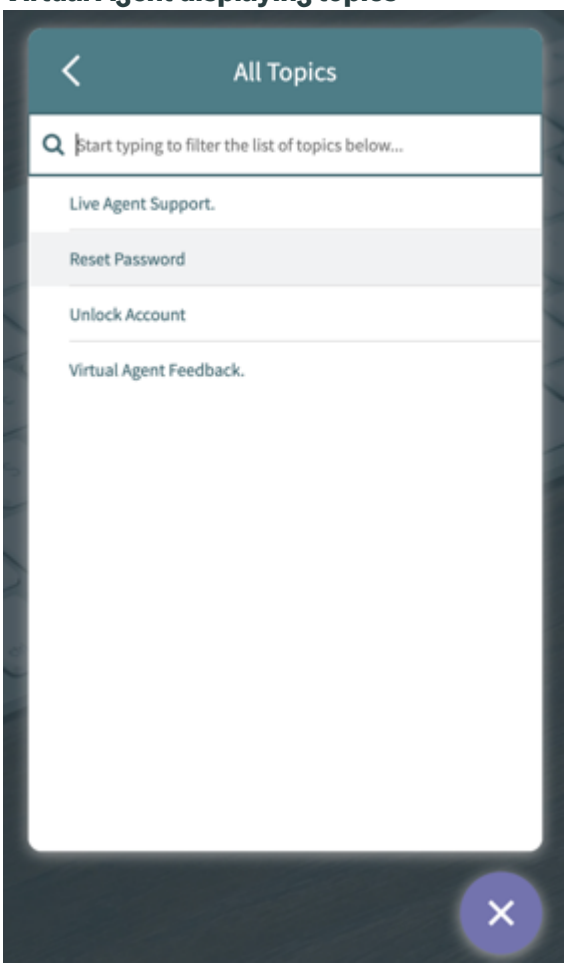
Virtual Agent displaying topics



Enrollment in Password Reset for Virtual Agent

You can let end users enroll for Password Reset verifications using the Virtual Agent. The Virtual Agent includes an enrollment topic and its topic blocks for each verification, such as SMS, email, security question, Soft PIN, or a third-party authenticator app. Users can select any of the topic blocks to enroll for verification.

You can modify the enrollment topic, but you must duplicate the default enrollment topic and then modify the duplicated topic.

Here's the enrollment flow in Virtual Agent:

1. Users select the enrollment topic in Virtual Agent.
2. Users select any one of these verification types:

   Security questions

   - If users aren't enrolled, Virtual Agent displays the questions, and users need to select questions and give answers to them.
   - If users are already enrolled, Virtual Agent shows options to the users to:
     - Change answers to the existing questions
     - Re-enroll

   Soft PIN

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- If the user isn't enrolled, Virtual Agent displays rules that are followed by a Soft PIN question. Users enter a valid Soft PIN and complete the enrollment.
- If users are already enrolled, they get a message asking whether to update existing Soft PIN enrollment.

  If users select **Yes**, Virtual Agent displays rules that are followed by a Soft PIN question.

  Users must enter a valid Soft PIN to complete the enrollment.

  Note:
  When users change the existing Soft PIN, they must use a new Soft PIN that must differ from the previously existing Soft PIN.

Third-party authenticator app

- If users aren't enrolled, they get a QR code and an alphanumeric code. Users can scan the QR code or enter the alphanumeric code in the authenticator app.
- If users are already enrolled, they get two options:
  - Generate a new QR code and an alphanumeric code
  - Disable multi-factor authentication

  If users select an option to generate a new QR, the new enrollment flow starts. If users select the other option, the multi-factor authentication gets disabled. If the multi-factor authentication is disabled, to re-enroll, users must enable it again.

Password Reset supports the following third-party authenticator apps:

- Google Authenticator
- Microsoft Authenticator
- Cisco Duo

Email and SMS

- If users aren’t enrolled, they can add new mobile devices for SMS verification or can add an email address for email verification.
- If users are already enrolled, they can view the list of enrolled mobile devices for SMS verification, or they can view an email address. For SMS, the users can verify, remove, or authorize mobile devices. For email, the users can verify or authorize the email address.

3. Users complete the enrollment.

Verification options for Password Reset for Virtual Agent conversations

The following verification options are supported in Virtual Agent conversations. Custom verifications are not supported in Virtual Agent.

- Personal data: The user provides specific pieces of personal data.
- Authenticator app: The user enters the generated code from the an authenticator app on a mobile device.
- SMS:The user enters the code received on a mobile phone.

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- Email:The user enters the code received in an email.
- Security question verification: The user enters the answers for the security question.

Soft PIN expiration framework for Password Reset

Virtual Agent supports expiration framework to account for Soft PIN verification during Password reset. As an end-user, you can use the existing Virtual Agent topic to enroll for Soft PIN enrollment to:

- Re-enroll when your Soft PIN has expires.
- Inform you of the number of days from the time you setup a new Soft PIN after which your token expires.
- Reset Soft PIN to account for history policies.
- Configure the topic to ask for password before proceeding to reset your Soft PIN.

Reset password conversation flow for Virtual Agent

1. Virtual Agent sends identity verification information to the end users based on the password reset process configuration.
2. Virtual Agent provides the reset steps if users successfully verify themselves with the given inputs.
3. Virtual Agent displays the password rules.
4. The user enters a new password, adhering to the password rules.
5. Virtual Agent prompts the user to reenter the password if the password does not meet the criteria.
6. Once the password meets the criteria, the Virtual Agent resets the password.
7. Users then log in using the new password.

Password reset flow using interactive voice response (IVR)

A user can reset a password using interactive voice response (IVR). For example, by using a phone call. A user gets the instructions for verification on a phone call. Once the verification is complete, the user receives an auto-generated password or an email containing a URL, which the user can use to reset the password based on the configuration of the process.

After resetting your password, the newly auto-generated password is spoken over IVR. If the Password Reset process is configured with an email or SMS, the password is also sent to the registered email and SMS.

The following verification types are supported over IVR:

- Authenticator app
- SMS
- Email

You can use the *sn_pwdreset_va.supported_channels* system property to enable the IVR or Microsoft Teams or both.

Note:
By default, the minimum character length is 8 characters. The maximum length in the password policy must be modified for a better experience over IVR.

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Change password conversation flow for Virtual Agent

1. The user initiates the Change Password action. The user selects the password reset process, or if only one process is available, the process is selected automatically.
2. Virtual Agent prompts the password guidelines or rules.
3. The user enters the old password, enters the new password, confirms the new password, and submits the request.
4. Virtual Agent shows the request status whether the password is changed or not.
5. If the password is changed, the users can use the new password to log in.

Unlock account conversation flow for Virtual Agent

When a user account is locked, the user can't log in to the account. But using the Virtual Agent, the user can unlock the account and log in.

1. Virtual Agent sends identity verification information to the end user based on the password reset process configuration.
2. Virtual Agent provides the verification information if the user successfully verifies their identity with the given inputs.
3. Once the user has been identified and verified, the Virtual Agent unlocks the user's account.

Note:
Users can also use the Microsoft Teams channel to unlock accounts and reset passwords.

Notify

Notify provides support for SMS and voice channels on the ServiceNow platform for communicating internally with team members and externally with customers and contractors. The plug-in also provides APIs and workflow activities to achieve the above. Some customers directly make use of the APIs in their products, and others via products like Major Incident Management, On-Call and CTI Softphone.

Explore	Configure
• Notify Twilio Direct driver • Notify Zoom connector • Notify voice and SMS capabilities • Notify Cisco Webex Connector • Notify connector for Microsoft Teams	• Activate Notify • Configure Notify with Twilio • Configure Notify Zoom connector in Notify • Configure a provider in Notify • Configure SMS opt-out preferences • Configure Notify Cisco Webex Connector • Install Notify connector for Microsoft Teams

Use	Reference

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(continued)

- Using Notify with SMS
- Using Notify for making conference calls
- Using Notify with tasks
- Using Notify with Incident Communications Management
- Using Notify with On-Call Scheduling
- Using the Notify Cisco Webex Connector with a major incident
- Use Notify connector for Microsoft Teams
- Differences between Notify-Twilio and Notify-Twilio Direct
- Notify workflow activities
- Components installed with Notify
- Developer training
- Developer documentation

Exploring Notify

Use and integrate Notify with the third-party service providers as a communication channel to meet with the stakeholders to resolve the incidents.

Notify Twilio Direct driver

The Notify-Twilio integration with the Notify-Twilio Direct driver provides APIs and workflow activities for applications to handle various notification features.

The Notify-Twilio Direct driver provides the following notification features:

- Start and manage a conference
- Send and receive SMS messages
- Send and receive calls

Notify automatically creates a TwiML application in the Twilio account and configures the application to use the instance as an endpoint.

Phone numbers associated with the Twilio account are imported to Notify. To manage phone numbers per instance, set up one Twilio account for each instance and configure all relevant phone numbers for the instance under that account.

Note:
Only one Twilio account (or subaccount) can be configured on a given Notify driver at a time. Both the old and new driver can be used simultaneously because they can be configured with different accounts.

The Notify-Twilio direct driver supports the use of API Keys and API Secret to make outbound REST API calls to Twilio. For more details, see API Key Resource.

To enhance the security, another set of user credentials are added in the system for the credentials in the form of Twilio API keys. The record contains the generated API key and the API secret as the username and password respectively.

Note:
Twilio Direct creates the Standard type API keys.

If the instance is connected to Twilio and you upgrade to Washington DC, the Twilio will not be disconnected from your instance and continues to use the Account SID and Auth key. However, if the administrator disconnects Twilio from the instance and re-connect the Twilio service, the additional record will be created to enhance the security.

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Activation Information

For new customers, only the Notify-Twilio Direct driver is available by default. For customers upgrading to the latest version, both the Notify-Twilio Direct and Notify-Twilio drivers are available.

The Notify plugin must be active to access Notify.

Related topics

Configure Notify with Twilio

Notify Zoom connector

The Notify Zoom Connector expands the Notify communication channel by managing and initiating a Zoom meeting directly from any task record such as an incident or a change.

Compatibility

New York and later.

Key Features

- Start and end Zoom meeting directly from any task record such as incident, or a change or even from the Major incident Workbench.
- Manage a Zoom meeting by adding or removing participants.
- Track and report meeting details such as meeting duration and attendees for further analysis.

System Requirements

- Install and activate the Notify plugin (com.snc.notify) before you install the application.
- Ensure that the system has Zoom spoke, version 1.0.2, for ServiceNow Integration Hub plugin (sn_zoom_spoke) installed and the necessary Integration Hub license to use Zoom for meeting management.

Plugins

- ServiceNow IntegrationHub Installer (com.glide.hub.integrations): Suite of plugins necessary to design integration flows in the Flow Designer application.
- The Zoom spoke, version 1.0.2 (com.sn.zoom.spoke) for ServiceNow Integration Hub provides actions that allow user to create and manage the conference meetings.

Notify voice and SMS capabilities

Notify provides support for SMS and voice channels for communicating internally with team members and externally with customers and contractors.

Notify provides a way for applications to start and manage a conference, send/receive SMS, send/receive calls and present them with IVR like system.

How Notify processes incoming calls

Notify processes incoming calls using workflow activities.

Any Notify activity that manages incoming phone calls creates a record on the Notify Workflow Activity [notify_wf_activity] table. Each notify_wf_activity record is associated with a single call. These records store JSON data detailing the actions to send to the telephony provider.

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Notify processes incoming calls in the following way:

1. A person calls a Notify phone number.
2. Notify launches the incoming call workflow associated with that Notify phone number.
3. The workflow reaches a Notify activity and invokes the activity `onExecute()` function.
4. The activity creates a new notify_wf_activity record detailing any actions to take, with a **State** value of execute.
5. Notify sends the specified actions to the telephony provider.
6. The notify_wf_activity record **State** changes to processed.
7. The telephony provider sends a response.
8. Response arguments, such as user input or recording info, are stored as JSON data in the notify_wf_activity **response_args** field.
9. The notify_wf_activity **State** changes to complete.
10. The JSON data from the notify_wf_activity record is copied to the **Last action** field in the Notify call record that triggered the workflow.
11. The workflow invokes the `onUpdate()` function in executing activities.
12. The activity confirms that the associated notify_wf_activity record has completed, and changes the activity state to finished.
13. The workflow transitions to the next activity.

Notify Cisco Webex Connector

Notify Cisco Webex Connector enables you to manage and initiate a Webex meeting directly from an incident.

Key Features

- Start and end Cisco Webex meetings directly from the major incident workbench.
- Manage a Cisco Webex meeting by adding or removing participants.

System Requirements

Install and activate the Notify plugin (com.snc.notify) before you install the application.

Install the ServiceNow IntegrationHub Installer (com.glide.hub.integrations) plugin to design the integration flows in the Flow Designer application. For more information, see Request IntegrationHub.

Configuring Notify

Configure and use Notify application with the third-party applications in your environment to resolve the incidents.

Activate Notify

You can activate the Notify (com.snc.notify) plugin if you are an administrator. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin
Role required: admin

About this task
Notify activates these related plugins if they are not already active.

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Plugins for Notify

Plugin	Description
E164 Compliant Phone Number [com.glide.phone_number]	Provides E-164 compliant phone number support.
SMS Preferences [com.snc.sms_pref]	Provides ability to set SMS preferences for receiving messages from different providers.

Note:
If you are upgrading from an earlier version of Notify, the Notify-Twilio driver remains active.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins

E.164 phone number field configuration

Differences between Notify and Legacy Notify

Describes the differences between the Notify and Legacy Notify applications, including architecture, workflows, Twilio support, and task-initiated conference calls.

Legacy Notify (com.snc.notifynow)	Notify (com.snc.notify)
Is deprecated. Supported only telephony services.	Supports pure conferencing solutions such as Zoom in addition to the Telephony providers like Twilio.
Manage a single number from a Twilio account per instance.	Provides support for multiple numbers per Twilio account, especially cross-geographical scenarios.

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(continued)

Legacy Notify (com.snc.notifynow)	Notify (com.snc.notify)
Does not include support for customizable workflows for Voice and SMS incoming or outgoing scenarios.	Workflow-driven approach for handling incoming and outgoing Voice and SMS events, making the integration easy to customize.
Hard-coded join conference SMS and IVR prompts for joining a conference call.	Includes a configurable workflow for handling SMS and Voice IVR prompts.
Support for SMS-based answers.	Notify On Task support for sending SMS and initiating conference calls from any task.

Migrating from Legacy Notify

When migrating to Notify from the Legacy Notify functionality, several changes are made to the instance.

If the Legacy Notify functionality is already enabled, several automatic changes occur when you activate Notify:

- The Legacy Notify menu is removed from the application navigator.
- Two separators are added to the new Notify menu: **Legacy Notify** and **Legacy Notify Admin**. New modules that replace the Legacy Notify modules are added to these sections.

  Note:
  The added modules are not the same modules that were in the Legacy Notify menu. Any customizations made to the Legacy Notify modules are not preserved.

- The notify_admin role allows access to Notify modules.
- The notifynow_admin role allows access to Legacy Notify modules.
- All workflow activities from the Legacy Notify application are moved to the **Legacy Notify** group.

Configure Notify with Twilio

Configure Notify to use the Twilio telephony service.

Before you begin
You must have an SID and authentication token for an active Twilio account (https://www.twilio.com/). You must have a separate contract with Twilio.

You must exclusively use a Twilio account to connect your ServiceNow instance.

Important:
Ensure that each instance on which you configure Notify uses a different Twilio account. Each account specifies a unique account SID, authentication token, telephone numbers, and endpoint. Using the same account across multiple instances may cause your Twilio service configuration to be overwritten.

Account and sub-account are Twilio categorizations, and both act the same for a ServiceNow instance.

Role required: notify_admin

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Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. On the Twilio Account Properties page, enter your **Account SID**.
3. Enter your **Auth Token**.
4. Click **Connect**.
   If the account is not associated with an instance and the connection is successful, a read-only list of E.164 and short code phone numbers associated with this Twilio account appears. This list displays the phone number, supported capabilities such as voice or SMS, the country for each Twilio number, and the Notify number group to which the number belongs.

   If the account is already associated with an instance, the system displays an error message. To connect to this account,

   - Disconnect the account from the instance.
   - Delete the TwiML apps in the Twilio account.

   Note:
   If you buy or release numbers on the Twilio account, open the configuration page again to refresh the list of numbers. Numbers removed from the Twilio service remain as Notify Number records, but with the **Active** field set to false. Use only active phone numbers for inbound or outbound communication.

What to do next

Phone numbers and short codes are provided by Twilio once the account is successfully connected and are stored on the Notify Phone Numbers [notify_number] table. Assign each number to a number group. Number groups allow you to control which workflows run when using the phone numbers in each number group.

Twilio-Direct callback testing

Make an outgoing call or send an SMS using Twilio and trigger callbacks to ServiceNow to test whether Twilio can reach the instance. You can also view when the last callback test was run, its status, and the test logs.

Before you begin

Role required: admin, notify_admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. Click **Test Callbacks**.
3. Select the SMS option and click **Initiate SMS**.
4. Select the call option and click **Initiate Test Call**.

   Note:
   The callbacks can be tested only after a connection is established with Twilio.

Advanced configuration for SMS

Use the Twilio co-pilot features to improve SMS delivery with phone number like using multiple numbers to send high-volume messages and content intelligence to automatically format every message without writing custom code. Reach large lists of users with one API request.

Before you begin

Role required: notify_admin

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About this task

The Twilio co-pilot features are enabled in your instance once configured. An example of a copilot feature is that you can configure which identity (phone number, shortcode, or alpha sender ID) to use to send a message. You can also spread the messaging traffic over several phone numbers or prioritize an alpha sender ID when sending messages to countries where alpha senders are commonly used. To know more about these features, visit https://www.twilio.com/copilot.

Important:
All the Twilio numbers must be part of the same messaging service for which you have enabled the **Advance SMS Features** feature.

The Twilio Notify bulk SMS feature is used to send SMS in bulk to customers. Use the passthrough `sendBulkSMS` API to reach large number of users across using a single API request. For more information on these features visit https://www.twilio.com/notify

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. On the Twilio Account Properties page, enter your **Account SID**.
3. Enter your **Auth Token**.
4. Click **Connect**.
5. On the **Advance SMS Features** tab, check the **Intelligent SMS Handling** box.

   Note:
   To setup Alpha Sender ID, users need to go to Twilio console.

   When you enable **Intelligent SMS Handling**, the "Messaging Service SID" is used to send the SMS even if a Twilio number is used in Notify.sendSMS API.

6. On the **Advance SMS Features** tab, check the **Twilio Notify Bulk SMS** box.

   Note:
   This feature uses Twilio Notify feature and might have an associated cost. Contact Twilio Support for more details.

Related topics

Using Notify with SMS

Advanced configuration for voice

Configure Answering Machine Detection (AMD) to determine if a human has picked up the call or not.

Before you begin

Role required: notify_admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. On the Twilio Account Properties page, enter your **Account SID**.
3. Enter your **Auth Token**.
4. Click **Connect**.

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5. On the **Advance Voice Features** tab, check the **Detect answering machine**box.
6. On the **Advance Voice Features** tab, enter the number of seconds in the **Machine detection timeout**field to set a timeout value.

Disconnect from a Twilio account

If a Twilio account is already associated with a different system, disconnect the account from the other system before connecting to the current instance.

Before you begin
Role required: notify_admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. On the Twilio Account Properties page, click **Disconnect**.
3. In the Disconnecting Twilio account pop-up window, click **OK**.

   The account is disconnected from the instance. The system clears the **Account SID** and **Auth Token** fields and deactivates the list of associated phone numbers.

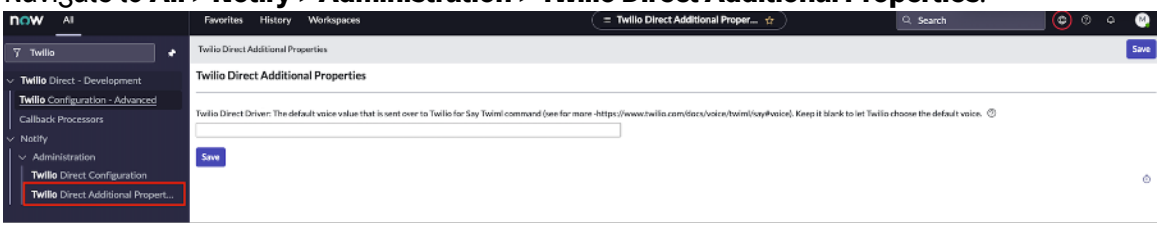
Configure Amazon Polly as default voice tone for text to speech

You can configure Amazon Polly as the default voice by overriding the default voice tone for text to speech.

Before you begin
Role required: notify_admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Additional Properties**.



2. In the Twilio Direct driver property field, enter the preferred voice tone.

   For example: "`Polly.Joanne`". The ServiceNow® instance passes Polly.Joanne value to the Twilio service and renders the voice in Joanne's tone.

   If you have a new *`San Diego`* or a higher version instance, the voice property will not be defined by default and the voice settings at Twilio will be considered. For more information on Amazon Polly voice, see Twilio Text-to-speech. However, if you are upgrading to *`San Diego`* or a higher release version, the default voice property will be "alice".

   Note:
   If you are defining the property in your ServiceNow® instance, the Twilio voice settings are overridden.

Configure Notify Zoom connector in Notify

Configure Notify to receive the event information from Zoom. An event is usually any action that is related to a meeting.

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Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Notify** > **Zoom** > **Configuration**.
2. Paste the verification token that you recorded on Zoom Event Subscription screen in the **Webhook validation token** field.
3. Save the record.

What to do next
Configure and use Zoom as a conference provider from any of the task records.

Note:
The person creating a conference is the host of the conference and must have their email set in their ServiceNow profile and use the same email for the Zoom account.

You must be signed in to the browser in order to direct to the Zoom client. However, if you are not signed in, you must provide your registration details.

Related topics

Configure a provider in Notify

Start a conference call

Set up Notify Zoom connector in Zoom

Use the Notify Zoom connector to expand the Notify communication channel by managing and initiating a Zoom meeting directly from any task record such as an incident or a change.

Before you begin
Role required: admin, Zoom admin

1. Ensure that you have Zoom spoke installed on your instance.
2. Make sure you have the required credentials and connections to Zoom on your instance.
3. Configure the Notify Zoom connector with the same Zoom account with which you created the OAuth app for Zoom spoke.

Procedure

1. On your Zoom OAuth app, navigate to **Feature** > **Add Feature** > **Event Subscription**.
2. Use the toggle button to enable the event subscription feature.
3. In the form that appears, fill in the URL using the following URL format: `https://yourinstancename.com/api/sn_notify_zoom/notify_zoom/ZoomEvent`.
   The URL is used to post information about events in Zoom to your instance.
4. Use the **Add Events** button to list all the events which Zoom is informing Notify about.
5. In the categories that appear, select **Meeting** and select all the meeting-related events from the list and click **Done.**
6. Under **Recording**, select **All Recordings have completed** and **Recording Transcript files have completed** from the list and click **Done**.
7. Click **Save**on the Add feature screen.
   A *`Verification Token`* appears on the Add Feature screen.
8. Record the token by clicking **Copy**.

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What to do next
Configure Notify with the verification token from Zoom.

Related topics
Configure Notify Zoom connector in Notify

Disable Zoom meeting password

Disable Zoom meeting password so that you can join a Zoom meeting without any meeting password.

Before you begin
Role required: notify_admin or admin

Procedure
1. Navigate to **Notify** > **Zoom** > **Configuration**.
2. Select **Do not set password**.
3. Click **Update**.

Configure a provider in Notify

Configure a conference provider or a phone number to be used as choices for initiating a conference call. For sending SMS, configure preferences for phone numbers.

Before you begin
Role required: notify_admin

About this task

Procedure
1. Navigate to **All** > **Notify** > **Provider Selector**.
2. Click **New**.
3. On the form, fill in the fields.

Provider selector fields

Field	Description
Name	Name of the provider you are adding.
Order	Order in which the provider appears when multiple providers are configured.
Source table	The table to which this provider needs to be added.
Condition	Conditions on the source table based on which provider selectors is applied.
Active	Indicates whether the provider is active.
Catch-all	Selects this provider if no other Provider Selector matches.
Manual selection	Disables the automatic selection of this provider, for example, if in a communication

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Field	Description
	plan you want to use this provider only as a forced communication channel.

4. Click **Submit.**
5. In the Provider Selector Choices section, click **New.**
6. Search for the conference provider or the Notify group that contains the phone numbers for initiating a conference.
   For sending SMS, search for the Notify group that contains the phone numbers.
7. Click **Submit.**

Configure SMS opt-out preferences

Allow recipients to opt out of receiving text messages.

Before you begin

Role required: admin, notify_admin

About this task

According to regulations in the CTIA Short Code Monitoring Handbook, recipients must be allowed to opt out of receiving text messages. The opt-out functionality is applicable only to Notify. When the user sends an SMS message with an opt-out keyword to any Notify number, the user is opted out of receiving messages from only the Notify number to which the message has been sent, not from all Notify numbers on that instance.

Important:
The Advanced opt-out feature is automatically enabled for short code and long code numbers associated with a Messaging Service. For more information, refer Getting Started with Advanced Opt-Out for Messaging Services. As this feature is a duplicate of the Twilio's new Advanced Opt-out feature, you should not activate the feature for numbers that are part of Messaging Service. For long code numbers that are not part of a Messaging service, Twilio handles the opt-out for default stop keywords listed at Twilio support for opt-out keywords.

This feature is disabled by default and holds significance for short-code and long codes that are not part of Messaging Service. To enable this feature, the Notify admin.

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **SMS Preference Configuration**.
2. Click **New** in the SMS Preference Configuration window.
3. Fill in the form fields.

SMS configuration preference fields

Field	Description
Provider	Select the provider for which you are configuring the SMS preferences.
Name	A user-friendly name for the configuration.
Order	Order in which the preference configurations apply. If you have multiple configurations,

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Field	Description
	this field indicates which configuration to consider first.
Default preference	The default preference for the configuration. The two options are: ○ **Opt-in**: Users by default will receive SMS messages. ○ **Opt-out**: Users by default will not receive SMS messages. They can start receiving SMS messages from a specific Notify number after sending a message with an opt-in keyword like START or BEGIN.
Enable for long code	Option that enables the opt-out feature for long code or toll-free numbers.
Enable for short code	Enables the opt-out feature for short codes only.
Opt-out keywords	Keyword replies that prevent a customer from receiving new messages from the phone number they're responding to. You can configure standard keywords such as STOP, STOPALL, END, CANCEL, QUIT, and UNSUBSCRIBE.
Opt-out confirmation message	Customized confirmation message to send to customers when they opt out of receiving SMS messages.
Opt-in keywords	Customized confirmation responses that enable customers to receive the messages coming from a phone number. You can configure standard keywords such as START, UNSTOP, and YES.
Opt-in confirmation message	A customized confirmation message to send to customers when they opt in to receiving SMS messages.

4. Click **Submit**.

Configure Notify Cisco Webex Connector

Configure the Notify Cisco Webex Connector in your environment to be able to use Cisco Webex application for making conference calls.

Install Notify Cisco Webex Connector

You can install the Notify Cisco Webex Connector application (sn_notify_webex) if you have the admin role.The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.

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Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Notify Cisco Webex Connector application (sn_notify_webex) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.
6. Select **Install**.

Create a Cisco Webex app

Create an app in Cisco portal to make outbound calls from an incident using Webex.

Before you begin

Role required: Cisco admin

Procedure

1. Log in to Cisco admin portal.
2. Navigate to **Start Building Apps** > **Start Building Apps** > **Create a New App** > **Create an Integration**.
3. On the form, fill the details for the integration app.

   a. **Will this integration use a mobile SDK**: Select **No**.

   b. **Integration name**: Option to provide the name for the Notify with Cisco Webex app.

   c. **Icon**: Option to choose an icon for the app.
   Select upload to select an icon for the Cisco Webex app.

   d. **Description**: A brief description of the app.

   e. **Redirect URI(s)**: URL of your ServiceNow instance.

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The URL should be of the format: "http://<instance_url>/oauth_redirect.do" where <instance_url> is your instance URL.

f. **Scopes**: Option to select the scopes that are required for conference calls. Select **meeting:admin_participants_read**, **meeting:admin_schedule_read**, **meeting:admin_schedule_write**, and **spark:all**.

g. Select **Add Integration**.

The app is successfully created. Save the **Client ID** and **Client Secret** by clicking on the **Copy** button in a notepad.

You must update the **Client ID** and **Client Secret** values in your ServiceNow instance.

Configure OAuth entity for Notify Cisco Webex

Configure the Cisco Webex as an OAuth provider and allow the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Select **Cisco Webex Teams spoke**.
3. Update the following values in the application registry.
   - **Client ID**: Paste the client ID generated while creating the Cisco integration app.
   - **Client Secret**: Paste the client secret generated while creating the Cisco integration app.
   - **Redirect URL**: Provide your instance details of your ServiceNow instance. The URL should be of the format "http://<instance_url>/oauth_redirect.do" where <instance_url> is your instance URL.
4. Select **Update**.
5. Select **OAuth Entity Scopes** tab.

   The following scopes are available by default:
   - meeting:admin_participants_read
   - meeting:admin_schedule_read
   - meeting:admin_schedule_write
   - spark:all

Create an OAuth credential record for Notify with Cisco Webex

Create a credential record for the Notify with Cisco Webex account.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

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The system displays this message: `What type of Credentials would you like to create?`

3. Select **OAuth 2.0 Credentials**.
4. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, Cisco Webex Teams Cred.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile created during the registration of Cisco Webex Teams as an OAuth provider. For example, Cisco Webex Teams OAuth Profile.
Applies to	Option to specify if the credential applies to all MID Servers in your network, or to one or more **Specific MID servers**. Specify the MID Servers that should use this credential in the **MID servers** field.
Order	Order to apply this credential. For example, 100.
Credential alias	Credential alias associated with the spoke.

5. Right-click the form header and click **Submit**.
6. Select the **Get OAuth Token** related link.

   You must log in to Cisco Webex account to retrieve the token details.

   Enter the email address of the Cisco account that connects your ServiceNow instance with Cisco Webex portal. This email address should be unique and can't be assigned to any user. Ex: cisco_servicenow@webex.com.

   On successful authentication, a confirmation message is displayed on the header.

Create a connection and credential alias for Notify connector for Cisco Webex Spoke

Create a credential record for the Notify connector for Cisco Webex account. The Notify connector for Cisco Webex Spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select the **CiscoWebexTeams** record.
3. Select **New** under **Connections** tab.
4. On the form, fill these values.

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Connection & Credential for Cisco Webex Teams

Field	Description
Name	Name for the HTTPS connection record for Cisco Webex Teams spoke
Credentials	Name of the credential created for Cisco Webex Teams spoke Provide the value created in "Create a OAuth credential record for the Cisco Webex Teams spoke".
Connection URL	Option to provide the connection URL. Provide the value as https://webexapis.com

5. Right-click the form header and click **Submit**.

Make Notify Cisco Webex Connector as default communication channel

Make Notify Cisco Webex Connector as a default communication channel to initiate a meeting to resolve the major incidents.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Notify** > **Provider Selector**.
2. Select **New**.
3. On the form, fill in the fields.

Provider Selector

Field	Description
Name	Name of the provider you are adding. For Example, Notify Cisco Webex.
Order	Order in which this provider appears when multiple providers are configured.
Source table	The table to which Notify Cisco Webex must be added. For Example: incident.
Active	Option for indicating whether Notify Cisco Webex as a provider is active.
Default	Option for making Notify Cisco Webex the default provider if other notify providers like Zoom or Twilio are configured. Enable the default option.

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4. Select **Submit**.
5. Select the newly created service provider.
6. In the **Provider Selector Choices** section, select **New**.
   a. Select **Webex** as the conference provider.
7. Select **Submit**.

Manage Notify properties

Manage the Notify Webex Connector application properties to configure the meeting capabilities.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Notify Properties**.
2. On the form, fill the fields.

Notify properties

Field	Description
Enable Notify integration for Task table and extensions	Option to enable Notify integration for Task table and extensions. Select the check box.
Enable Notify integration for Incident Communications Management. Entering phone number in 'com.snc.iam.notify_number' property is equivalent to setting this to true.	Option to use Notify Webex Connector for incident and major incident-related records. Select the check box.

3. Select **Save**.

Using Notify

Use the service providers to schedule the conference calls with the stake holders to resolve the incidents.

Using Notify with SMS

Send and receive SMS messages using Notify.

Notify stores inbound and outbound SMS messages in the Notify Messages [notify_message] table.

Notify supports sending concatenated SMS messages. Messages that exceed 160 characters, or 70 unicode characters, are split into multiple messages. This may affect your total telephony cost because each message can incur a cost. Some mobile carriers, such as Sprint, do not support concatenated SMS messages.

To send SMS messages to an individual recipient, use the Notify API *sendSMS* method. This method takes one recipient as an input parameter. You can also use the **send SMS** workflow activity.

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To send SMS messages to one or more recipients, use the Notify API *sendBulkSMS* method. This method takes a list as an input parameter and uses one API call to send multiple messages. Include the list of phone numbers in an array in the API call. This method improves performance by streamlining platform checks and Notify number validation.

Note:
When using *SNC.Notify.sendBulkSMS* API, instead of simply iterating over the numbers, all the given numbers are sent for SMS to Twilio in one API call. This happens only when Twilio Direct driver is active and Twilio Notify bulk SMS is enabled for the number in Advanced SMS features.

The Notify-Twilio integration provides programmable SMS outbound message status tracking with Status Callbacks. These callbacks can be helpful to see if a message has been delivered, failed, or ran into some other delivery issues.

SMS Statuses

Every Twilio SMS message request has a status value which describes the current state of the message. Use this information for troubleshooting SMS related incidents/ issues. Here are few descriptions of possible statuses of SMS sent from Notify through Twilio REST API.

Outbound message status progression

Status	Description
queued	The message has been queued by the provider to be sent to the carrier network.
accepted	The message is being processed by the provider before sending it to the carrier network.
sending	The message is being forwarded to the carrier network.
sent	The message has been successfully forwarded to the carrier network.
receiving	The provider has received an incoming message from the carrier network and is processing it.
received	ServiceNow has received the incoming message from the provider.
delivered	The message has been delivered to the target device. **Note:** A provider may not be able to report this status if the upstream carrier does not report this.
undelivered	The message could not be delivered to the target device. **Note:** A provider may not be able to report this status if the upstream carrier does not report this.
failed	The message failed to be forwarded to the carrier network.
unknown	The driver does not support the status

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Send an SMS with Zoom meeting invite

Send an SMS with Zoom meeting invite to ensure that the meeting participants or any newly added participant is updated with the meeting details when the meeting host starts the conference or adds a participant to the conference.

Before you begin

Role required: notify_view, notify_admin or admin

Note:
You need a telephony provider like Twilio or Nexmo.

Procedure

1. Navigate to **All** > **Notify** > **Zoom** > **Configuration**.
2. In the **Run Workflow on conference change** field, enter `Notify Zoom: Send SMS on Conference Change`.
   The Notify Zoom: Send SMS on Conference Change workflow is available with the demo data of the Notify Zoom Connector plugin (sn_notify_zoom).
3. Click **Update**.

Outbound communication requirements

Outbound communications initiated through Notify, such as phone calls and SMS messages, must satisfy recipient number requirements.

Recipient number requirements

These requirements apply to any number that receives a Notify phone call or message.

- The number must be E.164 compliant.
- The number must be different than the phone number used to initiate the call or message.

These requirements apply to all outbound communication initiated through Notify, such as by using Notify workflow activities or the Notify JavaScript API.

Invalid numbers prevent Notify workflows from running and cause an error to be logged. Set the **glide.notify.debug** property to true to create detailed error logs.

Using Notify for making conference calls

Notify administrators, major incident managers, or communications managers can manage conference calls.

Conference call records are stored on the Notify Conference Calls [notify_conference_call] table. Conference call participant records are stored on the Notify Conference Call Participants [notify_participant] table.

Conference call and participant records are created automatically when starting and connecting to a conference call. Most fields, such as the **Duration** of a call, are set automatically using business rules.

Note:
If a participant attempts to join a conference call using an invalid phone number, the caller is added to the participant list and the phone number is marked with a status of **Invalid**.

Notify administrators, major incident managers, or communications managers can manage conference call participants.

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Several conference call workflows are available by default. These workflows can be used for incoming and outgoing calls and incoming SMS messages. Conference call workflows are:

- Notify: (Re)join Conference Call
- Notify: Join Conference Call Via SMS
- Notify: (Re)join Conference Call with muting

Note:
Notify: (Re)join Conference Call with muting is available only with demo data.

The number groups Conference Call Group and Notify On Task Group use these conference call workflows by default.

Start a conference call

Start a conference call from a task or an incident communication plan by inviting one or more users to join a call. The conference will not start until at least two participants join.

Before you begin
Role required: notify_view, incident.manager

About this task
Call participants can include:

- Users who have been assigned specific responsibilities
- Ad-hoc user contacts
- Other involved parties who are not recorded as users, such as third-party contacts

Procedure

1. Navigate to **All** > **Incident Communications Management** > **Open**.
2. Open the relevant incident communication plan.
3. Click the **Initiate Conference Call** related link.
4. From the dialog box that appears, choose the **Conference Bridge** that you want to dial from.
5. Select the participants for the conference.

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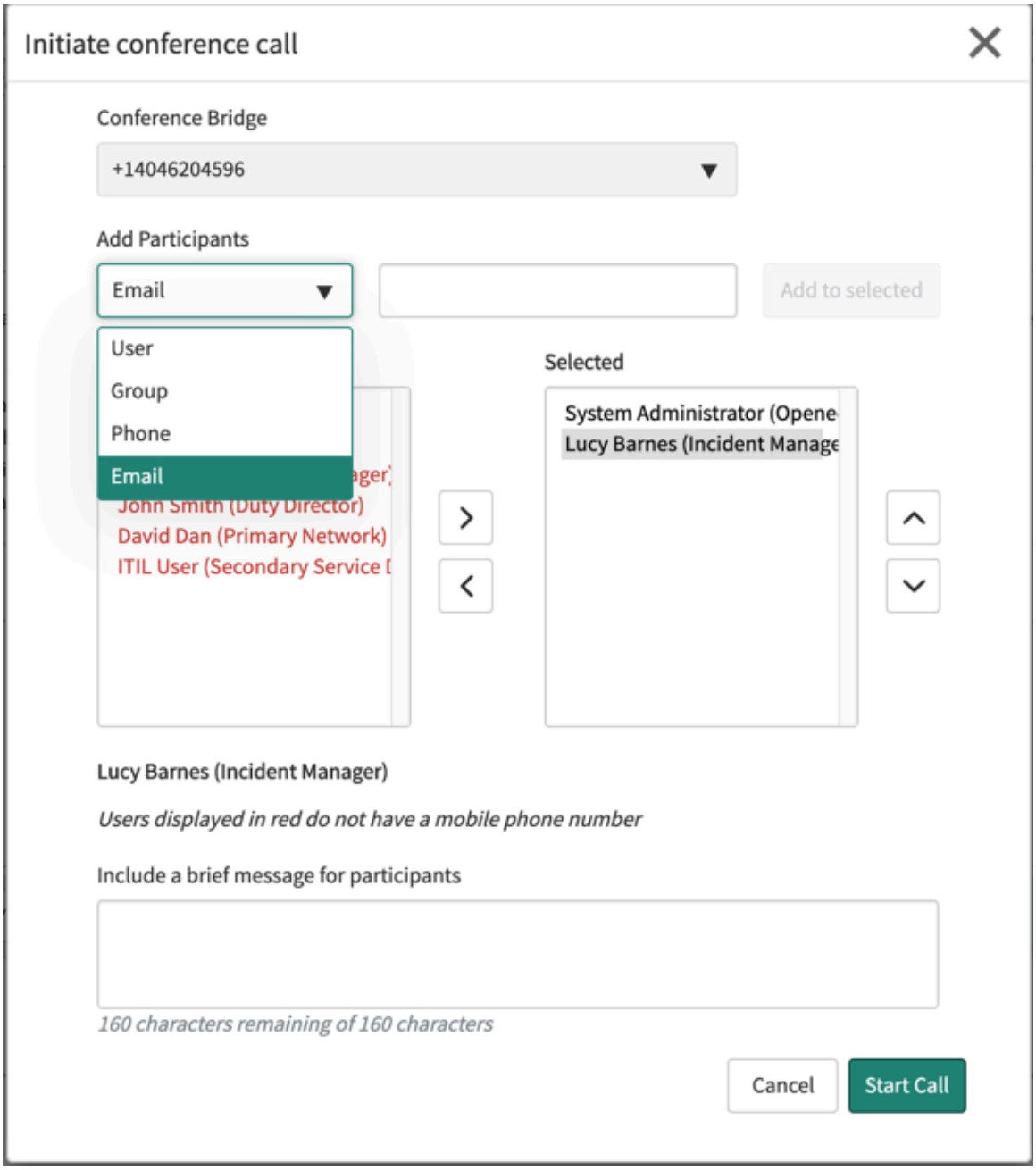
Initiate a conference call



The dialog box displays the Recommended and Selected participants for the conference. All users from the **User Contacts**list in the incident communication plan are in the Recommended section by default. The user who initiates the conference call is added to the selected list of participants.

If a shift exists for the group contacts, the primary and secondary on-call resources are shown in the **Recommended** list.

Calls are placed to the number in the **Mobile** phone field on the user record. If that information is blank, the user cannot be contacted through Notify. The mobile phone number has to be an E.164 compliant phone number. If the phone number is a local number, without the + prefix, the number will be retrieved based on the user's location and, if possible, converted into a valid E.164 number.

6. To select ad-hoc participants,

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Option	Description
Click the reference lookup icon, and select the relevant user.	Click **Add to selected**.
Enter the participant's phone number	Click **Add to selected**.

7. After the participant list is finalized, click **Start Call**.
   The conference call starts and a **Conference call initiated** message is displayed at the top of the incident communication plan form. Each user is called and can accept the call to join the conference.
8. Click the **Conference call initiated** message to see details of that conference call.
   When the final participant leaves the conference, the conference call closes.

> **Note:**
> VoIP phone systems, which do not use touch tone phones, may encounter issues with recognizing key presses. To avoid problems, ensure that conference call users use touch tone phones, or configure your VoIP system settings to recognize key presses, as described in your VoIP system documentation.

Add participants to a conference call

Add a participant to a conference call using Notify.

Before you begin

Role required: notify_view, notify_admin, major_incident_manager, or communication_manager

About this task

You can add the following participants:

- Users who have been assigned specific responsibilities
- Required ad-hoc user contacts
- Other involved parties who are not recorded as users, such as third-party contacts

Procedure

1. Navigate to **All** > **Notify** > **Conference Calls**.
2. Open the conference call that you want to add a participant to.
3. Click the **Add Participant** related link.
4. In the dialog box that appears, select the participants you want to add to the conference.
   You can add a single participant, a group of participants, or a phone number.

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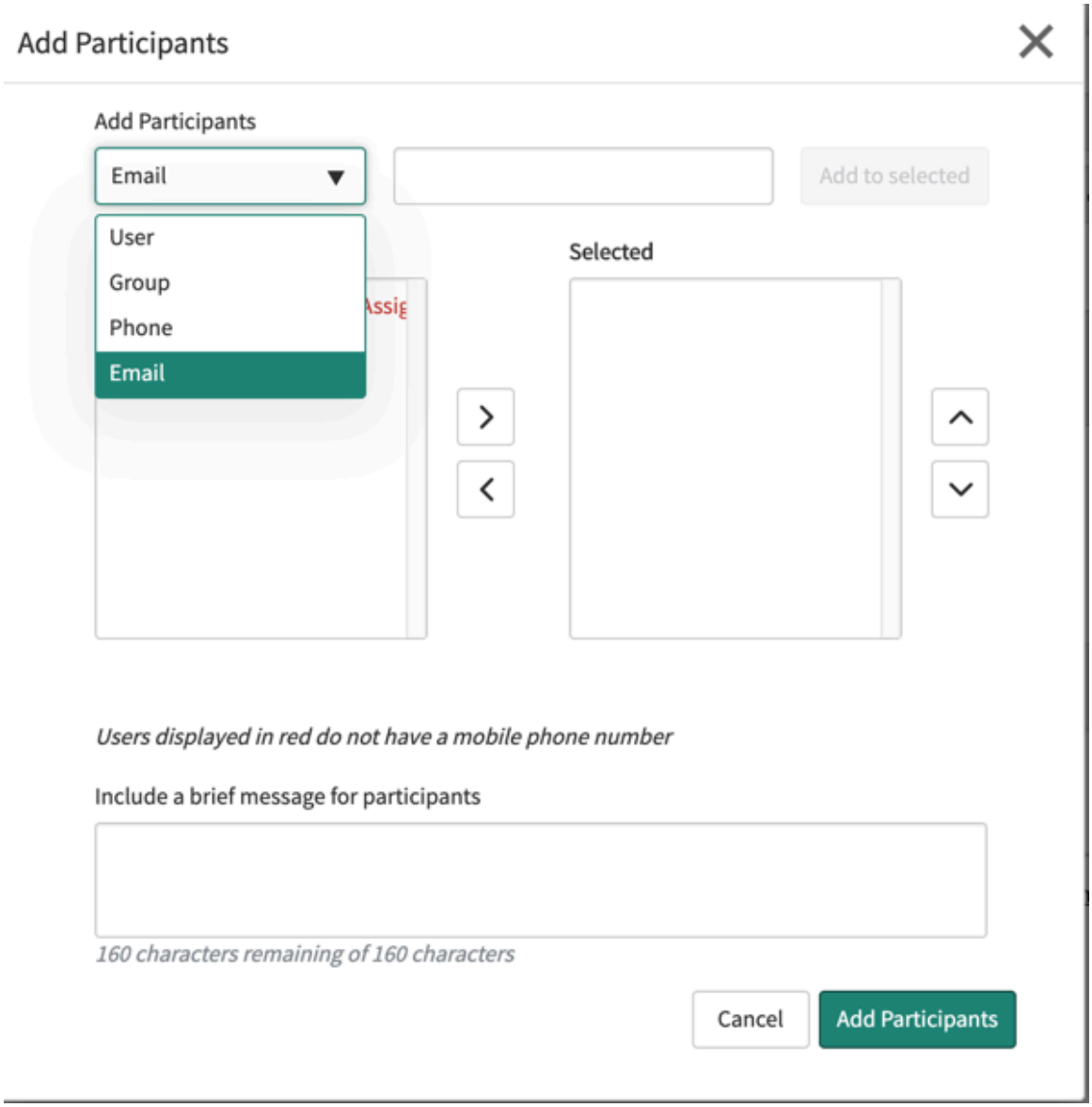

5. You can send a message for the participant who you want to add in the **Include a brief message for participants** field.
6. Click **Add Participant**.
   The selected user, group, or phone number is added to the selected conference call.

Related topics

Mute or remove a conference call participant

Mute or unmute all participants

As a communications manager or a conference call host, mute/unmute all the conference participants from the workbench.

Before you begin

Role required: notify_view, notify_admin, major_incident_manager, or communications_manager
Before starting this procedure, ensure there is an active conference call with one or more participants.

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Procedure

1. Navigate to **All** > **Major Incident Management** in the application filters.
2. Select the incident that you are trying to resolve.
3. On the incident, click **View Workbench**
4. In the **Conferences** tab, select a conference

Option	Description
Mute All	Click this button to mute all the participants in the conference
Unmute All	Click this button to unmute all the participants in the conference

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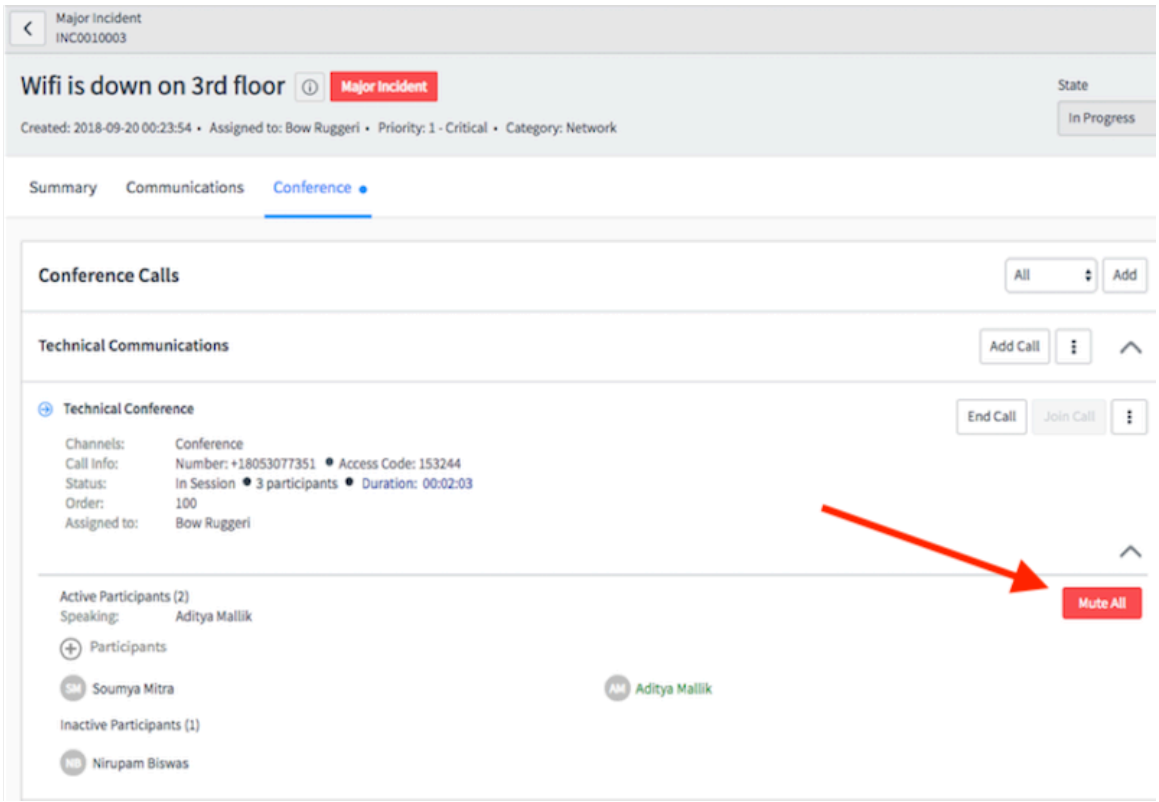
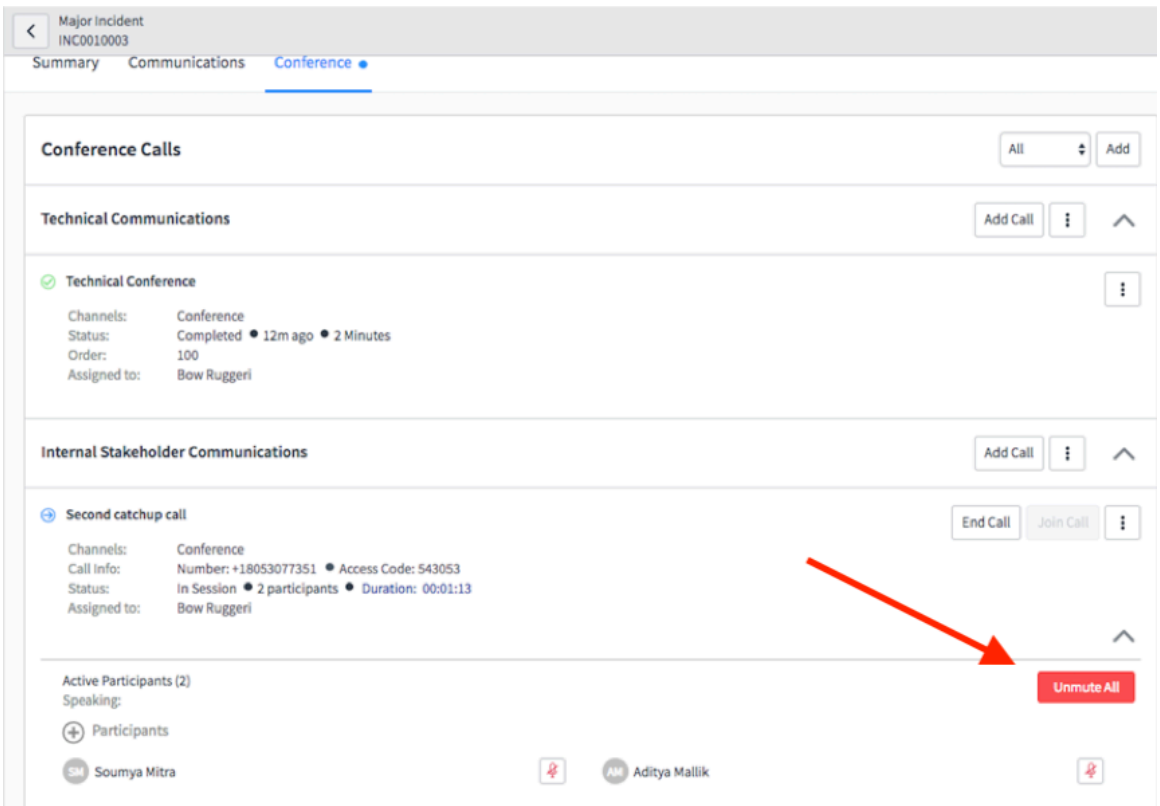
Mute All



Unmute All



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Mute or remove a conference call participant

As a communications manager, you can mute or kick conference call participants.

Before you begin

Role required: notify_view, notify_admin, major_incident_manager, or communication_manager
Before starting this procedure, ensure there is an active conference call with one or more participants.

Note:
Any participant with the host flag set to active, can mute or kick a participant from a conference call.

Procedure

1. Navigate to **All** > **Notify** > **Conference Calls**.
2. Select a conference call.
3. In the **Notify Conference Call Participants** related list, select a participant.
4. Click **Mute** or **Kick**.

Note:
You can unmute a muted participant. A kicked participant may rejoin the conference call by calling in again.

Send a message to conference call participants

Send a brief message as a text or voice message to the participants of a conference call to set a context to the call.

Before you begin

Role required: notify_view, or major incident manager

About this task

You must configure a telephony provider like Twilio so that you can use one of the Notify numbers to send SMS to the conference call participants.

Procedure

1. Navigate to **All** > **Major Incident Management** > **View Workbench**.
2. In the **Conference** tab, select the type of the call and click **Start Call**.
3. In the **Include a brief message for participants** field, type the message that you want to send to the conference call participants and click **Start Call**.

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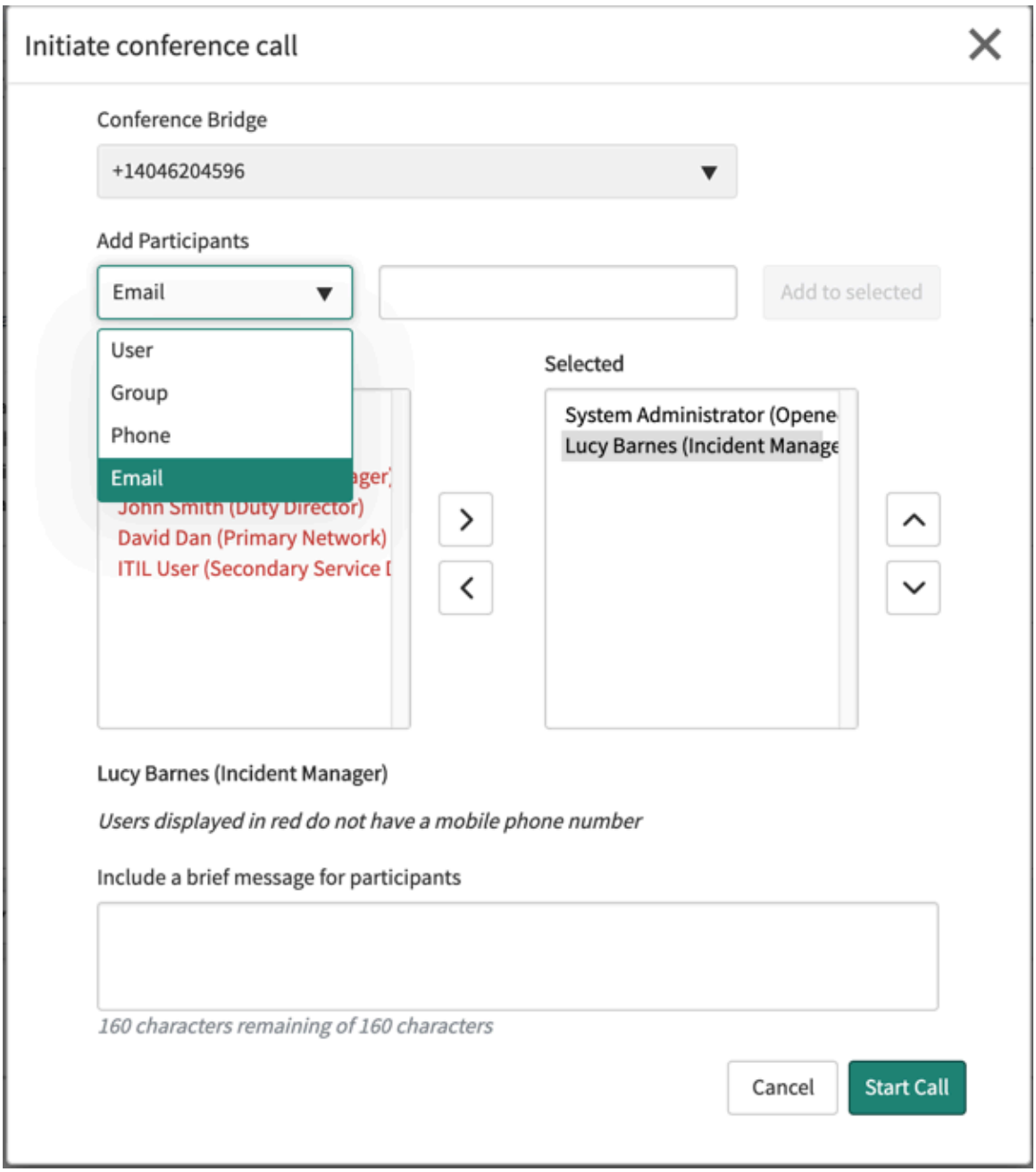
Initiate a conference call



Note:
Upon clicking **Start Call** the message text entered will be stored as description on the conference call record. If the OOB workflow is not modified, then the workflow takes care of sending this message text as SMS to the user. This is applicable if you have configured a telephony provider.

Viewing conference call information

Conference calls are listed as system activities in the **Activity** section of the Incident Communication Plan form and also are listed in the **Conference Calls** related list.

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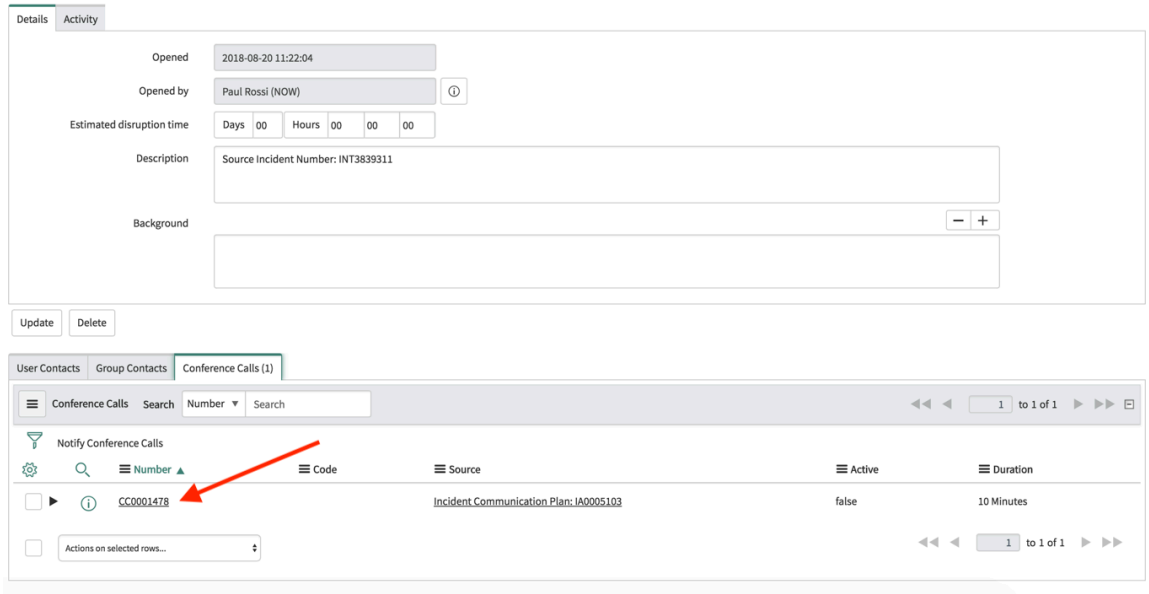
View conference call information



List of Notify calls

If you are a Notify administrator, you can view a list of calls and the status of a call made to or from Notify. The call records help in reporting and analytics.

To view a list of calls, navigate to **Notify** > **Calls**.

Call records are generated automatically when a user calls a Notify number or when a user makes an outbound call through Notify. You cannot create call records manually.

Note:
Although you can delete a call record, doing so may result in cascade deletion of related records.

For Notify calls where the source is specified, such as a task number, the source is added to the Notify Calls [notify_call] table in the **Source** column. For Notify conference calls where the source is specified, the source is added to the records for each of the calls in the conference.

Call status	Description
initiated	The number has just been dialed
ringing	The call is currently ringing.
in_progress	The call was answered and is currently in progress.
no_answer	The call was not answered.
completed	The call was answered and has ended normally.
busy	The caller received a busy signal.
failed	The call could not be completed as dialed, most likely because the phone number was non-existent.
invalid	The call could not be connected since input is invalid.

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Call status	Description
unknown	The driver does not support the status

Using Notify with tasks

Notify allows you to initiate conference calls and send SMS alerts from task records.

This functionality is available for all tables that extend the Task table, such as incident, problem, or change request. All calls and messages made from tasks are initiated using a single Notify phone number (E.164 or short code). You can configure which phone number is used by setting the property **glide.notify.task.phone_number**.

Start a conference call from a task

Use Notify to start conference calls from a task record.

Before you begin

Role required: notify_view, or itil
Notify must be set up before you can use Notify on task. Ensure there are Notify phone numbers (E.164 or short code) in number groups with phone call workflow.

Use **glide.enable.notify_on_task** property to enable Notify integration for Task table and its extensions. Entering phone number in **glide.notify.task.phone_number** property is equivalent to setting **glide.enable.notify_on_task** to true.

Procedure

1. Navigate to any task record, such as an incident or change request.
2. Click the **Start conference call** related link.
3. Select one or more **Recipients** to participate in the conference call.
4. Click **Start**.
   Any conference call records created from a task are associated with that task. You can view associated conference calls from the task record in the **Conference calls** related list. You may need to configure the form to add the related list.

Manage conference calls on task

Add and manage multiple participants on the conference including self-joining in to the conference call and end the conference call when the discussion is over.

Before you begin

- Role required: notify_view, itil, itil_admin, or admin
- A conference call is already initiated.

About this task

The **Manage Conference Calls** UI action is available for any table that extends the Task [task] table. If at least one conference call is active on a task record, the link appears on the related links section of the form. Out of the tables that extend the task table, the **Manage Conference Calls** UI action is intentionally hidden for Incident Communication Plan [incident_alert] table and Communication Task [comm_task] table. For these two tables, the functionality is already available as **Join conference call** and **End conference call** UI actions.

Procedure

1. Navigate to any task record such as Incident, Problem, or Change Request.
2. Open the record on which the conference all is active.

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3. In the related links, click **Manage Conference Calls**.
4. In the Manage Conferences window, you can perform the following activities:

Options	Description
Join Conference Call	If the logged in user is not already a part of the conference call, the user can join the conference.
Add Participants	Add participants to the conference who can contribute to the discussion.
End Conference Call	End the conference when the discussion is over.

5. **Optional:** In the Manage Conferences window, click the conference call number to know the details of the conference.

Send an SMS alert from a task

Use Notify to send information related to a call through SMS alerts from a task record.

Before you begin

Role required: notify_view, or itil

About this task

Ensure that there are Notify phone numbers (E.164 or short code) in number groups with SMS workflows.

Use **glide.enable.notify_on_task** property to enable Notify integration for Task table and its extensions. Entering phone number in **glide.notify.task.phone_number** property is equivalent to setting **glide.enable.notify_on_task** to true.

Procedure

1. Navigate to any task record such as an incident or a change request.
2. Click the **Send SMS** related link.
3. In the **From** choice list, select the phone number from which you want to send the SMS message.
4. Select and add the participants to whom you want to send the SMS message.
   All users from the **User Contacts** list in the incident communication plan are in the Recommended section by default.

   The dialog box displays the Recommended and Selected participants you selected to send an SMS message.
5. To select ad-hoc participants, choose one of the following actions.

Option	Description
Click the reference lookup icon and select the relevant user	Click **Add to selected**.

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Option	Description
Enter the participant's phone number	Click **Add to selected**.

6. After the participant list is finalized, type the message you want to send to the participants in the **Message** field and click **Send SMS**.

Result

Any SMS records created from a task are associated with that task. You can view associated SMS messages from the task record in the **SMS Messages** related list. You might need to configure the form to add this related list.

Using Notify with Incident Communications Management

Use Notify with incident communication plan to send SMS messages or start conference calls.

Certain configuration steps are required to use Notify with an incident communication plan.

- Both Notify and Incident Communications Management must be active.
- Notify must be configured and able to initiate and receive phone calls and SMS messages.
- The property **com.snc.iam.notify_number** must be set to an active Notify number with outgoing voice and SMS capability.
- This Notify number must belong to a number group configured with inbound and outbound conference call workflows.

Note:
The Conference Call Group number group is configured with conference call workflows by default.

Related topics

Incident Communications Management

Numbers and number groups

Using Notify for making conference calls

Initiate a conference call from incident communication plan

Use Notify to initiate a conference call from an incident communication plan by inviting one or more users.

Before you begin

Role required: notify_view, or admin

Procedure

1. Navigate to **Incident Communications Management** > **All**.
2. Open the relevant incident communication plan.
3. Click the **Conference** tab.
4. For the relevant incident communications task, under **Actions**, click **Start Conference Call**.
5. Select the conference bridge and the participants for the conference call.
   Available options in the conference bridge depend on the conference providers configured. For more information, refer Configure a provider in Notify.

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Join and end a conference call from incident communications management

After a conference call is initiated, join the call to participate in the discussion or end the call when the conference is no longer required.

Before you begin

Role required: notify_view, ia_admin or admin

Procedure

1. Navigate to **Incident Communications Management** > **All**.
2. Open the relevant incident communication plan.
3. Click the **Conference** tab.
4. For the relevant incident communications task, under **Actions**, perform one of the following actions.

Send communication updates for an incident communications plan

Update users on the latest communication on an incident through selected communication channels.

Before you begin

- Role required: notify_view, or admin
- Activate the Notify plugin (com.snc.notify) if you want to send communication through SMS.
- Set at least one communication channel for a communication task as SMS or email.

Procedure

1. Navigate to **Incident Communications Management** > **All**.
2. Open an incident communication plan record.
3. From the Incident Communication Tasks related list, open the incident communication task for which you want to send updates.
4. In the related links, click **Start Updates**.
5. Fill the required information and click **Send**.
   For sending an SMS communication, in the **From** choice list, select a number from which you want to send the communication.
6. Click **Send**.

Related topics

Incident Communications Management

Using Notify with On-Call Scheduling

When using both Notify and On-Call Scheduling, you can send On-call escalation notifications as SMS messages, in addition to emails.

Configure the following items to use Notify with On-Call Scheduling:

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- You must add at least one Notify phone number to the On-Call Group number group. This group is configured by default to handle inbound SMS responses (via On-Call: Check Assignment Response) that accepts or rejects an on-call assignment and to handle outbound voice calls (via On-Call: Assign by Acknowledgement Voice) to accept or reject assignments.
- You must configure workflows, such as the On-Call: Assign by Acknowledgement to drive escalations via SMS and Voice.

Set up Notify with On-Call Scheduling

You can configure on-call scheduling to use Notify functionality to send SMS alerts and assign users to tasks based on the SMS responses.

Before you begin

Ensure that the Notify and On-Call Scheduling plugins on your instance are activated.

Role required: notify_view, or admin

About this task

Set up Notify with On-Call Scheduling for the first time or migrate from On-Call Scheduling with NotifyNow.

Procedure

1. Navigate to **All** > **Notify** > **Numbers**.
2. Select the phone number you want to use to send and receive on-call scheduling messages.
3. In the **Notify group** field, select the **On-Call Group**.
   The On-Call Group is configured with the on-call workflows: **On-Call: Check Assignment Response**and **On-Call: Assign by Acknowledgement Voice** by default.
4. Navigate to **Workflow** > **Workflow Editor**.
5. Select the **On-Call: Assign by Acknowledgement** workflow.
6. Click the workflow menu icon in the title bar and select **Copy** to copy the **On-Call: Assign by Acknowledgement per rota** workflow.

   Save the copied workflow under a different name than what it is named by default.

   Note:
   You must avoid modifying default workflows and instead choose to copy and then modify the required workflow.

7. Select a **Send SMS** activity.
8. In the **To (script)** field, modify the `getRecipientsAndNumberToSendFrom()` to use the correct value from `getNotifyNumber()` notify number's sys ID.
9. Close the **Workflow Editor**
10. Navigate to **On-Call Scheduling** > **Trigger Rules**.
11. Select a trigger rule that launches an assignment workflow
12. In the **Trigger action** field, select **Workflow**.
13. In the **Trigger workflow** field, select the On-call: Assign by Acknowledgement workflow.
14. Click **Update.**
15. Repeat the previous 3 steps for each assignment trigger rule.
    Each time the conditions for one of these trigger rules is met, the On-call: Assign by Acknowledgement workflow runs.

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Related topics

Workflow editor title bar

Controlling the on-call communication channel with Notify

Configure On-Call Scheduling with Notify to always use a user's preferred communication channel.

If **Force communication channel** is specified in the **Escalation settings** for rosters, the preferred user device is used: SMS, voice, or email.

For example, if the preferred device is SMS and the on-call member does not have an SMS device defined, the user is not contacted even if the user has an email address. When forcing a communication channel on an escalation level does not succeed, no further communication attempts are made. The fact that the user could not be reached is logged.

Related topics

Subscription-based notifications

On-Call Assign by Acknowledgement workflow

The **On-Call: Assign by Acknowledgement** workflow is provided with Notify.

The workflow uses data from the escalation settings, including overlapping shifts and custom escalation settings, of shifts and rosters. Depending on these escalation settings, the workflow iterates through the defined escalation chain and sends notifications by SMS, email, or voice to users asking them for incident assignment. The workflow respects time-off as specified in the rosters. People who have time-off are not included in the escalation chain and no notifications are sent to them.

When you install both On-Call Scheduling and Notify, the message_number column is added to the Notify Messages [notify_messages] table to track responses to on-call assignment requests. This column indicates if the contacted user accepted or rejected the assignment. Before you can send notifications, you must define trigger rules. Trigger rules determine the conditions that must be met before a notification is sent and what action must be taken.

Call a user from the WebRTC UI

Make outbound calls and receive a voice call in the browser through the WebRTC interface from On-Call Schedules landing page, Roster and Escalation Details dialog box and on-call calendar.

Before you begin

Role required: notify_view, or itil

Procedure

1. Navigate to **All** > **On Call scheduling** > **On Call calendars**.
2. In the calendar that opens, click the name of the user you want to call.

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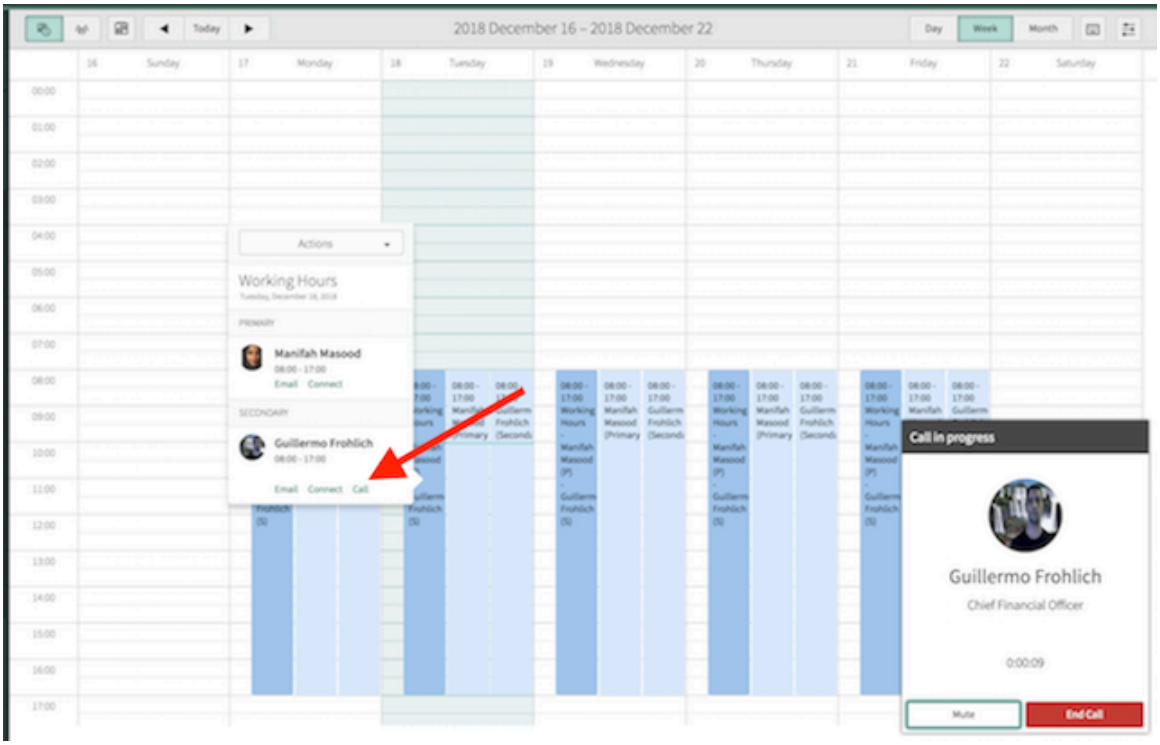
3. Choose **Call** to call the user.



Key differences between on-call scheduling with NotifyNow and with Notify

There are key differences between on-call scheduling with NotifyNow and on-call scheduling with Notify.

Tracking responses to questions

The On call:Assign by Acknowledgement workflow no longer uses the Notify Question tables to track assignment responses. When you install On-Call Scheduling with Notify, the message_number column is added to the Notify Messages [notify_messages] table to track responses to on-call assignment requests. This column indicates if the contacted user accepted or rejected the assignment.

Using the Notify Cisco Webex Connector with a major incident

Initiate a conference call from the major incident workbench by inviting one or more users to join a call.

Notify administrators, major incident managers, or communications managers can manage conference calls.

Create a collaborative communication task from MIM workbench

Create a communication plan or add a new communication task to an existing communication plan to resolve a major incident from the major incident management workbench.

Before you begin

Role required: notify_view, or admin

Procedure

1. Navigate to **All** > **Incident** > **Major Incidents** > **Open**.
2. Open the relevant major incident.

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3. Select **View Workbench**.
4. Select **Collaborate** tab.
5. Select **Add** that appears in the **Communication Tasks** section.
6. On the form, fill the fields.

Collaborative Task

Field	Description
Task Short description	Option to provide a short description for the communication task.
Channels	Option to choose the channel for communication. Select **Conference**.
Frequency	Option to select the frequency at which the task must be executed. A task can be executed only once or on specific durations.
Due in (Minutes)	Time span by when the task must be executed after the task initiates.

7. Select **Next**.
8. In the **Manage Recipients** tab, add the users required to be involved in the major incident communication plan.
9. Select **Add**.

Initiate Notify Cisco Webex conference from MIM workbench

Initiate a Webex conference from the MIM workbench to work towards the resolution of the major incident.

Before you begin

Role required: notify_view, or major_incident_manager

Procedure

1. Navigate to **All** > **Incident** > **Major Incidents** > **Open**.
2. Open the relevant major incident.
3. Select **View Workbench**.
4. Select **Collaborate** tab.
5. Select **Initiate** button.
6. On the form, fill the fields.

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Initiate task dialog box table

Field	Description
Conference Bridge	Option to select the conference bridge for the meeting. The Conference Bridge will be selected as Webex only Webex is the default provider selector.
Add Participants	Option to add the users and the stakeholders to work towards the resolution of the ticket. ○ **Users**: Enter the name of the user to include in the call. ○ **Group**: Enter the group of users to be included in the call. ○ **Email**: Enter a valid email of the participant to be included in the call. After adding the required stakeholders, click **Add to selected**.
Title	The default title is the ticket number appended with the short description.
Include a brief message for participants	Option to provide an opening message to the user before beginning the interaction.

7. Select **Start**.
8. Select **Open Link** in the dialog box that appears.

   You can also click the link from the workbench to begin the Webex conference call.

Add participants to a conference call

Add a participant to a conference call to participate in the discussion to resolve the major incident.

Before you begin

Role required: notify_admin, major_incident_manager, or communication_manager

Procedure

1. Navigate to **All** > **Incident** > **Major Incidents** > **Open**.
2. Open the relevant major incident.
3. Select **View Workbench**.
4. Select **Collaborate** tab.
5. Select (+) Participants under **Active Participants**.
6. On the form, fill the fields.

Add participants

Field	Description
Add Participants	Option to add the users and the stakeholders to work towards the resolution of the ticket.

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Field	Description
	○ **Users**: Enter the name of the user to include in the call. ○ **Group**: Enter the group of users to be included in the call. ○ **Email**: Enter a valid email of the participant to be included in the call. After adding the required stakeholders, click **Add to selected**.
Title	The default title is the ticket number appended with the short description.
Include a brief message for participants	Option to provide an opening message to the user before beginning the interaction.

7. Select **Add Participants**.

   You can view the participants status in an active conference call.

Join a conference call

You can join an active conference call from an incident to discuss about the resolution of an incident.

Before you begin

Role required: notify_view, notify_admin, major_incident_manager, or communication_manager

Procedure

1. Navigate to **All** > **Incident** > **Major Incidents** > **Open**.
2. Open the relevant major incident.
3. Select **View Workbench**.
4. Select **Collaborate** tab.
5. Select **Join Call**.

Notify reference

View the additional information about Notify application in this section.

Differences between Notify-Twilio and Notify-Twilio Direct

Describes the differences between the Notify-Twilio and Notify-Twilio Direct drivers, including architecture, workflows, Twilio support, and task-initiated conference calls.

Differences between Notify-Twilio and Notify-Twilio Direct

Notify-Twilio (com.snc.notify.twilio)	Notify-Twilio Direct (com.snc.notify.twilio_direct)
This plugin is deprecated. Notify - Twilio Direct Driver now replaces this plugin.	Provides next generation integration with Twilio and Notify.
Uses Java SDK based integration with Twilio.	It is a JavaScript based driver which uses platform provided outbound REST APIs to connect to Twilio.

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Differences between Notify-Twilio and Notify-Twilio Direct (continued)

Notify-Twilio (com.snc.notify.twilio)	Notify-Twilio Direct (com.snc.notify.twilio_direct)
NA	Adds support for various advanced SMS features such as Co-pilot messaging, Twilio Notify bulk SMS.
NA	Adds support for various functionalities in conference calls such as view the participant who is speaking on the conference call, disable beep when someone enters/exits a conference, advanced call features like machine detection and so on.

Migrate to Notify-Twilio Direct driver

Migrating to Notify-Twilio Direct driver provides next-generation integration with Twilio and Notify.

Before you begin

You must be connected to Twilio using the Notify Twilio driver.

Role required: notify_admin

Procedure

1. Navigate to **Notify** > **Administration** > **Twilio Configuration (Legacy)**.
2. Click **Migrate Now**.
3. Click **Ok** on the confirmation dialog.
   A disconnection of the Twilio driver is initiated and the Account SID and Auth Token are copied to Twilio Direct's configuration page. Twilio Direct is then autoconnected to that account, and you are redirected to the driver's configuration page.

Public URLs

On-premise customers should ensure that the URLs are accessible from the Internet for the Notify-Twilio driver to work correctly.

The Notify-Twilio drivers (both new and old) require that specific URLs on the instance be accessible from the Internet by the Twilio server without authentication. If the instance is within a private network, you need to either port forward or set up a reverse proxy.

For the Notify-Twilio driver, the URLs are:

- /NotifyTwilioCallProcessor.do
- /NotifyTwilioCallStatusProcessor.do
- /NotifyTwilioSMSProcessor.do
- /NotifyTwilioDialStatusProcessor.do
- /NotifyTwilioEventProcessor.do
- /NotifyTwilioDialProcessor.do
- /NotifyTwilioRecordingProcessor.do

For the Notify-Twilio Direct driver, the URLs are:

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- /api/sn_twilio_direct/twilio_callbacks/process/twiml/{callback_name}
- /api/sn_twilio_direct/twilio_callbacks/process/xml/{callback_name}

Note:
The *glide.notify.endpoint* property needs to be set to an Internet visible name because the instance name inside a private network can be different from the Internet domain.

Components installed with Twilio Direct driver

Several types of components are installed with the Twilio Direct driver for integration with Notify.

Business rules installed with Twilio Direct driver

Twilio installs the following business rules.

Business rule	Table	Description
Account Connected Disconnected Message	[sn_twilio_direct_twilio_config]	Verifies if Twilio is completely configured and displays an info message.
Calculate test duration	[sn_twilio_direct_callback_test]	Sets the duration for Twilio Callback tests.
Machine detection timeout range check	[sn_twilio_direct_twilio_config]	Verifies the timeout values for detecting the answering machine if the **Detect answering machine**is enabled. The valid range of the timeout is 3-120 seconds.
Move credentials	[sn_twilio_direct_twilio_config]	Moves the account credentials to [sn_twilio_direct_basic_auth]
Populate Credentials	[sn_twilio_direct_twilio_config]	Populates the current SID and Auth token from the [sn_twilio_direct_basic_auth] table to display them.
Set outbound calculated fields & auth	[sn_twilio_direct_twilio_config]	Sets the account credentials in the basic auth profile
Set Reset JWT Key	[sn_twilio_direct_basic_auth]	Copies the auth token from [sn_twilio_direct_basic_auth] to signing key password in [jwt_keystore_aliases].
Validate & set inbound calculated fields	[sn_twilio_direct_twilio_config]	Populates the callback_endpoint field based on the inbound rest field value. Displays an error message if the endpoint URLs are not in the correct format.
Validate Fast Bulk SMS option	[sn_twilio_direct_twilio_config]	When **Twilio Notify bulk SMS** is enabled, validates the Twilio messaging and Notify service id.
Validate Intelligent SMS option	[sn_twilio_direct_twilio_config]	When **Intelligent SMS handling** is enabled, validates the Twilio messaging service id.

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Tables installed with Twilio Direct driver

The tables installed with Twilio Direct driver are described below.

Tables installed with Twilio Direct driver

Table	Description
[sn_twilio_direct_callback_processor]	Extends the application file. Contains scripts which process callback payloads from Twilio and generate appropriate response XML or TwiML document. **Note:** Use caution when editing, deleting or adding new Callback Processor scripts as they are one of the key core components of the driver.
[sn_twilio_direct_twilio_config]	Extends the application file. Contains configuration option values for the driver.
[sn_twilio_direct_basic_auth]	Extends the basic auth credentials. The Account SID and Auth token are stored in this table.
[sn_twilio_direct_callback_test]	Stores the history of callback test runs.

Numbers and number groups

Number groups allow you to group Notify phone numbers and share workflows across grouped numbers.

Each phone number within Notify has an associated number group. Numbers within a group use the same workflows for handling incoming and outgoing calls and SMS messages.

Numbers associated with a group appear on the **Notify Phone Numbers** related list on the Notify Phone Number Group form.

If the number group workflows have incorrect conditions, a warning appears.

Create a number group

Group Notify phone numbers and share workflows across grouped numbers.

Before you begin

Role required: notify_admin

About this task

Each phone number within Notify has an associated number group. Numbers within a group use the same workflows for handling incoming and outgoing calls and SMS messages.

Numbers associated with a group appear on the **Notify Phone Numbers** related list on the Notify Phone Number Group form.

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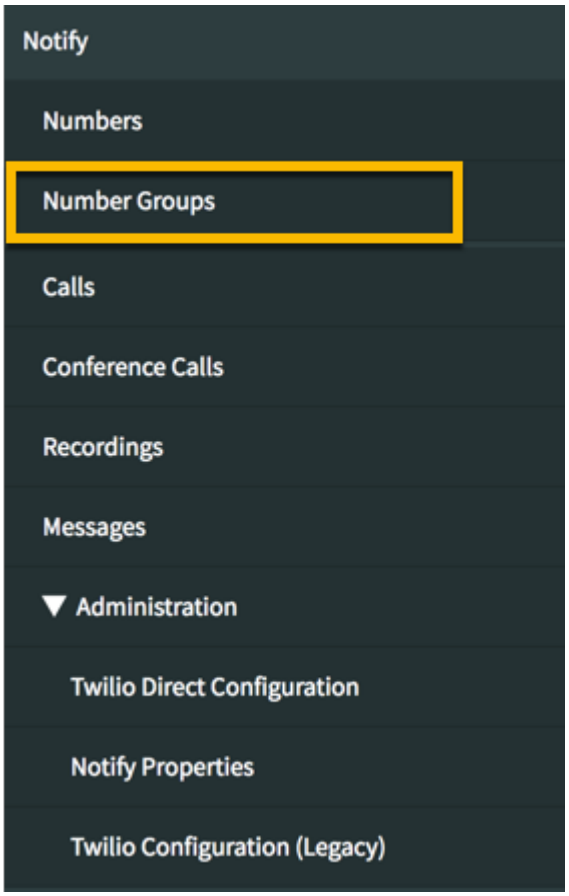
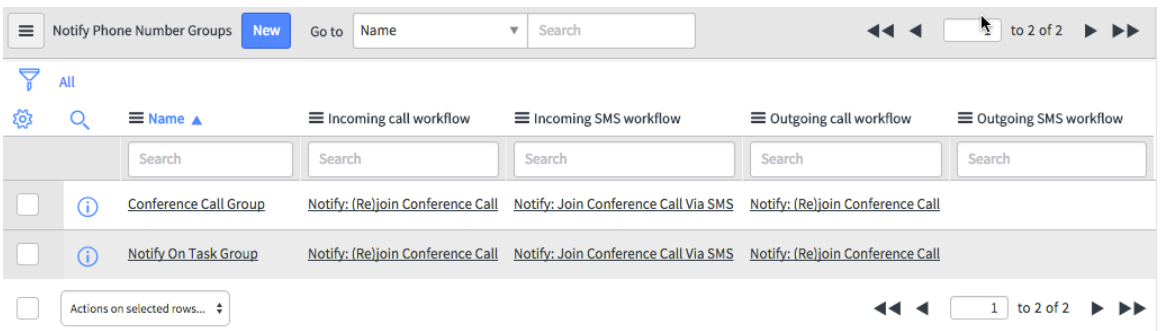
Procedure

1. Navigate to **All** > **Notify** > **Number Groups**.



2. Click **New**.
3. Enter a **Name**, and select **Notify: (Re)join Conference Call** for the **Incoming call workflow** field.



Note:
Ensure not to configure a workflow, which sends an outbound SMS itself, resulting in recursive calling of the workflow.

Field	Description
Name	Unique name for the number group.

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Field	Description
Incoming call workflow	Workflow to run when there is an incoming phone call for this group.
Incoming SMS workflow	Workflow to run when there is an incoming SMS message for this group.
Outgoing call workflow	Workflow to run when there is an outgoing phone call for this group.
Outgoing SMS workflow	Workflow to run when there is an outgoing SMS message for this group. **Note:** The Out of the Box workflow "Notify: Join Conference Call Via SMS" should not be populated for "Outgoing SMS workflow". Populating a workflow that sends an SMS under Outgoing SMS Workflow will trigger the same workflow thus causing recursive loop.

Incoming call workflows must run on the Notify Call [notify_call] table. Incoming and outgoing SMS workflows must run on the Notify Message [notify_message] or Global [global] tables.

Short codes can only be associated with SMS workflow groups. You cannot add an incoming or outgoing call to a short code group.

4. Click **Submit**.

What to do next

Associate a number to a number group

After creating a number group, associate numbers with that group to use the selected workflows.

Note:
Each phone number can only be associated with one number group.

You can create multiple number groups and configure with different Twilio numbers. You can then the associate the number groups with the various workflows based on your requirement.

Associate a number to a number group

Associate a Notify number to a number group to use inbound and outbound workflows.

Before you begin

Role required: notify_admin

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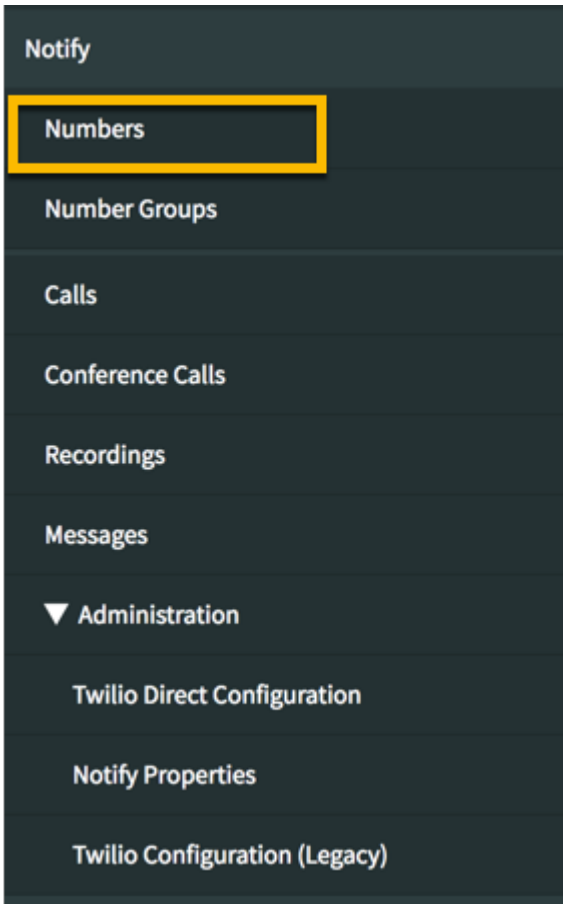
Procedure

1. Navigate to **All** > **Notify** > **Numbers**.



2. Click the listed phone number and assign it to a **Number Group**, as appropriate.

Note:
Each phone number can only be associated with one number group.

Field	Description
Number	Number for the entry.
Phone number	E.164 phone number, if applicable.
Notify group	(Optional) Group to which this number is assigned.
Number owner	Service provider of the number.
Short Code	Short code number, if applicable.
Active	Check box that indicates whether the number is active or not.

3. Click **Update**.

Notify workflow activities

Notify workflow activities manage calls and SMS messages in Notify.

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All Notify workflows that manage a phone call must run on the notify_call table. Call-related Notify activities can be added only to workflows where the **Table** field value is **Notify Call [notify_call]**.

You can identify if an outbound call was answered by a human or by an answering machine from within a Notify workflow by evaluating the *current.is_human* variable, such as with an **If** workflow activity. This variable is set by the telephony provider when an outbound call is answered. This variable is always true for inbound calls.

Note:
Do not add a **Timer** activity between multiple Notify activities that interact with active phone calls.

Important:
When creating a Notify workflow, set the workflow **If condition matches** field to **-- None --**. Notify controls which workflow to run based on the configured number groups.

Related topics

Using variables in Notify workflow activities

Join conference call workflow activity

The **Join Conference Call** activity connects an incoming or outgoing call to a Notify conference call.

Notify includes the workflows Notify: (Re)join Conference Call and Notify: Join Conference Call Via SMS to demonstrate how to use the **join conference call** activity to connect inbound and outbound calls, and inbound SMS messages to a conference call.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Record	Select this check box to record the conference call.
Advanced	Select this check box to display advanced configuration options.
Script	Specify advanced configuration options using JavaScript, such as if the new participant should be muted upon joining the conference call. You can access values from the workflow scratchpad.

Conditions

The conditions determine which transition comes after this activity. The **join conference call** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the confernece_call scratchpad variable is not set.

Scratchpad entries

The activity uses the workflow scratchpad to read persistent values.

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Values read from scratchpad

Scratchpad variable	Description
workflow.scratchpad.conference_call	A GlideRecord for a single conference call record. A call processed by this activity is added to this conference call. If this value is not specified, the **join conference call** activity will log an error. When initiating an outgoing call workflow using the Notify API `call(String notifyPhoneNumber, String toPhoneNumber, GlideRecord conferenceCall)` method, this scratchpad value is set automatically to the conference call GlideRecord. For incoming call workflows, or workflows initiated using a different mechanism, you must explicitly set this scratchpad value.

Enable different attributes available with Join Conference Call activity

System administrators can enable any or all of the below attributes and use them in the Join Conference Call workflow activity.

Attribute	Description
hangupOnStar	When hangupOnStar is enabled (set to true), participants in a conference call can press the * button to disconnect from the call. Control is returned to the workflow, which can be used to trigger customer-defined actions.
muted	When muted is enabled (set to true), the participant will join the conference in a muted state.
beepOnEnter	When beepOnEnter is enabled (set to true), a notification beep is played when a user joins the conference.
beepOnExit	When beepOnExit is enabled (set to true), a notification beep is played when a user leaves the conference.
enableImmediateInput	When enableImmediateInput is enabled (set to true), it allows input of a single digit immediately after the conference ends for this user and sets that in workflow.scratchpad.confDigits. This option will be ignored if hangupOnStar is false.

To enable any of the above attributes, perform the following steps:

1. Navigate to **Workflow** > **Administration** > **Workflow Versions**.
2. Open the Notify: (Re)join Conference Call workflow.
3. Click the **Show Workflow** related link.
4. To modify the workflow, click the WorkFlow Actions icon and click **Checkout**.

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5. Open the Join Conference Call workflow activity.
6. Enable the **Advanced** check box to display the **Script** field.
7. Set the **hangupOnStar** attribute to true in the *config* variable in the script. The default setting is false.
8. Click **Update**.
9. Click the WorkFlow Actions icon and click **Publish** to save the changes.

Similarly, you can enable the other attributes.

Call workflow activity

The **Call** activity makes outbound phone calls using a Notify workflow. This workflow activity can be added to any table.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Notify Number	The Notify phone number to make the call from. When you initiate a call, the outgoing call workflow for the number group associated with this number runs.
Phone number to call	The E.164-compliant phone number to call.
Advanced	Select this check box to use a script to determine number to call, and the Notify number to call from instead of using the **Phone number to call** and **Notify Number** variables.
Script	Define a script that controls which number to call. This script should return a string listing the Notify number sys_id, as well as the phone number to call, such as {notify_number: 'sys_id', phone_number: '+316...'}

Conditions

The conditions determine which transition comes after this activity. The **call** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the call could not be set up due to invalid data returned by the advanced script.

Send SMS workflow activity

The **send SMS** workflow activity to send short text messages using Notify to users' phones. This workflow activity can be added to any table.

Notify requirements

To send SMS messages, you must add and configure a provider in Notify. For more information about configuring a provider, see Configure a provider in Notify.

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Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
From	Select the Notify phone number to use to send the SMS message.
Advanced	Select this check box to use JavaScript to determine which numbers to send the message to, and the Notify number to use to send the message.
To	Select any number of users to send the message to. The user record must have a E.164-compliant phone number or notification device configured for SMS messages.
To (groups)	Select any number of groups to send the message to. All members of that group with an E.164-compliant phone number or SMS notification device receive the message.
Message	Enter the message to send. You can add field values from the current record by using the **Select variables** box. You can also add values from the workflow scratchpad. If a field and a scratchpad variable have the same name, the field value is used. Because you can use variables in this message, it is not possible to determine the length of the message at design time. If the activity sends a message that is longer than supported by the telephony provider, the message is truncated and the instance logs a warning.
To (script)	Enter a script to determine which numbers to send the message to, and the Notify number to use to send the message. The script should return a JavaScript object with the format `{notify_number: \'...sys_id...\', users: [...], groups: [...], numbers: [...]}`. Specify the users or groups to send the message to as an array of sys_id values. Specify other numbers as an array of E.164-compliant phone numbers. This field appears only if **Advanced** is selected.

Conditions

The conditions determine which transition comes after this activity. This activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the Notify number used to make the call is not configured correctly or unable to send SMS messages, or if an error occurs while sending the SMS.

Forward call workflow activity

The **Forward Call** activity forwards a Notify call to an E.164-compliant phone number.

If the person receiving a forwarded call hangs up, the **forward call** activity completes and transitions to the next activity. Any further Notify activities in the workflow run for the caller only.

Input variables

Input variables determine the initial behavior of the activity.

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Input variables

Variable	Description
Phone number to call	Enter the phone number to forward the call to.
Timeout (in seconds)	Enter the amount of time to wait for the call to be answered before hanging up.
Record	Select this check box to record the conversation.

Conditions

The conditions determine which transition comes after this activity.The **forward call** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the phone number to call is invalid.

Input workflow activity

The **Input** activity creates a phone menu by presenting a list of options on a Notify call.

Input Variables

Input variables determine the initial behavior of the activity.

Input Variables

Variable	Description
Number of digits	Specify the maximum number of digits the caller can enter. A caller can enter fewer digits than the maximum and press the **Finish key** to complete the entry.
Finish key	Specify the key a caller can press on their phone when finished selecting a menu option.
Timeout (in seconds)	Specify the amount of time to wait before closing the menu automatically when the caller does not select a menu option.
Advanced	Select this check box to use a script to build the phone menu, instead of using the activity conditions.

Script	Define the script to build the phone menu. The script must specify an *answer* variable as a JavaScript object with the following format:
	`answer = {`
	`"1": {`
	`"play": "https://some_url.com/options/one.mp3",`
	`"myCustomData": "some data here"`
	`},`
	`"2": {`
	`"play": "https://some_url.com/options/two.mp3",`
	`"myCustomData": "some other data here"`
	`},`
	`"3": {`
	`"speak": "type 3 to speak to a representative",`
	`"language": "en-US",`

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Input Variables (continued)

Variable	Description

	`"myCustomData": "some more data here"`
	`}`
	`};`
	
	The script may specify either a text-to-speech string and language code using the *speak* attribute or URL of the music to be played using the *play* attribute. You can also add optional attributes to store related information, such as *myCustomData* in the example above.
	
	Note:
	The script object continues to support *say* attribute for backward compatibility.

Conditions

The conditions determine the transition that comes after this activity.

The **input** activity does not specify any conditions by default. You must define conditions to build the phone menu. Each condition is one option on the phone menu. Notify reads the text from each condition **Name** to the caller, up to 100 characters per condition.

You can specify a language for each condition by prefixing the message with the language code, in the format **xx-XX:<Message>**. For example, add **fr-CA:** for Canadian French. Available languages are stored on the Notify Language [notify_language] table.

The condition that the activity transitions through depends on the digits entered by the caller. Set the condition **Condition** value to **parseInt(workflow.scratchpad.digits) == <expected digits>**. For example, to transition through a condition when the caller presses the number 3, set the **Condition** to **parseInt(workflow.scratchpad.digits) == 3**.

You can add an error condition to this activity. The activity transitions through the error condition if the advanced script returns an invalid value, or if the text to say for a condition is empty.

Scratchpad Entries

The activity uses the workflow scratchpad to write persistent values.

Values written to scratchpad

Entry	Description
workflow.scratchpad.digits	The digits entered by the caller, as a string.

workflow.scratchpad.menu<activity name>	The entire *answer* variable, if using the advanced script option. You can access this menu from other activities after this activity successfully executes.
	
	For example, if the activity name is `choices`, you can access values from the menu using
	
	`var previousActivity = "choices";`
	`var choicesMenu =`
	` workflow.scratchpad.menu[previousActivity];`

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Values written to scratchpad (continued)

Entry	Description

	`var menuItem = choicesMenu[workflow.scratchpad.digits]; // Selects the menu item based on the caller's input.`
	`var selectedValue = menuItem.myCustomData; //get the custom data for the selected menu item.`

Hangup workflow activity

The **Hangup** activity disconnects an active Notify phone call.

You can use the **hangup** activity to disconnect only calls that have been answered. Use the **reject** activity to disconnect calls that have not been answered.

Play workflow activity

The **Play** activity plays a sound file on a Notify call.

Input Variables

Input variables determine the initial behavior of the activity.

Input Variables

Variable	Description
URL	Enter the URL of a sound file to play. If the URL is inaccessible, or if the audio file mime type is not supported by the telephony provider, the **play** activity is skipped.
Loop	Enter the number of times the sound file should play.

Conditions

The conditions determine which transition comes after this activity. The **play** activity does not specify any conditions by default.

You can create an error condition to handle errors with the sound file. The activity transitions through the error condition if the specified sound file is not available, or has an unsupported mime type. Supported mime types are listed on the Notify Audio MIME Types [notify_mime_type] table.

Record workflow activity

The **Record** workflow activity records audio from a user on a Notify call.

Note:
The Record workflow activity records Notify call but not the Notify conference call. To record the Notify conference call, you can set the **Record** activity variable on the Join Conference Call workflow activity.

Input Variables

Input variables determine the initial behavior of the activity.

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Input Variables

Variable	Description
Max duration (in seconds)	Enter the maximum duration, in seconds, allowed for a recording.
Timeout (in seconds)	Enter the amount of time to wait before ending a recording automatically when the caller is silent.
Finish Key	Specify the key a caller can press on their phone to end the recording.

Scratchpad Entries

The activity uses the workflow scratchpad to store persistent values.

The **record** activity adds the *recording* variable to the workflow scratchpad. This variable stores metadata about the recording, such as URI, ID, and duration. You can access the following values from this variable.

Values written to scratchpad

Value	Description
recording.recordingDuration	The duration of the recording, in seconds.
recording.from_number	The caller's phone number, including country code.
recording.notify_number	The Notify phone number used to respond to the call, including country code.
recording.recordingID	The ID used by the telephony provider to identify the recording.
recording.recordingURL	The URL from the telephony provider to access the recording.

Reject workflow

The **Reject** workflow activity rejects an incoming Notify call.

You can use the **reject** activity to disconnect only calls that have not yet been answered. Use the **hang up** activity to disconnect calls that have been answered.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
reason	Select a reason for rejecting the call, such as **busy**.

Say workflow activity

The **say** workflow activity allows you to play a message, using text to speech, on a Notify call.

Input variables

Input variables determine the initial behavior of the activity.

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Input variables

Variable	Description
Text to say	Specify the text to read.
Language	Select the language and locale to use when reading text.
Advanced	Select this check box to use a script to define the language and message, instead of using the **Text to say** and **Language** values.
Script	Define a script to set what text is read on the call. The script must return a string that defines the language and the text to read. For example, to play an English-language message, return {language: 'en-US', text: 'Text to read'}.

Forward to notify client workflow activity

The **forward to notify client** workflow activity connects a phone call to a Notify WebRTC client.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
User	Select the user to connect the call to.
Advanced	Select this check box to use a script to determine which client to connect to, instead of using the **User** variable.
Script	Define a script that controls which client to connect to. This script should return a GlideRecord for a single User [sys_user] record.
Timeout (in seconds)	Enter the amount of time to wait for the call to be connected before hanging up.
Record	Select this check box to record the call.

Conditions

The conditions determine which transition comes after this activity. The **Forward to Notify Client** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if there is an issue with the Notify client.

Queue workflow activity

The **Queue** activity places an active Notify call in a queue.

Add the **Queue** activity to a workflow on the Notify Call [notify_call] table to put the current call on hold. This activity does not specify any input variables.

The queue that the call is added to is given a random ID.

Notify activity event handlers

Notify workflow activities provide JavaScript functions that are invoked automatically when your telephony provider broadcasts certain events.

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When the telephony provider broadcasts an event related to a Notify call, such as the caller hanging up, the event is processed by the workflow associated with that Notify call. All currently-executing Notify activities in that workflow invoke a JavaScript function associated with that event.

Not all activities that support an event provide a default event handler implementation. You can provide an implementation for those event handlers when creating custom Notify activities.

Related topics

Creating Notify activities

Available Notify activity event handlers

Creating Notify activities

Default Notify workflow generally performs a single action, such as initiating a phone call. You can create custom Notify workflow activities to implement more complex functionality.

Use event handler functions in each Notify activity definition to design your own activity behavior. For example, you can set the activity result if the caller hangs up by using the *onCompleted* function.

```
onCompleted: function() {
activity.result = 'call_ended';
},
```

When creating a new Notify workflow activity, follow these design principles.

- Within *onExecute* event handler function, create a new NotifyAction object. Use this object to create a simple or complex action, then serialize the object to the notify_wf_activity table.
- Within the *onUpdate* event handler function, deserialize the NotifyAction object from the notify_wf_activity table and use this object to perform any other operations.
- Use the other event handler functions and the Notify as needed to implement the desired activity behavior.

Related topics

NotifyAction - Global

Notify languages

Notify supports multiple languages when using text-to-speech.

For example, when using the **input** or **say** workflow activities, you can specify which language to use when reading the text.

The list of available languages is stored on the Notify Languages [notify_language] table. By default, languages supported by all Notify telephony providers are available. You can add additional languages if they are supported by your specific telephony provider.

Available Notify activity event handlers

When creating Notify workflow activities, you can use event-handler functions to respond to events from a telephony provider.

Not all activities or telephony providers support all events. For example, the **Reject** activity ends the call before the caller connects so the *onNoAnswer* function is never invoked from this activity.

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Note:
When configuring an activity to respond to an event, ensure that your telephony provider supports that event.

The following table describes available event handlers and lists the Notify workflow activities that can invoke each handler.

Event handlers

Handler	Description	Activities
onExecute	Runs when the activity first runs.	All call-related activities
onUpdate	Runs when the call record associated with the workflow is updated.	All call-related activities
onCompleted	Runs when a call ends.	All call-related activities
onRinging	Runs when a call starts ringing.	Forward call, call, join conference call, forward to notify client
onInProgress	Runs when both parties are connected on a call.	Forward call, call, join conference call, forward to notify client
onNoAnswer	Runs when a call is not answered.	Forward call, call, join conference call, forward to notify client
onBusy	Runs when a called number is busy.	Forward call, call, join conference call, forward to notify client
onFailed	Runs when an error occurs.	All call-related activities

Components installed with Notify

Several types of components are installed with the Notify application.

Roles installed with Notify

Notify adds the following roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Notify administrator [notify_admin]

Administrator with privileges for Notify 2 functionality.

Contains Roles

List of roles contained within the role.

- workflow_admin
- workflow_creator
- workflow_publisher

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

Important:
Avoid granting an admin role when more specialized roles are available.

Notify viewer [notify_view]

Assign to users who need to view notify content.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

This role has read-only access to the Notify Conference Calls table [notify_conference_call] and the Notify Conference Call Participants table [notify_participant].

The itil role inherits the notify_view role when the Incident Communications Management and the Notify plugins are activated.

Tables installed with Notify

Notify adds the following tables.

Tables

Table	Description
Notify Conference Calls [notify_conference_call]	A list of conference calls started using Notify
Notify Calls [notify_call]	A list of calls started using Notify
Notify Call Queue [notify_queue]	A list of calls that are in queue
Notify Call Status [notify_call_status]	List of possible statuses of calls, such as; initiated, ringing, etc.
Notify Client Connected Sessions [notify_client_session]	List of the connected sessions
Notify Conference Call Participants [notify_participant]	List of the participants in a conference call

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Tables (continued)

Table	Description
Notify Conference Call Participant Sessions [notify_participant_session]	List of the associations of a call record and Notify participant record
Notify Messages [notify_message]	List of messages sent from/to Notify
Notify Phone Numbers [notify_number]	List of phone numbers used by Notify to make calls and send messages
Notify Phone Number Groups [notify_group]	List of phone number groups used by Notify to make calls and send messages
Notify Languages [notify_language]	List of the languages that Notify supports when using text-to-speech workflow activities.
Notify Recordings [notify_recording]	List of conference call recordings
Notify Workflow Activity [notify_wf_activity]	List of Notify workflow activities
Notify Audio MIME Types [notify_mime_type]	List of audio file formats
Temporary Serialized Notify Action Cache [notify_action]	List of serialized Notify actions waiting to be processed
Notify SMS Template [notify_sms_template]	Contains the templates which are used while sending a Notify SMS.

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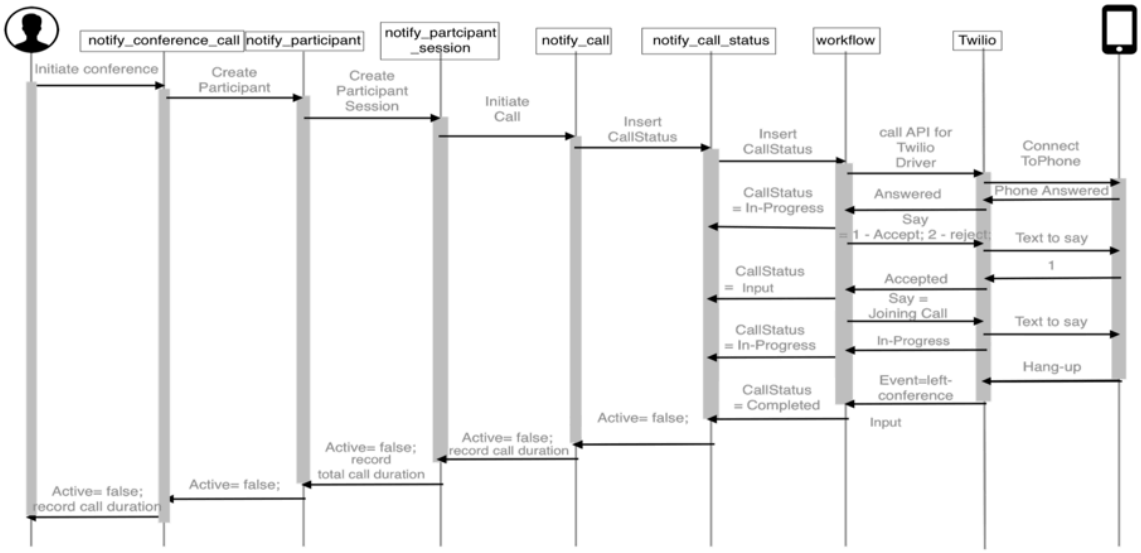
Notify call sequence



Properties installed with Notify

Notify adds the following properties.

Properties for Notify

Property	Description
sn_twilio_driver.max_conference_participants	Twilio maximum limit for number of participants in the conference call.
com.snc.iam.notify_number	The Notify number to use for conference calls. **Note:** This number must have a group configured with conference call workflows.
glide.notify.sms.max_characters	Maximum number of characters allowed to send SMS messages.
glide.enable.notify_on_task	Use this property to enable Notify integration for Task table and its extensions. Entering phone number in 'glide.notify.task.phone_number' property is equivalent to setting this to true.
glide.notify.endpoint	If the instance is accessible on public internet using some other name, which can happen if the instance is within a private network and is accessible via a reverse proxy from outside. In that case the public name needs to be provided here. e.g. https://some_public_domain.com
glide.notify.sms.save_confirmation_in_db	Check **Yes**if you want track the confirmation of opt-in/out requests SMS. The confirmations are saved in notify_message table.

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Properties for Notify (continued)

Property	Description
com.snc.iam.enable_notify	Use this property to enable Notify integration for Incident Communications Management. Entering phone number in 'com.snc.iam.notify_number' property is equivalent to setting this to true.
com.snc.iam.notify_number	The Notify number to use for conference calls. Note that this number needs to have a group configured with conference call workflows.
com.snc.on_call_rotation.notify_webrtc_number	Specify a valid Notify number with voice capability. This will enable On-Call integration with Notify which allows On-Call users to directly call people on rosters from the browser.
sn_major_inc_mgmt.notify_webrtc_number	Specify a valid Notify Number with voice capability. This will enable a specific Major Incident Management integration with Notify which allows Workbench users to directly call people from the browser.

Business rules installed with Notify

Notify adds the following business rules.

Business rule	Table	Description
No Call Workflows for Shortcodes	[notify_group]	Checks and displays an error if the call is being triggered by a short code.
Update Participant Duration	[notify_participant]	Updates participant duration when it becomes inactive.
Check if Notify call exists and active	[notify_participant_session]	Checks if Notify call has valid reference record and updates it if the call is inactive currently.
Update Last Active On	[notify_participant]	Sets the last active before insertion/update of Notify participant.
Show info msg about selection in choice	[notify_group_selector_choice]	Displays a message if either Notify group or conference provider is not selected.
Validate values in the choice	[notify_group_selector_choice]	Checks if either of Notify group or conference provider is filled.

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Business rule	Table	Description
Set scratchpad values	[notify_group_selector_choice]	Checks if conference provider is available by iterating through service provider list.
Show message for empty choices	[notify_group_selector]	Displays an info message if there are no choices for the provider selector.
Clear fields when Manual Selection is set	[notify_group_selector]	Clears out some fields when manual selection is set in Notify group selector table.
Update Participant Duration	[notify_participant_session]	Calculates the duration of participant on conference call.
Update session muted state	[notify_participant]	Sets the value of mute and expelled to true once the conference call participant becomes inactive.
Update conference call	[notify_participant]	Sets the state of conference call based on the participant leaving or joining the call.
Validate Order field value	[notify_group_selector]	Validates order field value to be unique amongst all provider selectors.
Restrict Workflows For only Voice Nums	[notify_number]	Restricts association of voice only capable number with number group having inbound/ outbound SMS workflows.
Restrict Workflows For only SMS Numbers	[notify_number]	Restricts association of SMS only capable number with number group having inbound/ outbound voice workflows.
Validations on default record	[notify_group_selector]	Validates that source table and order field are mandatory in case of default set to false and both fields empty in case of default set to true.
Clearing fields when Default is true	[notify_group_selector]	Clears out some fields when default is set to true.
No Default selector set	[notify_group_selector]	Ensures one active provider selector is set as default.
Check active default selector is unique	[notify_group_selector]	Ensures only one provider selector is set as default.

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Business rule	Table	Description
Process SMS preferences for incoming SMS	[notify_message]	When an SMS preference configuration defined for a particular telephony provider, then apply it for every incoming SMS.
Check default notify group is unique	[notify_group]	Validates that not more than one group is set as default Notify group.
Trigger conference end	[notify_conference_call]	When a conference call ends, triggers the notify.conference.end event
Update Call Active State	[notify_call_status]	Updates the status of the call in notify_call_status with the status received from Twilio.
Update Conference Call Active State	[notify_participant	Updates the active flag in notify_participant table. Also calculates the duration when the call is ended by a participant.
Update Participant Active State	[notify_participant_session]	Updates the active flag for the participant (notify_participant), and calculates the total time on the call upon disconnecting from the call.
Update Participant Session Active State	[notify_call]	Synchronizes the state of the call between notify_call and notify_participant_session. Upon disconnecting from the call, updates notify_participant_session with the duration of the call.
Warn for incorrectly configured workflow	[notify_group]	Checks notify_group table and displays an error if the a workflow is not configured correctly

Manage people and work capabilities

Use these applications to help streamline communications, manage work assignments and interactions, and assess employee skills.

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Advanced Work Assignment



Handle team assignments, route workflow, and provide user assistance.

Skills Management



Assess skills in individuals and teams.

Omnichannel Callback



Connect users and agents with callback service options.

E-signature



Manage signatures for documents or knowledge articles on any device.

Interaction Management



Centralize all communications on the platform for improved service call handling.

Password Reset



Provide secured password reset, user verification options, and more.

ServiceNow Voice



Manage third-party call systems and improve the service call experience for users and agents.

Advanced Work Assignment (AWA)

Maintain and improve your business workflow on the ServiceNow AI Platform. Advanced Work Assignment has options to assign tasks to teams and individual personnel based on availability and demand, as well as their skill levels. Give users the best service possible, with service messaging and role management handled on-the-fly for each task or assignment.

Skills Management

Track the skills that your teams use and need the most, associate skills with groups or individuals, and improve your training and hiring all with this module. Skills Management helps you manage data on various defined proficiencies or sets thereof. Create efficient skill assessments and associate them with teams or single personnel for improved task assignment, find and address knowledge gaps in your organization, and tailor your hiring and training plans.

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Omnichannel Callback

Expand your service contact opportunities with Omnichannel Callback. This module lets agents contact users back when they make calls for help or service requests during high-activity periods. Display or announce callback options in other apps on the ServiceNow AI Platform, configure callback options to route users to live or virtual agents, and more.

E-signature

Handle electronic signatures and acknowledgments with E-signature. Use desktop or mobile interfaces to sign documents and knowledge base articles. Tailor roles related to handling signing, and give users the option to provide typed or drawn signatures, credentials, or acknowledgments.

Interaction Management

Handle all your service interactions in one place with this highly flexible, extensible system. Calls, chats, and other contacts are routed and queued through a centralized location with the Interaction Management System (IMS), enabling every product to use the same framework for communication.

ServiceNow Voice

Keep your service call system working efficiently with Voice. This module integrates easily with third-party phone systems, and reduces navigation through multiple networks for more efficient call center interactions. Added metrics and analytics let managers review call data all in one place.

Advanced Work Assignment

Advanced Work Assignment (AWA) automatically assigns work items to your agents, based on their availability, capacity, and optionally, skills. AWA pushes work to qualified agents using work item queues, routing conditions, and assignment criteria that you define.

Get started

Explore	Configure	Use
		
Learn about Advanced Work Assignment (AWA) concepts and features.	Install Advanced Work Assignment (AWA) and activate relevant plugins. Set up AWA to automatically assign work items to qualified agents using defined work item queues, routing conditions, and assignment criteria.	Use Advanced Work Assignment (AWA) to compose SMS conversations, check work items and AWA events, and enable logging.

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Analytics & Reporting Solutions	Reference	
Work with dashboards, like Platform Analytics Solutions, to analyze information.	Get Advanced Work Assignment (AWA) details for domain separation, components, and properties.	

Exploring Advanced Work Assignment

Use Advanced Work Assignment (AWA) to automatically assign work items to your agents, based on their availability, capacity, and optionally, skills. AWA pushes work to qualified agents using work item queues, routing conditions, and assignment criteria that you define. Agents see their assignments in their Agent Workspace inbox.

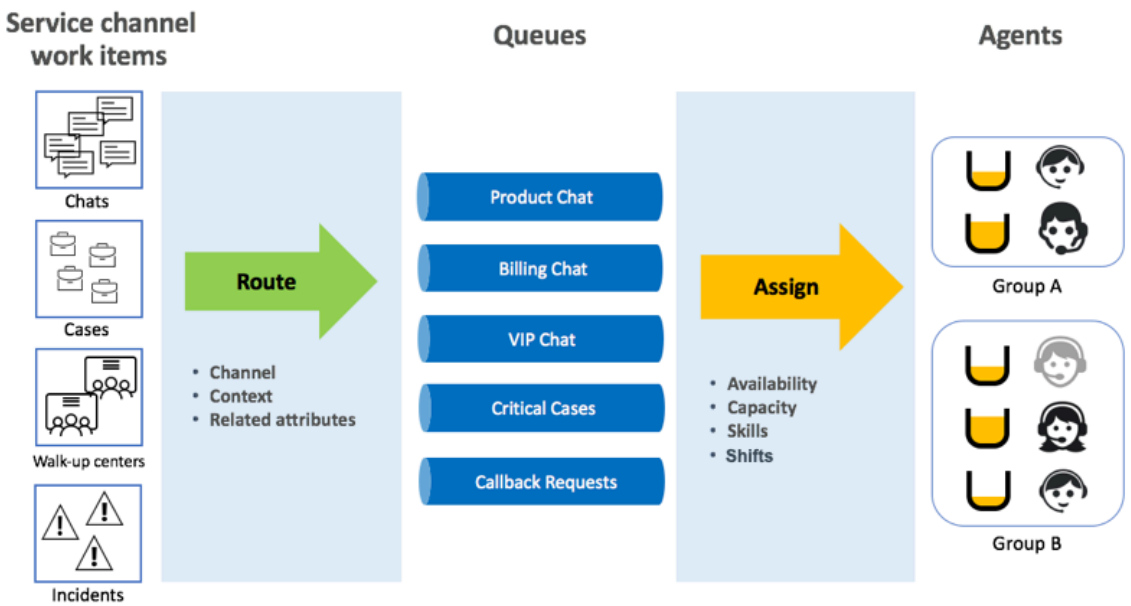
Overview of how AWA works

Customers use different channels to request service, for example, chats, cases, or incidents. Requests from customers create task or interaction records that store information about these objects, called work items. AWA automatically routes work items to queues that focus on certain types of support using criteria (such as priority or customer status) that you provide.

Queues can be defined based on need or type, for example product or critical cases. You also identify the agent groups responsible for work in the queue. AWA then applies assignment rules that you set and uses agent availability, capacity, skills (if defined), and shifts (if defined) to assign work to the most qualified agent.

Workflow

See the following diagram to learn more about the Advanced Work Assignment process flow.



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Navigate to **Advanced Work Assignment** > **Home** to start exploring AWA features.

Benefits

Advanced Work Assignment provides the following benefits.

Benefit	Feature	User
By automating the assignment of work tasks, AWA eliminates manual efforts involved in distributing workloads. Work items are conveniently pushed to the agent's inbox, so that the agent can focus on doing the work, rather than looking for work.	Work assignments	awa_admin or admin
AWA helps organizations make the best use of available resources by matching the right skills and expertise with specific tasks. This leads to reduced idle time and better allocation of talent across the organization.	Configure agent assignment rules	awa_admin or admin
AWA ensures a fair and balanced distribution of work tasks among resources. It takes into consideration factors like workload, capacity, and availability to avoid overloading certain individuals while underutilizing others.	Agent Inbox controls	awa_admin or admin

Advanced Work Assignment components

Service channels

A means of providing customer service. AWA offers base system channels for chats, cases, incidents, and walk-up centers. For each channel, you can set attributes such as agent capacity and utilization conditions to control the work handled in the channel.

Work items

A single piece of work handled by an agent from start to completion. For example, one chat or one case is an object that is routed and assigned to agents.

Work item queues

A queue stores a specific type of work item for a service channel. AWA admins can create queues that focus on certain types of support within the channel, such as VIP customers or critical cases. AWA routes work items to queues based on specific

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conditions or requirements that you define, such as customer status, or region. Groups assigned to each queue handle the incoming work items. After work items are placed in a queue, AWA can then assign items to available agents based on assignment rules and agent availability and capacity.

Assignment groups

Agents belong to specific groups organized by the type of work assigned to them. You provide details about an assignment group including the name and description, manager, and group email. You can also set up roles, groups and group members, queues, and agent capacity overrides for agents in an assignment group.

Assignment rule

Criteria that determines how work items are pushed to the appropriate agent within a qualified assignment group.

Agent capacity

The maximum number of work items on a particular service channel that an agent may actively work on at one time. If you want to set a maximum capacity for an agent across all service channels, define the maximum universal capacity for that agent. For information on configuring the maximum universal capacity, see Configure an agent's maximum universal capacity. Messaging Interactions in an On Hold state aren't calculated as part of an agent's capacity.

Agent availability

States that indicate agent presence and whether the agent is available for work or is busy or offline. AWA uses the agent availability state to determine if an agent is able to receive work.

Inbox layout

A configuration tied to a service channel that defines which fields of a record representing a work item are shown in agent inboxes. A layout defines what the agent sees in Agent Workspace.

Reassigning messaging conversations

If you want messaging conversations to be automatically reassigned if the current Assigned To agent on the conversation isn't available, set the *`glide.messaging.reassign.enabled`* system property to `true`. The system property only affects messaging conversations and the Assigned To agent is considered not available if the AWA Inbox status isn't set to "Available."

Configuring Advanced Work Assignment

Quickly install the required and popular plugins through the plugin page after selecting any **Get [plugin]** button on the Advanced Work Assignment home page. Plan and configure Advanced Work Assignment (AWA).

Before you begin

The AWA home page appears after you have installed and updated the Omni-Experience Standard Feature Set to the latest version through the ServiceNow Store.

Role required: admin

About this task

After installing the Advanced Work Assignment plugin and any relevant org-specific plugins, the following list outlines the basic planning and configuration steps that you must determine for AWA:

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- Determine what to route – Configure the base service channels to be used.
- Determine where to route – Define the work item queues and the routing rules, execution order, work item sort order, and strategy.
- Determine how to assign work items – Define the assignment rules that determine the work items pushed to agents.
- Determine what the agent sees – Set the inbox card layouts and presence (availability) states that agents use in their Agent Workspace inbox.

Procedure

1. Navigate to **Advanced Work Assignment** > **Home**, and then select the **Get Advanced Work Assignment plugin** button from the First, install a required plugin section.

   Note:
   Only users with the sys_admin role can install a plugin from the Advanced Work Assignment home page. For example, if a user with the awa_admin role tried to install the Advanced Work Assignment plugin, they're prompted to contact their administrator for installation. After the Advanced Work Assignment plugin is installed, all AWA home page options are available in the application navigator for users with the admin and awa_admin roles.

   The All Applications page opens in a new window or tab.
2. In the All Applications page, select **Install** and complete the installation prompts.
   The AWA home page experience refreshes and the Get targeted routing capabilities section appears.
3. **Optional:** Install org-specific AWA plugins through the **Get plugin** button for ServiceNow® IT Service Management (ITSM), ServiceNow® Customer Service Management, and/or ServiceNow® HR Service Delivery (HRSD) plugins.
   The AWA home page experience refreshes and the Get the most popular plugins section appears.
4. **Optional:** Install popular plugins, such as Agent Chat, Walk-up Experience, and/or Performance Analytics, to boost your AWA experience.
5. In the Essential settings section, select **Set up service channels** to configure the service channels that you activated.
   a. Create or change an inbox layout.
   b. Override agent capacity, as needed.
6. In the Essential settings section, select **Set up queues** to create work item queues for your service channels.
   a. Set the sort order for work items in the queue.
7. In the Essential settings section, select **Set up assignment rules** to configure the work assignment rules used to push work to the appropriate agents.
8. **Optional:** In the Additional settings section, consider configuring the following parameters to improve your AWA functionality.
   a. Select **Set up presence states** to configure availability states states that agents use to indicate whether they can receive work or are offline or away.
   b. Select **Set up reject reasons** to define the reject reasons that agents can use to decline work assignments that they receive in their Agent Workspace inbox.

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c. Select **Set up universal capacity** to configure your team's maximum universal capacity to prevent an agent from being assigned too many work items.

d. Select **Set up groups** to create groups of user sets who share a common purpose.

9. **Optional:** In the Advanced settings section, consider configuring the following parameters to improve your AWA functionality.

> **Note:**
> Advanced settings cards appear conditionally after installing their respective plugin.

a. Select **Set up Agent Affinity** to create or change the Agent Affinity rules that route work items in Advanced Work Assignment.

b. Select **Set up Shift-based Assignment** to assign work items to agents based on shifts.

Advanced Work Assignment home page

Explore, implement, and maintain ServiceNow® Advanced Work Assignment using a home-page experience. Discover AWA, install relevant plugins, and configure settings for AWA through the Advanced Work Assignment home page available to admins.

Advanced Work Assignment home page advantages

The Advanced Work Assignment home page makes it easy for you to get started and work toward achieving positive outcomes with your implementation. The Advanced Work Assignment home is ideal for first-time users who have never installed or configured Advanced Work Assignment (AWA), to experienced users looking to expand capabilities and maintain existing implementations.

AWA home provides the following features:

- Cards that guide you through the order of essential settings, like creating service channels, configuring queues, and adding assignment rules. Cards that redirect you to additional and advanced settings, such as configuring presence states, setting up reject reasons, determining universal capacity, setting up agent affinity, and establishing shift-based assignments.
- Lists of installed and available plugins.
- Quickly install plugins through the plugin page. The plugin page appears in either a new window or tab after selecting any **Get [plugin]** button. The plugin page opened dialog box appears on the home page, where you can select **Not Now** to continue with your current home page experience or **Done** to refresh the home page after your plugin's installation.
- Access to helpful resources and videos to help you learn more about configuring and managing AWA.

Navigate to **Advanced Work Assignment** > **Home** to start exploring AWA features.

> **Important:**
> The AWA home page appears after you have installed and updated the Omni-Experience Standard Feature Set to the latest version through the ServiceNow Store. Existing customers don't need to install it from the store. However, subsequent updates are available there. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Planning, installing, and exploring AWA

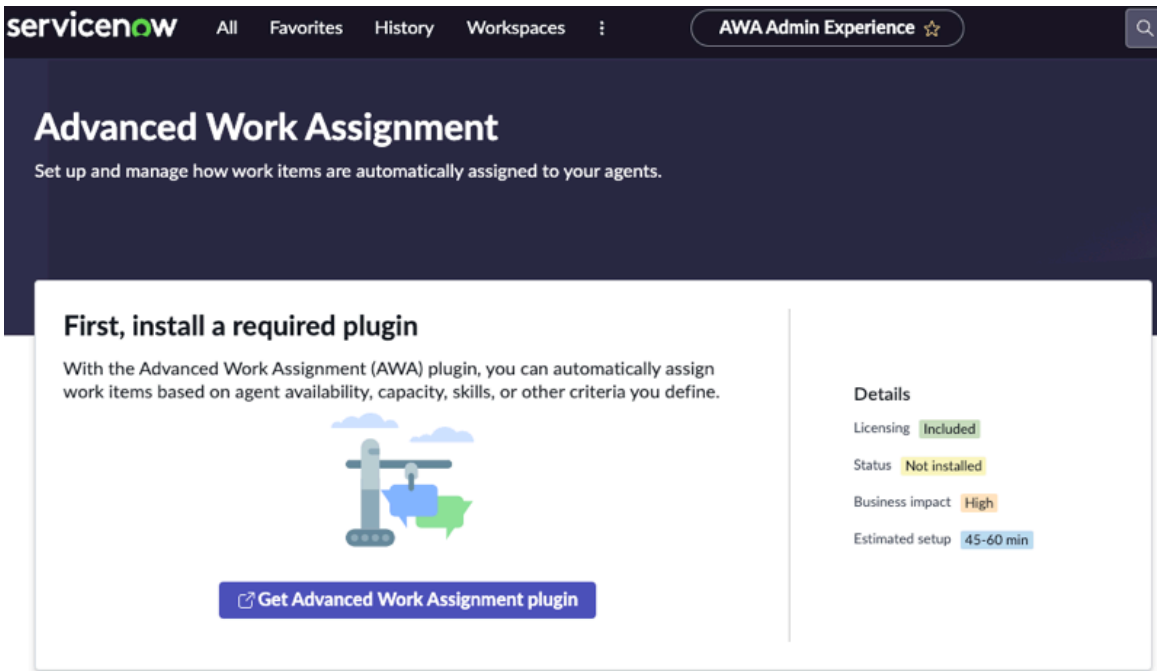
If you've never installed AWA, the Advanced Work Assignment home page prompts you to do so first. Before implementing AWA, take some time to reflect on a few important questions in the Think through these questions with your team Think through these questions with your team list. These questions are meant to help you envision the AWA experience that you need and want for your business. Expand the available questions to explore more thoughtful considerations, such as what queues would work best for your team and what skills does your team have.

The layout of the home page may vary, depending on which features you've installed and configured.

First, install the required plugin

Install the Advanced Work Assignment plugin to begin. Select **Get Advanced Work Assignment plugin** to install it.

> **Note:**
> Only users with the sys_admin role can install a plugin from the Advanced Work Assignment home page. For example, if a user with the awa_admin role tried to install the Advanced Work Assignment plugin, they're prompted to contact their administrator for installation. After the Advanced Work Assignment plugin is installed, all AWA home page options are available in the application navigator for users with the admin and awa_admin roles.



Get targeted routing capabilities

Activate org-specific AWA plugins through the **Get plugin** button to route work items to the right agents for ServiceNow® IT Service Management (ITSM), ServiceNow® Customer Service Management, and ServiceNow® HR Service Delivery (HRSD) plugins. These plugins enable org-specific service channels in AWA including configured data and demo data.

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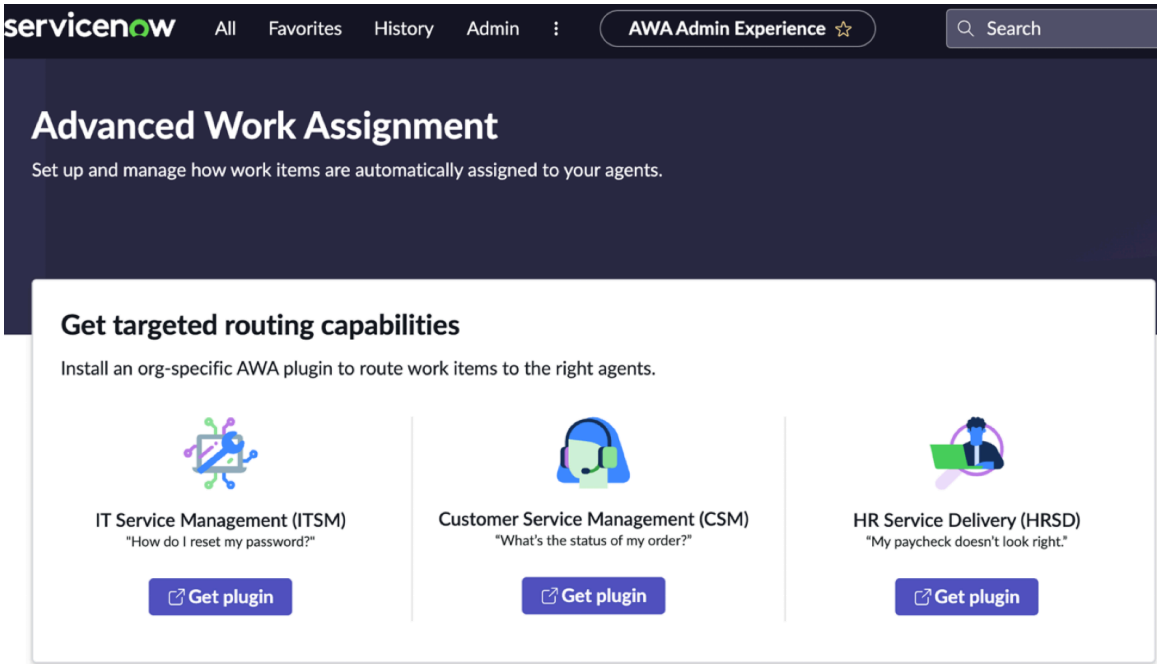
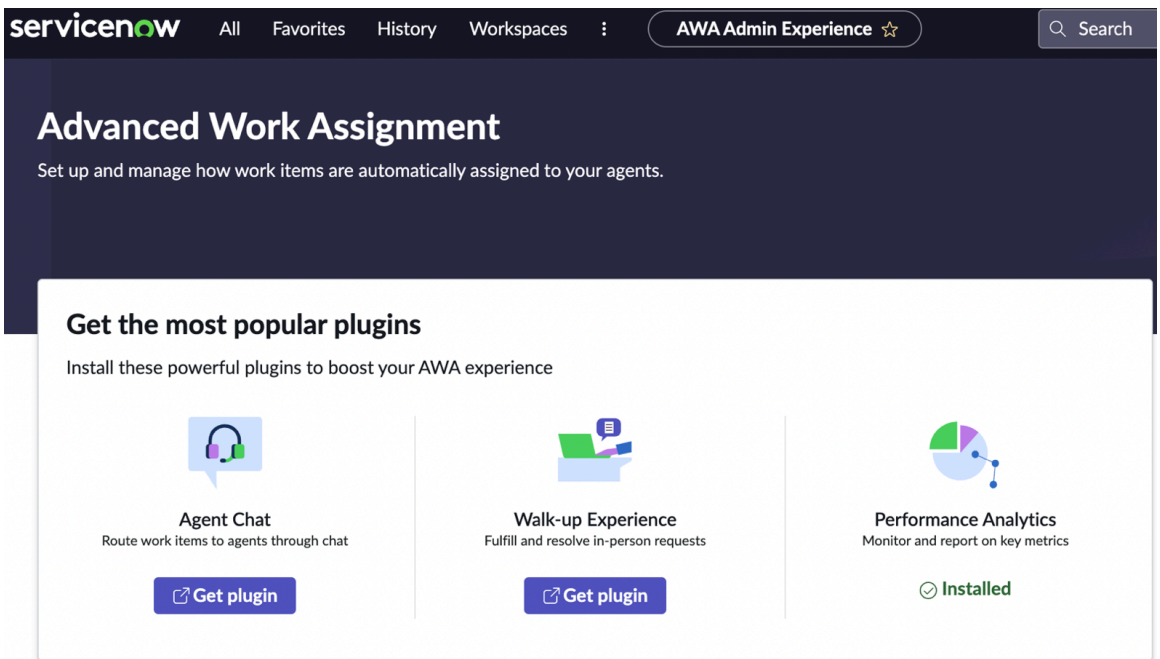


Get the most popular plugins

After installing any of the targeted routing capabilities plugins, install these popular plugins to boost your AWA experience.

- Agent Chat: The Agent Chat plugin enables the Chat service channel in AWA and chat monitoring in Agent Workspace.
- Walk-up Experience: The Walk-up Experience plugin activates the walk-up contact service channel for pre-built technology lounges.
- Performance Analytics: The Performance Analytics plugin activates the Performance Analytics Content Pack for AWA.



Watch and learn

Watch the embedded AWA implementation guide for more information about installing and implementing AWA directly from the right side of the home page.

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Helpful Resources

Explore the helpful AWA resources such as release notes, product documentation, and ServiceNow Community forums and content directly from the right side of the home page. These resources give you information to understand the configuration process and the benefits of setting up AWA features.

Installed Plugins

View a list of installed plugins. Admin role users can select a plugin's link to have that application's plugins page appear in a separate window or tab.

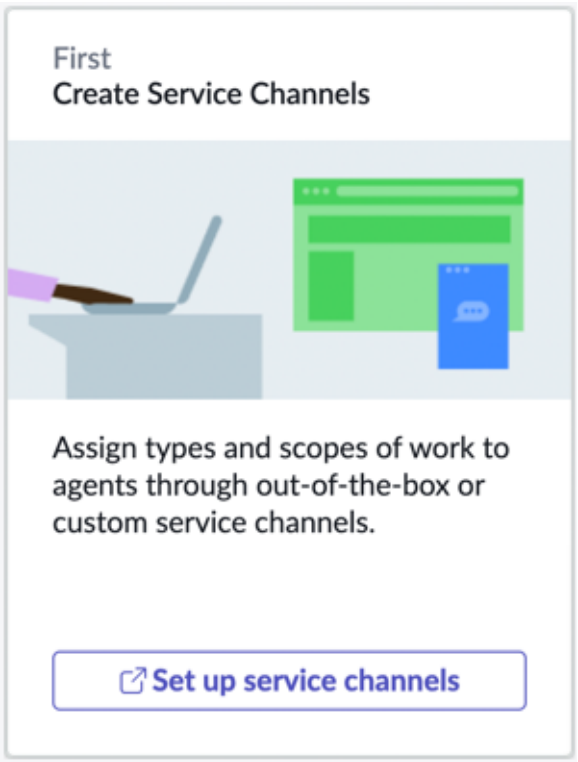
Available Plugins

View a list of available plugins that help save time setting up AWA. Admin role users can select a plugin's link to have that application's plugins page or ServiceNow Store site appear in a separate window or tab. Awa_admin role users can view a store app's plugin page to learn about the plugin, but only admin role users can install plugins.

Configuring essential AWA settings

Follow the order of the guided configuration setup to establish your AWA settings in the most logical order.

Essential settings cards

Card	Feature	Description
	Create Service Channels	Give customer support by automatically routing incoming work to agents through service channels. Service channels assign a specific type and scope of work to agents.

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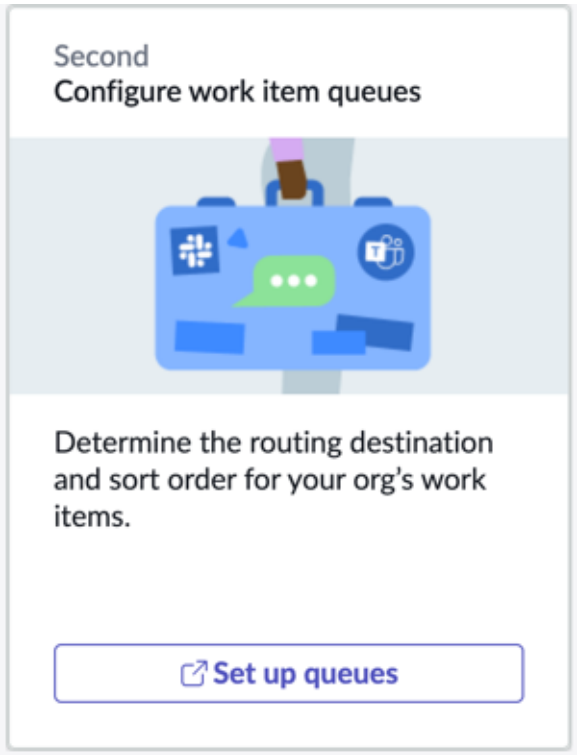
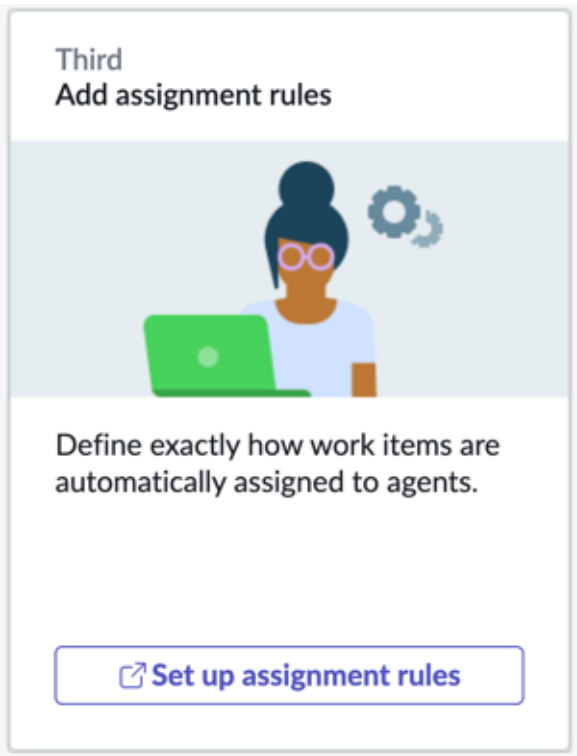
Essential settings cards (continued)

Card	Feature	Description
	Configure work item queues	Determine routing conditions and destinations for queues.
	Add assignment rules	Establish assignment criteria to agents who either have gone the longest without being assigned a work item, have the most work availability, or have the needed skills.

Configuring additional and advanced AWA settings

The additional card settings expand your organization's ability to maximize productivity with AWA.

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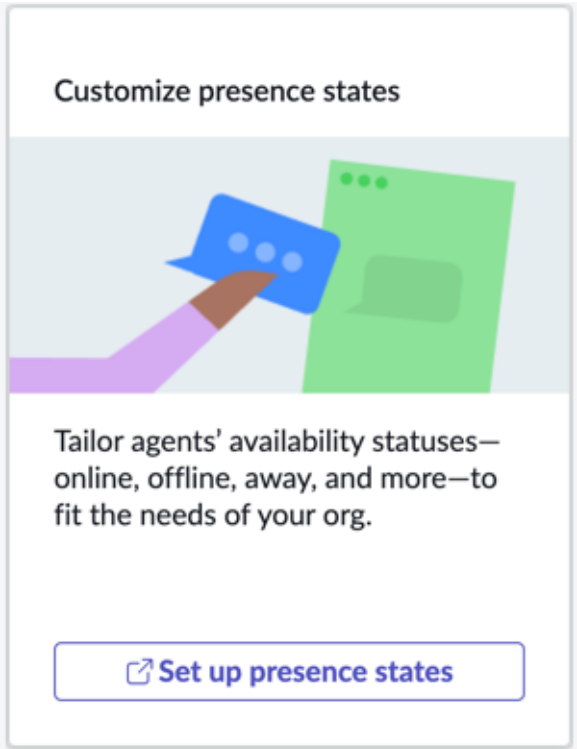
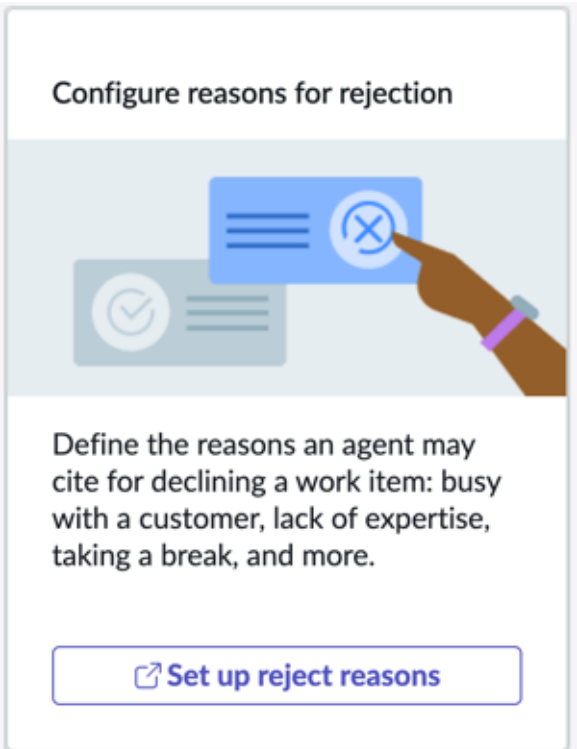
Additional settings cards

Card	Feature	Description
	Customize presence states	Configure availability states that agents use to indicate whether they can receive work or are offline or away.
	Configure reasons for rejections	Define the reasons that agents can use to decline work assignments that they receive in their Agent Workspace inbox.

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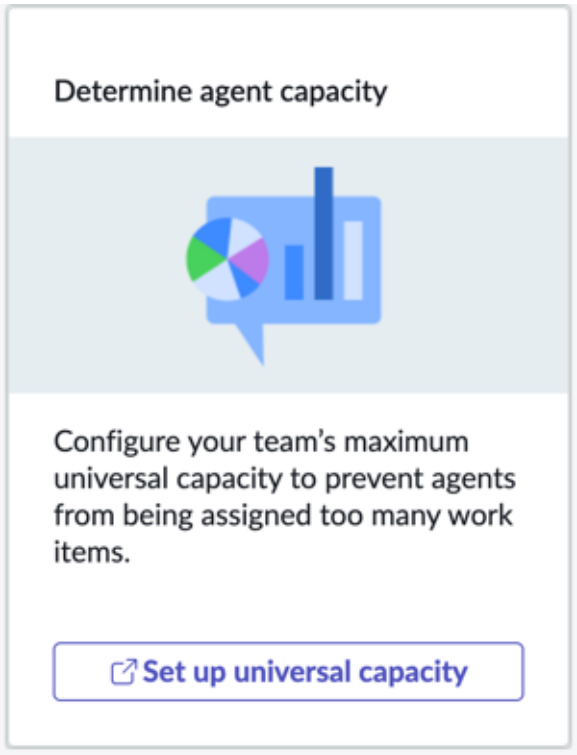
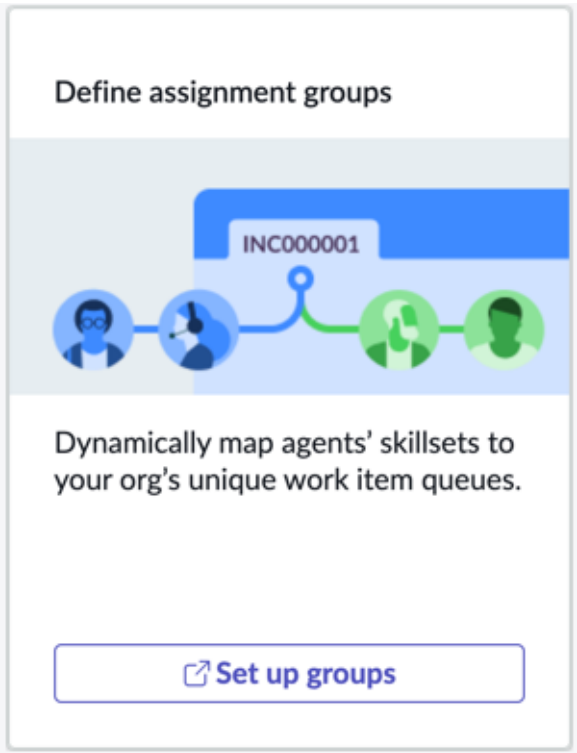
Additional settings cards (continued)

Card	Feature	Description
	Determine agent capacity	Configure your team's maximum universal capacity to prevent an agent from being assigned too many work items. If the agent's maximum universal capacity has been reached, additional work items aren't assigned to the agent.
Select **See More** to view this card. 	Define assignment groups	Create groups of user sets who share a common purpose.

Advanced settings cards appear conditionally after installing their respective plugin.

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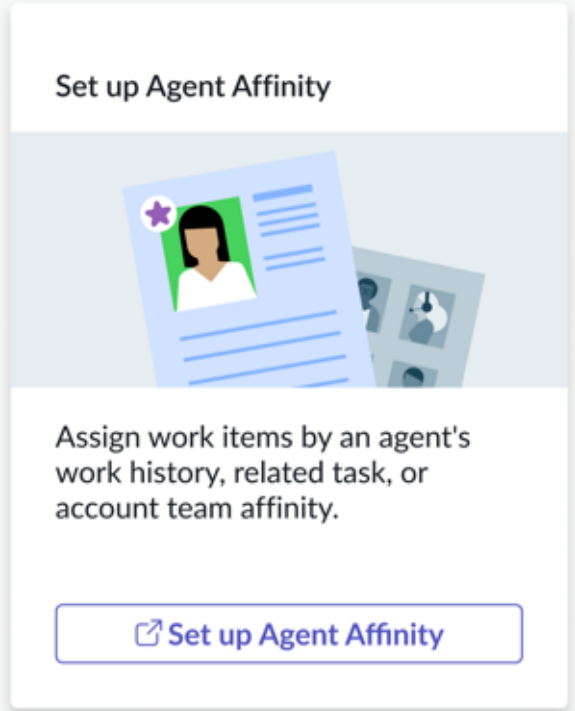
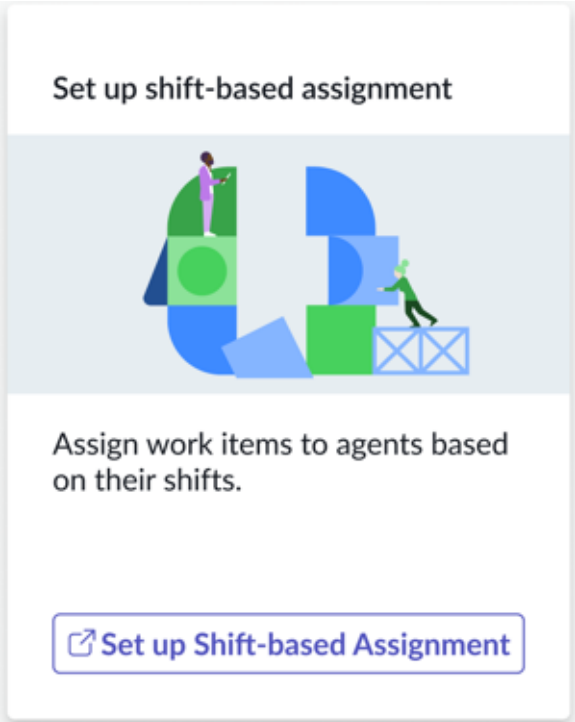
Advanced settings cards

Card	Feature	Description
	Set up Agent Affinity	Install the Agent Affinity plugin for this card to conditionally appear. Create or change the Agent Affinity rules that route work items in Advanced Work Assignment.
	Set up shift-based assignment	Install either one or both of the following plugins for this card to conditionally appear: • Workforce Optimization for Customer Service • Workforce Optimization for ITSM Assign work items to agents based on shifts.

Get started with Advanced Work Assignment

To implement Advanced Work Assignment, complete these initial configuration and setup steps.

Before you begin

Role required: awa_admin and admin

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Procedure

1. Navigate to **All** > **Advanced Work Assignment** > **Home**.
2. Select **Get Advanced Work Assignment plugin** to install the Advanced Work Assignment plugin for your instance.
   The All Applications page opens in a new window or tab.
3. In the All Applications page, select **Install** and complete the installation prompts.
4. Go back to the Advanced Work Assignment (AWA) home page, and then select **Done** on the Plugin page opened dialog box.
   The AWA home page experience refreshes and the Get targeted routing capabilities section appears.
5. Select **Get plugin** to activate org-specific IT Service Management (ITSM), Customer Service Management, and HR Service Delivery (HRSD) plugins.
   The All Applications page opens in a new window or tab.
6. In the All Applications page, select **Install** and complete the installation prompts.
7. Go back to the Advanced Work Assignment (AWA) home page, and then select **Done** on the Plugin page opened dialog box.
   The AWA home page experience refreshes and the Get the most popular plugins section appears.
8. **Optional:** Install additional plugins through various ways.
   - Select **Get plugin** to install popular plugins.
   - Select the plugin name from the Available Plugins sections.

   The All Applications page opens in a new window or tab.
9. **Optional:** In the All Applications page, select **Install** and complete the installation prompts.
10. **Optional:** Go back to the Advanced Work Assignment (AWA) home page, and then select **Done** on the Plugin page opened dialog box.

    (Optional) The plugin page opened dialog box only appears when you install plugins from the Get the most popular plugins section.

    The AWA home page experience refreshes and either the Get the most popular plugins section refreshes with the installed plugin or the plugin appears under the Installed Plugins section.
11. In the Essential settings section, select **Set up service channels** to configure the service channels that you activated.
    a. Create or change an inbox layout.
    b. Override agent capacity, as needed.
12. In the Essential settings section, select **Set up queues** to create work item queues for your service channels.
    Set the sort order for work items in the queue.
13. In the Essential settings section, select **Set up assignment rules** to configure the work assignment rules used to push work to the appropriate agents.
14. **Optional:** In the Additional settings section, consider configuring the following parameters to improve your AWA functionality.
    a. Select **Set up presence states** to configure availability states that agents use to indicate whether they can receive work or are offline or away.
    b. Select **Set up reject reasons** to define the reasons that agents can use to decline work assignments that they receive in their Agent Workspace inbox.

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c. Select **Set up universal capacity** to configure your team's maximum universal capacity to prevent an agent from being assigned too many work items.

d. Select **Set up groups** to create groups of user sets who share a common purpose.

15. **Optional:** In the Advanced settings section, consider configuring the following parameters to improve your AWA functionality.

> **Note:**
> Advanced settings cards appear conditionally after installing their respective plugin.

a. Select **Set up Agent Affinity** to create or change the Agent Affinity rules that route work items in Advanced Work Assignment.

b. Select **Set up Shift-based Assignment** to assign work items to agents based on shifts.

Activate Advanced Work Assignment

You can activate the Advanced Work Assignment plugin (com.glide.awa) if you have the admin role.

Before you begin
Role required: admin

About this task
Advanced Work Assignment activates the Skills Management plugin (com.snc.skills_management) to implement user and group skills.

Plugins for Skills Management

Plugin	Description
Skills Management [com.snc.skills_management]	Implements user and user group skills. Based on the same principles of roles management, which uses inheritance between user groups.

Procedure

1. Navigate to **All** > **Advanced Work Assignment** > **Home**.
2. Select **Get Advanced Work Assignment plugin** to install the Advanced Work Assignment plugin for your instance.
   The All Applications page opens in a new window or tab. If you don't see the **Get Advanced Work Assignment plugin** button, you either don't have the permissions to install the plugin, or the plugin has already been installed.
3. In the All Applications page, select **Install** and complete the installation prompts.
4. In the Advanced Work Assignment (AWA) Home experience's Plugin page opened dialog box, select **Done**.
   The AWA Home experience refreshes, the Get targeted routing capabilities section appears, and AWA is installed.

What to do next
Activate the targeted routing capabilities plugins and other popular AWA plugins to enable the appropriate service channels and the Platform Analytics Solutions for Advanced Work Assignment.

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Activate related plugins for Advanced Work Assignment

After activating the Advanced Work Assignment plugin, activate related AWA plugins to enable other base system service channels and the Performance Analytics Solutions dashboard for AWA.

You must have the admin role to activate these additional plugins for AWA.

Targeted routing capabilities plugins

Install the following plugins from the AWA Home experience's Get targeted routing capabilities section or the Available Plugins section. If you'd rather search for each plugin individually, see Activate a plugin.

Plugin	Description
Advanced Work Assignment for Incidents [com.snc.incident.awa]	Enables the Incident service channel in AWA. Includes a default configuration to support AWA for incidents.
Advanced Work Assignment for CSM [com.sn_csm.awa]	Enables the Case service channel in AWA. Includes configuration data supporting routing, queuing, and assignment of CSM cases.
Advanced Work Assignment for HRSD [com.sn_hr_awa]	Enables base system configuration data supporting routing, queuing, and assignment of HRSM cases, chats, and calls to agents.

Popular plugins

Install the following plugins from the AWA Home experience's Get the most popular plugins section or the Available Plugins section. If you'd rather search for each plugin individually, see Activate a plugin.

Plugin	Description
Agent Chat [com.glide.interaction.awa]	Enables the Chat service channel in AWA and chat messaging in Agent Workspace. Includes default configuration data for chats, including demo data.
Walk-up Experience [com.snc.walkup]	Activates the walk-up contact service channel for prebuilt tech lounges. Enables an IT organization to support online and off-site checkin.
Performance Analytics Content Pack – Advanced Work Assignment [com.snc.pa.awa]	Activates the Performance Analytics Content Pack for AWA. Provides base system KPIs.

Move from Connect Support to Advanced Work Assignment and Agent Chat

Move from ServiceNow® Connect Support to Agent Chat (live chat), which is the messaging system that agents use in Agent Workspace to interact with customers. Moving from Connect Support also involves using Advanced Work Assignment (AWA) to create the chat queues for routing chat work items to agents.

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Before you begin

Role required: admin

Important:

As of Utah, Connect Support is deprecated. For similar capabilities, please move to Advanced Work Assignment and Agent Chat.

About this task

Moving to modern applications such as Advanced Work Assignment and Agent Chat offers features and benefits that are not available in Connect Support. These new capabilities include:

- Automatic assignment of chats and work items to agents based on criteria that you define, such as agent availability, capacity, skills, Agent Affinity, and variable work item sizing.
- Automatic queue overflow handling
- Chat timeout reassignment
- Native Chat surveys
- Supervisor features, such as Agent Whisper, that enable managers to join ongoing public customer chats with agents or send private messages to agents.
- Agent features, such as workspace inbox controls for viewing, accepting, or rejecting incoming chats.

If you are currently using Connect Support APIs, see AWA Routing API for information on AWA APIs.

Procedure

1. Navigate to **All** > **Advanced Work Assignment** > **Home**.
2. Activate the Advanced Work Assignment and Agent Chat plugins if they are not currently active.
3. If needed, review your existing Connect Support chat queues and determine whether you want to create a similar set of queues for the Chat service channel in AWA.

   Note:
   You cannot use your Connect Support chat queues in AWA. Chat queues for Connect Support are stored in the Chat Queue [chat_queue] table. Chat queues for AWA are stored in the AWA Queue [awa_queue] table.

4. In the AWA Home page, configure the Chat service channel, create the associated chat queues, and establish agent work assignments.
5. In Agent Chat settings, access the Chat Setup form to specify Agent Workspace as the fulfiller interface for live chat and enable other live chat features.
6. Activate the chat client on your end user Service Portal.

Trouble?

Troubleshooting suggestions include these common problems and solutions:

Problem: While using AWA, the chat remains in routing and is not offered to an available agent.

Solution: This problem may happen if AWA attempts to route the chat to a Connect Support queue. In this case, the interaction remains assigned to the Virtual Agent user and no

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awa_work_item record is created. A common cause of this problem is the Chat Setup entry for the chat's application still being set to **Connect**.

Problem: When trying to route to a live agent, the requester is incorrectly told that no live agents are available.

Solution: This problem may be caused by one of these situations:

- Queue conditions that depend on checking interaction fields or context were created on the interaction too late for routing.
- Chat service channel is not associated with the Available presence state. A common cause of this problem is deactivating and reactivating the Chat channel.

Debugging suggestions include these questions to consider:

Here are a few questions to ask and places to look if agents are not receiving chats:

- Does an awa_work_item record exist for the interaction? If it does not, is the **Assigned to** field for the interaction empty or is it set to Virtual Agent? If the **Assigned to** field is set to Virtual Agent, it is probably trying to use Connect Support.
- In the Chat setup, are the fulfillers set appropriately for each application?
- In the interaction_json_blob referenced by the **interaction.context_document** field, is the *`Liveagent_application`* variable set to the expected value?

Install Conversational SMS service channel

You can install the Conversational SMS service channel application (sn_awa_sms_int) if you have the admin role. The application installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- The Conversational Messaging plugin (com.glide.messaging.awa) must be installed.

  For more information on activating plugins, see Activate a plugin.

Role required: admin

About this task

Note:
The Conversational SMS service channel is automatically installed with an application that implements an SMS provider, such as the Conversational SMS Integration with Twilio (sn_va_sms_twilio) application. For more information, see Install Conversational SMS Integration with Twilio.

Procedure

1. Navigate to **All** > **Advanced Work Assignment** > **Home**.
2. In the Available Plugins section, select **Conversational SMS**.

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Note:
If you cannot find the application, you may have to request it from the ServiceNow Store. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

3. Select **Install**, and then in the Install dialog box, select **Install**.

What to do next
Set up the Conversational SMS service channel

Activate Agent Affinity

You can activate the Agent Affinity plugin (com.glide.awa.agent_affinity) if you have the admin role.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Advanced Work Assignment** > **Home**.
2. In the Available Plugins section, select **Agent Affinity**.

Note:
If the plugin doesn't appear in the Available Plugins section, try searching for the plugin using the search bar. You can search for the plugin by its name or ID. If you can't find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install/Update All**, and then in the Install dialog box, select **Install**.

Note:
When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

Activate Conversational Messaging

You can activate the Conversational Messaging plugin (com.glide.messaging.awa) if you have the admin role.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Advanced Work Assignment** > **Home**.
2. In the Available Plugins section, select **Conversational Messaging**.

Note:
If the plugin doesn't appear in the Available Plugins section, try searching for the plugin using the search bar. You can search for the plugin by its name or ID. If you can't find a plugin, you might have to request it from ServiceNow personnel.

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3. Select **Install/Update All**, and then in the Install dialog box, select **Install**.

Note:
When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

Service channels

Provide customer support by automatically routing incoming work to agents through service channels.

A service channel is a means of assigning a specific type and scope of work to agents. You can configure base system service channels to set the context and attributes that define work handled in the channel, or create your own custom service channel.

Advanced Work Assignment provides several service channels from which work items originate. These channels are:

Service channel	Description	Plugin
Case	Routes and assigns customer service cases.	Included with Customer Service
Chat	Routes and assigns chat interactions.	Included with the Agent Chat plugin (com.glide.interaction.awa).
Chat - Asynchronous	Routes long-running conversations that use multiple service channels.	Included with the Conversational Messaging plugin (com.glide.messaging.awa).
Facebook Messenger	Routes requests from the Facebook Messenger chat conversations.	Included with the Conversational Integration with Facebook Messenger store application.
Incident	Routes and assigns incidents.	Included with the Advanced Work Assignment for incidents plugin (com.snc.incident.awa).
Line	Routes requests from LINE chat conversations.	Included with the Conversational Integration with LINE store application.
SMS	Routes long-running SMS conversations and conversations that use multiple service channels.	Included with the Install Conversational SMS service channel application.

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Service channel	Description	Plugin
Walk-up	Routes requests from walk-up contact channels.	Included with the Walk-up Experience plugin (com.snc.walkup).
WhatsApp	Routes requests from the WhatsApp chat conversations.	Included with the Conversational Integration with WhatsApp (powered by Twilio) store application.

You can also set up a custom service channel to address work that is not supported in the base system channels. For more information, see Set up a custom service channel.

For each service channel, you set attributes such as:

- Agent capacity: Amount of work that can be handled by the agents supporting the channel.
- Filters: Conditions that filter the type of work handled in the channel.
- Utilization: Conditions that determine when work items are generated.

For each service channel, you also:

- Create the agent inbox card layout used in Agent Workspace.
- Set capacity overrides for specific agents.
- Review and modify associated work item queues. For the Chat service channel, you can create queues using the **Queues** related list.

Service channel capacity and utilization

In Advanced Work Assignment, capacity is the number of work items automatically assigned to agents supporting a service channel. Utilization is the condition that identifies the work item states supported in the channel.

Agents have an assigned capacity for each service channel. This capacity is based on the default capacity set for the channel. The agent capacity for one service channel (for example, chat) does not interfere with the capacity on other service channels (for example, case or incident). Admins can set the **Default capacity** for a channel on the Service Channel form. This setting applies to all agents supporting the channel.

Managers can override the default capacity for:

- Individual agents, by using the **Agent Capacity Override** related list on the Service Channel form.
- Groups of agents, by using the **Agent Capacity Override** related list on the Group form.

If an agent already has a capacity override, setting the override again updates the existing capacity for that agent. Override capacity is stored in the Agent Capacity (awa_agent_capacity) table.

Create or configure a service channel

Create or configure a service channel that is used in Advanced Work Assignment (AWA).

Before you begin

Role required: awa_admin or admin

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About this task

You can specify additional conditions to filter the work items that are handled in the channel, change the agent capacity (workload) for the channel, set the inbox layouts that your agents use in Workspace, and view associated work item queues.

If you activate the corresponding plugins or install the corresponding store applications, AWA provides base system channels for these services:

- Cases plugin (com.snc_csm.awa)
- Chats plugin (com.glide.interaction.awa)
- Chats - Asynchronous plugin (com.glide.interaction.awa)
- Conversational Integration with Facebook Messenger application (sn_va_fb_messenger)
- Incidents plugin (com.snc.incident.awa)
- Conversational Integration with LINE application (sn_va_line)
- Walk-up interactions plugin (com.snc.walkup)
- Conversational Integration with WhatsApp (powered by Twilio) application (sn_va_whatsapp_twi)

For each channel, you can change certain default settings, such as the default capacity (workload) for agents. You can also use the related lists to review associated queues, define the associated inbox layouts (work item cards) that are displayed in Workspace, and override the agent capacity value.

You can also create a service channel record from the Service Channel module, but you must create a queue, assignment rule, and eligible assignment pool to route work through the service channel. For more information, see Set up a custom service channel.

Procedure

1. Navigate to the service channel settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up service channels**.
   - **All** > **Advanced Work Assignment** > **Service Channels**.
2. Choose a situation.
   - To create a service channel, select **New**.
   - To update a service channel, select the service channel record that you want to update.
3. On the form, fill in the fields.

Service Channel form

Field	Definition
Name	Name of the selected base system service channel to be configured: ○ Chat ○ Chat - Asynchronous ○ Case ○ Facebook Messenger

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Field	Definition
	○ Incident ○ Line ○ Walk-up ○ WhatsApp
Inbox order	Order in which channel items appear in the agent inbox.
Application	Name of the application. ○ Chat: Global ○ Chat - Asynchronous: Global ○ Case: Advanced Work Assignment for CSM ○ Facebook Messenger: Conversational Integration with Facebook Messenger ○ Incident: Advanced Work Assignment for Incidents ○ Line: Conversational Integration with LINE ○ Walk-up: Walk-up Experience ○ WhatsApp: Conversational Integration with WhatsApp (powered by Twilio)
Active	Option for activating the service channel. When you select this option, the associated queues for the service channel can start accepting work items.
Short description	Brief description of the service channel: ○ Chat: Live Agent Chat Interactions ○ Chat - Asynchronous: Asynchronous Live Agent Chat Interactions ○ Case: Cases for Agents ○ Facebook Messenger: Live Agent Facebook Messenger Interactions ○ Incident: Incidents for Agents ○ Line: Live Agent LINE Interactions ○ Walk-up: Walk-up interactions for agents to work on ○ WhatsApp: Live Agent WhatsApp Interactions
Table	Table that stores the service channel records.
Advanced condition	If enabled, the advanced conditions that apply to the channel. For example: ○ Chat: **[Type] [is] [Chat]** ○ Chat - Asynchronous: **[Subtype] [is] [mweb]**, **[Type] [is] [Messaging]**

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Field	Definition
	○ Facebook Messenger: **[Subtype] [is] [Facebook Messenger]** ○ Line: **[Subtype] [is] [Line]** ○ Walk-up: **[Type] [is] [Walk-up]** ○ WhatsApp: **[Subtype] [is] [WhatsApp]**
Assign to field	Field that references the user assigned to the item. In both Case and Interaction (and most other tables), this field is the **Assigned to** (assigned_to) field.
Assignment group field	Field that references the assignment group assigned to the item. In most tables, this field is the **Assignment group** field.
Type	Indicator of whether a communication service channel is handled as a synchronous or asynchronous conversation channel. This field appears when you select **Interaction** in the **Table** field. ○ Chat ○ Phone ○ Messaging ○ Other
Log level	Amount of information recorded when AWA events are logged. ○ None: No information is logged. ○ Basic: Only basic information is logged. ○ Verbose: Detailed information, including record details and event details, is logged. This field appears if **Enable logging** is enabled.
Inbox Alert Audio	Audible alert that sounds when a new item arrives in your inbox for this service channel. If you don’t specify an audio file, the default audio file sounds.
Message Alert Audio	Audible alert that sounds when a new message arrives in your conversation for this service channel. If you don’t specify an audio file, the default audio file sounds.
Capacity and Utilization	
Default work item size	Amount of an agent's capacity that is used when this work item is assigned. The default is 1.
Default capacity	Number of items automatically assigned to agents (pending overrides).

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Field	Definition
	○ Case: The default is 2. ○ Chat: The default is 4. ○ Chat: Asynchronous: The default is 4. ○ Facebook Messenger: The default is 4. ○ Incident: The default is 2. ○ Line: The default is 4. ○ Walk-up: The default is 1. ○ WhatsApp: The default is 4.
Utilization condition	Condition that determines what constitutes an active item that counts toward agent workload/capacity. For example, the record state is New, Open, or Awaiting Info. ○ For chat: The state is not Closed Complete or Closed Abandoned ○ For Chat - Asynchronous: The state is Closed Complete or Closed Abandoned ○ For case: The state is New or Open ○ For Facebook Messenger: The state is New or Work in Progress ○ For incident: The state is New, In Progress, or On Hold ○ For Line: The state is New or Work in Progress ○ For walk-up: The state is not On Hold, Closed Complete, or Closed Abandoned ○ For WhatsApp: The state is New or Work in Progress
Logging	
Enable logging	Option to record information in the syslog_awa table when AWA events are logged. Specify the level of detail to be recorded in the **Log level** field on this screen.
Stop logging at	Date and time that logging should stop. This field appears if **Enable logging** is enabled.

4. Select **Submit** or **Update**.
   The channel is added to or updated in the Service Channels [awa_service_channel] table.

What to do next

- Override the agent capacity for selected agents or groups.
- Create or modify an inbox layout for the service channel.

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- Configure agent assignment rules for the channel.
- Define agent pools eligible for assignment.
- Create or modify a work item queue for the channel.
- Create or modify a work item size override for the channel.

Conversational SMS service channel

Using the Conversational SMS service channel app on the ServiceNow Store, workspace agents can provide support for long-running SMS conversations and conversations that use multiple service channels.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Overview

Requesters can initiate support conversations through SMS. Since these support conversations can be long-running, workspace agents need the ability to track ongoing conversations while also addressing requesters on other service channels. With the Conversational SMS service channel store app, workspace agents can initiate or continue SMS conversations and also accept SMS work items from the Workspace Inbox. Requesters in SMS conversations see a limited subset of system messages. This minimizes the number of system messages in case the conversation is long-running.

Messaging profiles

Messaging profiles provide a way to match an incoming phone number to a requester:

If	Then
New SMS is received from a requester who is associated to a phone number on the User [sys_user] table but has no messaging profile match	• A messaging profile record is generated to match the number to the User table. • An interaction record is associated to the matching User table.
New message received from a requester who does not have a phone number match in the User table but does have messaging profile match	• An interaction record is associated to the matching messaging profile user. • The User table record is not associated to the phone number. The agent can manually verify.
New message received from a requester who does not have a phone number match in the User table or messaging profiles	• An interaction record is associated to the guest user (Virtual agent or live agent can manually verify). • A messaging profile record is generated for the phone number but not associated to a user.

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If	Then
New SMS from a requester that conflicts with an existing User table or messaging profile	• An interaction is associated with the messaging profile/user currently associated with the number. • Virtual agent or live agent can verify the user and reassociate the interaction/profile with the correct user.

Messaging actions

Messaging actions provide a way to trigger actions based on messaging activity on a conversation.

Messaging action parameters	Description
Event **1.** Requester message without agent response **2.** Agent message without requester response	Sending of a message from a requester or agent starts a timer that can trigger an action
Duration	Time set to trigger an action based on the Event parameter being set
Filter conditions	Condition needed on the Interaction record for a messaging action to be triggered (for example, State is "On Hold")
Action	Possible actions include: • Prompt agent – Sent Workspace notification to agent • Prompt requester – Sent system message in messaging conversation to requester • Reassign – Remove assigned agent from interaction • Set state – Set Interaction state to desired state

Ongoing conversations

The Agent Inbox displays new SMS messages and agents can locate currently assigned SMS conversations in the Ongoing tab. The tab indicator and record highlight indicate when an SMS conversation has a new message. Unlike chat conversations, SMS conversations can be long-running. Completed SMS conversations do not display in the Ongoing tab.

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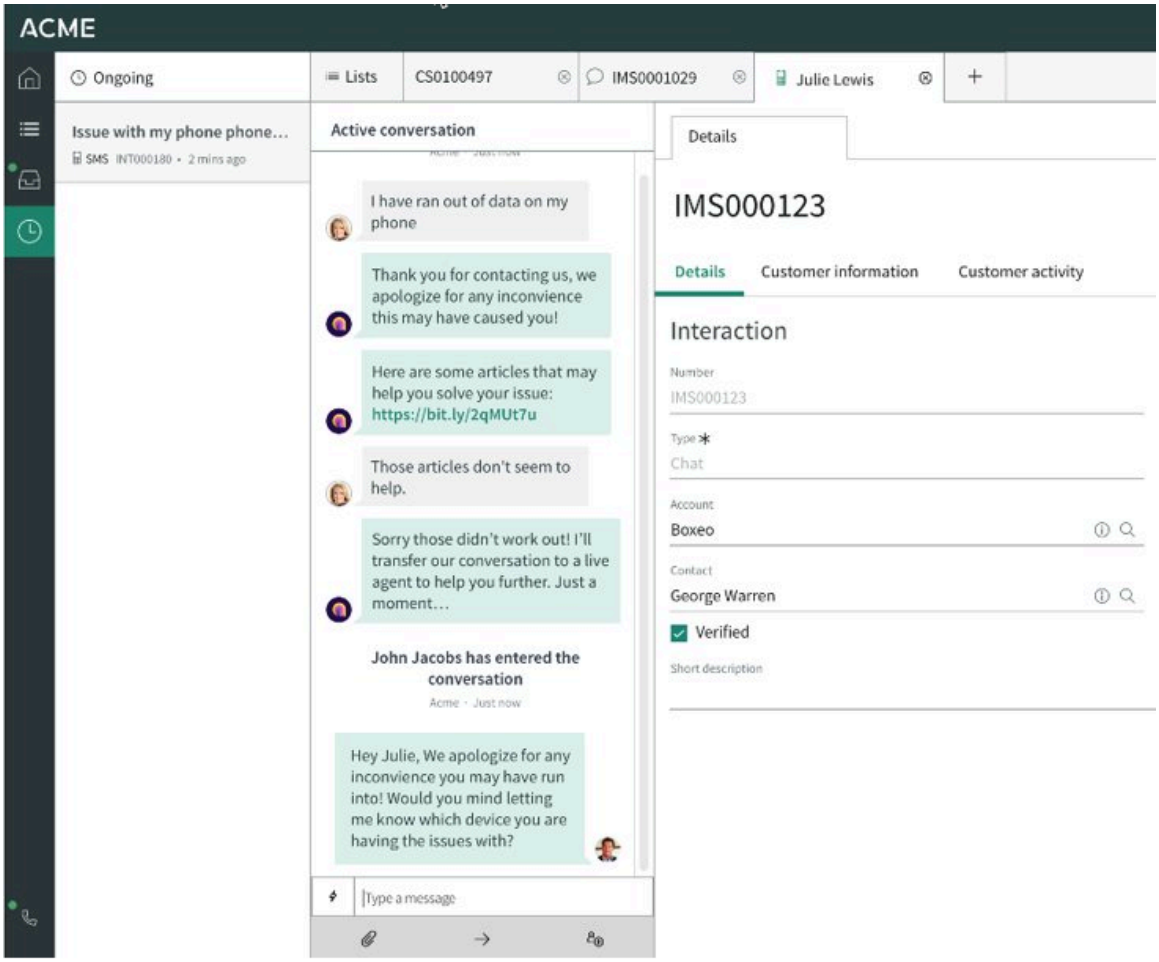

Requester initiated SMS conversations

When a requester initiates a support conversation, a virtual agent or a live agent addresses the conversation. Like other service channels, Advanced Work Assignment handles the routing of SMS conversations to live agents. This is how requester-initiated SMS conversations are handled:

If	Then
There is no active SMS interaction	• Create a new SMS interaction • Assign the interaction to a virtual agent or a live agent
There is an active interaction involving a live agent	• Inject the message into an existing conversation • Continue with agent in current conversation • Track using the same interaction record

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If	Then
There is an active interaction involving a virtual agent	• Inject the message into existing conversation • Continue with existing virtual agent topic • Track using the same interaction record

An active SMS interaction represents an ongoing conversation between a requester's phone number and a company's phone number.

Agent initiated SMS conversations

To initiate an SMS conversation with a requester, agents can select a provider number for an outbound service or manually enter a provider number. If there is a current ongoing SMS conversation, it automatically appears. When an agent initiates an SMS conversation:

If	Then
There is no active SMS interaction	• Create a new SMS interaction • Assign interaction to agent
There is an active interaction involving an agent	• Inject the message into existing conversation • Add agent to live group profile • No reassignment
There is an active interaction involving VA	• Close existing interaction • Create a new interaction and assign to agent
There is an active interaction involving a different contact/consumer/user	• Close existing interaction • Create a new channel user profile and deactivate the existing channel user profile • Create a new interaction and assign to agent

An active SMS interaction represents an ongoing conversation between a requester’s phone number and a company’s phone number.

Set up the Conversational SMS service channel

Configure the Conversational SMS service channel store app.

Before you begin
Role required: admin

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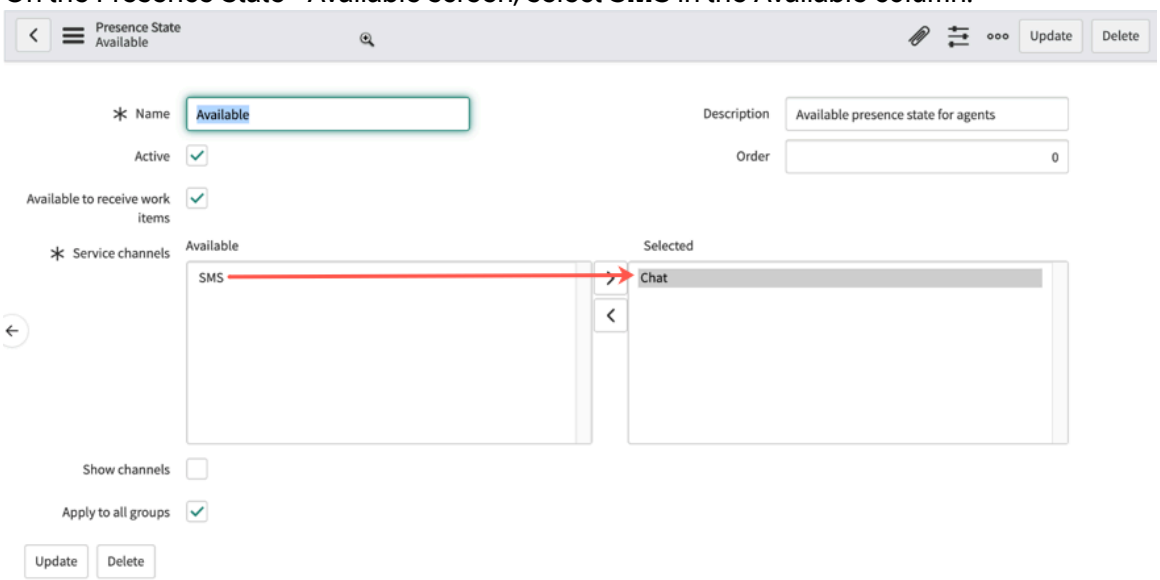
Procedure

1. Navigate to the service channel settings through one of the following navigation paths.
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up service channels**.
   - **All** > **Advanced Work Assignment** > **Service Channels**.
2. Select the SMS service channel.
3. On the Service Channel - SMS screen, select the **Active** check box to activate the service channel.
4. Because the SMS group has no users by default, manually add users to the SMS group.
5. Navigate to **All** > **Advanced Work Assignment** > **Home**.
6. In the Additional settings section, select **Set up presence states**.
7. In the Name column, click **Available**.
8. On the Presence State - Available screen, select **SMS** in the Available column.



9. Select the right-pointing arrow to move SMS from the Available column to the Selected column.
10. Select **Update**.

Set up a custom service channel

Set up a custom service channel to expand the type and scope of work that is routed automatically to your agents.

Before you begin

- Select the table that you want to use to route work to agents automatically. Only Task [task] and Interaction [interaction] tables are supported.
- Ensure that the form layout for the selected table is configured for the workspace view. Record types without a workspace view appear as read-only in Agent Workspace. For more information, see Set up forms in legacy workspace.
- If you want to open a record in AWA for a table that extends another table that has a service channel defined, ensure that the workspace view for that table has already been defined.
- Assign the awa_agent and workspace_agent roles to whichever agents are receiving work items in Agent Workspace from your custom service channel.

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Role required: awa_admin or admin

About this task

You can create a service channel record from the Service Channel module, but you must create a work item queue, assignment rule, and eligible assignment pool to route work through the service channel. You also must configure the custom service channel to make it available in an agent's inbox in Agent Workspace.

Procedure

1. Navigate to the service channel settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up service channels**.
   - **All** > **Advanced Work Assignment** > **Service Channels**.
2. Select **New**.
3. Complete the service channel fields, and then select **Submit**.
   For more information, see Create or configure a service channel.
4. Create an assignment rule.
   For more information, see Configure agent assignment rules.
5. Create a work item queue for your service channel.

   For more information, see Create a work item queue.
6. On the form for the work item queue that you created, go to the **Assignment Eligibility** related link and create an eligible assignment pool.

   Make sure to associate your assignment rule to the eligible assignment pool.

   For more information, see Define agent pools eligible for assignment.
7. Make your service channel available in Agent Workspace.
   a. Navigate to **All** > **Advanced Work Assignment** > **Home**.
   b. In the Additional settings section, select **Set up presence states**, and then open **Available**.
   c. On the form, move your custom service channel to the **Selected** list.
   d. Select **Active** option (if not already selected).
   e. Select **Update**.
8. **Optional:** Create or change the inbox card layout to show the most important information from a work item.
   For more information, see Create or change an inbox layout.

Result

Your custom service channel routes work to agents. In Agent Workspace, the service channel appears as an available service channel in the agent inbox.

Tutorial: Set up a custom service channel for change requests

Learn how to configure Advanced Work Assignment to automatically assign change requests to agents. Use this tutorial as a guideline to help you understand how service channel records, queues, and assignment rules work together to create a custom service channel.

In this tutorial, you learn how to set up a custom channel that:

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- Assigns new change requests to whichever Change Management agent has the most capacity
- Populates the assignee's agent inbox in Agent Workspace with change requests from the queue
- Displays the change request number, short description, and type on the inbox card
- Enables the agent to accept or reject change requests

For information on setting up custom service channels, see Set up a custom service channel.

Before you begin:

- Ensure that the form layout for the Change Request table is configured for the workspace view; otherwise, work items from the Change Request service channel appear as read-only in Agent Workspace. For more information, see Set up forms in legacy workspace.
- Assign the awa_agent and workspace_agent roles to the Change Management group so that members can open work items in Agent Workspace.

Create a service channel to route requests

Create a service channel in Advanced Work Assignment so that you can route change requests to agents.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to the service channel settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up service channels**.
   - **All** > **Advanced Work Assignment** > **Service Channels**.
2. Select **New**.
3. On the form, fill in the fields.
   - Name: Change Request
   - Inbox Order: 100
   - Table: Change Request [change_request]
   - Active: Selected
   - Utilization condition: [Active] [is] [true]
4. Select **Submit**.

Create an assignment rule for change requests

Create an assignment rule in Advanced Work Assignment that assigns change requests to agents who are available to do the tasks.

Before you begin

Role required: awa_admin or admin

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Procedure

1. Navigate to the assignment rules settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up assignment rules**.
   - **All** > **Advanced Work Assignment** > **Assignment Rules**.
2. Select **New**.
3. On the form, fill in the fields.
   - Name: Change Request Assignment Rule
   - Assign by: Most Capacity
   - Allow agents to reject: Selected
4. Select **Submit**.

Create a queue to route new change requests

Create a work item queue in Advanced Work Assignment that routes new change requests through the service channel that handles change requests.

Before you begin
Role required: awa_admin or admin

Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Select **New**.
3. On the form, fill in the fields.
   - Name: Change Management
   - Service channel: Change Request
   - Condition mode: Simple
   - Work item routing condition: [State] [is] [New]
4. From the form context menu, select **Save**.

Create an assignment pool of agents

Create an eligible assignment pool in Advanced Work Assignment that receives overflow work items, just in case you need more help from other agents to handle change requests.

Before you begin
Role required: awa_admin or admin

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Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Open the Change Management queue.
3. On the form, go to the **Assignment Eligibility** related list and select **New**.
4. On the form, fill in the fields.
   - Agent assignment rule: Change Request Assignment Rule
   - Groups: Change Management
5. Select **Submit**.

Make your service channel available in Agent Workspace

Make your service channel available in Agent Workspace so that agents can receive change requests in their inbox.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to the presence states settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Additional settings section, select **Set up presence states**.
   - **All** > **Advanced Work Assignment** > **Presence States**.
2. Open **Available**.
3. On the form, move **Change Request** to the **Selected** list.
4. Select **Active** (if not already selected).
5. Select **Update**.

Customize how change requests appear in an agent inbox

Customize how change requests appear in an agent inbox so that agents receive enough information to decide whether to accept or reject the work item.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to the service channel settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up service channels**.
   - **All** > **Advanced Work Assignment** > **Service Channels**.
2. Select the **Change Request** service channel record.

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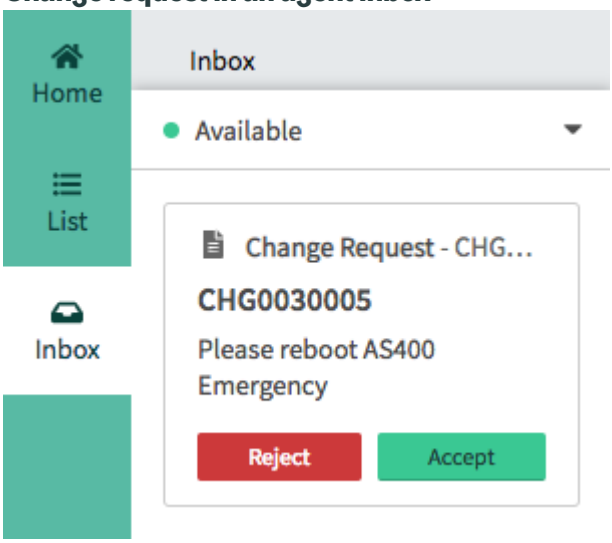
3. On the Change Request service channel form, go to the **Inbox Layouts** related list and open **Default Change Request layout**.
4. On the form, fill in the fields.
   - Field 1: Number
   - Field 2: Short description
   - Field 3: Type
5. Click **Update**.

Result

When you create a change request, the item is routed through the Change Request service channel and assigned to the agent in the Change Management assignment group who is available to receive the change request. When the assignee checks their agent inbox, the change request appears with the option for the agent to either reject or accept the work item.

Change request in an agent inbox



Inbox layout

The inbox layout determines the information shown on work item cards displayed in an agent's inbox.

The AWA admin (awa_admin) can configure layouts that represent items in an agent inbox. The configuration allows agents to see the most important attributes by service channel work items. The fields specified on the inbox layout determine the information displayed for a work item.

Each base system service channel provides preconfigured inbox layouts for work items. The AWA admin can view and edit these layouts and also create new layouts.

Up to five fields can be shown in the card layout.

- Fields can be added from the table that the service channel points to.
- Fields are dot-walkable.
- The first field added to the layout becomes the title field on the card.

Layout example

For chats that do not have either a contact or consumer, the layout includes only the chat subject. You control the display of the **Time to accept** count (timer) and the **Reject** button through the agent assignment rules.

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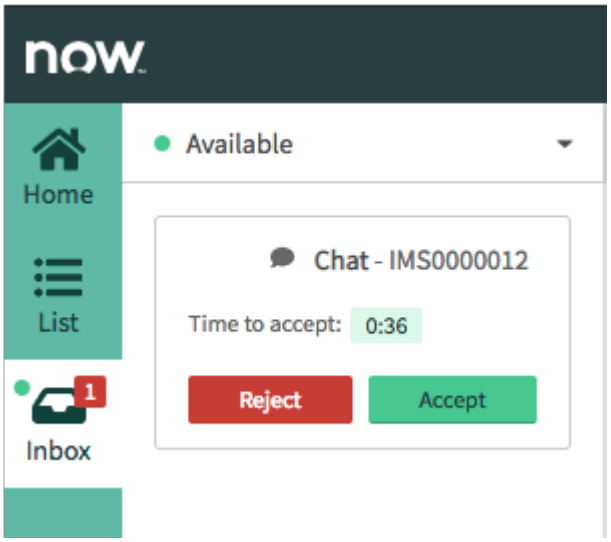

See Create or change an inbox layout for more information on accessing and modifying an inbox layout.

Create or change an inbox layout

Create or change the card layout for inbox items for a given service channel. Card layouts are displayed in the agent inbox view of Agent Workspace.

Before you begin

Role required: awa_admin or admin. Users with the awa_manager or agent role can review inbox layouts.

About this task

Cards represent work items in an agent's inbox in Agent Workspace. Each channel has a default layout for these cards, which can display up to five fields from the related table record. Use the Inbox Layout form to change a default layout, such as the name, short description, and the specific fields displayed on the card, for example channel and contact or consumer name. You can also specify certain conditions that determine when the card layout is used.

Procedure

1. Navigate to the service channel settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up service channels**.
   - **All** > **Advanced Work Assignment** > **Service Channels**.
2. Select the service channel to be updated.
3. In the Service Channel form, select the **Inbox Layouts** related link.
   - To create a layout, select **New**.
   - To change a layout, select the layout to be updated.
4. On the form, fill in the fields.

Field	Definition
Name	The name of the inbox layout.

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Field	Definition
Service channel	The name of the selected service channel.
Short description	The description of the inbox layout.
Order	The order in which the layouts appear in the agent inbox.
Condition	A condition that determines when this layout is used. Use the condition builder to specify a condition that must evaluate to true to apply the layout.
Card layout	Example card layout.
Field 1	The field from the table for the channel, for example the Interaction [interaction] table for the chat service channel. Select the field or select **None** to remove an existing field.
Field 2	The field from the table for the channel, for example the Interaction [interaction] table for the chat service channel. Select the field or select **None** to remove an existing field.
Field 3	The field from the table for the channel, for example the Interaction [interaction] table for the chat service channel. Select the field or select **None** to remove it.
Field 4	The field from the table for the channel, for example the Interaction [interaction] table for the chat service channel. Select the field or select **None** to remove it.
Field 5	The field from the table for the channel. For example, the Interaction [interaction] table for the Chat service channel. Select the field or select **None** to remove it.

5. Select **Submit** for a new layout or **Update** to modify a layout.
   The layout is added to or updated in the Inbox Layout [awa_inbox_layout] table.

What to do next

As needed:

- Override the agent capacity value for selected agents or groups.
- Create or change a work item queue for the channel.

Override agent capacity for selected agents

Change the default number of work items that an agent can handle for a service channel.

Before you begin

Role required: awa_admin or admin

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About this task

To change the capacity for selected agents, use the **Agent Capacity Override** related list for the service channel. To change the capacity for one or more members of a selected group, use the **Agent Capacity Override** related list for the group (**Advanced Work Assignment** > **Groups**).

Procedure

1. Navigate to the service channel settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up service channels**.
   - **All** > **Advanced Work Assignment** > **Service Channels**.
2. Select the service channel.
3. In the **Agent Capacity Override** related list, select **New**.
4. On the form, fill in the fields.

Field	Definition
Service Channel	Name of the selected channel.
Override Capacity	Number of work items that the selected agents can handle.
Users	Agents to which this override applies. Move the agent names from the **Available** list to the **Selected** list. You can use the filter to identify conditions that restrict the list of agents. **Note:** The filter shows only users or groups that have AWA roles (awa_agent, awa_manager, awa_admin, admin).

5. Select **Submit**.
   The selected agents and their associated capacity values are listed in the Agent Capacities table.

What to do next

If you're configuring a service channel, you can create or change an inbox layout for the channel.

Create or change a work item size override

Create a work item size override if you want Agent Affinity to calculate an agent's workload using a work item size other than the default.

Before you begin

Role required: awa_admin or admin

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Procedure

1. Navigate to the service channel settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up service channels**.
   - **All** > **Advanced Work Assignment** > **Service Channels**.
2. Select the service channel.
3. On the form, select the **Work Item Size Override** list.
   - To create an override, select **New**.
   - To change an existing override, select the override that you want to update.
4. On the form, fill in the fields.

Change work item size form

Field	Definition
Name	Name of the override.
Service Channel	Service channel that is assigned to the override.
Override Size	Size to use instead of the default.
Order	Order in which Advanced Work Assignment considers this size override.
Condition mode	Type of condition for routing work items using this size override: ○ Simple: Specify a routine condition using the condition builder. ○ Advanced: Specify a JavaScript scripted condition.
Conditions	Condition that applies to the override work item sizes. This field appears when you select **Simple** in the **Condition mode** field.
Script	JavaScript condition statement that specifies the override work item size. The condition must evaluate to true. This field appears when you select **Advanced** in the **Condition mode** field.

5. Select **Submit** to create the override or **Update** to change the override.

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Work items

View Advanced Work Assignment work items using the Work Items menu options.

Work items are a single piece of work handled by an agent from start to finish. For example, one chat or one case is an object that is routed and assigned to agents. Only users with awa_manager privileges can access the Management menu options.

Work item queues

In Advanced Work Assignment, queues store a specific type of work item for a service channel.

AWA administrators can create or modify queues based on customer need. As part of creating or modifying a queue, the awa_admin identifies some information about the queue, including the service channel to which the queue belongs and which agent groups handle the incoming work items.

The awa_admin can select a schedule that defines when the queue is available and identify a time limit within which an agent should accept a work item in the queue. If the selected service channel is **Chat**, the awa_admin creates the chat messages that are displayed to users.

Routing conditions identify the work items that are routed to a queue. Create routing conditions in one of two ways:

- Simple: use a condition builder to select routing conditions. The fields available for selection are based on the selected service channel.
- Advanced: use a JavaScript script to identify routing conditions.

The awa_admin can also create a queue without routing conditions so that work items are not routed to that queue automatically. Customers can manually assign work items to the queue or assign work items using assignment tools such as matching rules or Flow Designer.

When a case in a queue is assigned manually, the case is removed from the queue. The state of the work item is set to **Canceled** and the cancellation reason is set to **Manually assigned**.

Note:
New work items may not be assigned if they are routed to queues containing more than 10,000 work items in the queued state.

Configure routing rules that use chat context variables

You can specify queue routing rules that use chat context variables in the condition builder. For details on creating chat context variables, see Configure context variables for storing chat-related information. These variables can store contextual information that can be used in routing conditions to control where chat work items are routed.

For example, you can define chat context variables to store user responses from pre-chat surveys that you create. If you store these responses in chat context variables, such as a user's department or a product name, you can specify the context variables in queue routing conditions to direct where the live chat is routed. When you specify a routing condition using the condition builder, you can dot walk to the Context fields. In the fields menu, select **Show Related Fields** and open the fields menu again to select **Context → Interaction Context fields**.

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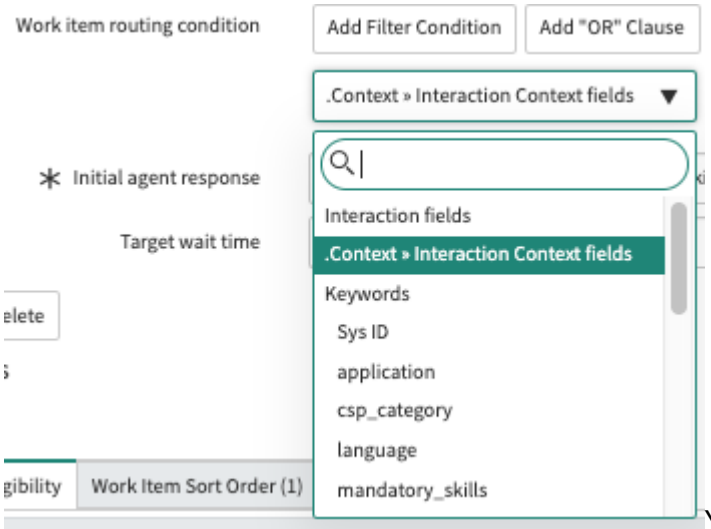

You can then select from the available chat context variables in the condition builder. For example, choosing **csp_category** becomes **Context.csp_category**.

Assign pools of agents eligible to work on a queue

Assign one or more agent groups to a queue using the **Eligibility Assignment** related list. These groups are eligible to receive work items from the queue, which allows work to get prioritized to eligible agents.

Select an agent assignment rule and any eligibility time constraints for each group. The eligibility time constraints are used to determine when the next pool of agents is eligible for assignment. For example, you can assign one group to handle work items immediately and a second group to handle the overflow from the first group after work items sit in the queue for a specified amount of time.

Note:
If no groups are assigned to a queue, work items can be routed to the queue but Advanced Work Assignment does not assign them.

Create a sort order for a queue

Use the Work Item Sort Order related list to create one or more sort conditions for work items in a queue. For each sort condition, specify a field from the selected service channel table and the direction to sort, either ascending or descending. Items in the queue are sorted and assigned to agents based on these conditions.

Create a work item queue

Define or change a queue so that you can determine which work items are routed automatically to agents through a given service channel.

Before you begin
Role required: awa_admin or admin

About this task
Depending on the service channel, additional configuration options are available. For example, in the chat channel you define the standard messages displayed during a chat session with a user.

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Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Choose a situation.
   - To create a queue, select **New**.
   - To change a queue, select the queue record to be updated.
3. On the form, fill in the fields.

Field	Definition
Name	Name of the queue. A default queue may be available for the service channel you activated through the plugins related to AWA.
Number	Base number for the table. For more information, see Record numbering.
Service channel	Channel to which the queue belongs. For the chat channel, define the standard messages displayed to chat users in the Chat Messages section.
Active	Option indicating whether the queue is enabled.
Application	Type of scoped application.
Schedule	Support schedule that defines when the queue is available.
Order	During routing, the order in which AWA considers the routing condition for this work item queue, in comparison to other queues.
Short description	Brief explanation of the queue.
Routing Condition	
Define condition here	Option that indicates a routing condition is to be applied to the queue. If checked, define the **Condition mode** and **Work item routing condition**.
Condition mode	Type of condition for routing work items in the queue.

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Field	Definition
	○ Simple: Specify a routing condition using the condition builder. ○ Advanced: Specify a JavaScript scripted condition.
Work item routing condition	Condition that applies to routing work items to this queue. Use the condition builder to select routing conditions. The fields available for selection are based on the selected service channel. For the chat service channel, you can specify chat context variables in the condition builder by dot-walking to related context fields. For example, if you defined chat context variables that store pre-chat routing information, you can dot-walk to those chat context variables in the condition builder. You can use the variables in routing conditions to specify where chats are routed.
Script	JavaScript condition statement that specifies the work items to be routed to the queue. The condition must evaluate to true. This field appears only when **Advanced** is selected from Condition mode.
Initial agent response	Message that users see when an agent accepts a chat. For example: `Thank you for contacting support. I am looking into your question now and will be with you shortly.`
Max wait time message	Message that users see when a chat ends because the Max Wait Time has elapsed. This field is required if the **Max Wait Time** is greater than 0.
Target wait time	Estimated time (Days or Hours, minutes, seconds) allotted for an agent to accept an item in the queue.
Max Wait Time	Maximum amount of time that all available agents have to accept or reject a chat request. After time runs out, the requester receives the value in either the **Max wait time message** field or the **No Agents Available Message** field defined in Agent Chat settings.

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Field	Definition
	Note: The **Max Wait Time** field is available after you associate the queue to the chat service channel.

4. Select **Submit** for a new queue or **Update** to change the queue.
   The queue is added to or updated in the Queues [awa_queue_list] table.

What to do next

- Define the **Assignment Eligibility**.
- Optionally, define the **Work Item Sort Order**.
- Optionally, define the **Queue Triggers**.
- Optionally, define the **Set Agent Affinity rules**.

Define agent pools eligible for assignment

Specify pools of agents eligible to receive overflow work assignments for a queue. An eligible assignment pool can consist of one or more groups of agents available to work on items in the queue. This feature enables Advanced Work Assignment to find a qualified agent from a wider pool of agents.

Before you begin

Role required: admin

About this task

Use the **Assignment Eligibility** related link to expand the pool of agents eligible to work on items in the queue when other agents are busy or unavailable. For each agent pool, select the assignment rule that determines the assignment eligibility. If you don't define an eligible assignment pool for a queue, work items are routed to the queue but AWA doesn't assign them.

Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Select the queue.
3. To create an assignment pool, go to the **Assignment Eligibility** related link.
   - To create a new eligible assignment pool, select **New**.
   - To change the assignment eligibility for a pool of agents, select the pool to be updated.
4. On the form, fill in the fields.

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Field	Definition
Agent assignment rule	The name of the rule that determines how work items are to be assigned. Select an assignment rule from the list.
Eligible at	The length of time in seconds before AWA considers the next set of agents for assignment.
Groups	The set of groups eligible for assignment. ○ Click the lock icon to unlock it and select the agent groups in the eligible assignment pool. ○ Click the lock icon to lock it.

5. Select **Submit** to create the eligible or **Update** if modifying an eligible assignment pool. The Queues [awa_queues] table is updated with the eligible assignment pool.

Set work item sort order

Specify the order in which work items in a queue are sorted.

Before you begin
Role required: awa_admin or admin

About this task
The **Work Item Sort Order** field only determines the order that AWA assigns the work item and doesn't affect the order of work items in the agent's inbox card. Work items in the inbox card are displayed based on the time that they arrive. The **Work Item Sort Order** field assigns a set of pending work items to agents designed by the defined work item sort order. For example, if two work items are pending when an agent becomes available, the **Work Item Sort Order** decides which work item is assigned first to an agent via AWA.

Procedure
1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Select the queue.
3. Select the **Work Item Sort Order** related list and select **New**.
4. In the Work Item Sort Order form, select:

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- **Field**: The field to be used for the sort. The fields are from the table for the associated channel. For example, the fields available for the chat service channel are from the Interaction table.
- **Sort Direction**: The order in which work items are sorted. Select either Ascending (smallest to largest or oldest to newest) or Descending (largest to smallest or newest to oldest).
- **Order**: The value of the **Order** value relative to other items in the queue.

5. Select **Submit**.

Create and manage queue triggers

Create and manage queue triggers to set off multiple actions during customer wait times for a particular queue.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Select the queue.
3. Select the Queue Triggers related list.
   - To create a queue trigger, select **New**.
   - To change a queue trigger, select the queue trigger record to be updated.
4. On the form, fill in the fields.

Queue Trigger form

Field	Description
Queue	Work items that belong to a service channel.
Message	Message that users see because the **Trigger Time** has elapsed. If the **Trigger Type** field value is **Max Wait**, this field becomes read-only and displays the value entered in the Queue form's **Max wait time message** field. When the **Max wait time message** appears to users, they're prompted to select a Virtual Agent topic and if they select a topic, they don't return to the live agent's queue.
Trigger Type	Type of configurable trigger: **Wait** or **Max Wait**. The **Wait** trigger defines the actions that happen when users are waiting in the queue and the **Max Wait Time** hasn't been met. The **Max Wait** trigger defines the actions

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Field	Description
	that happen when users are waiting in the queue and the **Max Wait Time** is met.
Trigger Time	Time (days or hours, minutes, seconds) allotted for the **Trigger Type**. If the **Trigger Type** field value is **Max Wait**, this field becomes read-only and displays the value entered in the Queue form's **Max Wait Time** field.
Flow	Name of the flow or subflow. **Note:** Flow Designer subflows must have a string input parameter named `conversation_id` for AWA queue triggers to detect the appropriate subflow. Ensure that the subflow you want to use has a string input parameter named `conversation_id` through the **Execution** tab in Flow Designer.
Virtual Agent topic	Name of the existing Virtual Agent topic that appears to the users when the max wait time is met.

5. Select **Submit** for a new queue or **Update** to change the queue.
   The queue triggers are added to or updated in the Queue Triggers related list.

External routing overview

External routing enables work to be routed to a queue based on the service channel and queue conditions, then uses an external solution to assign the queued work item to an agent.

Process flow

This is how the work items are processed when using external routing:

1. Work items are routed to the queue in a queued state but are unassigned. Work items will expire if the Max timeout is set.
2. External solution lookups work items in queue state by Work Item Table API.
3. External solution lookups agent availability in AWA Agent API before assigning to agent.
4. External solution uses AWA Assignment API to assign work item to the agent.
5. The agent will see an inbox card with an accept button (pending accept state) with no rejection options.

When Advanced Work Assignment is configured to use external routing:

- Queues do not need to have Assignment Eligibility Groups defined.
- Work items remain in the queue with a "queued" status until the external system routes the work item or the maximum wait time elapses.
- Related lists do not display at the bottom of the Queues screen.

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These APIs are required for external routing:

- REST API to support the external routing system. For information on REST API, see AWA Assignment API .
- Work item table API (awa_work_item) to look up the queued work items waiting for assignment. For information on table API, see Table API .
- AWA Agent API if the external solution requires validation of agent availability within Workspace before assignment. For information on AWA Agent API, see AWA Agent API .

Functionality of AWA components

When external routing is enabled, this is the functionality of AWA components:

Agent

- Components utilized
  - Accept button
  - Agent capacity in use (Service channel capacity) increases but is not utilized against the max capacity of service channel
  - Agent universal capacity in use increases but is not utilized against the max universal capacity
- Components not utilized
  - Agent availability
  - Reject button with rejection reasons
  - Max agent capacity
  - Max universal capacity

Service channel

- Components utilized
  - Channel advanced condition
  - Inbox layouts
  - Queue order
- Components not utilized
  - Assign to and assignment group fields
  - Capacity and utilization features
  - Agent capacity overrides
  - Work item override

Queue

- Components utilized
  - Max wait time will expire work items if set on queue
  - Work item routing conditions
  - Queue order
- Components not utilized

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- Queue agents' presence checks
- Work items remain in the queue with a status of "queued" until the external system routes the work item
- Queue schedules
- The following related lists are hidden on the queue since they are not utilized:
  - Assignment eligibility and rules
  - Work item sort order
  - Agent Affinity
  - Agent assignments
  - Group queue priorities
  - Work items

Use external routing for queues

Configure Advanced Work Assignment to route work items in the queues using external routing.

Before you begin

Be sure that you've reviewed the functionality of external routing and configured the necessary APIs. For more information, see External routing overview.

Role required: awa_admin or admin

About this task

Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. If the **External** field doesn't appear, select the update personalized list icon ( ) and add the **External** field to the screen.
3. Set the **External** field to **true** to use external routing.
   If you don't want to use external routing, set the **External** field to **false**.

Tutorial: Route interactions by context

Learn how you can configure Advanced Work Assignment to route conversations to agents according to the context of the conversation.

Before you begin

Activate the Customer Service Management Demo Data (com.snc.customerservice.demo) plugin.

A basic understanding of context variables is required. For more information on context variables, see Virtual Agent scripts.

Role required: awa_admin or admin

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About this task

The **What can we help you with?** record producer is available by default with the Customer Service Management Demo Data (com.snc.customerservice.demo) plugin. In the record producer, chat requesters can specify one of three issue categories that they need help with:

- Product
- Billing
- Order

Whichever category they select passes a value through the *liveagent_csp_category* context variable. Learn how to create queues that route conversations to agents according to the values passed through this context variable.

Create a queue for product issues

Create a queue for the Chat service channel that routes product issues.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Select **New**.
3. Enter the following information in the fields listed:
   - Name: Product Support
   - Service channel: Chat
   - Condition mode: Advanced
4. In the **Script** field, enter this script:

```
(function executeCondition(/* glide record */ current) {
 var contextTable = current.getValue('context_table');
 var interactionBlobRecord = new GlideRecord(contextTable);
 interactionBlobRecord.addQuery('sys_id',current.getValue('cont
ext_document'));
 interactionBlobRecord.query();

 if(interactionBlobRecord.next()){
  var jsonBlob =
 JSON.parse(interactionBlobRecord.getValue('value'));
  if(jsonBlob.liveagent_csp_category == 'product')
   return true;
 }
 return false;
})(current);
```

5. Click **Submit**.

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Create a queue for billing issues

Create a queue for the Chat service channel that routes billing issues.

Before you begin

Role required: awa_admin or admin

Procedure

1. From the Queues list view, click **New**.
2. Enter the following information in the fields listed:
   - Name: Billing Support
   - Service channel: Chat
   - Condition mode: Advanced
3. In the **Script** field, enter this script:

```
(function executeCondition(/* glide record */ current) {
 var contextTable = current.getValue('context_table');
 var interactionBlobRecord = new GlideRecord(contextTable);
 interactionBlobRecord.addQuery('sys_id',current.getValue('cont
ext_document'));
 interactionBlobRecord.query();

 if(interactionBlobRecord.next()){
  var jsonBlob =
 JSON.parse(interactionBlobRecord.getValue('value'));
  if(jsonBlob.liveagent_csp_category == 'billing')
   return true;
 }
 return false;
})(current);
```

4. Click **Submit**.

Create a queue for order issues

Create a queue for the Chat service channel that routes order issues.

Before you begin

Role required: awa_admin or admin

Procedure

1. From the Queues list view, click **New**.
2. Enter the following information in the fields listed:
   - Name: Order Support
   - Service channel: Chat
   - Condition mode: Advanced
3. In the **Script** field, enter this script:

```
(function executeCondition(/* glide record */ current) {
 var contextTable = current.getValue('context_table');
 var interactionBlobRecord = new GlideRecord(contextTable);
 interactionBlobRecord.addQuery('sys_id',current.getValue('cont
ext_document'));
```

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```
 interactionBlobRecord.query();

 if(interactionBlobRecord.next()){
  var jsonBlob =
 JSON.parse(interactionBlobRecord.getValue('value'));
  if(jsonBlob.liveagent_csp_category == 'order')
   return true;
 }
 return false;
})(current);
```

4. Click **Submit**.

Work assignments

After routing work items to the appropriate queues and corresponding agent groups, Advanced Work Assignment (AWA) pushes work to the most qualified agent using the assignment criteria that you specify. Assignment criteria revolve around the type of assignment rule (most capacity or last assigned) and whether skills are defined.

Administrators can choose to push work items to agents based on one of these assignment rules:

- Most capacity: This option pushes work to agents that have the most capacity (availability for work) for a given channel. For example, suppose that two available agents, Agent 1 and Agent 2 have different capacities. Agent 1 has capacity for three chats, but Agent 2 has capacity for two chats and is currently working on one chat. AWA assigns the next work item to Agent 1 with the most capacity.
- Last assigned: This option pushes work to the agent who has gone the longest without a work assignment in the service channel. If more than one agent has the same spare capacity in a service channel, AWA creates and assigns the next work item to the agent who has gone the longest without work in the service channel.

In addition to selecting the assignment rule, AWA admins can also determine whether:

- Agents can reject work items.
- Agents automatically accept chat interactions.
- A timer is used to set a timeout period (the length of time that an agent has to reject or accept a work item).
- Agent skills are to be considered during assignment.

Assignment process

When an agent is available, AWA:

- Checks the queue priority and gets an item from the queue with the highest priority. AWA also reviews items that have timed out or have been rejected by agents.
- Identifies the eligible assignment pool. The eligibility assignment pool widens the group of agents who are eligible to work on an item.
- Determines the available agents based on their presence state, the assignment rule selected (most capacity or last assigned), and also skills, if defined. Agents have spare capacity when they decline, transfer, or complete a work item. For example, after an agent transfers a chat, the agent has additional capacity.

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- Pushes the item to the inbox of the most qualified agent (the timer begins).
- Accepts work items automatically when **Enable auto-assign work items** is selected. Agents are unable to manually **Accept** or **Reject** work items.

Skill-based work assignment

In AWA, you can enable skill-based assignment and if needed, evaluate skill levels and make skill assignment mandatory (required). The basic process for setting up skills involves the following steps:

1. Identify agents that have specific skills (for example, a foreign language or expertise in a certain area such as network routers), and then assign the skills to those agents using the Skills Management feature.
2. Make the agents members of the assignment groups for the work item queues involving those skills.
3. Create an assignment rule in AWA that enables skill handling for the specific skills.

   If you chose to select the **Evaluate skill level** option while creating the assignment rule, AWA also reviews agents' skill levels prior to assigning the work item to the most qualified agent. If multiple agents have the same number of matching skills, agents with more skills at the sufficient skill level are prioritized over agents with fewer skills at the sufficient level. For example, a chat comes through listing three skills at a high skill level. Agent A and Agent B both have the three skills. Agent A has three skills with the following skill levels: two high and one low. Agent B has three skills with the following skill levels: one high and two low. In this example, Agent A would be the first assignee of the work item because they have more skills with the sufficient skill level than Agent B. Agent B would only be assigned this work item if Agent A rejected the work.

   AWA also prioritizes the number of matching skills over the number of skills with the sufficient skill level. For example, a chat comes through listing two skills and their sufficient skill levels: Both the English skill and the Databases skill are associated with an advanced skill level. Agent 1 has both skills but only at the beginner skill level. Agent 2 has only the English skill at the sufficient advanced skill level but doesn't have the Databases skill. In this example, the chat is routed to Agent 1 because this agent has both skills even though they aren't at the sufficient skill level.

   If you also chose to select the **Enforce mandatory skills** option while creating the assignment rule, AWA only assigns the work item to agents that have the mandatory skills at the sufficient skill level. For example, a work item with two high-level associated mandatory skills and one optional skill is ready for assignment. Agent C has all three skills but only one of the mandatory skills at the sufficient high skill level. Agent D has only the two mandatory skills, but both skills are at the sufficient high skill level. In this example, Agent D would be the only applicable work item assignee because they are the only agent with both mandatory skills at a high enough level.
4. Create the work item queue with a routing condition that includes the specific skill, and include the appropriate group in the eligible assignment pool.
5. Create a scripted business rule that includes the skill in the table associated with the relevant service channel (for example, the Case table).

During work assignment, AWA routes and assigns work items to the Agent Workspace inbox of the most qualified agent based on the agents skills and if applicable, skill level and mandatory skill settings.

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Configure agent assignment rules

Set the Advanced Work Assignment criteria for assigning work items to agents. Choose the assignment rule that considers the agent with the most capacity or the agent who has gone the longest without work. Establish the settings for the auto-assign handling, reject handling, and skill handling related lists.

Before you begin

- A basic understanding of the Skills Management feature is recommended.
- If you want agent skills to be considered when work is routed to the appropriate agents, define the skills for your agents or groups. When you enable the skill handling options on the Assignment Rules form, AWA assigns the users in groups with the appropriate skills to corresponding work items.
- You can use rules to identify skills and assign them to work items. For more information on defining and assigning skills for work items, see Routing work items to agents based on skills.

Role required: awa_admin or admin

Procedure

1. Navigate to the assignment rules settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up assignment rules**.
   - **All** > **Advanced Work Assignment** > **Assignment Rules**.
2. Choose a situation.
   - To create a rule, select **New**.
   - To change a rule, select the rule to be updated.
3. On the Assignment Rule form, fill in the fields.
   For a description of the field values, see Assignment Rule form.
4. Select **Submit** for a new rule or **Update** if you're changing the rule.
   The assignment rule is added to or updated in the Assignment Rules [awa_assignment_rule] table.

Tutorial: Automatically assign work to agents by skill

Learn how you can configure Advanced Work Assignment to automatically route cases to agents who speak German. Use this tutorial as a guideline to help you understand how you can route work items to agents according to their designated skills.

Before you begin:

- Activate the Skills Management (com.snc.skills_management) plugin.
- A basic understanding of the Skills Management feature is required.
- To have skills automatically assigned to cases, consider activating the Skill Determination (com.snc.skill_determination) plugin.
- Create a group of users who work in customer support.
- Assign the awa_agent and workspace_agent roles to the customer support group.

Advanced Work Assignment (AWA) Tutorial: Automatically assign work to agents by skill
Watch this video for a visual representation of the following tutorial example.

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Create a skill

Create a "German" skill.

Before you begin
Role required: skill_admin or admin

Procedure

1. Navigate to **All** > **Skills** > **All Skills**, and then click **New**.
2. Enter the following information in the fields listed:
   - **Name**: `German`
   - **Active**: Selected
3. Select **Submit**.

Create an assignment rule that auto assigns agents' work

Create an assignment rule that routes cases according to skills.

Before you begin
Role required: awa_admin or admin

Procedure

1. Navigate to the assignment rules settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up assignment rules**.
   - **All** > **Advanced Work Assignment** > **Assignment Rules**.
2. Select **New**.
3. Enter the following information in the fields listed:
   - **Name**: `Case Assignment Rule with Skills`
   - **Assign by**: `Most Capacity`
   - **Enable auto-assign work items**: Selected

     Note:
     Selecting this option automatically accepts chat interactions on behalf of agents. The **Display options** field appears and you can select either **Inbox card** or **Inbox card and workspace tab**.

   - **Enable skills**: Selected
   - **Evaluate skill level**: Cleared
   - **Enforce mandatory skills**: Selected
4. Select **Submit**.

Create a queue

Create a queue where you can route work to agents who have the German skill.

Before you begin
Role required: awa_admin or admin

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Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Select **New**.
3. Enter the following information in the fields listed:
   - **Name**: `German Case Queue`
   - **Service channel**: `Case`
4. Select **Submit**.

Define assignment eligibility

Define who is eligible to receive cases from the German Cases queue.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Select the German Cases queue.
3. On the form, go to the Assignment Eligibility related link and select **New**.
4. In the **Agent assignment rule** field, select **Case Assignment Rule with Skills**.
5. In the **Groups** field, select your customer support group.
6. Select **Submit**.

Enable skill determination

Activate the skill determination business rule to tag skills for your work items.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to **All** > **System Definitions** > **Business Rules**.
2. Select the **Skill determination for cases** record.
3. On the form, select the **Active** field.
4. Select **Update**.

Define a skill determination rule

Create a skill determination rule to tag the German skill to incoming cases from German speakers.

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Before you begin
Role required: awa_admin or admin

Procedure
1. Navigate to **All** > **Skills** > **Skill Determination Rules**, and then select **New**.
2. Enter the following information in the fields listed:
   - **Name**: `Skill determination for German cases`
   - **Active**: `true`
   - **Source table**: **Case [sn_customerservice_case]**
   - **Condition**: **Opened by.language is German**

     Note:
     Search for the `Show related fields` option when defining the conditions to get the Opened by.language option.

   - **Skills**: German
3. Select **Submit**.

Result
Cases that need German speakers are routed to users in Customer Service and Support who have the German skill.

Using Agent Affinity

Agent Affinity is an Advanced Work Assignment feature that lets you assign work items by an agent's work history, related task, or account team affinity.

Advanced Work Assignment assigns work items to agents by their availability, capacity, and skills. You can use Agent Affinity to customize this AWA assignment process and identify the agent best suited for the work item. Agent Affinity ensures that the same agent is assigned to a similar work item instead of orienting a new agent every time.

Note:
Agent Affinity rules do not override assignment eligibility or constraints that are specified on AWA assignment rules.

The types of affinities are:

Historical
: Identifies the best agent based on the agent's history of serving the same customer.

Related task
: Identifies the best agent based on the agent's past assignments of related tasks.

Account team
: Identifies the best agent based on the agent's responsibility or role in the account team.

Note:
Account team affinity is available only to Customer Service Management customers.

Affinity rules are associated with AWA queues. Up to three rules can be associated with each queue. The affinity order determines how the assignment engine ranks the agents. The agent with the higher order affinity rule is considered as the best agent first.

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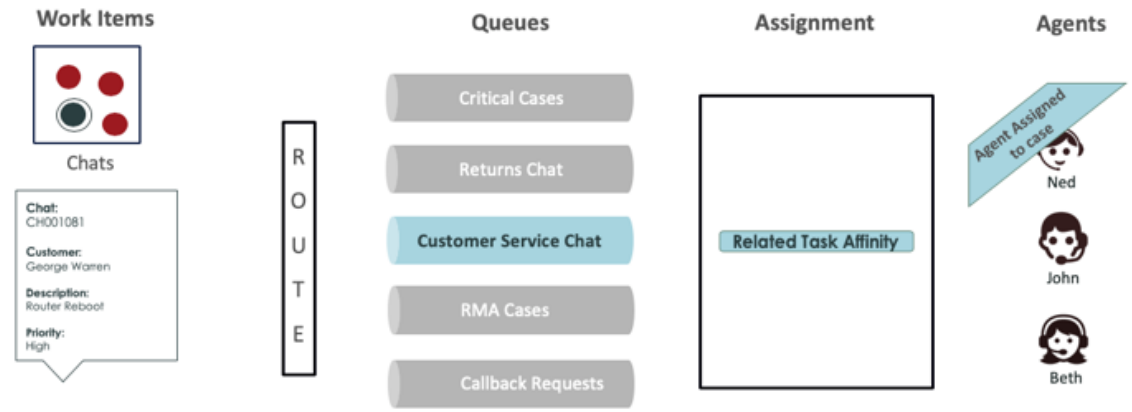
The following example shows how AWA uses Agent Affinity to determine the best agent for a work item. In this example, AWA is configured to use all three affinities in this order: related task affinity, account team affinity, and historical affinity. George Warren, who is a customer at the Boxeo company, has a router problem. George previously contacted support to report an issue. That case was assigned to agent Ned. The primary support agent for Boxeo is agent John. Within the past seven days, another agent, agent Beth, addressed a chat with Boxeo.

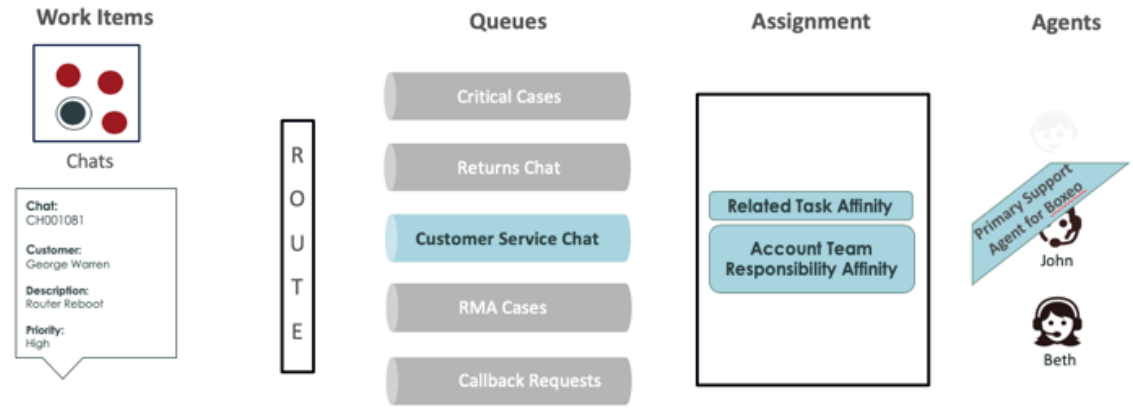
The next time George initiates a customer service chat from the case page, the case is automatically added as a related task to the chat interaction. Agent Affinity uses the related task affinity to look for an agent who has fulfilled past assignments for a related task. Because agent Ned was assigned to a related task on the record, AWA assigns the work item to agent Ned if available with capacity.

Example of related task affinity



If agent Ned is unavailable or doesn't have the capacity, AWA uses the account team affinity. AWA looks for another agent based on an agent's responsibility or role in the account team. Because agent John is the primary support agent for the Boxeo company, AWA assigns the work item to Agent John if available with capacity.

Example of account team affinity



If agent John is not available, AWA uses the historical affinity and looks for an agent that has recently interacted with the company. This information is stored on the Agent Affinity screen. Because agent Beth addressed a chat with Boxeo within the past seven days, AWA assigns the work item to agent Beth if available with capacity.

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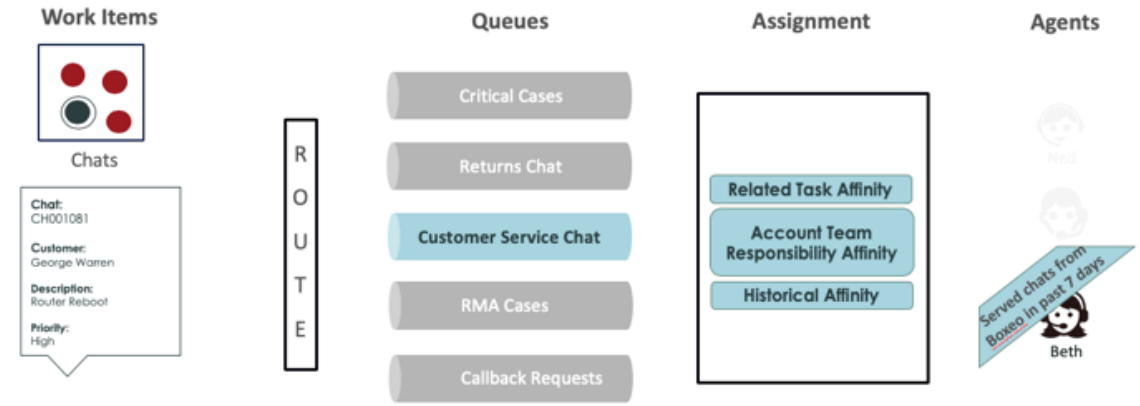
Example of historical affinity



Configure Agent Affinity rules

Create or change the Agent Affinity rules that route work items in Advanced Work Assignment.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to the agent affinity settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Advanced settings section, select **Set up Agent Affinity**.
   - **All** > **Advanced Work Assignment** > **Agent Affinity Rules**.
2. Choose a situation.
   - To create an affinity rule, select **New**.
   - To update an existing affinity rule, select the affinity rule.
3. On the form, fill in the fields.

Field	Definition
Name	Name of the affinity rule.
Service channel	Service channel that the rule applies to.
Application	Name of the application.
Affinity based on	Type of affinity. Only affinity types corresponding to your selection appear. ○ History ○ Related Tasks ○ Account Team Responsibility
Agent's affinity to	Account level or contact level. This field appears when you select **History** in the **Affinity based on** field.
Number of days	Past number of days during which the agent has worked with the customer. The maximum

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Field	Definition
	number of days is 30. This field appears when you select **History** in the **Affinity based on** field.
Responsibility	Agent who is part of the account team. This field appears when you select **Account Team Responsibility** in the **Affinity based on** field.

4. Click **Submit** for a new affinity rule or **Update** to modify an existing affinity rule.

Set Agent Affinity rules

Specify the Agent Affinity rules to determine the order in which work items in a queue are sorted.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to the queue settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Essential settings section, select **Set up queues**.
   - **All** > **Advanced Work Assignment** > **Queues**.
2. Select the queue.
3. Select the Agent Affinity related list.
   - To create a Agent Affinity rule mapping, select **New**.
   - To change an existing Agent Affinity rule mapping, select the mapping to be updated.
4. On the form, fill in the fields.

Agent Affinity Rule Mapping form

Field	Definition
Agent Affinity Rule	Agent Affinity rule to be used for the sort.
Order	Value of this rule relative to the other rules in the queue. Rules are ordered from lowest to highest so a rule with an order of 100 is considered before a rule with an order of 200.

5. Select **Submit**.
   You can specify a maximum of three Agent Affinity rules per queue.

Deactivate Agent Affinity

Deactivate Agent Affinity if you do not want Agent Affinity to assign work assignments to agents.

Before you begin

Role required: awa_admin or admin

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Procedure

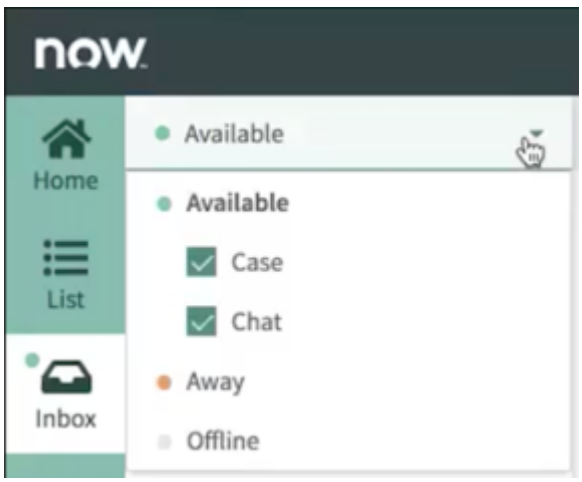
1. In the navigation filter, enter `sys_properties.list`.
   The entire list of properties in the System Properties [sys_properties] table appears.
2. In the **Search** field, enter `glide.awa.agent_affinity.enabled`.
3. Click **glide.awa.agent_affinity.enabled**.
4. On the system property screen, change **Value** from **true** to **false** and click **Update**.
   Agent Affinity is now deactivated.

Agent Inbox controls

Control certain elements of the agent experience in Agent Workspace. Define the agent presence (availability) states and the work item rejection reasons used by agents to decline work assignments in their Agent Workspace inbox.

Agent presence states

Agent availability in Agent Workspace Inbox



AWA admins can define the presence states that agents choose in their inbox to indicate their availability. The default states are

- Available: Solid green bubble indicates that the agent is available to receive work.
- Away: Solid yellow bubble indicates that the agent is not available to receive work.
- Offline: Solid grey bubble indicates that the agent is not available to receive work.

AWA developers with the awa_integration_user role can also use JavaScript or REST APIs to get or set agent presence and agent channel availability. For more information, see

- Agent Presence API (REST APIs)
- Agent - Global (JavaScript APIs)

Agent rejection controls

AWA admins can give agents the option to reject work assignments and specify the reason for rejecting it. The **Reject** button displays on work assignment cards. When an agent rejects an assignment, a pop-up window enables the agent to select a reason for declining the work item.

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Configure agent presence states

Create or modify the availability states that agents use to indicate whether they can receive work or are offline or away. Agents set these states in their Workspace Inbox.

Before you begin

Role required: awa_admin or admin. Users with the awa_manager and awa_agent roles can review the presence states.

About this task

The default presence states are Available, Away, and Offline. For the Available state, be sure to enable it (using the Active check box) so that AWA can route work to agents.

Procedure

1. Navigate to the presence states settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Additional settings section, select **Set up presence states**.
   - **All** > **Advanced Work Assignment** > **Presence States**.
2. Choose a situation.
   - To create a presence state, select **New**.
   - To update a presence state, select the presence record you want to update.
3. On the form, fill in the fields.

Field	Definition
Name	Name of the presence state, for example: Out of office. The default presence states are Available, Away, or Offline.
Active	Enables this presence state for agents. **Note:** For the default Available state, be sure to enable this **Active** check box so that work items are routed to available agents. If the **Active** state is not enabled, AWA does not route work items to agents.
Available to receive work items	Indicates that agents can handle work items in this presence state. If the presence state is Away or Offline, this box is not selected.
Service channels	Service channels that can use this presence state. To select a service channel, move the channel name from the **Available** list to the **Selected** list.
Description	Brief description of the state.
Order	Order in which this state is displayed in the agent inbox.

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Field	Definition
Show channels	Enables you to restrict the service channels in which agents can update their presence using this state. When you select this field, the **Restrict agent update** field is displayed.
Disable agent inactivity check	If this check box is selected, the agent's presence will not be automatically set to "offline" based on inactivity and it must be manually set by the AWA Agent API. You may need to configure the form to add this field.
Restrict agent updates	Service channels in which agents cannot use this state to update their presence. Select the lock icon and select the appropriate channels. When you complete your selections, select the lock icon to lock the field. You may need to configure the form to add this field.
Apply to all groups	Indicates all groups can use this presence state. To specify only certain groups that can use this presence state, unselect this check box to display the **Apply to groups** list. You may need to configure the form to add this field.
Apply to groups	Selected groups that can use this presence state. To select a group, move the group name from the **Available** list to the **Selected** list. You may need to configure the form to add this field.

4. Select **Submit** for a new presence state or **Update** if modifying an existing presence state. The presence state is added to or updated in the Presence States [awa_presence_state] table. The presence state is also listed in the Availability section of the Agent Workspace Inbox for the agents belonging to the groups and channels that use this state.

Configure reasons for rejecting work items

Define the reasons that agents can use to decline work assignments that they receive in their Agent Workspace inbox. A reject reason can apply to all service channels or a single channel that you specify.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to the reject reasons settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Additional settings section, select **Set up reject reasons**.
   - **All** > **Advanced Work Assignment** > **Reject Reasons**.
2. Choose a situation.

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- To create a rejection reason, select **New**.
- To update an existing rejection reason, select the reason record.

3. On the form, fill in the fields.

Field	Definition
Reason	Name of the reason for rejecting work items.
Agent selectable	Indicates that the reject reason is selectable by agents in their Agent Workspace Inbox.
Order	Order in which the reject reasons are listed in the agent inbox.
Apply to all service channels	Indicates that the reject reason applies to all service channels. To make the reason available to a single channel, unselect this check box and in the **Service channel** field, select the appropriate channel.
Service channel	Service channel that the rule applies to. This field is displayed when **Apply to all service channels** isn't enabled.
Reassignable	Indicates if the work item can be reassigned to the agent who rejected it.

4. Select **Submit** for a new reason, or if changing an existing reason, select **Update**.
The rejection reason is added to or updated in the Reject Reasons [awa_reject_reason] table.

Configure reassignable settings

Configure whether an agent who rejected a work item is eligible to be offered the same work item.

Before you begin

Role required: admin

Procedure

1. Navigate to the reject reasons settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Additional settings section, select **Set up reject reasons**.
   - **All** > **Advanced Work Assignment** > **Reject Reasons**.
2. Select the reason record that you want to change.
3. On the form, configure the **Reassignable** field:
   - If you want to have an agent who rejected a work item be eligible to be offered the same work item, select the **Reassignable** field.
   - If you don't want to have an agent who rejected a work item be eligible to be offered the same work item, unselect the **Reassignable** field.

Management

Configure Advanced Work Assignment properties using the Management menu options.

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Only users with awa_manager privileges can access the Management menu options.

Configure an agent's maximum universal capacity

Prevent an agent from being assigned too many work items by configuring the agent's maximum universal capacity. If the agent's maximum universal capacity has been reached, additional work items won't be assigned to the agent.

Before you begin

Role required: admin

Procedure

1. Navigate to the universal capacity settings through one of the following navigation paths:
   - **All** > **Advanced Work Assignment** > **Home**.

     In the Additional settings section, select **Set up universal capacity**.
   - **All** > **Advanced Work Assignment** > **Universal Capacity**.
2. Choose a situation.
   - To create a new maximum universal capacity for an agent, select **New**:

Field	Definition
Max Universal Capacity	Maximum capacity for an agent across all service channels. If an agent's current capacity equals the maximum universal capacity, additional work items won't be assigned to the agent.
Users	The max universal capacity is assigned to the users (agents) in the Selected list. Select agents in the Available list and then select the right-pointing arrow to add them to the Selected list. To filter the agents in the Available list, create a filter by selecting **Add Filter** or run an existing filter by selecting **Run Filter**.

   - To update an existing maximum universal capacity for an agent, select the maximum universal capacity to update:

Field	Definition
Max Universal Capacity	Maximum capacity for an agent across all service channels. If an agent's current capacity equals the maximum universal capacity, additional work items won't be assigned to the agent.
Universal Capacity In Use	Current workload for an agent across all service channels.
Agent	Name of the agent.

3. Select **Submit** for a new universal capacity or **Update** for an existing universal capacity.

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Create or change groups for Advanced Work Assignment queues

Create or manage groups that have associated Advanced Work Assignment queues.

Before you begin

Role required: awa_manager or admin

About this task

Groups are sets of users who share a common purpose. By creating these groups, information that is displayed in AWA is limited to only users that are in AWA groups. The assignment group can be configured so that work items are assigned using the group queue priority. Each round of assignment can include multiple passes through the work items, each with an increasingly inclusive set of groups. This process ensures that agents in each group are offered items according to their group's queue priority order.

Procedure

1. Navigate to **All** > **Advanced Work Assignment** > **Home** > **Management** > **Groups**
2. Choose a situation:
   - To create a group, select **New**
   - To change a group, select the group you want to update.
3. On the Group screen, fill in the fields.

Field	Description
Name	Name of the group.
Manager	Group manager or lead.
Group email	Group email distribution list or the email address of the point of contact, such as the group manager.
Parent	Other group of which this group is a member. If a group has a parent, the child group inherits the roles of the parent group. The members of the child group aren't members of the parent group. For example, if an incident is assigned to the parent group and you select the Assigned to look up icon, only the members in the parent group are available. The members of the child group aren't available.
Description	Helpful information about the group.

4. Select **Submit**.
5. If you want to configure the queue priority order for the group, follow these steps:
   a. Select the group name on the list.
   b. Select the Queues related list at the bottom of the screen.
   c. Double-click in the order number field that you want to change.
   d. On the pop-up Order dialog, enter the new order number.
   e. Select the green check mark to save the change.

AWA post work item subflow

Configure the base system AWA post work item subflow by defining the input in flow designer.

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Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. On the Flow Designer screen, select **Subflows**.
3. In the Name column, enter `Template: AWA post work item`.

   This searches for the Template: AWA post work item.
4. Select **Template: AWA post work item**.
5. In the subflow header, select the more actions icon ( ) and then **Copy subflow.**
6. On the Create a copy of this subflow dialog, enter a unique and descriptive name for the copied subflow in the **New subflow name** field.
7. Select **Copy**.
   The new subflow is created and displays as a tab in the subflow designer editor.
8. You can customize the subflow by doing one of the following:
   - Integrate with a third-party system by adding an action with a spoke from the Integration Hub (for more information, see Spokes)
   - Use a REST action step and call the external endpoint (for more information, see REST step).
   - Call a REST message in the subflow itself (for more information, see Outbound REST Web Service).

Configure messaging actions

Create or modify messaging actions that are performed when an event occurs. These actions apply only to messaging.

Before you begin
Activate the Conversational Messaging plugin (com.glide.messaging.awa). For information on activating this plugin, see Activate Messaging Actions.

Role required: admin

About this task

- For the Requester Message without Agent Response event, the default length of time that elapses before an agent is sent a reminder is 30 minutes.
- For the Agent Message without Requester Response event, the default length of time that elapses before the conversation is set to the Closed Abandoned state is 2 days.

  If you're using both Virtual Agent and Live Agent, the system closes an abandoned live conversation based on the lowest timeout value for closing conversations. Be aware that other conversation timeout behavior can affect idle live chat timeouts, regardless of the **Duration** and **Action** that you specify. For details, see Closing Virtual Agent and Agent Chat conversations.

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Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Messaging** > **Actions**.
   - To create a new messaging action, click **New**.
   - To update an existing messaging action, click the messaging action.
2. On the form, fill in the fields.

Messaging Action form

Field	Definition
Name	Name of the messaging action.
Event	Event that starts the timer: ○ Requester Message without Agent Response - message from a requester that has not been responded to by an agent. ○ Agent Message without Requester Response - message from an agent that has not been responded to by a requester.
Duration	Length of time that elapses after the event before the action runs.
Active	Option to track the timers and perform actions.
Filter Conditions	Condition the timer is evaluated for.
Action	Action to perform after the duration of time has elapsed: ○ Prompt Agent - prompt the agent using a Workspace notification. ○ Prompt Requester - display system message with prompt to requester. ○ Reassign - clear the **Assigned to** field of the interaction so that it can be rerouted to another agent. ○ Set State - set the interaction to the given state.
Prompt	Message displayed to requester. This field appears when you select **Prompt Agent** in the **Action** field.
State	State of the interaction. This field appears when you select **State** in the **Action** field.

3. Click **Submit** for a new messaging action or **Update** to modify an existing messaging action.

Enable logging for Advanced Work Assignment

Enable logging to monitor AWA routing and assignment.

Before you begin

Role required: maint

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Procedure

1. In the navigation filter, enter `sys_logger_configuration.list`.
2. On the Logger Configurations screen, select **New**.
3. On the New record screen, fill out the fields:

Field	Description
Logger Name	Name of logger that this configuration applies to. This should be set to `com.snc.awa`.
Application	This field defaults to `Global` and cannot be changed.
Active	Option to activate logging.
Additive	Option to use the new logging in addition to any existing logging. This should be set to `false`.
Level	Type of errors that should be logged: ○ FATAL - errors that cause the service to shut down (status 0). ○ ERROR - non-fatal service error messages. ○ WARN - warning messages indicating potential issues. ○ INFO - informational messages representing service actions. ○ DEBUG - detailed service operation messages which help troubleshoot issues. ○ TRACE - very detailed service operation messages which help troubleshoot issues. ○ ALL - all errors should be logged. This should be set to `INFO`.
Filters	Enter any filters and their values that you want applied to the results.
Destination	Where the format log is sent. This should be set to `Database`.
Layout	Layout format that should be applied to the logs.

4. Select `Submit`.
   Logging for the AWA assignment engine is enabled in the syslog table.
5. To view the system log, navigate to **System Logs** > **System Log** > **All**.

Using Advanced Work Assignment

The following sections detail how awa_manager or awa_agent roles can use Advanced Work Assignment (AWA) to complete various tasks such as checking an agent's presence and capacity, checking unassigned work items, and creating SMS conversations.

Check for an agent's presence and capacity

View a list of agents in Advanced Work Assignment, their presence status, and capacity for each of the agent's service channels to see which agent can handle a case. This list is filtered across different teams, channels in teams, and channels dashboards.

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Before you begin
Role required: awa_admin or admin

Procedure
1. Navigate to **All** > **Advanced Work Assignment** > **Management** > **Agent Presence & Capacity**.
2. In the list, check which agent is available to handle a case:

AWA Agent Presence and Capacities form

Field	Definition
Agent	Name of the agent.
Current presence state	Presence state that is currently assigned to the agent.
Updated	Date and time that this agent was last updated.
Channel	Service channel that is assigned to the agent.
Capacity in use	Current workload of agent.
Capacity	Maximum capacity that the agent can handle.

Check unassigned interactions

View a list of unassigned interactions in Advanced Work Assignment from chat and phone that are currently waiting in the queue and are not assigned to any agents. You can use this list to debug, implement advanced work assignments, or determine why certain work items are not being assigned.

Before you begin
Role required: awa_manager or admin

Procedure
1. Navigate to **All** > **Advanced Work Assignment** > **Management** > **Unassigned interactions**.
2. In the list, check the unassigned interactions:

Field	Description
Number	Interaction number.
Type	How the interaction began (for example, chat, phone, or walk-up).
Created	Date that the interaction was created.
Opened for	Name of the user starting the interaction.
Account	Name of the company that is associated with the interaction.
Assigned to	User that is assigned to the interaction.
State	Status of the interaction.
Queue	Queue that is assigned to the interaction.
Offered on	Date that the interaction was first offered to an agent.
Rejected	Interaction that was rejected by the agent.

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Field	Description
Timed Out	Interaction that has exceeded the timeout specified in assignment rule.
Exceeded Queue Target Wait Time	Interaction that has waited longer than the target wait time of the queue.

Check unassigned task work items

View a list of unassigned task work items in Advanced Work Assignment, such as cases and incidents, that are currently waiting in the queue and are not assigned to any agents. You can use this list to debug, implement advanced work assignments, or determine why certain work items are unassigned.

Before you begin

Role required: awa_manager or admin

Procedure

1. Navigate to **All** > **Advanced Work Assignment** > **Management** > **Unassigned Task Work Items**.
   - To create a task, click **New**.
   - To modify an existing task, select the task to be updated.
2. On the form, fill in the fields.

Work Item form

Field	Description
Active	Whether the task is still being worked on or is complete.
Display Name	Task name.
Offered on	Date that the task was first offered to an agent.
State	List that shows the status of the task: ○ Accepted ○ Cancelled ○ Pending Accept ○ Queued
Assignment rule	Rule that assigns cases that meet the matching rule criteria to a customer service agent.
Exceeded Queue Target Wait Time	Task that has waited longer than the target wait time of the queue.
Rejected	Task that was rejected by the agent.
Timed Out	Task that has exceeded the timeout specified in the assignment rule.
Assigned to	User that is assigned to the task.
Document ID	Document ID that is assigned to the task.
Previous Work Item	Reference to a previous work item for the same Document ID.

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Field	Description
State changed on	Date that the task state was most recently changed.
Cancelled reason	Reason that the task was canceled: ○ Disqualified from service channel ○ Manually assigned ○ Time out ○ Transfer was cancelled or rejected
Is Dismissed	Whether the task has been dismissed.
Work Item Size	Amount of an agent's capacity that is used if this task is assigned.
Wait time	Length of time the task has waited in the queue before being assigned.
Assignment group	Group that is assigned to the task.
Document table	Document table that is assigned to the task.
Queue	Queue that is assigned to the task.

3. Click **Submit** to create the task or **Update** to modify the task.

Check work items and AWA events

View a list of work items and AWA events.

Before you begin

Role required: awa_admin or admin

Procedure

1. Navigate to **Advanced Work Assignment** > **Work Item** > **All**.
   A list of the work items appears.
2. Select the preview button (ⓘ) for the work item you want to view.
3. On the Work Item dialog box, select **Open Record**.

Work Item form

Field	Definition
Exceeded Queue Target Wait Time	Indicator that the interaction has waited longer than the target wait time of the queue.
Queue	Queue assigned to the task.
Assigned to	User assigned to the task.
Document ID	Document ID assigned to the task.
State	Status of the task: ○ Accepted ○ Canceled

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Field	Definition
	○ Pending Accept ○ Queued
Active	Indicator of whether the task is still being worked on (active) or is complete.
Canceled reason	Reason the task was canceled: ○ Disqualified from service channel ○ Manually assigned ○ Time out ○ Transfer was canceled or rejected **Note:** Work items may be canceled if all agents remain at full capacity for the entire interaction.
Is Dismissed	Indicator of whether the task was dismissed.
Rejected	Task that was rejected by the agent.
Timed Out	Task that has exceeded the timeout specified in the assignment rule.
Assignment group	Group assigned to the task.
Document table	Document table assigned to the task.
Previous Work Item	Reference to a previous work item for the same Document ID.
State changed on	Date that the task state was most recently changed.
Allocated by	User who assigned the work item.
Display Name	Task name.
Offered on	Date the task was first offered to an agent.
Work Item Size	Amount of an agent's capacity used when this task is assigned to the agent.
Wait time	Length of time the task waited in the queue before being assigned.
Assignment rule	Rule that assigns cases that meet the matching rule criteria to a customer service agent.
Offer Count	Number of times the work item was offered to agents.

4. Scroll to the bottom of the Work Item form to view the list of the AWA Events.
5. Select the preview button  for the AWA event you want to view.
6. On the AWA Event dialog box, select **Open Record**.

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AWA Event form

Field	Definition
Caused By	User who triggered the AWA event.
Record ID	Interaction record ID.
Type	Type of AWA event: ○ Assignment ○ Manual Assignment ○ Routing ○ Acceptance ○ Rejection ○ Cancellation
Name	Name of the corresponding interaction.
Channel	Service channel used for the AWA event.
Record table	Table name of document being logged.
Record Details	Details of the work item record.
Timestamp	Date and time the AWA event occurred.
Event Details	Details about the AWA event: ○ Routing event - details of the queue that was selected. ○ Assignment event - details about which agent was selected and which eligibility pools were considered. These details include a listing of all candidate agents that were considered from each pool and a summary of which agents were filtered from consideration. ○ Rejection events - details about the user who rejected the item and the reason. ○ Manual assignments - details about the manager making the assignment, the previous and new agents, and the previous work item (if there is one). ○ Cancellation events - no additional details.
Summary	Event summary.

The AWA Event form appears.

Agent initiated SMS conversation

Customer Service Management supports additional messaging channel such as SMS which tracks interactions between the agent and customer.

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Requirements

At least one provider configuration for messaging type channel must be available to view the **Compose SMS** option in the agent interaction screen. For more information about provider sys_cs_provider_application.list, see Create a channel identifier.

Phone number validation

REST endpoint `/api/now/initiate_message/validate_phone_number` is used to validate if the phone number is in the E.164 format. If the number of a known consumer is not in the E.164 format, the system converts it to the E.164 format based on for example, the location of the consumer. If the location is not found, it will by default convert the number to an E.164 format. For more information about E.164 formats and validation, see Phone number field type.

Customer profile validation

REST endpoint `/api/now/initiate_message/validate_profile` is used to validate the channel user profile. When you send an SMS in reply to an interaction of type phone, the message is sent to a consumer originally associated with the interaction. If the same phone number is associated to a different consumer, and you send an SMS, you will get a message that the phone number is currently associated to another consumer and sending the new message will associate the phone number to the current user.

A phone number is associated to consumer A and an interaction has occurred after which the phone number was disconnected for consumer A. There is a new interaction with consumer B and you select the same phone number that was associated with consumer A. A message appears that the phone number is currently associated to consumer A, and sending a new message will associate consumer A's phone number to consumer B who is the current user.

Agent initiated SMS conversations

To initiate an SMS conversation with a requester, agents can select a provider number for an outbound service or manually enter a provider number. If there is a current ongoing SMS conversation, it automatically appears. When an agent initiates an SMS conversation:

If	Then
There is no active SMS interaction	• Create a new SMS interaction • Assign interaction to agent
There is an active interaction involving an agent	• Inject the message into existing conversation • Add agent to live group profile • No reassignment
There is an active interaction involving VA	• Close existing interaction • Create a new interaction and assign to agent

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If	Then
There is an active interaction involving a different contact/consumer/user	• Close existing interaction • Create a new channel user profile and deactivate the existing channel user profile • Create a new interaction and assign to agent

Customize the behaviour of send from and to numbers

The AgentInitiatedConversationUtil extension point is added to implement a customers' logic to change the default behaviour of the **Send from** and **Send to** fields. For more information, see Associating user profiles on messaging interactions. For this store application, AgentInitiatedMessagingUtilExtPointImpl extension point is configured for fetching the from and to numbers.

Compose an SMS conversation

An agent can compose an SMS to interact with a customer for resolving various issues. If the interaction is not messaging type, you see the **Compose SMS** option.

Before you begin

Role required: agent_workspace_user
A provider is configured for SMS messaging type channel.

About this task

As an agent, you can compose and send an SMS to an ongoing interaction which is not messaging type.

Procedure

1. Click **Compose SMS**.
   The Send via SMS screen is displayed.
2. Select a phone number from the **Send from:** drop-down list.
   - If there is only one provider phone number this field is pre-populated with the number.
   - If there are multiple provider profiles available for SMS channels, you can choose from the drop-down list.
3. Select a phone number from the **Send to:** drop-down list.
   - The phone numbers are pre-populated from the consumer or contact records.
   - If both are not populated, the system looks for the number from the opened for record in the sys_user table.
   - If there is already a channel user profile associated with a consumer or contact, the phone number is pre-populated.

   a. Choose **Other** and select a phone number in the drop-down list.

   Note:
   All phone numbers must be in the E.164 format. For more information, about phone number and channel user profile validation, see Phone number validation.

   If there is already an ongoing SMS type of interaction with the same or different consumer, you can view the interaction card in the same screen. The interaction card for the consumer number you have selected contains interaction number, message type, last updated time, consumer, and assigned to information.

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4. Enter your message in the **Message** field.
5. Click **Attach file**, browse, select the file and attach.

> **Note:**
> You can attach only image files to the message. For more information about the REST API for uploading attachments, see Attachment - POST /now/attachment/upload.

6. Click **Send**.
   For more information, see Agent initiated SMS conversations.

Analytics & Reporting Solutions

The following sections review advanced analytics and Platform Analytics Solutions. Advanced analytics equips you to view cards that represent the Advanced Work Assignment dashboards that you can access.

Using Advanced analytics to access AWA dashboards

Advanced analytics enable you to view cards that represent the Advanced Work Assignment dashboards that you have access to. You can also see a dashboard picker, which lets you view the cards for all the dashboards in a group. You can then search and choose a dashboard from a list.

Navigate to **Advanced Work Assignment** > **Management** > **Advanced Analytics**.

The advanced analytics for the dashboards lets you see the dashboards in one of these categories: by default, the Recent category is selected when you visit the advanced analytics for the dashboards.

- **Recent** shows up to nine dashboards that you have visited recently. The most recent are shown first.
- **Owned by me** shows the dashboards that you have created and those dashboards to which you have been assigned ownership.
- **Shared with me** shows the dashboards which have been shared with you as a user, or member of a group or role.
- **All** shows all the dashboards that you have access to.

> **Note:**
> The category that you choose limits the dashboard groups and individual dashboards that you see when you choose from the Groups list and the **Dashboard Picker** field. If no dashboards in the incident group have been shared with you, and you select Incident from the Groups list, then the overview displays a note that no dashboards match your search.

All tabs except for the Recent tab are sorted in ascending order by:

1. Dashboard group — Order

   The owner of the dashboard can specify an order number in the dashboard group's form. This field is optional.

2. Dashboard group — Name
3. Dashboard — Order

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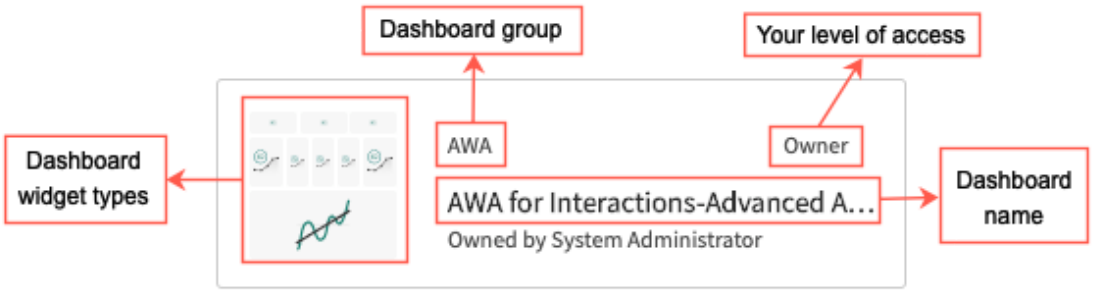
The owner of the dashboard can specify an order number in the dashboard's form. This field is optional.

4. Dashboard — Name

Using Advanced Analytics tiles

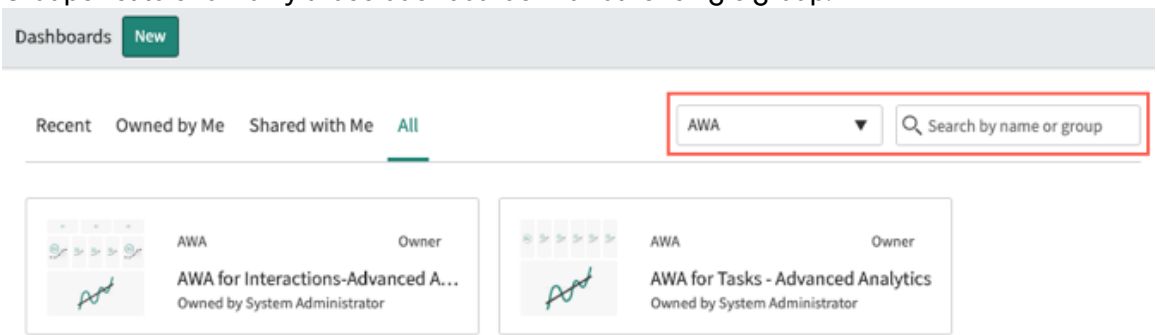
Tiles on Advanced Analytics show thumbnails of the widgets on the dashboard, the dashboard group, your level of access on the dashboard, the name of the dashboard, and the owner of the dashboard. Dashboard access levels are Owner, Editor, and Viewer. For more information, see Share a responsive dashboard.



Note:
If you can't view a dashboard widget, you will see a message that prompts you to contact the administrator. You may not be able to view a dashboard widget because of wrong configuration settings, access restrictions, or because there is no data to display.

Using the Advanced Analytics Groups list

The advanced analytics screen defaults to showing only the dashboards related to AWA. You can see other dashboards by changing the Groups list to show only those dashboards in another single group.



Click **New** to Create or configure a responsive dashboard.

Operations dashboard

Enable managers to monitor work items across all service channels so that their agents can better support customer needs.

This dashboard is available in the Advanced Work Assignment content pack. For information on activating the content pack, see Platform Analytics Solution for Advanced Work Assignment.

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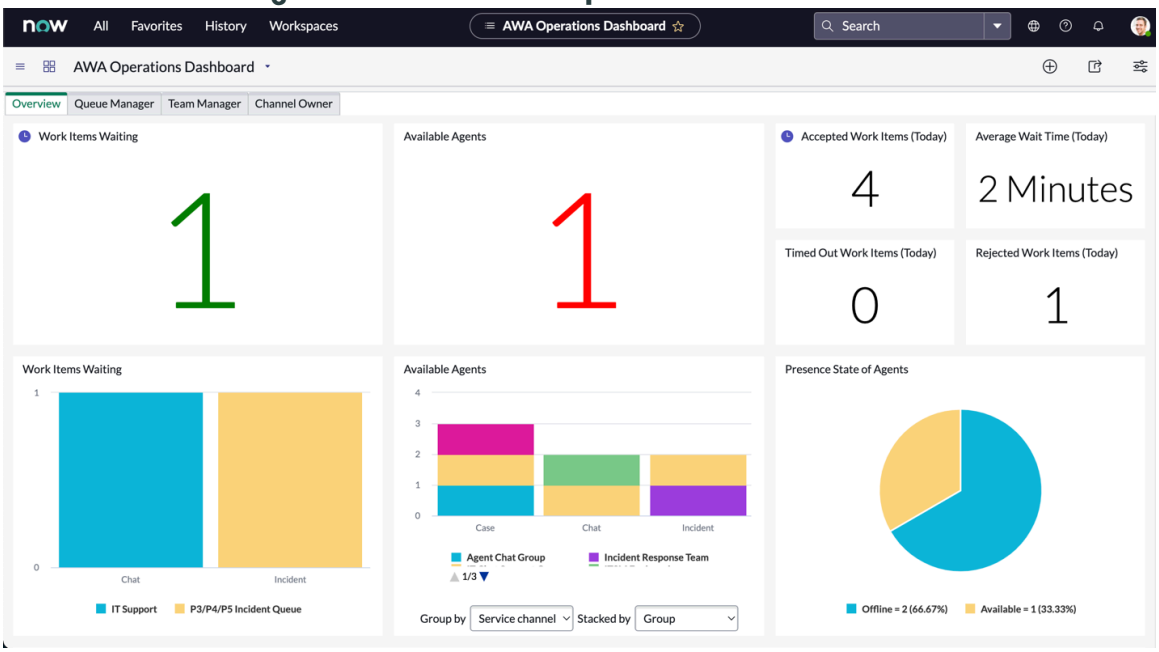
Advanced Work Assignment dashboard for Operations



End users and roles

End user and goal	Required role
AWA administrator: Configures Advanced Work Assignment to best fit the business needs of customer service.	awa_admin
AWA manager: Identifies the areas of concern for routing and assignment of work items across service channels.	awa_manager
Agent manager: Manages agents or agent groups. The agent manager wants to know what agents are working on to make sure that customer needs are being met.	sn_customerservice_manager
Performance Analytics administrator: Ensures that business managers are making the best use of Performance Analytics solutions.	pa_admin or pa_viewer

Use case

This dashboard provides support managers with an overview of incoming work items and the availability of agents to handle them. Managers can monitor these daily trends to determine if adjustments should be made to the routing criteria, agent capacity values, and other settings that determine how work is pushed to agents.

Indicators

Indicator	Description
New Work Items	Total number of interaction work items that were created today. The goal for this indicator

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Indicator	Description
	is to minimize the number of interaction work items that agents receive.
Accepted Work Items	Percentage of interaction work items that agents have accepted.
Exceeding Target Work Items	Percentage of interaction work items that have exceeded the target wait time.
Rejected Work Items	Percentage of interaction work items that agents have rejected.
Timed Out Work Items	Percentage of interaction work items that timed out.
Weekly Trends	Number of work items in each of the following states for the past week: • New • Exceeding Target • Abandoned • Rejected • Timed Out

Breakdowns

To analyze data according to different categories, select a breakdown from the dashboard menu:

- Service Channel
- Queue
- Assignment Group

For more information on analyzing data with breakdowns, see Using breakdowns on dashboards.

Reports

Title	Type	Description
Accepted Work Items - Last Hour	Single  Score	Number of interaction work items that agents have accepted in the past hour.

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Title	Type	Description
Abandoned Work Items - Last Hour	Single  Score	Number of interaction work items that agents have abandoned in the past hour.
Average Wait Time - Last Hour	Single  Score	Average amount of time that customers have spent waiting for an agent response in the past hour.

Platform Analytics Solution for Advanced Work Assignment

This Platform Analytics Solution contains preconfigured dashboards. These dashboards contain actionable data visualizations that help you improve your business processes and practices.

Enabling Platform Analytics Solutions

Use the Performance Analytics widgets on the dashboard to visualize data over time, analyze your business processes, and identify areas of improvement. With solutions, you can get value from Performance Analytics for your application with minimal setup.

Note:
Solutions include some dashboards that are inactive by default. You can activate these dashboards to make them visible to end users according to your business needs.

For unlimited access to all features of this Platform Analytics Solution, purchase a Performance Analytics subscription. For more information, see Activating your Performance Analytics subscription.

To enable a solution for Advanced Work Assignment, an admin navigates to **System Definitions** > **Plugins** and activates the Performance Analytics - Content Pack - Advanced Work Assignment plugin.

Virtual Agent Academy: Using analytics to optimize Advanced Work Assignment Watch this video for more information about the Platform Analytics Solution for Advanced Work Assignment.

Related topics

- Platform Analytics Solutions
- Activate your Performance Analytics subscription

Advanced Work Assignment dashboard for interactions

Enable managers to monitor Interaction [interaction] work items so that their agents can better support customer needs.

This dashboard is available in the Performance Analytics - Content Pack - Advanced Work Assignment plugin. For information on activating the content pack, see Platform Analytics Solution for Advanced Work Assignment.

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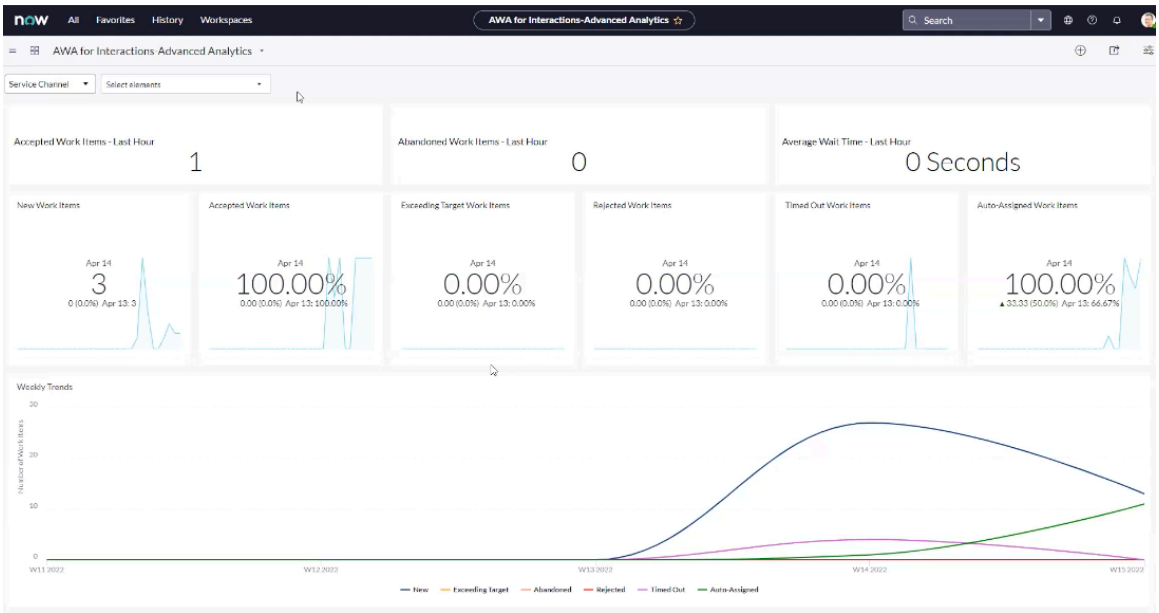
AWA dashboard for Interactions



End users and roles

End user and goal	Required role
AWA administrator: Configures Advanced Work Assignment to best fit the business needs of customer service.	awa_admin
AWA manager: Identifies the areas of concern for routing and assignment of work items across service channels.	awa_manager
Agent manager: Manages agents or agent groups. The agent manager needs to know what agents are working on to make sure customer needs are being met.	sn_customerservice_manager
Performance Analytics administrator: Ensures that business managers are making the best use of Performance Analytics solutions.	pa_admin or pa_viewer

Use case

This dashboard provides support managers with an overview of incoming work items and the availability of agents to handle them. Managers can monitor these daily trends to determine if adjustments should be made to the routing criteria, agent capacity values, and other settings that determine how work is pushed to agents.

Indicators

Indicators define a performance measurement taken at regular intervals of a business service, an activity, or organizational behavior.

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Indicator	Description
New Work Items	Total number of work items that were created today. The goal for this indicator is to minimize the number of interaction work items that agents receive.
Accepted Work Items	Percentage of all interaction work items that agents have accepted in the past hour.
Exceeding Target Work Items	Percentage of all interaction work items that have exceeded the target wait time.
Rejected Work Items	Percentage of all interaction work items that agents have rejected.
Timed Out Work Items	Percentage of all interaction work items that timed out.
Auto-Assigned Work Items	Percentage of all interaction work items that were automatically assigned.
Weekly Trends	Number of work items in each of the following states for the past week: • New • Exceeding Target • Abandoned • Rejected • Timed Out • Auto-Assigned

Breakdowns

To analyze data according to different categories, select a breakdown from the dashboard menu:

- Service Channel
- Queue

For more information on analyzing data with breakdowns, see Using breakdowns on dashboards.

Data visualizations

Title	Type	Description
Accepted Work Items - Last Hour	 Single Score	Number of interaction work items that agents have accepted in the past hour.

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Title	Type	Description
Abandoned Work Items - Last Hour	42 Single Score	Number of interaction work items that agents have abandoned in the past hour.
Average Wait Time - Last Hour	42 Single Score	Average amount of time that customers have spent waiting for an agent response in the past hour.

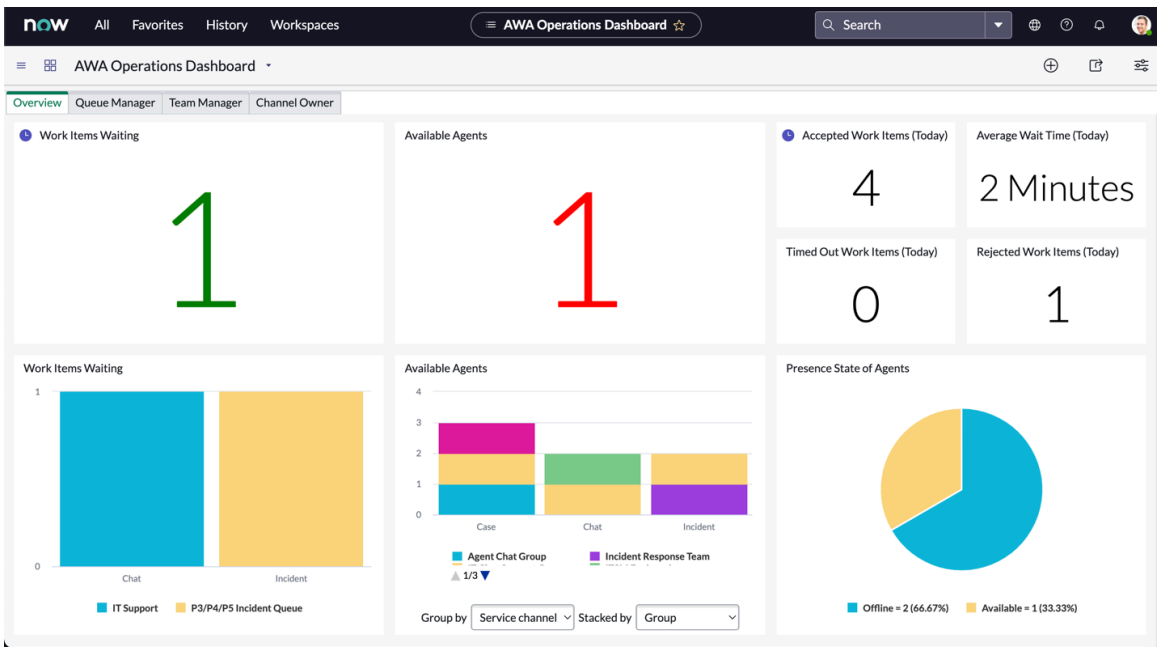
Advanced Work Assignment dashboard for operations

Enable managers to monitor work items across all service channels so that their agents can better support customer needs.

This dashboard is available in the Performance Analytics - Content Pack - Advanced Work Assignment plugin. For information on activating the content pack, see Platform Analytics Solution for Advanced Work Assignment.

AWA dashboard for Operations - Overview

The Overview tab of the Operations dashboard displays information across all queues, teams, and channels.



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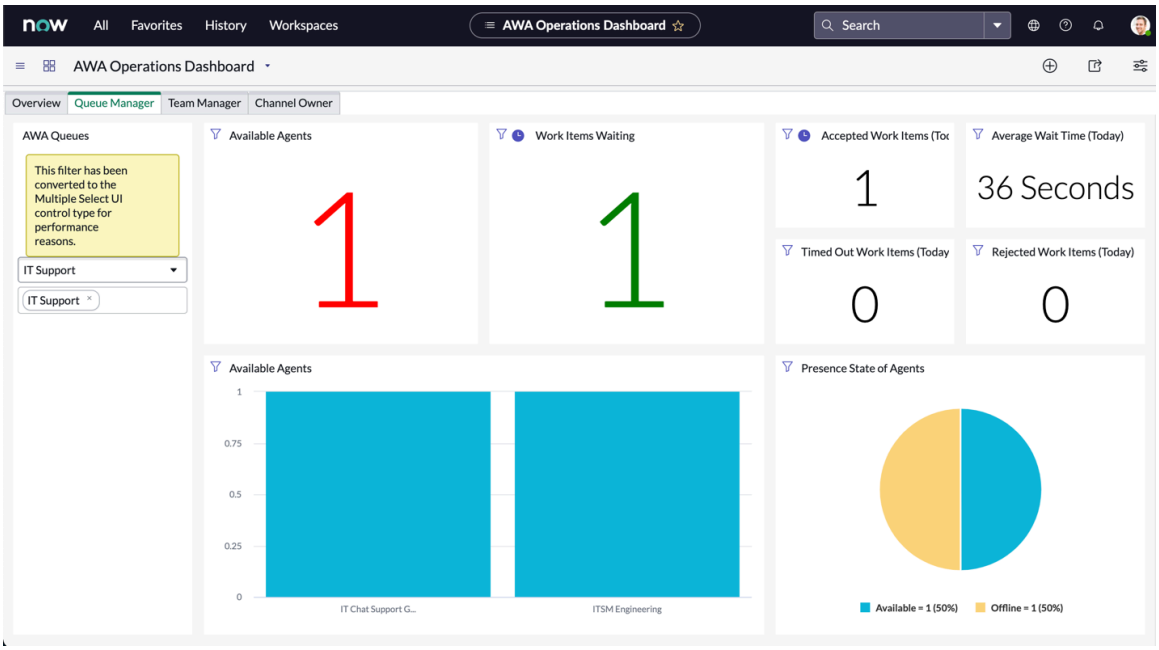
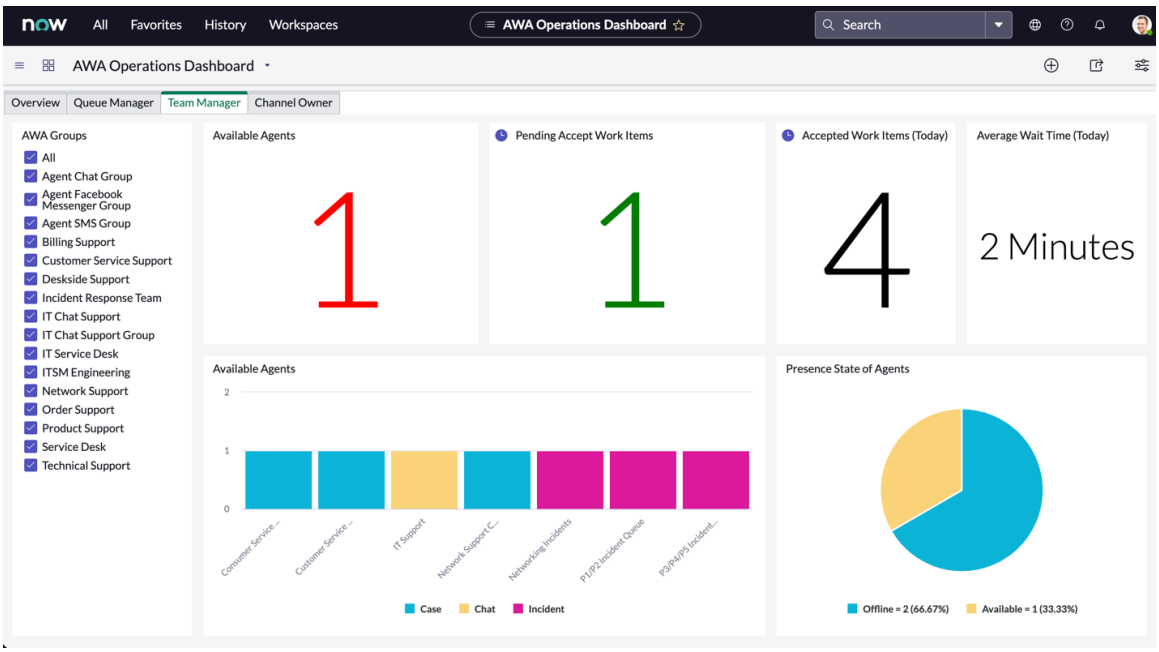
AWA dashboard for Operations - Queue Manager

The Queue Manager tab of the Operations dashboard displays overall queue information. You can select the queue you want to look at from the left-hand panel.



AWA dashboard for Operations - Team Manager

The Team Manager tab of the Operations dashboard displays information at a group level. You can select the group you want to look at from the left-hand panel.



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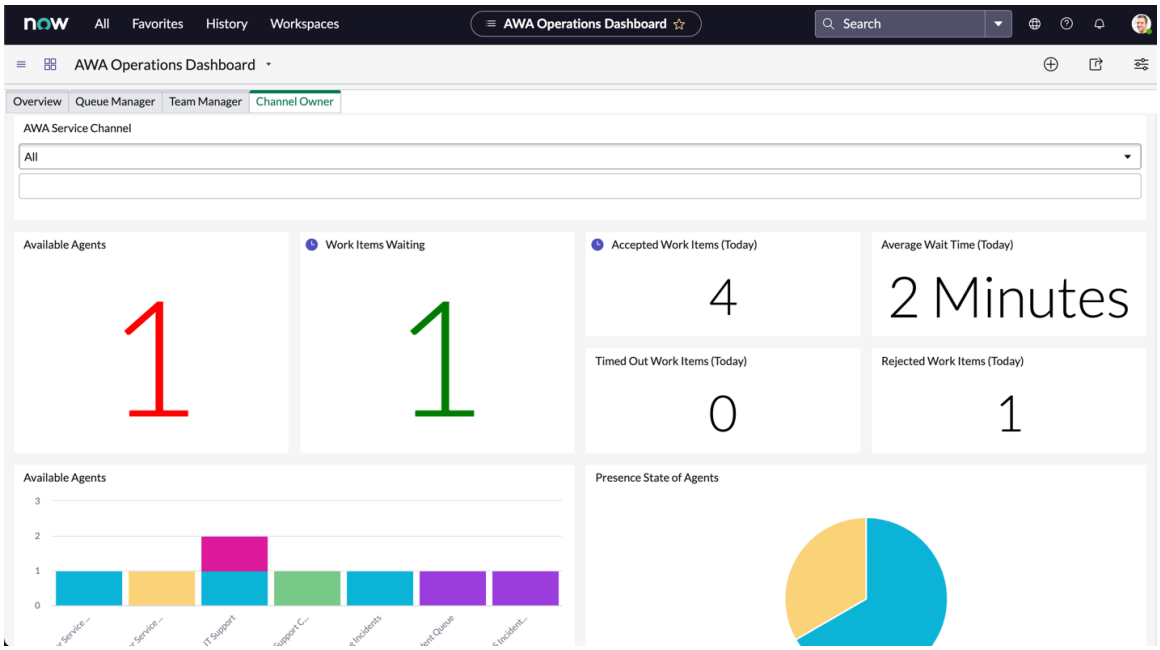
AWA dashboard for Operations - Channel Owner

The Channel Owner tab of the Operations dashboard displays overall channel data, depending on the service channel you select from the drop-down list.



End users and roles

End user and goal	Required role
AWA administrator: Configures AWA to best fit the business needs of customer service.	awa_admin
AWA manager: Identifies the areas of concern for routing and assignment of work items across service channels.	awa_manager
Agent manager: Manages agents or agent groups. The agent manager wants to know what agents are working on to make sure that customer needs are being met.	sn_customerservice_manager
Performance Analytics administrator: Ensures that business managers are making the best use of Performance Analytics solutions.	pa_admin or pa_viewer

Use case

This dashboard provides support managers with an overview of incoming work items and the availability of agents to handle them. Managers can monitor these daily trends to determine if adjustments should be made to the routing criteria, agent capacity values, and other settings that determine how work is pushed to agents.

Breakdowns

Breakdowns divide information into different categories. To analyze data according to different categories, select a breakdown from the dashboard menu:

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- Service Channel
- Queue

For more information on analyzing data with breakdowns, see Using breakdowns on dashboards.

Data visualizations

Title	Type	Description
Work Items Waiting	Single  Score	Work items that are pending accept or queued.
Available Agents	Single  Score	Number of agents that are available.
Accepted Work Items (Today)	Single  Score	Number of operation work items that agents accepted today. This includes auto-assigned work items that are accepted.
Average Wait Time (Today)	Single  Score	Average time it takes for an agent to accept a chat in the queue today.
Timed out Work Items (Today)	Single  Score	Work items that have timed out today.

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Title	Type	Description
Rejected Work Items (Today)	Single  Score	Work items that were rejected but not timed out.
Presence State of Agents		Distribution of agents across different presence states.
Agent Presence & Capacity		Count and list of agents in an assignment group with their current presence state, time since the user entered in the current presence state, and capacity in use for each channel. • Agent • Current presence state • Updated • Channel • Capacity in use • Applied Max Capacity • Universal Capacity In Use • Max Universal Capacity

Advanced Work Assignment dashboard for tasks

Enable managers to monitor Task [task] work items so that their agents can better support customer needs.

This dashboard is available in the Performance Analytics - Content Pack - Advanced Work Assignment plugin. For information on activating the content pack, see Platform Analytics Solution for Advanced Work Assignment.

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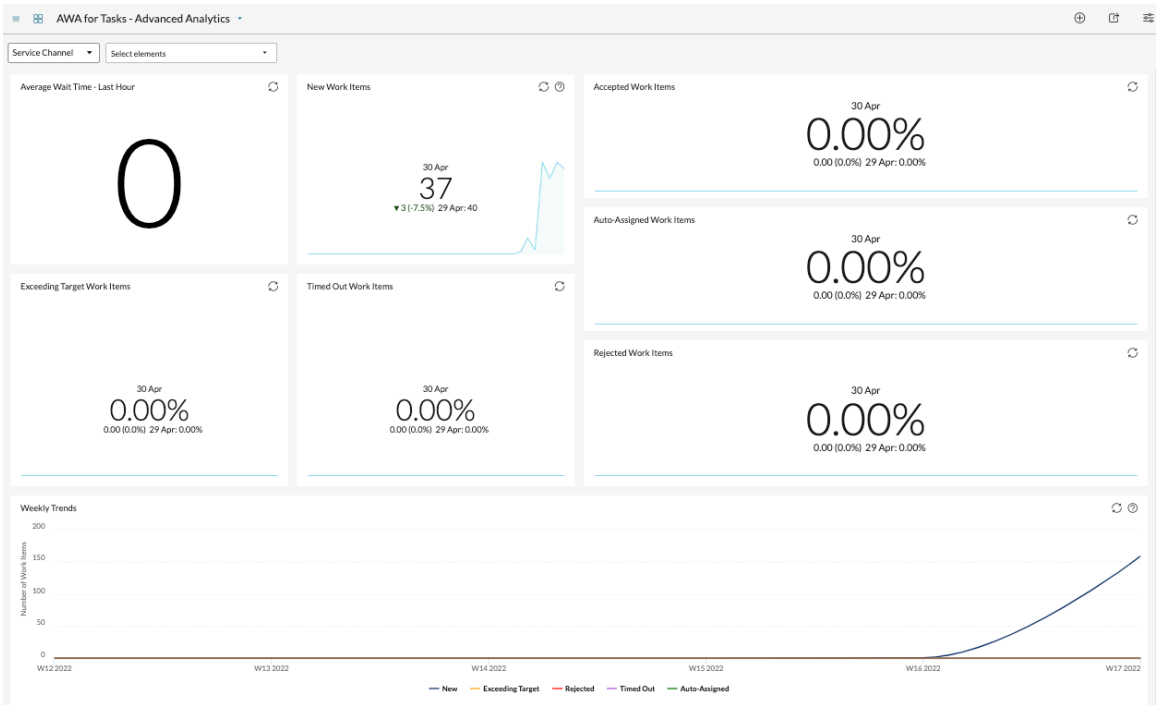
AWA dashboard for Tasks



End users and roles

End user and goal	Required role
AWA administrator: Configures Advanced Work Assignment to best fit the business needs of customer service.	awa_admin
AWA manager: Identifies the areas of concern for routing and assignment of work items across service channels.	awa_manager
Agent manager: Manages agents or agent groups. The agent manager needs to know what agents are working on in order to make sure customer needs are being met.	sn_customerservice_manager
Performance Analytics administrator: Ensures that business managers are making the best use of Performance Analytics solutions.	pa_admin or pa_viewer

Use case

This dashboard provides support managers with an overview of incoming work items and the availability of agents to handle them. Managers can monitor these daily trends to determine if adjustments should be made to the routing criteria, agent capacity values, and other settings that determine how work is pushed to agents.

Indicators

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Indicator	Description
New Work Items	Total number of task work items that were created today. The goal for this indicator is to minimize the amount of task work items that agents receive.
Accepted Work Items	Percentage of all task work items that agents have accepted.
Auto-Assigned Work Items	Percentage of all task work items that were automatically assigned.
Exceeding Target Work Items	Percentage of all interaction work items that have exceeded the target wait time.
Timed Out Work Items	Percentage of all interaction work items that timed out.
Rejected Work Items	Percentage of all interaction work items that agents have rejected.
Weekly Trends	Number of work items in each of the following states for the past week: • New • Exceeding Target • Abandoned • Rejected • Timed Out • Auto-Assigned

Breakdowns

To analyze data according to different categories, select a breakdown from the dashboard menu:

- Service Channel
- Queue

For more information on analyzing data with breakdowns, see Using breakdowns on dashboards.

Data visualizations

Title	Type	Description
Average Task Wait Time - Last Hour	Single  Score	Average amount of time in the past hour that customers have spent waiting for an agent response.

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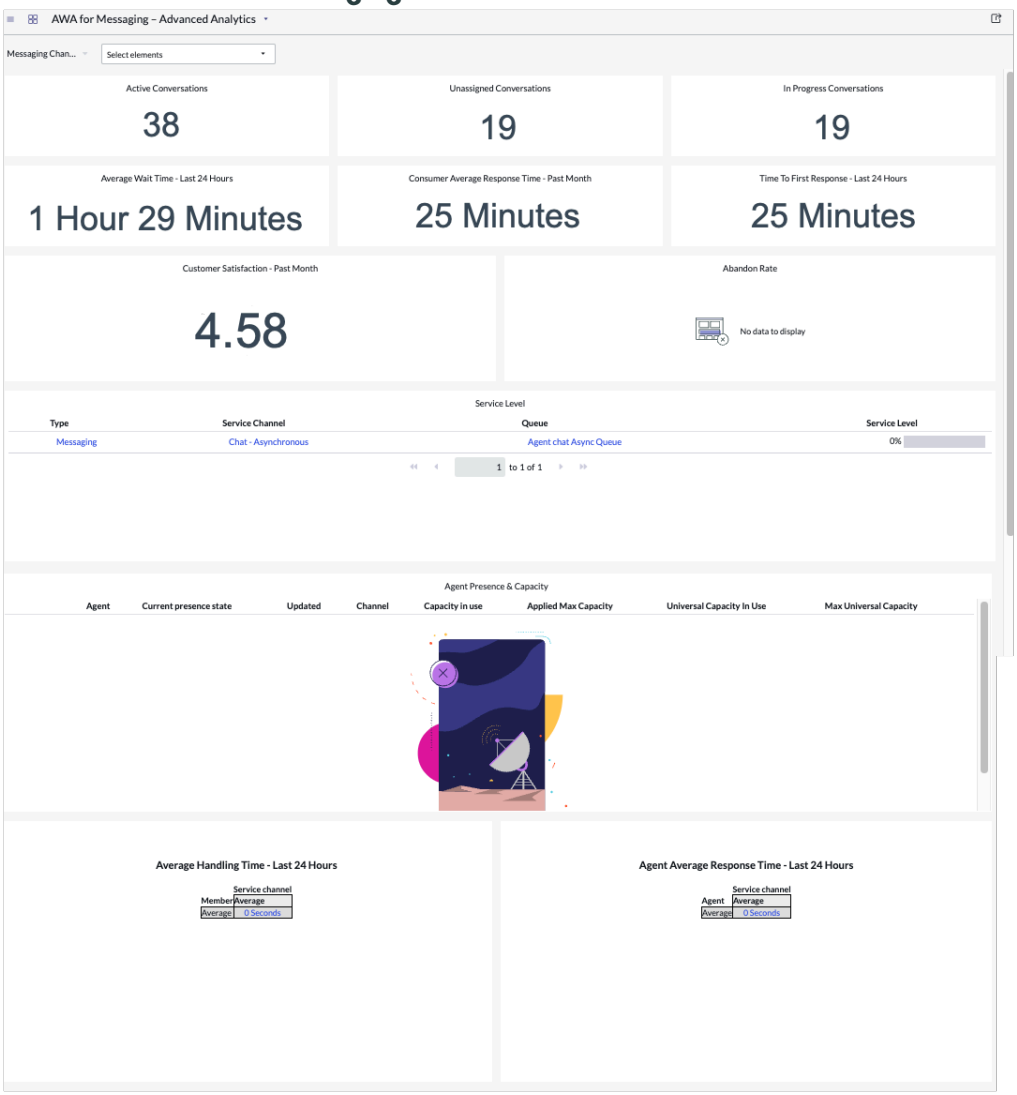
Advanced Work Assignment dashboard for messaging

Enable managers to monitor Conversation [interaction] work items so that their agents can better support customer needs.

This dashboard is available in the Performance Analytics - Content Pack - Advanced Work Assignment plugin. For information on activating the content pack, see Platform Analytics Solution for Advanced Work Assignment.

AWA dashboard for Messaging



End users and roles

End user and goal	Required role
AWA administrator: Configures Advanced Work Assignment to best fit the business needs of customer service.	awa_admin
AWA manager: Identifies the areas of concern for routing and assignment of work items across service channels.	awa_manager
Agent manager: Manages agents or agent groups. The agent manager needs to know	sn_customerservice_manager

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End user and goal	Required role
what agents are working on to make sure customer needs are being met.	
Performance Analytics administrator: Ensures that business managers are making the best use of Performance Analytics solutions.	pa_admin or pa_viewer

Use case

This dashboard provides support managers with an overview of incoming work items and the availability of agents to handle them. Managers can monitor these daily trends to determine if adjustments should be made to the routing criteria, agent capacity values, and other settings that determine how work is pushed to agents.

Indicators

Indicators define a performance measurement taken at regular intervals of a business service, an activity, or organizational behavior.

Indicator	Description
Abandon Rate	Percentage of conversations that have been abandoned by the requestor.

Data visualizations

Title	Type	Description
Active Conversations	Single  Score	Agent Chat messaging conversations that are not Closed Complete or Closed Abandoned and are not cancelled.
Unassigned Conversations	Single  Score	Agent Chat messaging conversation that is in a pending accept or queued state.
In Progress Conversations	Single  Score	Agent Chat messaging conversation that is on hold, new, or work in progress.

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Title	Type	Description
Average Wait Time - Last 24 Hours	Single  Score	Average time it takes for an agent to accept a chat in the queue today.
Consumer Average Response Time - Past Month	Single  Score	Messaging conversation that is Closed Complete or Closed Abandoned and is assigned and the requester average response time is not empty and it was created after one month.
Time To First Response - Last 24 Hours	Single  Score	Inbound messaging conversation where the first response wait time is not empty and it was created after 24 hours.
Customer Satisfaction - Past Month	Single  Score	Customer satisfaction score over the past month
Service Level	Single  Score	• Type • Service Channel • Queue • Service Level
Agent Presence & Capacity		• Agent • Current presence state • Updated • Channel • Capacity in use • Applied Max Capacity • Universal Capacity In Use • Max Universal Capacity

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Title	Type	Description
Average Handling Time - Last 24 Hours	Single  Score	Average time of the interactions handling duration in the last 24 hours.
Agent Average Response Time - Last 24 Hours	Single  Score	Average agent response time in the last 24 hours.

Advanced Work Assignment reference

The following sections detail the installed components and properties for Advanced Work Assignment (AWA), along with domain separation and performance statistics information.

Assignment Rule form

When creating or changing an Advanced Work Assignment assignment rule, the Assignment Rule form contains the following fields.

Assignment Rule form

Field	Definition
Name	Name of the assignment rule.
Application	Name of the application to which this assignment rule belongs. The default application is **Global**.
Short description	Brief description of the assignment rule.
Assign by	Type of assignment. Select one of the following values: • **Last Assigned**: Routes a work item to the agent who has gone the longest without being assigned work. • **Most Capacity**: Routes a work item to the agent who has the greatest availability for handling the work.
Auto-assign handling	Work items are automatically accepted without agents having to select **Accept** or **Reject**. • **Enable auto-assign work items**: Select this option to have work items automatically accepted on behalf of agents. Agents are unable to manually **Accept** or **Reject** work items.

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Assignment Rule form (continued)

Field	Definition

	• **Display options**: Select one of the following values:
	  ○ Select **Inbox card** to accept the chat interactions and add them to the agent inbox. Agents can open the accepted interaction from the inbox.
	  ○ Select **Inbox card and workspace tab** to accept chat interactions and open a tab for each accepted interaction.

Rejection handling	Work items are rejected and handled.
	• Allow agents to reject: Enable agents to reject work items in their inbox.
	• Reassign on timeout: Enable reassignment of work items not accepted or rejected by agents within the specified timeout period:
	  ○ Timeout value (Days and Hours, Minutes, Seconds): Length of time allowed for an agent to accept or reject a work item before the assignment times out (ends) and is reassigned to another agent.
	  ○ Timeout presence state: Agent availability state after the timeout occurs: Available, Away, or Offline.
	
	This tab isn't available when auto-assign handling is activated.

Skill handling	Skill-based work assignments. • **Enable skills**: Route work items to agents with the appropriate skills. When selected, the **Evaluate skill level** and **Enforce mandatory skills** check boxes appear cleared. • **Evaluate skill level**: Route work items to the most qualified agents based on their skill level. • **Enforce mandatory skills**: Route work items to agents with required skills.
Shift handling	Work items are assigned to agents based on shifts.

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Assignment Rule form (continued)

Field	Definition
	• Enable-shift based assignment: Assign work items to agents based on time available in their shifts. • Add time constraints: Add the time required to complete work items in shifts and whether agents should be continuously available for the required time period. This field appears only when the **Enable shift-based assignment** option is selected. • Agent criteria: Select an agent based on the time left in the agent's shift. This field appears only when the **Enable shift-based assignment** option is selected. Available options: ○ Least time left in shift: Assign a work item to an agent from a group of available agents based on the least amount of time available in their shifts. ○ Most time left in shift: Assign a work item to an agent from a group of available agents based on the maximum time available in their shifts. • Time required: Time required to complete a work item. • Available continuously for the required time: Assign work items to agents who are continuously available for the required time period without any breaks in a shift. Agents who don’t have the minimum time required

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Assignment Rule form (continued)

Field	Definition
	in their shifts aren't considered for work item assignments. **Note:** The **Shift handling** field is available only if the Advanced Work Assignment plugin (com.glide.awa) is activated and the Workforce Optimization for Customer Service plugin (com.snc.wfo.csm) or the Workforce Optimization for ITSM plugin (com.snc.wfo_itsm) plugin, or both, is activated. As a manager, you must have planned schedules for agents to assign them shifts. For more information, seeScheduling in Workforce Optimization for Customer Service and Scheduling in Workforce Optimization for ITSM. This field appears only when the **Add time constraints** option is selected.

Domain separation and Advanced Work Assignment

Domain separation is supported in the Advanced Work Assignment feature. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Overview

Advanced Work Assignment enables the automatic assignment of work items to qualified agents using work item queues defined for specific service channels. Managed Service Providers can create domain-specific queues by specifying a particular domain as a queue routing condition.

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How domain separation works in Advanced Work Assignment

When an instance has a domain hierarchy where users and groups belong to different domains, you may need to restrict the visibility of work items to certain agents in a domain. You may also need to ensure that work items are routed to agents in the proper domain. AWA admins can configure service channels and associated work item queues to:

Route work by domains

To push work items to agents in domains where only certain tasks or interactions are visible to them, use a routing condition that routes those items to the appropriate queues. For example:

- To restrict a queue to only items that match exactly to a particular domain X, specify this condition: **[Domain] [is] [X]**
- To route all work items in domain X and its child domains to a queue, use the **Domain Path** field and specify a condition such as: **[Domain Path] [starts with] [!!!/!!#/]**

Assign work to agents in the appropriate domain

To assign work items to agents in the appropriate domain, ensure that the assignment groups specified in the queue Eligibility Assignment pools have agents that belong to the domains where they can see the work items routed to the queue.

If a mismatch occurs, and agents in an eligible assignment group cannot see a work item in a queue, AWA may temporarily assign an item to an agent. However, before the item is moved to the agent's inbox, AWA automatically rejects the assignment with the reason **No access**. AWA reassigns the work item to a different agent who might have access. If none of the available agents can see the work item, the item could be rejected multiple times.

> **Warning:**
> The item can get stuck in the queue until the AWA admin corrects the eligible assignment configuration.

Related topics

Domain separation for service providers

Components installed with Advanced Work Assignment

Several types of components are installed with activation of the Advanced Work Assignment plugin, including tables, user roles, and scheduled jobs.

> **Note:**
> The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Roles installed

AWA adds the following roles for users who configure, manage, and receive work assignments.

Role title [name]	Description	Contains roles
Advanced Work Assignment administrator	Admin role for the AWA feature. Configures and manages AWA.	awa_manager

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Role title [name]	Description	Contains roles
[awa_admin]		
Advanced Work Assignment developer [awa_integration_user]	Developer role for the AWA feature. Uses the AWA integration APIs.	None
Advanced Work Assignment agent [awa_agent]	Agent role for the AWA feature. Handles customer interactions and manages workload across multiple service channels.	None
Advanced Work Assignment manager [awa_manager]	Manager role for the AWA feature. Monitors performance of agents across all service channels.	None

Scheduled jobs installed

Scheduled job	Description
AWA WorkItem TimeOut Job	
AWA Cleanup Job	

Tables installed

Table	Description
AWA Agent Capacity [awa_agent_capacity]	Stores capacity override records for agents on individual channels.
AWA Agent Channel Availability [awa_agent_channel_availability]	Store the records that determine the agents available in the channel.
AWA Agent Presence [awa_agent_presence]	Stores the records that define the agent availability state.
AWA Agent Presence History [awa_agent_presence_history]	Stores records on agent presence state changes.
AWA Assignment Rule [awa_assignment_rule]	Stores the assignment rule records used to determine the work items pushed to agents.
AWA Eligibility Pool [awa_eligibility_pool]	Stores the records that define grouping of agents eligible to receive work items in the queue when the items have been rejected by agents or agents are unavailable.
AWA Group Queue Priority	Stores the priority values for queues assigned to groups.

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Table	Description
[awa_group_queue_priority]	
AWA Inbox Layout [awa_inbox_layout]	Defines the fields that appear on a work item card in the Agent Workspace inbox.
AWA Offer Details [awa_offer_details]	Stores whether a work item was assigned using Agent Affinity and how the assignment was completed.
AWA Presence State [awa_presence_state]	Defines presence states.
AWA Queue [awa_queue]	Stores the work item queue records.
AWA Queue Item Sorting [awa_queue_item_sorting]	Defines which fields in a work item for a queue you can sort on.
AWA Reject Reason [awa_reject_reason]	Stores the records that define the reasons that agents use to decline work items assigned to them.
AWA Service Channel [awa_service_channel]	Defines the communication channel for which work items may be queued.
AWA Work Item [awa_work_item]	Stores items of work, for example, chats, cases, or incidents, that are routed from service channels to queues and then to agents.
AWA Work Item Rejection [awa_work_item_rejection]	Stores the rejection history records for each work item.

Properties installed

Property	Description
glide.awa.enabled	Enables the auto assignment of work items for Advanced Work Assignment. • **Type**: true | false • **Default value**: true • **Location**: System Property [sys_properties] table
com.snc.awa.cache.enabled	Enables the Advanced Work Assignment cache.

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Property	Description
	• **Type**: true | false • **Default value**: true • **Location**: System Property [sys_properties] table

Properties for Advanced Work Assignment

The Advanced Work Assignment Properties page provides configuration options for AWA.

If you have the admin role, you can create or change these properties by navigating to **System Properties** > **All Properties**.

Properties for AWA

Property	Description
AWA Routing Look-Back Time `com.glide.awa.routinglookback`	AWA defaults to routing work items created within the last 10 minutes. If a work item is created after 10 minutes has passed, it isn't considered for AWA routing. For work items that are created outside of the default 10-minute window, create this system property to expand the AWA routing look-back time: • **Name**: `com.glide.awa.routinglookback` • **Type**: **Integer** • **Value**: Number of seconds For example, set the property **Value** to 86400 (24 hours) to cover a full shift for any missed work items. • **Description**: `Number of seconds AWA looks back for routing once the work items are eligible for AWA.` **Note:** This property affects all service channels in the system.
Disable Query business rules `glide.awa.query_br_disable`	If the property is enabled, AWA disables before query business rules during its execution. For example, if enabled, an instance can have a custom before-query business rule on the interaction table without affecting how AWA routes or assigns interactions.

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Properties for AWA (continued)

Property	Description
	• **Type**: true | false • Default value: true • Location: **System Properties** > **All Properties**
Bypass *AWA* Queue Max Wait Time *glide.awa.bypass_max_wait_time.enabled*	This property overrides the queue's max wait time value with the assignment rule's timeout value to help prevent work items from disappearing prematurely in an agent's inbox.
Enable/disable execution of subflows *glide.awa.enable_routing_subflow*	Enables/disables the execution of subflows defined on the AWA queues when work items are routed. • **Type**: true | false • Default value: false

For information on adding a system property, see Add a system property.

Advanced Work Assignment monitoring page

Administrators (admin or awa_admin) can monitor Advanced Work Assignment activity by reviewing information on the Advanced Work Assignment Stats page.

The Advanced Work Assignment Stats page displays AWA performance statistics. Administrators can access the Advanced Work Assignment Stats page by entering `<instance_url>/awa_stats.do` where instance_url is the base of the ServiceNow URL.

Note:
The mean, median, max, and min statistics are representative of the particular node you are viewing.

Total Agent Summary

Field	Description
Agent Status	Overview of agent status for all assigned agents

Channel Summaries

Work Items

Field	Description
Number Queued	Number of work items currently queued
Number Pending Acceptance	Number of work items currently pending acceptance

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Work Items (continued)

Field	Description
Number of Duplicates	Number of duplicate work items (meaning same document id, usually from transfers)
Number Rejected	Number of work items rejected
Current Number Meeting Channel Condition	Number of work items with the channel condition met
Current Number Meeting Utilization Condition	Number of work items with the current utilization condition met
Current Number Meeting Channel & Utilization Condition	Number of work items meeting both channel and utilization condition
Total Work Item Count	Total number of work items for the given channel

Query Performance

Field	Description
Max Query Response Time	Maximum amount of time for the response of querying all the active and unassigned work items of a given channel
Min Query Response Time	Minimum amount of time for the response of querying all the active and unassigned work items of a given channel
Mean Query Response Time	Mean amount of time for the response of querying all the active and unassigned work items of a given channel
Median Query Response Time	Median amount of time for the response of querying all the active and unassigned work items of a given channel
Total Query Count	Total number of times the query for inactive/unassigned work items has been made for the given channel

Record Watchers

Field	Description
Record Watcher Entries Present	True if the required record watchers for the channel exist (channel eligibility responder, work item responder, workload responder).
Number of Entries Triggered	Number of times onEntry has been called on this node for the given record watcher
Number of Exits Triggered	Number of times onExit has been called on this node for the given record watcher
Number of Changes Triggered	Number of times onChange has been called on this node for the given record watcher

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Queues

Field	Description
Total Number of Queues	Total number of active queues for a given channel
Number of Queues in Schedule	Number of queues for a given channel that are currently in schedule
Number of Queues Out of Schedule	Number of queues for a given service channel that are currently out of schedule
Number of Inactive Queues	Number of queues that are not marked as active

Agents

Field	Description
Agent status overview for the given channel	Number of agents with this status

Channel Breakdown

Queues

Field	Description
In Schedule	True if the queue is in schedule, false otherwise
Agents Available	True if the given queue has agents available, false otherwise
Number of Agents Available	Number of agents marked as available for the given queue
Number of Work Items Queued	Number of work items queued for the given queue
Number of Work Items Pending Acceptance	Number of work items pending acceptance for the given queue
Max Routing Time for Work Items	Maximum routing time of creating a work item for a given record and assigning it to the queue
Min Routing Time for Work Items	Minimum routing time of creating a work item for a given record and assigning it to the queue
Mean Routing Time for Work Items	Mean routing time of creating a work item for a given record and assigning it to the queue
Median Routing Time for Work Items	Median routing time of creating a work item for a given record and assigning it to the queue
Total Routing Count of Work Items	Total number of work items routed to the queue from created records

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Advanced Work Assignment roles

Advanced Work Assignment (AWA) is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

AWA administrator [awa_admin]

The AWA administrator configures and manages AWA.

Contains Roles

List of roles contained within the role.

- chat_survey_admin
- interaction_agent
- quickactions_user
- sn_ace.ace_user
- sn_ci_gs_content.ci_guided_setup_admin

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

AWA agent [awa_agent]

The AWA agent handles customer interactions and manages workload across multiple service channels.

Contains Roles

List of roles contained within the role.

- quickactions_user
- sn_templated_snip.template_snippet_reader

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

AWA integration user [awa_integration_user]

The AWA integration user uses the AWA integration APIs.

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Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

AWA manager [awa_manager]

The AWA manager monitors the performance of agents across all service channels.

Contains Roles

List of roles contained within the role.

- *interaction_agent*
- *quickactions_user*

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Skills Management

Use Skills Management to associate skills with individual users or groups and assign them to tasks or projects. You can also assess the skills needed for your organization, identify gaps, and implement effective plans for hiring or training of your teams.

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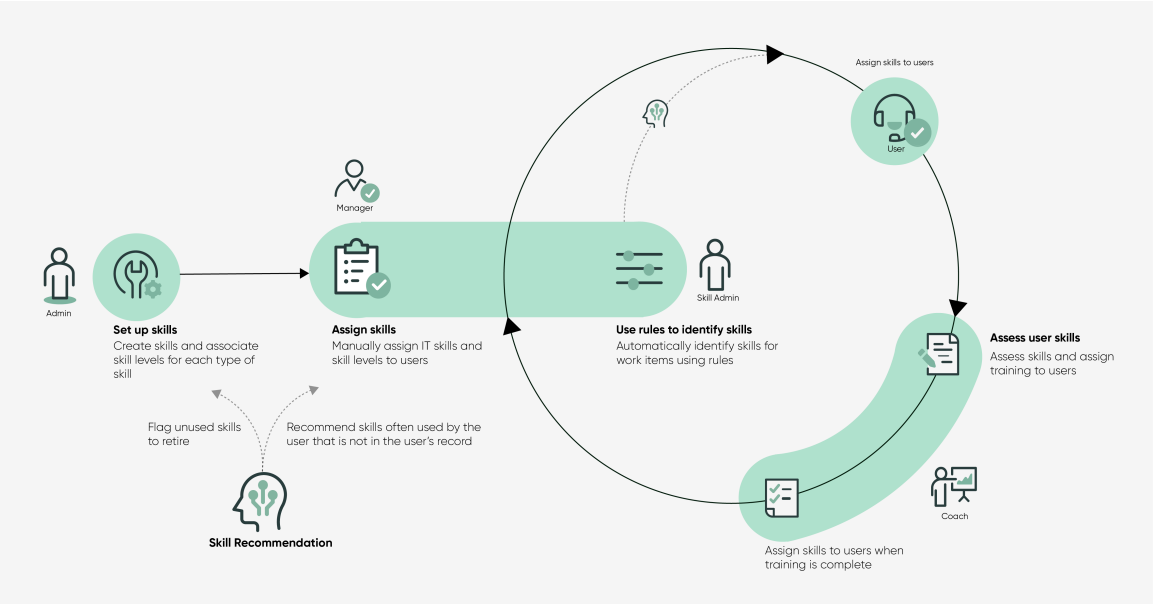
Overview



Get started

Explore

Learn how you can implement and manage skills for individuals or teams.

Configure

Plan and configure your implementation.

Integrate

Implement skills across your organization.

Reference

Get details about roles and extension points in Skills Management.

Troubleshoot and get help

- ServiceNow Community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

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Exploring Skills Management

Use Skills Management to associate skills with individual users or groups and assign them to tasks or projects. You can also assess the skills needed for your organization, identify gaps, and implement effective plans for hiring or training of your teams.

Important:
Using the Skills Management application, you can create skills and skill categories manually, and also assign them manually to users. Skills Intelligence uses Artificial Intelligence (AI) to help your organization leverage skills data for talent management and employee development. When you activate the Skills Intelligence plugin (com.sn_skills_int), it also activates the Skills Management plugin (com.snc.skills_management). For information on Skills Intelligence, see Skills Intelligence.

Skills can contain other skills. For example, if you define network as a skill, you can add router as the skill it contains. A user assigned to a parent skill grants access to a child skill. Once a skill is assigned to a group, all members of the group inherit that skill and any others contained within it. Skills management works similar to ServiceNow platform Create a role.

Using this application, you can:

- Manage skills for agents and your employees from a central location.
- Use a standard way to identify skills for your organization and keep them up to date.
- Group skills into categories and define skill levels to track the expertise of your resources at a granular level.
- Reduce task or project reassignments by assigning tasks to agents and projects to teams that have the right skills to work on those items.
- Identify skill gaps and resolve them by implementing effective plans for coaching and training of resources.
- Manage the effectiveness of your team by evaluating the skills your team has and determining the skills you need for on your projects.

Integration with ServiceNow® applications

A skill is an ability to do something that comes from training, experience, and practice. As a system administrator, you can define skills for your organization and assign it to users and groups from a central location. As an application manager, you can assign users to tasks based on these skills. For example, if you are an IT manager, you can use the Skills Management application to define skills and assign them to users and groups, which facilitates the routing of incidents to agents with relevant skills.

Group skills into categories and define skill levels to standardize skill implementation across your organization.

Use skills from the centralized location in the following applications:

- IT service management - As an IT manager, reduce your time and costs while resolving incidents by assigning work items to the right agent. Assess the skill gaps that agents have in your team and coach or train agents based on those needs. Identify and define a standard way to keep skill categories and levels consistent within your team.
- Customer service management - As a customer service manager, identify agent skills and automatically route tasks to agents who have the required skill to work on those tasks. Manage your team's effectiveness by understanding what type of skills your employees need to get hired or get trained to take on other roles.

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- Field service management - As a field service or customer service manager, use rules to identify skills and skill levels that agents require to resolve work items such as cases, work order tasks, and agent interactions. Automate skill assignment to reduce a manager's work load. Automatically assign tasks to agents using Field Service dynamic scheduling.
- Human resources management - As an HR manager, identify the types of skills your organization needs and make hiring decisions based on those needs. Manage your team's effectiveness by understanding what type of skills your employees need to get hired or get trained to take on other roles.
- Project portfolio management - As a project and portfolio manager, standardize how you categorize skills, define skill level types, and add skill levels for your team. Set up skills for your team in a central location and make them available within your team. Prevent project reassignments by assigning projects to the team members who have the right skills to work on them.

Roles used in Skills Management

Role	Description
Skill administrator [skill_admin]	• Inherits the skill manager [skill_manager] and skill user [skill_user] roles. • Can perform create, read, update, and delete (CRUD) operations on skills, skill levels, skill level types, skill categories, and sub categories.
Skill manager [skill_manager]	• Inherits the skill user [skill_user] role. • Can perform read operations on skills, skill levels, skill level types, skill categories, and sub categories. • Can assign skills to users and groups.
Skill user [skill_user]	Can perform read operations on skills, skill levels, and skill level types.

Activating Skills Management

The Skills Management application is activated when you enable the Skills Management (com.snc.skills_management) plugin.

Configuring Skills Management

Create skills, identify the type of skill level it belongs to and associate skill levels for each type to define skills for your users consistently across your organization and be able to assign resources accordingly. For example, you can add French as a skill, language as the skill level type, and familiar, proficient, and expert as the skill levels.

Identify all skills you currently have and would need across your organization to begin implementing skills. For example, if you are in Customer Service, you might have agents who have Java as a technical skill and you might need agents who have experience in network administration. If you are in Human Resources, you may have employees who have coaching as a skill and you might need employees who can get new hires on board.

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Associate each skill you have identified with a skill level type. For example, you could associate Java with programming as the skill level type and coaching with leadership as the skill level type.

Define skill levels for each type you have identified. As an example, you could use familiar, proficient, and expert as skill levels for the Java skill level type and beginner, intermediate, and advanced as the skill levels for the coaching skill level type.

Define the skill taxonomy

Organize related skills into categories and subcategories so that you can manage skills and create reports quickly and efficiently.

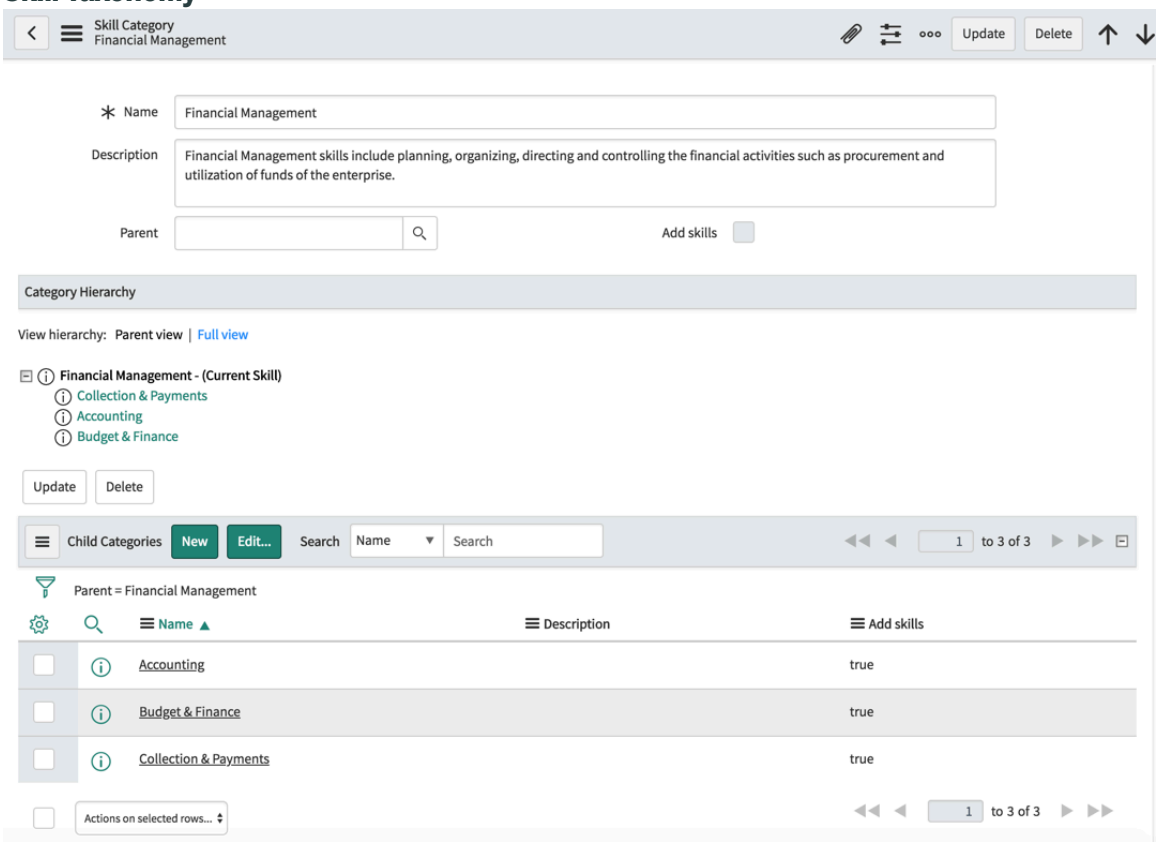
Before you begin

Role required: skill_admin

About this task

A skill category can contain parent and child categories that together create a category hierarchy. You can add skills to the lowest category in the hierarchy.
You can build your skill taxonomy from scratch or use the sample data provided with your application.

Skill Taxonomy



Procedure

1. Navigate to **All** > **Skills** > **Skill Taxonomy**.
2. In the **Skills Categories** list, click **New**.
3. In the **Name** field, enter a unique name for the category.
4. **Optional:** In the **Parent** field, select a parent category.
5. Right-click the form header and click **Save**.
   The category is added to the **Category Hierarchy**.

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6. Add sub-categories or skills.

7. Click **Submit**.

Create skill categories using sample data

Onboard your team quickly using the skill taxonomy framework provided with your application.

Before you begin

Role required: skill_admin

About this task

The sample data provides 150 records that you can use to get started building your skill taxonomy.

Procedure

1. Activate the Skills Library Data for Skills Management (com.snc.skills_management.seed_data) plugin.
2. Navigate to **Skills** > **Skill Taxonomy**.
3. In the **Skill Categories** list, review each category and set the **Add skills** field to **true** for all skill categories you want to add to your application.

Define a skill level type

Define skill levels (for example, beginner, intermediate, advanced) for different skill level types (for example, a language or an IT certification) so you can associate skill levels to users and define skill levels and types required for tasks.

Before you begin

Role required: skill_admin or admin

Procedure

1. Identify skill level types.

   You can group skills that belong to the same category into a skill level type. For example, you could use language as the skill level type if Japanese and French are defined as skills. Take an inventory of every type of skill your organization needs.

2. Add skill level types, define skill levels, and associate them with a skill level type.
   After you add a skill level type, you can define different levels for that type of skill. For example, if you add language as a type of skill, you can associate familiar, proficient, and expert as skill levels. When you select French, for example, as a skill for a user, you will be able to define the user's skill level for French as either familiar, proficient, or expert.

   a. Navigate to **Skills** > **Skill Level Types**.

   b. Click **New**.

   c. Enter a name and description for the skill level type, and then right-click the form and click **Save**.

   d. Associate skill levels with this skill type.

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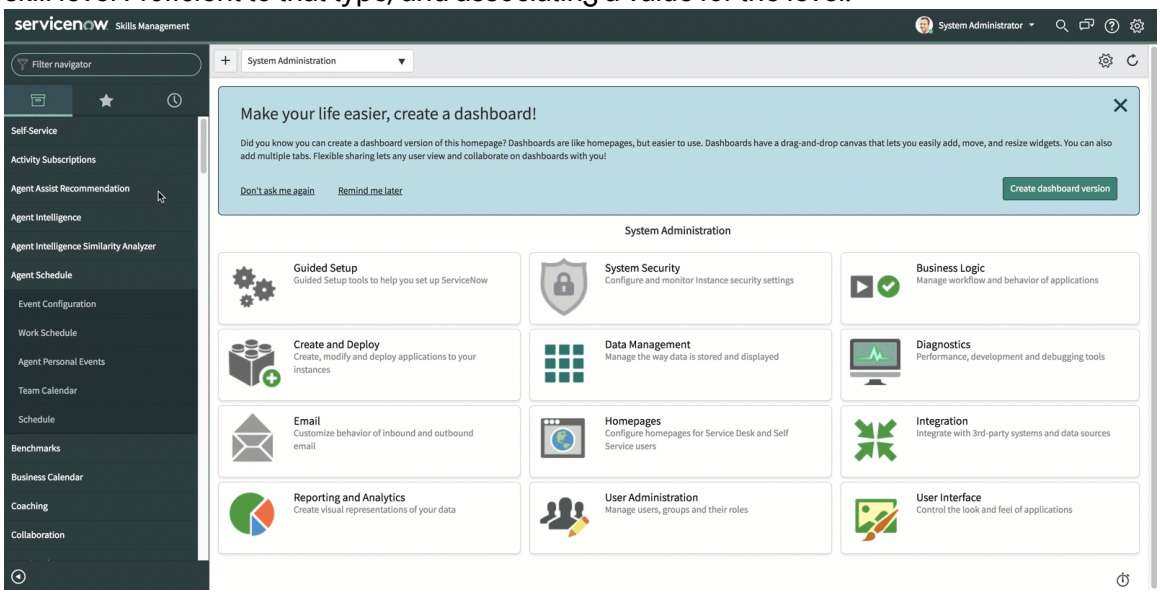
By default, skill level types are associated with the **Default** skill level and have a value of 1. You can change the name and value for this default skill level. The value is used to measure skill gaps. For example, if you give a value of 10 for a skill level defined as proficient and a value of 25 for a skill level defined as expert, when you create a skill report to measure gaps, you will see a value of 15 as a measure for the skill gap.

3. Click **Submit**.

Example:
This example shows a system administrator creating the skill level type Language, adding the skill level Proficient to that type, and associating a value for the level.



Add a skill

Create skills to specify the competencies of your users and associate them with users, and configuration items.

Before you begin
Role required: skill_admin or admin

Procedure

1. Identify skills.

   Take an inventory of all skills you currently have and would need across your organization. For example, if you are using Customer Service, you may have agents who have Java as a technical skill and you may need agents who have experience in network administration. If you are using Human Resources, you may have employees who have coaching as a skill and you may need employees who can get new hires on board.

2. Add skills.

   You can associate each skill with other skills, users, or configuration items. You can assign users to tasks or projects, or identify employees with specific skills using these associations.

   a. Navigate to **Skills** > **All Skills**.

   b. Click **New**.

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c. Enter a name and description for the skill and then right-click the form and click **Save**.

d. If you want to associate subskills with the skill, click the **Contains Skills** tab and create a new skill or add an existing skill as a subskill.
The subskill is automatically inherited by the user or group that contains the associated skill.

e. Specify skills for users by clicking the **Users** tab and creating a new user for the skill or adding existing users.

f. Associate the skill with configuration items by clicking the **Model** tab and adding one or more configuration items.

3. Click **Update**.

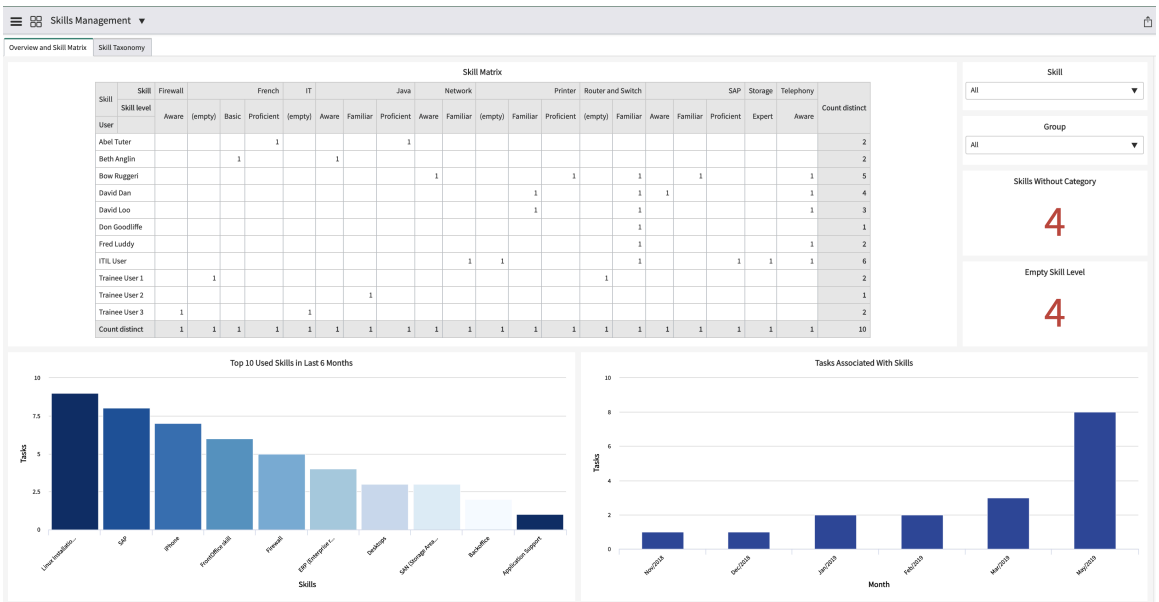
Using Skills Management

Use the Skills Management dashboard to analyze trends in assessing skill gaps in your organization and plan for coaching or training of your employees based on needs. Identify users and teams who have the right skills to work on tasks and projects.

The Skills Management dashboard provides comprehensive reports on skill competencies of users, the tasks that require those skills, and skill gaps you can address to fulfill your organizational needs.

You can access the dashboard by navigating to **Skills** > **Dashboard**.

Overview and Skill Matrix tab



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Skill Taxonomy

You can filter these reports based on the skill category and view reports for each category.



End user and roles

End user and goal	Required role
As a s skills manager, you can: • Build your teams based on the skills set your organization needs. • Have visibility into skill competencies of employees. • Analyze skill gaps and plan for coaching or training of your employees based on the needs. • Identify users who have a specific skill or belong to specific skill categories. • Track skill proficiencies of users over time. • Identify key skills being used in solving your business needs and the users with those skills. • Build learning programs based on skill strengths, weaknesses, preferences, gaps, and risks identified for your organization. • Build teams based on skills you need to complete projects. • Evaluate how effectively users solve business needs using their skill	skill_manager

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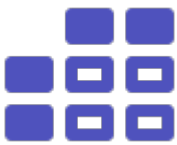
End user and goal	Required role
competencies and provide feedback to implement improvements. • Review how efficiently work assignments are made based on skill levels. • Match user skills with skills needed to complete work items and assign projects to teams based on those skills.	

Data visualizations

Title	Type	Description
Skills Matrix	 Multi-level pivot table	• View competencies for all users in a particular group. • View the competency of all users for a particular skill in a group.
Top 10 skills used in the last six months	 Bar chart	Identify the top 10 skills that are in use and which users have those skills.
Tasks associated with skills	 Bar chart	View the number of tasks that have skills assigned to them. The example report shows data for the last six months.
Users with Skills	 Bar chart	View the total number of users with skills assigned in each skill category.

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Title	Type	Description
Skills in Category	 Bar chart	View the total number of skills in the selected category.
List of user skills	 List of skills with total count of users for each skill	View number of users available for each skill.

Assigning and Managing skills

Manage skill assignment efficiently by assigning skills to users and analyze the skill coverage of your teams.

Note:
The **Manage skills** page uses the Next Experience user interface. For more information on Next Experience, see Next Experience UI.

You can analyze your teams' skills based on a department. For example, if you select Finance as the department, the page displays all skills that contain Finance skill. When you select a department, the page displays all users from that department. You can also display all users and their skills based on the groups you manage.

If you want to add your own custom group types, your administrator can configure Skills Management extension points to add them.

The skill matrix displays the skill coverage and skill proficiency of all users within a team. If a skill hasn't been added to the user, the skill matrix displays an **Add** button. You can select this button, add the skill, and associate a skill proficiency for the user. If a skill doesn't have the proficiency defined, it displays the skill as acquired. For information on adding skills, see Assign skill proficiency levels for skills.

For each team, the skill coverage bar displays the number of users that have that skill and the number of users in each proficiency. If the skill proficiency isn't defined, it displays the number of users with or without the skill.

You can select the filter icon and narrow down the display of the skill matrix using the Users, Skills, and Location filters.

Assign skill proficiency levels for skills

Add a skill and assign skill levels to users to facilitate the automatic assignment of skill-based tasks to agents.

Before you begin
Role required: skill_manager or skill_admin

About this task
Only skill administrators can create or edit skills. Skill managers can assign skills to users.

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Procedure

1. Navigate to **All** > **Skills** > **Manage IT Skills**.
2. Assign a skill level to a user or add a skill along with the skill level.

Associating skills with work items

Assign skills to tasks manually or use rules to associate them automatically to work items such as cases, tasks, or chat interactions.

The video below shows an overview of how skills are automatically added to work items.

Skill-based routing

Assign skills to tasks

Add skills and the level required for each skill to tasks. Identify whether the skill is mandatory to perform the task.

Before you begin

Role required: admin

Procedure

1. Navigate to incident, problem, change request or any task record to which you want to associate skills.
2. In the related list, select the **Tasks Skills** tab.

   Note:
   You must configure the related list and add **Task Skill->Task**to the **Selected** column to display this tab.

3. In the Task Skills table, do the following:
   a. In the **Skill** field, click the lookup icon and select a skill.
   b. In the **Skill level** field, select a level for the selected skill.
   c. In the **Mandatory** field, select **true** if the skill is mandatory for the selected task.
4. Click **Submit**.

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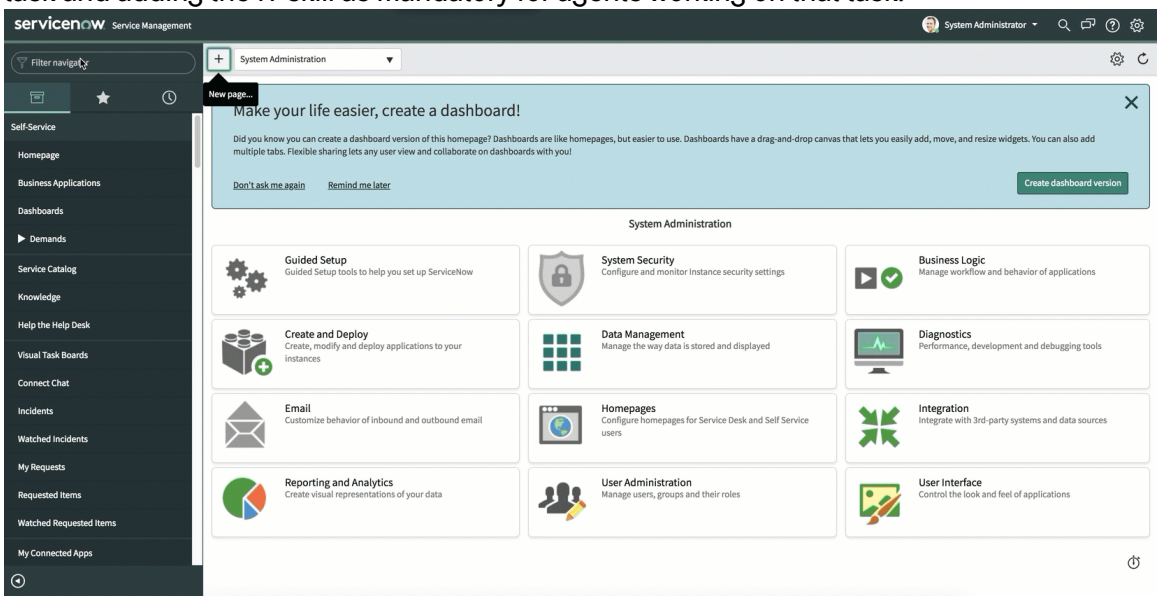
Example:
The image below shows an administrator configuring skills for an incident task and adding the IT skill as mandatory for agents working on that task.



Routing work items to agents based on skills

Use rules to automatically route work items to agents.

For more information on routing agents to work items, see Advanced work assignments

Learn how Skill Determination works

Use Skill Determination to add skills to incoming work items so that agents with those skills can work on it.

Skill Determination uses two rules:

- Skill Determination rule—set what skills you want to add to incoming work items.
- Business rule for Skill determination—set criteria on when a business rule must execute.

  When executed, it runs on the source table defined in the Skill Determination rule, triggers the corresponding Skill Determination rule, and adds the skills that are in the Skill Determination rule record to the incoming work item.

The flow chart shows a visual representation of the Skill Determination flow.

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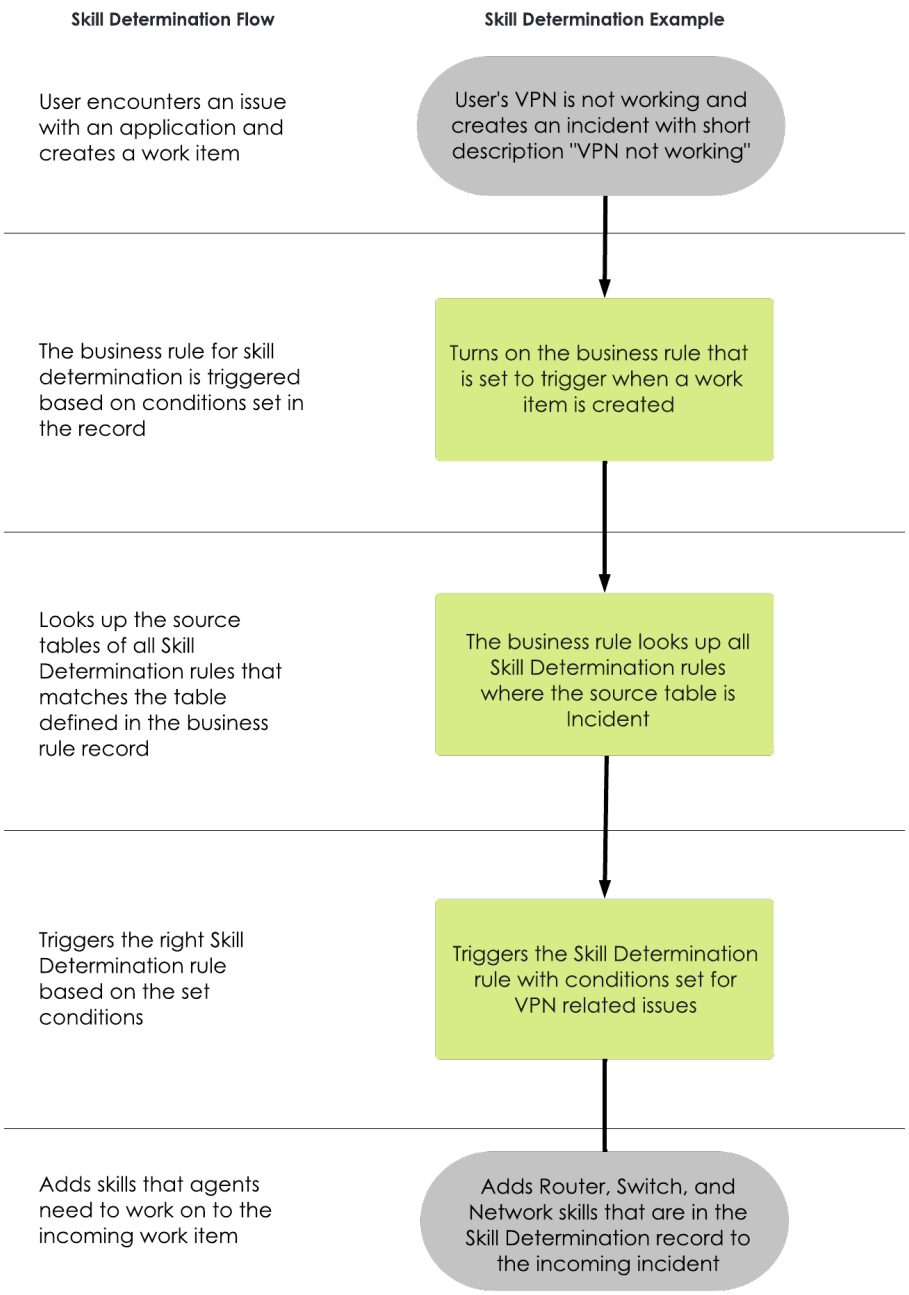

Step	Skill Determination Flow
1.	A user has an issue with their VPN connection and has created an incident with the short description 'VPN not working'. The incident needs agents with **Router and Switch** as well as **Network** skills to work on the task.
2.	A business rule has been created on the incident table that's set to trigger when an incident is created.
3.	The business rule looks up all Skill Determination rules where the incident table is set as the source table. The business rule then triggers the Skill Determination rule that has one of the conditions set as the**[Short description] [contains] [VPN]**.

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Step	Skill Determination Flow
	The Skill Determination rule has the skills **Router and Switch** as well as **Network** skills in the Skills related list. When triggered, these skills are added to the incident with the short description 'VPN not working'.

Add a business rule for skill determination

Create business rules to enable agents to work on cases, work order tasks, and chat interactions. These rules will trigger Skill Determination rules, which will add the necessary skills to the respective work items. This ensures that agents have the appropriate skills to handle these tasks effectively.

Before you begin

Role required: admin

Enable the Skill Determination [com.snc.skill_determination] plugin.

Procedure

1. Navigate to **All** > **System Definition** > **Business Rules**.

   Note:
   If you want to use the skill determination rules available by default, make sure the **Active** field for that rule is set to **true**. For example, if you want to use the *`Skill determination for interaction`* business rule, make sure the rule is active.

2. Select **New**.
3. Add details for the business rule.

Field	Description
Name	Descriptive name for the business rule.
Table	Select the table on which you want to run this business rule for skill determination.
Advanced	**a.** Enable the **Advanced** check box. **b.** Select the **Advanced** tab. **c.** In the **Script** field, enter the following code: `(function executeRule(current, previous /*null when async*/ ) { var skillUtils = new sn_skill_rule.SkillDeterminationUtils(); var skills = skillUtils.determineWorkItemSkills(current);`

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Field	Description
	skillUtils.assignSkillsToWorkItem(skills, current); })(current, previous); **d.** In the **When to run** tab, set when you want the business rule to execute. For more information, see Create a business rule.

4. Select **Submit**.

Create Skill Determination rules to assign skills to work items

Create Skill Determination rules to identify skills required by agents to work on work items and automatically associate them to those work items.

Before you begin

Role required: skill_admin or admin

About this task

You can automatically add a skill to a case based on the product associated with the case if you enable the Product to Skill mapping table (Skill Required for Model Maintenance [cmn_m2m_skill_model]).

A skill determination rule is created for every new skill required for a work item.

- If a skill is no longer required for a work item, deactivate or remove the rule applied for the work item.
- If two rules have the same skill associated with one work item and one rule evaluates the skill as mandatory and the other rule evaluates it as optional, then the rule that evaluates the skill as mandatory is always used.

The table describes the types of Skill Determination rules you could create.

Skill Determination Rule Types

Rule Type	Description
Simple	Adds skills to work items based on a set of conditions used to evaluate the source table.
Lookup	Adds skills to work items based on selections from two different tables connected using one or more reference fields.
Advanced	Adds skills to work items using a script.

Procedure

1. Navigate to **All** > **Skills** > **Skill Determination Rules**.
2. Click **New**.
3. In the **Name** field, enter a name for the rule.

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4. Select the **Active** check box to enable the rule to assign skills to work items.
5. From the **Source table** drop-down menu, select the work item source table for this rule.
6. Using the condition builder, select the conditions to evaluate the work item.
7. Create the rule.
8. Click **Submit**.

Qualify and rank users based on skills and skill levels

Rank users so that you can select the right users based on skills needed to complete tasks. Qualify users to work on tasks such as case, work order task, or chat interaction based on the number of skills and skill levels required to work on those tasks.

Before you begin

Role required: skill_admin

About this task

Use the UserSkillAnalyzer API to analyze the skills and skill levels of users and the UserSkillRanking API to rank and assign them to tasks. For example, when you use the Field Service Management application to assign agents to tasks, you can analyze and rank them based on their skills and skill levels using these APIs and use dynamic scheduling to assign them to tasks.

Note:
You must add the Matching Skill Level Gap for Dynamic Scheduling criterion to the task filter to rank agents assessed based on skill gaps. For more information on adding this criterion, see Create a task filter

Procedure

1. Analyze the skills and skill levels users have to complete work items using the UserSkillAnalyzer API.

   The API performs the following verification to check if users are qualified to be assigned to the work items:

   a. If the user has all mandatory skills required to complete the work item, but does not have the skill level, the agent is not qualified to work on the task if the skill level is mandatory to work on the task.
   b. If the user does not have all mandatory skills required to complete the task, the agent is not qualified to work on the task.
   c. If the user has all skills and the skill levels required to complete the task, the agent is qualified to work on the task.
   d. If the user has all skills required, but not mandatory to complete the task, the agent is qualified to work on the task.

   If the user is qualified to work on the task, the API performs the following verification to analyze gaps in skill level and the total number of skills the users have to execute tasks based on the skill requirements for the work item:

   a. Verifies if a work item requires a skill that does not have a level type defined.
   b. Verifies if a work item requires a skill that has a level type defined but does not have the skill level defined.

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c. Verifies if a work item requires a skill that has the skill level defined, but the agent does not have the skill level defined. If the skill level is mandatory to complete the task, the user who does not have those skill levels will not be assigned to those tasks.

d. Verifies whether a user has all skill levels that are mandatory, but not optional, to perform a task.

2. Rank users qualified to complete work items using UserSkillRanking API.
The API retrieves a list of qualified users based on matching and mandatory skills and skill levels.

Related topics

Dynamic scheduling

Reference for Skills Management

Validate that Skills Management still works after you make any configuration change such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Skills Management quick start tests require activating the Skills Management plugin (com.snc.skills_management).

Skills Management test suite

Test	Description	Release version
Skills MGMT: User skill level inheritance when user is part of multiple groups	Verify that the user is assigned the highest skill level when the user belongs to multiple groups that have been assigned the same skills with different skill levels.	New York
Skills MGMT: Add skills to lowest level category	Verify that skills can be added to the lowest level category.	New York
Skills MGMT: Create a child category under a parent category	Verify that a lower-level category can be created when the flag for **Add skills** is unchecked in the parent category.	New York
Skills MGMT: Create a skill category	Verify that a skill category can be created on the skill category form.	New York
Skills MGMT: Create skill level type and skill levels	Define the skill level type and different skill levels for the type.	New York
Skill MGMT: Skill level inheritance from group to user	Verify that skill levels can be inherited from a group to the users of the group and that the **Inherited** and **Skill level inherited** fields are set to true.	New York
Skills MGMT: Create a skill from Manage IT Skills user interface.	Verify that you can create a skill from the Manage IT Skills user interface.	Orlando

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Skills Management test suite (continued)

Test	Description	Release version
Skills MGMT: Add skills and skill levels to users in the Manage IT Skills user interface.	Verify that you can add skills and associated skill levels to users in the Manage IT Skills user interface.	Orlando
Skills MGMT: Select a skill and add users to the skill in the Manage IT Skills user interface.	Verify that you can select a skill and add the skill and associated skill levels to one or more users in the Manage IT Skills user interface.	Orlando
Skills MGMT: Select a skill that does not have a skill level and add users to that skill in the Manage IT Skills user interface.	Verify that you can select a skill that does not have a skill level and add the skill to one or more users in the Manage IT skills user interface.	Orlando

Domain separation and Skills Management

Domain separation is supported in the Skills Management app, and configured to apply to all features of the application. Separation of data is configured along with separation of logic and process.

Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can then control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

How domain separation works in Skills Management

Domain separation is supported in Skill Management with no explicit setup or configuration requirements. Skills, skill categories, skills levels can be created in separate domains, including the global domain. When domain separation is implemented, people with skill app roles can view skill information only in the domain assigned. **Domain** and **Domain Path** columns are available for all Skill tables provided with the base system. The **Domain** column contains the name of the domain to which the event or alert belongs, and the **Domain Path** column contains the unique domain identifier.

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Table name	Description
sys_user_has_skill	User skill information
cmn_skill	Main skill table
cmn_skill_category	Define skill categories
cmn_skill_level_type	Define skill level type
cmn_skill_level	Define skill level
sys_group_has_skill	Group skills
cmn_skill_contains	Define skills contained within skills
task_m2m_skill	Task skill information

Note:
If the domain column is not shown, click the **Update Personalized List** icon and add the required column. You can also add the domain path column, if desired.

Use cases:

- A Skill Manager that belongs to the Acme domain creates a skill and wants to view and associate it to user in the Acme domain. A user must belong to the Acme domain, its parent domain, or the global domain to view the skill record.
- A Skill Manager that belongs to a parent domain tries to view a skill in a child domain. The user of a parent domain can view a skill record of the parent as well as all child domains of that parent.
- A Skill Manager that belongs to a parent domain wants to create/associate a skill on behalf of another user in the Acme domain. A user must belong to the same domain as the user for which the skill record is created.
- A Skill Manager wants to associate a record for an integrated application in the Acme domain. A user must belong to the domain of the integrated application from which a record is associated.
- A Skill Manager has access to multiple domains but wants to update a record with content within a specific domain. The domain specified for the current record drives the functionality of that record and reference fields.

Quick start tests for Skills Management

Validate that Skills Management still works after you make any configuration change such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Skills Management quick start tests require activating the Skills Management plugin (com.snc.skills_management).

Skills Management test suite

Test	Description	Release version
Skills MGMT: User skill level inheritance when user is part of multiple groups	Verify that the user is assigned the highest skill level when the user belongs to multiple groups that have been assigned the	New York

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Skills Management test suite (continued)

Test	Description	Release version
	same skills with different skill levels.	
Skills MGMT: Add skills to lowest level category	Verify that skills can be added to the lowest level category.	New York
Skills MGMT: Create a child category under a parent category	Verify that a lower-level category can be created when the flag for **Add skills** is unchecked in the parent category.	New York
Skills MGMT: Create a skill category	Verify that a skill category can be created on the skill category form.	New York
Skills MGMT: Create skill level type and skill levels	Define the skill level type and different skill levels for the type.	New York
Skill MGMT: Skill level inheritance from group to user	Verify that skill levels can be inherited from a group to the users of the group and that the **Inherited** and **Skill level inherited** fields are set to true.	New York
Skills MGMT: Create a skill from Manage IT Skills user interface.	Verify that you can create a skill from the Manage IT Skills user interface.	Orlando
Skills MGMT: Add skills and skill levels to users in the Manage IT Skills user interface.	Verify that you can add skills and associated skill levels to users in the Manage IT Skills user interface.	Orlando
Skills MGMT: Select a skill and add users to the skill in the Manage IT Skills user interface.	Verify that you can select a skill and add the skill and associated skill levels to one or more users in the Manage IT Skills user interface.	Orlando
Skills MGMT: Select a skill that does not have a skill level and add users to that skill in the Manage IT Skills user interface.	Verify that you can select a skill that does not have a skill level and add the skill to one or more users in the Manage IT skills user interface.	Orlando

Related topics

Quick start tests

Extension points in Skills Management

Use extension points to calls scripts to add custom group types to manage skills.

To see a list of extension points that you can use for Workforce Optimization for ITSM, navigate to **System Extension Points** > **Scripted Extension Points**. In the Extension Points list, open the *sn_skill_cfg_page.ManageSkillsExtnPt* extension point.

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Use scripted extension points to integrate customizations without altering the core components in the application code. When customizing a base application, you implement the scripted extension points by creating the custom script includes and registering them against the scripted extension points.

Extension points for event types

Extension point name	Description
`sn_skill_cfg_page.ManageSkillsExtPt`	Implement this extension point to customize the logic of creating users by groups for the Manage IT skills page.

Important:
You can configure additional groups using the `sn_skill_cfg_page.ManageSkillsConstants` script include. For information on script includes see, Script includes.

Omnichannel Callback

ServiceNow® Omnichannel Callback app enables other ServiceNow® apps to display or announce callback options to users. The Omnichannel Callback app is available through the ServiceNow® Store.

Get started with Omnichannel Callback

Select a tile to get started with Omnichannel Callback.

Explore



Learn more about Omnichannel Callback and review its benefits

Configure



Configure features and components required to support agents with callback requests

Work on callback records



Learn how to work on callback records

Reference



Get additional information to configure and administer Omnichannel Callback

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Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring Omnichannel Callback

Learn more about Omnichannel Callback and review its benefits.

Omnichannel Callback overview

The Omnichannel Callback app is a ServiceNow AI Platform® capability that offers enhanced user experience by providing an option for agents to call users back rather than waiting in the queue for an available agent. For example, you can use the callback functionality to call users back when the agent wait time is long or when there are no agents available.

Callbacks are a well-received addition to any interactive voice response (IVR). You can invoke callbacks on any supported conversational integration channels.

Omnichannel Callback workflow

In this workflow:

1. Users seeking help from a live agent request for a callback when the live agent is either unavailable or the wait time to get to a live agent is long.
2. Omnichannel Callback determines the availability of agents via ServiceNow® Advanced Work Assignment (AWA) and places a callback work item for an available agent.
3. AWA picks up the callback task and places it in the callback queue.
4. The agent receives a **Callback** accept card. If the agent decides to close the interaction or requeue the callback manually, the agent can do so from the workspace.

Omnichannel Callback benefits

Benefit	Feature	Users
Omnichannel Callback creates callback work items for available agents via AWA based on the pre-configured recurring intervals.	Recurring Callback	Agents
The agent can directly call the end user. **Note:** When an agent dials the end user through **Click to Call**, the auto-scheduled callback logic does not count the attempt toward the remaining callback attempts.	Click to Call	Agents
Users requesting a callback can schedule by date and time based on the available time slots. Omnichannel Callback provides the framework for the scheduled callback. Consumer use cases for scheduled callback are currently supported via Customer Service Management (CSM) application only.	Scheduled callback	Customers

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Benefit	Feature	Users
The user can request for a video callback at an appointed time. Currently, video callback is supported only via the Zoom service and requires the Zoom extension for Omnichannel Callback Store app. For more information, see Zoom extension for Omnichannel Callback.	Video callback	Customers

Configuring Omnichannel Callback

Configure the Omnichannel Callback features and components that you need to support agents with callback requests.

Configuration overview

Admins can enable the callback feature and configure one or more callback channels by navigating to **Conversational Interfaces** > **Settings** > **General** > **Omnichannel Callback** and clicking **Manage**. The callback behavior per channel can be set by configuring the following callback parameters: Topic, Maximum callback attempts, and the callback timeout threshold. For more information on how to configure the callback behavior, see Configure callback behavior for a channel.

The Omnichannel Callback app includes the default Callback-Phone and Callback-General topics. The Callback-Phone and Callback-General topics are triggered when agents are not available or the agent wait time is longer than the callback threshold time, which is the average of the most recent AWA queue time. You can customize the default callback topics as per your requirements. For more information on how to customize the callback topics, see Customize a default callback topic.

1. Get started with Omnichannel Callback

   Review this information before you start setting up Omnichannel Callback.

2. Install Omnichannel Callback

   You can install Omnichannel Callback if you have the admin role.

3. Configure callback behavior for a channel

   Configure callback behavior for a channel using the callback parameters.

4. Customize a default callback topic

   Customize the default callback topic as per your requirements.

Get started with Omnichannel Callback

Review the following information before you start setting up Omnichannel Callback.

Checklist

Setup task	Description
Verify that the ServiceNow core applications or plugins that are required to support Omnichannel Callback are installed and activated.	Verify that the following applications or plugins are installed and activated from the ServiceNow Store. When you activate the first plugin, its dependant plugins are activated automatically. If not installed,

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Checklist (continued)

Setup task	Description
	install and activate one application at a time in the following order to ensure a smooth implementation. • com.glide.cs • com.glide.interaction.awa • com.glide.cs.custom.adapter • com.snc.appointment_booking For more information, see Install Omnichannel Callback.
Verify that you have assigned the required ServiceNow AI Platform roles.	The following roles are used across the Omnichannel Callback features: • The administrator (admin) installs the application from the ServiceNow Store and assigns the roles. • sn_omni_callback.callback_api

Install Omnichannel Callback

You can install the Omnichannel Callback application (sn_omni_callback) if you have the admin role.The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the Omnichannel Callback application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin

About this task

The following items are installed with Omnichannel Callback:

- Roles
- Scheduled jobs
- Tables

For more information, see Components installed with Omnichannel Callback.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Omnichannel Callback application (sn_omni_callback) using the filter criteria and search bar.

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You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

In the list next to the **Install** button, the versions that are available to you are displayed.

3. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.

4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.

5. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
6. Select **Install**.

Configure callback behavior for a channel

Configure callback behavior for a channel using the callback parameters. You can create a separate callback configuration for each supported conversational integration channel.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **General**.
2. On the Callback configuration form, swipe the **Activate** toggle switch to the right, enter the wait time threshold, and select **Save**.

   Note:
   Ensure that the application scope of your ServiceNow instance is set to global before editing the Callback configuration form.

3. Select a channel that you want to configure callback for from the Channel drop-down list.
4. Select a callback topic from the Callback Topic drop-down list.
   Select **Callback-Phone** for voice channels and **Callback-General** for messaging or chat channels. These default callback topics are triggered when there are no agents available to take the call or when the average wait time in the queue is over the predefined threshold. You can also use a custom callback topic based on your requirements. For more information on how to customize a callback topic, see Customize a default callback topic.
5. Provide the **Max callback attempts**.
   After the maximum number of callback attempts is reached, the callback task is closed and no further callback attempts are made.
6. Provide the **Callback timeout (threshold (in hours)**.
   When the callback timeout is reached, no further callback attempts are made and the callback task is closed.

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Customize a default callback topic

Customize the default callback topics as per your requirements.

Before you begin

Role required: admin

About this task

You can customize one of the following default callback topics: Callback-Phone for voice channels and Callback-General for messaging or chat channels. The following procedure explains how to customize the Callback-Phone topic.

Procedure

1. Duplicate the Callback-Phone topic from the Virtual Agent Designer.
   For more information on how to duplicate a topic, see Duplicate a Virtual Agent topic.
2. In the Advanced properties section of the **Properties** tab, select the voice channel that you want to associate with the custom callback topic.
3. On the **Flow** tab, modify the default callback flow and set the following properties in the Script action utility, if required.

   a. Set Global Callback Executed (vaVars.global_callback_executed) to **true**.

   b. Set No Agent Available (vaVars.global_show_no_agent_available_msg) to **false**.

   c. Set the following properties in the Create Callback Task node.

   - Set Global Callback Executed (vaVars.global_callback_executed) to **true**.
   - Set No Agent Available (vaVars.global_show_no_agent_available_msg) to **false**.
   - Callback Number (callback_number): Required field to be populated with the number on which the user requested a callback. This number may be the number that the user is calling from or the dialed number.
   - Short description (short_description): User issue description.
   - Initial Interaction (initial_interaction): Interaction detail from which the callback task has been initiated.
   - Max Retry Attempts (max_retry_Attempts): Maximum retry attempts after which the callback task is closed.
   - Expire Time (expire_time): Callback timeout after which the callback task is closed.
   - Messaging Channel (messaging_channel): Messaging channels configured for use. If not provided, the default callback channel is used.
   - Scheduled (scheduled): Set to **true** to make the callback task eligible for auto callback.

4. Save and publish your custom callback topic by clicking **Save** and **Publish**.
5. Map the custom callback topic to the voice service provider.

   a. Fetch the sys_id of your custom callback topic from the Topics [sys_cs_topic] table.

   b. Select your voice service provider from the Provider Channel Identities [sys_cs_provider_application] table.

   c. On the **Provider Identity Properties** tab, update the value of the **callback_topic_id** property with the sys_id of your custom callback topic and click **Update**.

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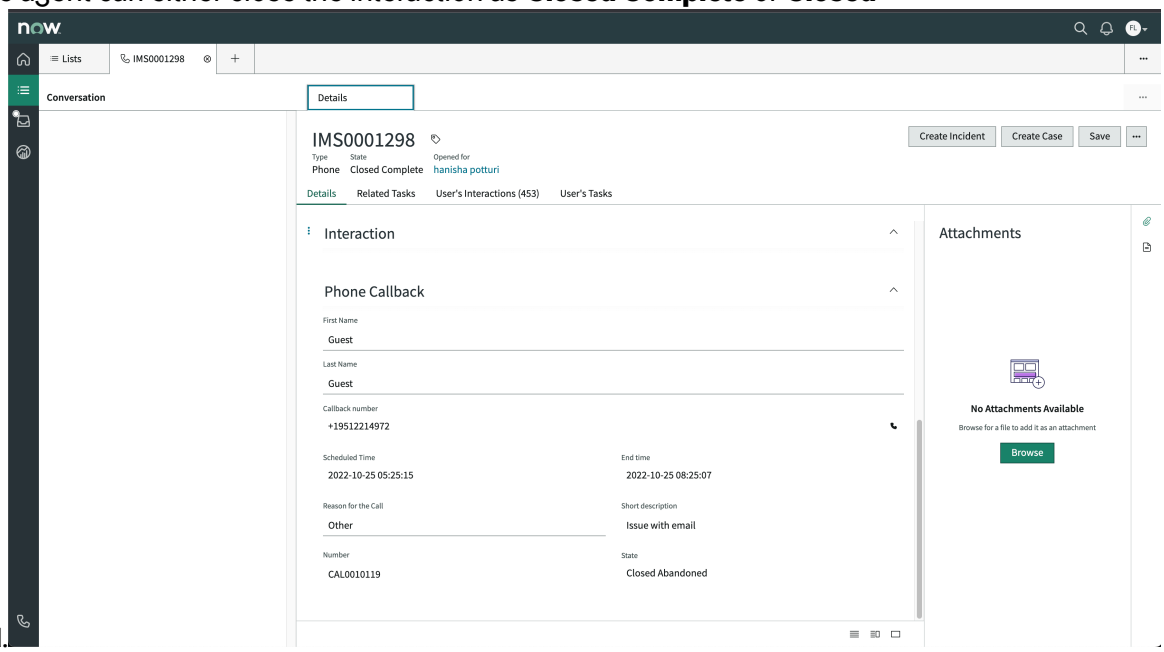
Working on callback records

Use Workspace to work on callback records originating from Omnichannel Callback.

Agents can work on the records for the following callback scenarios.

- Recurring callback: AWA routes a callback work item to an available agent based on the predefined callback attempt interval. The agent then receives a **Callback** work item. When the agent accepts the callback work item, auto-dial initiates a call to the user. Based on the resolution, the agent can either close the interaction or requeue the callback.
- Click to call: The agent can directly call the end user using the phone icon in the interaction record if auto-dial is not enabled or the initial call did not succeed.
- Scheduled voice callback: When a user requests a voice callback at their preferred date and time, an interaction record with callback details is created a minute before the scheduled call time and an agent receives the callback work item. When the agent accepts the callback work item, auto-dial initiates a call to the user. Based on the outcome, the agent can either close the interaction as **Closed Complete** or **Closed Abandoned**.



- Scheduled video callback: When a user requests a video callback at their preferred date and time, an interaction record with callback details is created

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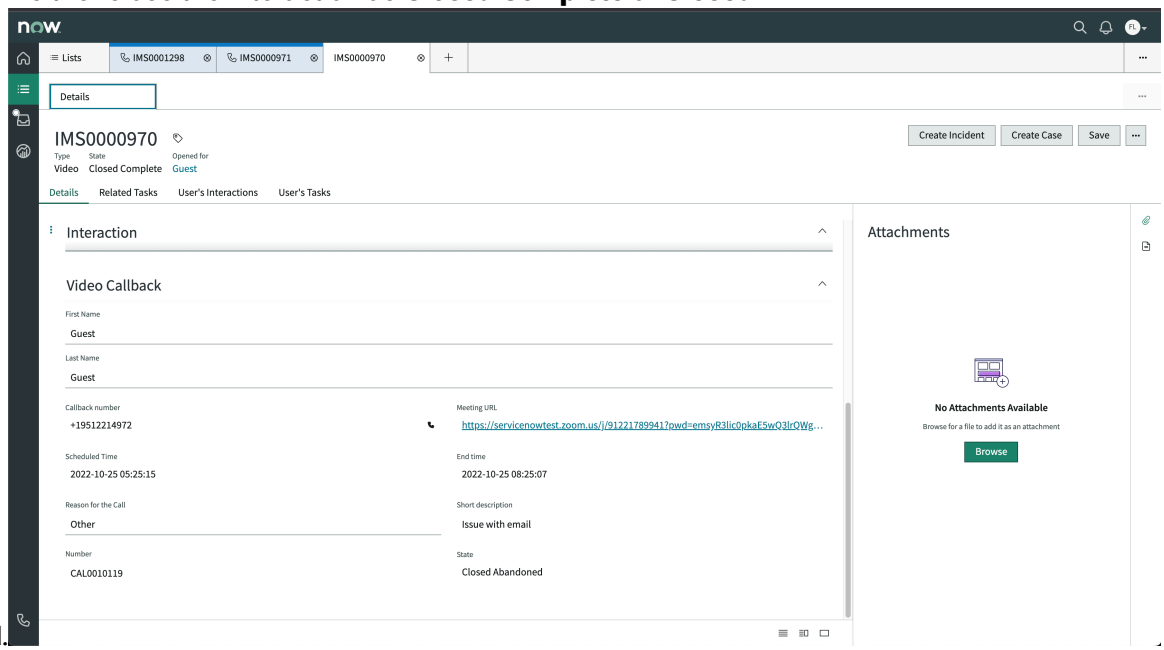
which includes a URL to initiate the video call. Based on the outcome, the agent can either close the interaction as **Closed Complete** or **Closed Abandoned**.



Omnichannel Callback reference

Reference topics provide additional information that you can use to configure and administer Omnichannel Callback.

Components installed with Omnichannel Callback

Several types of components are installed with activation of the Omnichannel Callback plugin, including user roles, scheduled jobs, and tables.

Scheduled jobs installed

Scheduled job	Description
Callback Scheduler - Scheduled	Executes the callback task of type Scheduled a minute before the scheduled start time.
Callback Scheduler - Recurring	Executes the callback task of type Recurring after creation of the callback task or at the next retry attempt.
Omnichannel Callback Close expired tasks	Marks the callback tasks as Closed Abandoned in the following scenarios. • Recurring callback: If the current time is past the expiry time or the number of callback attempts exceeds the maximum retry attempts. • Scheduled callback: When the callback task is not closed one hour after the scheduled end time.

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Tables installed

Table	Description
Callback Properties [sn_omni_callback_st_callback_properties]	Lists the callback properties that determine the callback behavior.
Callback [sys_cs_callback]	Lists the callback tasks of type Scheduled and Recurring.

Roles installed

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Callback API [sn_omni_callback.callback_api]

Read/write from the [sys_cs_callback] table and access all the APIs provided by the Omnichannel Callback app.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Domain separation and Omnichannel Callback

Domain separation is supported for Omnichannel Callback. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

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For more information on support levels, see Application support for domain separation.

Overview

Domain separation enables you to partition your organization's data and administrative control into separate domains. This lets you isolate data and control access to it, which is particularly important in environments where multiple tenants share a common platform.

How domain separation works in Omnichannel Callback

Domain separation in Omnichannel Callback works by routing callback requests to domain-specific available agents.

When using domain separation for Omnichannel Callback, keep the following points in mind.

- Domain separation applies to both the agent and the customer requesting for a callback. This means that agents will only be able to access interactions records that are created under the domain of the user requesting the callback.
- The agent should be in the same domain as the user to receive a callback request in the workspace.
- No configuration is required for domain separation for Omnichannel Callback.

Domain separated tables

The sys_cs_callback table is domain separated.

Use cases

When domain separation is used, a callback request from guest users is routed to the agent with the same domain as the guest user. For custom chat channels, the domain of the provider application is used as a reference to route the callback to the domain-specific agent.

Related topics

Domain separation for service providers

Zoom extension for Omnichannel Callback

The ServiceNow® Zoom extension for Omnichannel Callback application enables other ServiceNow® applications to display a Zoom callback option to users. The Zoom extension for Omnichannel Callback application is available through the ServiceNow® Store.

Overview

The Zoom extension for Omnichannel Callback app is a ServiceNow AI Platform® capability that enables users to request a callback over Zoom when the agent wait time is long, or agents are unavailable. Agents and users can collaborate over a Zoom meeting at a date and time requested by users.

Features

Zoom extension for Omnichannel Callback offers the following capabilities:

- Allows users to request a video callback from omnichannels such as Virtual Agent, Engagement Messenger, portals, and chats.
- Enables agents and users to collaborate to resolve an issue.

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- Enables agents to join a Zoom meeting from an interaction record.
- Imports the Zoom meeting transcript to the interaction record. The inserted transcripts are not sentiment analyzed.
- Imports the Zoom meeting recording URL to the interaction record.
- Displays the names of participants who attended the meeting.
- Marks the interaction Close complete when the following conditions are met:
  - Both the participants joined the meeting.
  - The Zoom meeting has ended.

Install Zoom extension for Omnichannel Callback

You can install the Zoom extension for Omnichannel Callback application (com.sn.zoom.callback) if you have the admin role.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the Zoom Extension for Omnichannel Callback application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin

About this task

The following items are installed with Zoom extension for Omnichannel Callback:

- Script includes
- Business rules

For more information, see Components installed with Zoom extension for Omnichannel Callback.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Zoom extension for Omnichannel Callback application (com.sn.zoom.callback) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.

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Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

Important:
If you don't load the demo data during installation, it's unavailable to load later.

6. Select **Install**.

Components installed with Zoom extension for Omnichannel Callback

Several types of components are installed with the Zoom extension for Omnichannel Callback application.

Script includes

Zoom extension for Omnichannel Callback script includes

Script include	Description
ZoomCallDatabase	Contains database-related functions.
ZoomCallDriver	Implements extension point for sn_omni_callback.VideoCallDriver.
ZoomCallEventHandler	Overrides the functions of ZoomCallEventHandlerSNC.
ZoomCallEventHandlerSNC	Contains utility functions for handling the transcript completed events.
ZoomCallTranscriptProcessor	Contains utility functions to process the Zoom transcript.
ZoomCallUtils	Overrides the functions of ZoomCallUtilsSNC.
ZoomCallUtilsSNC	Contains the utility functions for Zoom callback.

Business rules

Zoom extension for Omnichannel Callback business rules

Close interaction (Zoom Callback)	Notify Conference Call [notify_conference_call]	Closes the interaction after the Zoom meetings ends. Both the agent and the requester must join the call to close the interaction.
Create Notify Conference call record	Callback [sys_cs_callback]	Creates a notify conference call record when the Zoom callback is created.
Recording Completed (Zoom Callback)	Notify Recording [notify_recording]	Stores the recording URL in the interaction when the recording is completed.
Update Zoom Host when agent is assigned	Interaction [interaction]	Makes the agent the host when the interaction is accepted by the agent.

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Setting up Zoom extension for Omnichannel Callback

Enable your users to request a callback over Zoom by integrating your#Zoom account with the ServiceNow instance. You can also enable the account to authenticate requests from your instance by creating a custom OAuth application in the account.

The configuration process consists of the tasks listed in the following table.

Task	Description
Setting up the Zoom spoke for Zoom extension for Omnichannel Callback	Integrate your organization's Zoom account with your ServiceNow instance using the Zoom spoke to create Zoom meetings.
Setting up Notify Zoom connector for Zoom extension for Omnichannel Callback	Set up the Notify Zoom connector in Zoom to receive the event information from Zoom.
Configure a Zoom webhook for Zoom extension for Omnichannel Callback	Configure a Zoom webhook in ServiceNow to notify the Zoom Extension app when certain events occur in Zoom.
Configure the Zoom channel for callbacks over Zoom	Enable the Zoom callback channel and specify the host email address for a callback over Zoom.

Setting up the Zoom spoke for Zoom extension for Omnichannel Callback

Enable the Zoom spoke to perform various actions such as creating meetings, rescheduling meetings, deleting a meeting, or fetching the participant details from your Zoom account by integrating your Zoom account with your ServiceNow instance.

Create a connected app in Zoom

Create a connected app in your Zoom account to enable OAuth 2.0 authentication with the Zoom spoke.

Before you begin

- Ensure that you have an Integration Hub subscription.
- Ensure that Omnichannel Callback is installed on your instance.
- Ensure that the Zoom spoke is activated. For more information, see Zoom spoke

Role required: Zoom admin

Procedure

1. Log in to Zoom marketplace.
2. In the **Develop** drop-down list, select **Build App**.
3. Choose the **OAuth** card from the available cards.
4. Disable the **Would you like to publish this app on Zoom App Marketplace?** option.
5. Select **Create.**
6. Provide a name for the app in the **Name** field.
7. Set the app type to **Account-level app**.

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Note:
Account-level apps must be installed by a Zoom admin, who manage the app for all account users in the account.

8. Configure the redirect URLs for authentication.

   a. In the App credentials section, enter the ServiceNow instance redirect URL in the **Redirect URL for OAuth** field in the following format:
   `https://<instance name>.com/oauth_redirect.do`

   b. In the OAuth allow list section, add the ServiceNow instance redirect URL in the following format:
   `https://<instance name>.com/oauth_redirect.do`

   c. Record the values of the **Client ID** and **Client Secret** fields to use them for the application registry.

9. In the left panel, select **Scopes**.
10. In the Add Scopes section, select **Add Scopes**.
11. On the **Add Scopes** dialog box, select the scope type.
12. Select the **Meeting** scope type.
13. Select the following scopes:
    - View all user meetings
    - View and manage all user meetings
14. Select the **Recording** scope type.
15. Select the following scopes:
    - View all user recordings
    - View and manage all user recordings
16. Select the **User** scope type.
17. Select the **View all user information** scope.
18. Select **Done**.

Result
The actions under the selected scopes become available to the Zoom spoke.

Configure a Zoom connection in ServiceNow instance

Use the information generated during Zoom account configuration to register the Zoom spoke as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin
Role required: admin

Procedure

1. From your ServiceNow instance, navigate to **Process Automation** > **Flow Designer**.
2. In the Flow Designer, select the **Connections** tab.
3. Search for the Zoom connection and select **View Details**.

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4. On the Zoom connection card, select **Edit**.
5. On the form, fill in the fields.

Field	Description
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to your Zoom instance: `https://api.zoom.us`.
OAuth Entity Name	Name to identify the application registry record.
OAuth Client ID	Client ID created during application registration.
OAuth Client Secret	Client secret created during application registration.
OAuth Redirect URL	OAuth callback endpoint: `https://instance name.service-now.com/oauth_redirect.do`.

6. Select **Edit and Get OAuth Token**.
   A confirmation message is displayed that the token is available.

Setting up Notify Zoom connector for Zoom extension for Omnichannel Callback

Setting up the Notify Zoom connector in Zoom and then in your ServiceNow instance enables your instance to receive the event information from Zoom. An event is usually any action that is related to a meeting.

Note:
Currently, only the Zoom recording URL without passcode is stored in the interaction. You can configure the Zoom account to disable the passcode option.

Configure the Notify Zoom connector in Zoom

Configure the Notify Zoom connector in Zoom to receive event information in your ServiceNow instance from Zoom.

Before you begin

- Ensure that Notify Zoom Connector and Omnichannel Callback are installed on your instance.
- Ensure that you have the Zoom spoke installed on your instance.
- Make sure you have the required credentials for and connections to Zoom on your instance.
- The Notify Zoom connector must have been configured with the same Zoom account with which you created the OAuth app for the Zoom spoke.

Role required: admin, Zoom admin

Procedure

1. On your Zoom OAuth app, navigate to **Feature** > **Add Feature** > **Event Subscription**.
2. Enable the event subscription feature.
3. Select **Add Event Subscription** to add the first event subscription.

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4. Enter the URL to be used to post information about events in Zoom to your instance: `https://<instance name>.com/api/sn_notify_zoom/notify_zoom/ZoomEvent`
5. Select the **Add Events** button.
6. Select **Meeting** and then select the following meetings from the list:
   - Start Meeting
   - End Meeting
   - Participant/Host joined meeting
   - Participant/Host left meeting
7. Select **Recording** and then select **All Recordings have completed** from the list.
8. Select **Done**.
9. On the Add feature screen, select **Save** to save the event subscription configuration.
10. Select **Add Event Subscription** to add a second event subscription.
11. In the form, enter the URL used to post information about events in Zoom to your instance: `https://<instance name>.com/api/sn_zoom_spoke/zoom_webhook_endpoint/webhook`
12. Select the **Add Events** button.
13. Select **Recording** and then select **Recording Transcript files have completed** from the list.
14. Select **Done**.
15. In the Add feature section, select **Save** to save the event subscription configuration.
16. In the Token section, select **Copy** to record the verification token to be used during configuration of the Notify Zoom connector.

Configure the Notify Zoom connector in ServiceNow

Configure Notify in your ServiceNow instance to receive event information from Zoom.

Before you begin

You must have copied the verification token displayed during the configuration of the Notify Zoom connector in Zoom.

Role required: admin

Procedure

1. Navigate to **All** > **Notify** > **Zoom** > **Configuration**.
2. Paste the verification token in the **Webhook validation token** field.
3. Select **Update**.

What to do next

Configure a Zoom webhook for Zoom extension for Omnichannel Callback

Configure a Zoom webhook for Zoom extension for Omnichannel Callback

Configure a Zoom webhook in ServiceNow to notify the Zoom extension for Omnichannel Callback app when certain events occur in Zoom.

Before you begin

You must have copied the verification token displayed during the configuration of the Notify Zoom connector in Zoom.

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Role required: admin

Procedure

1. Navigate to **All** > **Zoom Spoke** > **Zoom Webhook Registries**.
2. Select **Zoom Callback Transcript completed** from the list.
3. Paste the verification token for validating event notifications in the **Token** field.
4. Select **Update**.

Configure the Zoom channel for callbacks over Zoom

Allow agents to call users back over Zoom by enabling the Zoom callback channel and specifying the host email address.

Before you begin

Role required: admin

Procedure

1. Navigate to **All**, and then enter `sys_cs_channel.list` in the navigation filter.
2. On the Messaging Channels form, select the **Zoom** channel.
3. If you are prompted in a message at the top of the form to switch applications to be able to edit the record, select the word **here**.
4. In the Channel Properties section, configure the channel properties.
   - Set the *enabled* property to true.
   - In the *host_email* property, enter the email with which the meetings should be created.
5. Select **Update**.

Proactive Triggers

Proactive Triggers supports end users by providing helpful platform actions, using real-time data. Admin users can customize rules and actions to present rich text pop-up messages to specific users.

Overview

For an introduction to Proactive Triggers and to get familiar with the product, watch this video. Proactive Triggers high-level overview of the product

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Get started

Explore



Learn about Proactive Triggers concepts and process flows.

Install



Activate the Proactive Triggers feature.

Configure



Manage and set up rules and actions for Proactive Triggers to determine when the triggered messages display to end users on the ServiceNow® portal.

Reference



Get component details for Proactive Triggers.

Exploring Proactive Triggers

Proactive Triggers is a ServiceNow® Store application that is available to all Virtual Agent web client and Agent Chat customers by default. Proactive Triggers can increase adoption of Virtual Agent by proactively sending context-specific messages to end users.

Proactive Triggers overview

The Proactive Triggers rich text pop-up messages provide users with actions according to real-time Proactive Triggers data. When end users engage with the Proactive Triggers message, the Virtual Agent opens. If there's a Virtual Agent topic, associated with the action, the topic runs. If buttons are presented to end users (a maximum of three), they can select the most relevant button to run the associated Virtual Agent topic. Proactive Triggers can be used with LLM topics if Now Assist in Virtual Agent is set up. Proactive Triggers can also be used with Agent Chat to connect customers to a live agent in configurations without Virtual Agent. For more information about the Proactive Triggers process, see How Proactive Triggers work.

Proactive Triggers admins use Proactive Triggers rules to define when, where, and how to engage with customers. Proactive Triggers actions define what the rule does, using several key fields. Admins customize these rules and actions based on when and how their customers are most likely in need of help. For example, customers may need help when ordering equipment, opening an incident/case, or viewing information in a Knowledge Base article. Proactive Triggers rules can be applied to any defined URL, including any portal URL, catalog item, or external site. Proactive Triggers rules can be applied to the Proactive Triggers API after the **Proactive Trigger on Search** business rule and related trigger type, rule, and action are enabled. For additional information and an example of the Proactive Triggers API script, see ProactiveTriggerAPI - Scoped.

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Proactive Triggers examples

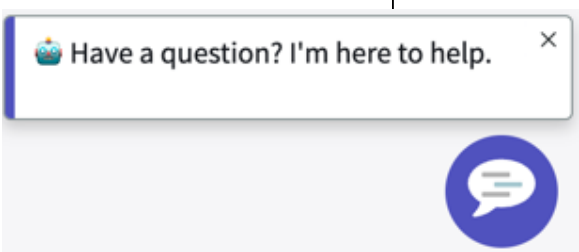
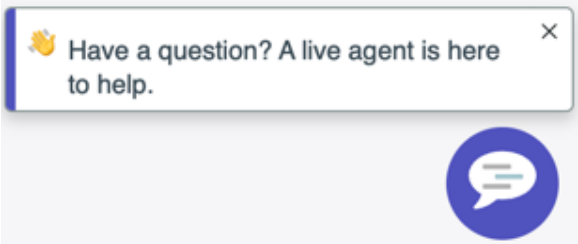
The Proactive Triggers feature uses rules and related actions based on those rules to present messages to end users. These rules and actions are context-specific and are based on real-time data gathered as end users navigate across portal pages or through the Proactive Triggers API call.

By default, the Proactive Triggers feature includes these sample rules: Virtual Agent greeting and Chat welcome message when a live agent is available.

See the following table for information about action type examples.

Note:
Depending on the plugins installed, you may only see one of these rules or you may see other rules as well.

Default sample rules

Default sample rules	Description	Example
Virtual Agent greeting	This rule gives a sample welcome message to end users on a portal page. This message introduces the Virtual Agent to both internal and external end users.	
Chat welcome message when a live agent is available	This rule gives a sample welcome message to end users when the web client is configured for Live Agent only. This message introduces Agent Chat to end users. **Note:** This message appears only if you have the Advanced Work Assignment (AWA) plugin (agent chat) installed.	

After a rule is created, the admin creates one or more actions that are triggered by the rule. Actions define the messages that end users see based on the rule and the next steps available for the end users to take. These messages are displayed differently depending on the selected action type.

See the following table for information about action type examples.

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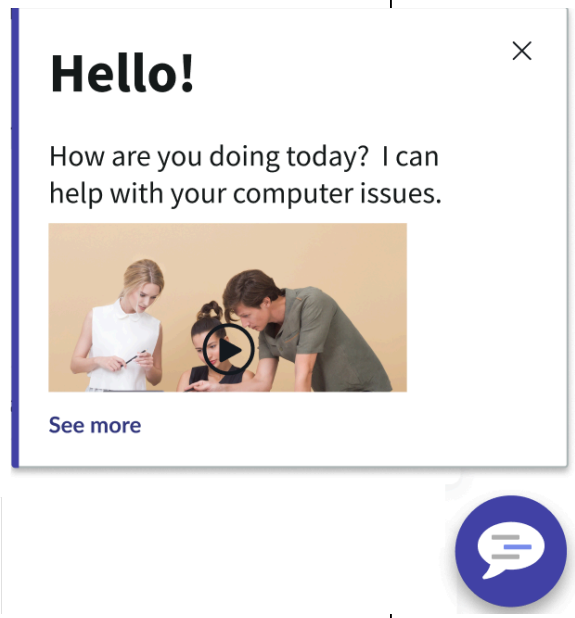
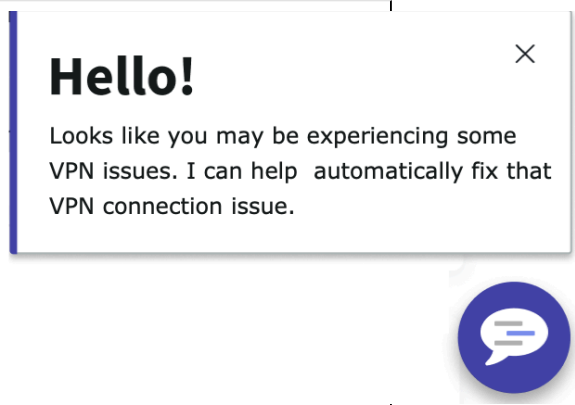
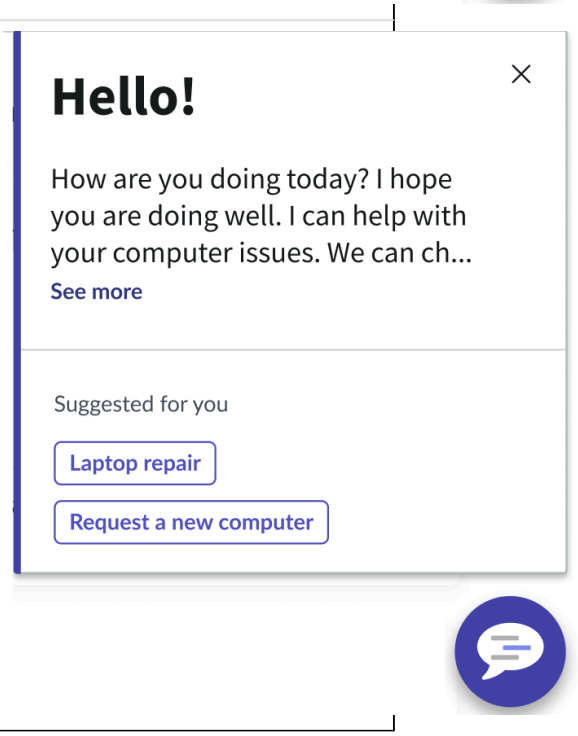
Action types

Action type	Description	Example
Message only	End users see an HTML pop-up message.	
Message that launches a virtual agent topic	End users see an HTML pop-up message that directs them to an available Virtual Agent topic.	
Message that launches a selection of virtual agent topics	End users see an HTML pop-up message with up to three suggested action buttons that direct them to a relevant Virtual Agent topic.	

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You can customize the appearance of the Proactive Triggers message. For example, you can change the side bar color of the message. For more information about customization, see Configure Agent Chat in a portal.

How Proactive Triggers work

Explore example use cases and how information flows through the Proactive Triggers process.

Proactive Triggers use cases

Proactive Triggers are useful in various scenarios. Explore the following example use cases to determine how to use Proactive Triggers effectively for your organization.

- An admin creates a Proactive Triggers rule that runs when a user views a Knowledge article containing the keyword "VPN" (or any other keyword that has a matching Virtual Agent topic). The admin configures the rule to run the VPN Connectivity Virtual Agent conversation, which proactively helps the user resolve the VPN issues.
- An admin creates a Proactive Triggers rule that runs when a user views any catalog item with a short description that includes a specific keyword, such as "laptop." The admin configures the rule to connect the user to a live agent, using the Live Agent Support topic, which proactively helps the user get assistance in ordering a laptop.

You can also use Proactive Triggers to engage with customers in more complex scenarios. Admin users can create multiple rules using different delay times and different user criteria to create a customized user experience. For more information about configuring more complex scenarios, see Multiple Proactive Triggers rules and actions.

Proactive Triggers process

1. Whenever an end user navigates to a Proactive Triggers enabled page, Proactive Triggers reads the page URL or called API to determine if any Proactive Triggers rules should run.
2. During this analysis, Proactive Triggers determines the Trigger Type source.

Web browsing (client side)	Trigger type
Knowledge Base pages	Knowledge
Service Catalog pages	Catalog Item
Portal home pages	Portal Home
All other portal pages	URL

System API (server side)	Trigger type
Search event on portal pages	Search Event

3. Next, Proactive Triggers evaluates all the Proactive Triggers rules for that Trigger Type one by one until a matching rule is found.

> **Note:**
> Rules are created with the required fields **Delay Time** and **Order**. During the rule matching process, rules are analyzed in ascending Order, according to the order number assigned. If the Delay Time is reached before the order number, the Delay Time takes precedent.

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4. After a Proactive rule has been matched, the rule's actions are evaluated one by one. This evaluation proceeds in ascending order, according to the **Order** field in the associated Proactive actions. As part of this process, the **Applies To** field is compared with the user visiting the page to determine if the action applies to this user.
5. After Proactive Triggers identifies at least one rule and action that apply to the visiting user and the Delay Time has been met, a pop-up message appears directly on the web page. The contents of this message are configured by the admin for the matched action.
6. If the user selects the pop-up message, the chat widget opens. If the matched action is of the type *`Virtual Agent Topic`*, the chat widget also runs the topic configured in that action.

Installing Proactive Triggers

Enable Proactive Triggers so that you can begin working with the feature.

Before you begin

The Proactive Triggers feature [sn_pt] is available as an app and must be installed from the ServiceNow Store. This feature is only available after you've installed and updated the Omni-Experience Standard Feature Set to the latest version through the ServiceNow Store.

Role required: admin

About this task

The following steps provide a high-level overview of how to enable Proactive Triggers.

Procedure

1. Navigate to **All** > **Conversational Interfaces** > **Settings** > **General**.
2. Under Proactive triggers, select the Enable Proactive Triggers field toggle switch to enable the feature.
3. Set the com.glide.cs.advanced-chat-popover system property to **True**.

Enable Proactive Triggers

Use Proactive Triggers to create and view context-specific messages and use relevant actions on the web client.

Before you begin

Note:
The Proactive Triggers feature [sn_pt] is available as an app and must be installed from the ServiceNow Store. This feature is only available after you've installed and updated the Omni-Experience Standard Feature Set to the latest version through the ServiceNow Store. Subsequent updates are also available there. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

For conceptual information about Proactive Triggers, see Exploring Proactive Triggers.

The Proactive Triggers feature can be used with Domain Separation. For more information about Domain Separation, see Domain separation explained.

Role required: admin

About this task

An admin first enables and then creates rules and actions as separate tasks.

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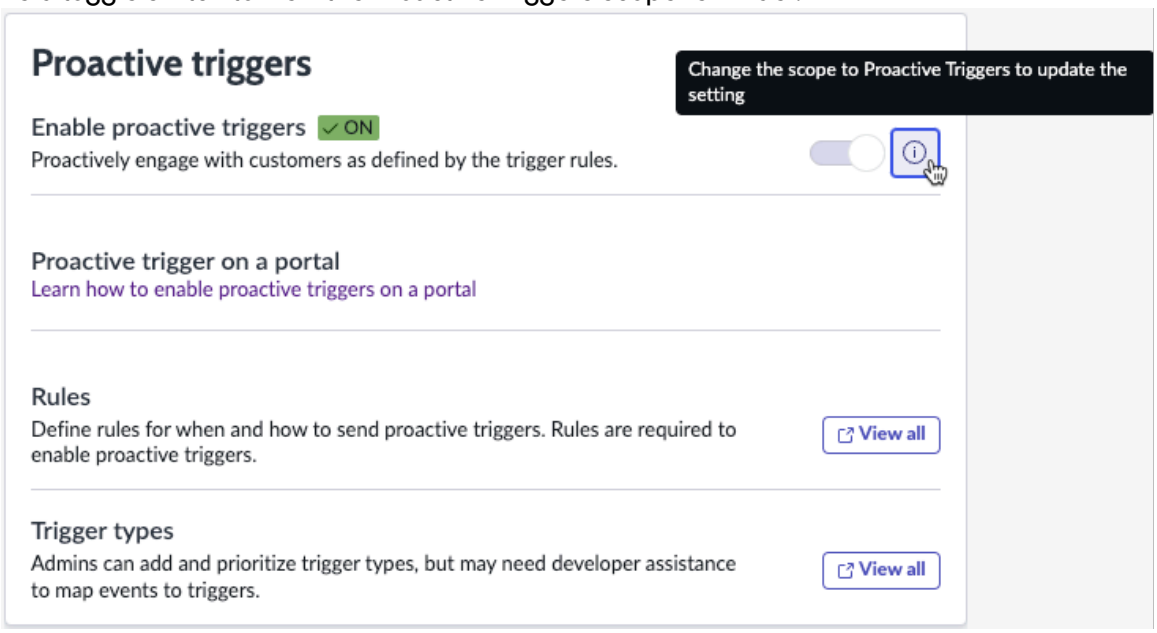
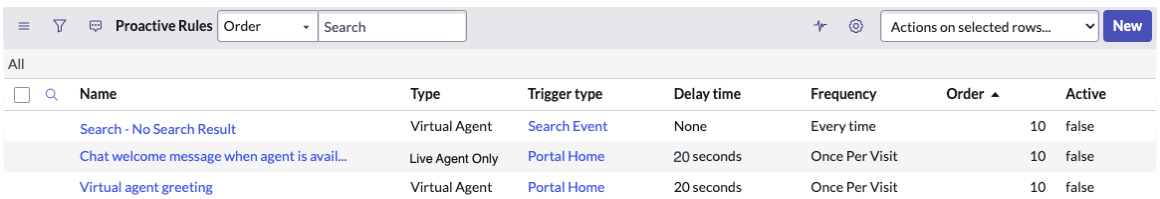
Procedure

1. In the navigation filter, enter `sys_properties.list`.
   The entire list of properties in the System Properties [sys_properties] table appears.
2. Search for the `com.glide.cs.advanced-chat-popover` system property, and then change the value from **False** (default) to **True**.
   This system property enables the smart chat component on the Service Portal.
3. Navigate to **Conversational Interfaces** > **Settings**.
   You must be in the Proactive Triggers scope to enable this feature.
4. Under Proactive triggers, select the more info icon (ⓘ) next to the **Enable proactive triggers** field toggle switch to view the Proactive Triggers scope reminder.



   For more information about scopes and how to change them, see Application scopes.
5. Under **Proactive triggers**, select the **Enable proactive triggers** field toggle switch to enable the feature.

   By default, the Proactive Triggers feature is inactive.
6. Next to **Rules**, select **View all**.
   The default sample rules included with Proactive Triggers appear.



Name	Type	Trigger type	Delay time	Frequency	Order	Active
Search - No Search Result	Virtual Agent	Search Event	None	Every time	10	false
Chat welcome message when agent is avail...	Live Agent Only	Portal Home	20 seconds	Once Per Visit	10	false
Virtual agent greeting	Virtual Agent	Portal Home	20 seconds	Once Per Visit	10	false

7. Navigate back to the **Conversational Interfaces** > **Settings** page and next to **Trigger types**, select **View all**.

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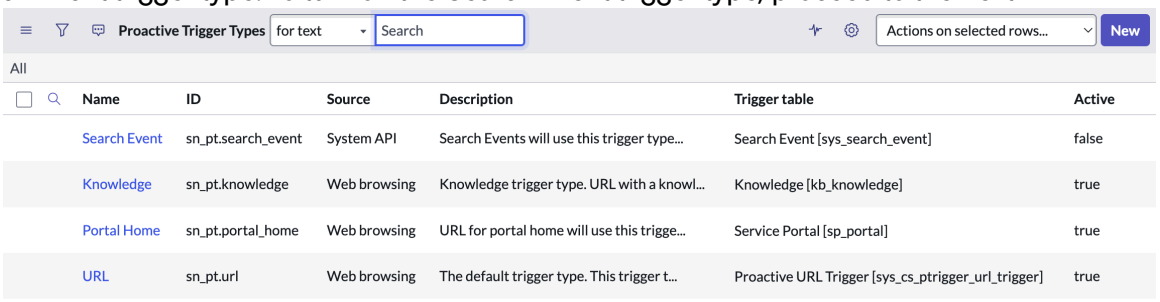
The default trigger types appear. All trigger types default to **Active is true** except the Search Event trigger type. To turn on the Search Event trigger type, proceed to the next step.



Name	ID	Source	Description	Trigger table	Active
Search Event	sn_pt.search_event	System API	Search Events will use this trigger type...	Search Event [sys_search_event]	false
Knowledge	sn_pt.knowledge	Web browsing	Knowledge trigger type. URL with a knowl...	Knowledge [kb_knowledge]	true
Portal Home	sn_pt.portal_home	Web browsing	URL for portal home will use this trigge...	Service Portal [sp_portal]	true
URL	sn_pt.url	Web browsing	The default trigger type. This trigger t...	Proactive URL Trigger [sys_cs_ptrigger_url_trigger]	true
Catalog Item	sn_pt.catalog_item	Web browsing	Catalog item trigger type. URL with a ca...	Catalog Item [sc_cat_item]	true

8. **Optional:** Turn on the Search Event trigger.

   (Optional) The Search Event triggers a pop-up message on the Service Portal Default Search Profile whenever a search result yields no result. The Search Event trigger is an inactive default trigger type that uses the System API source rather than the web browsing source. Because this trigger type defaults to inactive, an admin must turn on the related business rule, trigger type, Proactive Triggers rule, and action prior to using this trigger.

   a. Navigate to **System Definition** > **Business rules**.

   b. Search for `Proactive Trigger on Search` in the **Business Rules** field, and then select the business rule.

   c. Select the **Active** option to turn on the business rule.

   d. **Optional:** Adjust any settings, as needed.

      Note:
      Your organization may want to update the **Filter Conditions** on the **When to Run** related tab. For example, if your organization doesn't use the Service Portal, update the default values in the Filter Conditions section to reflect your organization's preferred portal or site. Your organization may also want to adjust the Proactive Triggers API script in the **Advanced** related tab. For additional information on the Proactive Triggers API script, see ProactiveTriggerAPI - Scoped.

   e. Select **Update**.

   f. Navigate to **Conversational Interfaces** > **Settings** and under **Proactive Triggers**, select **View All** next to **Trigger Types**.

   g. Select **Search Event**.

   h. In the Proactive Trigger Type form for Search Event, select the **Active** option to turn on the trigger type and adjust any settings, as needed.

   i. Select **Update**.

   j. Select **Search - No Search Result** from the Proactive Rules related list.

   k. In the Proactive Rule form for Search - No Search Result, select the **Active** option to turn on the rule and adjust any settings, as needed.

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l. Select **Update**.

m. Select **No Search Result Message** from the Proactive Actions related list.

n. In the Proactive Action form for No Search Result Message, select the **Active** option to turn on the action and adjust any settings, as needed.

o. Select **Submit**.

The Search Event trigger type is turned on.

Result

The Proactive Triggers feature is enabled and you know where to create rules, actions, and custom trigger types.

What to do next

Create rules and actions for Proactive Triggers. For more information, see Create rules and actions for Proactive Triggers.

Create custom trigger types. For more information, see Create custom trigger types.

Related topics

Enable message preview on the web client

Application scopes

To upload and distribute custom applications on the ServiceNow Store, you need to create a private scope for your applications.

All applications have an application scope that determines which of its resources are available to other parts of the system. Application scoping ensures that one application does not impact another application. You specify what parts of an application other applications can access by setting application access controls.

For example, if you create a conference room booking application in its own application scope, by default, the application can access and change its own tables and business logic, but other applications such as Incident Management cannot make changes to it without explicit permission.

An application scope ensures that:

- The conference room booking application does not interrupt core business services.
- Other applications do not interfere with its normal functioning.

Application scope is available for new and upgraded instances starting with the Fuji release.

Configuring Proactive Triggers

Plan, configure, and review your Proactive Triggers.

Before you begin

Activate the Proactive Triggers feature.

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Note:
For new customers onboarding from Vancouver onward, the web client is only accessible to authenticated users by default. To allow unauthenticated users to access the web client, you must enable the $sn-va-web-client-app and sn_va_web_client_app_embed pages for public access. For more information, see Make UI pages public or private.

Role required: admin

About this task
The following steps provide a high-level overview of the Proactive Triggers configuration process.

Procedure
1. Navigate to **Conversational Interfaces** > **Settings** > **General**, and then select the **View All** button next to Proactive Triggers's **Rules**.
2. Select **New** to create rules and define actions that are triggered by those rules.
3. **Optional:** Navigate to **Conversational Interfaces** > **Settings** > **General**, and then select the **View All** button next to Proactive Triggers's **Trigger types**.
4. **Optional:** Select **New** to create custom trigger types.
5. **Optional:** Create multiple rules related to the same trigger type, if needed.

What to do next
Review execution logging tables and explore common issues and their resolutions to ensure that your Proactive Triggers feature is working as expected.

Create rules and actions for Proactive Triggers

Create rules and related actions for Proactive Triggers. These rules and their related actions determine the messages that end users see on the ServiceNow portal.

Before you begin
Enable the Proactive Triggers feature, and review the list of default rules included with Proactive Triggers.

Role required: sn_pt.proactive_admin or admin

About this task
Select a default rule in the Proactive Triggers rules list to see how the default rule is defined. Admins or proactive admins can use these rules, change them, or create rules. After a rule is created, the admin creates one or more actions that are triggered by the rule. Actions define the messages that end users see based on the rule and the next steps available for the end users to take. For examples of default rules and action types, see Exploring Proactive Triggers.

Procedure
1. Navigate to **Conversational Interfaces** > **Settings** > **General**, and then select **View All** next to Proactive Triggers **Rules**.
   The list of default rules included with Proactive Triggers is displayed.
2. Select **New** to display the Proactive Rule form.
3. On the Proactive Rule form, fill in the fields.
   For a description of the field values, see Proactive Rule form.
4. Select **Submit**.
   The rule is created and is displayed in the list of available rules.
5. Select the newly created rule, and then go to the Proactive Actions related list.

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6. Select **New** and, when prompted, choose the action type for the rule.

Action types

Action type	Description
Message only	End users see an HTML pop-up message.
Message that launches a virtual agent topic	End users see an HTML pop-up message that directs them to an available Virtual Agent topic.
Message that launches a selection of virtual agent topics	End users see an HTML pop-up message with up to three suggested action buttons that direct them to a relevant Virtual Agent topic.

Note:
If you've created Live Agent rules, you can only select Message action types for those rules.

7. On the Proactive Action form, fill in the fields.
For a description of the field values, see Proactive Action form.
8. **Optional:** If you select the **Message that launches a selection of virtual agent topics** action type, work with the following default list columns on the Proactive Action Virtual Agent Topic Controls related list to determine the button display order:

Proactive Action Virtual Agent Topic Controls related list

Column	Description
Label	The button label that appears to end users. Double-click (or use the keyboard shortcut) the value to enter a button label up to a maximum of 40 characters. Leave this value empty if you want to have the label auto-populate with the topic title.
Topic	The Virtual Agent topic that end users interact with after they've selected the button. Double-click (or use the keyboard shortcut) the value to enter or search for a Virtual Agent topic.
Active	The active status of the rule action. A rule needs at least one active action for the rule to be triggered. Double-click (or use the keyboard shortcut) to select either **true** or **false**. Leave this value empty to auto-populate this value to **true**.
Order	The button order that is displayed on end users' screens. Double-click (or use the keyboard shortcut) to enter the button preference order. Leave this value empty if you want to auto-populate with the next available order number that increments by one.

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Note:
Up to three buttons can appear in the proactive message.

9. Select **Submit**.
   The Proactive action is created.

   You can create additional rules and actions as needed. For information about using multiple rules and actions, see Multiple Proactive Triggers rules and actions.

   You can localize the language for end users by making entries to the Translated Text table. For more information about making entries to the Translated Text table, see Translating text fields.

Result
The triggering rules and actions are ready for you to validate and test.

Create custom trigger types

Create your own trigger type during the rule creation process that is specific to your organization for improved Proactive Triggers usage.

Before you begin
Role required: sn_pt.proactive_admin or admin

About this task
For a more advanced configuration, create your own custom trigger types. You can create custom trigger types through two different paths.

1. Through the **View All** button next to the **Trigger types** field in **Conversational Interfaces** > **Settings** > **General** > **Proactive triggers**.
2. Through the rule creation process.

Procedure
1. Navigate to **Conversational Interfaces** > **Settings** > **General**, and then select **View All** next to the **Rules** field in Proactive Triggers.
2. Select **New** to display the Proactive Rule form.
3. Next to the **Trigger type** field, select the create new trigger type icon ( ).
4. On the form, fill in the fields.

Proactive Triggers Create Trigger Type form

Field	Description
Name	Name of the custom trigger type.
ID	System-generated, read-only ID required for API calls. This ID is only displayed after you've submitted the new trigger type and you view the trigger record.
Description	Trigger type description.
Order	Trigger run order whenever two rules conflict in the same time frame. The lowest number is evaluated first when multiple triggers are running at the same time.

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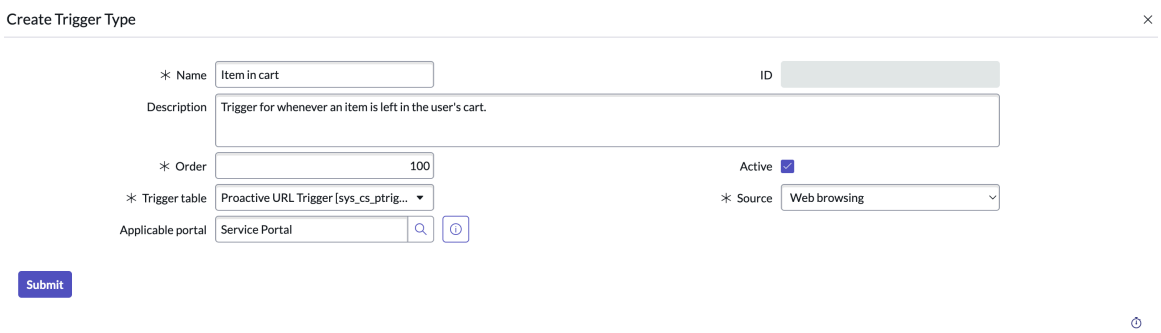
Field	Description
Active	Option to activate the trigger type so that it's available as a trigger type when creating a rule.
Trigger table	The table referenced in the rule condition builder. Only one trigger type can exist for the same referenced table. For example, if you try to create a trigger type referencing the Knowledge [kb_knowledge] table with a Web browsing source, an error appears when saving the trigger type. This error appears because the default Knowledge trigger already uses this same table and source.
Source	The trigger initiation is either **System API** or **Web browsing**. ○ **System API**: Calls the Proactive Triggers API. For example, a business rule on the trigger table calls the API that initiates the trigger. **Note:** Trigger types with the **System API** source only work for internal ServiceNow sites and not external sites. ○ **Web browsing**: Calls to a URL. The default active trigger types are associated with the web browsing source.
Applicable portal	The trigger type is only applicable to select pages on a particular portal.

Example of a custom trigger type



5. Select **Submit**.
   The new, custom trigger type appears as the **Trigger Type** field value.

What to do next

After creating the custom trigger type, the **Create new trigger type** button updates to the **Preview this record** button ( ). Select **Preview this record** to preview the new trigger type that you created and view the system-generated ID. To make edits to this trigger type, select **Open Record** to manage the parameters of the custom trigger type.

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Also, you can make edits to this new trigger type by selecting **View All** next to the **Trigger types** field in **Conversational Interfaces** > **Settings** > **General** > **Proactive triggers**.

Multiple Proactive Triggers rules and actions

The Proactive Triggers feature uses rules and actions to trigger context-specific Virtual Agent conversations with end users on the web client.

An admin enables the Proactive Triggers feature.

An admin then creates rules and defines actions that are triggered by those rules. Admins can create multiple rules and actions. They also specify the end user that the rules and actions apply to.

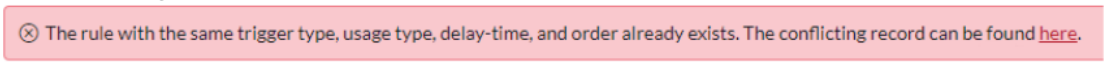
Multiple rules can be defined with the same trigger type references (for example, catalog item, knowledge, portal home, URL) as long as the **Order** and **Delay time** settings are different. Multiple rules defined on the same trigger type references let you layer messages based on how long the end user is on the page.

A rule can include more than one action, but ensure that you apply the action to different users in the **Applies to** fields.

If you have errors when you create a rule, check the following fields to see if there's a conflict:

Tip:
The error message that appears includes a link that you can select to help you identify the conflicts.

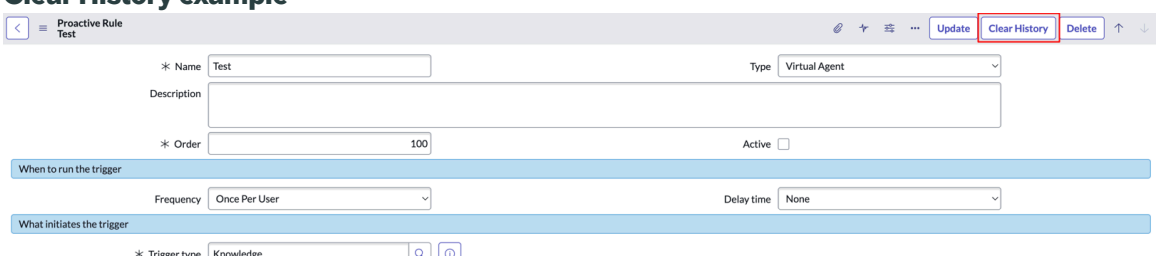
Error message example



- **Trigger type**
- **Delay time**
- **Order**

It may be necessary to clear the rule's history for the rule to function as anticipated. When you set your rule's **Frequency** field to **Once per user** and you want to run the rule again, you must clear the history. Clearing the history lets you apply the rule again for that user. To clear the rule's history, select **Clear History** on the rule's Proactive Rule form. After the history clears, an admin must reactivate the rule.

Clear History example



Related topics

Manage Proactive Triggers

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Manage Proactive Triggers

After admins have installed Proactive Triggers and created related actions and rules, admins can check that the Proactive Triggers feature is performing as expected. For example, admins can view the Proactive Execution History table and the Proactive Daily Report table.

This topic includes information admins can use to see if the Proactive Triggers feature is performing as expected. For example, admins can review the Proactive Triggers history tables to make sure that the rules and actions are working as intended.

This topic also includes common issues that admins may encounter when they're creating rules and actions, along with the proposed solutions.

View Proactive Triggers history and report tables

To see if the Proactive Triggers feature is running as intended, admins can review these two tables' data:

- Proactive Execution History#(sys_cs_ptrigger_execution) table
  - Real-time execution history of Proactive Triggers events.

    Tip:
    The Notes column provides a brief rule execution status. For additional information about why Proactive Triggers didn't run successfully, select the execution event from the Created column, and then view the **Details** field under the **Others** section.

  - The data from this table is removed every seven days.
- Proactive Daily Report (sys_cs_ptrigger_report_daily) table
  - Aggregated execution data by user, rule, and action per day.
  - Execution data is processed every hour and updates this table.
  - The data from this table is removed every 35 days.

Common issues and resolutions

The following table lists issues that you may encounter when you're creating rules and actions, and the suggested resolutions.

Issue	Resolution
If a trigger type is defined as a URL in the rule, when the page is actually a catalog item, knowledge, or portal, the rule won't run.	Admin must fix the rule to match the page type.
The **Frequency** is set to run once per user but the rules don't run.	Clear the rule history at the rule level. For details on clearing the rule history, see Multiple Proactive Triggers rules and actions.
Rule doesn't run for some end users, and the **action** type selected is **virtual agent topic**.	End users may not have access to the Virtual Agent topic defined on the action. Check the access to the topic in Virtual Agent Designer.
The Proactive Triggers rule doesn't run.	Close any active conversations in the Virtual Agent web client.

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Proactive Triggers reference

The following section details the installed components for Proactive Triggers.

Components installed with the Proactive Triggers feature

When the Proactive Triggers feature is installed, the feature includes required components, such as specific roles and tables. Admins can review these roles and tables to make sure that the feature has been installed correctly.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application Find components installed with an application.

Roles installed with the Proactive Triggers feature

Role title [name]	Description	Contains roles
Proactive_admin [sn_pt.proactive_admin]	Allows users to create proactive rules and have access to related tables and related records	• user_criteria_admin • sp_admin

Tables installed with the Proactive Triggers feature

Table	Description
Proactive Custom Trigger Types [sys_cs_ptrigger_trigger_type_list]	Create and view custom trigger types
Proactive Rules [sys_cs_ptrigger_rule]	Stores all Proactive Triggers rules
Proactive Actions [sys_cs_ptrigger_action]	Parent action table
Proactive Virtual Agent Topic Action[sys_cs_ptrigger_va_topic_action]	Extended table from action for Virtual Agent action
Proactive Execution History #[sys_cs_ptrigger_execution]	Execution history for the last 7 days
Proactive Daily Report [sys_cs_ptrigger_report_daily]	Aggregated execution data by user, rule, or action per day

Proactive Triggers roles

Proactive Triggers adds the Proactive Triggers admin role.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

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Installed roles

Role title [name]	Description	Contains Roles	Groups	Elevated	Considerations
Proactive Triggers admin [sn-pt.proactive_admin]	Users who create proactive rules and have access to related tables and related records.	• User Criteria Administrator [user_critera_admin] • Service Portal administrator [sp_admin]	None.	No	Users assigned this role can access any related tables and records including potentially protected information, as well as proactive rules.

Note:

Simplify user administration by creating groups that contain all the roles necessary for specific personas rather than to individual users. You can then assign individual users to those groups. When users transition to new roles, you can then re-assign their group memberships, and avoid scenarios where users retain unexpected roles.

For details on the administration of users, groups, and roles, see User Administration.

Proactive Triggers admin [sn-pt.proactive_admin]

Users who create proactive rules and have access to related tables and related records.

Contains Roles

List of roles contained within the role.

- User Criteria Administrator [user_critera_admin]
- Service Portal administrator [sp_admin]

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Important:
Avoid granting an admin role when more specialized roles are available.

Domain separation and Proactive Triggers

Domain separation is supported for Proactive Triggers. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

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Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

Overview

The Proactive Triggers rich text pop-up messages provide users with actions according to real-time Proactive Triggers data. Domain separation is enabled and supported at the basic level.

How domain separation works in Proactive Triggers

Each domain has its own set of rules and trigger types that are evaluated independently of other domains.

Related topics

Domain separation explained

Domain separation for service providers

Proactive Rule form

When creating a Proactive Triggers rule, the Proactive Rule form includes the following fields.

Proactive Rule form

Field	Description
Name	Name of the new rule that you want to create.
Type	Proactive Triggers conversation type for end users. Choices are: • Virtual Agent Rules are triggered when the Virtual Agent is available. • Live Agent only Rules are triggered when the web client is configured to live agent only. You can configure the web client to live agent only from the Service Portal. For instructions, see Configure Agent Chat in a portal.
Description	Rule description.

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Proactive Rule form (continued)

Field	Description
Order	Order of when a Proactive Triggers rule is to be applied. If there's more than one rule, the rules with lower numbers for a particular delay time are applied first.
Active	Option to activate the rule.
When to run the trigger	
Frequency	How often the rule should be applied. Choices are: • Every time: Every time an end user visits the page. • Once per visit: Every time an end user visits a page per user log in. • Once per user: Applies the rule only the first time that an end user visits the page. With this frequency setting, you must clear the rule's history if you want to run this rule again for a user. For more information about clearing the rule history, see Multiple Proactive Triggers rules and actions.
Delay time	Time to wait before the rule is applied. Choices are: • None • 10 seconds • 20 seconds • 30 seconds • 1 minute • 3 minutes
What initiates the trigger	
Trigger type	System API or web browsing URL for the type of trigger. Select the lookup list icon ( ) to view your default choices. If enabled, your default system API choice is **Search Event**. This trigger type triggers an action when no search results are found on the Service Portal or Employee Service Center.

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Proactive Rule form (continued)

Field	Description
	Tip: Ensure that your Proactive Trigger business rule (**Proactive Trigger on Search**), trigger type (**Search Event**), rule (**Search - No Search Result**), and action (**No Search Result Message**) have the **Active** option turned on so that this rule runs effectively. These parameters default to inactive. Your default web browsing URL choices are: • **Catalog item**: Triggers an action based on the catalog item's reference fields. • **Knowledge**: Triggers an action based on the knowledge article's reference fields. • **Portal home**: Triggers an action based on the portal home page's reference fields. • **URL**: Triggers an action based on the defined URL. Define the URL components as shown in this example.  **Important:** ○ If you're using the Virtual Agent web client outside of the ServiceNow instance (for example, as part of a third-party website), use the URL trigger type. Don't use any of the other trigger types. ○ The URL trigger type applies only if no other available trigger types match the URL. If you don't see the trigger type that you need using the lookup list icon ( ), you can create your own custom trigger type. For more information about custom trigger types, see Create custom trigger types.
Conditions	Conditions that must be met for the trigger type to run as defined by the admin. Conditions vary by trigger type. Specify the Proactive Triggers conditions that you want to use.

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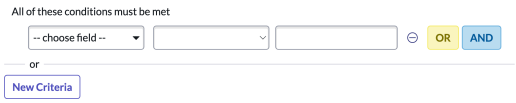
Proactive Rule form (continued)

Field	Description
	For more information about using conditions, see Condition builder. **Note:** Rule conditions are case-sensitive and must match. For example, if you want to use the name of a catalog item, such as the iPhone condition, entering "iphone" doesn't give you the results that you want.  **Note:** When specifying the conditions that must be met for a trigger type, be careful not to specify conflicting trigger types and conditions. Conflicting URL trigger types and conditions can cause errors. For more information, see Manage Proactive Triggers.
Advanced conditions	Option for using scripts to define the condition. 
Find available agent	Option to check for any available live agents.

Proactive Action form

When creating a Proactive Triggers rule, the Proactive Action form includes the following fields.

Proactive Action form

Field	Description
Name	Name of the action that you want to associate with a rule.
Description	Description of the action to be applied.
Applies to	The set of end users to which this action applies. For example, you can apply an action to any **Any Users** or **Guest Users** user criteria. Use the lookup using list icon ( ) to select the user. The **Applies to** settings must be unique for the actions for each rule.

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Proactive Action form (continued)

Field	Description
	To create a user criteria record, see Create a user criteria record for Service Portal. **Note:** If you don't specify a user, this rule is applied to all users.
Model Type	Topic type, either an **LLM** or **NLU/Keyword** value, that is associated with the Proactive Triggers action. This field is only applicable if Now Assist is installed and enabled.
Topic	List of Virtual Agent topics available. The selected topic runs when end users open the Proactive Triggers message. **Note:** Only the topics that are active and published appear in the list. System topics aren't included in the topics list. (For **Message that launches a virtual agent topic** actions only.)
Active	Option to activate the action.
Order	Order of when a Proactive Triggers action is to be applied. If there's more than one action, the actions with lower numbers are applied first.
Rule	Rule to which this action applies.
Select variables from	Option for choosing from a list of variables to use in the message. Choices are: • Trigger Type: References the trigger type table selected for the rule. • User: References the user table. Uses the attributes in the user table for the Proactive Triggers message.
Message	Text that the end users see when the action is applied. To enter the text, you can: • Use the tools and options of the HTML editor. **Note:** Support for using the link button may be included in future releases. • Use variables (Trigger Type or User).

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Proactive Action form (continued)

Field	Description
Tagline	Text that the end users see above the buttons that you've created. The default tagline text is `Suggested for you`. (For **Message that launches a selection of virtual agent topics** actions only.)

Interaction Management

Interactions provide a centralized location for all communication channels in the platform. Each interaction represents a request for assistance through a given channel, for example, a call or a chat.

Overview

The ServiceNow AI Platform offers several forms of queueing and communication management, but each system is tightly coupled to the specific area. Interactions offer an alternative, flexible, and more extensible option so that each product area can use the same framework.

Get started

Activate



Activate Interaction Management.

Configure



Configure interaction components, determine which actions occur depending on the state of the interaction, and configure States determine the behavior for interactions. For each state of the interaction life cycle, you determine which routine actions to perform.

Use



Manually create interactions or associate records with an interaction.

Reference



Learn about the components installed with Interaction Management.

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Troubleshoot and get help

- Virtual Agent interaction records
- ServiceNow Community forums
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Activating the Interaction Management system

An administrator can activate the Interaction Logging, Routing, and Queueing plugin (com.glide.interaction) to access the functionality.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Interaction Logging, Routing, and Queueing plugin plugin (com.glide.interaction) using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Configuring Interaction Management

You can configure the behavior of an interaction and the types of information that is stored with the record. You can also use interaction wrap up to provide agents with a brief wrap-up period at the end of customer conversations.

Interaction states

Configure the behavior of an interaction by determining the routine behavior for each state that the interaction goes through during the life cycle.

Interaction framework

Configure each of the following interaction components to determine the behavior and life cycle.

- Lists: Configure the interaction list view. You can also extend the interaction table.
- Forms: Configure the form view to tailor interactions for each application.

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Interaction states

States determine the behavior for interactions. For each state of the interaction life cycle, you determine which routine actions to perform. For example, the *On Created* state would have a script that creates an interaction and then adds the end user as the 'opened for'. The script then sends a message to the end user to let them know that the interaction has been opened.

Interaction states

State	Description
New	An interaction is inserted into the interaction table.
On Hold	The interaction is waiting for assignment.
Work In Progress	An agent accepts an unassigned interaction.
Wrap Up	This state indicates that the agent has completed a conversation with a customer and is wrapping up the interaction. This state is available if an interaction wrap up configuration has been created for the specific type of interaction and that configuration is active. For more information, see Interaction wrap up.
Closed Complete	The interaction timed out or the agent or consumer intentionally closed the interaction.
Closed Abandoned	The interaction is closed because the consumer disconnects or is unresponsive.

Interaction context and channel metadata

Context and channel metadata are document ID fields included as part of interactions. Both types of records store information about the interaction.

Context

Context for an interaction tracks the information for an interaction, such as the initial question, asset tagging, or device location. Context records are stored on the interaction_json_blob table by default, however you can use any table to store a context record.

Channel metadata

Channel metadata contains the information needed to interact with the channel on which communication is happening on, for example, the chat or phone channels. Channel metadata can be free-form JSON or a reference to another record.

Interaction wrap up

Interaction wrap up provides agents with a brief wrap-up period at the end of customer conversations. Agents can use this time to complete their work before moving on to assist other customers.

Interaction wrap up is a feature available for all types of interactions. When enabled, an interaction record moves from the Work In Progress to the Wrap Up state at the end of a customer conversation. This brief, configurable period enables agents to complete tasks such as posting work notes and updating record information before moving on to other work items.

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While in the Wrap Up state, an agent's capacity is not reduced until the state of the interaction moves to Closed Complete.

Note:
The interaction wrap up feature works with multiple types of communication channels. This feature supports a chat and messaging interactions base system.

Configuring interaction wrap up

Users with the system administrator role create an interaction wrap up configuration for the desired communication channel. Creating a configuration automatically enables the feature and the Wrap Up state for interactions that match the configuration settings.

The interaction wrap up configuration includes the following information:

- The selected communication channel.
- Additional conditions that apply to the interaction records included in the configuration.
- Whether wrap up is automatically ended by the system and, if automatically ended the duration of the wrap up period.
- Whether a countdown timer that displays the wrap up duration is shown to agents in CSM Configurable Workspace.

The interaction wrap up configuration adds the Wrap Up state to the **State** field on the Interaction record. For more information about the wrap up state, see Interaction states.

Starting wrap up

The wrap up period begins when either the agent or the customer ends a conversation. The system then does the following:

- Moves the state of the interaction from Work in Progress to Wrap Up.
- Starts a countdown timer for the wrap up duration period.

Manually ending wrap up

Ending the wrap up period can be performed manually by the agent or automatically by the system.

Agents can end the wrap up by clicking **End Wrap Up** on the Interaction record, which moves the interaction from Wrap Up to Closed Complete.

Agents can also end the wrap up period by closing the interaction record tab.

- If the interaction is in the Wrap Up state, closing the tab ends the wrap up period and moves the interaction to Closed Complete. The system displays a message to the user about ending the wrap up period.
- If the interaction is in the Work in Progress state, closing the tab skips the wrap up period and moves the interaction to Closed Complete.

Automatically ending wrap up

If an agent has not already ended wrap up, the system can automatically end the wrap up period after a set period of time. Automatic wrap up must be enabled in the interaction wrap up configuration.

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- The system starts the wrap up duration timer when the wrap up period starts.
- When the wrap up duration timer reaches zero, the system ends wrap up and changes the state from Wrap Up to Closed Complete.
- The system sets the **System wrap up** field on the Interaction record to True.

Note:
Agents can manually end the wrap up period even if automatic wrap up is enabled.

Interaction form

The Interaction form displays information about a customer interaction.

The interaction form includes the following fields.

Field	Description
Number	The automatically assigned interaction number.
Type	The type of customer interaction, such as a chat or phone call.
Account	The name of the customer contact's company. This field is filled in automatically if the information is available in the contact record.
Contact	The name of the customer contact.
Consumer	The name of the consumer.
State	The current state of the interaction. For more information, see Interaction states.
Assigned to	The name of the assigned user.
Short description	A brief description of the customer issue.
Work notes	Records information about the interaction and the work being done to resolve the customer issue.
Wrap up duration	If using the Interaction wrap up feature, the system administrator can configure the Interaction form and add the **Wrap up duration** field. This field records the length of time that the Interaction record spends in the Wrap Up state. This is a read-only field. If a duration is not calculated, this field is set to 0. Duration is calculated as the time an interaction is in the Wrap Up state before moving to either Closed Complete or Closed Abandoned.

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Field	Description
	Note: If an agent closes the tab and ends the interaction, the wrap up duration is recorded as 0 seconds.
System wrap up	If using the Interaction wrap up feature, the system administrator can configure the Interaction form and add the **System wrap up** field. The system determines if the interaction wrap up was performed manually by an agent (by clicking **End Wrap Up**) or automatically by the system and sets this field accordingly. • Set to **True** when automatic wrap up is enabled and the system moves an interaction from the Wrap Up state to either Closed Complete or Closed Abandoned at the end of the wrap up duration. • Set to **False** when an agent manually wraps up an interaction. The default value for this field is false.

Interaction wrap up timer

The interaction wrap up timer displays a countdown of the wrap up duration period in CSM Configurable Workspace.

The system administrator can configure the display of the wrap up timer by enabling the **Show duration to agent** field on the Interaction Wrap Up Configuration form.

The read-only timer appears in an interaction record's secondary values. Depending on the configuration of the secondary values, these values can be displayed either in the form header or in the contextual side panel.

Note:
The interaction wrap up timer works in both CSM Configurable Workspace and CSM Agent Workspace but the timer display is only available in CSM Configurable Workspace.

The timer counts down the amount of time specified in the **Duration in seconds** field on the Interaction Wrap Up Configuration form. The background color of the timer changes as it counts down the duration.

Timer color	Description
Green	Time remaining is between 100% to 50% of duration.
Yellow	Time remaining is between 50% and 25% of duration.
Orange	Time remaining is between 25% and 0% of duration.
Red	When the timer reaches 0.00, the display turns red and then disappears. The system updates the state of the interaction record to Closed Complete.

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Interaction wrap up scheduled job

The interaction wrap up feature includes a scheduled job to close any interactions in the Wrap Up state that were not closed either manually by an agent or automatically by the system.

Ending the wrap up period is typically performed in the following ways:

- Manually by the agent.
- Automatically by the system, if the **Enforce wrap up duration** setting is enabled in the interaction wrap up configuration.
- By closing the workspace tab.

While most interaction records are automatically closed when the configured wrap up period ends, the interaction wrap up feature also includes a scheduled job to close any remaining records. For example, if the **Enforce wrap up duration** setting is not enabled in the configuration and agents close interactions by closing the browser, these interactions can remain in the Wrap Up state.

The **Fallback Timeout for Interactions in Wrap Up** scheduled job functions as a fail-safe method for closing interaction records that remain in the Wrap Up state. This scheduled job:

- Evaluates interaction records in the Wrap Up state.
- Closes those records that have been in the Wrap Up state longer than the time specified in the Max Wrap Up system property.

The Max Wrap Up system property (**com.glide.interaction.max_wrapup_duration**) defines the length of time that an interaction record can be in the Wrap Up state. The default value for this property is 15 minutes.

The time value set in the Max Wrap Up system property must be greater than the time value set in the **Enforce wrap up duration** field on the Interaction Wrap Up Configuration form.

The default run interval for this scheduled job is five minutes. The system administrator can configure this time interval.

Note:
This scheduled job is inactive by default.

Create an interaction wrap up configuration

Create a configuration for each type of interaction that uses the interaction wrap up feature.

Before you begin
Role required: admin

About this task
Creating a configuration automatically enables the interaction wrap up feature and adds the Wrap Up state for interactions that match the configuration settings.

The **Interaction** > **Wrap Up** module includes a list of wrap up configuration records. These configurations are stored in the Interaction Wrap Up Configuration (interaction_wrap_up_configuration) table.

Procedure

1. Navigate to **Interaction** > **Wrap Up**.
2. Click **New**.
3. Fill in the fields on the Interaction Wrap Up Configuration form.

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Field	Description
Name	The name of the interaction wrap up configuration.
Active	Indicates whether the configuration is active. The default value is true.
Table	Read only. The table that stores the interaction records to which this configuration applies.
Conditions	Use the condition builder to select the conditions that apply to the interaction records included in this configuration.
Enforce wrap up duration	Enables the system to automatically end the wrap up period. The default value is false. If enabled, the system automatically ends the wrap up period at the end of the wrap up duration (set in the **Duration in seconds** field) and moves the state of the interaction record from Wrap Up to Closed Complete.
Duration in seconds	The duration of the wrap up period. ○ The default value is 60 seconds. ○ The value must be greater than 0. The system displays this field when you enable the **Enforce wrap up duration** field.
Show duration to agent	Enables a duration countdown timer for the agent. The default value is false. The system displays this field when you enable the **Enforce wrap up duration** field. **Note:** The interaction wrap up timer works in both CSM Configurable Workspace and CSM Agent Workspace but the timer display is only available in CSM Configurable Workspace.
Order	The order of the configuration, which is used in evaluation processing of wrap up configuration records. If there are multiple records, the lower order number takes precedence over higher numbers. The default value is 100.

4. Click **Submit**.

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Using Interaction Management

Other applications use Interaction Management to control channels, but you can work manually with interactions as well.

Create an interaction

Most interaction creation takes place in other applications as interactions are merely a method of controlling channels. However, if needed you can create an interaction from the Interaction application.

Before you begin

Role required: interaction_agent

Procedure

1. Navigate to **All** > **Interaction** > **All**.
2. Click **New**.
3. In the Type field, enter the way the interaction began.
   For example, chat, phone, or walk-up.
4. In the Opened for field, type the name of the user starting the interaction.
5. Include any additional information in the short description and the work notes fields.
6. Click **Submit**.

What to do next

View any incidents opened by the same user by clicking the Use the Incidents by Same Caller related list.

Associate a record with an interaction

As an agent, you might need to create a record on another table to work on an interaction. You can associate the record with the interaction.

Before you begin

Role required: interaction_agent

Procedure

1. Navigate to **All** > **Interaction** > **Assigned to me**.
2. Open the interaction you want to associate with another record.
3. In the form header, click **Associate Record**.
4. In the ID of related record field, click the search icon.
5. From the Document Table list, select the table you want to associate a record from.
6. From the Document field, click the search icon.
7. Select an existing record from the list, or click **New** to create a record.
8. Click **OK**.
9. Click **Submit**.

Result

The associated record appears in the Related Tasks related list for the interaction.

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Interaction Management reference

Learn about the components installed with Interaction Management.

Components installed with Interaction Management

Several types of components are installed with activation of the Interaction Logging, Routing, and Queueing plugin, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Roles installed

Role title [name]	Description	Contains roles
Interaction Administrator [interaction_admin]	Configure interactions for users.	interaction_agent
Interaction Agent [interaction_agent]	Create and edit interactions. Transfer interactions to different agents or queues.	None

Tables installed

Table	Description
Interaction [interaction]	Table for all interaction records.
Interaction JSON blob [interaction_json_blob]	List of records that store context information for each interaction.
Interaction related record [interaction_related_record]	List of related records that have been associated with an interaction.

Live Feed Core UI

Live Feed is a social IT application that provides a place to post and share content in a ServiceNow® instance.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

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Get started

Explore	Activate	Administer
		
Learn about Live Feed concepts and features.	Activate Live Feed on your instance.	Administer document feeds, record feeds, and notifications.

Use	Reference
	
Post in Live Feed and use feeds, teams, hashtags, and records.	Get details about domain separation and components, such as tables, user roles, business rules, and script includes.

Troubleshoot and get help

- Live Feed discussions in the ServiceNow Community
- Contact Customer Service and Support

Exploring Live Feed Core UI

Live Feed content forms a searchable knowledge source for sharing information within an organization.

Live Feed overview

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

Live Feed content forms a searchable knowledge source for sharing information within an organization. Main features include the following:

- Users can post, reply to, and rate messages, including links and images.
- Administrators can set up automatic messages that are generated when specific records are updated throughout the system.

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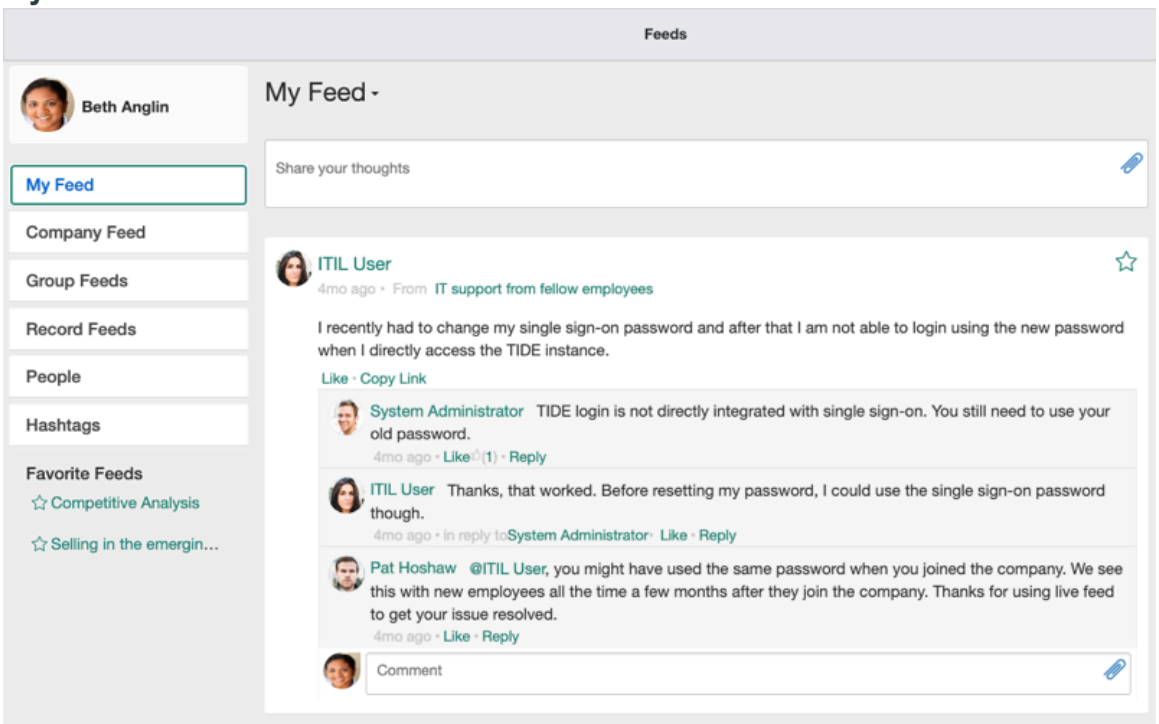
- Users can subscribe to receive email notifications when new messages are posted.
- Users who take advantage of the accessibility options in the platform can tab through a Live Feed to navigate.

Live Feed includes different types of feeds, including company feeds, group feeds, individual feeds, and record feeds.

My Feeds



Note:
Live Feed v2 is active for all new instances by default. If you are upgrading from an earlier version of ServiceNow®, you need to activate Live Feed v2 to use these features.

Live feed can be domain separated at the data level only. For more information on Live Feed and domain separation, see Domain separation in Live Feed.

Live Feed users

Users

User	Description
Admins	Admins activate and administer Live feed in the following ways: • Add and configure document feeds • Activate and configure record feeds • Set up notifications • Manage Live Feed security
Users	Users can subscribe to feeds, post content, work on records, and use hashtags.

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Live Feed benefits

Live Feed benefits

Benefit	Feature	Users
Document feeds allow users to work on tasks and other records through the Live Feed interface. Users can post messages in Live Feed that are automatically maintained as comments or work notes on the record, if the record has these journal fields.	Document feeds	Configuration: Admins Users: anyone
Record feeds allow users to work on tasks and other records through the Live Feed interface. Users can post messages in Live Feed that are automatically maintained as comments or work notes on the record if the record has these journal fields.	Record feeds	Configuration: Admins Users: anyone
When a record is inserted or updated on a specific task table and the notification conditions are met, a message is generated and posted to the specified group or to the company feed.	Live Feed table notifications	Configuration: Admins Users: anyone
Users can be combined into teams for the purpose of subscribing to specifically-focused feeds.	Teams in Live Feed	Configuration: Admins Users: anyone
Hashtags are words marked with a hash symbol (#) in messages. Hashtags are a way to categorize messages by keyword or topic for improved search results.	Hashtags in Live Feed	Anyone

What to explore next

To learn more about configuring and using Live Feed, see:

- Activating Live Feed
- Administering Live Feed
- Using Live Feed
- Live Feed reference

Live Feed browser support

The Live Feed v2 plugin does not support Internet Explorer 7 through 9.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

Users who access the instance from those browser versions can use Live Feed v1 functionality. Users who access the instance from browsers that are compatible with HTML5 can use Live Feed v2 functionality.

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Activating Live Feed

Live Feed is active for all instances. An administrator can activate the Live Feed plugin if it is not already active.

Before you begin

Role required: admin

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Administering Live Feed

Administrators and users with the live_feed_admin role can configure Live Feed security and provide access to Live Feed from content management pages. Administrators can also set up Live Feed table notifications.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

Document feeds

A document feed is a Live Feed group that is associated with a record, such as an incident or change.

Document feeds allow users to work on tasks and other records through the Live Feed interface. Users can post messages in Live Feed that are automatically maintained as comments or work notes on the record, if the record has these journal fields.

The benefits of using document feeds include the following.

- Improving communication between users working on the same record.
- Improving visibility into progress for end users.

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- Providing a single place to see updates on multiple records.
- Saving conversation history in the record so that knowledge is not lost in an email chain.

To use document feeds, activate the Live Feed Document plugin, which is active by default in new instances. See Use Live Feed to work on records to learn how to use this feature.

The system automatically creates a document group for the feed when a user follows or shows a record on Live Feed. The system also creates a document group when a user creates a new record on a table that has Live Feed enabled.

The following list describes features of the document feed group.

- Is unlisted; it does not appear when users view all groups on Live Feed.
- Automatically approves membership for every user who can access the record.
- Uses the record number as the group name.
- Uses the record short description as a group description.
- Maintains all messages posted to Live Feed on the record, if the record has a journal field for comments. If the record has a standard text field for comments, each live post overwrites the field value.
- Maintains all messages posted on the record in Live Feed if the record has a journal field for comments. When the group is created, existing messages are added to the document feed.

A user who participates in Live Feed becomes a member of the group.

Related topics

Activate a plugin

Add a Live Feed UI action on a table

You can add UI actions on a table to allow users to follow records in live feed.

Before you begin
Role required: ui_action_admin or admin

Procedure

1. Navigate to **System Definition** > **UI Actions**.
2. Open one of the Live Feed UI actions, for example, the *`Follow on Live Feed`* list UI action.
3. In the *Table* field, select the table name.
4. Right-click the header and select **Insert** to create a copy of the UI action for the desired table.
5. Repeat steps 1 – 4 for all Live Feed UI actions.

Configure document feeds

You can configure a table to support document feeds.

Before you begin
Role required: personalize_dictionary or admin

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Procedure

1. Add Live Feed to a form header.
2. Add *Follow on Live Feed* and *Show Live Feed* as list and form UI actions.

Security configuration for document feeds

Document feeds honor the access control rules (ACLs) for the associated record. Users can only view messages on the document feed if they have access to the same information on the record.

Consider the following examples:

- If an ACL allows a user to read and create comments on an incident, then the user can view and add messages posted as comments on the incident feed.
- If an ACL restricts a user from reading work notes, then the user cannot view messages posted as work notes on the incident feed.

Note:
Access control rules are only checked when a user first accesses the document feed. After users view the feed, an administrator must remove them manually to change their access.

Disable a record feed

You can disable Live Feed functionality from the form of any table.

Before you begin
Role required: personalize_dictionary or admin

Procedure

1. Navigate to **System Definition** > **Dictionary**.
2. Open the dictionary entry for the table.
3. Add `live_feed=false` in the **Attributes** field.
4. Click **Update**.

Note:
If the Collaboration feature is activated, you can remove the show Live Feed icon ( ) from all form headers. Set the *glide.live_feed.task_header_button* property to **collaboration**.

Disable a document feed

You can disable a document feed from the form of any table.

Before you begin
Role required: personalize_dictionary or admin

Procedure

1. Navigate to **System Definition** > **Tables**.
2. Open the table record.
3. Clear the **Live feed** check box.
4. Click **Update**.

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Business rule installed with Live Feed Document

This business rule is installed with Live Feed Document. There are no tables, roles, or notifications installed with it.

Business rule	Description
Live Feed integration	Writes journal comments to the Live Feed if there is a group for this record.

Record feeds

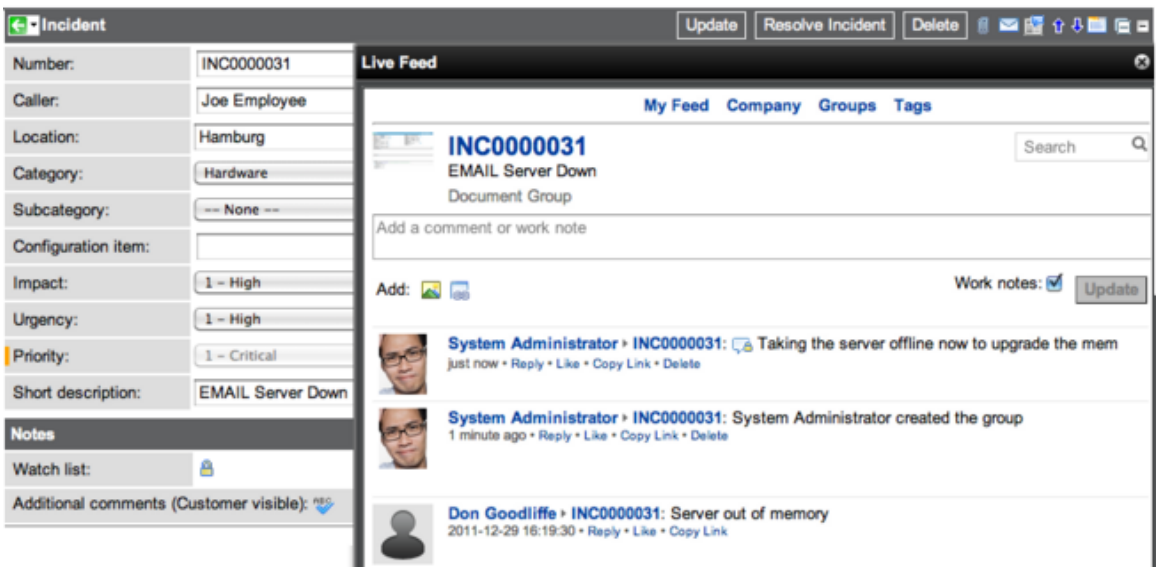
A record feed is a Live Feed group that is associated with a record, such as an incident or change.

Record feeds allow users to work on tasks and other records through the Live Feed interface. Users can post messages in Live Feed that are automatically maintained as comments or work notes on the record if the record has these journal fields.

You can use record feeds to do the following:

- Improve communication between users working on the same record.
- Improve visibility into progress for end users.
- Provide a single place to see updates on multiple records.
- Save feed history in the record so that knowledge is not lost in an email chain.

Live Feed document



Note:
Many of these features are part of Live Feed v2.

Activate the Live Feed Document plugin

The Live Feed Document plugin is active by default.

Before you begin
Role required: admin

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About this task

Administrators can enable record feeds in an instance by activating the Live Feed Document plugin, which activates the Live Feed plugin if it is not active. For upgrades, administrators must activate the plugin.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Configure record feeds

Configure a table to support record feeds. You can add the Show Live Feed button in the form header and add the UI actions Follow on Live Feed and Show Live Feed as List and Form.

By default, the Show Live Feed icon appears on the form header for all tables that extend task, including the Incident, Change Request, and Problem tables, and in the list and form context menus for all task tables.

Add Live Feed to a form header

Add the **Live Feed** button in the form header for a table.

Before you begin

Role required: admin

Procedure

1. Type `sys_properties.list` in the Application Navigator.
2. Open the record for *`glide.live_feed.task_header_button`*.
3. In the **Value** field, change the value to `both`.

   Note:
   By default, the value is `collaboration` so that the property is supported in the Collaboration (com.glide.collaboration) plugin. Changing the value to `both` allows the system property to be supported in Collaboration and Live Feed.
4. Click **Update**.
5. Navigate to **System Definition** > **Tables**.
6. Open the table record.
7. If the **Live feed** check box does not appear on the form, configure the form layout to add the **Live feed** field.

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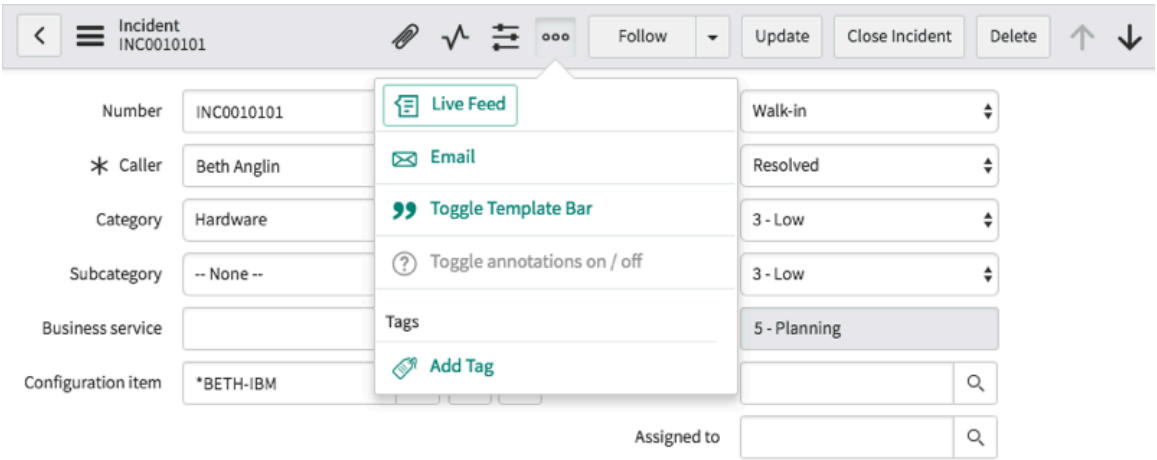
8. On the form, select the **Live feed** check box.
9. Click **Update**.
   Alternatively, you can add **live_feed=true** to the **Attributes** field in the dictionary entry for the table.

Result

The **Live Feed** button appears on the overflow menu of the form header.



Add Live Feed to a context menu

Add Live Feed UI actions on a table.

Before you begin

Role required: admin

Procedure

1. Navigate to **System Definition** > **UI Actions**.
2. Open one of the Live Feed UI action, for example, **Follow on Live Feed**.
3. In the **Table** field, select the table name.
4. Right-click the header and select **Insert** to create a copy of the UI action for the desired table.
5. Repeat steps 1 – 4 for all Live Feed UI actions.

Disable a record feed

You can disable Live Feed functionality from the form of any table.

Before you begin

Role required: personalize_dictionary or admin

Procedure

1. Navigate to **System Definition** > **Dictionary**.
2. Open the dictionary entry for the table.
3. Add `live_feed=false` in the **Attributes** field.

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4. Click **Update**.

Note:
If the Collaboration feature is activated, you can remove the show Live Feed icon () from all form headers. Set the *glide.live_feed.task_header_button* property to **collaboration**.

Configure security

Record feeds honor the access control rules (ACLs) for the associated record.

Users can only view messages on the record feed if they have access to the same information on the record. For example:

- If an ACL allows a user to read and create comments on an incident, then the user can view and add messages posted as comments on the incident feed.
- If an ACL restricts a user from reading work notes, then the user cannot view messages posted as work notes on the incident feed.

Note:
Access control rules are only checked when a user first accesses the record feed. After users view the feed, an administrator must remove them manually to change their access.

Live Feed table notifications

Live feed table notifications generate automatic Live Feed messages. The Live Feed plugin must be activated to use table notifications.

When a record is inserted or updated on a specific task table and the notification conditions are met, a message is generated and posted to the specified group or to the company feed. Table notifications are supported for all task tables and all task types by default.

Administrators and users with the live_feed_admin or chat_admin roles can set up table notifications for any table in an instance.

Set up table notifications for task tables

You can set up a table notification for a task table to enable automatic Live Feed messages.

Before you begin
Role required: live_feed_admin or chat_admin

Procedure

1. Navigate to **Live Feed** > **Feed Administration** > **Table Notifications**.
2. Click **New** or select a notification to open it.
3. Complete the form.

Live Table Notification fields

Field	Description
Table	Select the table for which notifications are generated. **Note:** The list shows only tables and database views that are in the same scope as the table notification.

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Field	Description
Post to chat rooms	Select the check box to generate the notification in chat rooms that are associated with the record, This applies to task records only and requires that the Chat plugin is active.
Post to Live Feed	Select the check box to generate the notification on Live Feed. If record feeds are not set up and the **Feed group** field is blank, the notification is posted to the company feed.
Record Feeds	Select the fields to post for record feeds. This field is available only if **Post to live feed** is selected.
Application	Select the application that contains this record.
Active	Select the check box to enable the notification.
Insert	Select the check box to generate the notification when a record is inserted into the database.
Update	Select the check box to generate the notification when a record is updated.
Feed	Select the Live Feed team to which you want to post messages. This field is available only if **Post to Live Feed** is selected. Clear the field to post notifications on the company feed.
Conditions	Create the condition that must be met to generate the notification. If you add a condition statement, the system evaluates the condition first and parses the **Before script**field only if the condition is met. You may choose to leave this field blank and include conditions in the script.
Description	Enter a description of the table notification.

Message	Construct the automatic message you want to generate. You can include field values as variables and a link to the record.
	
	To add a variable, position the cursor in the text and then click the field name in the **Select variables** field. To add a link to the record, enter `${URI}` in the message text as shown in the following example.
	
	`High priority incident opened: ${URI}`
	`Short description: ${short_description}`
	
	Note:
	For security reasons, any HTML code is automatically stripped out of a message before it is posted.

Before script	Create a script that runs before a notification is generated. The script runs only if the condition evaluates to true or is empty. The following variables are available in the script. ○ *`current`*: the GlideRecord object that triggered the notification. ○ *`changedFields`*: an ArrayList of fields changed on submit. Use changedFields.contains('fieldname') to check for change. ○ *`answer`*: set answer to false to cancel the notification.

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Field	Description
	○ *profileSource*: set to a valid GlideRecord object to define the profile that is posting the message. ○ *profileID*: set to a live_profile sys_id to define the profile that is posting the message; by default it is the current record. Overrides profileSource if both are specified. Any custom variable created in the script is also exposed to the message in the form of *${myVariableName}*.

4. Click **Submit** or **Update**.

Set up table notifications for non-task tables

Table notifications are supported for all task tables by default, and you can set up a table notification for any other table.

Before you begin

Role required: live_feed_admin or chat_admin

Procedure

1. Navigate to **System Definition** > **Business Rules**.
2. Open the *Live Feed events* business rule.
3. In the Advanced section,select and copy the text in the **Script** field.
4. Click the back arrow on the top, left to exit the record and return to the Business Rules list.
5. Click **New**.
6. Enter the following values at the top of the form.
   - **Name**: Enter a name, such as `Live Feed events for my table`.
   - **Table**: Select the table for which you are setting up a notification.
   - **Active** and **Advanced**: Select these check boxes.
7. In the **When to run** section, enter the following values.
   - **When**: Select **before**.
   - **Insert**, **Update**, and **Delete**: Select the check boxes.
8. In the **Advanced** section, paste the script from the *Live Feed events* business rule into the script box.
9. Click **Submit**.
   The *Live Feed events* business rule runs on the non-task table. It fires the *live_feed.update* event, which is associated with the *Live Feed Update* script action. The script action sets up variables and processes the table notifications.

What to do next

After saving the business rule, create a Live Feed table notification record for the new table as you would for a task table.

Live Feed table notification examples

The following examples demonstrate how to set up different types of table notifications that are useful for Live Feed.

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Workaround posted

This example demonstrates a table notification that generates an automatic message on Live Feed whenever a workaround is added to an open problem.

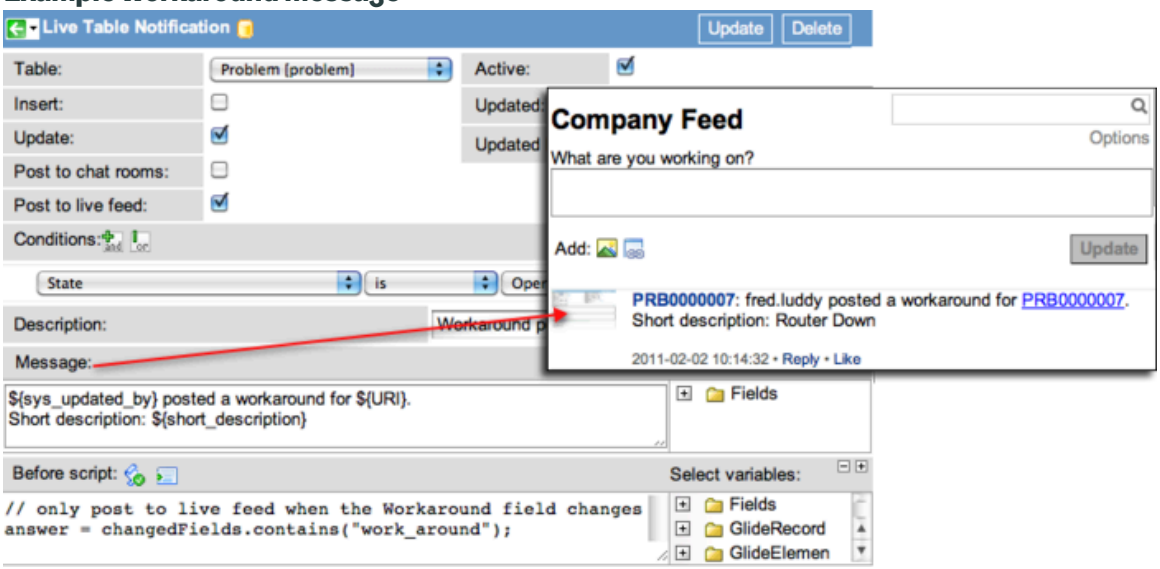
- **Table**: Problem [problem]
- **Active**: Select the check box.
- **Update**: Select the check box.
- **Post to Live Feed**: Select the check box.
- **Conditions**: [State] [is] [Open]
- **Description**: `Workaround Posted`
- **Message**:

```
${sys_updated_by} posted a workaround for ${URI}.
Short description: ${short_description}
```

- **Before script**:

```
// only post to Live Feed when the Workaround field changes
answer  = changedFields. contains ( "work_around" ) ;
```

Example workaround message



Related topics

Live Feed table notifications

Problem resolved (advanced)

This advanced example demonstrates a table notification that generates an automatic message on Live Feed whenever a problem is closed.

It also adds a message about the assigned user and posts the message from the assignment group profile instead of the problem record.

- **Table**: Problem [problem]
- **Active**: Select the check box.
- **Update**: Select the check box.
- **Post to Live Feed**: Select the check box.

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- **Conditions**: [Problem State] [is] [Closed/Resolved]
- **Description**: `Problem Resolved`
- **Message**:

```
Problem ${number} - ${short_description} has been resolved.
 ${fixedByMsg}
```

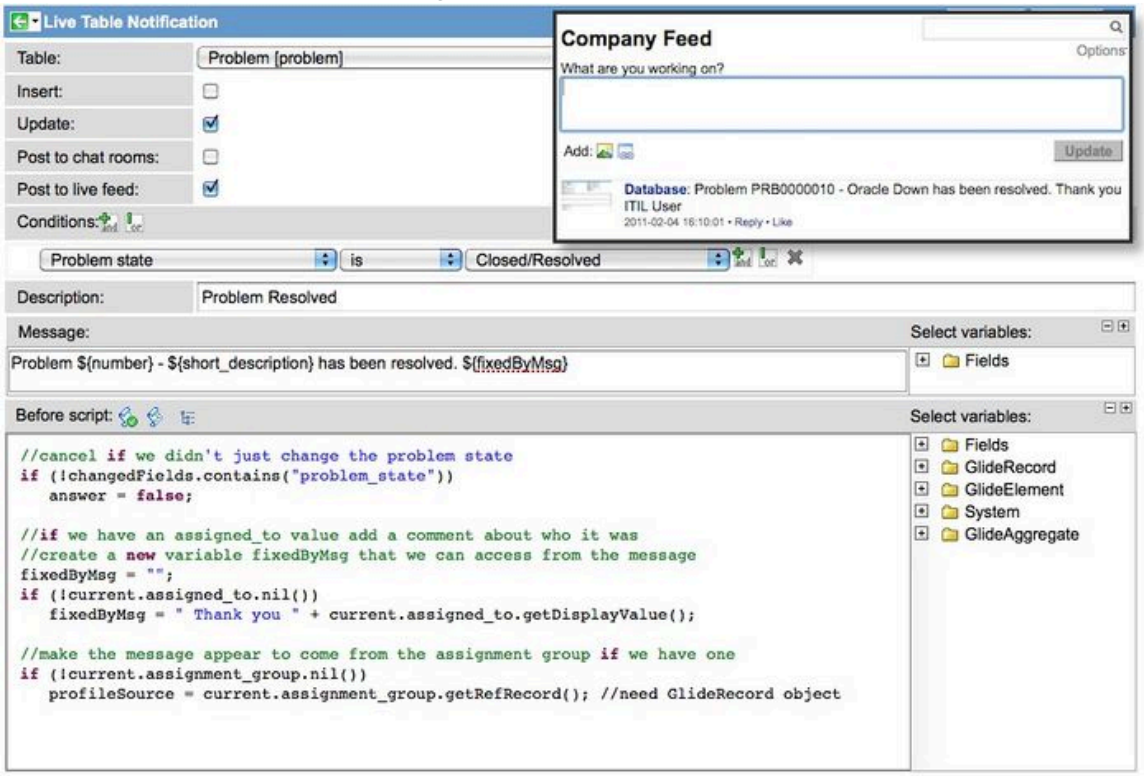
- **Before script**:

```
//cancel if we didn't just change the problem state if
 ( !changedFields. contains ( "problem_state" ) )
answer  = false ;

 //if we have an assigned_to value add a comment about who it
 was //create a new variable fixedByMsg that we can access from
 the message
fixedByMsg  = "" ; if ( !current. assigned_to. nil ( ) )
fixedByMsg  = " Thank you " + current. assigned_to.
 getDisplayValue ( ) ;

 //make the message appear to come from the assignment group if
 we have one if ( !current. assignment_group. nil ( ) )
profileSource  = current. assignment_group. getRefRecord
 ( ) ; //need GlideRecord object
```

Example problem resolved message



Related topics

Live Feed table notifications

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Opportunity won (non-task)

This example demonstrates a table notification on a non-task table. It generates an automatic message on Live Feed whenever a sales opportunity is won, if you have activated the Sales Force Automation plugin.

Create a business rule on the Opportunity [sales_opportunity] table that matches the **Live Feed events** business rule on the task table.

Create a table notification with the following values:

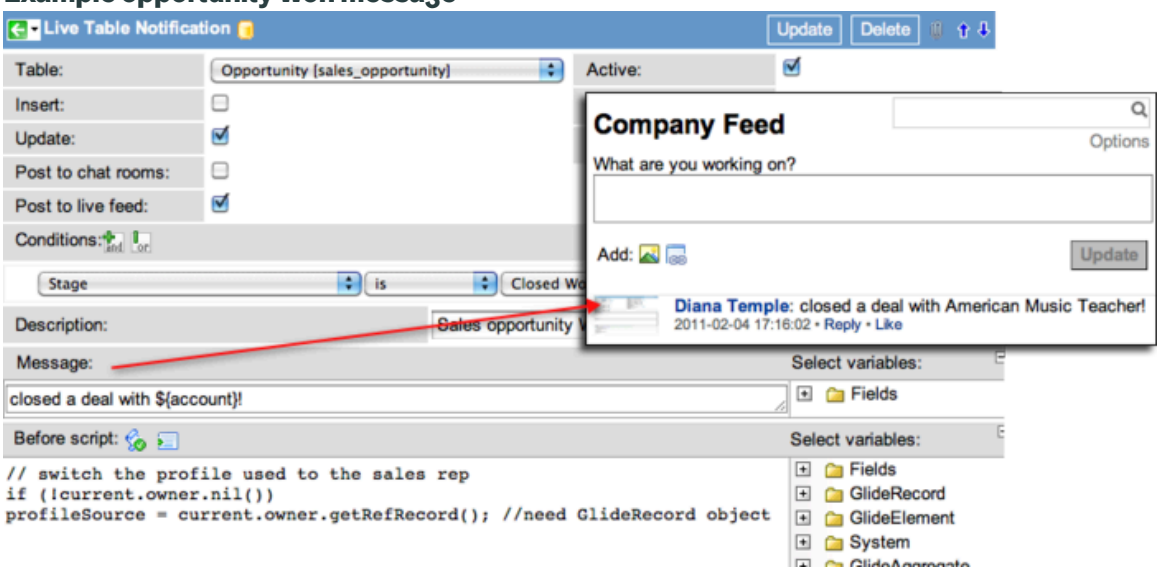
- **Table**: Opportunity [sales_opportunity]
- **Active**: Select the check box.
- **Update**: Select the check box.
- **Post to Live Feed**: Select the check box.
- **Conditions**: [State] [is] [Closed Won]
- **Description**: `Opportunity won`
- **Message**:

```
${owner} closed a sale with ${account}!
```

- **Before script**:

```
//make the message appear to come from the assigned salesperson
 if there is one if ( !current. owner. nil ( ) )
profileSource  = current. owner. getRefRecord ( ) ; //need
 GlideRecord object
```

Example opportunity won message



Related topics

Live Feed table notifications

Related feeds table notification

This example demonstrates table notifications to be sent out to related feeds.

For this example, whenever the status of a story changes to **Complete**, a table notification message is sent to the related sprint, release, or epic. Messages are posted only if the related feed already exists; this notification does not create a new feed.

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- **Table**: Story [rm_story]
- **Active**: Select the check box.
- **Update**: Select the check box.
- **Post to Live Feed**: Select the check box.
- **Record feeds**: Move **Sprint**, **Release**, and **Epic** to the **Selected** column.
- **Conditions**: [State] [changes to] [Complete]
- **Description**: `Story is done; message to Epic, Release, and Sprint`
- **Message**:

```
${URI} status changed to ${state}
```

Live Feed security and table access

By default, administrators and users with the live_feed_admin role can configure live feed security and view all Live Feed tables.

You can also modify the following Live Feed tables:

- Live Table Notification [live_table_notification]: Set up automatic messages that are generated when specific records are updated throughout the system.
- Live Feed Message [live_message]: Modify only if necessary, such as to delete an inappropriate message or restore a message that a user accidentally deleted. This table is typically managed by system functionality.

Extending or modifying data in any Live Feed chat table is not recommended.

Limit Live Feed access by role

All active users in the instance have access to Live Feed by default.

Before you begin

Role required: live_feed_admin and admin

Procedure

1. Complete the following steps to define the roles that allow users to see the Live Feed module.
   a. Perform the appropriate action for your version of the UI:
      - Core UI: Navigate to **System Definition** > **Application Menus**, and then select **Live Feed**.
      - UI15: Right-click the icon beside the Live Feed module and select **Edit Module**.
   b. Enter the roles that have access in the **Roles** field.
   c. Click **Update**.
2. Complete the following steps to define the roles that allow users to see live feed from a mobile device.
   a. Navigate to **System Definition** > **Applications (Mobile)**.
   b. Click **Live Feed**.
   c. Enter the roles that have access in the **Roles** field.
   d. Click **Update**.

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3. Use the following settings in the Access Control form to create access control rules to limit who can view the live_feed pages.
   - **Type**: ui page
   - **Operation**: read
   - **Name**: create one access control rule record for each of the following pages
     - live_feed
     - live_feed_small
     - $live_feed
     - $live_feed_small
   - **Requires role**: in this related list, add roles to define who can access the Live Feed pages. Users who do not have these roles cannot access Live Feed.

Manage Live Feed message content

Users can remove their own messages from feeds. If necessary, administrators can remove inappropriate messages that are posted by any user.

Before you begin

Role required: live_feed_admin and admin

About this task

For security reasons, any HTML code is automatically stripped out of a message before it is posted. This measure ensures that users cannot modify any page settings by posting a message.

Procedure

1. Navigate to **Live Feed** > **Feed Administration** > **Messages**.
2. Open the message to be removed.
3. In the **State** field, select **deleted**.
   You may need to configure the form to add this field.
4. Click **Update**.

Live Feed team security

You can restrict who can create teams by modifying an access control rule.

Modify the following access control rule:

- **Table**: Live Group Profile [live_group_profile]
- **Operation**: create

Restrict hashtag renaming

You can restrict who can rename hashtags.

You restrict hashtag rename by modifying the following access control rule:

- **Table**: Live Tag [live_tag]
- **Operation**: write

Provide access to Live Feed from CMS pages

You can provide access to Live Feed from pages built in the Content Management System (CMS). For example, allow an end user to access your company feed via the ESS portal.

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Before you begin
Role required: content_admin or admin

About this task
The ESS Portal template includes the **Portal - Live page** and **Live Feed** dynamic blocks. To provide access to Live Feed from CMS pages, add the Live Feed dynamic block to a CMS page or include **Portal - Live page** in a site.

Procedure
1. Navigate to **Content Management** > **iFrames**.
2. Click **New**.
3. Enter the iFrame block details.

iFrame block fields

Field	Description
Name	Enter a unique name such as **Live Frame**.
Frame Name	Enter a frame name, such as **live_frame**.
URL	https://INSTANCE/live_feed.do?sysparm_doctype=true where INSTANCE is your instance URL (example, [instance name] .service-now.com)
Application	Displays scoping information.
Sizing	Select **Fixed Size** and enter height and width pixel dimensions according to the page where you plan to display the feed (for example, width of 1024 and height of 768).

4. Click **Submit**.
5. Add the block to a page.

Related topics
Administering Live Feed

Content Management System

Using Live Feed
Live Feed provides many methods you can use to share content with others in your organization.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

Depending on your role, there are several different types of feeds you can access, teams you can join and share information with, and hashtags you can use for categorizing messages.

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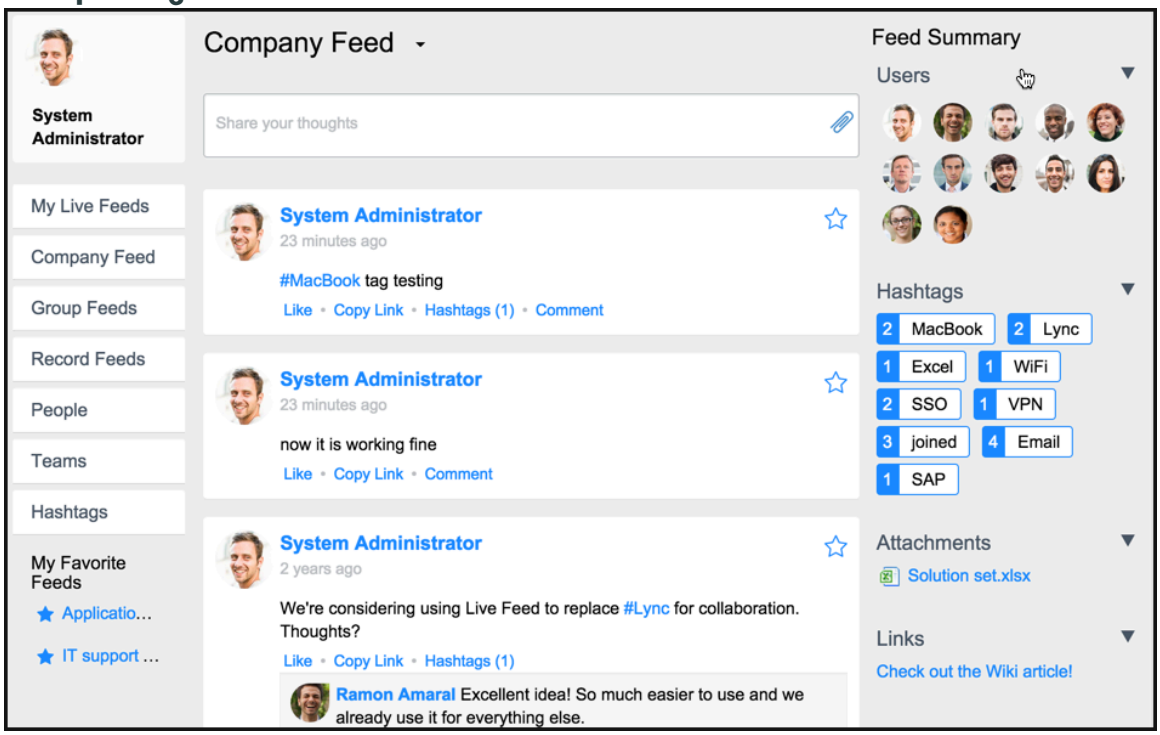
Example image



Note:
Live Feed v2 is active for all new instances by default. If you are upgrading from an earlier version of ServiceNow, you need to activate Live Feed v2 to use these features.

Use hashtags in Live Feed

Hashtags are words marked with a hash symbol (#) in messages. Hashtags are a way to categorize messages by keyword or topic for improved search results.

For example, to identify messages associated with VPN questions, add the hashtag #VPN in the message text.

Note:
Many of these features are part of Live Feed v2. If you are using Live Feed v1, or have not activated Live Feed v2, see Legacy Live Feed.

Tag messages

To tag a keyword or topic in a message, enter a # symbol before the word. A link to the hashtag is added beneath the message and all feed users can search and filter by the hashtag to find the message.

Follow these tips for using hashtags effectively:

- Limit the number of hashtags per message (no more than 3 is a good guideline).
- Use hashtags only in messages that are relevant to the tagged topic.
- Write a message first, and then add hashtags only if they add value. Answer the question, "What are you working on?", rather than "What hashtags apply to what you are working on?"
- Use camel case to create a hashtag that is more than one word long. For camel case, remove the space and use an uppercase letter to start each word. For example, to create a topic about the service desk, use #ServiceDesk.

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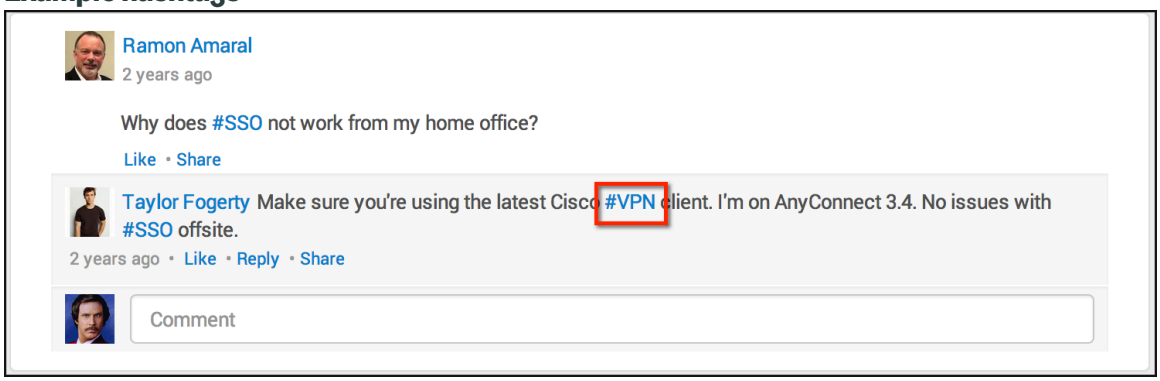
Example hashtags



View an available hashtag

View a hashtag from any feed.

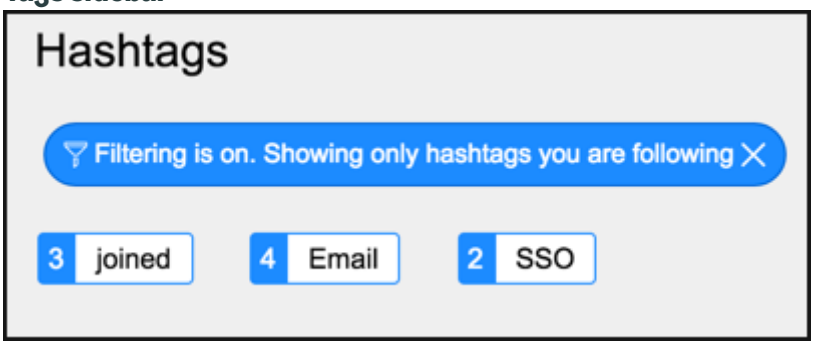
Before you begin

Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Hashtags** in the sidebar.
   Any hashtags already defined are displayed. Up to 36 hashtags can be displayed, and options are available for searching and sorting the hashtags. When searching, you do not need to include the hash symbol (#).

Tags sidebar



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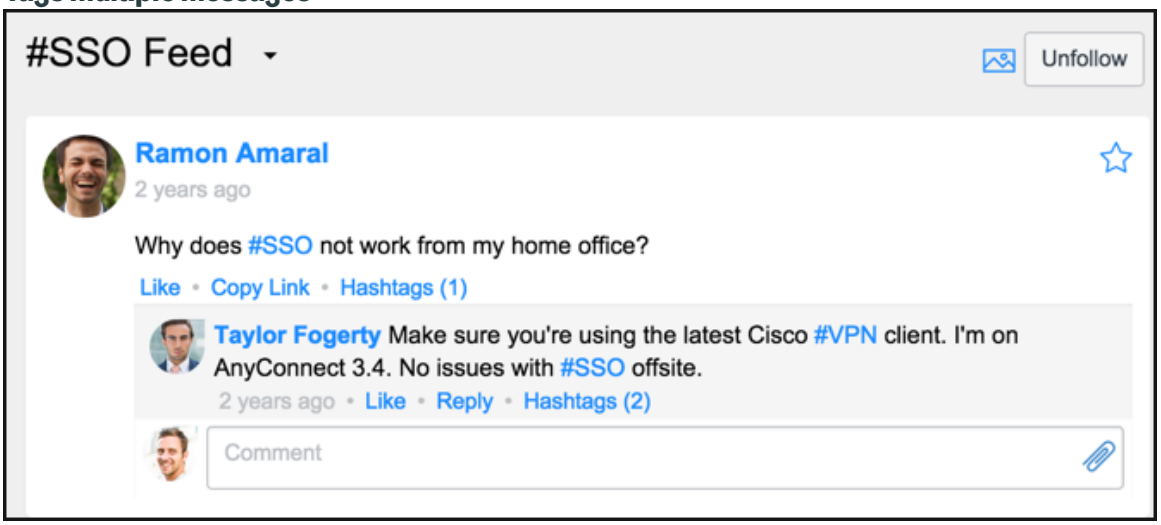
3. Click a hashtag to view all messages containing that hashtag.

Tags multiple messages



Change a hashtag name and merge a hashtag

Over time, users may create many hashtags with similar names, such as competitive, competitor, and competition. To combine hashtags for better searching and filtering, change the names of similar hashtags to a standard name.

Before you begin

Role required: admin

About this task

Administrators can restrict who can rename hashtags.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Hashtags** in the sidebar to reveal the currently defined hashtags.
3. Turn off the filter to show all hashtags.
4. Point to the hashtag you want to change.

   If you have the rights to edit hashtags, an edit tag ( ) appears.
5. Click the edit tag icon.

Edit tag



6. Enter a new hashtag name.
7. Press **Enter**.

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- If the new name is different than the other hashtags, the new hashtag name replaces the old hashtag name on the list and in the text of any messages that include the hashtag.
- If the name is the same as one of the existing hashtags, the hashtags will be merged. For example, if you have two hashtags called **Competitive** and **Competitors**, and you change the name of **Competitors** to **Competitive**, all of the messages previously tagged **Competitors** are changed to **Competitive** and the **Competitors** hashtag is removed.

Note:
If a hashtag is removed from the message, renaming that hashtag does not change the message text.

Add an image to a hashtag

You can add an image at the domain level of already defined hashtags if you have the admin role.

Before you begin
Role required: admin

Procedure

1. Click **Hashtags** in the sidebar.
2. Select the appropriate hashtag.

   Tag with image icon

3. Do one of the following:
   - Locate the image in your file system, and then drag-and-drop the image onto the add an image icon ( ).
   - Click the add an image icon ( ), select the image file, and click **Open**.
4. To change the image, simply drag-and-drop a new image onto the old one, or click on the existing one and select a new image.

   When you view a message that contains a hashtag with an image, that image appears in the hashtag heading bar.

   Message with tag icon

   

Follow and unfollow a hashtag

You can view all postings assigned a specific hashtag by following the hashtag. You can also unfollow the hashtag if you no longer want to view those postings.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Hashtags** in the sidebar.
3. Select the hashtag you want to follow.
4. Click **Follow**.

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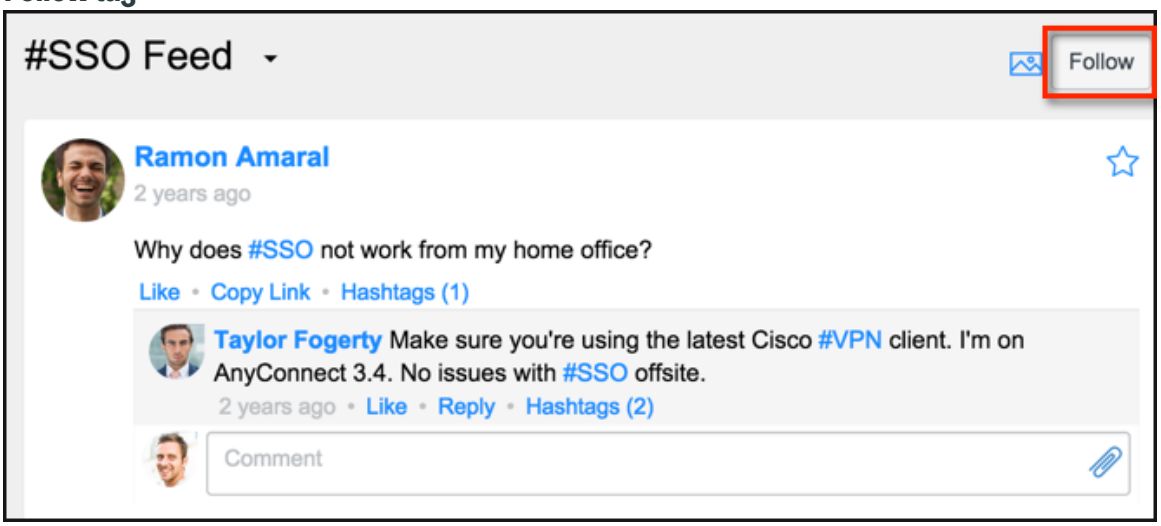
Follow tag



A confirmation message appears.

5. Click **X** to dismiss the message.
   To unfollow a hashtag, repeat the same steps and click **Unfollow**.

Remove a hashtag from a posted message

As a participant in a conversation, you can remove hashtags from messages that have already been posted.

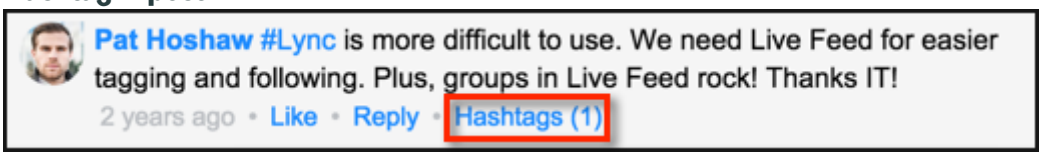
Before you begin

Role required: admin

Procedure

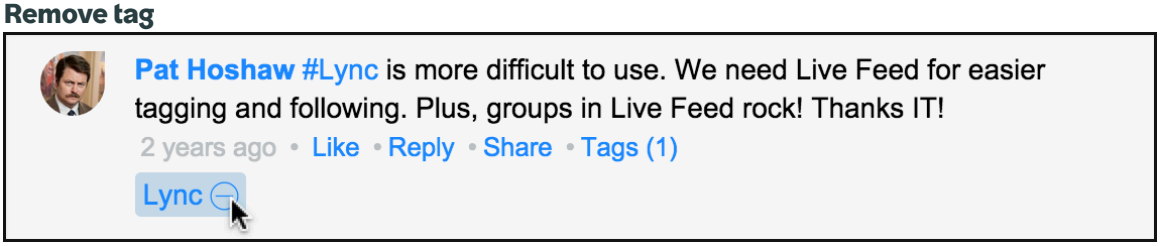
1. Navigate to the posted message.
2. Click **Hashtags** in the message posting.

Hashtag in post



The hashtags associated with the message are displayed, along with the removal icon.

Remove tag



3. Click the removal icon.

Use teams in Live Feed

Users can be combined into teams for the purpose of subscribing to specifically-focused feeds.

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Teams can be created based on any criteria that makes sense for your organization. For example, you can create a team called IT Developers and subscribe the team to feeds such as Coding Standards, AngularJS Development, and ServiceNow Customization Best Practices. When a new developer is added to the IT Developers team, that user automatically has rights to participate in all of the feeds followed by the team.

Automatic team creation

If you create a record on a table that has Live Feed enabled, such as the Incident table, and click Follow/Show Live Feed for the record, a record feed is created for the record.

The record feed name is based on the table name.

Reply to email notifications using email

After receiving an email about a posted message or a reply, you can post your reply to Live Feed by responding to the email.

The body of the email reply is posted as a response to the Live Feed message. Any attachments that you include in your reply email are also posted in the Live Feed reply.

Create a Live Feed team

When you create a team, you become the team administrator.

Before you begin
Role required: admin

About this task
As team administrator, you can do the following:

- Modify team properties
- Accept or reject membership requests
- Remove members from the team
- Delete the team

Procedure

1. Navigate to **Live Feed** > **Teams**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. Click **Create Team**.

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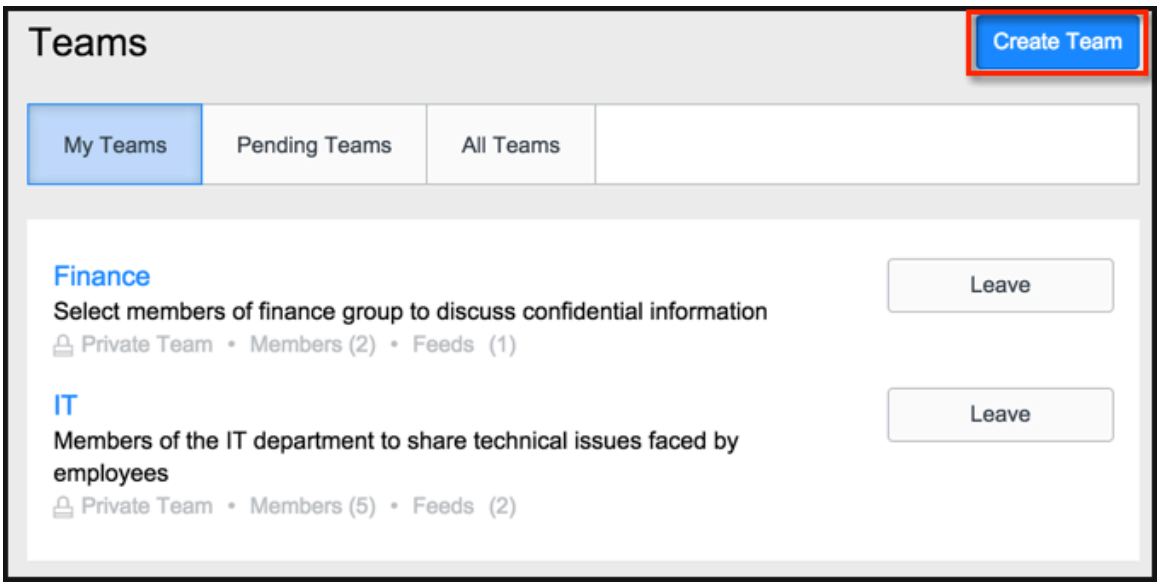
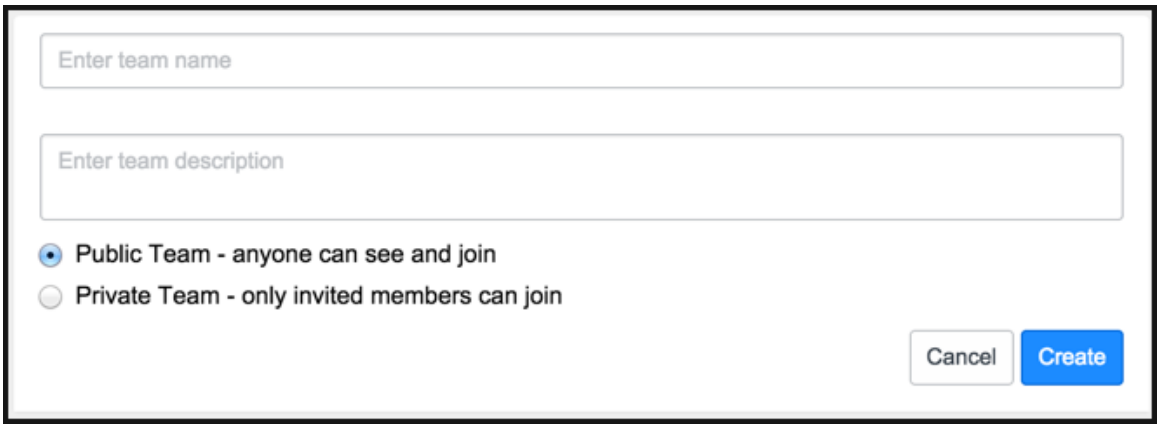
Teams tab



4. Enter a **Name** to appear at the top of the feed and in messages posted to the team.

Create Team form



This name links to the team feed.

5. Enter a **Description** to appear at the top of the feed and under the team name in the list of all teams.
6. Select the access level for the team:
   - **Public Team**: In the list of all teams, any user can see the name of this team. Any user can also see the feed and join the team. Messages in a public team appear in the Company Feed with a link to the team feed.
   - **Private Team**: In the list of all teams, any user can see the name of this team, but not the feed. Messages in private teams do not appear on the Company Feed.

     When **Private Team** is selected, the **Show this team for anyone to find and request to join** check box is displayed. Select this check box to allow any user to search for this team and request to join it. Clear the check box to allow only invited users to see the feed and join the team.
7. Click **Create**.
   The team is created with you as the team administrator.

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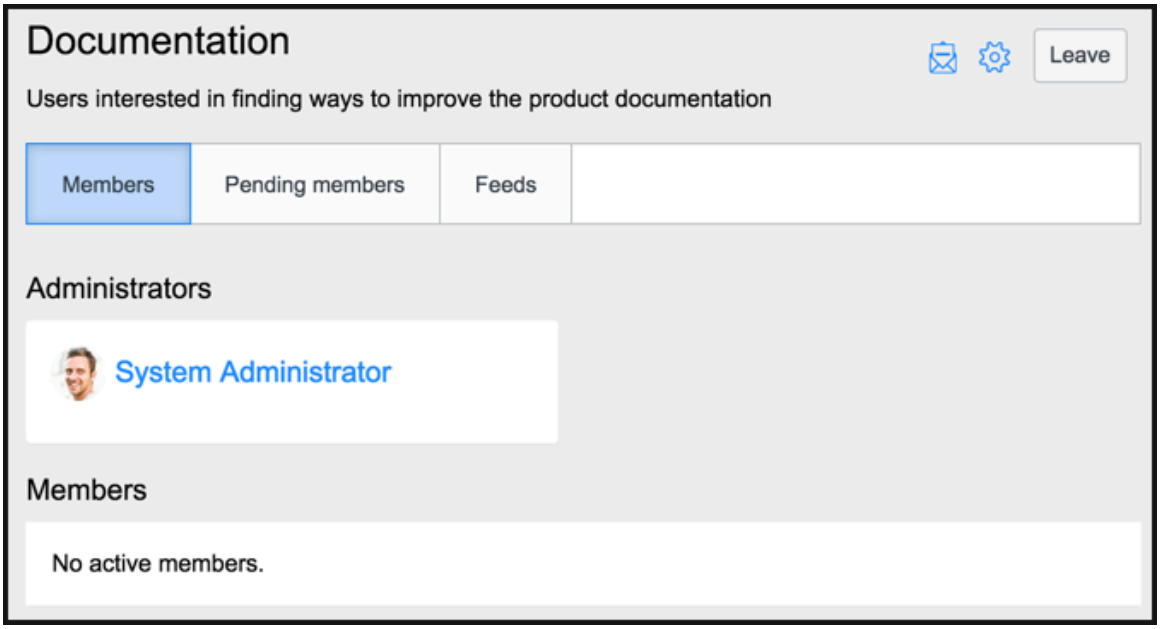

Note:
A team administrator can create one or more group feeds specifically for the members of this team by clicking the **Group Feeds** tab and **Create Group Feed**. Additionally, the team can be invited to join a feed. Having multiple feeds for the team facilitates focused discussions on topics of interest to the team and allows the team to selectively invite other teams and members to collaborate on specific feeds.

Join a team

You can join a public team, accept an invitation, or request access to a team.

Before you begin

Role required: admin

About this task

As a team member, you can:

- View messages posted to the team (team feed). Non-members can also view the feed for a public team.
- View a list of team members.
- Invite another team to join the team.
- Subscribe to team email notifications.
- Leave the team.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Teams** and click **All Teams**.
   - If you received an invitation, click **Accept**. You can **Decline** the invitation if you do not want to join the team.
   - If the team is public, click **Join**.
   - If the team is private, click **Request**. The team administrator receives an email notification and must accept your request before you can join the team.

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View a team feed

View a team feed to see messages belonging to that team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
   - To view a team you belong to, select the team name.
   - To view a public team you do not belong to, select **All Teams** and then click the team name.

     You must be a member to view the feed for a private team.

View a team member

View a list of members belonging to a Live Feed team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
   You must be a member of the team to view the members.
4. Click **Members**.
   The list of team members appears, organized by team administrators and team members.

Invite a new member

You can invite another user to join a team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
4. Click the **Pending members** tab.
5. In the **Add User** field, enter the name of the user you want to invite.

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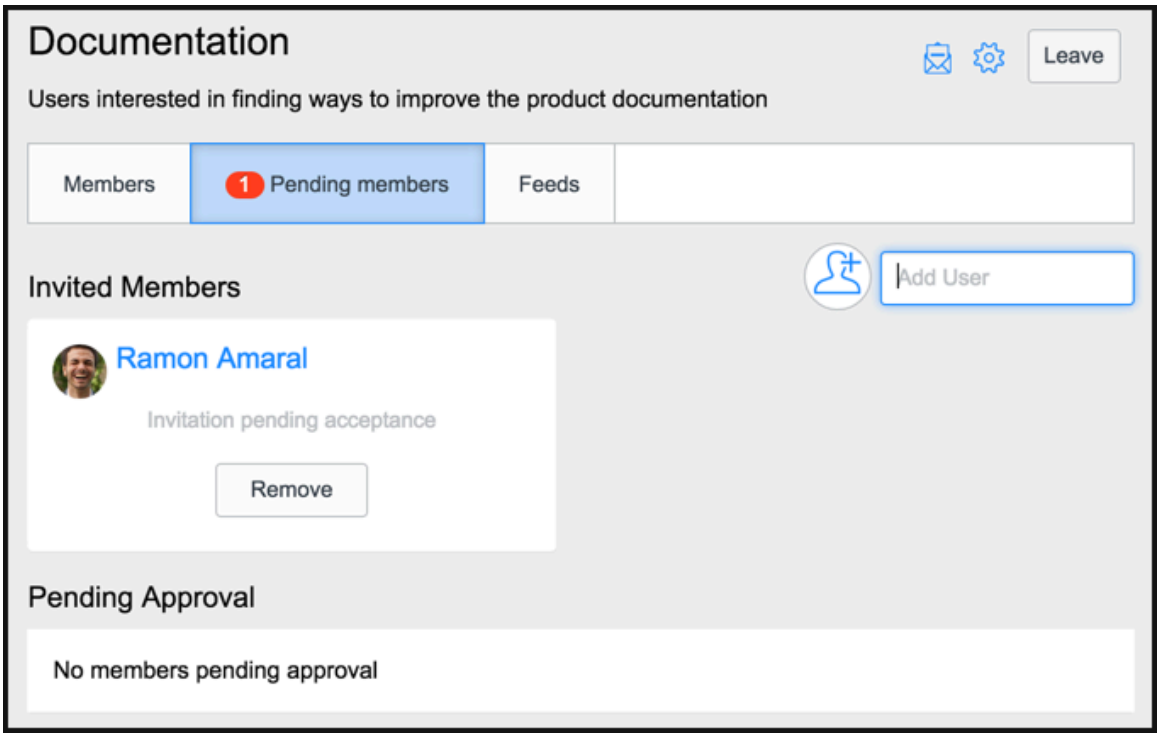
The invited member's picture appears.



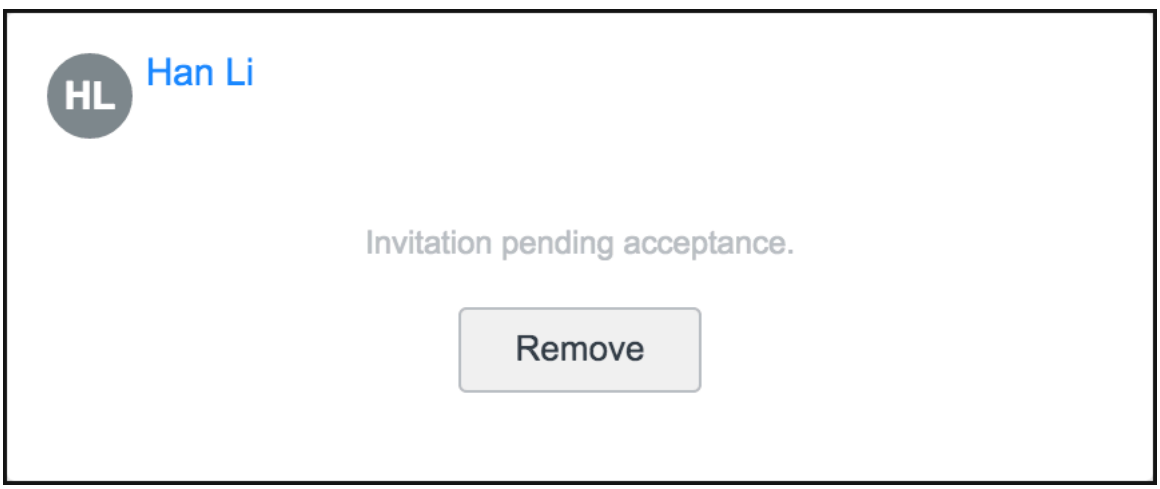
Remove a member

If you are team administrator, you can remove any member from the team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
4. Click the **Members** tab.



5. Click **Remove** below the member name.

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6. Click **Remove** again in the confirmation box that opens.

Note:
You can remove members regardless of their current state. That is, you can remove members who have already joined the team or whose membership is pending.

Subscribe to team and email notification

Users can subscribe and unsubscribe to receive email notifications generated by feeds the team participates in.

Before you begin
Role required: none

About this task
Email notifications are generated whenever actions such as posting messages, replies, likes, polls, and @mentions are performed.

All notifications related to a top-level message, such as replies, mentions, and likes, are sent out with the same subject. The subject line defaults to **Live Feed** followed by the beginning of the subject line from the top-level message. For example, if the subject of the feed is **IT Support**, the email notification's subject will be **Live Feed IT Support**.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Teams** and select the team name.
3. Click the subscribe icon ( ).
   You can click the unsubscribe icon ( ) to stop receiving email notifications.

Subscribe a team to feed notification

A team administrator can subscribe a team to specific feeds so the members of the team receive email notifications.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Teams** and select the team name.
   You can use the advanced search to locate team of which you are the administrator.
3. Click **Feeds**.
4. Click the subscribe icon ( ) beside the feed name.
   You can click the unsubscribe icon ( ) to stop receiving email notifications.

Leave a team

You can give up membership to a team by leaving that team.

Before you begin
Role required: none

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Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. Click **Leave** beside the team name.

Modify a team

If you are team administrator, you can modify an existing team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
4. Click the edit icon ().
5. Modify the team properties as needed.
6. Click **Save**.

Manage a membership request

When a user requests membership to a private team, the team administrator receives an email.

Before you begin
Role required: admin

About this task
If you are the team administrator, you can manage membership requests.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Teams** and select the team name.
   If one or more users have been invited to the team, the **Pending members** tab shows the number of invitations sent.

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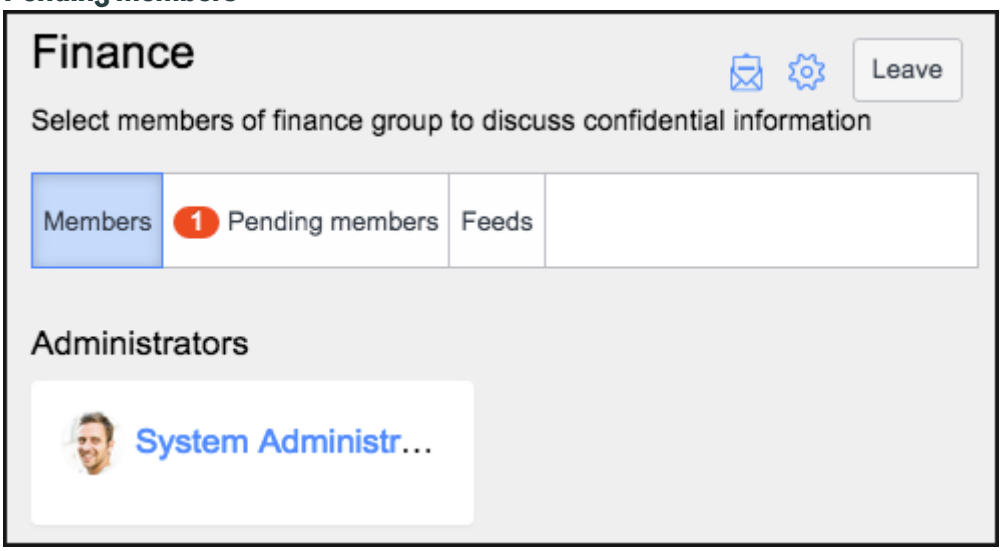
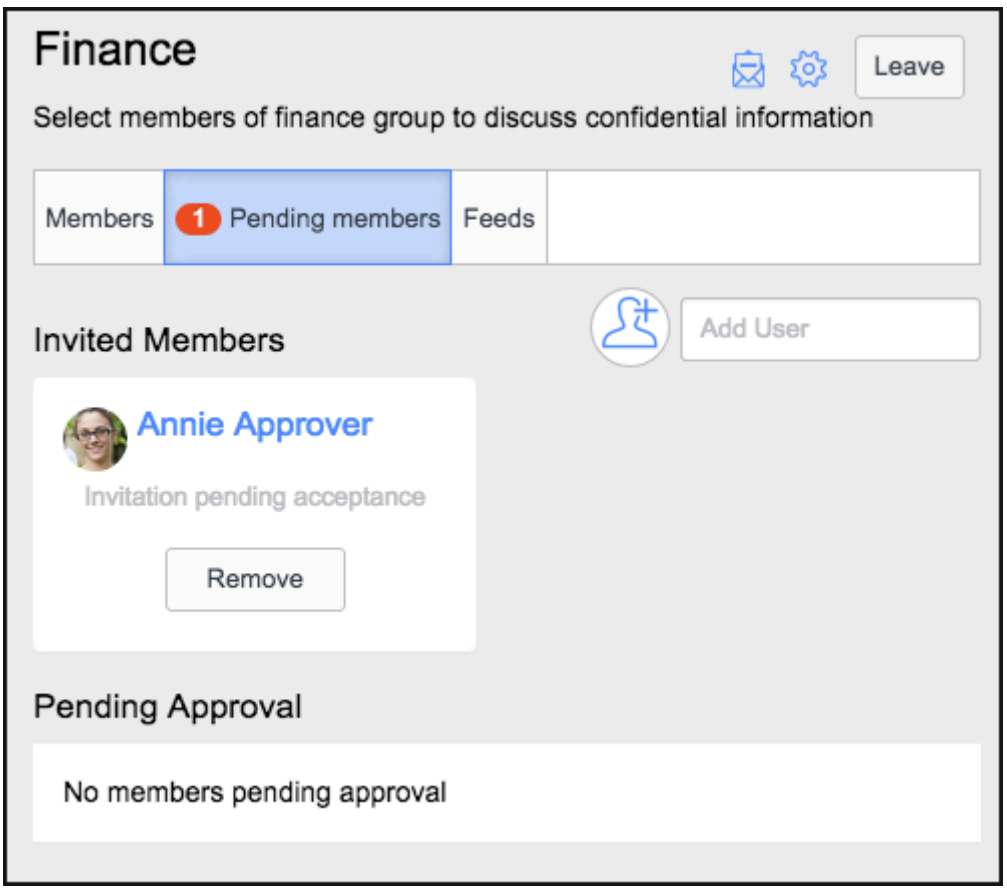
Pending members



3. Click **Pending members**.

   This shows the users who have received invitations, but who have not yet accepted.

Invited members



4. You can cancel a user's invitation by clicking **Remove**.
5. You can invite another user to the team by entering their name in the **Add user** field and clicking the Invite member ( ) button.

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Delete a team

If you are the team administrator, you can delete a team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
4. Click the edit icon ().
5. Click **Delete**.
6. Click **Yes** to confirm deletion.
   The team is deleted from Live Feed. Messages posted to a private team are deleted; messages posted to a public team remain on the company feed without a team link.

   If you delete a team that is associated with an active record, such as an incident that has not yet been closed, the team becomes active again when any user modifies that record or follows the record on Live Feed. The first user who modifies the record becomes the team administrator. The previous messages that existed as part of the record feed are not deleted.

Use Live Feed to work on records

A record feed is associated with a record, such as an incident or change.

Record feeds help users collaborate on records by providing a place for anyone who can access the record to share messages and post attachments specific to that record.

With record feeds, users can:

- Follow record feeds and post messages in Live Feed. These messages can also be automatically maintained in the comments or work notes journal fields on records.
- View Live Feed from records.
- Work on multiple records from **My Feed**.
- Access Live Feed team functions, such as sending invitations and subscribing to email notifications.

Any users with access to the record can also use the record feed. By default, record feeds are available on the incident, change, and problem tables. Administrators can configure record feeds for additional tables.

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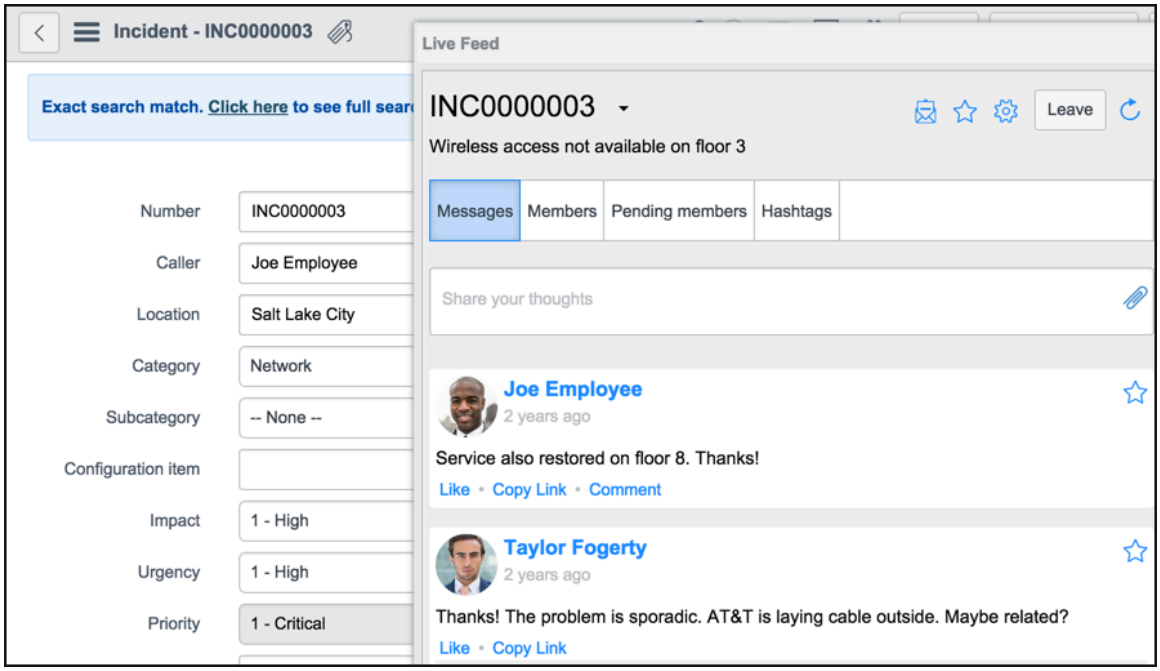
Live Feed Document



How Document Feeds Work

The Live Feed application creates a document group for each document feed. The document group:

- Automatically approves membership for every user who can access the record.
- Uses the record number as the group name.
- Uses the record short description as a group description.
- Maintains all messages posted on the record in Live Feed (if the record has a journal field for comments). When the group is created, existing messages are added to the document feed.
- Lists the group when users select **View all groups** on their Live Feed interface, unless the record associated with the document feed has been closed. When the state of the record is closed, the Live Feed group becomes inactive and unlisted.
- Automatically adds users to the document group when they view the record.

Document Group Creation

When a user follows or shows a record on Live Feed, a Live Feed group is automatically created and associated to the record (if one does not already exist). The user becomes a member of the group and can use Live Feed to work on the record. If the user can access work notes on the record, the user also becomes a group administrator.

A Live Feed group is also automatically created when a user creates a record on a table that uses document feeds, such as the Incident table. The user who creates the record becomes the administrator of the group, and any other user who modifies the same record automatically joins the group.

Add Live Feed to a homepage

Add Live Feed to a homepage so it is the first thing you see when you log in.

Before you begin
Role required: admin

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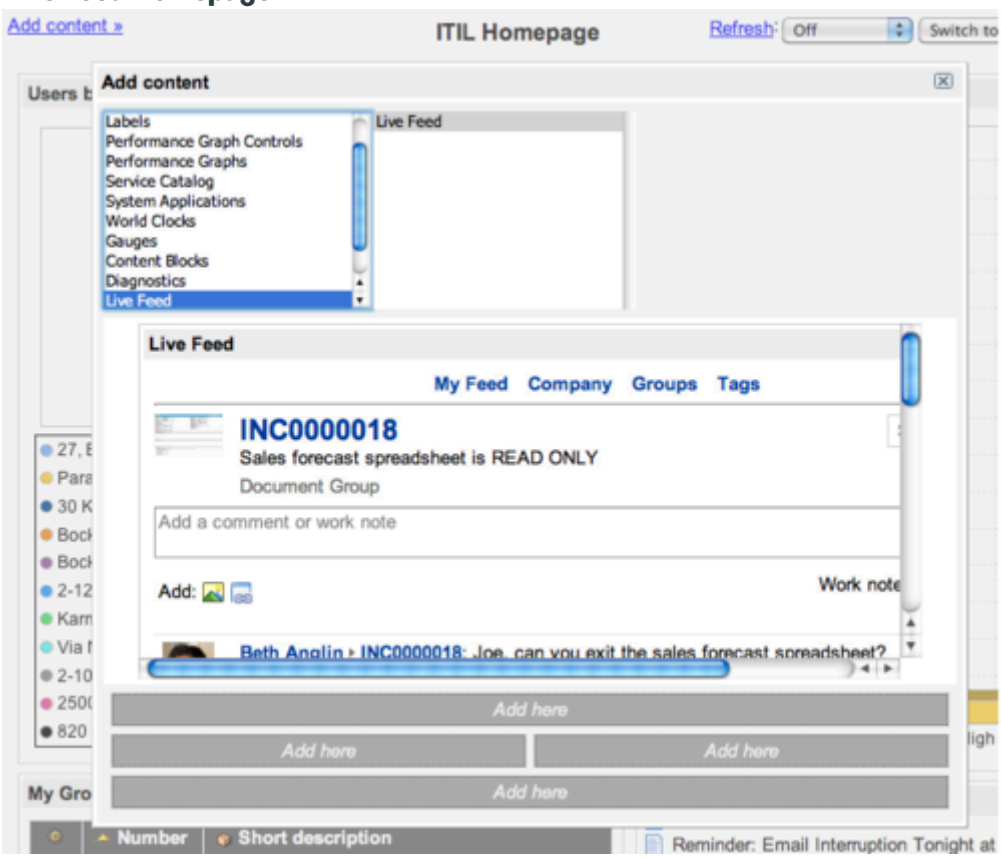
Procedure

1. Click **Add** content at the top of the homepage.
2. Select **Live Feed** in the left panel.
3. On the bottom of the window, click **Add here** in the appropriate layout position, then close the window.

> **Note:**
> Administrators can add Live Feed to a global homepage to make it available for all homepage users by default. By default, users with any role can add Live Feed to their homepage. Administrators can restrict this ability.

Live Feed Homepage



Modifying and deleting document feeds

The user who creates a record feed becomes the group administrator, which allows the user to modify the following record feed properties.

- **Name**: Default value is the record number.
- **Description**: Default value is the record short description.
- **Picture**: Default value is a thumbnail image of the record.

Feed administrators can also delete the feed. When deleted, the feed is removed from Live Feed but messages remain in the journal field of the associated record.

Viewing Live Feed from records

Interact with the record feed in any form that has Live Feed enabled.

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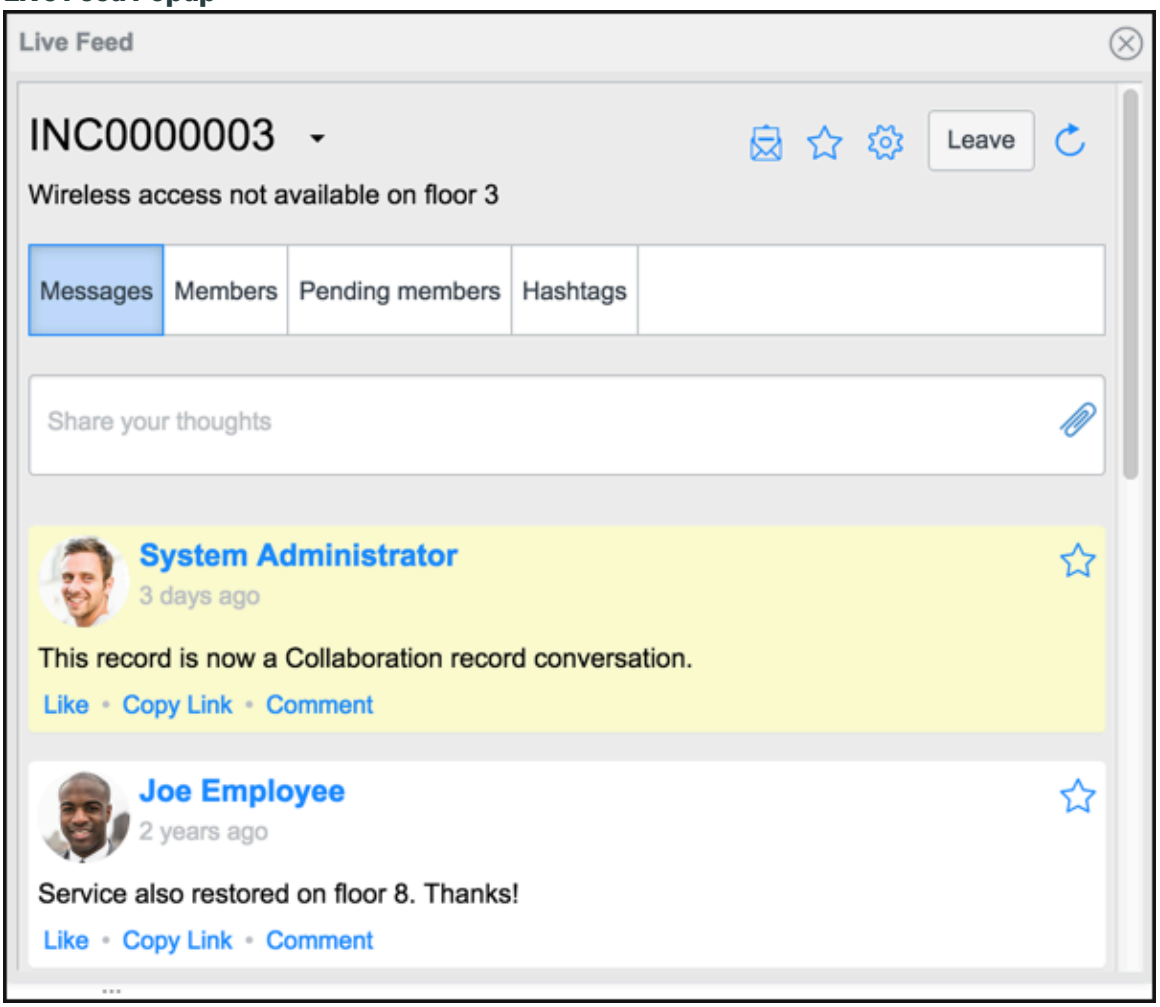
The record feed appears in a pop-up window. The record feed also appears on the record form's activity formatter if the administrator enables the record feed system property (`glide.ui.show_live_feed_activity`).

To access a record feed from the form, do one of the following:

- Click the **Show Live Feed** button in the form header. This displays the Live Feed pop-up.
- Right-click the form header and select **Show Live Feed**. This also displays the Live Feed pop-up.
- Scroll down to the activity formatter area on the form. Click one of the following tabs:
  - **Live Feed**: click to show a text box to type in the feed.
  - **Activity**: click to show the activity summary. The activity filter determines the content in the activity summary.

Live Feed Popup



If the activity formatter or the **Live Feed** and **Activity** tabs are not visible, administrators can do the following:

- Configure the form layout and add **Activities (filtered)** to the form. This adds the activity formatter.
- Personalize the form layout and add **Activities (filtered)** to the form. This adds the activity formatter.

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- Go to **System Definition** > **Tables**, access the table associated with the record, and verify that the live_feed dictionary attribute is set to true on the form. This adds Live Feed to the activity formatter.
- Go to **Live Feed** > **Feed Administration** > **Properties** and enable the following property:**Toggle the display of the Live Feed tab in the activity formatter**

Working with record feeds

When a user follows a record, the user becomes a member of a private group for the record.

Team members can do the following:

- View the record feed from Live Feed.
- View a list of group members (other users who are following the record).
- Invite another user to join the group. Only users who have access to the record have access to the record feed.
- Subscribe to email notifications.
- Leave the team to stop following the record.

Follow a record feed from a form

You can follow records that have a record feed associated with them from within the record form.

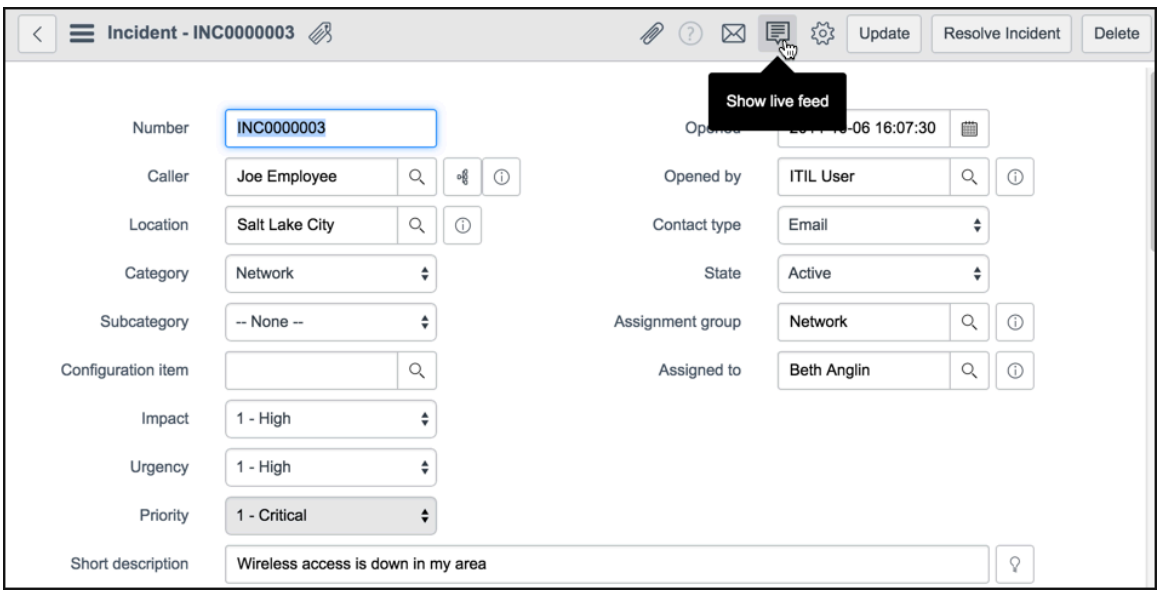
Before you begin

Role required: none

Procedure

1. Navigate to the record in a list or form.
2. Click the **Show on Live Feed** icon in the header.

Follow Task



Follow a record feed from a list

You can follow records that have a record feed associated with them when viewing a list of records. This method allows you to select multiple records to follow.

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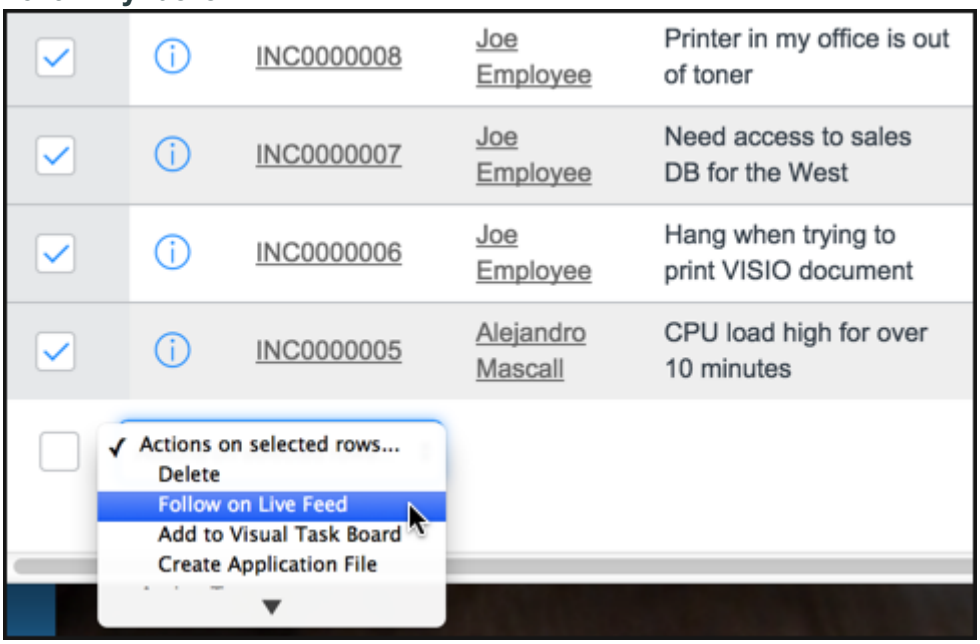
Before you begin
Role required: none

Procedure
1. Navigate to a list of records (for example, **Assigned to me**).
2. Select the **Action** check box beside each record to follow.
3. In the **Actions** choice list, select **Follow on Live Feed**.

Follow My Tasks



Post a message to a record feed

Use Live Feed to post a message to a record feed.

Before you begin
Role required: none

Procedure
1. Open the record feed in one of the following ways:
   - From your homepage (must already be following the record)
   - As a team in Live Feed (must already be following the record)
   - From My Live Feed (must already be following the record)
   - From the **Live Feed** pop-up window
   - From the **Live Feed** tab on the activity formatter
   - Click the **Show Live Feed** button ( ) in the form header.
2. Compose the message and add images and links.
3. In the To list, select the record where you want to post the message.

Note:
Applies to Live Feed only.

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4. **Optional:** Select the **Work Notes** check box to post the message as a work note.
   Only users with access to work notes on the record can post and see work notes. This option is only available for records that have a journal field.
5. Click **Post**.

> **Note:**
> If the record has journal fields for comments or work notes, your message is automatically added to the appropriate field on the record. If the record has a standard text field for comments on the activity formatter, each live post overwrites the field value. Comments added through Live Feed start with #LiveFeed on the activity formatter.

Use feeds in Live Feed

Feeds allow users to create focused discussions in Live Feed.

Live feed includes different types of feeds. The user who creates a group or record feed becomes the feed administrator. This user configures the access level for the feed:

- **Public**: any user can see the name on the list of all feeds, view the feed, and join it. Messages appear on the company feed with a link to the public feed.
- **Private**: any user can see the name on the list of all feeds, but only invited members can view the feed and join. Messages do not appear on the company feed.

> **Note:**
> The concept of groups changed in Live Feed v2.

Create a group feed

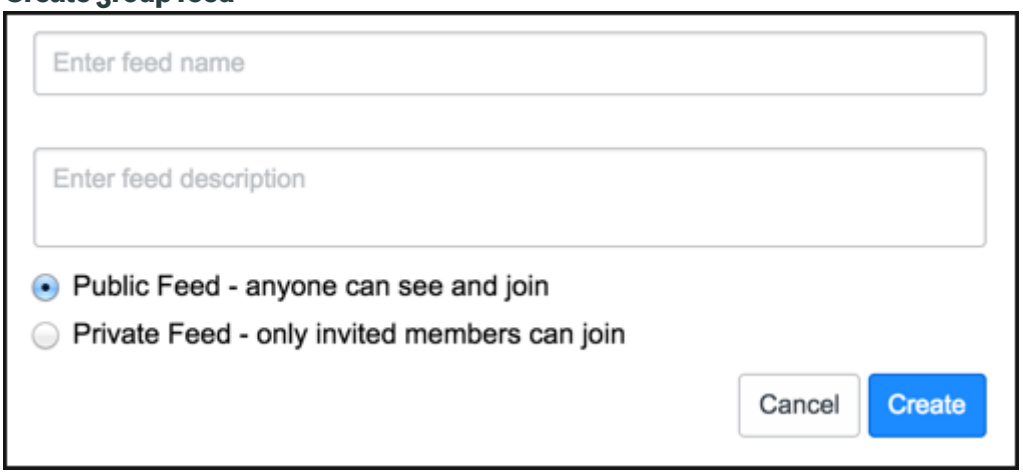
Group feeds are created by users so that members with similar interests can find that information in one place. Individual users or teams can join group feeds.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Group Feeds** and click **All Feeds**.
3. Click **Create Group Feed**.

Create group feed



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4. Enter the feed name and description.
   These will appear in the list of group feeds.
5. Indicate how members can join the feed:
   - **Public Feed**: Select this to allow anyone to view and join the group feed.
   - **Private Feed**: Select this to restrict membership to only members invited by the administrator.

     When **Private Feed** is selected, the **Show this feed for anyone to find and request to join** check box is displayed. If it is selected, any user can search for this group feed and join it. If the check box is not selected, only users who are invited can see the feed and join the group feed.
6. Click **Create**.

Create record feeds

When a user views a record on a table that has Live Feed enabled, such as the **Incident** `[incident]` table, the user can click the **Show Live Feed** button at the top of the form to automatically create a record feed.

When a user who has write access to a record's **work_notes** journal field clicks the **Show Live Feed** button, that user becomes the record feed administrator. If, for example, a customer calls technical support to report an incident and the customer clicks **Show Live Feed** on a record, a record feed is created, but the customer is not the record feed administrator. When a support representative later opens the incident and participates in the record feed, the user becomes the feed administrator.

Record feeds are, by default, private unlisted. That is, only invited members can see the name of the record feed in the list of feeds, and join it. Record feed administrators, however, have the ability to change the access level at any time. This can be helpful if, for example, a user is working on a sales opportunity and wants customers to be able to participate in a record feed without granting them access to the records.

Control how Live Feed is enabled for records

A property called *`glide.ui.show_live-feed_activity`* controls whether Live Feed is automatically enabled for all records.

This glide record is disabled by default. If the property is enabled, a record feed is automatically created whenever a record is viewed, and you become a member of that feed.

A second property, *`glide.live-feed.auto_join_document_group`*, enables automatic membership to a record feed whenever the associated document is visited and the user clicks **Show Live Feed**.

View the activity stream in record feeds

When you view record feeds, Live Feed displays the activity stream for the document.

For example, for an incident feed, the screen displays recent activity for the incident. The activity stream is updated whenever anything is changed in the associated record.

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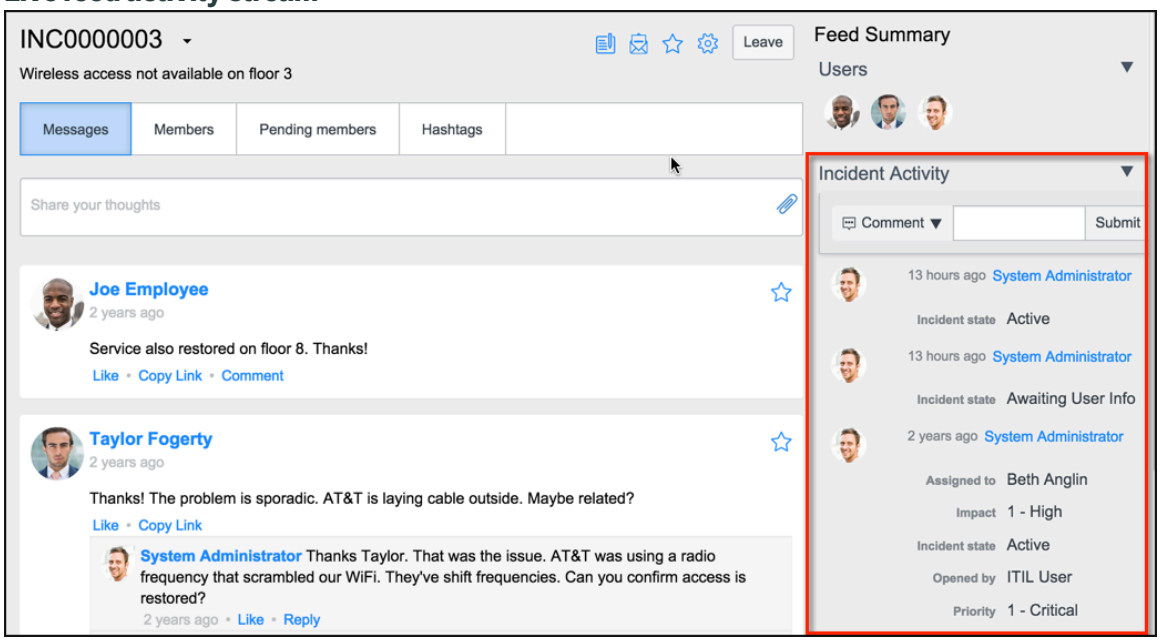
Live feed activity stream



Note:
The information in the activity stream is subject to the same ACL rules as those for viewing the underlying document.

Participate in a feed

When you join a feed, you become a feed member.

Before you begin

Role required: none

About this task

Feed members can do the following:

- View messages posted to the feed. Non-members can also view the messages for a public feed.
- View a list of feed members.
- Invite another user to join the feed.
- Subscribe to feed email notifications.
- Leave the feed.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then click **All Feeds**.

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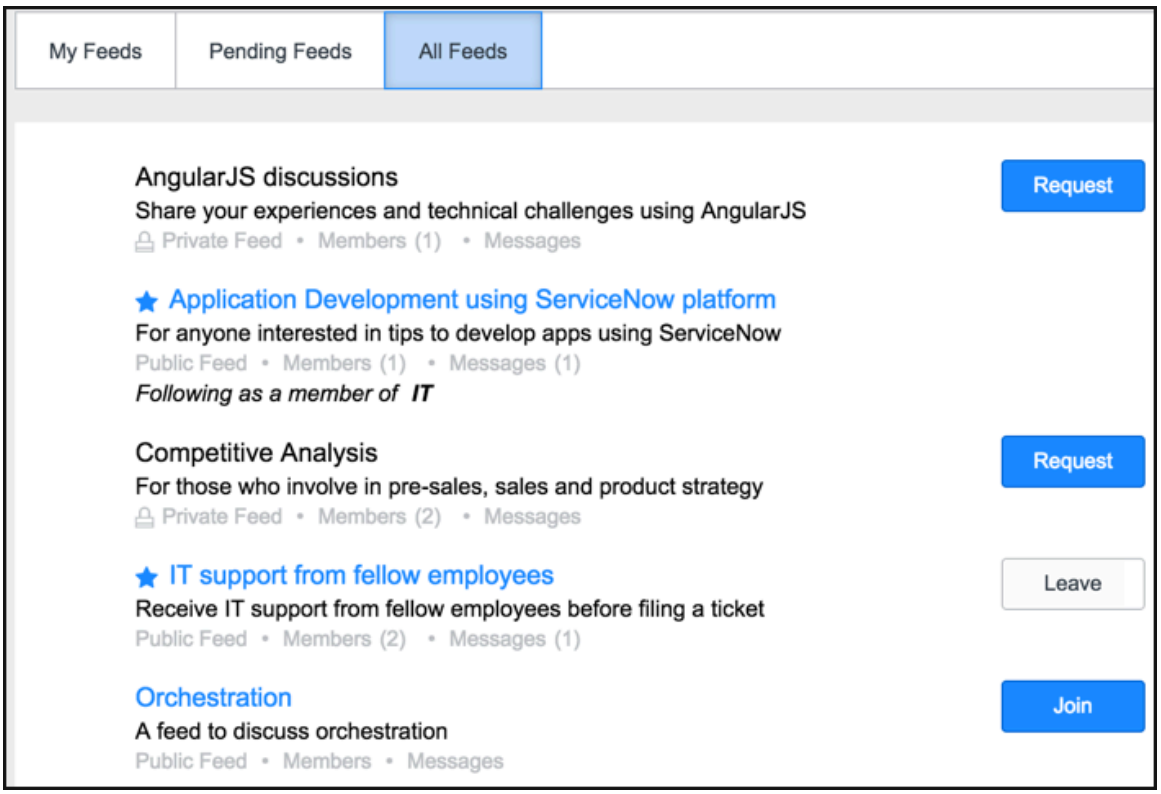
All feeds



- If you received an invitation, click **Accept**. You can **Decline** the invitation if you do not want to join the feed.
- If the feed is public, click **Join**.
- If the feed is private, click **Request**. The feed administrator receives an email notification and must accept your request before you can join the feed.

Mark a feed as a favorite

Top-level messages in feeds can be marked as favorites on a per user basis only.

Before you begin

Role required: none

About this task

You can also search for messages marked as favorites, and remove the favorite designation as needed.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then click **All Feeds**.
3. In the list of feeds, click the star icon ( ) adjacent to the feed name you want to mark as a favorite.

   To unfavorite a message, click the star icon ( ) of a message that is already a favorite.

View a feed

You have several options for viewing a feed.

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Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**.
   This displays a list of feeds you belong to and an option to view all feeds.
   - To view a feed you belong to, select the feed name.
   - To view a public feed you do not belong to, select **Show All** and then click the feed name. You must be a member to view the feed for a private feed.

Note:
If you navigate away from the Live Feed application and then back again, the system displays the feed you last visited if you are a member of it.

View a feed member

View a specific member of a group feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**.
   This displays a list of feeds you belong to and an option to view all feeds.
3. Click the feed name.
   The list of feed members appears, organized by feed administrators and members.

Invite a new member to a group feed

The feed administrator can invite another user or a group to join a feed.

Before you begin
Role required: none

About this task
When a team is added to a feed, all members of the team also indirectly become members of the feed. Only users, and not teams, can be the feed administrators. A team member who is following a feed can become administrator by directly inviting another user to the feed.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click the **Pending members** tab.
4. In the **Add user or team** field, begin entering a user or team name and select a user or team from the suggestion list.
   The invited user or team members receive an email notification.

Invite a new member to a record feed

The feed administrator can invite another user or a team to join a record feed.

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Before you begin
Role required: none

About this task
When a team is added, each of the individual members of the team become members of the feed. That is, if Team ABC is added to a feed, the feed does not show that Team ABC is a member. Instead, the feed shows each of the individual members of Team ABC as members of the feed.

When users are invited, their membership state is initially **Invited**. When they accept the invitation, the system checks their access to the **work_notes** journal field. If they have write access, they become administrator members; otherwise, they become active members.

Procedure
1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Record Feeds** and select the record feed name.
3. Click the **Pending members** tab.
4. In the **Add user or team** field, begin entering a user or team name and select a user or team from the suggestion list.

   If you invite a team, the individual members of the team are invited.

   The invited users receive an email notification.

Remove a member from a feed

The feed administrator can remove any member from the feed.

Before you begin
Role required: none

Procedure
1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click the **Members** tab.
4. Locate the member you want to remove and click **Remove**.

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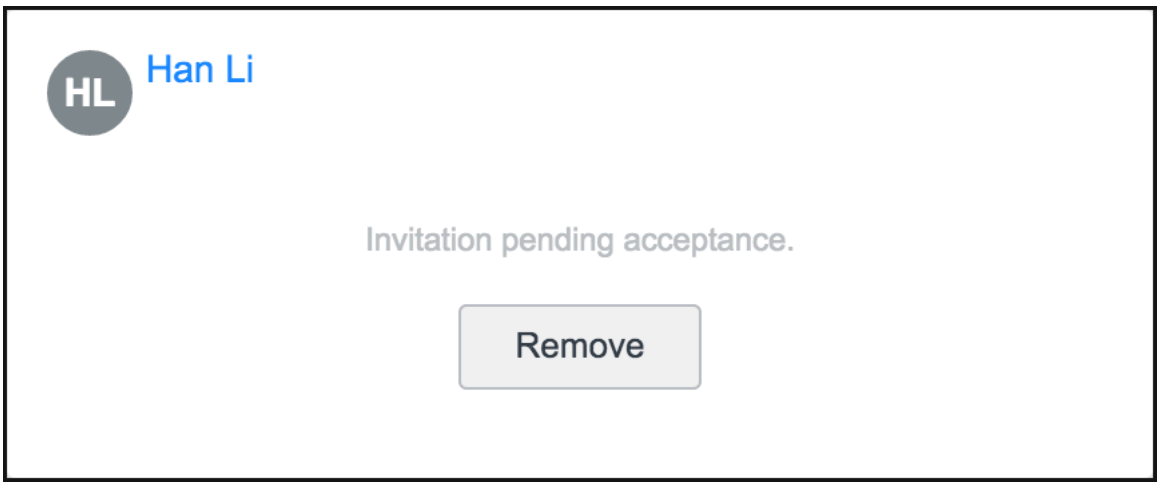
Remove member



Note:
You can remove members regardless of their current state. That is, you can remove members who have already joined the feed or whose membership is pending.

Subscribe to a feed

Direct members of a feed can subscribe and unsubscribe to the feed in order to receive email notifications whenever any activity in the feed occurs, such as new messages being posted, replies, likes, polls, and @mentions.

Before you begin
Role required: none

About this task
Individual indirect members—that is, members of a team that is participating in a feed—cannot subscribe or unsubscribe from a feed directly. If the team administrator subscribes the team to a feed, the individual members receive an email notification for activities in the feed such as new messages being posted, replies, likes, polls and @mentions.

All notifications related to a top-level message, such as replies, mentions, and likes, are sent out with the same subject. The subject line defaults to **Live Feed** followed by the beginning of the subject line from the top-level message. For example, if the subject of the feed is **IT Support**, the email notification's subject will be **Live Feed IT Support**.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click the subscribe icon ( ).

You can click the unsubscribe icon ( ) to stop receiving email notifications.

Note:
If a team is subscribed to receive email notifications for a feed, but a member of the team did not subscribe to the team, that member does not receive the email notifications.

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Navigate between Live Feed and other modules

If you are participating in a feed and navigate to another module, when you return to Live Feed it displays the feed you were previously viewing if it is public or if it is a private feed that you are a member of.

For example, assume you are viewing a public feed and then navigate to a particular incident record. Upon returning to Live Feed, the feed you were previously viewing opens. If you were last viewing a private feed that you are not a member of, returning to Live Feed opens the Company Feed.

Leave a feed

Members can choose to leave a group feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click **Leave**.

> **Note:**
> If you leave a feed associated with a record, such as an incident, you automatically rejoin that feed if you modify the associated record again.

Delete a feed

If you are a feed administrator, you can delete the feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click **Delete**.
4. Click **Yes** to confirm deletion.
   The feed is deleted from Live Feed. Messages posted to a private feed are deleted. Messages posted to a public feed remain on the Company Feed without a feed link.

Live Feed UI overview

The Live Feed user interface provides many methods you can use to share content with others in your organization.

> **Important:**
>
> Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

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Update your Live Feed profile

Your profile information includes a photo or image, and tabs for different types of information including messages, feeds, teams, followers, and those who are following you. You can update your profile information and picture at any time.

Before you begin

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

Role required: none

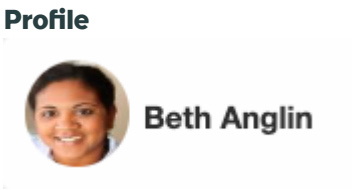
About this task

You can provide details about yourself, such as your role in your organization. You can also update your profile picture. However, only admins can delete a profile picture.

Note:
The functionality described here applies to HTML5-compliant browsers, such as Chrome, Firefox, Safari, and IE10 and above.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click your name or title displayed with your picture.



The profile record opens.

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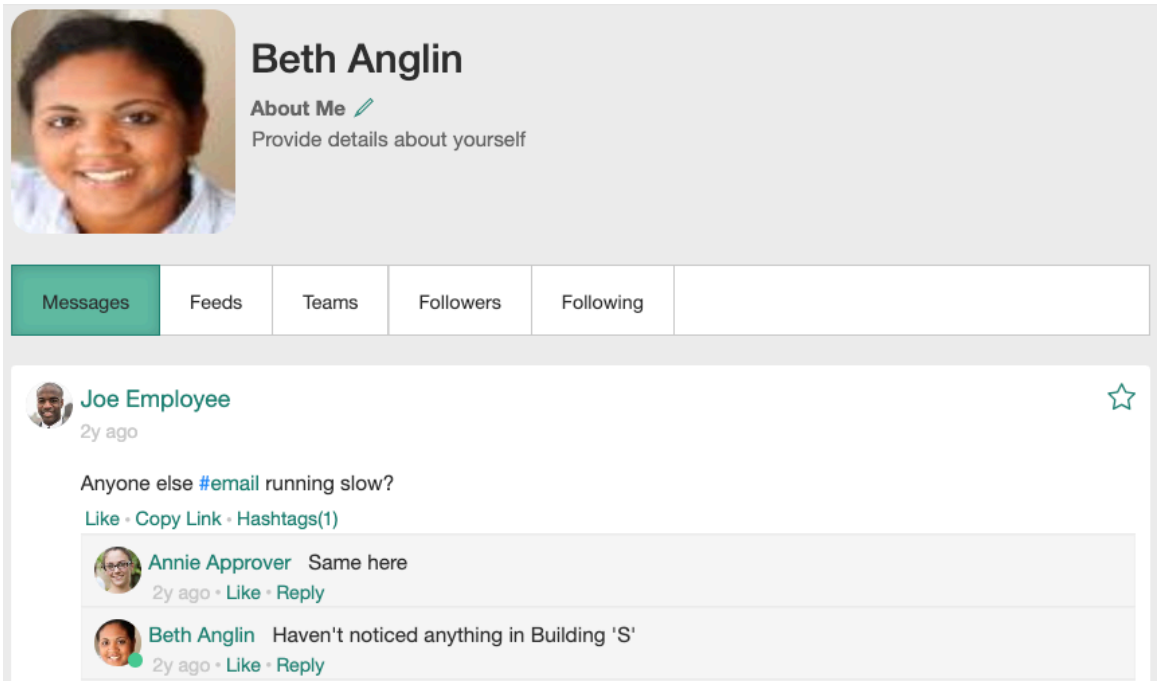
Profile record



3. Click the pencil icon next to **About Me** and type a short description about yourself that you want to share with others who view your profile.
   This is text that you might not necessarily want to change on a regular basis.
4. You can change your profile photo using either of the following two methods:
   - Hover over the existing picture (or tap the photo in the case of the smartphone or tablet interface) to display the **Upload a picture** link. Select the link, navigate to the location of the photo you want to use, and then select **Open**.
   - Locate the photo file you want to use on your computer, and then drag-and-drop it over the existing photo.

Upload a picture link



Note:
Your profile picture is used by the Connect and legacy chat features as well, if they are activated.

Work with Live Feed messages

This portion of the UI gives the user access to various types of messages and tools for grouping and categorizing messages. Also included are methods for identifying which user feeds you are following and which users are following you.

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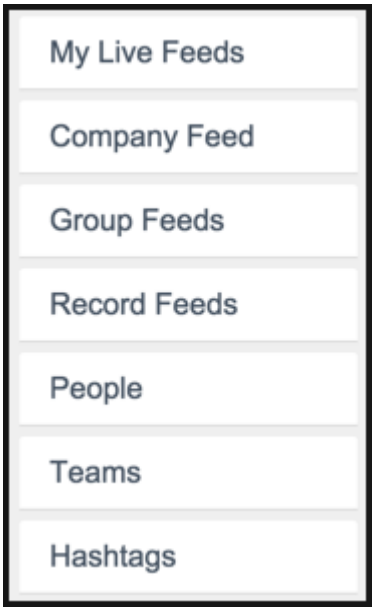
Tools for working with Live Feed messages

Menu section	Description
	• *My Live Feeds*: These are custom feeds that allow you to customize Live Feed to view the content that is most important to you. • *Company Feed*: This feed displays all posts, except those posted to private or unlisted groups. • *Group Feeds*: These feeds are created by users. Record Feeds: These feeds are associated with a record, such as an incident or change. • *Record feeds*: These feeds help users collaborate on records by providing a place for anyone who can access the record to share messages and post attachments specific to that record. • *People*: This option displays people who are following the current user and people the current user is following. • *Teams*: This option is used to combine users into groups for the purpose of subscribing to specifically-focused conversations. • *Hashtags*: Hashtags are words marked with a hash (#) symbol in messages. Hashtags are used to categorize messages by keyword or topic for improved search results messages filtered from all conversations that include specific hashtags.

View another Live Feed user

When a requester user, one that has no ServiceNow role, is viewing a feed and points to another user's picture, information for the user appears from the Business Card view of the User [sys_user] table.

Before you begin

Role required: none

About this task

Admins can change the amount of information that is displayed for users with different roles.

Procedure

1. Select a profile picture in your feed.

A user summary appears.

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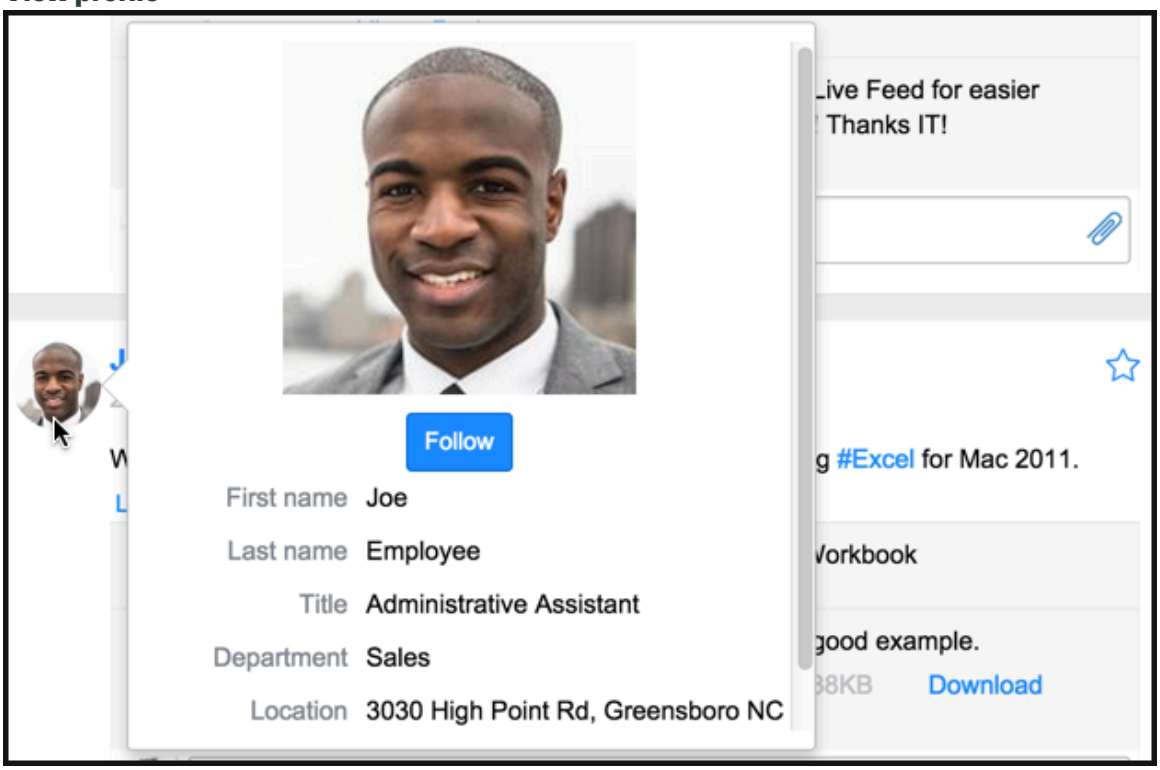
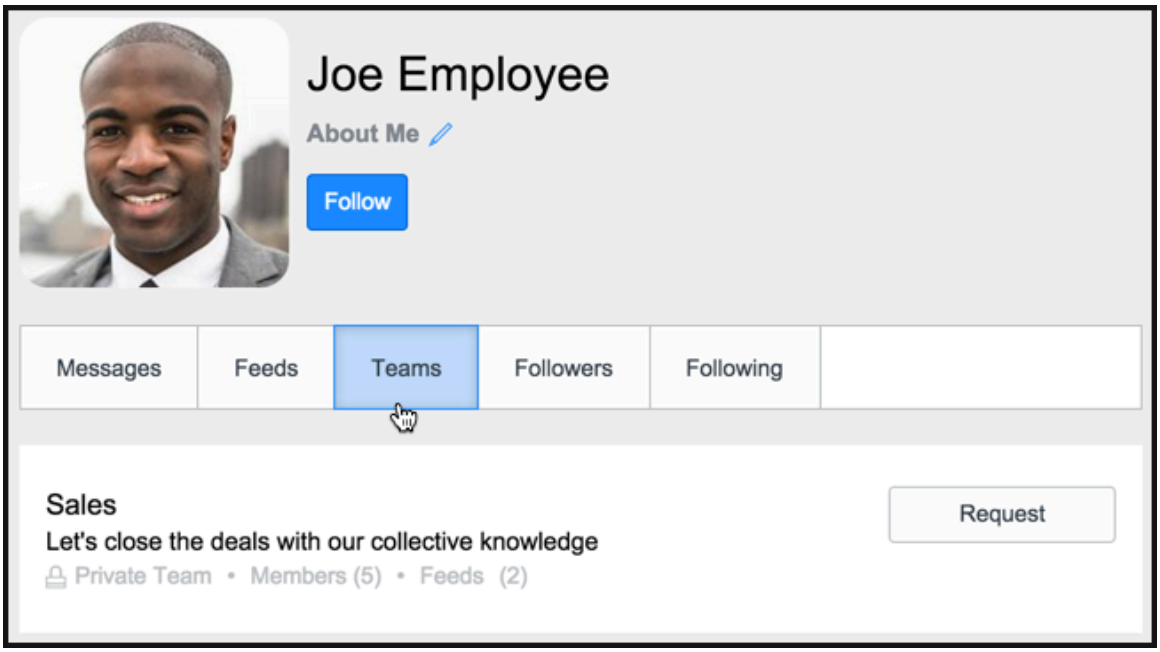
View profile



2. Select the profile picture to view the full profile.
   Use the tabs to view different types of information about the user.

Profile tabs



Follow other Live Feed users

As you use Live Feed, you can follow the message threads of other users.

Before you begin

Role required: none

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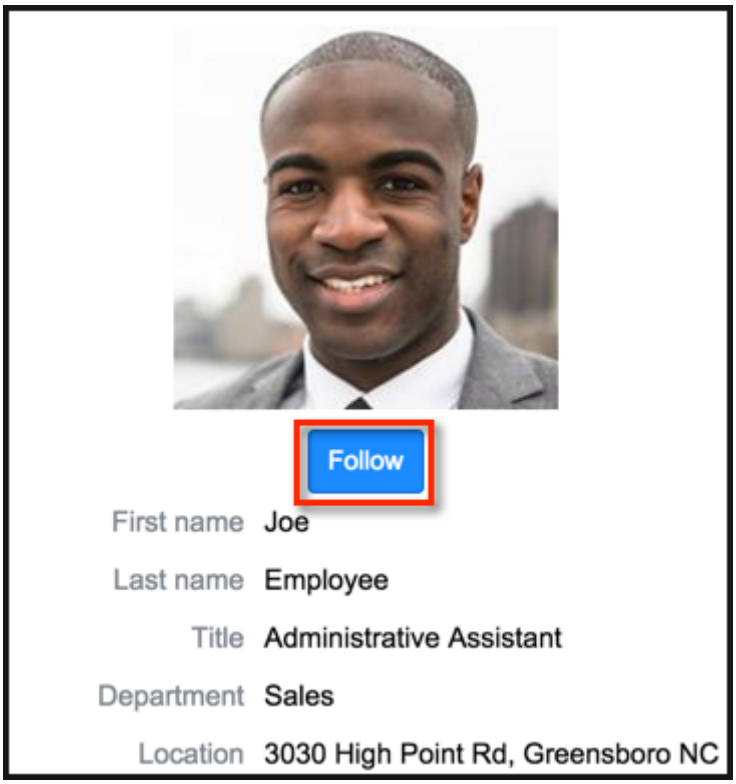
Procedure

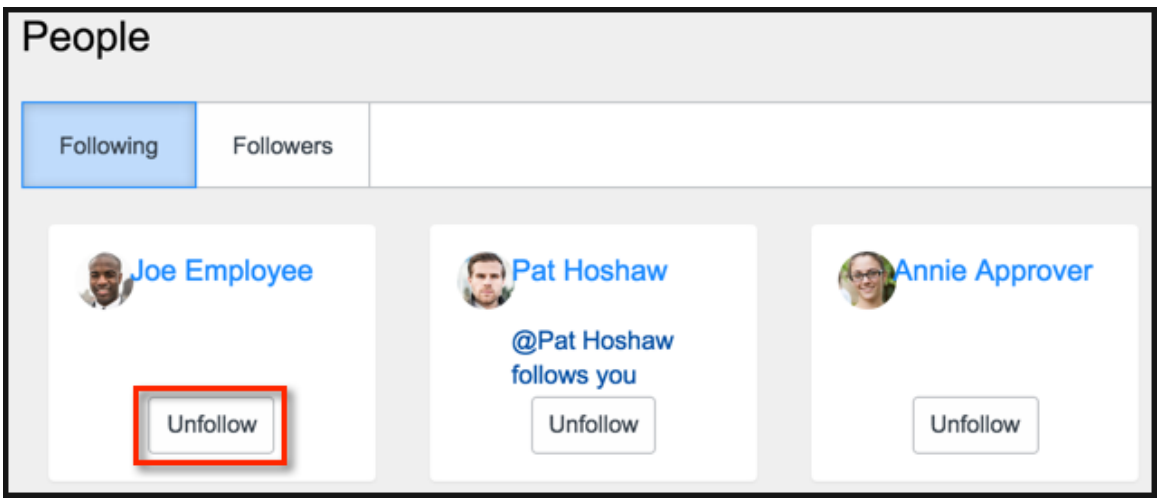
1. Navigate to a thread that the user you want to follow is engaged in.
2. Click that user's name or point to the user's picture.
   A **Follow** link appears in the user's profile.

Profile with Follow link



3. Click **Follow**.
4. To stop following the user, navigate to **People** > **Following**.

Unfollow



5. Click **Unfollow**.
6. To view people who are following you, navigate to **People** > **Followers**.

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Select feeds

A feed is a stream of related messages. You can use the feed selector to switch between feed types and to view specific group feeds and record feeds.

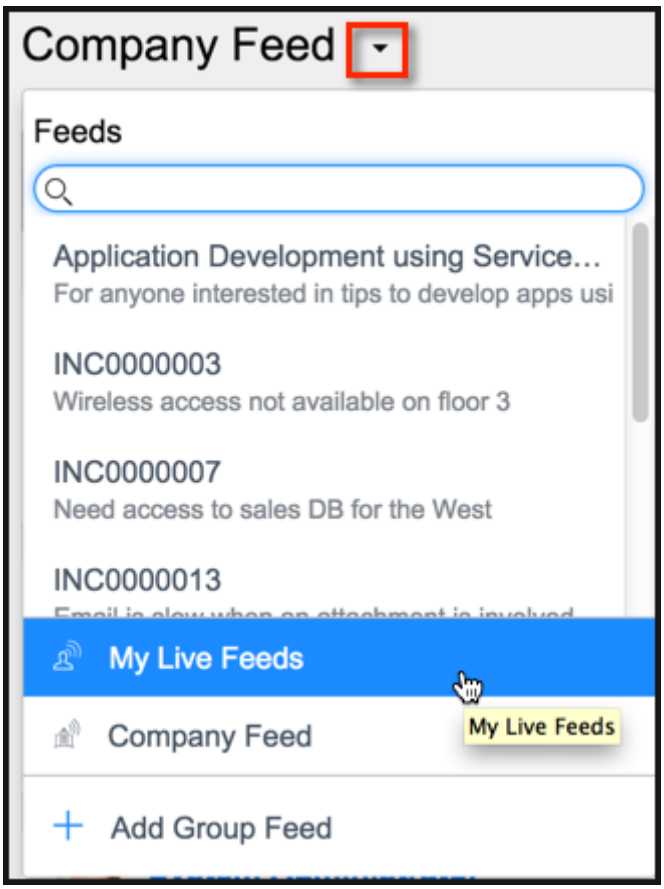
Before you begin

Role required: none

Procedure

1. Use the **Search** field to locate any type of feed.
   As you type in the **Search** field, the results are dynamically displayed. For example, if you type *INC*, records that are incidents are forced to the top of the results list.

Feed selector



2. You can also select the following types of feed information.

Feeds types

Feed	Description
My Live Feeds	Displays the following posts: ○ messages from users you follow ○ messages with hashtags you follow
Company Feed	Displays all posts, except those posted to private or unlisted groups.
Add Group Feed	Allows you to add a group feed.

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Follow feeds

You can view users who are following you or other users you are following.

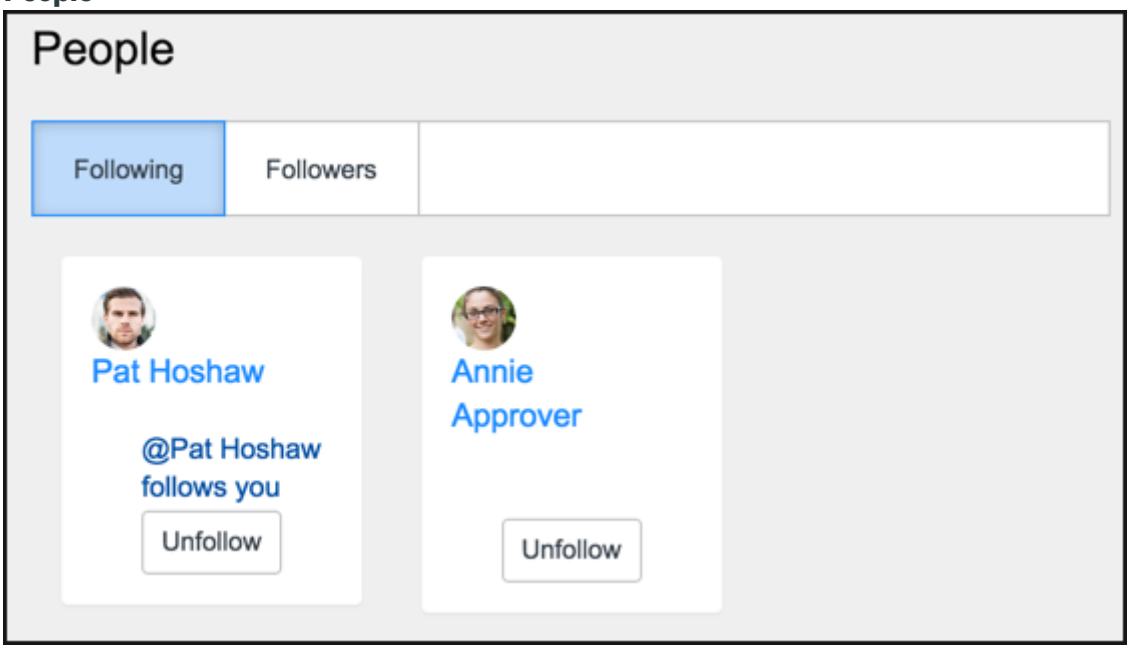
Before you begin
Role required: none

Procedure

1. Click **People** in the sidebar.

   The system shows 10 most recent followers or users you are following.

People



2. Click the Show More link if either list contains more than 10 users.

Note:
If you are following a particular user whose profile changes, that user moves to the front of the Following list. This alerts you to changes in the profile of a user you are following.

Bookmark feeds and hashtags

The Live Feed interface uses the standard bookmarking functionality for feeds and hashtags.

Before you begin
Role required: none

Procedure

Drag-and-drop group feeds and hashtags from the Feed Summary section to the Edge for quick access.

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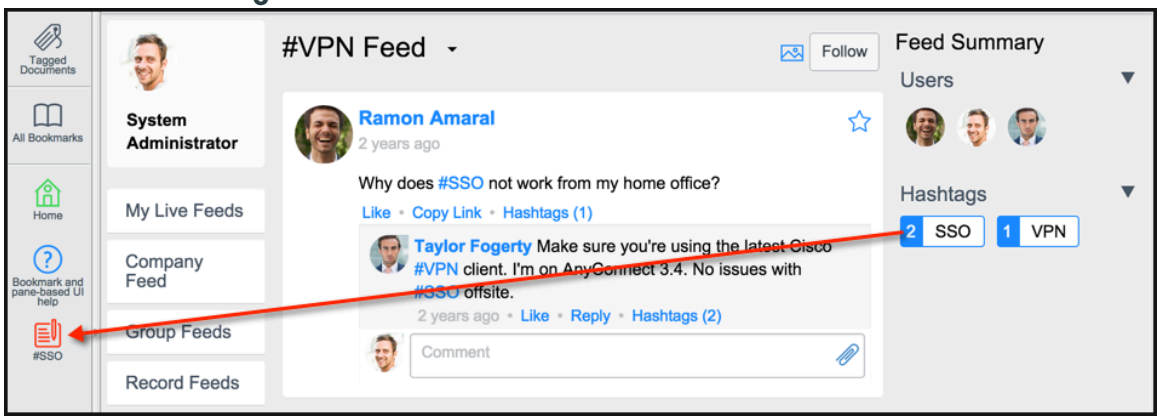
Bookmark a hashtag



Add Live Feed to your homepage

You can add Live Feed to your own homepage or to a global homepage.

Before you begin

Role required: none

Procedure

1. Navigate to a homepage.
2. Click the add content icon (+) in top left corner of the homepage.
3. Select Live Feed in the left panel.
4. On the bottom of the window, click **Add here** in the appropriate layout position, then close the window.

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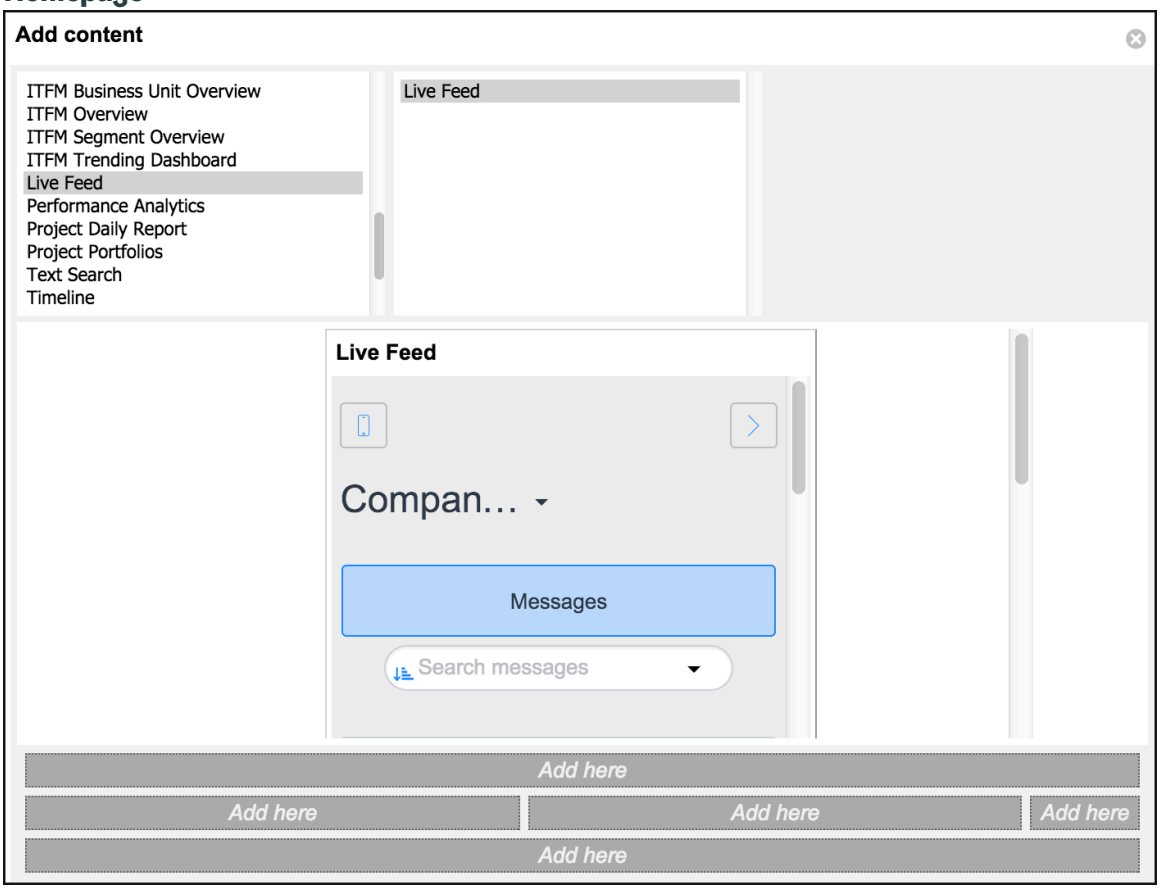
Homepage



Note:
Administrators can add Live Feed to a global homepage to make it available for all homepage users by default. Users with any role can add Live Feed to their homepage; however, administrators can restrict this ability.

Post content in Live Feed

In Live Feed, you can post new messages and replies to existing messages for all users in the feed. You can also send a reply message to a team or record.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

Attachments in feeds

In addition to entering text, you can attach files, such as images, documents, and spreadsheet files in any ServiceNow supported file type to Live Feed messages.

Administrators can manage attachment file settings, such as supported file types and maximum attachment file size, by editing system properties.

You can also include links to user-defined URLs and knowledge articles contained in your instance's knowledge base.

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Note:
The functionality described here applies to HTML5-compliant browsers, such as Chrome, Firefox, Safari, and Internet Explorer 10 and above. Significant differences while using different browsers are highlighted.

Post a Live Feed message

You can post a message to open a new feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click the feed to which you want to post your message, for example My Live Feed, Company Feed, and so on.
3. Enter a message in the **Share your thoughts** field.
   Use hashtags, if you want.
4. As needed, click  ,  , or  to add a poll, attachment, or screenshot image, respectively.
5. Click **Post**.

Reply to a Live Feed message

To participate in an existing thread of a feed, you can compose and submit a reply message. By default, the message is visible to all members of the feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Locate the message you want to reply to.
3. Type your reply in the message box and click **Reply**.
   As needed, you can add hashtags, attachments, links, or knowledge base articles.
4. To limit who can view the reply to a single individual, select a user from the **To** choice list.
5. Click **Reply**.
6. To view additional replies, click **Show all replies**.
   By default, 7 replies are visible for each message. Any reply to a reply includes a **Threads** link.

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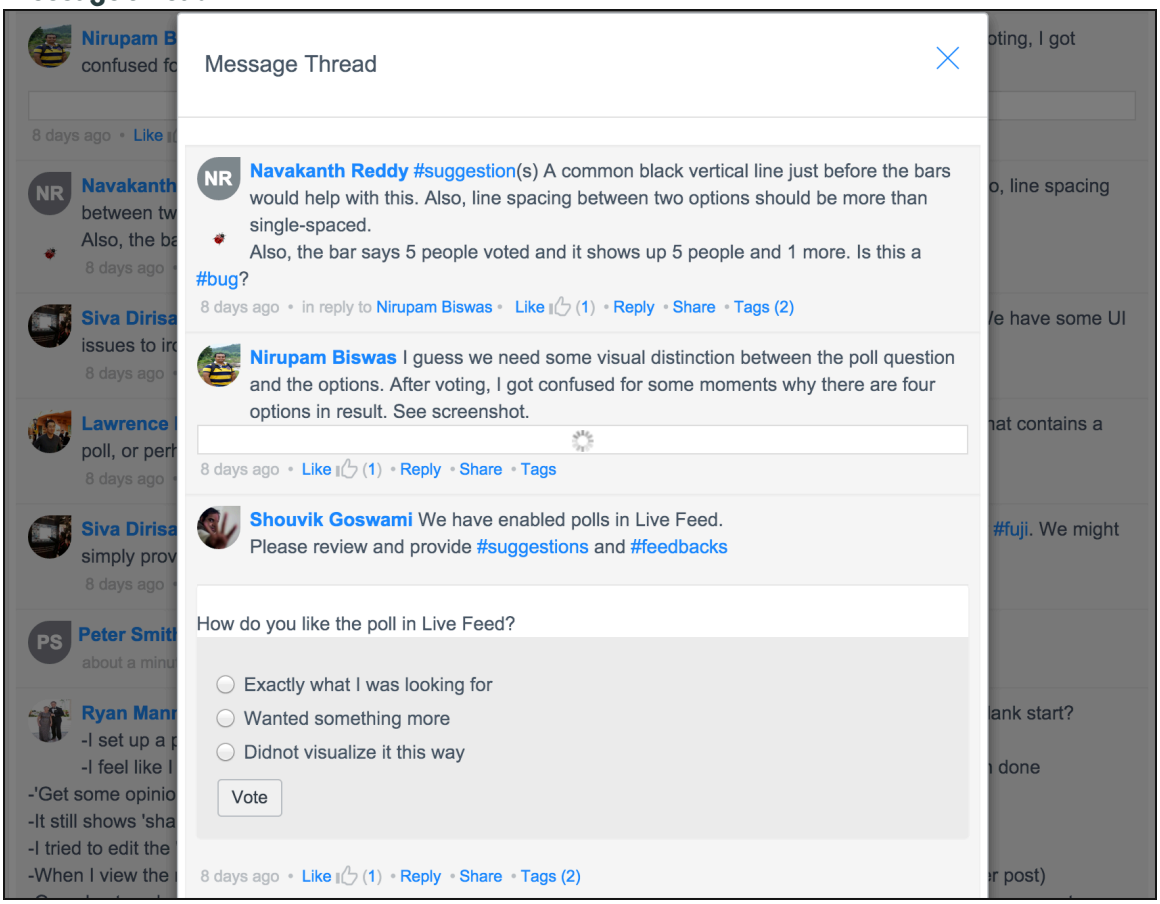
7. Click **Threads** to view all of the replies within the selected reply in reverse chronological order within the **Message Thread** pop-up window, similar to an email thread.

Message thread



Attach a file to a post or reply

You can attach files to a post by dragging a file into a post or pasting an image from the clipboard.

Before you begin

Role required: none

About this task

Use the paperclip icon ( ) to drag files into a post. Additionally, you can paste images into a post or reply from the clipboard.

Procedure

1. Do one of the following:

   - While composing a post or reply (see Reply to a Message), locate one or more images or other supported types of files, and drag them into the message box.

   - Click the paperclip icon ( ) in the message box, navigate to the location of the files you want to attach, select them, and click **Open**.

2. To add more files, drag-and-drop additional files into the text box below the displayed files or images, or click the plus sign.

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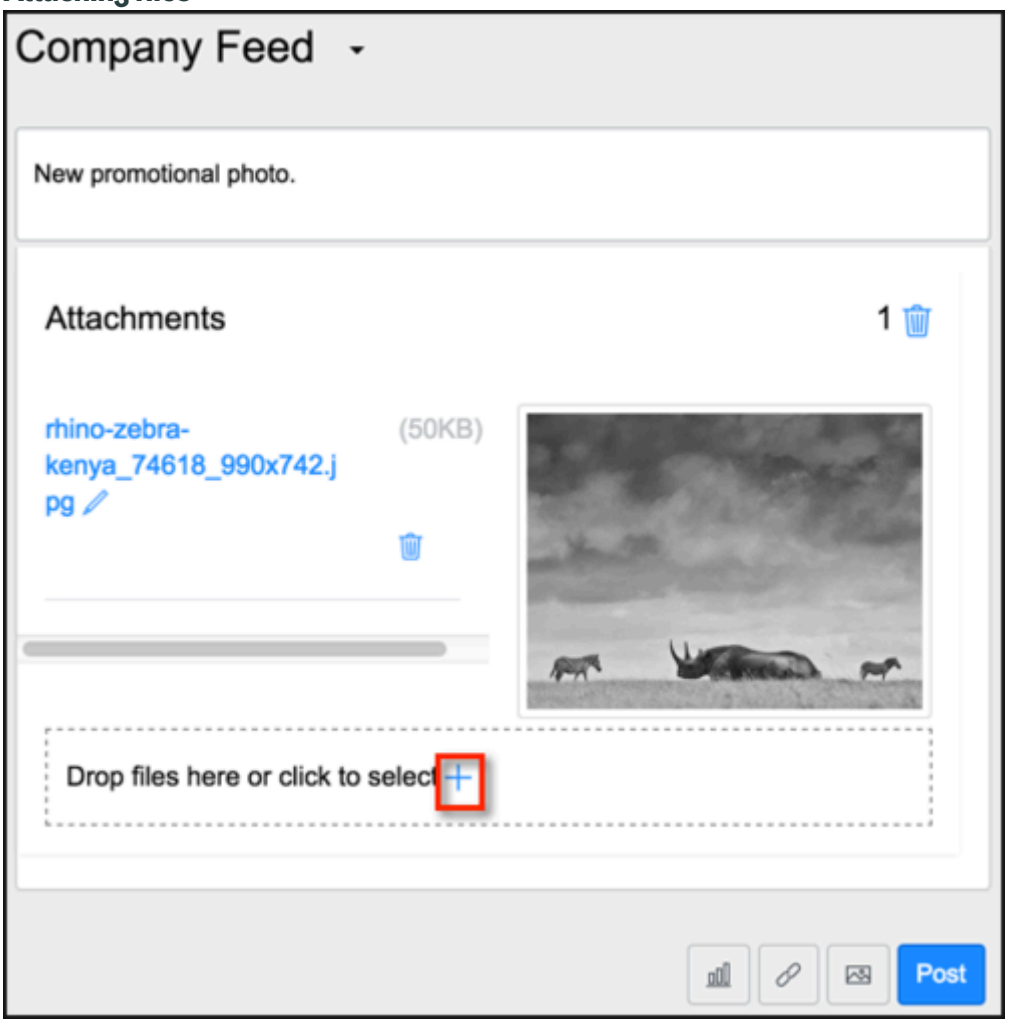
Attaching files



3. If you want to delete an attachment before posting the message, click the trashcan icon adjacent to the attachment.
4. Enter a comment to share your thoughts about the image.

> **Note:**
> The **Post** button is enabled only after you add the comment.

5. Click **Post** or **Reply**.
6. If you added files that do not contain previews and then posted the message, they will be listed in the message box with a **Download** link.
7. Click the link to download the files.

Copy an image from the clipboard

In addition to adding files to a message, you can also copy images to the clipboard and paste them into a message or reply.

Before you begin
Role required: none

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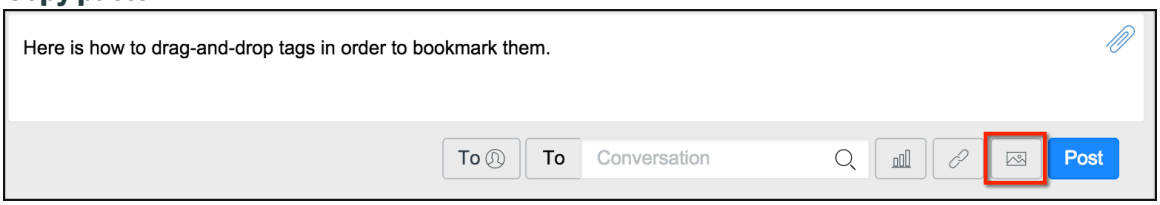
Procedure

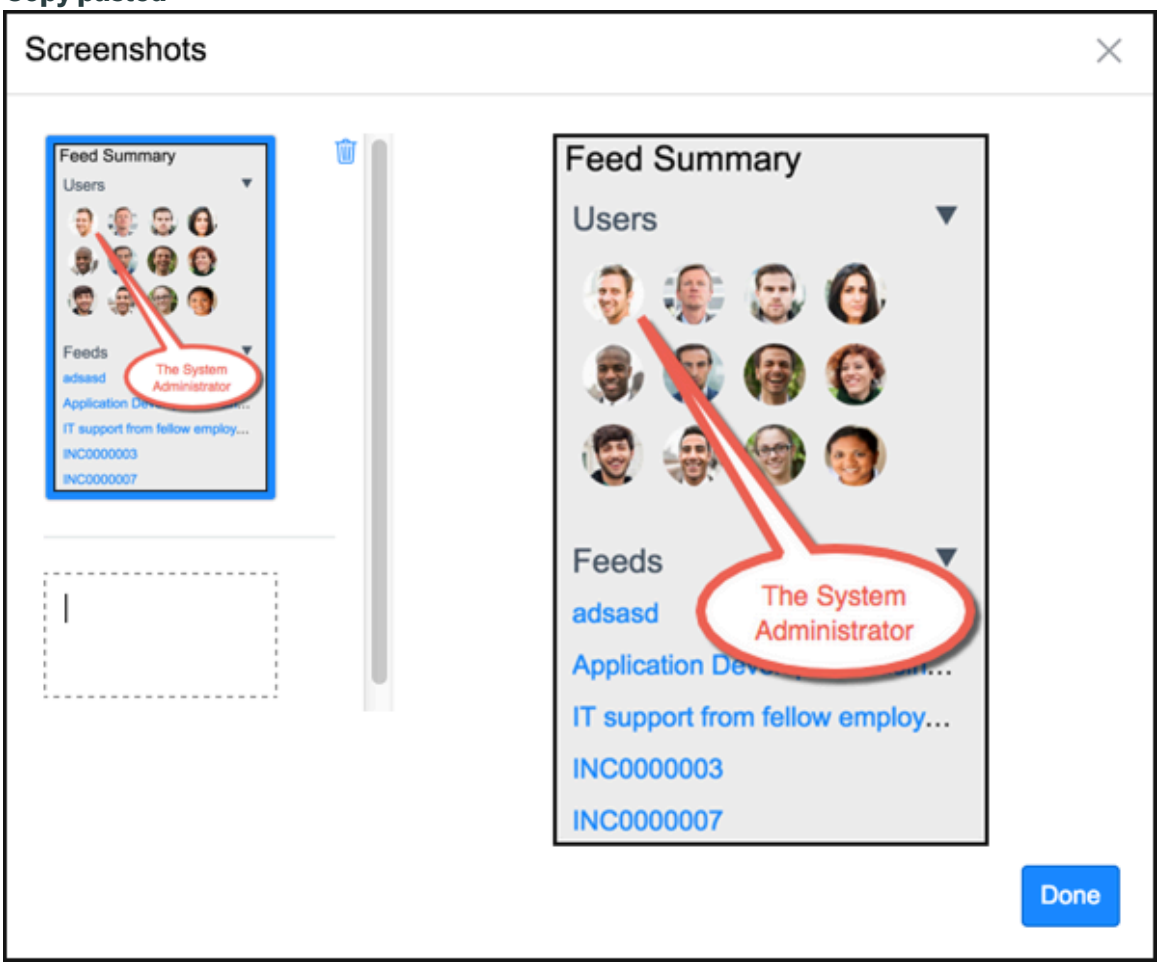
1. Click into the **Comment** box and add a comment.

Copy paste



2. Click the **Add an image** button.
   The **Screenshots** dialog box opens.
3. Right-click the **Paste an image here** box and select **Paste** to paste the image from the clipboard.

Copy pasted



4. To add another image, repeat the previous steps.
5. When you finish pasting images into the message, click **Done**.
6. To change the link text, click **Pasted Image** and enter a new label.
7. When you finish, click **Post** or **Reply**.
8. To remove an image, click the trash can icon adjacent to the link.

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9. To make changes to an existing image, click the edit icon ( ).

Note:
The copy/paste functionality is supported in Chrome, Firefox, and Internet Explorer 11.

Add a link to a post or reply

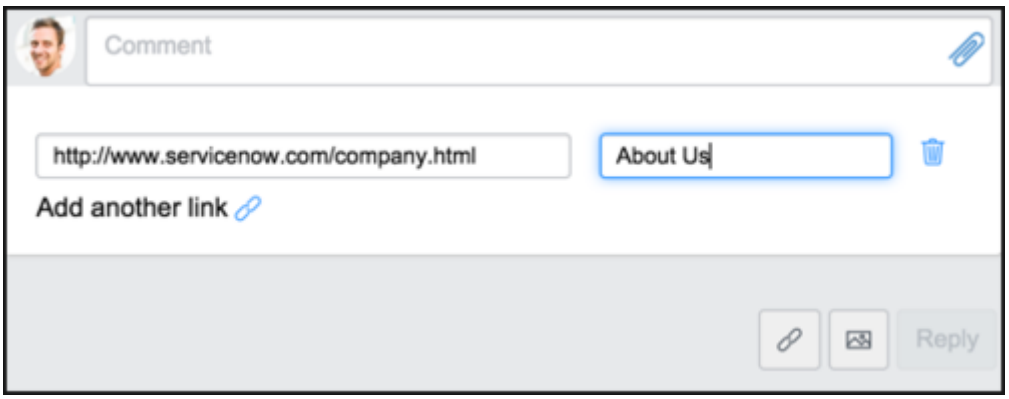
Add or modify a link to a Live Feed post.

Before you begin
Role required: none

Procedure

1. Click into the **Comment** box.
   The **Add a link** button appears.
2. Click the **Add a link** button.
   The **URL** and **Link text** fields appear.

Add a URL



3. Enter the URL and the text you want to appear as the link.
4. To add another link, click the link icon under the **URL** field.
5. When you have finished entering your message, click **Post** or **Reply**.

URL Saved



To remove a link, click the trash can icon adjacent to the link. To make changes to an existing link, click the edit ( ) icon.

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Add a knowledge article link to a post or reply

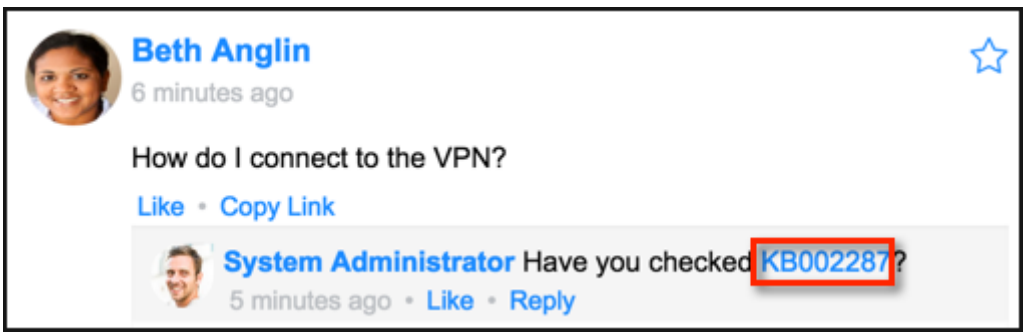
Use the ID of a knowledge article to post it as a reply to a Live Feed conversation.

Before you begin
Role required: none

Procedure

1. While composing a post or reply, type the ID of the knowledge article you want to link to. You do not need to identify the knowledge article ID as a hyperlink. Live feed recognizes it as such and automatically converts it into a link when the message is posted.
2. When you are finished entering your message, click **Post** or **Reply**.

KB link



Add a poll to a message

When you are posting a message, you have the option of creating a poll in order to record your viewers' opinions. As users take the poll, their feedback statistics are displayed within the feed.

Before you begin
Role required: admin

Procedure

1. Open the feed where you want to create a message with a poll.
2. Enter the message with an invitation to take the poll in the **Share your thoughts** box.
3. Click the poll ( ) icon.

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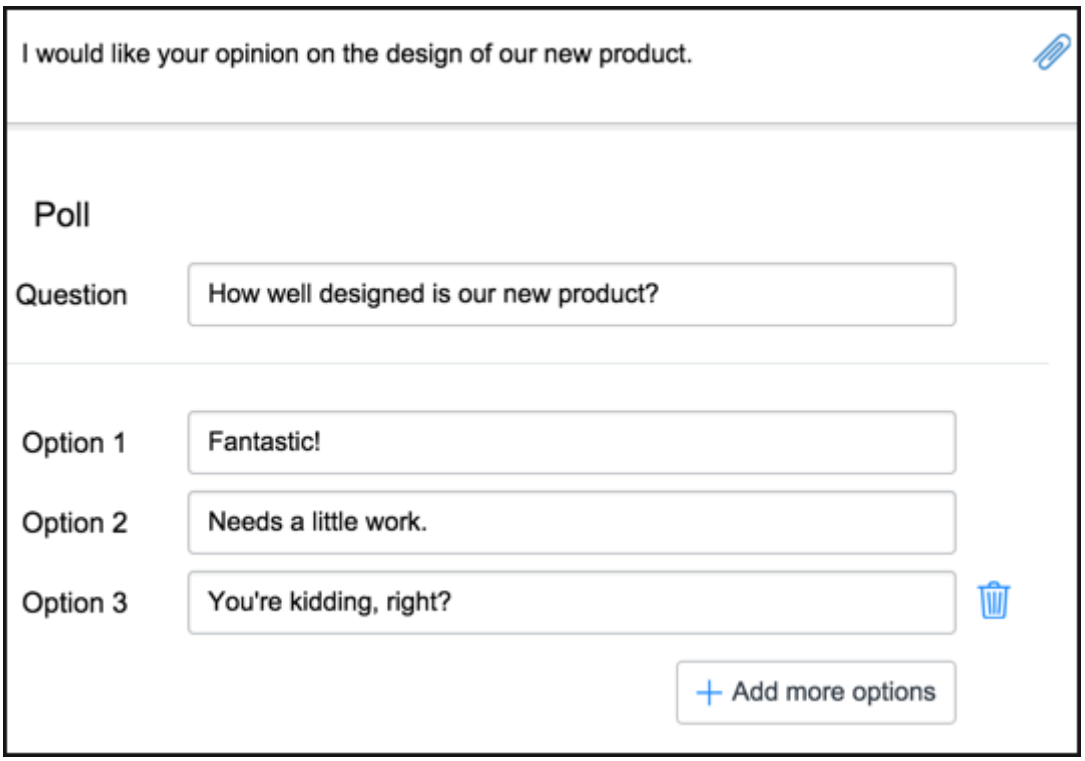
Poll



4. In the **Question** field, enter the question on which you are soliciting opinions.
5. In the **Option** fields, enter possible responses to the query.
6. To add more response options, click **Add more options**.
7. Click **Post**.
   After the poll is posted, users who view the message can vote. After they vote, their pictures appear next to their response, with others who have voted for the same option.

   An email notification with the poll result is sent to all participants of the poll informing them that the poll is closed.

Add mentions to a message

An @mention is any posted update that contains @username anywhere in the body of the message.

Before you begin

Role required: none

About this task

The user's name, with a link to that user's feed, is inserted into the message. Additionally, the mentioned user receives an email notification about the mention. This is a great way of bringing attention to other members in a conversation. All @mentions are included in the logged-in user's My Feed.

Note:
If an @mention is used by a member of a team, only members of that team appear in the auto-suggest list.

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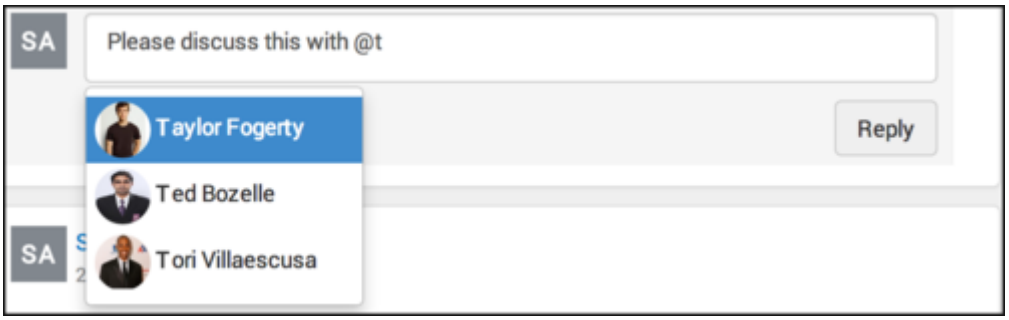
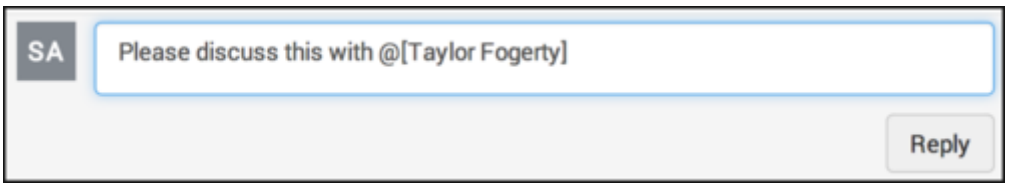
Procedure

1. While entering a message or reply in a conversation, type `@username` anywhere in the message.
   As you type, an auto-suggest list appears with names and pictures of users that match your entries. For example, if you type `@t`, the auto-suggest list shows the pictures and names of all users with names that start with T.



2. Click the user you want to add.
   That user's name is inserted into the @mention in the body of the message.



Note:
My Feed displays @mentions of you and the teams you are a member of. Profile feeds for another user display only @mentions of that user.

Like a message

Like a message to provide feedback to the author.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Live Feed** > **Live Feed**.
2. Click **Feeds**.
3. Locate the feed that contains the message you want to like.
4. Under the message title, click **Like**.
   If the message has previously been liked, the number of likes for a message displays next to the Like link.

   For a top-level message, the profile pictures of the first 5 users who liked a message are displayed. Any additional users who liked the message can be viewed by hovering over the **# more** link. If the logged-in user has liked the message, that user's image will appear first, followed by the image of the user who last liked the message.

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For a reply, you must hover your mouse pointer over the **count** link to view the users who liked the message.

Note:
After a message has been liked, it cannot be unliked.

Delete a message

Users can delete any of their own posts or replies. A conversation administrator can also delete messages.

Before you begin
Role required: none

Procedure

1. Hover over the message you want to delete.
2. Click the trash can icon in the upper-right-hand corner of the message box.
3. Click **Delete** in the confirmation box.
   The message disappears from the feed.

Live Feed reference

Topics in this section describe domain separation in Live Feed, as well as the various components that are installed with it.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed will no longer work. See Next Experience UI for more information.

Domain separation in Live Feed

This is an overview of domain separation and Live Feed. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Overview

Support: Level 2

Parent and child domains define the Live Feed content that can be viewed and shared with other users.

- A user in a parent domain can see users and content within their domain and within all child domains that are lower in the domain hierarchy.
- A user in a child domain can see users and content within their domain but cannot see the parent domain or other child domains at the same level in the domain hierarchy.

Enable domain separation for Live Feed

Domain separation for the Live Feed application is available starting with the Eureka release. For users upgrading to Eureka, a sys_domain column is added to existing live feed-related database tables. For existing database records, the value of the sys_domain field is set to empty (global). This allows the domain separation feature to work with existing Live Feed records.

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Show or hide the Live Feed application for a domain

The administrator can Live Feed visibility for a domain. This includes:

- Displaying Live Feed in the application navigator.
- Following a document feed for a record.
- Viewing Live Feed from a record.

Use Live Feed with domain separation

All of the Live Feed features are available to users within a domain and work the same way, with some exceptions to visibility.

- *Posting and sharing content*
  - Users in a child domain can interact with other users in the same domain. This includes posting and replying to messages, deleting messages, attaching files and links, and rating content.
  - Users in a parent domain can interact with other users in the same domain and with users in any child domains. Messages that are added to child threads by parent users are given the visibility of the child domain, not the parent domain.
- *Viewing content*
  - Users in a child domain can view content that resides within their domain. This includes filtering by feed, sorting, searching, and viewing older messages.
  - Users in a parent domain can view content that resides within their domain and within any child domains.
  - My Feed shows messages, teams, and hashtags based on the user's domain. Showing another user's feed only shows posts visible in the current user's domain.
- *Using hashtags*
  - Hashtags are separated by domain. Users in a child domain can use all of the hashtag functions within their domain. This includes tagging messages, viewing available hashtags, changing hashtag names, and searching and filtering by hashtag.
  - Users in a parent domain can use all of the hashtag functions within their domain and can see hashtags in any child domains.
- *Using teams*
  - Teams are separated across domains. Users in a child domain can join and follow teams within their domain, and can invite other users within their domain to join teams.
  - Users in a parent domain can join and follow teams that belong to their domain or to any child domains.
- *Exceptions to teams*
  - New teams are created in the user's domain. However, if the team has a record associated with it, the team is created in record's domain.
  - New threads in an existing team are created in the domain of the existing team.
  - When a user is creating a new team from a document, if the document domain is not empty or global, the team domain needs to be changed to be the document's domain.
  - For a document-generated team, when the domain of the document changes, the domain of all related Live Feed records changes as well.
- *Subscribing to email notifications*

  Users can subscribe to email notifications from users and teams within their domain only.

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Related topics

- Live Feed security and table access
- Limit Live Feed access by role
- Manage Live Feed message content
- Live Feed team security
- Restrict hashtag renaming
- Domain separation

Components installed with Live Feed

Several types of components are installed with Live Feed.

Demo data is available with Live Feed.

Tables installed with Live Feed

The Live Feed plugin includes the following tables.

Table	Description
Link attachments [live_link]	Stores links and attachments that are added to messages.
Live Favorite [live_favorite]	Stores the favorite conversations, user groups, and messages.
Live Feed Searches [live_feed_search]	Stores Live Feed text searches. Access at **Live Feed** > **Feed Administration** > **Search Log**.
Live Follows [live_follow]	Maintains users' follow preferences for user feeds.
Live Group Profile [live_group_profile]	Stores conversation properties, including name, description, and public status. Also stored are user group properties, such as name, description, and public status.
Live Group Member [live_group_member]	Maintains the member lists for conversation and user group.
Live Mention [live_mention]	Stores the profiles mentioned in a message. References sys_user table.
Live Message Tag [live_message_tag]	Stores messages associated with user-created tags. Appears as a related list on Live Tag records.
Live Messages [live_message]	Stores messages. References sys_user table. Access at **Live Feed** > **Feed Administration** > **Messages**.
Live Poll	Stores a poll question.

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Table	Description
[live_poll]	
Live Poll Cast [live_poll_cast]	Stores profiles of users who voted for a particular option in a poll.
Live Poll Options [live_poll_option]	Stores poll options.
Live Profiles [live_profile]	Stores user Live Feed profiles. References sys_user table. Access at **Live Feed** > **Feed Administration** > **Profiles**.
Live Table Notification [live_table_notification]	Generates automatic table notifications, such as when a user reads Live Feed for the first time and when a high priority incident is opened. Access at **Live Feed** > **Feed Administration** > **Table Notifications**.
Live Tag [live_tag]	Maintains user-created tags. Access at **Live Feed** > **Feed Administration** > **Tags**.
Live Tag Follows [live_tag_follow]	Maintains users' follow preferences for tags.
Messages Liked by [live_message_like]	Maintains like ratings for posts. Access at **Live Feed** > **Feed Administration** > **Likes**.

User roles installed with Live Feed

The Live Feed plugin includes the following user roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

live_feed_admin

Can manage Live Feed functions. Users with the live_feed_admin role can set up table notifications for non-task tables, limit Live Feed access by role, and manage Live Feed message content.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

chat_admin

Can manage chat functions (if the Chat plugin is activated). Users with the chat_admin role can change chat room message read access and define chat room access rights.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Script includes installed with Live Feed

The Live Feed plugin installs the following script includes.

Name	Description
LiveMsgUtil	Provides helper functions for working with live_message records.
LiveFeedFilter	Queries filters for working with live_feed records.
LiveFeedUtil	Provides helper functions for working with live_feed records.

Business rules installed with Live Feed

The Live Feed plugin includes the following business rules.

Business rule	Table	Description
Feed Group Creator Becomes Admin	Live Group Profile [live_group_profile]	Designates the group creator as the group administrator.
Live Feed events	Task [task]	Runs on task insert, update, and delete. Triggers event associated with the Live Feed Update Script action that processes Live Table Notifications to auto-generate Live Feed messages.
Live feed member update events	Live Group Member [live_group_member]	Generates a notification event when member state changes (invited, accepted, declined, left, rejected, request, request_accepted).

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Business rule	Table	Description
Live feed integration	Journal Entry [sys_journal_field]	Writes journal comments to the Live Feed if there is a group for this record.
Live feed new member events	Live Group Member [live_group_member]	Generates a notification event when new members are added.
Live Feed profile events	Live Profile [live_profile]	Runs on live_profile insert/update/delete, triggers event associated with the Live Feed Update script action that processes Live Table Notifications to auto-generate Live Feed messages.
Live Feed message events	Live Feed Message [live_message]	Runs on live_message, notification event trigger for new live messages.
Live message like events	Message Liked by [live_message_like]	Runs on live_message_like, notification event trigger for new like records.
LiveFeed Group Member Visibility 2.0	Live Group Member [live_group_member]	Ensures users can only see the members list for public groups and groups they belong to.
LiveFeed Group Profile Validation	Live Group Profile [live_group_profile]	Ensures that a public group is visible.
LiveFeed Group Profile Visibility 2.0	Live Group Profile [live_group_profile]	Ensures that the list of all groups only displays public groups, private groups that are visible, and groups the user belongs to.
LiveFeed Membership Changes	Live Group Member [live_group_member]	Enforces that only the group administrator and users with live_feed_admin role can manage membership for a group.
LiveFeed Single Group Membership	Live Group Member [live_group_member]	Ensures that a user is not added multiple times to the same group.
Live Message Likes	Live Message Like [live_message_like]	Updates the number of likes for a message.
LiveFeed Join Group Check	Live Group Member [live_group_member]	Ensures that users can not automatically join private visible groups.
Update Follow/ Follower Counts	Live Follow [live_follow]	Updates the following/followers counts.

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Business rule	Table	Description
Live Feed Group	Assessable Record [asmt_assessable_record]	Creates/Deletes a Live Feed group for an assessable record
Live Feed Message Visibility	Live Feed Message [live_message]	Ensures user's access to Live Feed messages

Email notifications installed with Live Feed

The Live Feed plugin includes the following email notifications.

Email notification	Description
Live Feed Feed Member Accepted	Sends an email to the administrator when a user has accepted to join the feed.
Live Feed Feed Member Declined	Sends an email to the administrator when a user has declined to join the feed.
Live Feed Feed Member Invited	Sends an email to a user when they have been invited to join a feed.
Live Feed Feed Member Left	Sends an email to the administrators when a user has left the feed.
Live Feed Feed Member Removed	Sends an email to user when they have been removed from the feed.
Live Feed Feed Member Request	Sends an email to administrators when an user requests to join a feed.
Live Feed Feed Member Request Accepted	Sends an email to the user when their request to join a feed is accepted.
Live Feed Feed Request Rejected	Sends an email to the user when their request to join a feed has been rejected by an administrator.
Live Feed MsgReply Subscription	Sends an email when a reply or reply_to_reply message is inserted into the thread of a message in a feed.
Live Feed Team Member Accepted	Sends an email to administrators when a user accepts an invitation to join a team.
Live Feed Team Member Declined	Sends an email to administrators when a user declines an invitation to join a team.
Live Feed Team Member Invited	Sends an email when a user is invited to join a team.
Live Feed Team Member Left	Sends an email when a user leaves a team.
Live Feed Team Member Removed	Sends an email when an administrator has removed a user from a team
Live Feed Team Member Request	Sends an email when a user requests to join a team.
Live Feed Team Member Request Accepted	Sends an email when a user's request to join a team is accepted.

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Email notification	Description
Live Team Member Request Rejected	Sends an email when a user's request to join a team is rejected.
Live Message All Subscription	Sends an email to subscribed users when any message (new or reply) is posted.
Live Message Feed Subscription	Sends an email when a new message is inserted into a feed.
Live Message Liked	Sends an email to the creator of a message when another user likes the message.
Live Message Mention	Sends an email to a user when that user is mentioned in a message.
Live Message New Posts Subscription	Sends an email to subscribed users when a new (not reply) message is posted.
Live Message Reply	Sends an email to all users in a feed thread when a user posts a reply (live_message.replied event).

E-signature

Sign electronic documents from any desktop or mobile device with e-signature. E-signature is a scoped application that enables users to sign managed documents or knowledge articles with their typed or drawn e-signature, credentials, or as an acknowledgment.

Get started

Activate	Use	Reference
		
Activate e-signature.	Create or modify e-signature templates.	Learn about the components installed with e-signature.

Troubleshoot and get help

- ServiceNow Community forums
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Activating e-signature

You can activate the e-signature plugin (com.snc.esign) if you have the admin role. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin
Role required: admin

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About this task

E-signature activates these related plugins if they are not already active.

Plugins for E-signature

Plugin	Description
ServiceNow document viewer [com.snc.documentviewer]	Document viewer is a platform feature that will enable users to view enterprise class documents inline within the platform attachment instead of downloading it to the local device and then opening the documents with a locally installed viewer.
Managed documents [com.snc.document_management]	Managed Documents application. To enable the ability to publish to the knowledge base, activate the knowledge document plugin.
Signature pad [com.snc.signaturepad]	Provides a tool to allow a digital signature in a .pdf document. The Human Resources application uses this with various documents.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Using e-signature

Users with the assigned e-signature roles can create templates for documents that require an electronic signature.

Role assignment

Before you begin using e-signature, you must assign the e-signature roles to the appropriate roles, groups, or users in your application. See Components installed with e-signature for more information.

How to use e-signature templates

Users with the e-signature administrator [sn_esign.admin] or manager [sn_esign.config_manager] role can create e-signature templates. Each e-signature template pairs a document type to sign (managed document or knowledge article) with a signature type (signature, credential, or acknowledgment). For example, you could create an e-signature

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template for a non-disclosure agreement that requires a typed or drawn signature. For more information, see Create or modify an e-signature template.

You can then use the e-signature template in task forms to request electronic signatures from users. In the HR Service Delivery application, for example, you can add HR tasks to HR cases or configure HR task templates to request electronic signatures per the selected e-signature template. See E-signature for HR for HR-specific examples.

Create or modify an e-signature template

Create or modify an e-signature template to define an electronic document and signature configuration for use in task forms.

Before you begin

Role required: sn_esign.admin or sn_esign.config_manager

Each template is associated with a document type such as a managed document or knowledge article, and you can configure the template so that the signatory is required to sign the document with their typed or drawn signature, credentials, or as an acknowledgment.

Procedure

1. Navigate to **All** > **E-signature** > **E-signature template**.
2. Click **New** or open a record.
3. Fill in the fields on the form.

E-signature template form

Field	Description
Name	Name of the e-signature template.
Task table	Task table that the e-signature template is associated with.
Document type	Document type of the e-signature template. Select one of the following: ○ **HR document template**: Make sure that the **Task table** field is set to HR Task [sn_hr_core_task]. The HR document template that the signatory will sign is selected on the HR case form. See Select an HR document template for an e-signature task for more information. ○ **Knowledge article**: In the **Knowledge article** field, select the knowledge article that the signatory will sign. ○ **Managed document**: In the **Managed document** field, select the managed document that the signatory will sign.
Signature type	Signature type of the e-signature template. Select one of the following: ○ **Acknowledgment**: The signatory acknowledges the document by accepting and completing the task. **Note:** This option is not available for HR document templates. ○ **Credential**: The signatory signs the document with their credentials.

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Field	Description
	Note: This option is not available for HR document templates. ○ **Signature**: The signatory signs the document with their typed or drawn signature.
Acknowledgment text	Adds a check box with accompanying acknowledgment text that the user must select before the signing is completed. This option can be used with any signature type. **Note:** Acknowledgment text is limited to 1,000 characters.

4. Click **Submit** or **Update**.

What to do next

You can use the e-signature template in task forms to request electronic signatures from users.

E-signature reference

Activating the e-signature plugin installs additional roles and tables.

Components installed with e-signature

Several types of components are installed with activation of e-signature, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Roles installed

Role title [name]	Description	Contains roles
E-signature administrator [sn_esign.admin]	Can manage the e-signature module.	sn_esign.config_manager
E-signature manager [sn_esign.config_manager]	Can manage the e-signature configurations.	None

You can assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

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For further information on user administration and how to manage users, see User administration.

Tables installed

Table	Description
E-Signature Configuration [sn_esign_configuration]	E-signature configuration table.
E-Signature Acknowledgement [sn_esign_acknowledgement]	E-signature acknowledgment table.

For further information on table administration and how to manage data, see Table administration.

ServiceNow Voice

Integrate a third-party phone system with your ServiceNow® Voice instance to drive the efficiency of your call center without having to navigate through multiple systems while attending a call. Help managers analyze the calls and view call metrics at one place.

ServiceNow Voice in action

Here's an overview on how ServiceNow Voice is integrated with Amazon Connect. ServiceNow Voice with Amazon Connect

Explore	Set up	Integrate
Learn about how customers, agents, and managers use ServiceNow Voice.	Set up ServiceNow Voice.	Extend ServiceNow Voice capabilities by integrating with other applications.

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Use	Reference	
Receive inbound calls, place outbound calls, and monitor calls.	Get details about components such as roles, contact flows, and operation handlers.	

Additional resources

Voice API on the ServiceNow® Developer Site

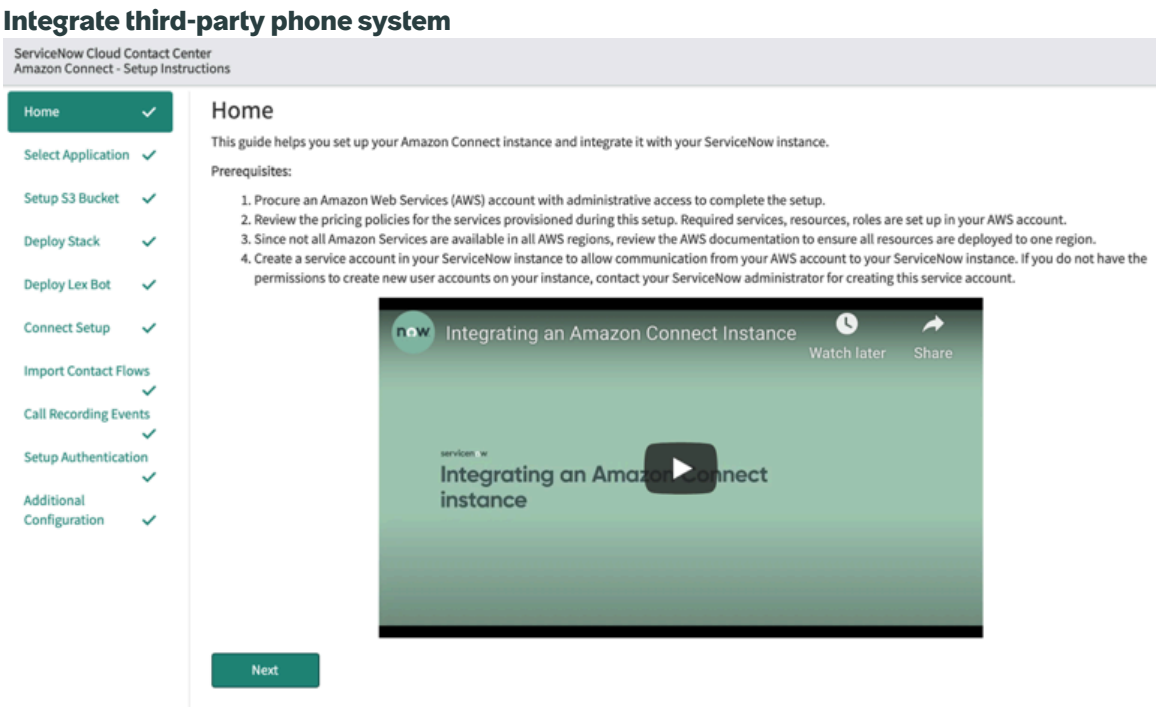
Exploring ServiceNow Voice

Use ServiceNow Voice to facilitate inbound and outbound telephone calls by integrating your ServiceNow instance with a third-party phone system such as Amazon Connect.

Key features

Integrate a third-party phone system with Voice in the ServiceNow instance

Provide a seamless inbound and outbound voice call experience for your callers and agents using third-party systems. See the ServiceNow Store for a full list of integrations.



Display relevant data for an agent at the right time

Display relevant data in an interaction for an agent to help a customer during a call.

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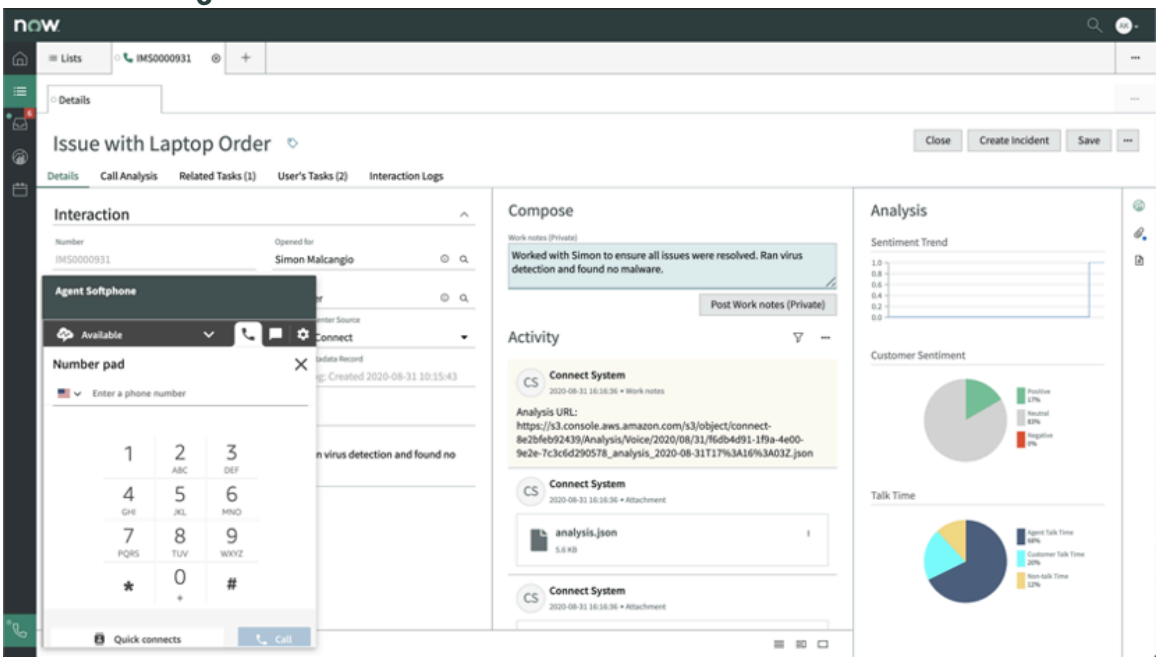
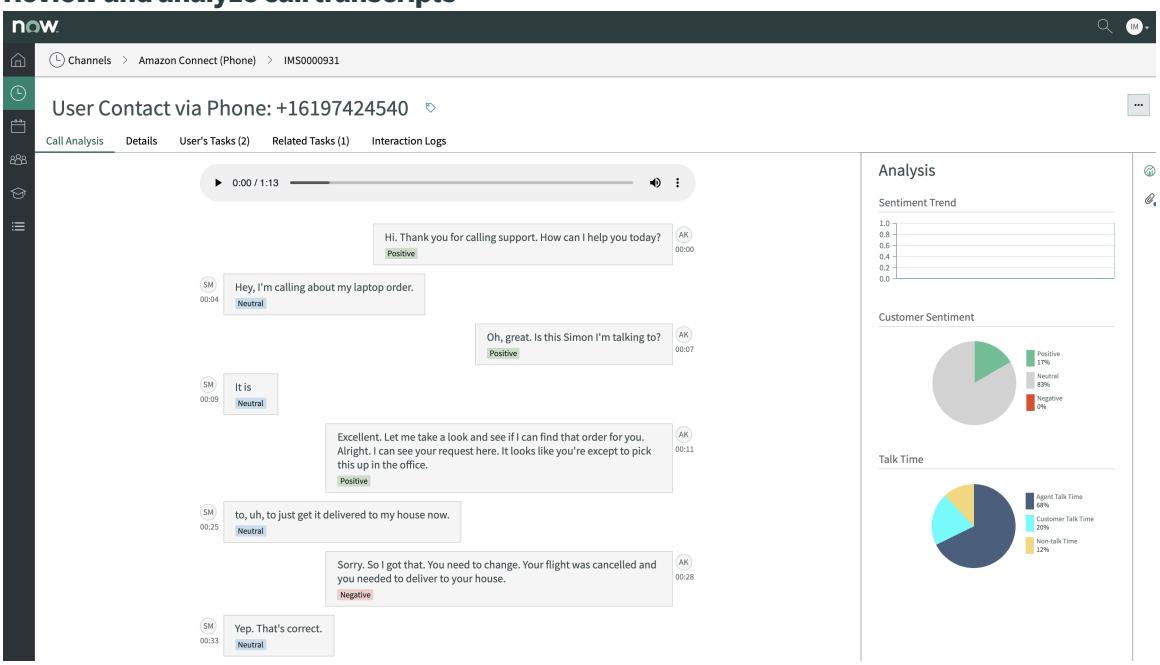
Route calls to agents



Analyze recording and call metrics of interactions

Within your ServiceNow instance, access recordings, call metrics, and call transcripts of agents to analyze interactions.

Review and analyze call transcripts



As an admin, you can:

- Use pre-built instructions and templates to integrate your ServiceNow instance with a third-party phone system such as Amazon Connect.
- Use pre-built operation handlers that invoke interactions to fulfill requests between a third-party phone system and Voice.

As a manager, you can:

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- View the call transcript and recording for coaching.
- View call metrics (for example, agent call time) for reporting.
- Analyze agent conversations and provide feedback for quality assurance.

As an agent, you can:

- Get calls routed to your assigned queues and accept or reject the calls via the integrated softphone from within the ServiceNow instance.
- Transfer a call to another agent or to a queue using **Quick connect**.
- Get the context of caller information before accepting a call.
- View real-time transcripts of calls while interacting with a customer. For more information about real-time transcripts, see
- Collaborate with managers who can analyze your conversations and provide feedback for quality assurance.
- Manage presence states within the ServiceNow instance. For information about the presence states of an agent, see Agent Inbox controls.
- Access and use your softphone directly from within the ServiceNow interface using the OpenFrame integration. For information about OpenFrame, see OpenFrame overview.

As a caller, you can:

- Create a task using voice-based interactions. For example, create an incident or a case, or unlock your account.
- Get your requests fulfilled within the integrated ServiceNow instance through bot interactions using the voice or dual-tone multi-frequency (DTMF) inputs. These bot interactions are defined in contact flows in the third-party phone system.
- Speak to an agent who can help fulfill a request.

Inbound call workflow for the integration of Voice with Amazon Connect

When a caller contacts the call center, using the voice or dual-tone multi-frequency (DTMF) inputs from a caller, a contact flow is invoked in the Amazon Connect instance based on the caller context such as language. An interaction record is created for this call.

- The caller request will invoke an operation handler in the ServiceNow instance.
- The request can be resolved by an automated interaction with a bot. If the caller request is not resolved by an automated interaction with bot, then the call is queued for the next available agent. An agent then receives the call and interaction, and resolves the request.

Here is an example workflow.

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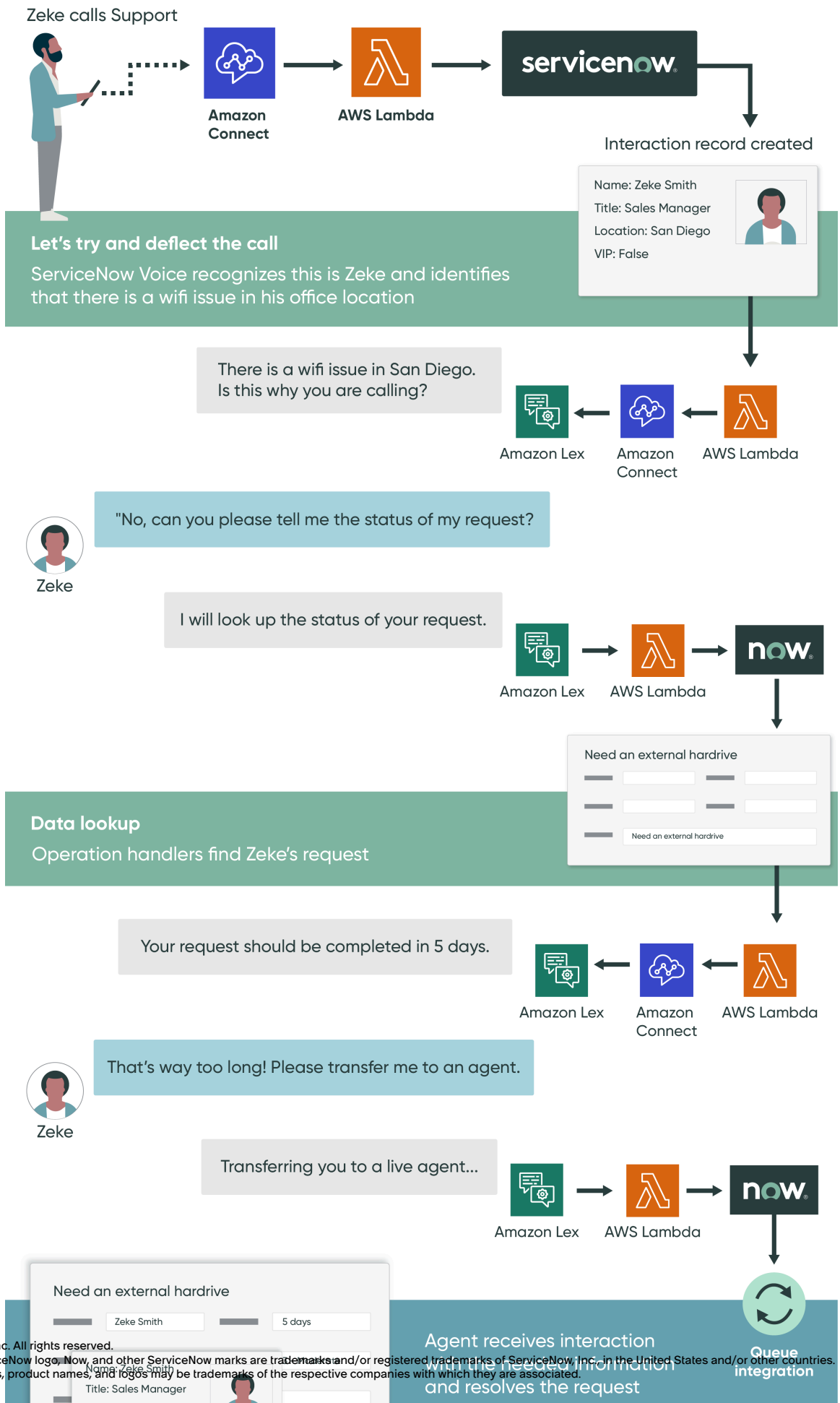
servicenow

Amazon Connect Integration



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Setting up ServiceNow Voice

Enable ServiceNow Voice and integrate it with a third-party phone system such as Amazon Connect.

When you set up a third-party phone system and integrate it with the ServiceNow instance, an agent can accept an incoming call or make an outbound call from the ServiceNow instance using the integrated softphone. This experience is based on the configurations made within the third-party phone system.

Here's an overview of setting up Voice: Video that provides an overview of setting up ServiceNow Voice on Amazon Connect.

Get started with Voice

1. Procure a license for a ServiceNow application, such as ITSM or CSM, which includes ServiceNow Voice.
2. Install the ServiceNow Voice applications in ServiceNow® Store. For information about this installation, see Install ServiceNow Voice applications.
3. Sign up and create an account with a third-party phone system. By default, Amazon Connect is supported. For information about creating an Amazon Web Services (AWS) account, see the Amazon documentation.
4. Configure the framework for the third-party phone system within the ServiceNow instance. By default, the framework is supported for Amazon Connect. For information about this configuration, see Integrate ServiceNow Voice with Amazon Connect.

Install ServiceNow Voice applications

You can install the ServiceNow Voice applications if you have the admin role. The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Your organization must have purchased a license for a ServiceNow application, such as ITSM or CSM, which includes the ServiceNow Voice SKU.
- You should install at least one content pack, for example, CSM or ITSM.

Role required: admin

About this task

The following ServiceNow Voice applications should be installed.

ServiceNow Voice applications

Application	Description	Components installed
ServiceNow Voice [sn_cti_core]	Provides the framework that supports the integration with your third-party phone system.	For information about the components installed with this application, see Components installed with ServiceNow Voice Core.

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ServiceNow Voice applications (continued)

Application	Description	Components installed
ServiceNow Voice with Amazon Connect [sn_cti_amzn_cct]	Integrates Amazon Connect with ServiceNow Voice Core.	For information about the components installed with this application, see Components installed with Amazon Connect Integration with ServiceNow Voice.
ServiceNow Voice UI Components [sn_cti_ux]	Enables call recording, transcription, and sentiment analysis for ServiceNow Voice with Workspace experience.	None
ServiceNow Real Time Transcription [sn_cti_amzn_cct] (Available for ServiceNow Voice for Customer Service Management only.)	Enables real-time call transcription so that the agent can see the call transcript while on a call with the customer.	[sn_cti_csm_cnt.enable_ims_update]

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find these applications using the filter criteria and search bar.
   - ServiceNow Voice (sn_cti_core)
   - ServiceNow Voice with Amazon Connect (sn_cti_amzn_cct)
   - ServiceNow Voice UI Components (sn_cti_ux)

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install the Voice applications.
   - ServiceNow Voice (sn_cti_core)
   - ServiceNow Voice with Amazon Connect (sn_cti_amzn_cct)
   - ServiceNow Voice UI Components (sn_cti_ux)

   For the complete Voice experience, install ServiceNow Voice for ITSM or ServiceNow Voice for CSM applications. For information about these installations, see Install ServiceNow Voice for ITSM and Install ServiceNow Voice for CSM.
4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.

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Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

> **Important:**
> If you don't load the demo data during installation, it's unavailable to load later.

5. Select **Install**.

Domain separation and ServiceNow Voice

Domain separation is supported for ServiceNow Voice. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

Domain-separated tables

- CTI Instance [sn_cti_instance]
- CTI Component Logging Configuration [sn_cti_log_cfg]
- Operation Handler [sn_cti_operation_handler]
- Provider Component [sn_cti_provider_component]
- Provider Configuration [sn_cti_provider_config]
- Provider Message Transformer [sn_cti_provider_msg_transformer]
- CTI user [sn_cti_user]
- AWS Resource [sn_cti_aws_resource]
- Amazon Connect Instance [sn_cti_connect_instance]

Related topics

Domain separation for service providers

Configuring a phone PIN

You can set up or reset a phone PIN that can be used for caller authentication during a call with an agent.

If the **Require authentication** field is set to **true** for an operation handler, the corresponding operation is invoked only after the caller enters the PIN.

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Important:
It is applicable for both Voice for ITSM and ServiceNow Voice for CSM applications.

Reset the phone PIN for a caller

Reset the phone PIN for a caller if the caller's account is locked.

Before you begin
Role required: sn_cti_core.user_manager

About this task

Procedure

1. Navigate to **All** > **ServiceNow Voice - Core** > **User Pin Reset**.
2. For the required CTI user, Click the preview icon and open the record to reset the PIN.
   a. In the **PIN** field, enter the new PIN.
   b. Clear the **Disabled** check box.
   c. Click **Update**.

Set or reset the phone PIN

Set up or reset your phone PIN that can be used for caller authentication when you call an agent.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **ServiceNow Voice - Core** > **My Phone PIN**.
2. On the Request Phone PIN form, enter the PIN and re-enter it.
3. Click **Submit**.

Configure the E.164 format for a consumer phone number

Ensure that all the necessary information for a phone number is included and properly formatted to successfully route an international call over a territory's public telephone network. Provide the E.164-compliant formatting and validation for phone number.

Before you begin
Role required: admin

About this task
An E.164 phone number field displays the following field types:

- A list for the phone number territory
- An input box for entering phone numbers

The E.164 format that does not contain any dashes or spaces and must include the + sign. For example, +14152223456.

Procedure

1. Navigate to **All** > **Customer Service** > **Consumers**.
2. Select the required consumer record.

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3. On the Consumer form, right-click any phone field and select **Configure Dictionary**.
4. On the Dictionary Entry form, for the **Type** field, select **Phone Number (E164)**.
5. Click **Update**.

Result
After this configuration, when entering the consumer phone number in the phone field, select the territory and enter the corresponding phone number. The same format is reflected in Agent Workspace.

Configuring CTI component logging

Configure CTI component logging to enable component logging to the system logs.

Before you begin
Role required: admin

About this task
You can create logs for the following components:

- Operation handler
- Provider component
- Provider configuration
- Provider message transformer

> **Note:**
> Do not leave the log configurations on in a production instance, since this can impact performance.

Procedure

1. Navigate to **All** > **ServiceNow Voice Core** > **Log Configuration** > **New**.
2. Select the component, component table, and log level you want to configure.
3. Choose the log level option.
   Options include the following:
   - Off
   - Error
   - Warn
   - Info
   - Debug
4. Click **Submit**.
5. Create a separate record for each type of component table you want to log.
   If there are multiple logging configurations, the final log level is the selected component's log level, based on the following prioritization:
   a. Operation handler
   b. Provider message transformer
   c. Provider component
   d. Provider configuration

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6. To view the logs, navigate to **All** > **System Logs** > **System Log** > **All**.
   You can see the logs from the invoked *sn_cti* modules, including the date created, log level, log message, and source. In the system logs, the message log level is always **info**. For basic logs from *sn_cti_core* without any logging configuration, the log level varies.

For an entry on *sn_cti_log_cfg.list* for an operation handler with **warn** log level logger located in the operation handler, the code is as follows:

```
var log= ctx.getLogger();
log.warn("CTX Logger Demo from Operation Handler");
```

Sample output:

```
cti_core::
 P:c4bae70xxxxf6a9a|C:bxxxx44|T:793cxxxx7b|O:6fb1xxxx4006dabb45v
c::CTX Logger Demo from Operation Handler
```

- P: Provider
- C: Component
- T: Transformer
- O: Operation handler

Configure Real Time Transcription for ServiceNow Voice Customer Service Management

Configure settings in your Amazon Connect instance, and in your ServiceNow instance to allow agents to see a real time transcription of voice calls with customers.

Before you begin

- An Amazon Connect instance set up using the guided setup.
- Real Time Transcription is only available for ServiceNow Voice for Customer Service Management
- Role required: admin

About this task

For new deployments, the Real-Time Transcription feature is enabled during the guided setup for Voice for Customer Service Management.

If you have already deployed Voice for CSM and are upgrading, go through all of the steps for Setting up ServiceNow Voice, and Set up Real-Time Transcription for ServiceNow Voice before completing the setup on Amazon Connect.

Procedure

1. Go to your Amazon Connect instance.
2. Enable Contact Lens in the Amazon Connect instance.
   See the Amazon documentation for full instructions. Also refer to the Contact Lens documentation for more information about Contact Lens for Amazon Connect.
   a. On the "Set recording and analytics behavior block", enable Contact Lens.
   b. Enable speech analytics with real-time and post-call analytics.
3. Go to the **Setup Guide** for Amazon Connect.
4. Complete the instructions in the Real Time Transcription section.

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Set up Real-Time Transcription for ServiceNow Voice

Set up the properties in the Amazon Connect integration in order to enable Real-Time Transcription.

Before you begin
Role required: admin

About this task
For new deployments, the Real-Time Transcription feature is enabled during the guided setup for ServiceNow Voice.

If you have already deployed ServiceNow Voice and are upgrading, go through all of the steps for Setting up ServiceNow Voice, and the steps in this procedure, before completing the setup on Amazon Connect.

Procedure

1. Add the system property `sn_cti_csm_cnt.enable_ims_update` and set it to **true**.
   For more information on adding a new system property, see Add a system property.
2. Navigate to **All** > **Amazon Connect integration** > **View instances**.
3. Choose your instance, and click on the **Setup guide** related link.
4. Select the checkbox at the top of the setup guide to enable Real Time Transcription setup.
   Once you select the Real Time Transcription checkbox, agents can see the conversation panel in their workpace.
5. Proceed through the setup guide.
   Even if you have already set up your Amazon Connect integration, you must complete the setup tasks again, due to changes in the Lambda Cloudformation Template and contact flow.
6. In the **Setup Authentication** step, create a user with "Web Service Only access".
   This user is intended only for communication between ServiceNow and Amazon Connect.
   a. Go to the **Roles** related list.
   b. Edit the user, and add the role `interaction_integration_user`.
   c. Click **OK**.

What to do next
Proceed with the setup tasks on your Amazon Connect instance detailed in the setup guide.

Scripting for operation handlers

You can use the APIs in the ServiceNow Voice framework to create a seamless voice call experience for your callers and agents.

The *`CTIOperationRequest`* API provides methods to set and get data on the current CTIOperationRequest object. For information on this API, see CTIOperationRequest - Scoped, Global.

The *`CTIOperationResponse`* API provides methods to set and get data on the current CTIOperationResponse object. For information on this API, see CTIOperationResponse - Scoped, Global.

The *`CTI API`* provides REST resources that enable Computer Telephony Integration (CTI) providers to interact with the Voice framework. For information about this API, see CTI API.

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Provider configuration in Voice

For both inbound and outbound calls, a provider configuration contains settings about the involved components and message transformers for a specific third-party phone system provider. Any request from that phone system provider is handled within ServiceNow based on these settings.

To view the available provider configurations, navigate to **ServiceNow Voice - Core** > **Provider Configurations**.

Any request from a third-party phone system is passed into a ServiceNow instance through the *CTI Operation* endpoint of the *CTI API*. For information about this API, see CTI API. Based on the provider and the component specified in the endpoint, the corresponding message transformers are invoked to perform the following:

- Transform the request from the third-party phone system before passing the request to an operation handler.
- Transform the response from the operation handler before passing it on to the third-party phone system.

Provider component

For each component or node available in the third-party phone system, a provider configuration contains a provider component. It contains a mapping between the component and a message transformer.

To view the available provider components, navigate to **ServiceNow Voice - Core** > **Provider Components**.

Message transformer

A message transformer defines how a request and response can be transformed between a third-party phone system and the ServiceNow instance.

- The **Input Transformer** field has a script that defines how a request from a third-party phone system should be transformed within the ServiceNow instance before passing the request to an operation handler.
- The **Output Transformer** field has a script that defines how the response from the operation handler should be transformed before passing it on to the third-party phone system.

To view the available message transformers, navigate to **ServiceNow Voice - Core** > **Provider Message Transformers**.

Provider configuration for the integration of Voice with Amazon Connect

For the ServiceNow Voice integration with the ServiceNow Voice with Amazon Connect application, the *AWS Connect Default Handler* provider component is available by default.

Note:
The ServiceNow Voice with Amazon Connect integration with ServiceNow application [sn_cti_amzn_cct] must be installed from the ServiceNow® Store. For information on installing this application, see Install ServiceNow Voice applications.

For each node that can be used an integration point between Amazon services and the ServiceNow instance, the following provider components and the corresponding message transformers are available.

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Provider components and message transformers

Node	Provider component	Message transformer
Get Customer Input	sn_aws_connect_lex_intent_processor_component	AWS - Lex - Intent - Message Transformer (SN Proxy)
Invoke AWS Lambda Function	sn_aws_connect_lambda_proxy_component	AWS - Connect - Lambda - Message Transformer

When a customer dials using a phone number, a call is placed through the Amazon Connect 's phone system. Using one of its components, Amazon Connect provides the request to the ServiceNow instance through the `CTI Operation` endpoint of the `CTI API`. For information about this API, see CTI API. Based on the provider and the component specified here, the corresponding message transformers are invoked to perform the following:

- Transform the request from Amazon Connect before passing the request to an operation handler.
- Transform the response from the operation handler before passing it on to Amazon Connect.

Extension points in Voice

Using extension points, you can call the custom scripts to extend the functionality of ServiceNow Voice. While integrating a third-party phone system with ServiceNow Voice, you can invoke extension points using the `CTI API` to handle events in ServiceNow Voice.

By using extension points, you can easily integrate customizations without having to alter the base code. You can extend standard base functionality using customized scripts. For more information, see Using extension points to extend application functionality.

To view the extension points that are available by default, navigate to **System Extension Points** > **Scripted Extension Points** and group by the ServiceNow Voice application.

Note:
You should install the ServiceNow Voice, ServiceNow Voice for ITSM, ServiceNow Voice for CSM, and ServiceNow Voice with Amazon Connect applications from the ServiceNow® Store. For information about these installations, see Install ServiceNow Voice applications, Install ServiceNow Voice for ITSM, and Install ServiceNow Voice for CSM.

Extension points in Voice

Extension point	Description
sn_cti_core.clickToCallContextMap	Enables the copying of application-specific field values to interaction records for ServiceNow Voice outbound calls.
sn_cti_core.CTICallAnalysisExtractor	Defines how the transcription and the recording data is retrieved for an interaction based on the third-party phone system integrated with ServiceNow Voice.
sn_cti_core.SoftPhoneEventSink	Defines if the third-party phone system can handle an event. Maps events from the Softphone interface to back-end events.

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Using Voice

Agents can use ServiceNow Voice to receive inbound calls and make outbound calls with a seamless voice call experience. Managers can use this application to monitor and analyze calls.

Receiving inbound calls in ServiceNow Voice

An agent can receive inbound calls using the Agent Softphone interface to handle a caller's request.

As an agent, you should have any of the following roles to receive an inbound call:

- sn_openframe.user and interaction_agent
- If the Advanced Work Assignment plugin (com.glide.awa) is installed, awa_agent & awa_integration_user.

After a customer dials in, the corresponding contact flow is invoked in Amazon Connect. Through the configured nodes, the request is forwarded to an operation handler in the ServiceNow instance.

If an agent is available, the agent can receive the call and handle the request using Agent Softphone interface. For information about the presence states of an agent, see Agent Inbox controls.

Interaction record states

If	Then the interaction
The interaction has just been created, is currently in a call tree being deflected by an IVR flow, or has not yet been routed and assigned to an agent	Is in **New** state.
The Lex Bot deflects the call or the user disconnects the call any time before the call enters the queue	Moves to **Closed Complete** state.
The interaction gets assigned to an agent	Moves to **Work in Progress** state.
The user disconnects the call while waiting in the queue	Moves to **Closed Abandoned** state.

Initiating outbound calls with ServiceNow Voice

Improve your productivity as an agent by initiating outbound calls to connect with customers using the click-to-call feature in the ServiceNow Voice application.

As an agent, you can initiate outbound calls using the click-to-call feature when accessing the phone number of a user. The phone number of a user, if available, is displayed on the ServiceNow application UIs. Example application UIs include the contact details on a Case form, the user record on an Incident form, the Consumer form, the Contact form, and other application UIs.

Note:

- If not available, you can add the **Caller** field to an incident form.
- The phone number of a user should be in the E.164 format. For information about configuring a phone number in this format, see Configure the E.164 format for a consumer phone number.

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You should have any of the following roles to initiate an outbound call:

- sn_openframe.user and interaction_agent
- If the Advanced Work Assignment plugin (com.glide.awa) is installed, awa_agent & awa_integration_user.

You can click the link to the user's phone number displayed on the application UI. The user record must have the mobile phone, business phone, or both. The Agent Softphone pop-up window is displayed letting you know that the call will be recorded, and then the user's number is connected. An interaction record of type Phone is created for the call and is in the **Work in Progress** state.

For ServiceNow Voice Core, if the `createConversation` flag is set to true, a conversation record is created for an outgoing call.

For ServiceNow Voice with Customer Service Management, if the `sn_cti_csm_cnt.enable_ims_update` flag is set to true, a conversation record is created for an outgoing call.

The following agent presence states are configured by default for the Voice application and are displayed in your Agent Workspace Inbox.

Agent Workspace Inbox statuses

Status	Description
CallingCustomer	Indicates that you are in the process of connecting with a customer. After the call is connected, the status appears as **Busy**.
Busy	Indicates that you are on the call.
AfterCallWork	Indicates that you ended the call and right now working on updating the task such as case details. The status is displayed after you click **End call** in the Agent Softphone pop-up window.
Available	Indicates that you are available to accept another task such as a case. The status is displayed after you click **Clear contact** in the Agent Softphone pop-up window.
FailedConnectAgent	Indicates that you were unable to connect with the customer. After the call doesn't go through, the status appears as **Available**.

Note:
The Agent Workspace Inbox statuses are synchronized with your Advanced Work Assignment (AWA) activity.

The activity stream of the associated interaction record is populated with your status details, the URL to the call recording, contact trace record, and call transcript.

[store-future: BEGIN review]

Monitoring calls in Voice

A manager can monitor analyze calls to provide feedback and coach agents.

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As a manager, you can:

- View the call transcript and recording for coaching.
- View call metrics (for example, agent call time) for reporting.
- Analyse agent conversations and provide feedback for quality assurance.

In Agent Workspace, ITSM Manager Workspace, and CSM Manager Workspace, you can use the **Call Analysis** tab in an interaction to analyze transcripts, recordings, and sentiments.

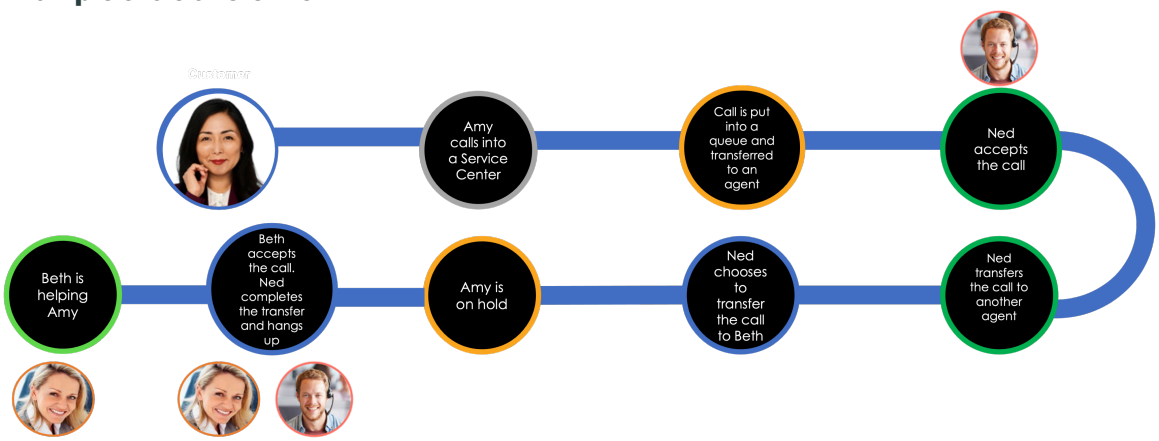
[End]

Transferring a call to an agent or queue

When on a call with a customer, an agent can transfer the call to another agent or to a queue to get more assistance for the customer.

This feature is available for ServiceNow Voice for Customer Service Management. See Integrating ServiceNow Voice with CSM for more information.

Example of a transfer flow



1. Navigate to **All** > **Workspace Experience** > **CSM/FSM Configurable Workspace**.
2. Ned uses the Agent Softphone to accept an incoming call from a customer.
3. To transfer the call, Ned clicks **Quick connects** and choose either another agent or a queue (for example "Billing queue"). The transfer begins, and **INTERNAL-TRANSFER** displays on the softphone. The customer is placed on hold until the next agent accepts the call.
4. Once the next agent (Beth) selects **Join**, and joins the call, the first agent (Ned) can either remain on the call or leave the call.
5. When the Ned leaves the call, the call is reassigned to the Beth on the interaction record.

Integrating Voice with other applications

You can extend the capabilities of ServiceNow Voice for inbound and outbound calls by integrating with other applications.

Integrate ServiceNow Voice with Amazon Connect

Connect ServiceNow Voice of your ServiceNow instance with the Amazon Connect instance to provide a seamless inbound and outbound voice call experience for your callers and agents.

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Before you begin

- Procure an Amazon Web Services (AWS) account with the administrative access to complete the integration setup between Amazon Connect and ServiceNow. For information about creating the AWS account, see the Amazon documentation.
- Create a service account in your ServiceNow instance to allow communication from your AWS account to your ServiceNow instance. If you do not have the permissions to create service accounts on your instance, contact your ServiceNow administrator for creating this service account.

Role required: sn_cti_amzn_cct.admin

Watch the video below to learn more about integrating an Amazon Connect instance. This video covers: Deploying Amazon resources and the Lex Bot, setting up the Amazon Connect instance and the contact flow, authentication and roles, and User ID and password parameters

Procedure

1. Log in to your Amazon Web Services (AWS) account and setup an Amazon Connect instance. For instructions on setting up this instance, see the Amazon Connect documentation.
2. Integrate the Amazon Connect with your ServiceNow instance.

   a. Log in to your ServiceNow instance.

   b. Navigate to **Amazon Connect Integration** > **Setup Instance**.

   c. On the form, fill in the fields.

Amazon Connect Instance form

Field	Description
Name	Name of the Amazon Connect instance.
AWS ARN	Amazon resource name of the Amazon Connect instance. For information on AWS ARN, see the Amazon Connect documentation.
Active	Option that indicates if the record is active.
Override Params	Option to edit the domain for Amazon Connect instance parameters. You should select this option only when you want to integrate the ServiceNow instance with an Amazon Connect instance created before introducing the new domain for the Amazon Connect console. For information about this new domain, see the Amazon Connect documentation.
Instance Params	Auto-generated parameters based on the name of the Amazon Connect instance. For example, here are the Amazon Connect instance parameters before and after introducing the new domain for the Amazon Connect console.

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Field	Description

	▪ Before introducing the new domain
	`{"ccpHost":"acmesupport.awsapps.com","ccpUrl":"https://acmesupport.awsapps.com/connect/ccp-v2","audioRecordingUrlPrefix":"https://acmesupport.awsapps.com/connect/get-recording?format=wav&callLegId="}`
	▪ After introducing the new domain
	`{"ccpHost":"acmesupport.my.connect.aws","ccpUrl":"https://acmesupport.my.connect.aws/ccp-v2","audioRecordingUrlPrefix":"https://acmesupport.my.connect.aws/get-recording?format=wav&callLegId="}`

3. Configure the Amazon Connect components in your ServiceNow instance.

   a. Navigate to **Amazon Connect Integration** > **View Instances**.

   b. Select the instance you want to configure.

   c. Click the **Setup Guide** related link.

   d. Complete the instructions for components specified in each section.

Steps to configure Amazon Connect components

Step	Description
Select Application	Select an application for which you want to configure the Amazon Connect components.
Setup S3 Bucket	Host content that can be deployed by Amazon CloudFormation. For more information on creating an S3 bucket, see the Amazon documentation
Deploy Stack	Set up a collection of the required Amazon Web Services (AWS) resources. For more information on stacks, see the Amazon documentation. You can deploy the AWS stack using AWS CloudFormation templates. ▪ Use AWS Cloud Formation template to describe AWS resources and properties ▪ Use AWS Cloud Formation stack to provision the resources described in the template **Note:** If you are upgrading from a previous release, point your existing deployment of Lambda function running on Node.js 10.x to point it to Node.js 14.x. For more information, see the Amazon documentation.

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Step	Description
Deploy Lex Bot	Build voice-based conversational interfaces for your users. For more information on Lex Bot, see the Amazon documentation
Connect Setup	Integrate with your ServiceNow instance with AWS services

Import Contact Flows	▪ To enable Advanced Work Assignment (AWA) Voice Routing, check the checkbox under the **AWA Voice Routing** heading. Complete the steps specified in the setup guide:
	  ▪ Complete AWS Lambda and Oauth credential setup.
	  ▪ Download the recommended hold music using the link in the setup guide (you can choose your own hold music, but it cannot be longer than 5 seconds).
	  ▪ Upload the hold music. See the AWS documentation.
	▪ Define a call tree for inbound and outbound calls between Amazon Connect and your ServiceNow instance. For more information on contact flows, see the Amazon documentation.
	▪ Based on your subscription, you have default inbound and outbound contact flows. For example, for the integration of ServiceNow Voice with ITSM applications, see Components installed with ServiceNow Voice for ITSM.
	▪ For an inbound contact flow, create queues to route contacts from AWS queues to ServiceNow queues. For information on creating queues in AWS, see the Amazon documentation.
	▪ Set up call transfer flows through Amazon Connect using Transfer to Agent Flow and Transfer to Queue Flow. The transfer flows are reusable and can also be applied to ServiceNow Voice for ITSM.
	▪ Amazon Connect (Phone) is a placeholder phone channel for Amazon Connect integration. For queues that you implement in your Amazon Connect instance, you can use this channel to create corresponding Advanced Work Assignment queues. For an example implementation, see Associate Amazon Connect queues for ITSM to a ServiceNow instance or Associate Amazon Connect queues for CSM to a ServiceNow instance.

Setup Real Time Transcription	Set up the properties in the Amazon Connect integration in order to enable Real-Time Transcription. Refer to Configure Real Time Transcription for ServiceNow Voice Customer Service Management for configuration instructions.
Call Recording Events	Send recording events to the ServiceNow instance by enabling call recording on your Amazon Connect instance. For more information on recording behavior, see the Amazon documentation

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Step	Description
Setup Authentication	Integrate your Amazon Connect instance with your ServiceNow account by creating a service account
Additional Configuration	Launch the Amazon Connect softphone interface within ServiceNow UI by configuring Openframe. The Openframe configuration created in your ServiceNow instance enables agents to launch the softphone from within the ServiceNow interface. You can also configure user groups to restrict this configuration to specific agent user groups. **Note:** Agents should log in to the softphone interface in a separate browser tab using the Amazon Connect credentials or SSO credentials (if configured). Once logged in, the softphone can be launched and used within the ServiceNow interface.

Configure a contact flow for an automated caller interaction

Invoke an automated caller interaction with bots to fulfill the caller's request within the ServiceNow instance.

Before you begin

Role required: sn_cti_core.admin

About this task

When a caller contacts the call center, using the voice or dual-tone multi frequency (DTMF) inputs from caller, a contact flow is invoked in the Amazon Connect instance based on the caller context. The contact flow contains nodes that act as integration points between Amazon services and the ServiceNow instance. Based on the nodes defined in the contact flow, the corresponding operation handlers are triggered in the ServiceNow instance. The caller then gets the response that is defined in the operation handler. For information about contact flows, see the Amazon documentation.

In the ServiceNow base system, a few operation handlers are available by default. For information on operation handlers, see ServiceNow Voice reference.

Procedure

1. **Optional:** If you do not want to use a default operation handler, create and configure an operation handler in the ServiceNow instance.

   a. Navigate to **ServiceNow Voice - Core** > **Operation Handlers**.

   b. Click **New**.

   c. On the form, fill in the fields.

Operation Handler form

Field	Description
Operation Name	Name of the operation that you want to automate.
Type	Type that specifies how the operation is implemented.

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Field	Description
	▪ Script: Implementation is included in a script. ▪ Forward to Handler: Request is forwarded to an operation handler, which is invoked by lookup on the sys_id of that handler. This scenario is possible when you have different intents for similar operations, for example, Create an HR incident and Create incident. ▪ Forward to Operation: Request is forwarded to an operation handler, which is invoked by lookup on the name of the handler and then name resolution to find the handler. ▪ Integration Hub - Action: Calls an Integration Hub action. ▪ Integration Hub - Subflow: Calls an Integration Hub flow or subflow.
Application	Application associated with the operation handler.
Domain	Domain associated with the operation handler.
Active	Option to activate the operation handler.
Require Authentication	Option to enable authentication for the operation handler. **Note:** If this option is selected, the corresponding operation is invoked only when a valid authentication token is passed in the request. It is supported by an authentication operation handler that supports pin-based authentication, which can be leveraged in your contact flows. For information about configuring the PIN, see Configuring a phone PIN.
Description	Summary about the operation handler.
Script	Script that contains the operation implementation and the response for the caller. This field appears when **Script** is selected for **Type**.
Forward To	Operation handler to which you want to forward the request. This field appears when **Forward to Handler** or **Forward to Operation** is selected for **Type**.
Integration Hub - Action	(Optional) Integration Hub action that you want to call to complete the request. This field appears when **Integration Hub - Action** is selected for **Type**.
Integration Hub - Flow/ SubFlow	(Optional) Integration Hub flow or subflow that you want to call to complete the request. This field appears when **Integration Hub - Subflow** is selected for **Type**.

d. Click **Submit**.

2. Create a contact flow in Amazon Connect to define an end-to-end customer experience.

For information about creating a contact flow, see the Amazon documentation.

When building a contact flow within Amazon Connect, use any of these nodes to trigger operation handlers defined in the ServiceNow instance. These nodes act as integration points between Amazon services and the ServiceNow instance.

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Nodes in contact flows

Node	Description	Configuration
Get Customer Input	Invokes a Lex Bot. The operation handler that is triggered is based on the name of the intent associated with the Lex Bot. For information about this node, see the Amazon documentation. **Note:** This node can be used when the integration is between Amazon Lex and the ServiceNow instance.	**a.** Create an intent for the required Lex Bot in your Amazon Connect instance. For information about creating an intent, see the Amazon documentation. **b.** Specify the following information in the intent. ▪ Intent name: Name of the intent. **Note:** This intent name should match an operation handler in the ServiceNow instance with the same name, or name + '_<suffix>' where suffix can contain any five uppercase alpha characters. ▪ Sample utterances: Caller utterances that trigger the operation handler. ▪ Lambda initialization and validation: If the operation handler being invoked requires authentication, select the **Initialization and validation code hook** check box and select the deployed AWS Lambda function. ▪ Lambda function: Deployed AWS Lambda function that is invoked. **c.** Save, build, and publish the intent. **d.** Open the required contact flow in the contact flow designer in your Amazon Connect instance. **e.** Click the Get Customer Input node and specify the Lex Bot details in the **Amazon Lex** section. **f.** Click **Save**.
Invoke AWS Lambda Function	Invokes an AWS Lambda function. The operation handler that is triggered is based on the *sn_operation* parameter set on the node in the contact flow. For information about this node, see the Amazon documentation.	**a.** Open the required contact flow in the contact flow designer in your Amazon Connect instance. **b.** Click the Invoke AWS Lambda Function node and specify the following input parameters. ▪ Destination key: sn_component, Value: Component from where the Lambda function is invoked. For example, sn_aws_connect_lambda_proxy_component.

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Node	Description	Configuration
	Note: This node can be used to for data dips (for example, authorizing a caller) where the integration is between the call center and the ServiceNow instance. The data dip configuration allows a caller to enter information, such as an account number, to route calls to a particular queue. Using this number, you can look up the first name of the caller and create an interaction record after the call is initiated. Also, you can customize the greeting with the caller name later in the flow.	▪ Destination key: sn_operation, Value: Name of the operation handler that you want to invoke. For example, interactionEvent. ▪ (optional) Destination key: queueName, Value: Name of the queue that you want to transfer the flow to. **Note:** This parameter is used to invoke the workItemEvent operation handler. ▪ (optional) Destination key: queueId, Value: ARN of the queue that you want to transfer the flow to. **Note:** This parameter is used to invoke the workItemEvent operation handler. ▪ (optional) Destination key: authToken, Value: AuthToken received via authentication call. This parameter is required for invoking an operation handler that requires authentication. ▪ (optional) Destination key: interactionId, Value: Interaction ID received via interactionEvent call. **c.** Click **Save**.

3. Ensure that a caller's phone number is associated with the contact flow after it is created and published.

   This process ensures that each time the caller calls, the corresponding contact flow is invoked. For information about associating a phone number with a contact flow, see the Amazon documentation.

   Note:
   For a sample implementation of invoking operation handlers in a contact flow, you can refer to the default contact flows. For information on default contact flows, see Components installed with ServiceNow Voice for ITSM and Components installed with ServiceNow Voice for CSM.

Integrating ServiceNow Voice with ITSM

Route calls coming through the ServiceNow Voice to specific phone queues based on user preference, utterances, or any other ServiceNow data to optimize incident resolution.

Sample ITSM contact flow

Use the inbound **(ServiceNow ITSM Inbound Demo Flow)** and outbound **(ServiceNow ITSM Outbound Demo Flow)** Amazon Connect ITSM sample contact flows that come with the Voice integration to get you up and running quickly. The sample flow allows you to deflect voice calls or route them based on the caller context to different queues. When a call comes through the

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ServiceNow Voice, the Amazon Connect application uses data dips to identify the caller and then deflect the call or route it to the right agent. For more information on integrating ServiceNow Voice with Amazon Connect see, Integrate ServiceNow Voice with Amazon Connect.

Callers can access status updates or make updates to their records when they are authenticated.

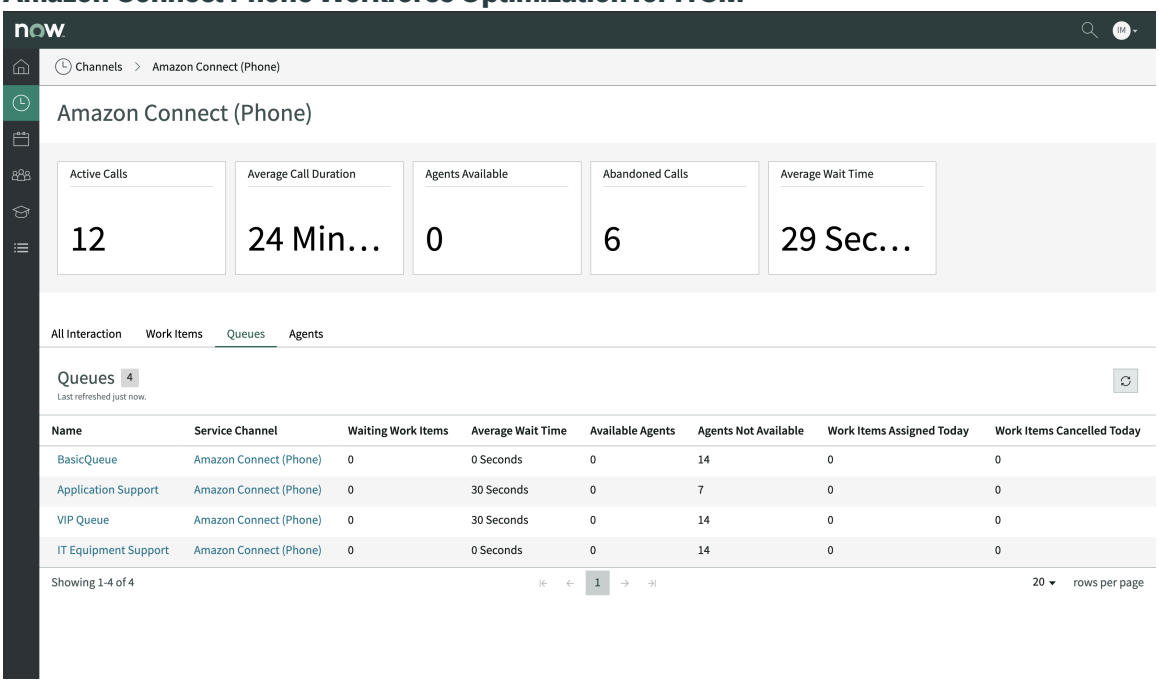
PIN-based authentication

Callers can use PIN-based authentication to access the phone channel. Managers can set or reset the PIN for the users who can also set or reset their phone PIN. For more information, see Configure a phone PIN.

Workforce Optimization for ITSM

Integrate Voice with Workforce Optimization for ITSM to visualize call metrics from Amazon Connect. The Voice uses Advanced Work Assignment to display the call metrics and active calls along with all other Channel metrics in the Manager Workspace.

Amazon Connect Phone Workforce Optimization for ITSM



Install ServiceNow Voice for ITSM

You can install the ServiceNow Voice for ITSM application (sn_cti_itsm_cnt) if you have the admin role. This plugin installs the ITSM content for integration between ServiceNow Voice and a third-party phone system.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Your organization must have purchased ITSM Pro subscription, which includes the ServiceNow Voice SKU.
- ServiceNow Voice for ITSM requires the following ServiceNow Store application. Ensure that this application is installed before you install ServiceNow Voice for ITSM.

Required ServiceNow Store applications

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Amazon Connect Integration with ServiceNow Voice (sn_cti_amzn_cct)

Integrates the ServiceNow instance with the Amazon Connect server.

Role required: admin

About this task

The following items are installed with ServiceNow Voice for ITSM application (sn_cti_itsm_cnt):

- Contact flows
- Operation handlers

For more information, see Components installed with ServiceNow Voice for ITSM.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the ServiceNow Voice for ITSM application (sn_cti_itsm_cnt) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install ServiceNow Voice for ITSM application (sn_cti_itsm_cnt).
4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.
5. Select **Install**.

Integrating ServiceNow Voice with CSM

Access the CSM -specific contact flows and operation handlers when you integrate the ServiceNow Voice application with the Customer Service Management application.

The ServiceNow Voice for CSM application provides seamless interactive voice response (IVR) and calling experiences for your customers and agents by integrating a cloud contact center provider with the robust capabilities of the Customer Service Management application.

Overview

The ServiceNow Voice for CSM application provides the following Customer Service capabilities for the integration with a cloud call center provider such as the Amazon Connect service:

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- A bot building framework to automate interactions with consumers and customer contacts.
- An inbound contact flow to define the customer experience in an IVR.
- An outbound contact flow to connect with consumers and customer contacts from the phone number field displayed in any of the ServiceNow application UIs.
- Operation handlers to configure automated interactions for customer service cases.
- A phone PIN setup option for consumers and customer contacts.
- Amazon Connect phone queues for the Workforce Optimization for Customer Service application.

To get started with the ServiceNow Voice for CSM application, see Install ServiceNow Voice for CSM.

Key features

Customer experience

Engage via voice-based interactions using a natural language process to do the following:

- Create a case
- Update and check case status
- Speak with an agent
- Request a call back from an agent

Agent experience

- Preview caller information displayed in Agent Workspace before accepting an inbound call.
- Indicate your presence in the Agent Workspace Inbox with voice as a service channel when the Agent Workspace Inbox is integrated with the Agent softphone.
- View real-time transcripts of calls while interacting with a customer. For more information about real-time transcripts, see Real time transcriptions for ServiceNow Voice for Customer Service Management
- Transfer calls to another agent or to a queue, and include transcripts and interaction history with the transfer.
- Make outbound calls to connect with a customer and automatically capture interaction details to simplify data entry.

Manager experience

- Review call transcripts, sentiments, and recordings to explore coaching opportunities for agents.
- Use call metrics, such as the agent call time, to report on agents.
- Monitor real-time phone metrics captured in a unified dashboard by using the Workforce Optimization for Customer Service application.

> **Note:**
> This feature is available when the Workforce Optimization for Customer Service application is enabled for the Customer Service Management application.

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ServiceNow Voice for CSM user roles

The users with the roles listed in the following table can use the ServiceNow Voice for CSM application.

Roles required for ServiceNow Voice for CSM

Roles	Tasks
agent_workspace_user	Initiate or accept voice calls to understand customer issues and resolve issues.
sn_customerservice_manager	View details of voice calls using the interaction record of the Phone type.
sn_customerservice.consumer, sn_customerservice.customer	Initiate or accept voice calls to create and track one's own customer service cases.

Example workflow

The following example workflow shows the use of the ServiceNow Voice for CSM application in resolving a customer issue:

1. A customer is in an IVR call using the ServiceNow Voice for CSM application.
2. The ServiceNow Voice for CSM application identifies the customer and starts an interaction.
3. A welcome message is read out to the customer including announcements, if any.
4. Based on customer identification, the Cloud Call Center for CSM application addresses the call.
   - If the caller is identified as an existing customer who has a customer contact or consumer record with the phone number details available in the Customer Service Management application, a personal greeting is read to the caller and the automated interactions are made available.
   - If the caller is not identified, the call is routed to a live agent.
5. The ServiceNow Voice for CSM application identifies the customer intent using automated interactions, and then based on the interaction responses, either creates or updates a case.

   Note:
   This step in the flow applies only when the caller is an existing customer.

Workforce Optimization for Customer Service

Integrate Voice with Workforce Optimization for Customer Service to visualize call metrics from the Amazon Connect service. Voice uses the Advanced Work Assignment feature to display the call metrics and active calls along with all other Channel metrics in the Manager Workspace. For more information, see Using Voice with Workforce Optimization for Customer Service.

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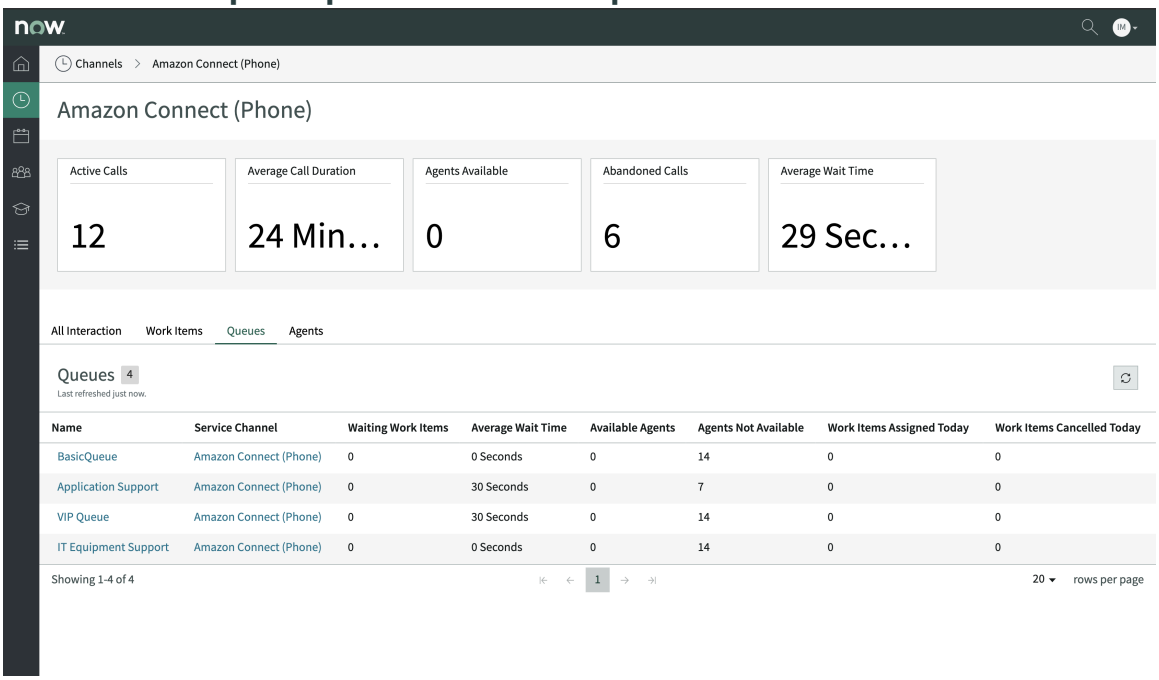
Amazon Connect phone queues in Workforce Optimization for Customer Service



Related topics

- Setting up ServiceNow Voice
- Using Voice
- Components installed with ServiceNow Voice for CSM

Install ServiceNow Voice for CSM

You can install the ServiceNow Voice for CSM application (sn_cti_csm_cnt) if you have the admin role. The application installs related ServiceNow® Store applications if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Your organization must have purchased CSM Pro subscription, which includes the ServiceNow Voice SKU.
- ServiceNow Voice for CSM requires the following ServiceNow Store applications. Ensure that this application is installed before you install ServiceNow Voice for CSM.

  Required ServiceNow Store applications

  Amazon Connect Integration with ServiceNow Voice (sn_cti_amzn_cct)

  Integrates the ServiceNow instance with the Amazon Connect server.

Role required: admin

About this task

The following items are installed with ServiceNow Voice for CSM:

- Contact flows
- Operation handlers

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For more information, see Components installed with ServiceNow Voice for CSM.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the ServiceNow Voice for CSM application (sn_cti_csm_cnt) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you may have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If there are any plugins or applications that need to be installed, you must install them before you can install ServiceNow Voice for CSM.
4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.
5. Select **Install**.

What to do next

To set up Voice for CSM, see Setting up ServiceNow Voice

Configuring the phone PIN settings for ServiceNow Voice

Use a#PIN-based authentication mechanism for enabling a customer contact or consumer to connect with the ServiceNow Voice for CSM #application.

An authentication mechanism for inbound#dialing#enables protecting the details of#customer contacts and consumers from unauthorized users. When using the#ServiceNow Voice for CSM application, you as an administrator can configure the PIN-based authentication mechanism available within the#ServiceNow Voice for CSM application or set up a custom authentication mechanism.

The PIN-based authentication mechanism available within the#ServiceNow Voice for CSM application enables #customer contacts#and#consumers#to use a custom phone PIN for accessing details related to their customer service cases during inbound#dialing.

By default, the#**My Phone PIN** #link in the Additional Configuration section of the setup guide for configuring the Amazon Connect components enables the PIN-based authentication mechanism. For more information about the setup guide, see Integrate ServiceNow Voice with Amazon Connect#.

Note:
The **My Phone PIN** link for customer contacts and consumers is available only with the sample CSM -specific contact flows.

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To enable a PIN-based authentication mechanism, the **My Phone PIN** link in the setup guide uses the predefined Setup PIN record producer that is configured by default for consumers and customer contacts. As an administrator, you can edit the Setup PIN record producer to add any additional ServiceNow roles, include the record producer in a service catalog, and display the service catalog as a module on a customer-facing portal. Customers can then use the module to configure and reset their phone PIN. For more information, see Record Producer and Set up a service catalog.

Real time transcriptions for ServiceNow Voice for Customer Service Management

Agents can see a transcript of voice calls while interacting with customers. Real time transcription allows agents to better understand customer issues, and allows managers to gain insights into customer trends and agent training gaps.

Inbound call example flow for customers and agents

The below examples illustrate common scenarios for using real-time transcriptions for inbound calls. The customer calls in and requests to speak to an agent. As soon as the call begins, the agent can see the transcript of the call in chat panel as they work with the customer. The real time transcript is not visible to the customer, however, the transcript can help the agent better understand the customer issue and refer back to the conversation for clarification.

Personas:

- Customer Service Agent
- Customer

Example Customer Flow for inbound calls.

1. Customer dials an Amazon Connect customer service number.
2. Confirm the approval for recording (press 1).
3. Give instruction: “Speak to a live agent”.
4. Provide a subject for the customer service agent: “Router Issue”.
5. Confirm the subject and wait for the agent to pick up the call.

Example Agent Flow for inbound calls.

1. Log in to your ServiceNow instance and open the Configurable Workspace
2. Log in to Amazon Connect.
3. Set status to **Online**.
4. Wait for a call alert and answer the call.
5. A new interaction with the subject and chat panel opens with the real time transcript.

Outbound call example flow for agents

The below example illustrates a common scenario for using real-time transcriptions in outbound calls. The agent contacts the customer, and as soon as the call starts, the agent can see the transcript of the call in chat panel as they work with the customer. The real time transcript is not visible to the customer, however, the transcript can help the agent better understand the customer issue and refer back to the conversation for clarification.

Persona: Customer Service Agent.

1. Log in and open the Configurable Workspace.
2. Log in to Amazon Connect.

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3. Set status to **Online**.
4. Open a contact record and click the phone icon next to the customer's phone number.

> **Note:**
> The real time transcription only works when you place the call using the "click to call" button.

An interaction is created with the subject "outbound call to `<customer name>`", and a chat panel opens with the transcript.

Integrating ServiceNow® Voice with Virtual Agent

ServiceNow® Voice with Virtual Agent allows you to use the ServiceNow Virtual Agent conversation as an IVR (Interactive Voice Response) in phone and to use the existing ServiceNow Advanced Work Assignment to find an agent in case of an escalation and allows agents to work in ServiceNow Workspace to manage the incoming cases on the queue.

The ServiceNow Voice for Virtual Agent application provides seamless interactive voice response (IVR) and calling experiences for your customers and agents when integrated with a Contact Center In Washington DC release, we have Amazon Connect, a pre-built adapter integrating the ServiceNow Voice with Virtual Agent to provide the robust capabilities of the Virtual Agent application.

To use our pre-built adapter connector with ServiceNow Voice with Virtual Agent, install the Virtual Agent API (sn_va_as_service) plugin.

Key features

User experience

- Have Virtual Agent answer calls and interact with end users for automated deflection on the phone channel.
- Complete workflow including case lookup, interaction, and task management using Virtual Agent.
- Enable agents to interact with users on the phone on workspace in case of any escalations.
- Receive calls in inbox that are routed via the Advanced Work Assignment rules.

Calling and routing

- Make outbound calls via click to call or via auto-connecting the Omnichannel Callback feature.

  For more information, see Configure Conversational IVR with Amazon Connect.
- Transfer to external phone number using the Amazon Connect Softphone.
- Skills-based call assignment using the Advanced Work Assignment.

Artificial intelligence

- Match intent and entity using ServiceNow Virtual Agent.
- Analyze sentiments of the utterances.
- Real-time transcription and storage of the recording.

User benefits

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- Account log in using voice to receive enterprise service.
- Callback options.

Example workflow

The following example workflow shows the use of ServiceNow Voice for Virtual Agent application in resolving a customer issue.

- A customer is in an IVR call using the ServiceNow Voice for Virtual Agent application.
- The ServiceNow Voice for Virtual Agent application identifies the customer and starts an interaction.
- A welcome message is read out to the customer including announcements if any.
- Based on customer identification, the ServiceNow Voice for Virtual Agent application addresses the call.
  - If the caller is identified as an existing customer who has a customer contact or consumer record with the phone number details available in the ServiceNow Voice for Virtual Agent application, a personal greeting is read to the caller and the automated interactions with Virtual Agent conversations are made available.
  - If the caller is not identified, the caller is presented with the guest topics and the live agent topic. The caller can select the live agent topic to route themselves to a live agent.
- The ServiceNow Voice for Virtual Agent application identifies the customer intent using automated interactions, and the Virtual Agent conversations guide customers to complete the workflow, including changing records, passwords or hearing about a case status.

Note:
This step in the flow applies only when the caller is an existing customer.

Related topics

Conversational IVR with Amazon Connect

Integrate Advanced Work Assignment Voice Routing

Provide customers the ability to use AWA as the routing engine for ServiceNow® Voice on Amazon Connect.

Before you begin

Role required: sn_cti_amzn_cct.admin

Procedure

1. Navigate to **Amazon Connect Integration** > **View Instances**.
2. Select the instance you want to configure.
3. Click the **Setup Guide** related link.
4. Go to the **Import Contact Flows** section of the setup guide.
5. To enable Advanced Work Assignment (AWA) Voice Routing, check the checkbox under the **AWA Voice Routing** heading.
   Complete the steps specified in the setup guide:
   a. Complete AWS Lambda and Oauth credential setup.
   b. Download the recommended hold music using the link in the setup guide (you can choose your own hold music, but it cannot be longer than 5 seconds).
   c. See the AWS documentation to upload the hold music.

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What to do next

For more information about integrating ServiceNow® Voice with Amazon Connect, see Integrate ServiceNow Voice with Amazon Connect.

Integrating ServiceNow Voice for HR

The ServiceNow Voice for HR Agent Workspace provides seamless interactive voice response (IVR) and calling experiences for your employees and agents by integrating a cloud contact center provider with the robust capabilities of the Agent Workspace for HR Case Management.

The ServiceNow Voice for HR provides the following capabilities:

- An inbound contact flow to define the employee experience in an IVR.
- An outbound contact flow to connect with employee contacts from the phone number field displayed in any of the ServiceNow application interfaces.
- Operation handlers to configure automated interactions for employee service cases.

Employee experience with ServiceNow Voice for HR

The following example provides an overview of how an employee uses ServiceNow Voice for HR to resolve their HR requests and issues.

An employee calls the general HR phone number with a request. The employee provides information via the interactive voice response (IVR). Using the provided information, ServiceNow Voice for HR tries to identify the caller.

If the caller is identified as an existing employee in HR Agent Workspace, Voice reads a personal greeting to the employee and offers automated interactions to enable the employee to independently address their request. If the employee cannot resolve their request using the IVR, the system routes the call to a live agent.

If the caller is not identified, the call is routed to a live agent.

Agent experience with ServiceNow Voice for HR

Once installed, ServiceNow Voice appears as a pop-up in the HR Agent Workspace where agents can do the following:

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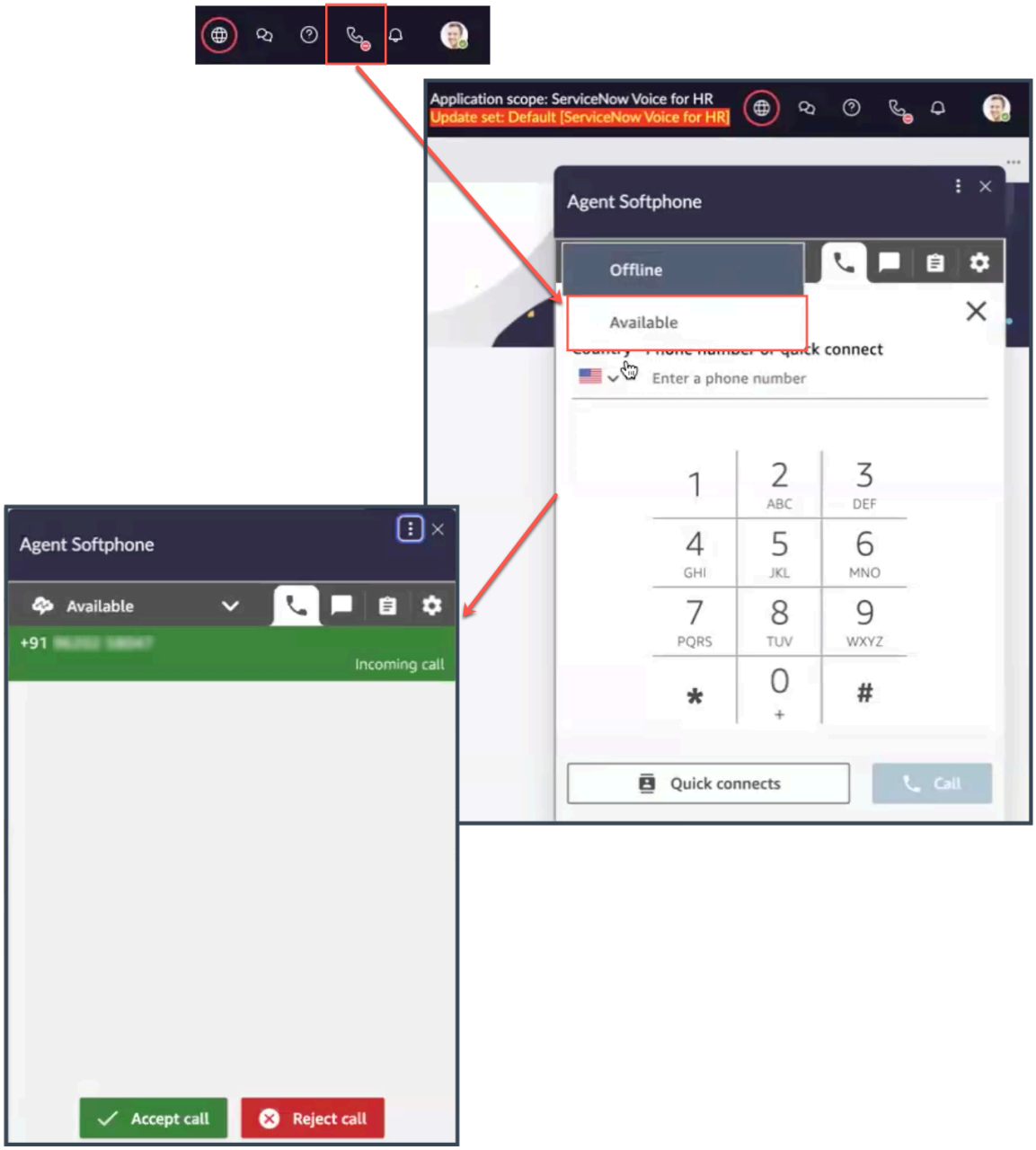
- Indicate availability to receive calls on the agent softphone



- Preview caller information before accepting an inbound call.

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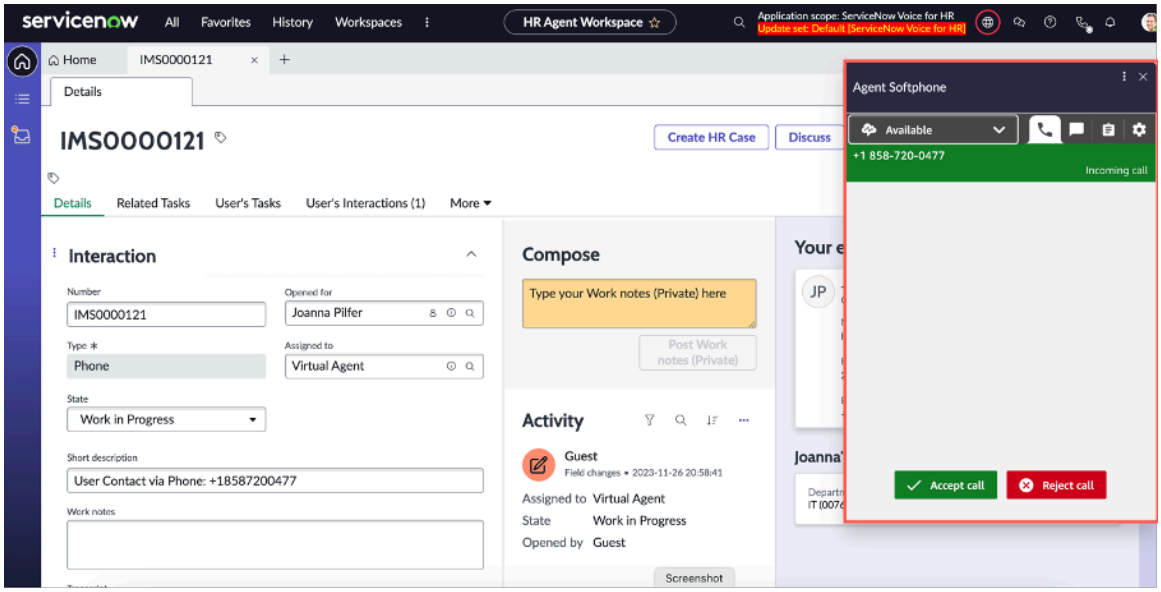
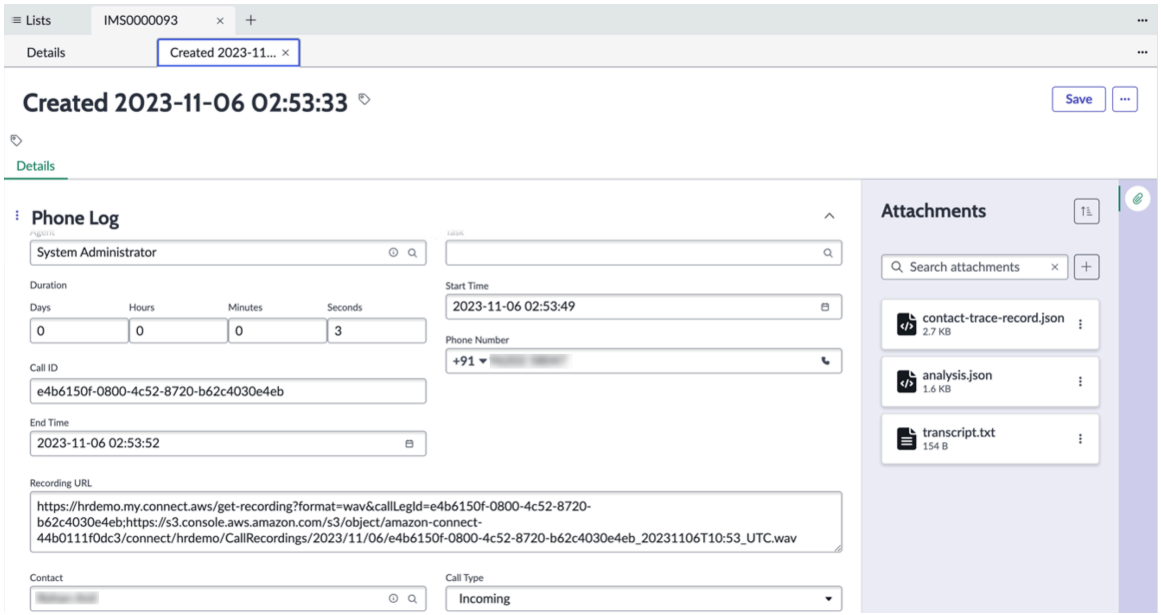


- View the call transcript, hear the recording, and review the call analysis in the interaction related list.



- Make outbound calls to connect with a employee and automatically capture interaction details to simplify data entry

Configuration

ServiceNow Voice for HR (sn_cti_hr_cnt) is activated from the store and requires the following dependency applications:

Application	Description
ServiceNow Voice with Amazon Connect [sn_cti_amzn_cct]	Integrates the ServiceNow instance with the Amazon Connect server. For information about the components installed with this application,

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Application	Description
	see Components installed with Amazon Connect Integration with ServiceNow Voice
Agent Workspace for HR Case Management [sn_hr_agent_ws]	Enables call recording, transcription, and sentiment analysis for ServiceNow Voice with Workspace experience.
ServiceNow Voice for HR Agent Workspace [sn_cti_hr_cnt]	Provides the framework that supports the integration with your third-party phone system.

You must install the dependency applications first, then install ServiceNow Voice for HR. For more information, see Install ServiceNow Voice for HR.

ServiceNow Voice for HR creates an interaction record for every call between an employee and an HR agent with the IMS prefix. These records contain related lists of details relating to the employee and interaction. To maximize the full feature capability, add the Interaction record to the HR Agent workspace. For more information, see Add Interaction Related Records to HR Agent workspace.

Install ServiceNow Voice for HR

You can install ServiceNow Voice for HR if you have the admin role. The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow® Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Your organization must have purchased the Agent Workspace for HR Case Management (sn_hr_agent_ws) subscription.
- Ensure that Amazon Connect Integration with ServiceNow Voice (sn_cti_amzn_cct) is installed. For more information, see Install ServiceNow Voice applications.

Role required: admin

About this task

Follow the steps below to install these applications to use ServiceNow Voice for HR.

The following items are installed with ServiceNow Voice for HR:

- Contact flows
- Operation handlers

For more information, see Components installed with ServiceNow Voice for HR Agent Workspace.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the ServiceNow Voice for HR Agent Workspace (sn_cti_hr_cnt) using the filter criteria and search bar.

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You can search for the application by its name or ID. If you cannot find the application, you may have to request it from the ServiceNow Store.

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed.

4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data comprises the sample records that describe application features for the common use cases. Load the demo data when you first install the application on a development or test instance.

   Important:
   If you don't load the demo data during installation, it's unavailable to load later.

5. Select **Install**.

What to do next

Follow these steps to Integrate ServiceNow Voice with Amazon Connect.

Add Interaction Related Records to HR Agent workspace

ServiceNow Voice for HR creates an interaction record for every call between an employee and an HR agent, which contain related lists of details relating to the employee and interaction. To maximize the full feature capability, add the Interaction record to the HR Agent workspace.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Interaction** > **All**.
2. Open any IMS record.
   If there are no records, create a dummy record.
3. Click **Additional actions** > **Configure** > **Related lists**.
4. Select the **HR Workspace** view.
5. Locate the **Interaction Related Record -> Interaction** option and add it to the **Selected** list.

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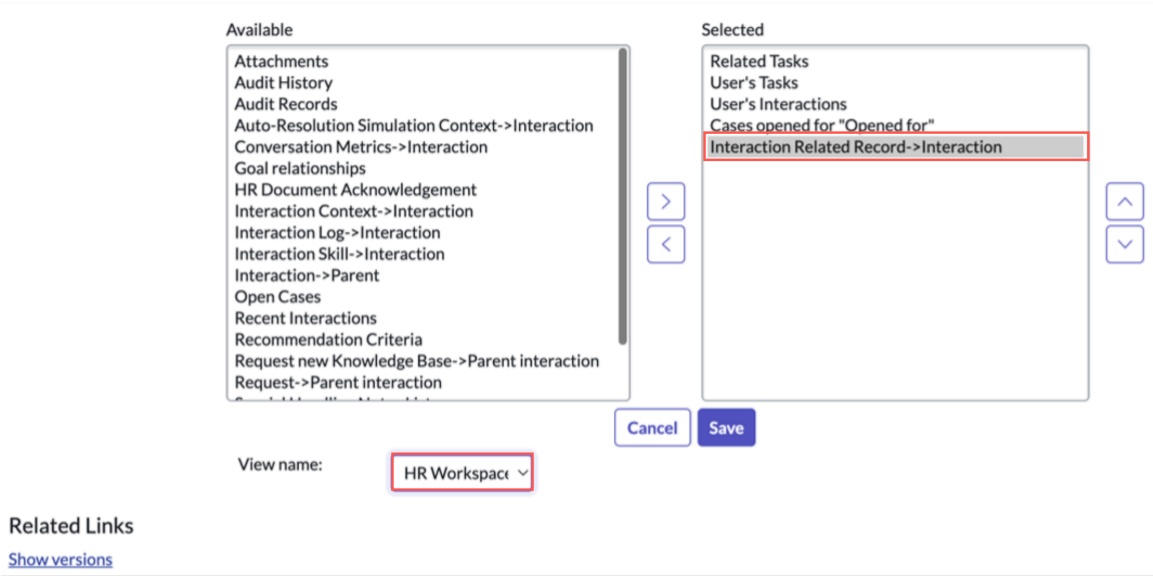

6. Click **Save**.

ServiceNow Voice reference

Reference topics provide additional information about components installed with ServiceNow Voice.

Components installed with ServiceNow Voice Core

Several types of components are installed with activation of the ServiceNow Voice Core application (sn_cti_core), including user roles, plugins, and operation handlers.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Roles installed

Role title [name]	Description	Contains roles
CTI service account [sn_cti_core.service]	Allows communication between the third-party phone system instance and the ServiceNow instance.	sn_openframe_api_user
CTI admin [sn_cti_core.admin]	Creates the framework for integration with a third-party phone system.	None
CTI user manager [sn_cti_core.user_manager]	• Can access the Call Analysis tab and interaction to analyze transcripts, recordings, and sentiments. • Can manage the CTI-enabled user PIN.	None

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Plugins installed

Plugin	Description
Interaction Management (com.glide.interaction)	Enables interaction logging, routing, and queueing
Openframe (com.sn_openframe)	Provides an interface to integrate a communication frame to place and receive calls.

Operation handlers installed

Operation handlers are defined in the ServiceNow instance to run a script based on the intent of the caller and provide response to the caller.

Plugin	Description
$transcript	Saves the call transcript
$query2ssml	Securely queries tables and returns the response as ssml
workItemEvent	If the Advanced Work Assignment plugin (com.glide.awa) is installed, creates a work item on Advanced Work Assignment table before routing the call to agent, and associates an interaction with the work item. **Note:** In a contact flow, invoke this operation handler in the Invoke AWS Lambda Function node just before transferring the flow to a queue
interactionEvent	Defines the life cycle of the an Amazon Web Services (AWS) interaction event, such as initiating an interaction and associating an agent and caller to the interaction
authenticate	Authenticates a user based on the PIN. For information on PIN configuration, see Configuring a phone PIN.
fetchVoiceInteraction	Fetches interaction and processes createConversation flag for creating conversation.

Components installed with Amazon Connect Integration with ServiceNow Voice

Several types of components are installed with installation of the Amazon Connect Integration with Voice application (sn_cti_amzn_cct), including user roles, plugins, and operation handlers.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Roles installed

Role title [name]	Description	Contains roles
Amazon Connect administrator	Configures the integration with the Amazon Connect instance.	sn_cti_core.admin

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Role title [name]	Description	Contains roles
[sn_cti_amzn_cct.admin]		

Plugins installed

Plugin	Description
ServiceNow Voice - Core (sn_cti_core)	Provides the framework that supports the integration with your third-party phone system.
Openframe (com.sn_openframe)	Provides an interface to integrate a communication frame to place and receive calls.

Operation handlers installed

Operation handlers are defined in the ServiceNow instance to run a script based on the intent of the caller and provide response to the caller.

Plugin	Description
$connect.kinesis.event	Receives and processes the call trace record that is created by Amazon Connect in the Amazon Kinesis stream.
$connect.s3.event	Receives and processes JSON events from the S3 buckets where the call recording, transcript and analysis data is created and stored. Associates this information with an interaction and Openframe call log records.
createPhoneLog	Creates a PhoneLog for each call transfer and links the Phone Log to the Interaction Related Record

Components installed with ServiceNow Voice for ITSM

Several contact flows and operation handlers are installed with activation of the ServiceNow Voice for ITSM application (sn_cti_itsm_cnt).

Contact flows installed

Contact flow	Description
ServiceNow ITSM Inbound Demo Flow	Contains the call tree for inbound calls. When a caller contacts the call center, using the voice or dual-tone multi frequency (DTMF) inputs from caller, the contact flow is invoked in the Amazon Connect instance based on the caller context. This contact flow contains nodes that act as integration points between Amazon services and the ServiceNow instance. Based on the nodes defined in the contact flow, the corresponding operation handlers are triggered in the ServiceNow instance. The caller then gets the response that is defined in the operation handler.
ServiceNow ITSM Outbound Demo Flow	Contains the call tree for outbound calls. It specifies the whisper message that a caller hears before getting connecting to an agent.

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Operation handlers installed

Operation handler	Description
sn_FallbackIntent	Captures the user input
manageIncident	Manages an existing incident
unlockAccount	Unlocks a user account
announcements	Makes announcement for a caller
manageIncident.DialogCodeHook	Initializes the Amazon Connect instance and validates incoming calls
createIncident	Creates an incident

Components installed with ServiceNow Voice for CSM

Several contact flows and operation handlers are installed with Cloud Call Center for CSM application (sn_cti_csm_cnt).

Contact flows installed

Contact flow	Description
ServiceNow CSM Inbound Demo Flow	Contains the call tree for inbound calls. When a caller contacts the call center, using the voice or dual-tone multi frequency (DTMF) inputs from caller, the contact flow is invoked in the Amazon Connect instance based on the caller context. This contact flow contains nodes that act as integration points between Amazon services and the ServiceNow instance. Based on the nodes defined in the contact flow, the corresponding operation handlers are triggered in the ServiceNow instance. The caller then gets the response that is defined in the operation handler.
ServiceNow CSM Outbound Demo Flow	Contains the call tree for outbound calls. It specifies the whisper message that a caller hears before getting connecting to an agent.
ServiceNow CSM Transfer to Agent Flow	The call is relocated to another persona using call transfer functionality. A new PhoneLog is created with each transfer. The PhoneLog also includes any attachments associated with the interaction. Call transfers can be done with either incoming and outgoing calls.
ServiceNow CSM Transfer to Queue Flow	The inbound call is relocated to a queue using call transfer functionality. A new PhoneLog is created with each transfer. The PhoneLog also includes any attachments associated with the interaction. Call transfers can be done with either incoming and outgoing calls.

Operation handlers installed

Operation handler	Description
$csm.connect.s3.event	Receives and processes events from S3 buckets where connect audio, transcript and analysis data is created and stored and tries to associate with interaction and openframe call log records.

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Operation handler	Description
	This is CSM operation handler for the new data model with conversation as metadata
$csm.connect.kinesis.event	Handler to process CTR events from Kinesis stream for CSM integration with VA Conversations
speakToCSMAgent	Enables customer contacts and consumers to speak with a live agent.
createCSMCase	Enables customer contacts and consumers to create a customer service case.
manageCSMCase	Enables customer contacts and consumers to update an existing case.
csmAnnouncements	Makes announcements for a caller.
createCSMInteraction	Creates an interaction record in the ServiceNow instance for the incoming calls.
updateCSMInteraction	Updates an existing interaction record in the ServiceNow instance for the incoming calls.
fetchCSMInteraction	Fetches interaction and processes sn_cti_csm_cnt.enable_ims_update sys property for creating conversation.

Components installed with ServiceNow Voice for HR Agent Workspace

Several contact flows and operation handlers are installed with ServiceNow Voice for HR Agent Workspace.

Contact flows installed

Contact flow	Description
ServiceNow HR Inbound Demo Flow	Contains the call tree for inbound calls. When a caller contacts the call center, using the voice or dual-tone multi frequency (DTMF) inputs from caller, the contact flow is invoked in the Amazon Connect instance based on the caller context. This contact flow contains nodes that act as integration points between Amazon services and the ServiceNow instance. Based on the nodes defined in the contact flow, the corresponding operation handlers are triggered in the ServiceNow instance. The caller then gets the response that is defined in the operation handler.
ServiceNow HR Outbound Demo Flow	Contains the call tree for outbound calls. It specifies the whisper message that a caller hears before getting connecting to an agent.

Operation handlers installed

Operation handlers are reusable code components that get executed on the ServiceNow instance. They work on the request/response message exchange pattern.

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Operation handler	Description
createHRInteraction	Creates an interaction record in the ServiceNow instance for the incoming calls.
fetchHRInteraction	Fetches interaction and processes sn_cti_hr_cnt.enable_ims_update sys property for creating conversation.

ServiceNow AI Platform Legacy Capabilities

Explore ServiceNow Legacy options for past releases and versions of the ServiceNow AI Platform.

Legacy Chat



Enable chat between users and with live agent support.

Legacy Notify



Communicate and handle notifications through Twilio.

Orchestration



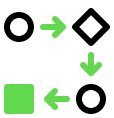
Extend automation capabilities to external services.

Task Communications Management



Create communications plans for any event.

Workflow



Legacy chat

Provide communication resources with ServiceNow legacy chat app. Create one-on-one or group conversations with instant messaging or chat rooms, link to task records to enable live collaboration, and connect users to live support from help desk agents.

Legacy Notify

Keep users in touch with each other using Notify. This application connects to your business's Twilio account and provides multiple communication formats. Set up conference calls to coordinate between multiple teams or individuals, and create notifications to send to specific contacts. Implemented by default with Incident Communications Management, Notify is available for use with various other ServiceNow applications.

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Orchestration

Take the power of ServiceNow beyond the ServiceNow AI Platform. Orchestration extends the platform's automation capabilities to external instances, with activity packs to automate IT and business processes. Create more activities and packs using Activity Designer and Scoped Applications, and track data flow through your external activities with Databus.

Task Communications Management

Define and implement communications plans based on any event you choose. The Task Communications Management app assists event-based communication through Slack, SMS, and email. Define plans, connect plans with task tables, and ensure easy collaboration and issue resolution.

Workflow

Create clear action plans and automate your business step-by-step with Workflow. This app offers a graphical user interface with easy drag-and-drop action, easily handling the design of multi-step processes. There are various activities, such as records generation, user notification, script actions, and so on. These activities fit into a custom flowchart, giving users a clear picture of the working processes for your enterprise.

Connect

ServiceNow® Connect is a real-time messaging platform that connects you to your coworkers, bypassing email and static documents.

Connect integrates with other features within the system, such as Visual Task Boards, Human Resources Management, and Customer Service Management. The Connect interface overlays the standard interface, which allows users to participate in conversations while they work.

Connect contains the following features:

- Connect Chat: Enables users to chat with individuals and groups, quickly share files, and collaborate on any record by connecting with the right people instantly.
- Connect Support: Enables support agents to provide real-time assistance to end users, using queues. Requires the Connect Support plugin.

Core UI is required to use Connect.

Important:
Connect is not supported in Next Experience. If you turn on Next Experience, Connect functionality will no longer work. See Next Experience.

Note:
Connect does not replace legacy chat but offers some of the same functionality. Do not use these features concurrently

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Explore **Set up** **Administer**

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- Upgrade to New York
- Connect interface
- Connect Chat
- Connect Support
- Activate Connect
- Activate Connect Support
- Supported browsers for Connect Chat
- Properties for Connect
- Connect actions
- Configure the fields on a record card in Connect
- Properties for Connect Support

Use	Develop	Troubleshoot and get help
• Start a direct or group conversation • Follow a record in Connect •	• Developer training • Developer documentation	• Ask or answer questions in the Connect community • Search the Known Error Portal for known error articles • Contact Customer Service and Support

Supported browsers for Connect Chat

The system supports Connect Chat on most modern browsers.

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

- The latest public release of Firefox or Firefox ESR
- The latest public release of Chrome
- Safari version 9.1 and later
- Microsoft Edge version 90
- Internet Explorer version 11
  - Edge mode is supported.
  - Compatibility mode is not supported.
  - Setting Security Mode to High (via the **Internet Options** > **Security** tab) is not supported.
  - Internet Explorer 11 is susceptible to memory leaks, which may impact performance, especially in Windows 7.

Activate Connect

Connect is active by default on new instances. For upgraded instances, you can activate the Connect plugin (com.glide.connect) if you have the admin role.

Before you begin

Role required: admin

About this task

If you used Collaboration in the Fuji release, the Connect plugin is activated automatically.

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Important:
Connect is not supported in Next Experience. If you turn on Next Experience, Connect functionality will no longer work. See Next Experience.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins

Properties installed with Connect

Properties are added with activation of Connect.

Note:
To open the System Property [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Name	Description
collaboration.email_interval	Sets the number of minutes the system waits before sending a Connect notification email to an inactive user. • **Type**: integer • Default value: 3 • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Configure the email notification interval
collaboration.frameset	Determines whether the Connect overlay is visible (enabled). This property also impacts Connect Support. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Disable the Connect overlay

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Name	Description
collaboration.polling_interval	Sets the number of seconds the system waits between polling for new Connect messages. This property also impacts Connect Support. • **Type**: integer • Default value: 10 • Location: System Property [sys_properties] table
connect.notification.audio_alert	Specifies the audio file to play to notify users of new messages, support conversation transfers, and @mentions in Connect. This property's value must point to the **Name** field of a record in the Audio File [db_audio] table. This property also impacts Connect Support. • **Type**: string • Default value: connect_alert.mp3 • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Customize the Connect audio notification sound
connect.retrieve_external_link_content	Enables Connect to render URLs for external sites as links. When this property is disabled, URLs that point anywhere outside the instance appear as plain text. This property also impacts Connect Support. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties**
connect.roles	Determines which user roles are required to access Connect. When the value is blank, no role is required. This property also impacts Connect Support. **Note:** If you choose to restrict Connect access to specific roles, consider updating the role requirements for Connect modules and other access points. • **Type** : string • Default value: <empty> • Location: **Collaborate** > **Administration** > **Properties**
glide.connect.enabled	Hides the **Create or Join Chat Room** related link, which appears on the Incident form when legacy chat is enabled. Legacy chat and Connect Chat should not be used concurrently and this property should not be modified.

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Name	Description
	• **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties**
glide.connect.chat.disabled	Disables and hides all UI elements related to Connect. • **Type**: true | false • Default value: false • Location: System Property [sys_properties] table

glide.live_feed.task_header_button	Determines whether the show live feed icon () and **Follow** button are available in the form header of tables that have the *live_feed=true* dictionary attribute.
	• **Type**: choice list
	• Default value: collaboration
	• Other possible values:
	  ○ **both**: enables both the show live feed icon and the **Follow** button.
	  ○ **live_feed**: enables the show live feed icon.
	  ○ **none**: disables both the show live feed icon and the **Follow** button.
	• Location: **Collaborate** > **Administration** > **Properties**
	• Learn more: Configure record conversations

Activate Connect Support

The Connect Support plugin (com.glide.connect.support) is no longer available.

Before you begin

Important:

This plugin is no longer available. In Paris and future releases, Connect Support no longer receives enhancements or non-priority bug fixes. Consider migrating to ServiceNow® Advanced Work Assignment and Agent Chat in workspace to automatically assign chat requests and other work items to agents. For details, see Migrate from Connect Support to Advanced Work Assignment and Agent Chat.

If you are currently using the legacy chat feature to provide help desk support, close any open help desk chats before activating Connect Support. Legacy chat and Connect Support should not be used concurrently. When you activate Connect Support, the system automatically sets the state of all Chat Queue Entry [chat_queue_entry] records to **Closed Complete**. This ends any open help desk chats. For more information, see Migrate from legacy chat to Connect Support.

Role required: admin

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Properties installed with Connect Support

Properties are added with activation of Connect Support.

Name	Description
connect.support.conversation_limit	Determines how many support conversations an individual agent can have at one time. When the value is set to **-1**, an agent can participate in an unlimited number of conversations. • **Type**: integer • Default value: -1 • Location: **Collaborate** > **Support Administration** > **Properties**
connect.support.idle.delay	Determines how many seconds a user must be inactive in a support conversation before an idle countdown timer appears. • **Type**: integer • Default value: 120 • Location: **Collaborate** > **Support Administration** > **Properties**
connect.support.idle.count_down	Determines how many seconds the idle countdown timer remains open after it appears. If the idle user does not dismiss the timer before the countdown completes, the system closes the support session.

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Name	Description
	• **Type**: integer • Default value: 60 • Location: **Collaborate** > **Support Administration** > **Properties**
connect.support.show_agent_avatar	Determines whether an agent's avatar is shown in a support conversation (enabled). When the property is disabled, users see the agent's name only. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Support Administration** > **Properties**
connect.support.user.closed.conversation_limit	Determines how many closed conversations appear in a user's support conversation history. When the value is set to **0**, all previous conversations appear in the history. • **Type**: integer • Default value: 0 • Location: **Collaborate** > **Support Administration** > **Properties**
glide.connect.support.enabled	Disables or enables Connect Support. When the property is enabled, the **Service Desk Chat** button in the Employee Self-Service portal opens the conversation in Connect Support, rather than legacy chat. Additionally, the Support tab appears in the Connect sidebar. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Support Administration** > **Properties**
glide.connect.support.reflect_system_messages	Controls whether Connect Support reflects system messages in records created from a support chat, for example, transfer notices, automated queue messages, etc. • **Type**: true | false • **Default value**: false • Location: System Property [sys_properties] table

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Additional plugins for Connect Support

Additional plugins are available for Connect Support. These plugins integrate Connect Support with other features and provide capabilities to track performance metrics.

You must have the admin role to activate these additional plugins. For details, see Activate a plugin .

Additional plugins for Connect Support

Plugin	Description
Connect Support and Service Portal Integration [com.glide.connect.support.service-portal]	Adds Connect Support components for use in the Service Portal.
Connect Support Manager's Dashboard [com.glide.connect.managers_dashboard]	Provides a homepage for Connect Support, and all required configuration records. Though the plugin name contains the term dashboard, the plugin does not provide functionality related to Performance Analytics dashboards. Homepages are similar to dashboards, but do not require Performance Analytics roles to view. **Note:** The Connect Support Manager's Dashboard plugin does not activate Connect Support automatically. You must activate Connect Support to collect data for the homepage.
Human Resources Application: HR Connect [com.snc.hr.hr_connect]	Sets up a human resources (HR) chat queue and makes it available on the HR Service Portal. **Note:** This plugin does not appear in the **System Definition>Plugins** list. Contact ServiceNow personnel to activate it. If not already active, the Human Resources Application: HR Connect plugin activates the Human Resources Application: Core [com.snc.hr.core] plugin that provides basic HR features.
Performance Analytics - Content Pack - Service Desk Chat [com.snc.pa.chat]	Provides the **Service Desk Chat Monitor** dashboard, which analyzes key Connect Support metrics and indicators. The Performance Analytics - Content Pack - Service Desk Chat plugin activates the Connect Support Manager's Dashboard [com.glide.connect.managers_dashboard].
Performance Analytics - Context Sensitive Analytics for Chat	Provides in-form analytics for Connect Support. These analytics are available as a related link on the Chat Queue Entry [chat_queue_entry]

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Additional plugins for Connect Support (continued)

Plugin	Description
[com.snc.pa.chat.context_sensitive_analytics]	form, and also as the **Context Sensitive Analytics - Chat** dashboard. The Performance Analytics - Context Sensitive Analytics for Chat plugin activates the Performance Analytics - Content Pack - Service Desk Chat [com.snc.pa.chat] plugin if it is not already active.

Connect interface

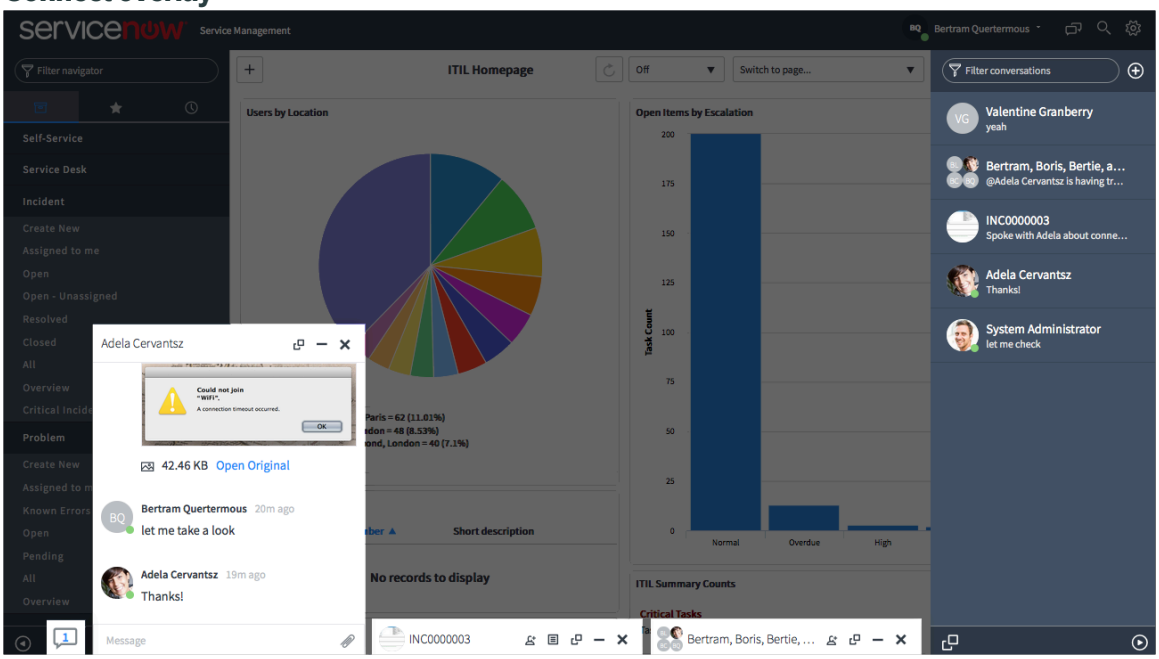
Users can work in a compact view of Connect, which overlays the standard user interface, or in a full-screen workspace.

Connect Chat and Connect Support share the same interface, so support agents can keep track of all their conversations in one place.

Connect overlay

The Connect overlay appears over the standard user interface. It consists of the Connect sidebar, which is the primary interface for Connect Chat and Connect Support, and any Connect mini windows that are open. Each mini window contains a header, a conversation area, and a message field.

Connect overlay



Note:
An administrator can disable the Connect overlay so users can only use the Connect workspace, a full-screen interface with additional Connect tools.

Connect sidebar

The Connect sidebar is the primary interface for Connect Chat and Connect Support. It lists your conversations and provides access to create conversations.

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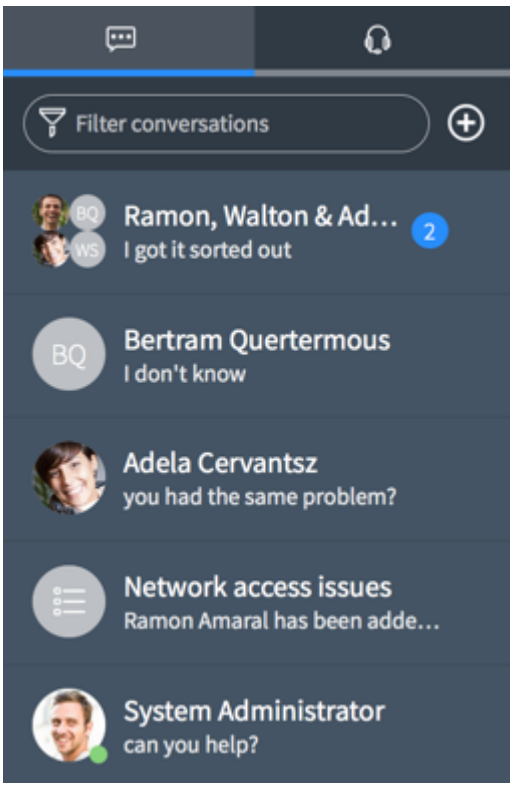
The sidebar is collapsed by default. Click the toggle Connect sidebar icon ( ) in the banner frame to expand or collapse the sidebar, which appears on the right edge of the interface.

Connect Chat

The chat view of the sidebar is available to all users. If Connect Support is enabled, users must click the chat tab of the sidebar, which is represented by a speech bubble icon. If Connect Support is not enabled, there are no tabs in the sidebar and the chat view displays by default.

The chat view of the sidebar lists all your current Connect Chat conversations. It also contains a filter tool and a button to create conversations.

Chat view of the Connect sidebar



If you have unread messages in a conversation, a number appears by the conversation in the sidebar. Point to a conversation and click the **x** icon to remove the conversation from the sidebar.

Connect Support

The support view of the sidebar is available when Connect Support is activated. The support view is visible only to users who are agents for at least one support queue. Users must click the support tab of the sidebar, which is represented by a headset icon.

The support view displays **Queues** to which you belong. It also displays your open support conversations under **Cases**.

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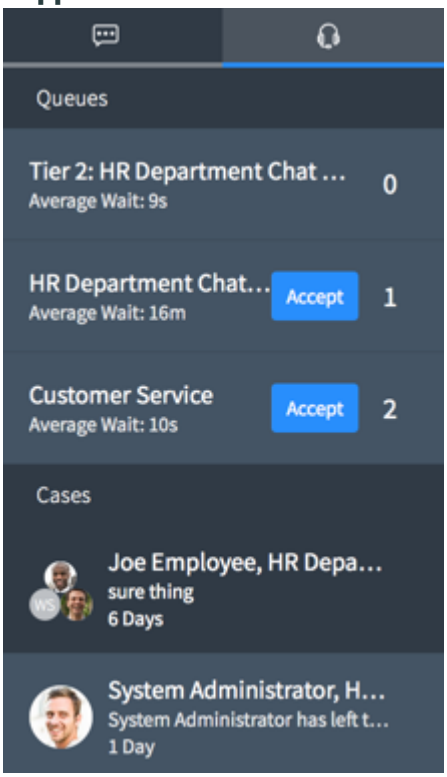
Support view of the Connect sidebar



If you have unread messages in a conversation, a number appears by the conversation in the sidebar.

Connect mini windows

When you open a Connect Chat or Connect Support conversation in the Connect overlay, it opens in a Connect mini window. Each mini window contains a header, a conversation area, and a message field.

Several icons appear in the mini window header and by the message field.

Note:
The icons you see for each conversation depend on the conversation type and other conditions.

Chat mini window icons

Icon	Name	Description
	Add user	Add a user to the conversation. This icon is visible for group and record conversations only. Administrators can enable this icon for Connect Support conversations.
	View document	View the record associated with the conversation. This icon is visible for record and support conversations only.
	New window	Open the conversation in the Connect workspace, a full-screen window with additional Connect tools.
	Collapse/ Expand conversation	Hide or show the conversation. Alternatively, click anywhere in the mini window header to the left of the icons.

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Chat mini window icons (continued)

Icon	Name	Description
	Close window	Close the mini window. The conversation remains in the Connect sidebar and the history is preserved when you reopen the conversation. You can also close a mini window by pressing the Escape key.
	Connect actions	Open the Connect actions menu, which contains options like **Transfer** and **Create Incident**. This icon is visible only when Connect actions are available for the conversation. By default, this icon is visible for support conversations only. Administrators can add options to this menu by creating Connect actions.
	Message type	Choose whether messages are added to the associated record as comments or work notes. This icon is visible only for record and support conversations.
	Attach file	Attach and send a file. Select one or more files and click Open. You can also add an attachment by dragging and dropping it directly in the conversation.

Connect workspace

The Connect workspace is a full-screen view of all your Connect Chat and Connect Support conversations in one place. It contains the conversation pane, which displays the conversation header and an expanded version of the mini window, and the conversation tools area.

To open the Connect workspace, navigate to **Collaborate** > **Connect Chat** or click the new window icon () in a Connect mini window. If you do not have any recent conversations, a screen appears with helpful information about Connect.

The Connect workspace is composed of the following elements.

Connect workspace elements

Element	Description
Sidebar	Provides access to conversations. The Connect sidebar behaves the same way in the workspace as it does in the Connect overlay. The only difference is that the sidebar appears on the left edge of the Connect workspace. For more information about using the sidebar, see Connect sidebar.
Conversation pane	Displays the currently selected conversation.
Conversation tools	Provides quick access to key information, conversation members, attachments, and notification preferences for the currently selected conversation. Some of the conversation tools vary depending on the type of conversation.

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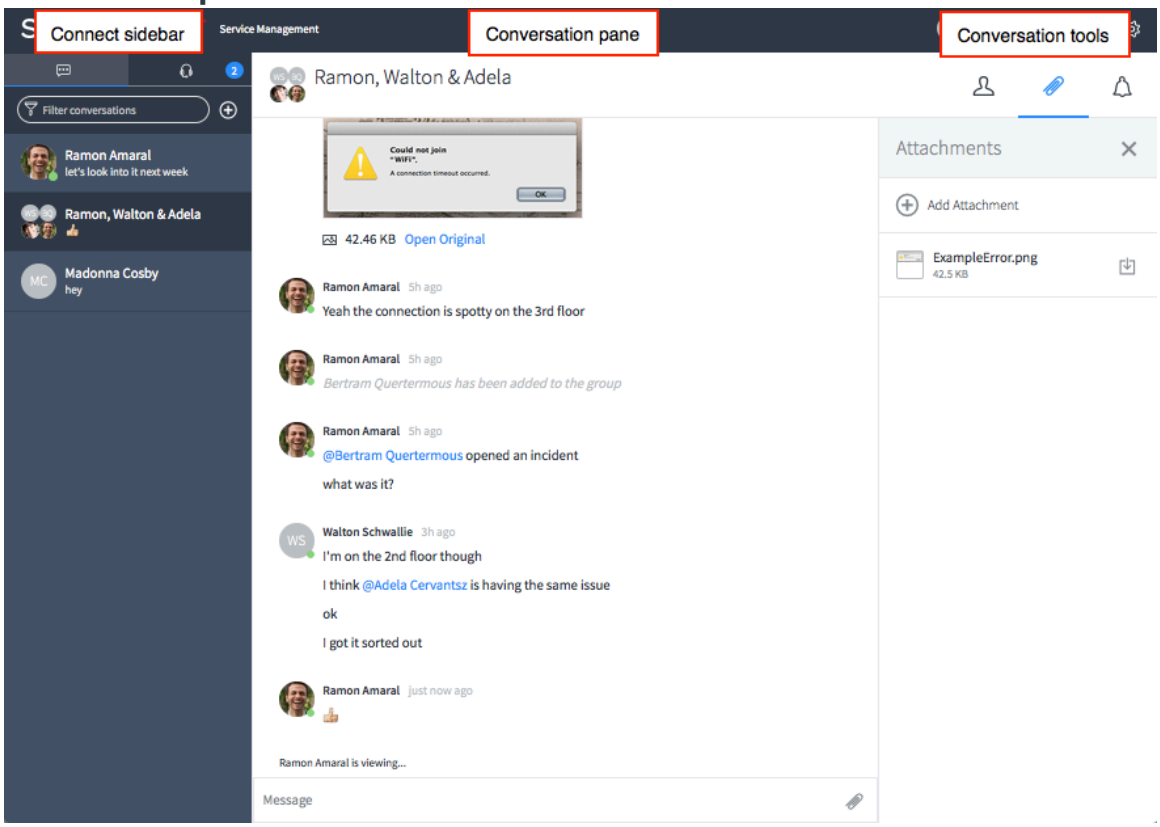
Connect workspace



Conversation pane

The conversation pane of the Connect workspace displays the conversation header and an expanded version of the mini window.

The header displays basic conversation details like the avatar and name. You can edit these details for group or record conversations.

Below the header, messages appear in chronological order. You can enter messages in the text entry field at the bottom of the window.

Connect conversation tools

The conversation tools area in the Connect workspace contains several tabs, each represented by an icon.

Click an icon to open the tab. Click the same icon again to hide the tab. The tabs you see for each conversation depend on the conversation type and other conditions.

Conversation tool tabs

Tab icon	Tab name	Description
ⓘ	Info	Contains the following sections, each of which appears only if it contains information. • **Record**: Lists details about the record the current conversation follows, such as record number, state, assignee, and short description. The fields displayed in this section vary by the type of record. This section is available only for record conversations.

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Conversation tool tabs (continued)

Tab icon	Tab name	Description
		• **Related Records**: Lists Visual Task Boards and task records that have been referenced in the conversation, such as incidents, problems, or changes. When you send a record number as a message or drag a record in a conversation, it appears as a link. The list displays the short description for each task. Click a task to open the record in a new browser tab. Only conversation members who have rights to view the tasks can access them. • **Links**: Lists URLs that have been referenced in the conversation. Click a link to open the destination page in a new browser tab. This tab is not available for support conversations.
	Record	Displays a compact form view of a record created from the current conversation, such as an incident. If more than one record has been created from the conversation, there is a separate record tab for each one. These tabs are available only for support conversations.
	Knowledge Base	Displays a compact view of the knowledge homepage. For more information, see Share knowledge in a Connect Support conversation.
	Members	Lists all members of the current conversation. You can add or remove conversation members for group and record conversations.
	Attachments	Lists all attachments in the conversation. Click an attachment to open it. Click **Add Attachment** to upload an attachment.
	Notification preferences	Contains settings to control which notifications you receive for the current conversation. For more information, see Edit which notifications you receive for a conversation.

Enable or disable Connect notifications globally

You can edit your Connect notification settings globally to enable or disable mobile, desktop, email, or audio notifications for all your Connect Chat and Connect Support conversations.

Before you begin

Role required: none

About this task

By default, Connect mobile, email, and audio notifications are enabled globally. You must enable desktop notifications.

An administrator can customize the sound used for audio notifications.

Note:
You receive mobile notifications only if you have installed the ServiceNow mobile app.

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Procedure

1. In the banner frame, click the gear icon () to open the system settings.
2. In the system settings window, click the **Notifications** tab.
3. In Notifications by Category, navigate to **Connect**.
4. Enable or disable Connect mobile, desktop, email, or audio notifications.
5. **Optional:** Configure the following system notifications.
   For more information on how to configure system notifications, see Apply notification conditions.

Notification	Description
Activity Stream @Mention Email	Sends an email alert to a user anytime they get @mentioned in an activity stream
Collaboration Offline Group Message(s)	Sends email to offline users who are members of a group conversation after a certain number of minutes determined by the *collaboration.email_interval* property to limit spam. **Note:** It takes 90 seconds after a user logs out for the system to register that the user is offline. If a message is sent to the user within 90 seconds of them logging out, then the user does not receive the notification.
Collaboration Offline Message Bundle	Sends email to offline users after a certain number of minutes determined by the *collaboration.email_interval* property to limit spam. **Note:** It takes 90 seconds after a user logs out for the system to register that the user is offline. If a message is sent to the user within 90 seconds of them logging out, then the user does not receive the notification.
ConnectMessagePushNotification	Uses a push notification to inform users when there are new messages in a conversation
ConnectNotificationPushNotification	Uses a push notification to inform a user when they have been @Mentioned in a record

What to do next

Edit which notifications you receive for a specific conversation.

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Connect notification browser support

The following browsers support Connect chat notifications.

Connect chat browser support

Browser	Enable notification steps
Chrome	1. From a Chrome window, click the Chrome menu in the upper right corner. 2. Go to **Settings** > **Show advanced settings...** > **Privacy** > **Content settings**. 3. In the Content settings window, from the notifications section, select your notification settings.
Mozilla Firefox (starting with version 44)	Manage browser notification settings using the information icon next to the URL.
Safari (starting with OS X Mavericks)	1. From a Safari window, open **Preferences**. 2. Select the notifications tab. 3. Select **Allow** or **Deny** to control which websites have access to notifications.
Microsoft Edge	Notifications are enabled by default on Windows 10 PCs and tablets starting with EdgeHTML 14. For more information, see https://blogs.windows.com/msedgedev/2016/05/16/web-notifications-microsoft-edge/#pVkwubg7uvROayyl.97.

Note:
Internet Explorer does not support Connect notifications out of box.

Edit which notifications you receive for a conversation

You can control which types of Connect notifications you receive for each conversation and when you receive them.

Before you begin

Role required: none

About this task

Connect can send mobile, desktop, email, and audio notifications to inform you of messages and other activity, when you are not actively viewing Connect. You can edit your notification preferences in each conversation to control which notifications you receive for the conversation and under what circumstances. For example, if you are a member of a large group conversation, you might want to receive mobile, desktop, and email notifications for all activity, and audio notifications only when someone mentions you. You might also want to disable a certain type of notification entirely for a conversation.

By default, you receive mobile, email, and audio notifications for all activity in every conversation you belong to. You must enable desktop notifications manually. Not all browsers allow desktop notifications. For more information, see Enable or disable Connect notifications globally.

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An administrator can customize the sound used for audio notifications.

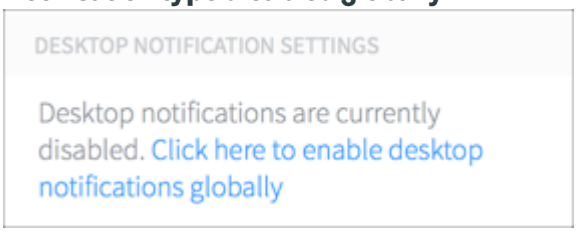
Note:
You receive mobile notifications only if you have installed the ServiceNow mobile app.

Procedure

1. Open a conversation in the Connect workspace.
2. In the conversation tools to the right of the conversation, click the notification settings tab ( ).
3. Edit the following settings according to your preferences.

Note:
If a notification type is disabled globally, a link to enable that type appears. You must click the link before you can edit conversation-specific notification settings.

Notification type disabled globally



Mobile Notification Settings	Choose to receive push notifications: ○ For all activity ○ Only when @ mentioned (this option is not available for direct conversations) ○ Never
Desktop Notification Settings	Choose to receive desktop notifications: ○ For all activity ○ Only when @ mentioned (this option is not available for direct conversations) ○ Never
Email Settings	Choose to receive email notifications: ○ For all activity ○ Only when @ mentioned (this option is not available for direct conversations) ○ Never
Audio Notification Settings	Choose to receive audio notifications: ○ For all activity ○ Only when @ mentioned (this option is not available for direct conversations) ○ Never
System Message Notifications	Enable or disable system message notifications, which are automatically

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	generated by events like conversation membership changes and Visual Task Board updates. This option is not available for direct conversations.

Upload a profile picture

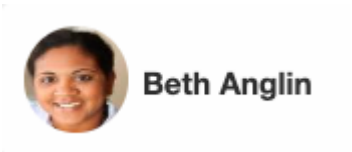
You can upload a profile picture in your Live Feed profile to use as an avatar in Connect Chat and Connect Support conversations.

Before you begin
Role required: none

About this task
Users who do not have profile pictures are represented by an avatar with their initials. Administrators can upload a profile picture in a user record which displays if there is no Live Feed photo.

Procedure

1. Navigate to **All** > **Collaborate** > **Live Feed**.
2. Click the tile with your picture or initials and title.



3. Use one of the following actions to add your photo.
   - Locate the photo file you want to use and drag it over the existing photo.
   - Point to the existing picture (or tap the photo in the smartphone or tablet interface) to display the **Upload a picture** link. Click the link, navigate to the location of the photo you want to use, and click **Open**.



Related topics

Update your Live Feed profile

Drag a file into a Connect conversation

Drag and drop functionality in Connect Chat and Connect Support provides an easy way to share external attachments and links or items from within your instance.

Before you begin
Role required: none

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About this task
You can drag several things from within an instance, including items from the application navigator, records or breadcrumbs from lists, and Visual Task Boards from the My Task Boards page.

Procedure

Drag an item in a Connect mini window.

To drag a record from a list, drag the reference icon ( ), the record number, or a reference column value.

Connect accepts the same file extensions as the platform. For more information, see Add and manage attachments.

Share a Visual Task Board in a Connect conversation

You can share a Visual Task Board in a Connect Chat or Connect Support conversation.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Self-Service** > **Visual Task Boards**.
2. Drag a task board to a Connect mini window.
   A link to the task board appears in the conversation. The task board is also listed in the conversation tools, which are visible in the Connect workspace. Only conversation members who are members of the board can access it. If you share a task board in a Follow a record in Connect, it appears as a URL in the record activity stream.

Related topics

Connect

Visual Task Boards

Mention a user in a Connect conversation

You can get someone's attention in a group conversation by mentioning them.

Before you begin
Role required: none

About this task
Users can set their notification preferences so they receive notifications only when they are mentioned. Mentioning a user creates a shortcut to view their basic information and send them a direct message.

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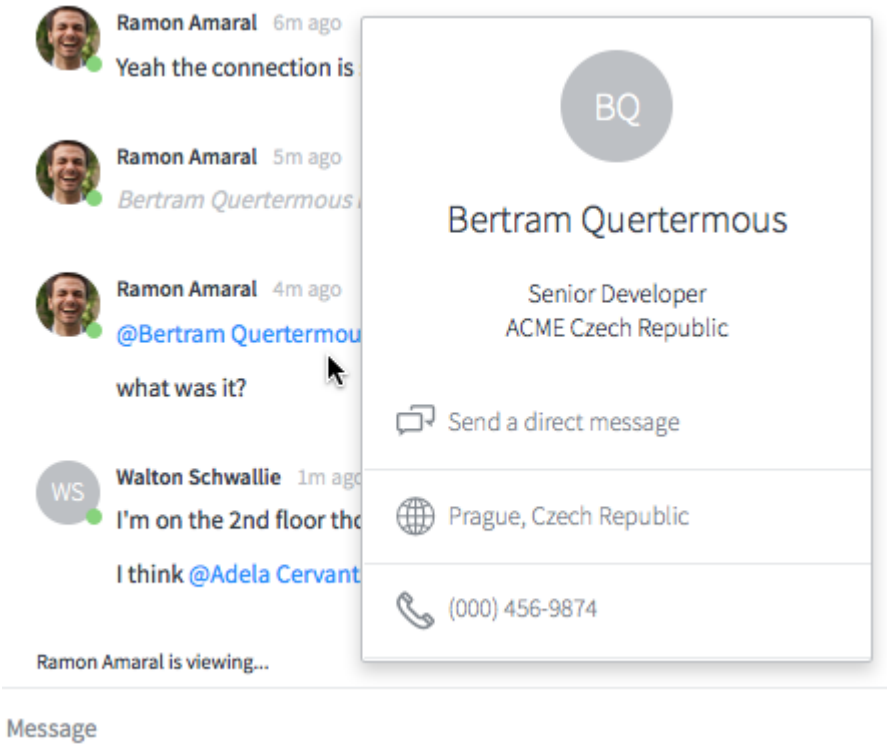

Procedure

1. Open a Connect group conversation.
2. In the message field, type the @ character.
   A suggestion menu appears with the names of the conversation members.
3. Select the person you want to mention and send the message.

Connect administration

Administrators can configure various performance settings and features that impact both Connect Chat and Connect Support.

Note:
There are also administrative options specifically for Connect Chat or Connect Support. For more information, see Connect Chat administration and Connect Support administration.

Properties for Connect

The Connect Properties page provides several configuration options for Connect.

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

Users with the admin role can access these properties by navigating to **Connect** > **Administration** > **Properties**.

Note:
Many of the properties also impact Connect Support.

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Properties for Connect

Property	Description
Disable Presence glide.ui.presence.disabled	Turns off user presence globally when enabled. Enabling this property turns off user presence throughout the platform, not just in Connect. • **Type**: true | false • Default value: false • Location: **Connect** > **Administration** > **Properties** • Learn more: User presence
Enable Connect in the frameset collaboration.frameset	Determines whether the Connect overlay is visible (enabled). This property also impacts Connect Support. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Disable the Connect overlay
Enable Connect to retrieve external link metadata in order to render richer content in messages with links to YouTube, news articles, images, etc. glide.ui.url.external, glide.ui.url.external.content	Enables Connect to render URLs for external sites as links. When this property is disabled, URLs that point anywhere outside the instance appear as plain text. This property also impacts Connect Support. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties**
Number of minutes to wait before collecting unread messages and sending an email to offline users. collaboration.email_interval	Sets the number of minutes the system waits before sending a Connect notification email to an inactive user. • **Type**: integer • Default value: 3 • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Configure the email notification interval
Maximum number of latest conversations to show during search. (Default = 50)	Sets the number of results that appear when you search conversations in Connect. In the System Properties [sys_properties] table, this property appears as *connect.search.conversation_limit*.

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Properties for Connect (continued)

Property	Description
	• Type: integer • Default value: 50
Audio file to play to notify users of new messages, support conversation transfers and @mentions in Connect. This property's value should point to the 'name' field of an audio file in the db_audio table. connect.notification.audio_alert	Specifies the audio file to play to notify users of new messages, support conversation transfers, and @mentions in Connect. This property's value must point to the **Name** field of a record in the Audio File [db_audio] table. This property also impacts Connect Support. • **Type**: string • Default value: connect_alert.mp3 • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Customize the Connect audio notification sound
Comma separated allow list of roles able to access Connect. Empty allows all roles. connect.roles	Determines which user roles are required to access Connect. When the value is blank, no role is required. This property also impacts Connect Support. **Note:** If you choose to restrict Connect access to specific roles, consider updating the role requirements for Connect modules and other access points. • **Type** : string • Default value: <empty> • Location: **Collaborate** > **Administration** > **Properties**
Determine whether or not a button is shown in task forms to view the Collaboration document conversation or Live Feed Record Feed related to the task. Note: The Collaboration button will only be enabled if the frameset view is also enabled with collaboration.frameset = true glide.live_feed.task_header_button	Determines whether the show live feed icon ( ) and **Follow** button are available in the form header of tables that have the *live_feed=true* dictionary attribute. • **Type**: choice list • Default value: collaboration • Other possible values: ○ **both**: enables both the show live feed icon and the **Follow** button. ○ **live_feed**: enables the show live feed icon. ○ **none**: disables both the show live feed icon and the **Follow** button.

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Properties for Connect (continued)

Property	Description
	• Location: **Collaborate** > **Administration** > **Properties** • Learn more: Configure record conversations
Disable the legacy chat "Create or Join Chat Room" link on the Incident form (Must have Chat plugin enabled to see link) glide.connect.enabled	Hides the **Create or Join Chat Room** related link, which appears on the Incident form when legacy chat is enabled. Legacy chat and Connect Chat should not be used concurrently and this property should not be modified. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties**

Configure the polling interval

The polling interval determines how frequently the system polls for new Connect messages.

Before you begin

Role required: admin

About this task

The default interval is 10 seconds. You can change this value. The shorter the polling interval, the more frequently the system checks for new messages and the greater the impact on performance.

Note:
This setting impacts Connect Chat and Connect Support.

Procedure

1. Navigate to **sys_properties.list**.
2. Locate the *collaboration.polling_interval* property.
3. Set the **Value** to a different number of seconds.
   Setting the polling interval to a value smaller than 2 is likely to tax the system too heavily, while a value greater than 10 is likely to result in a poor user experience.

Disable the Connect overlay

The Connect overlay is enabled by default and is integrated with the standard user interface. You can disable the Connect overlay.

Before you begin

Role required: admin

About this task

To disable the Connect overlay and remove the toggle Connect sidebar icon from the banner frame, set the *collaboration.frameset* property to **false**.

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Procedure

1. Navigate to **All** > **Connect** > **Administration** > **Properties**.
2. Locate the property called **Enable Connect in the frameset** (*collaboration.frameset*) and clear the check box.
3. Click **Save**.

Result

When the frameset is disabled, any Connect chats open in the Connect workspace. For more information on completely disabling Connect Chat, see Disable Connect Chat.

Customize the Connect audio notification sound

You can replace the default Connect audio notification sound with an audio file of your choice.

Before you begin

Role required: admin

Upload the audio file you want to use as the notification sound.

Role required: admin

About this task

The audio notification sound is used for all Connect conversation types, including Connect Support conversations.

Procedure

1. Navigate to **All** > **System UI** > **Audio Files**.
2. Locate the audio file you want to use as the notification sound and copy the **Name** value.
3. Navigate to **Connect** > **Administration** > **Properties**.
4. Locate the property called **Audio file to play to notify users of new messages, support conversation transfers and @mentions in Connect** (*connect.notification.audio_alert*) and replace the default value with the name of the audio file.
5. Click **Save**.

Result

End users receive audio notifications when sending and receiving support chats. Support agents only receive audio notifications for inbound chats when the chat window is not in focus.

Administer Connect actions

You can create or modify Connect actions to provide custom functionality in Connect Chat or Connect Support conversations.

Before you begin

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

If you want to customize the icon for a Connect action, navigate to **Collaborate** > **Administration** > **Action Icons** to view the available icons and their class names. Note the class name of the icon you want to use.

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Role required: admin

About this task

The Connect action menu appears by the message entry field when one or more Connect actions are available for a conversation, based on defined conditions. When a user selects a Connect action, the system runs the script defined for that action.

Procedure

1. Navigate to **Connect** > **Administration** > **Actions**.
2. Click **New** or open an existing record to edit a table.
3. On the form, fill in the fields.

Connect Action form

Field	Description
Condition	JavaScript condition statement that must return true for the action to be available in a conversation. For example, to show the action in Connect Support conversations only, enter `conversation.type === "support"` or `conversation.table === 'chat_queue_entry'`. For information about the *`conversation`* object, see the GlideConversation API reference documentation.
Hint	This field is not used.
Icon Class Name	Class name of the icon to use. To view all available icons and their class names, navigate to **Collaborate** > **Administration** > **Action Icons**.
Order	Order of the action relative to other items in the Connect action menu.
Script	Script to execute when the action is run. For example, to create a new incident that is based on the conversation, enter the following code: `response.newRecord("incident",{ short_description: conversation.document.short_description ||"", caller_id: conversation.document.opened_by });` For information about the *`response`* object, see the ConnectActionResponse API reference documentation. **Note:** You can only create a Connect action that is based on a task table.
Shortcut	Text that triggers the action when entered after the "/" character in a conversation.
Title	Text that appears in the Connect action menu. The title for each Connect action should be unique.

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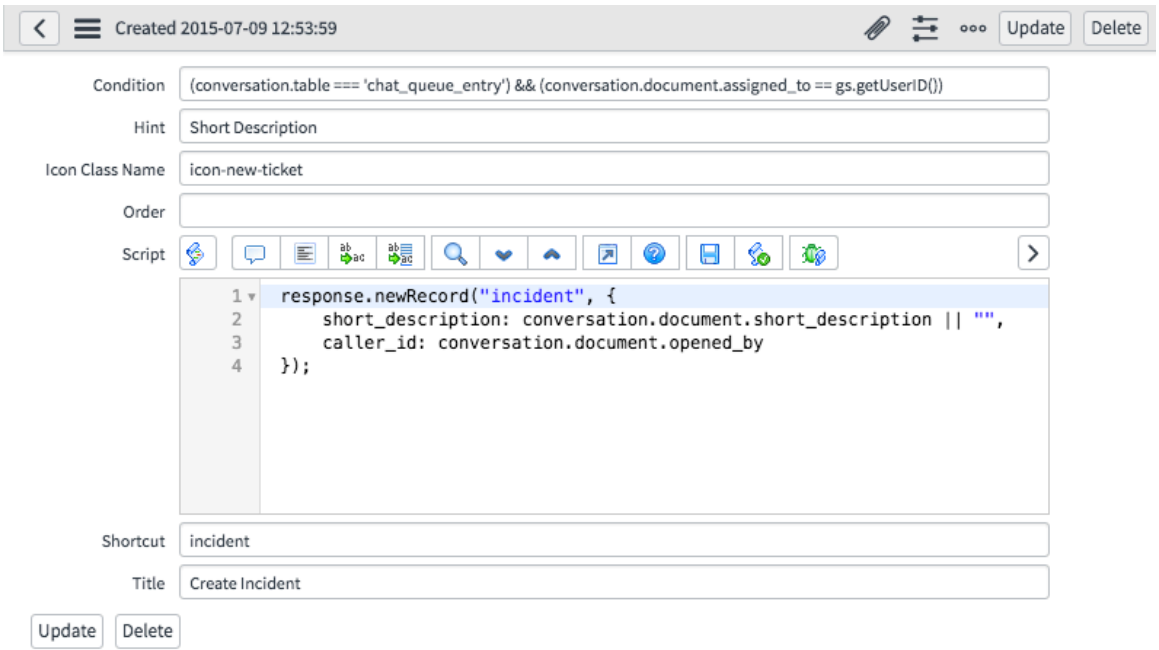
Result

Connect Actions form



Configure the fields on a record card in Connect

When a record is either linked to or created from a Connect Chat conversation, the details of the record display as a card in the chat window.

Before you begin

Role required: admin

About this task

The card view only applies to the full Connect Chat page and the end-user view of Connect Support conversations.

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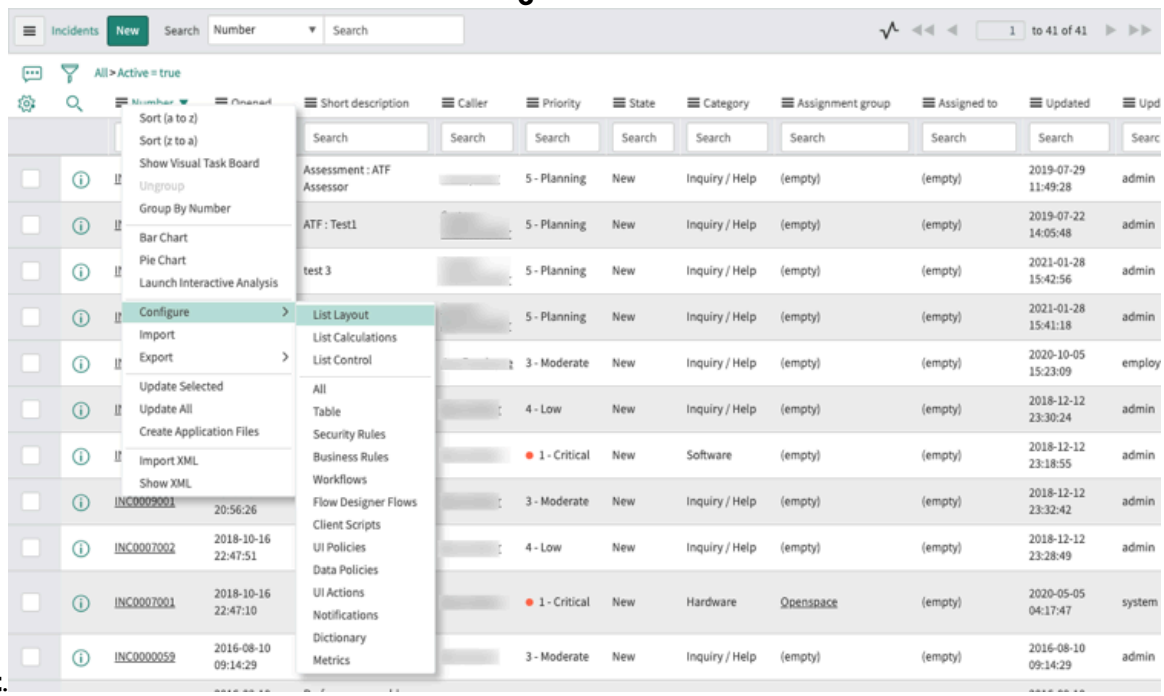
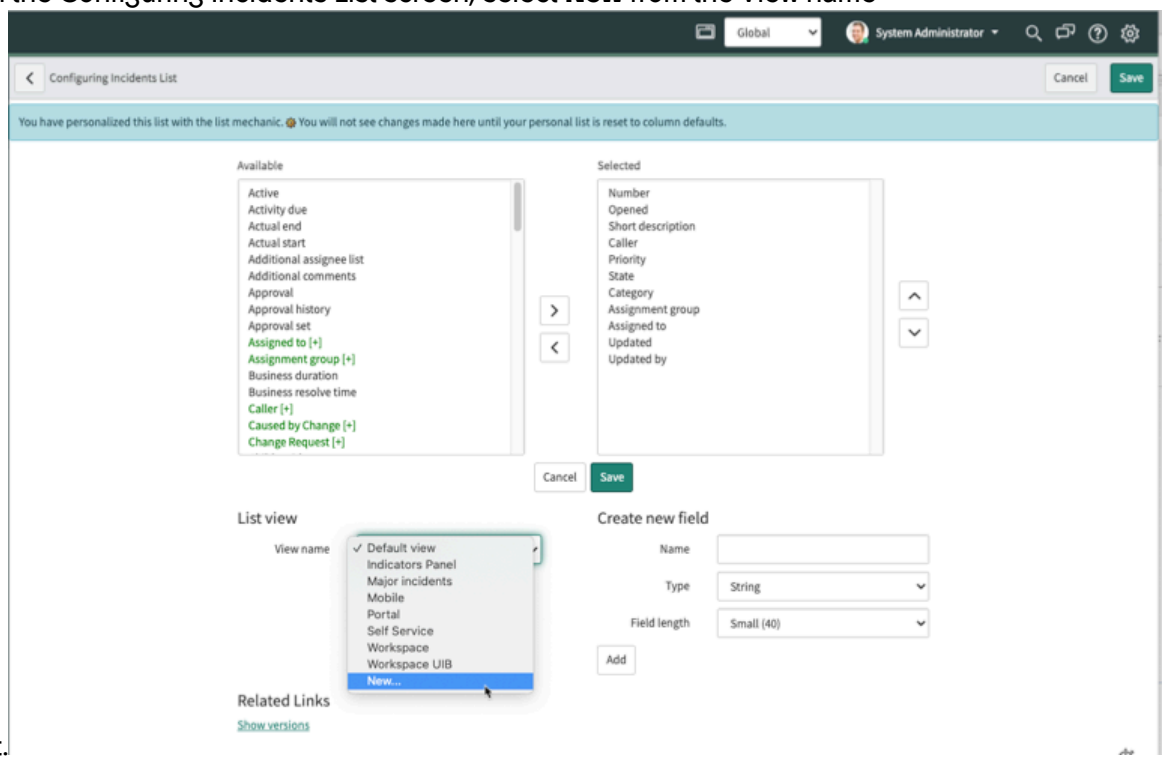
Procedure

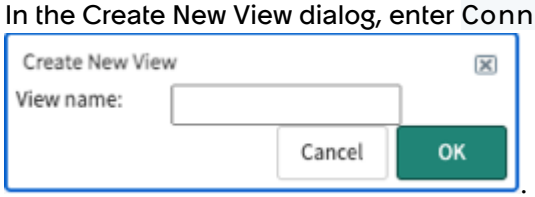
1. Select the menu icon (☰) on any of the column names of the incident list view.
2. Right-click on the column name and select **Configure** > **List Layout**.



3. On the Configuring Incidents List screen, select **New** from the View name list.



4. In the Create New View dialog, enter `Connect` in the View name field.



For more information on creating a form view, see Create and delete views .

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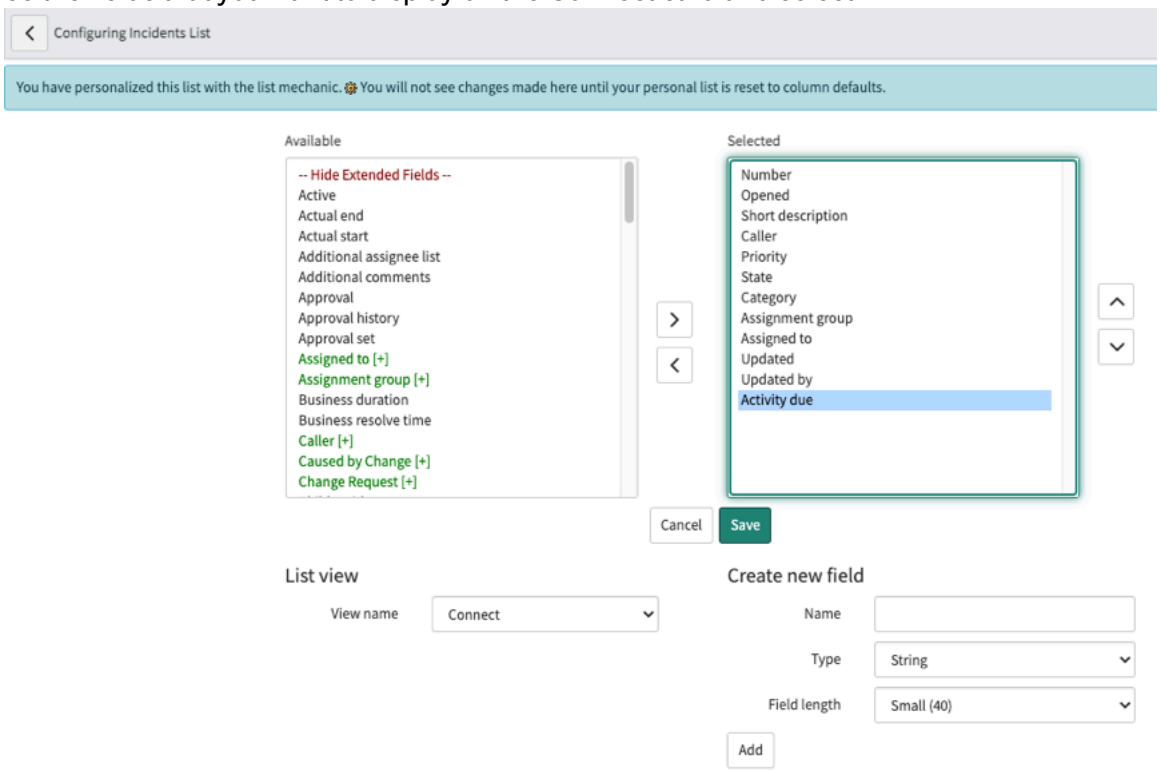
You cannot remove the Author or the Updated fields from the card regardless of whether they are on the view or not. The card always shows the Short Description field in the top even if it is in a different order in the list.

5. Choose the fields that you want to display on the Connect card and select



Save.

6. Validate that the card displays the fields in a Connect Chat conversation.

Disable specific URLs for Connect

Prevent users from accessing certain websites by disabling linking to specific Top-Level Domains (TLDs).

Before you begin

Role required: admin

Procedure

1. In the navigation filter, type `sys_properties.list`.
2. Search for the *`glide.ui.url.external.top_level_domains`* system property.
3. In the value field, remove any TLDs that you do not want your users to have access to.
   For example, remove any TLDs that are commonly used for restricted websites, such as `xxx` or `adult`.

   The list of TLDs is based on the top 200 most common domains.

Result

Any TLD not included in the value field becomes unclickable in Connect.

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Connect Chat

Connect Chat is a real-time messaging tool that enables users to chat with individuals and groups, quickly share files, and collaborate on any record by connecting with the right people instantly.

Important:

Connect Chat is not available in Next Experience. Starting with Washington DC, certain Connect Chat functions are available in Next Experience by using Sidebar. See KB1123615 – Moving from Connect Chat to Sidebar or Next Experience for more information about the differences between Connect Chat and Sidebar.

Connect Chat animates communication around records, Visual Task Boards, topics of interest, or groups of people.

Features include:

- Direct conversations between two users.
- Group conversations between three or more users.
- Conversations linked to records. Comments and work notes appear in conversations in real time and users can update the record directly from the conversation.
- Drag-and-drop sharing of links, files, and records.

Core UI is required to use Connect Chat.

This video demonstrates how to use Connect Chat.

How to use Connect Chat

This video demonstrates how to use Connect Support.

How to use Connect Support

Note:
Connect Chat does not replace legacy chat but offers some of the same functionality. The features should not be used concurrently.

Connect Chat use

All users have access to Connect Chat, a convenient way to stay updated on all the people and documents you work with in a familiar chat interface.

You can start using Connect Chat right away with virtually no setup. Connect Chat supports a few different types of conversations so you can use it as a social tool or a quick way to follow specific records.

Start a direct or group conversation

You can start a conversation with one or more users in Connect Chat.

Before you begin

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

Role required: none

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About this task

A conversation between two users is called a direct conversation. A conversation between three or more users is called a group conversation.

Procedure

1. In the chat view of the Connect sidebar, click the plus icon (**+**) by the filter.
   A Connect mini window appears.
2. In the **To** field, enter the name of the user you want to chat with.
   Suggestions appear as you type.
3. **Optional:** Enter additional names to create a group conversation.
   You can add or remove group conversation members later. You cannot add members to a direct conversation after you create it.
4. Press the Enter key to shift focus to the message field.
5. Send a message to create the conversation.
   The conversation is added to the Connect sidebar for quick access.

Follow a record in Connect

You can follow a record in Connect Chat to track activity as it happens, in a familiar chat interface. When you follow a record, you become a member of a record conversation.

Before you begin

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

Role required: whichever role is required to access the record you want to follow in Connect

About this task

You must first activate the Connect (com.glide.connect) plugin to complete this task.

Any record conversation you create in Connect becomes a record feed in live feed, and vice versa. Unlike direct or group conversations, all messages in record conversations are comments or work notes.

Note:
By default, record conversations are enabled for all tables that extend Task [task]. Administrators can enable record conversations for additional tables or disable them if desired.

Procedure

1. Navigate to a task record.
2. Do one of the following actions.

Option	Description
Follow the record	In the form header, click **Follow**. The system adds you as a member of the record conversation, but does not open the

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Option	Description
	conversation. You can open the conversation from the Connect sidebar.
Follow the record and open a chat mini win dow	**a.** In the form header, click the down arrow in the **Follow** button. **b.** Select **Open Connect Mini**. The system adds you as a member of the record conversation and opens it in a Con nect mini window.
Follow the record and open the Connect workspace	**a.** In the form header, click the down arrow in the **Follow** button. **b.** Select **Open Connect Full**. The system adds you as a member of the record conversation and opens it in the Con nect workspace, the full-screen view.

The **Follow** button is relabeled **Following**.

3. Add comments or work notes to the record directly from Connect.
   Any comments or work notes added to the record appear in the record conversation. Likewise, comments and work notes you add to the conversation appear on the record.
   a. In the record conversation, by the text entry field, click the message type icon ( ).
   b. Select **Comment** or **Work Note**.
   c. Enter a message.
   By default, record conversation messages are added as work notes.

Note:
If you add an attachment to a record conversation, it is attached to the underlying record as well.

What to do next
Edit your notification settings for the record conversation.

Related topics
Live Feed Core UI

Edit basic conversation details
In Connect Chat, you can customize the avatar, name, and description for a group or record conversation.

Before you begin
Role required: none

About this task
These details are not editable for direct conversations.

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Note:
The name and description for a record conversation default to the record name and short description. However, editing the name or description for a record conversation does not change anything on the underlying record.

Procedure

1. Open the a group or record conversation in the Connect workspace.
2. Click anywhere in the conversation header to the left of the icons.
   A pop-up appears to edit conversation details.
3. Edit the conversation image, name, and description as needed.
4. Click **Save**.

Add or remove conversation members

In Connect Chat, any member of a group or record conversation can add or remove other conversation members. In a direct conversation with only two people, you cannot add members to the conversation after you create it.

Before you begin
Role required: none

Procedure

1. Open a group or record conversation in the Connect workspace.
2. In the conversation tools to the right of the conversation pane, click the member list tab ( ).
3. Do one of the following actions.

Option	Description
Add a member	**a.** Click **Add Member to Group**. **b.** Use the search field to find and select a user.
Remove a member	**a.** Point to a member name. **b.** Click the minus icon (**-**).

Create a Connect conversation from a Visual Task Board

Create a Connect Chat conversation from a Visual Task Board to collaborate with board members and keep track of activity as it happens.

Before you begin
Role required: none

About this task
When you create a conversation from a task board, all the board members become members of the conversation. The members are synchronized between the task board and the conversation. For example, if you remove a user from the conversation, the system automatically removes the user from the board as well.

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Procedure

1. Navigate to **All** > **Self-Service** > **Visual Task Boards**.
2. Open a task board.
3. In the board header, click the connect with board members icon ( ).
   The system automatically opens a record conversation for the board. Each board member becomes a member of the conversation.

Related topics

Connect Chat

Visual Task Boards

Connect Chat administration

Administrators can configure various performance settings and features of Connect Chat.

Note:
There are also settings that apply to both Connect Chat and Connect Support. For more information, see Connect administration.

Configure the email notification interval

The email notification interval determines how long the system waits before sending a Connect Chat email notification to an inactive user.

Before you begin
Role required: admin

About this task
The default interval is 3 minutes. You can change this value.

Procedure

1. Navigate to **All** > **Connect** > **Administration** > **Properties**.
2. Locate the property called **Number of minutes to wait before collecting unread messages and sending an email to offline users.** (*collaboration.email_interval*) and set the value to a different number of minutes.
3. Click **Save**.

Result
When an offline user is sent a Connect message, the collaboration.new_offline_message event fires. The system waits the amount of time provided in the collaboration.email_interval property, then triggers the collaboration.notify_offline_user and collaboration.notify_offline_user.group events (depending on if the conversation was peer to peer or a group conversation).The sysevent_email_action record listens for collaboration.notify_offline_user(.group) then builds an email notification containing all the messages from the last collaboration.email_interval minutes that the user has received in that conversation.

Enable record conversations for a table

Record conversations are enabled for all tables that extend Task [task] by default. You can configure record conversations for additional tables that extend Task.

Before you begin
Role required: admin

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About this task

To create record conversations, users must have access to the **Follow** button in the form header. To show the button and thus enable record conversations for a table, the following conditions must be true.

- The *live_feed* dictionary attribute must be set to **true** for the table. By default, *live_feed=true* for all tables that extend Task [task].
- The *glide.live_feed.task_header_button* property must be set to **both** or **collaboration**. By default, *glide.live_feed.task_header_button* is set to **collaboration**.

Procedure

1. Navigate to the list view of a table for which you want to enable record conversations.
2. Perform the appropriate action for the list version.
   The list of dictionary entries for the table appears.
3. Open the dictionary entry that has **Type** set to **Collection**.
   The Dictionary Entry form appears.
4. In the **Attributes** related list, click **New**.
   The Dictionary Attribute form appears.
5. In the **Attribute** field, enter `Live feed`.
6. In the **Value** field, enter `true`.
7. Click **Submit**.
8. Navigate to **Collaborate** > **Administration** > **Properties**.
9. Locate the property called **Determine whether or not a button is shown in task forms to view the Collaboration document conversation or Live Feed Record Feed related to the task** (*glide.live_feed.task_header_button*).
10. Ensure the property is set to **both** or **collaboration**.
    The *glide.live_feed.task_header_button* property also controls whether the show live feed icon () appears. If the property is set to **collaboration**, the show live feed icon does not appear on form headers.

Related topics

Dictionary attributes

Prevent users from following records in Connect for all tables

Users can follow records in Connect for any table that extends Task [task] by default. You can disable this functionality for all tables.

Before you begin

Role required: admin

About this task

To disable record conversations for all tables, prevent the **Follow** button from appearing in all form headers by editing the *glide.live_feed.task_header_button* property.

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Procedure

1. Navigate to **sys_properties.list**.
2. Locate the *glide.live_feed.task_header_button* property.
3. Set the **Value** to **live_feed**.

Prevent users from following records in Connect for a specific table

Users can follow records in Connect for any table that extends Task [task] by default. You can disable this functionality for a specific table.

Before you begin
Role required: admin

About this task
To disable record conversations for a specific table, prevent the **Follow** button from appearing in form headers for the table. To do so, set the *live_feed* dictionary attribute to **false** for the table.

Procedure

1. Navigate to the list view of a table for which you want to disable record conversations.
2. Perform the appropriate action for the list version.
   The list of dictionary entries for the table appears.
3. Open the dictionary entry that has **Type** set to **Collection**.
   The Dictionary Entry form appears.
4. In the **Attributes** related list, locate the **Live feed** dictionary attribute.
5. Set the **Value** to **false**.

   Setting the dictionary attribute to **false** also removes the show live feed icon () for the table.

Related topics

Dictionary attributes

Disable Connect Chat

You can disable Connect Chat to prevent users from being able to chat within the platform.

Before you begin
Role required: admin

About this task
Disabling Connect Chat hides the Connect Chat sidebar icon. Users who try to access Connect Chat from the navigation pane receive a message that says Connect has been disabled.

Procedure

1. In the navigation filter, type `sys_properties.list` and press Enter.
2. Search for the *glide.connect.chat.disabled* property.
3. Set the property value to **true**.

Connect Support

Connect Support is a real-time messaging tool that enables support agents to easily track their support cases, find solutions, and resolve problems quickly.

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Important:

Starting in Utah, Connect Support has been deprecated and is no longer supported or available for new activation. For similar capabilities, please move to Advanced Work Assignment and Agent Chat. For details, see Move from Connect Support to Advanced Work Assignment and Agent Chat.

Connect Support builds on the messaging platform provided with Connect. For general information about the Connect interface, setup, and administration, see Connect. When Connect Support is enabled, users designated as support agents can access the support tab of the Connect sidebar.

Using Connect Support:

- Administrators can create chat queues and enable users to access live support.
- Support agents can monitor the queues to provide instant support.
- Users can share links, files, and records using drag-and-drop.

Core UI is required to use Connect Support.

Note:
Connect Support does not replace legacy chat but offers some of the same functionality. Do not use the features concurrently.

Monitor incoming Connect Support conversations

In the support tab of the Connect sidebar, you can monitor the queues for which you are an agent and accept incoming conversations.

Before you begin
Role required: none

About this task
Note:
The support tab is visible only if you are an agent for one or more queues.

Procedure
1. Navigate to **All** > **Connect** > **Connect Support**.
   The Connect workspace opens in a new tab.
2. Click the support tab of the Connect sidebar, indicated by a headset icon ().
   The support tab displays **Queues** to which you belong. It also displays your open support conversations under **Cases**. When a user starts a support conversation or an agent transfers a conversation to a queue, any agent who belongs to the associated queue can accept the conversation. An agent can also request to transfer a conversation directly to you.

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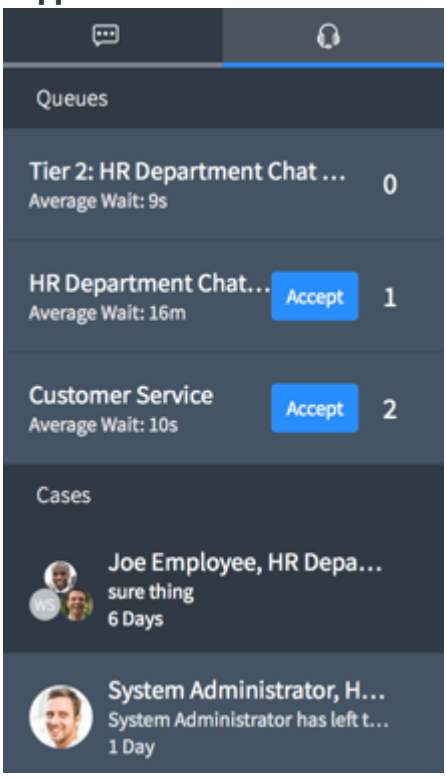
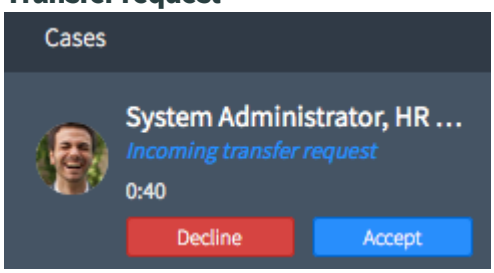
Support tab of Connect sidebar



3. Accept a conversation in one of the following ways.

Option	Description
Accept a conversation from a queue	Under **Queues**, click **Accept** by the queue. The conversation opens in the conversation pane and an entry appears in the **Cases** section of the sidebar.
Accept a transfer request	Under **Cases**, click **Accept** by a transfer request. **Transfer request**  The conversation opens in the conversation pane. The agent who transferred the conversation can stay in the conversation.

4. Respond to the user and help resolve the issue.
   By default, your messages are added to the conversation record as comments and are visible to the user.

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5. **Optional:** Initiate a Zoom meeting to help resolve customer issues faster.
   For more information, see Initiate Zoom meetings from chats.

Related topics

Configure a survey in the Connect chat support

Share knowledge in a Connect Support conversation

The support view of the Connect workspace has a built-in knowledge tool that makes it easy to search for knowledge articles and share them in a conversation.

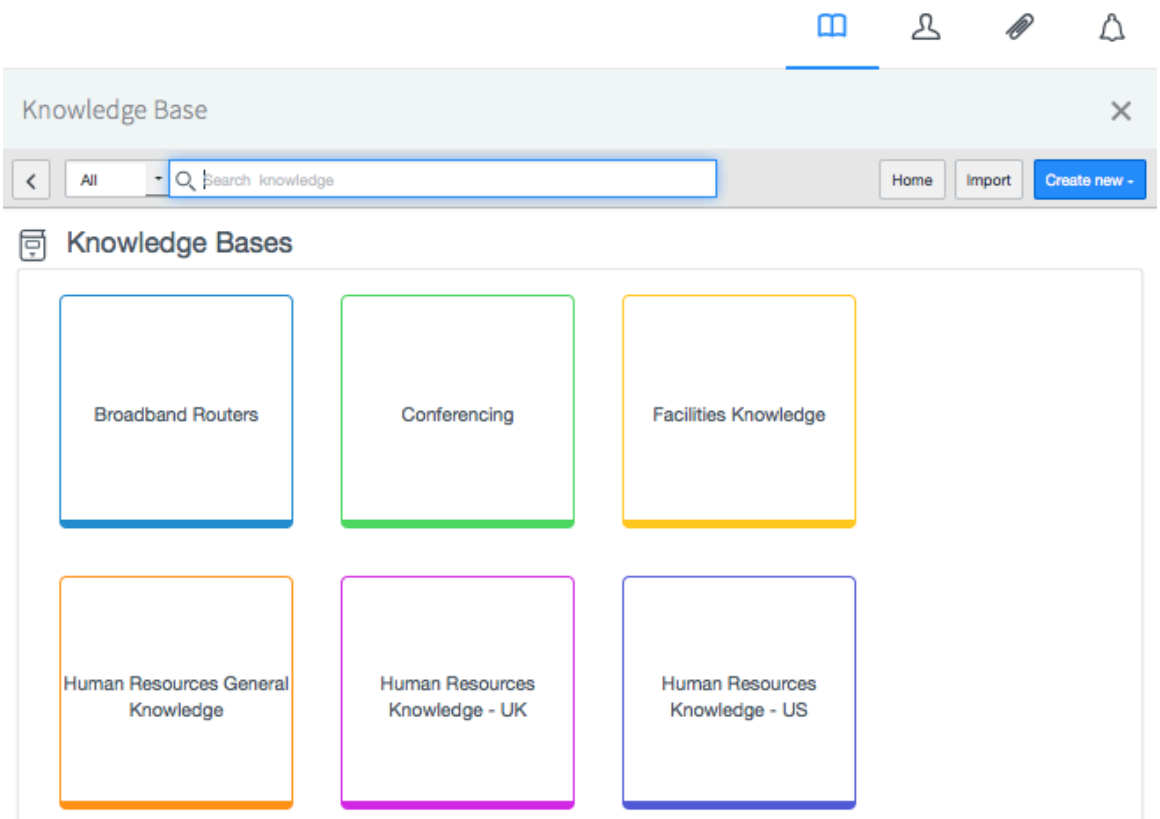
Before you begin
Role required: none

About this task
Use the knowledge tool to research user questions and provide solutions quickly and easily.

Procedure

1. Open a support conversation in the Connect workspace.
   The knowledge tool is not available in Connect mini windows.
2. In the conversation tools area to the right of the conversation pane, click the knowledge base tab, which is represented by an open book icon.

   The knowledge homepage appears in the conversation tools pane.



3. Search for articles related to the user's issue.

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For more information about finding knowledge, see Search using Knowledge Management v3.

4. To share an article in the conversation, drag a knowledge article link to the conversation pane and drop it anywhere in the drop zone that appears.

Transfer a Connect Support conversation to a different agent or queue

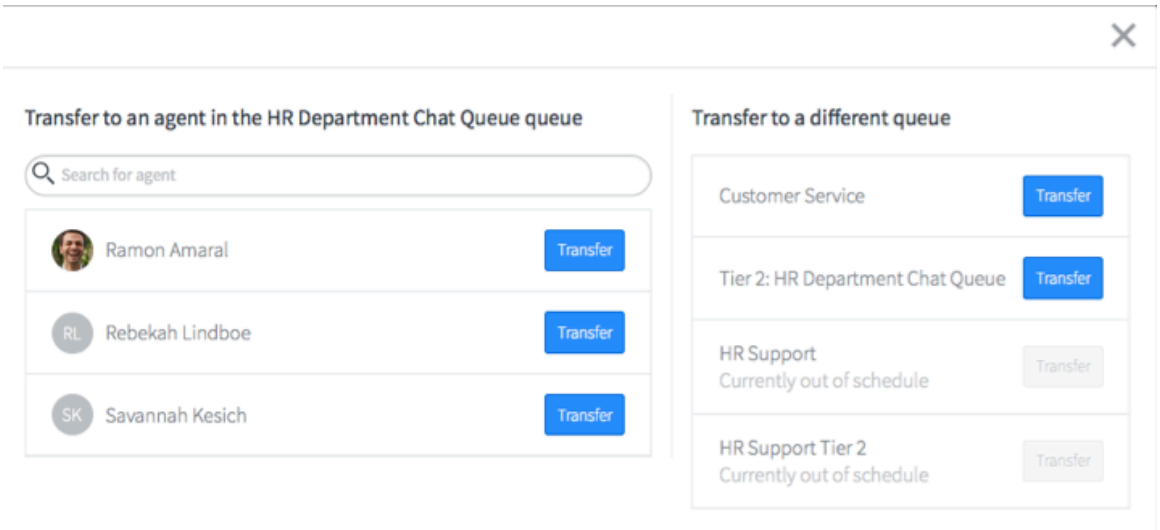
You can transfer a Connect Support conversation to a different agent in the queue or to a different queue.

Before you begin

Role required: none

Procedure

1. Open a Connect Support conversation.
2. At the bottom of the conversation, click the menu icon ( ) to open the Connect actions menu.
3. In the Connect actions menu, select **Transfer**.
   A transfer dialog box opens.



4. Do one of the following actions.

Option	Description
Transfer the conversation to an agent	**a.** To start the transfer request, click **Transfer** by an agent's name. Be sure to choose an agent who is online. A green dot on their avatar indicates that a user is online. You can cancel the transfer any time before it is accepted.

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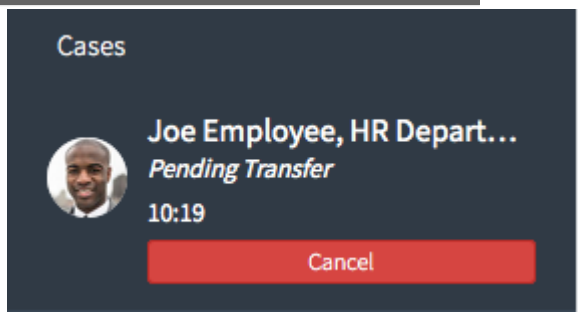
Option	Description
	 **b.** When the transfer is accepted, select one of the following options in the dialog box that appears. ▪ Stay: Remain in the conversation, which is also known as a warm transfer. This option is ideal if you want to provide the new agent with background information or introduce the user to the new agent. ▪ Leave: Exit the conversation, which is al so known as a cold transfer.
Transfer the conversation to a queue	Click **Transfer** by a queue. The system automatically removes you from the conversation and the conversation enters the queue you selected.

Add a user to a Connect Support conversation

You can add additional users to a Connect Support conversation.

Before you begin

An administrator must enable the *glide.connect.support.add_members* property before users can be added to conversations.

Role required: none

Procedure

1. Open a group or record conversation in the Connect workspace.
2. In the conversation tools to the right of the conversation pane, click the member list tab ( ).
3. Do one of the following actions.

Option	Description
Add a member	**a.** Click **Add Member to Group**. **b.** Use the search field to find and select a user.
Remove a member	**a.** Point to a member name. **b.** Click the minus icon (**-**).

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Option	Description
	The assigned support agent cannot be re moved from a Connect Support conversation.

Note:
Only the assigned support agent can create an incident from the Connect Support conversation.

Escalate a Connect Support conversation

If an escalation path is defined for a Connect Support conversation, you can use a shortcut to escalate a Connect Support conversation to a different queue.

Before you begin

Define an escalation path for the queue, using the **Escalate to** field on the Chat Queue [chat_queue] table. For more information, see Administer Connect Support queues.

Procedure

1. Open a Connect Support conversation.
2. At the bottom of the conversation, click the menu icon ( ) to open the Connect actions menu.
3. In the Connect actions menu, select **Escalate**.
   A confirmation dialog box appears.
4. In the dialog box, click **Escalate**.
   The system automatically removes you from the conversation and the conversation enters the escalated queue.

Connect Support chat states

Connect Support chats move through specific states.

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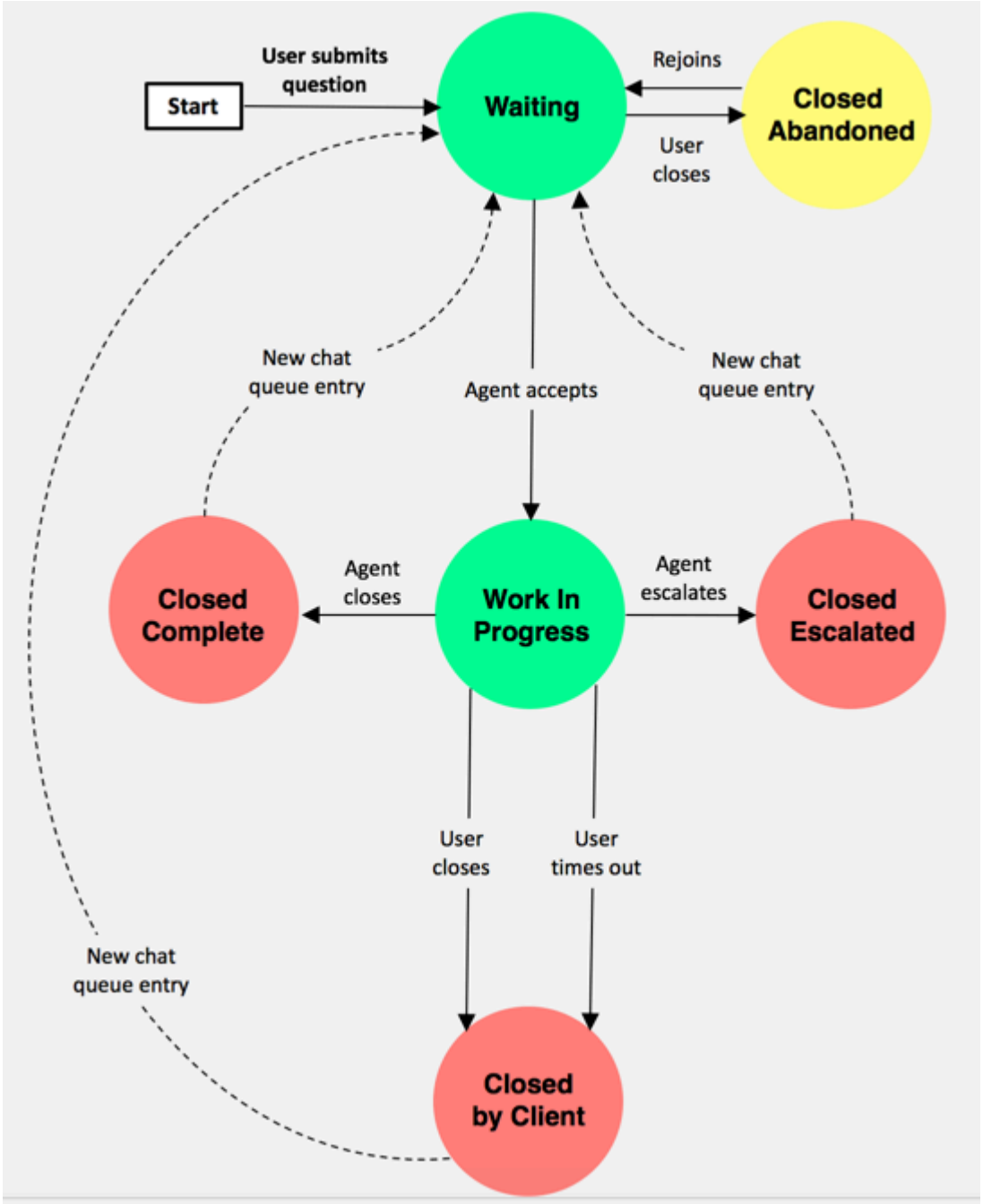
Connect Support states diagram



Connect Support chat states

Composite state	State	Definition
Active	Waiting	• Requester/end user enters a queue by sending a message. Agent has not yet accepted it. • Requester/end user rejoins a session that is in a Reopenable state.

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Connect Support chat states (continued)

Composite state	State	Definition
	Work in Progress	• Agent accepts a chat from a queue. Both requester and agent engage in a chat session. • Requester/end user temporarily leaves an ongoing conversation; requester or agent does not end the session; requester rejoins session.
Reopenable	Closed Abandoned	Requester/end user clicks **End Chat** button before agent accepts the request.
Permanently closed	Closed by Client	• Requester/end user clicks **End Chat** button after agent accepts the request. • Requester/end user times out.
	Closed Escalated	Agent escalates an ongoing conversation by performing the Escalate action from the menu icon.
	Closed Complete	• Agent ends the session. • During a chat, if an agent creates an incident or case and closes it, the chat session closes automatically.

Connect Support administration

Administrators can configure various performance settings and features of Connect Support.

Note:
There are also settings that apply to both Connect Chat and Connect Support. For more information, see Connect administration.

Migrate from legacy chat to Connect Support

Connect Support is an extension of Connect. Users designated as support agents have access to the support tab of the connect sidebar. Do not use Connect Support concurrently with legacy chat.

Before you begin

Role required: admin

Before you activate Connect Support, inform your support agents to close out any existing chats.

Legacy chat uses a different field to determine which state a help desk chat is in. A fix script is included in the Connect Support plugin that circumvents this issue by closing out any existing help desk chat sessions. Manually closing out any existing chats before allowing this script to run helps prevent any loss of chat information.

If you do not close out existing help desk chats, your metrics and chat queue will not work accurately.

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Procedure

1. Activate the Connect Support plugin.
   When you activate the Connect Support plugin, the *glide.connect.support.enabled* property redirects the legacy chat URL to Connect Support.

   For more information, see Activate Connect Support.

2. Hide the Social IT application.
   Activating Connect Support does not completely eliminate the legacy chat module. To prevent users from using the legacy chat, hide the Social IT application menu. For more information, see Enable or disable an application menu or module .

Properties for Connect Support

The Connect Support Properties page provides several configuration options specifically for Connect Support.

Important:

Starting with Utah, Connect Support has been deprecated. For similar capabilities, please move to Advanced Work Assignment and Agent Chat. For details, see Move from Connect Support to Advanced Work Assignment and Agent Chat.

These properties are available for Connect Support.

Properties for Connect Support

Users with the admin role can access these properties by navigating to Connect > Support Administration > Properties.

Note:
The Connect Properties page contains many general Connect properties that impact Connect Support.

Property	Description
Should Connect be used for handling chat queue entries glide.connect.support.enabled	Disables or enables Connect Support. When the property is enabled, the **Service Desk Chat** button in the Employee Self-Service portal opens the conversation in Connect Support, rather than legacy chat. Additionally, the Support tab appears in the Connect sidebar. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Support Administration** > **Properties**
Number of support conversations an individual agent can have at one time (-1 is unlimited) connect.support.conversation_limit	Determines how many support conversations an individual agent can have at one time. When the value is set to **-1**, an agent can

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Properties for Connect Support

Users with the admin role can access these properties by navigating to Connect > Support Administration > Properties.

Note:
The Connect Properties page contains many general Connect properties that impact Connect Support.

(continued)

Property	Description
	participate in an unlimited number of conversations. • **Type**: integer • Default value: -1 • Location: **Collaborate** > **Support Administration** > **Properties**
Show agent avatar in Connect Support conversations. connect.support.show_agent_avatar	Determines whether an agent's avatar is shown in a support conversation (enabled). When the property is disabled, users see the agent's name only. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Support Administration** > **Properties**
Number of seconds to wait (without user interaction), before presenting end users with an idle countdown timer connect.support.idle.delay	Determines how many seconds a user must be inactive in a support conversation before an idle countdown timer appears. • **Type**: integer • Default value: 120 • Location: **Collaborate** > **Support Administration** > **Properties**
Number of seconds to count down from before marking end user as having left their support session connect.support.idle.count_down	Determines how many seconds the idle countdown timer remains open after it appears. If the idle user does not dismiss the timer before the countdown completes, the system closes the support session. • **Type**: integer • Default value: 60 • Location: **Collaborate** > **Support Administration** > **Properties**

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Properties for Connect Support

Users with the admin role can access these properties by navigating to Connect > Support Administration > Properties.

Note:
The Connect Properties page contains many general Connect properties that impact Connect Support.

(continued)

Property	Description
Limits the number of closed conversations that the support user can see. (0 = unlimited) connect.support.user.closed.conversation_limit	Determines how many closed conversations appear in a user's support conversation history. When the value is set to **0**, all previous conversations appear in the history. • **Type**: integer • Default value: 0 • Location: **Collaborate** > **Support Administration** > **Properties**

Administer Connect Support queues

You can define the support agents, default messages, schedule, and escalation path for each Connect Support queue.

Before you begin
Role required: admin

About this task

Note:
Both Connect Support queues and legacy chat queues are stored on the Chat Queue [chat_queue] table. Do not use Connect and legacy chat concurrently.

Procedure

1. Navigate to **All** > **Connect** > **Queues**.
2. Click **New** or open an existing queue from the list.
3. Complete the Chat Queue form, as appropriate.

Chat Queue form

Field	Description
Name	Name of the queue.
Active	Not used in Connect.
Assignment group	User group that contains the support staff for the queue. Any user in the group can view the queue in the Connect sidebar and accept chats. No other users can access the queue. This field must be populated.

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Field	Description
Average wait time	Average time it takes for an agent to accept a chat in the queue. This value is automatically calculated. Do not manually edit.
Confirm problem	Not used in Connect.
Escalate to	Different queue to which an agent can escalate a chat. For example, there is a queue for high priority support chats. When a queue is defined in this field, agents can access the **Escalate** option in conversations.
Initial agent response	Message that users see when an agent accepts their chat. For example, **Thank you for contacting support. We are looking into your question now and will be with you shortly.**
Not available	Message that users see when they attempt to start a chat outside the defined queue **Schedule**. You can use HTML to format the message and include links or media.
Question	Initial phrase that users see when they start a new chat in the queue. For example, **How can I help you?**
Schedule	Schedule that defines when the queue is available. Leave the field blank to make the queue available all the time. Users cannot start a new conversation in the queue outside the schedule hours.

4. Manage the HR chat queue

Make a Connect Support queue accessible to end users

To make a Connect Support queue accessible to end users, use the accepted URL format.

Before you begin

Create a queue. Create agents for the queue by assigning users to the assignment group associated with the queue.
Role required: admin

About this task

For example, you might create a module or add a link to a portal. The accepted URL format is `https://<instancename>.service-now.com/$chat_support.do?queueID=<sys_id>`.

Procedure

1. Navigate to **All** > **Connect** > **Administration** > **Queues**.
2. Right-click the name of the queue to which you want to link.
3. In the context menu, select **Copy sys_id**.
4. Follow browser instructions to copy the sys_id if browser security measures restrict this function.
5. Preview the support queue by navigating to `https://<instancename>.service-now.com/$chat_support.do?queueID=<sys_id>`.
6. Create a module or other link to the queue using the URL.

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Add a scripted extension point for Connect Support chats

Implement the `ConversationServerInteractionService` extension point, which enables you to create custom scripts that use context variables from pre-chat surveys presented to requesters in the Agent Chat client.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Extension Points** > **Scripted Extension Points** and select the `ConversationServerInteractionService` scripted extension point.
2. Click the **Create implementation** related link to create a new custom script include.
3. In the Script Include form, create the code that uses the pre-chat context variables to route chats to the appropriate Connect Support queue.
4. Click **Update**.

Result

The custom script is created and registered against the `ConversationServerInteractionService` scripted extension point.

Connect Support metrics

Optional plugins provide a homepage and Performance Analytics dashboards, which contain helpful Connect Support metrics.

The reporting homepage is ideal for support managers who want a simple solution to track the recent performance of the support organization. The Performance Analytics dashboards provide a more full-featured solution for support managers who want to analyze trends over time.

Users with the admin role can activate the following plugins to use these features.

Connect Support homepage and dashboard plugins

Plugin	Description
Connect Support Manager's Dashboard [com.glide.connect.managers_dashboard]	Provides a homepage for Connect Support, and all required configuration records. Though the plugin name contains the term dashboard, the plugin does not provide functionality related to Performance Analytics dashboards. Homepages are similar to dashboards, but do not require Performance Analytics roles to view.
Performance Analytics - Content Pack - Service Desk Chat [com.snc.pa.chat]	Provides the **Service Desk Chat Monitor** dashboard, which analyzes key Connect Support metrics and indicators.
Performance Analytics - Context Sensitive Analytics for Chat [com.snc.pa.chat.context_sensitive_analytics]	Provides in-form analytics for Connect Support. These analytics are available as a related link on the Chat Queue Entry [chat_queue_entry] form, and also as the **Context Sensitive Analytics - Chat** dashboard.

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Note:
For more information about these plugins, including which other plugins they activate, see Additional plugins for Connect Support.

Related topics

Performance Analytics concepts

Use the Connect Support homepage

Use the Connect Support homepage to view key indicators and metrics related to support conversations, queues, and agents.

Before you begin
Activate the Connect Support Manager's Dashboard plugin (com.glide.connect.managers_dashboard) to view this homepage.
Role required: chat_admin

About this task
The homepage is called **Service Desk - Chat**.

Procedure

1. Navigate to **All** > **Connect** > **Support Administration** > **Reporting Dashboard**.

   Note:
   Though the module name contains the term dashboard, the module does not provide functionality related to Performance Analytics dashboards. Homepages are similar to dashboards, but do not require Performance Analytics roles to view.

   The Connect Support homepage, which is called **Service Desk - Chat**, opens.
2. Click a widget to drill down into its data.

Use the Connect Support dashboards

Use the Connect Support dashboards in Performance Analytics to understand trends in your support organization's performance over time.

Before you begin
Activate one or both of the following plugins, according to your analytics needs:

- Performance Analytics - Content Pack - Service Desk Chat (com.snc.pa.chat)
- Performance Analytics - Context Sensitive Analytics for Chat (com.snc.pa.chat.context_sensitive_analytics)

Role required: both chat_admin and pa_viewer

About this task
The Performance Analytics - Content Pack - Service Desk Chat plugin (com.snc.pa.chat) includes the **Service Desk Chat Monitor** dashboard, which contains the following tabs:

- **Chat Monitor By State**: Contains metrics related to closed support conversations.
- **Overview**: Contains several metrics related to support conversations, queues, and agents.
- **KPI Process**: Contains metrics that are key performance indicators (KPIs) of the Connect Support process, including the average queue response time, the average duration of support conversations, and the number of new support conversations per day.

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The Performance Analytics - Context Sensitive Analytics for Chat plugin (com.snc.pa.chat.context_sensitive_analytics) includes the **Context Sensitive Analytics - Chat** dashboard. The dashboard contains additional metrics related to support queues, including the number of support conversations closed.

Note:
You must license Performance Analytics to collect scores for the indicators on the dashboards. Without Performance Analytics premium, the dashboards display the indicators with no data.

Procedure

1. Navigate to **All** > **Performance Analytics** > **Dashboards**.
   The last dashboard you viewed opens.
2. In the dashboard picker, under the **Connect Chat** group, select the dashboard you want to view.
3. View the indicators.

Related topics

Performance Analytics concepts

Configure the add support users property

To enable support agents to add users to a Connect Support conversation, add the *glide.connect.support.add_members* property.

Before you begin
Role required: admin

Warning:
Enabling the *glide.connect.support.add_members* property can negatively impact instance performance if there are large numbers of users logged in to the instance.

About this task
When the *glide.connect.support.add_members* property is added and enabled, support agents can add users to a support conversation. Any added user can also add other users. Only the assigned agent can create an incident from the chat. When non-support agents are added to a chat, the chat appears in their chat tab.

Note:
Make sure you are in the Global scope when adding this property.

Procedure

1. Enter `sys_properties.list` in the navigation filter.
   The entire list of properties in the System Properties [sys_properties] table appears.
2. Verify that the property does not exist by searching for the property name.
   If the property does exist, update the property with the information in the following table.
3. Select **New**.
4. Complete the form.

Service Desk Chat Platform Analytics Solutions

Platform Analytics Solutions contain preconfigured dashboards. These dashboards contain actionable data visualizations that help you improve your business processes and practices.

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Platform Analytics data visualizations use Performance Analytics indicator data to show you data over time, helping you analyze your business processes and identify areas of improvement. With Platform Analytics Solutions, you can get value from Performance Analytics for your application with minimal setup. You can always create your own objects as well.

Important:
Set up and test Platform Analytics Solutions on a non-production instance before enabling them in production.

To enable the solution for Service Desk Chat, an admin can navigate to **Performance Analytics** > **Guided Setup**. Click **Get Started** then scroll to the section for Service Desk Chat. The guided setup takes you through the entire setup and configuration process.

Related topics

Platform Analytics Solutions

Activate your Performance Analytics subscription

Connect Support and Service Portal

Use Connect Support in your portal to allow your users to ask questions or submit requests to support agents. You configure the instance options to control the appearance of your widget and how it functions.

The Connect Support and Service Portal integration creates a Connect Support widget that you can add to a page in the Service Portal.

Configure Connect Support widget instance options

You can control the appearance of your widget and how it functions by configuring the instance options.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Configuration** and open the Service Portal Designer.
2. From the Service Portal Designer, select the page you added the Connect Support widget to. If you have not yet added the widget to a page, see Create and edit a page using the Service Portal Designer for more information.
3. Click the edit icon in the corner of the widget to open the instance options menu.
4. Complete the fields using the following table.
   Depending on the functionality you want to add, you may not need to add all these fields.

Connect Support widget instance options

Field	Description
Bootstrap color	Select a color for your widget from a list of common bootstrap colors. Themes control the overall color of a widget, but if you want your widget to be a specific color, you can select it from the list.
Queue URL	The URL for the Connect Support chat queue that you want questions to be directed to. For example, htts://<instancename.service-now.com/$chat_support.do?queueID=<sys_id>

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Field	Description
Queue Name	The name of the queue you want the questions to be directed to. You can find a list of queue names in **Collaborate** > **Connect Support** > **Queues**.
Queue ID	The sys_id of the queue you want questions to be directed to. You can find this ID by going to the support queue and either copying the queue ID from the support link, or by selecting **Copy sys_id** from the context menu.
Message	The text for the button in the Connect Support widget
Window	Use this option to open the chat in another tab rather than in a new window.
Title	The name in the widget header

Classic Orchestration

ServiceNow® Orchestration extends the workflow engine to manage processes and to automate things outside of a ServiceNow instance.

Orchestration is available as a separate subscription from the rest of the ServiceNow platform. See Activate Orchestration for details.

Explore

- Introduction to Orchestration
- Orchestration applications
- Orchestration ROI
- Orchestration examples
- Domain separation and Orchestration

Set up

- Activate Orchestration
- MID Servers for Orchestration
- Available activity packs
- Setup Client Software Distribution

Administer

- List of Orchestration plugins
- Orchestration Runtime plugin

Use

- Orchestration activity packs
- Password Reset
- Client Software Distribution

Develop

- Orchestration activity designer
- Orchestration custom activity templates
- Client software distribution extension framework
- Developer training

Troubleshoot and get help

- Ask or answer questions in the Orchestration community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Introduction to Orchestration

Orchestration automates simple or complex multi-system tasks on remote services, servers, applications, and hardware.

An Orchestration process can cross all management disciplines and interact with hosted services and all types of infrastructure elements. These capabilities provide a powerful system for managing IT and Business processes quickly and reliably.

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Orchestrated solutions aide collaboration among teams by providing reusable data and versioning for both the workflows and the activities within them. Subject matter experts can create activities that are reusable to numerous workflow developers. When an activity requires a change, developers can see the downstream implication of the change immediately by knowing which workflows use the activity. Well-designed orchestrations never fail and apply human tasks to address errors as they arise.

Orchestration tools

Orchestration can make calls outside of a ServiceNow instance, directly to web services or through a MID Server to systems within corporate firewall. Orchestration also enables the creation reusable activities that wrapper Java Script functions for manipulating things inside the platform. Orchestration extends the Workflow editor by providing these features:

- Activity packs containing ready-to-use activities.
- Activity Designer, which enables developers to create custom activities without an over dependence to create scripts to orchestrate to third-party systems.
- Ability to create activity packs using Scoped Applications.
- A Databus for following the flow of data across orchestration activities.

Orchestration Core provides entitlements to use specific applications:

Client Software Distribution

An application that automates software delivery from the Service Catalog. Provides OOB support for SCCM. Partner solutions support Macs using JAMF. Other third-party solutions provide support through the extension framework.

Configuring Password Reset

An application for users to reset their password in Active Directory. It can expand to communicate with other third-party systems.

Orchestration ROI

Enables users to evaluate estimated costs and actual costs for tasks, automate these tasks, and track the ROI of these tasks.

Systems that Orchestration can automate

Orchestration can automate tasks such as employee onboarding, user access rights, server management, managed file transfers, and Security Operations Orchestration activities . For example, you might use the Active Directory and Exchange activities provided in the base Orchestration system to set up network accounts and mailboxes for new employees.

If Orchestration does not provide the activities you need for an integration, create the necessary activities using the templates in the Orchestration Activity Designer. The external systems that Orchestration can automate for:

- Any system exposing web services (SOAP, REST)
- Any system accessible from the command line (such as a UNIX system accessible through SSH, a Windows system enabled for PowerShell remoting or WMI)
- Numerous proprietary services: Windows Active Directory, Microsoft Exchange mail servers, InfoBlox, and F5 Networks.

> **Note:**
> For a full list of Activity Pack service offerings, see Orchestration Core Activity Packs.

- Any filesystem accessible by SFTP

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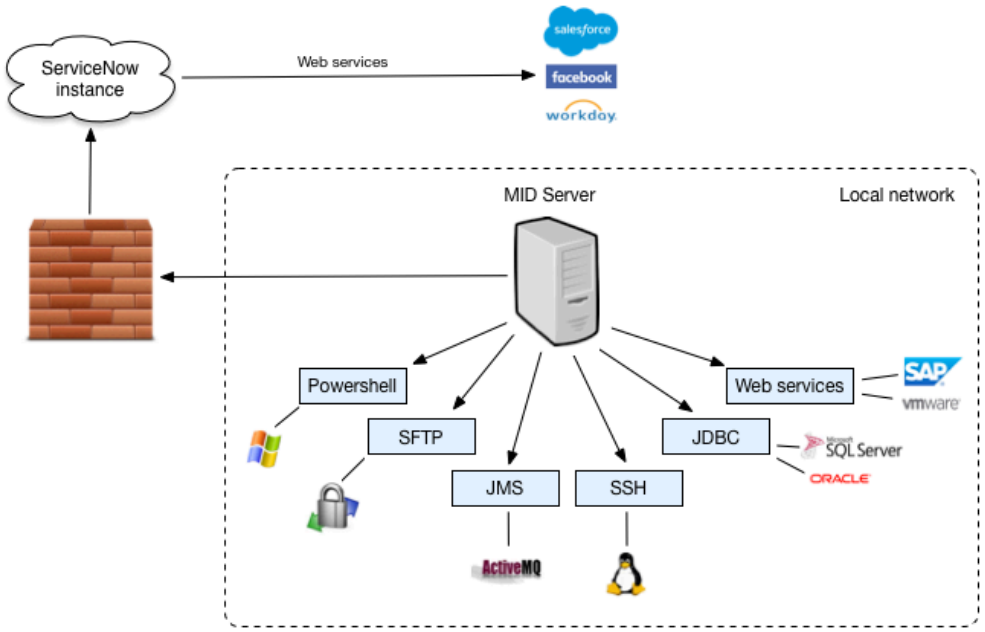
- Any database with a compliant JDBC driver
- Additional Activity Packs are also available with other ServiceNow products, such as Security Operations

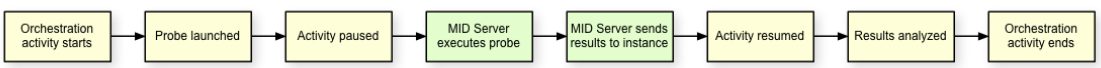
Orchestration capabilities



Orchestration workflow

When an Orchestration activity starts within a workflow, Orchestration launches a Discovery probes and sensors and writes a probe record to the ECC Queue. The workflow pauses as the MID Server picks up the request and executes the probe. When the probe reports back, the workflow resumes as the results are analyzed. The workflow can exit or continue at this point.

Orchestration workflow



Domain separation and Orchestration

Domain separation is supported in Orchestration. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

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Support level: Standard*

- Includes **Basic** level
- Business logic: Processes can be created or modified per customer by the service provider. The use cases reflect proper use of the application by multiple service provider customers in a single instance.
- The owner of the instance needs to be able to configure MVP business logic and data parameters per tenant as expected for the specific application.

Use case: As an admin, I need the ability to make comments mandatory on close of a record for one tenant, but not for another.

Related topics

Domain separation for service providers

Activate Orchestration

The Orchestration (com.snc.runbook_automation) plugin is available within a separate subscription from the rest of the ServiceNow platform.

Before you begin

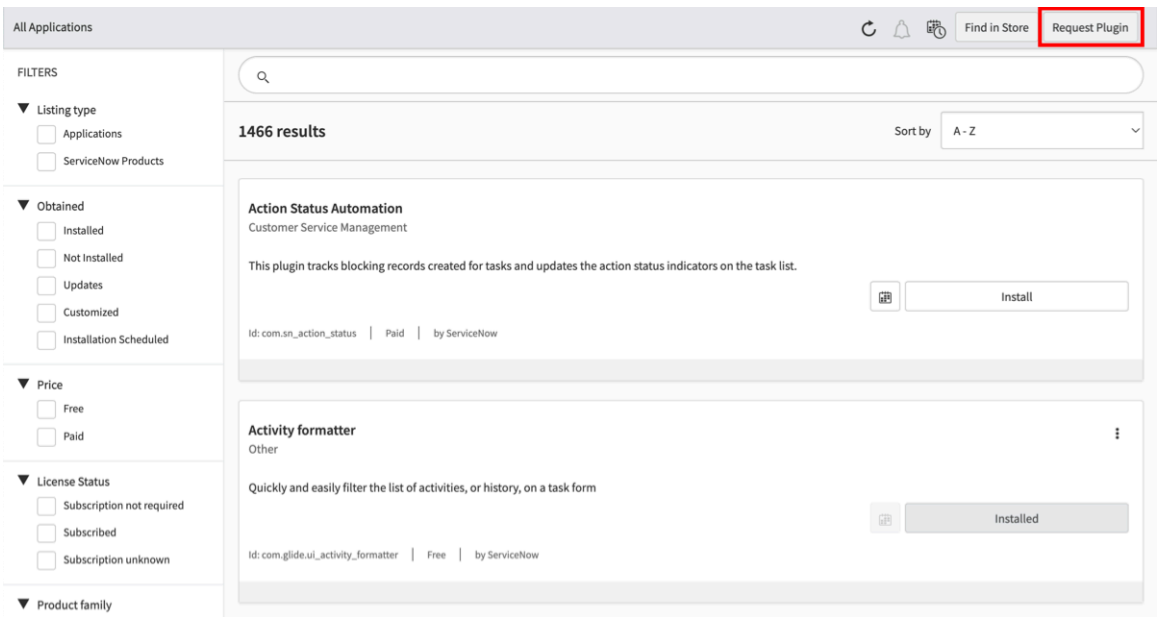
To purchase a subscription, contact your ServiceNow account manager. The account manager can arrange to have the plugin activated on your organization's production and subproduction instances, generally within a few days.

If you don't have an account manager, decide to delay activation after purchase, or want to evaluate the product on a subproduction instance without charge, follow these steps.

Role required: none

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the **Activate Plugin** form on Now Support.



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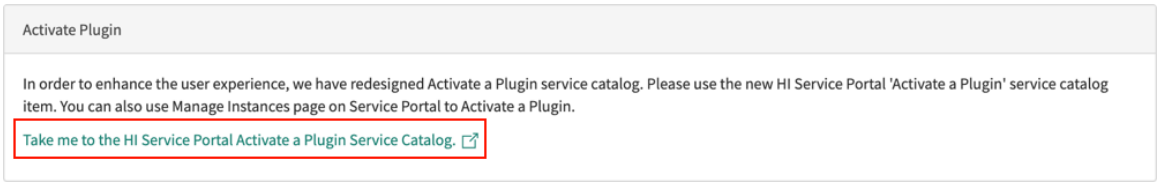
3. On Now Support, select the link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Instance on which to activate the plugin.
Which plugin would you like to activate	Name of the plugin to activate. **Note:** If the system does not list the plugin you want or if you are activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	The date and time to activate the plugin. **Note:** Plugins are activated in two batches, once in the morning and once in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.

Example

For example, see the following form to activate the CSM Workspace plugin on an instance named My Instance.

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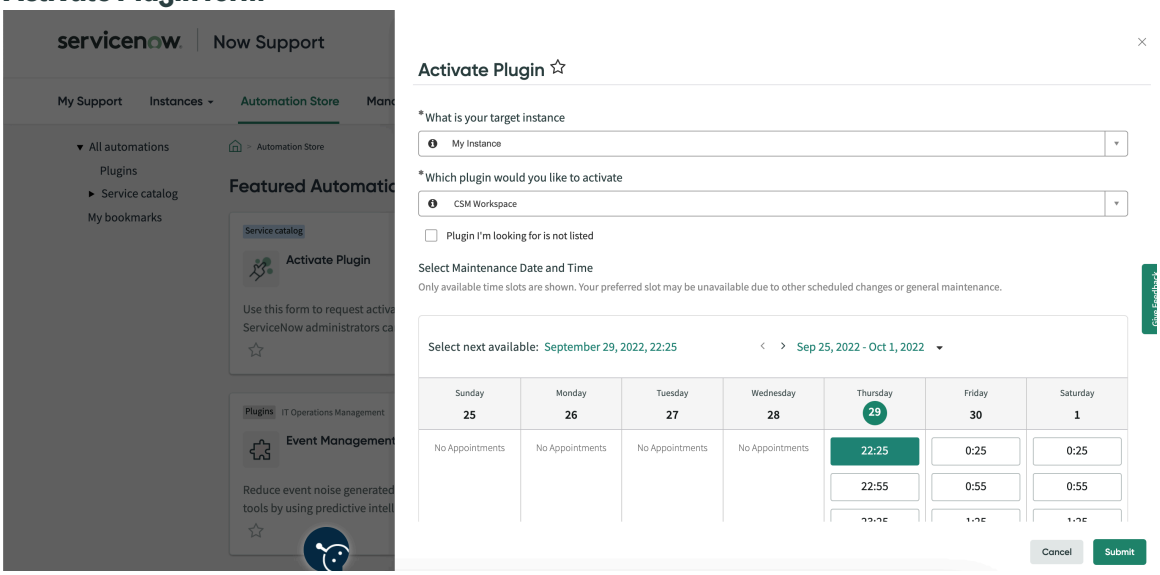
Activate Plugin form



7. Select **Submit**.
   For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

List of Orchestration plugins

This table lists all plugins available for Orchestration and their dependencies.

These Orchestration plugins are available for purchase or can be requested as part of your Orchestration subscription. Contact your account representative for details.

Name	Description	Dependencies
Orchestration [com.snc.runbook_automation]	Main plugin for the Orchestration feature. This plugin extends Workflow to automate operations with external systems. Use this plugin to orchestrate business services, applications, and infrastructure.This plugin automates operations such as deployments, configurations, and information gathering. Orchestration can automate Web Services and uses MID Servers to execute commands on devices inside an enterprise's network.	• Orchestration - ROI • Orchestration - Runtime
Orchestration - Active Directory [com.snc.orchestration.ad]	Installs the Active Directory activity pack. These activities create, delete, and manage objects in Windows Active Directory.	Orchestration
Orchestration - Asset Lease Management [com.snc.orchestration.asset_lease_management]	Provides the software lease functionality for Client Software Distribution. Allows users to select the start and end dates of software leases and to request an extension of a lease.	None

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Name	Description	Dependencies
	Note: This plugin is not automatically enabled when Orchestration is active.	
Orchestration - Azure Active Directory [com.snc.orchestration.azure.ad]	Installs the Azure AD activity pack. These activities automate employee onboarding and offboarding functions on Azure Active Directory and manage Office 365 licensing.	Orchestration
Orchestration - Client Software Distribution [com.snc.orchestration.client_sf_distribution]	Allows the distribution of software from the service catalog using third party management systems, such as Microsoft System Center Configuration Manager (SCCM) **Note:** This plugin is not automatically enabled when Orchestration is active.	• Orchestration - System Center Configuration Manager • Orchestration - Asset Lease Management • Service Catalog Scoped API • Software Asset Management
Orchestration - Exchange [com.snc.orchestration.exchange]	Installs the Exchange activity pack. These activities manage Microsoft Exchange mail systems.	Orchestration
Orchestration - F5 network management [com.snc.orchestration.f5]	Installs the F5 Network Management activity pack. These activities configure elements of an F5 load balancer, including pools, pool members, and the virtual servers contained in the pool.	Orchestration
Orchestration - Infoblox DDI Activity Pack [com.snc.orchestration.infoblox]	Installs the Infoblox DDI activity pack. These activities support Infoblox DDI management.	Orchestration
Orchestration - PowerShell [com.snc.orchestration.powershell]	Installs the PowerShell activity pack. These activities control and automate the administration of Windows machines and applications, using the Windows .NET Framework.	Orchestration
Orchestration - Probe [com.snc.orchestration.probe]	Installs the Probe activity pack. These activities run ServiceNow® probes on target hosts to return specific information.	Orchestration
Orchestration - ROI [com.snc.runbook_automation.roi]	Installs an Orchestration application that estimates savings resulting from automated tasks in an instance and computes actual savings. Orchestration - ROI is activated automatically with a base Orchestration subscription.	• Performance Analytics • Cost Management

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Name	Description	Dependencies
Orchestration - ROI Premium [com.snc.runbook_automation.roi_premium]	Installs a premium dashboard that displays detailed reports on calculated savings for automated tasks over time. The Orchestration - ROI Premium plugin requires purchase and activation of the Performance Analytics - Premium plugin to display its reports. **Note:** This plugin is not automatically enabled when Orchestration is active.	• Orchestration - ROI • Performance Analytics - Premium
Orchestration - Runtime [com.snc.runbook_automation.runtime]	Enables other applications on the ServiceNow® platform to distribute and use orchestration content without requiring an Orchestration subscription. The Orchestration - Runtime plugin displays the Orchestration activities shipped with these applications in the Workflow Editor and allows customers to modify the activities without requiring an Orchestration license.	• Workflow Runtime Engine • Core Automation
Orchestration - SFTP [com.snc.orchestration.sftp]	Installs the SFTP File Transfer activity pack. These activities manage files and directories on an SFTP server and move files from one SFTP server to another.	Orchestration
Orchestration - SSH [com.snc.orchestration.ssh]	Installs the SSH activity pack. These activities read, write, and copy files, and reset user passwords on Linux computers.	Orchestration
Orchestration - System Center Configuration Manager [com.snc.orchestration.sccm_mgmt]	Installs the System Center Configuration Manager (SCCM) activity pack. These activities manage software deployments and collections on an SCCM server.	Orchestration

Orchestration Runtime plugin

The Orchestration – Runtime plugin enables other applications on the ServiceNow® platform to automate tasks, without requiring an Orchestration subscription.

The Orchestration – Runtime plugin can be activated as part of another plugin or application. It is used by strategic technology partners and ServiceNow applications to distribute activity packs to customers who may not own Orchestration. For example, the Security Incident Response Management (SIRM) application provides orchestration content, which includes activities that are available from the **Packs** tab in the Workflow Editor. Customers who purchase SIRM can consume and modify the activities that SIRM ships without having to purchase an Orchestration license.

Included with the plugin

The Orchestration – Runtime plugin provides access to the **Packs** and **Data** tabs in the Workflow Editor. This plugin gives users access to custom activities for their applications and enables them to reuse data from the Databus. This plugin does not provide access to custom Orchestration

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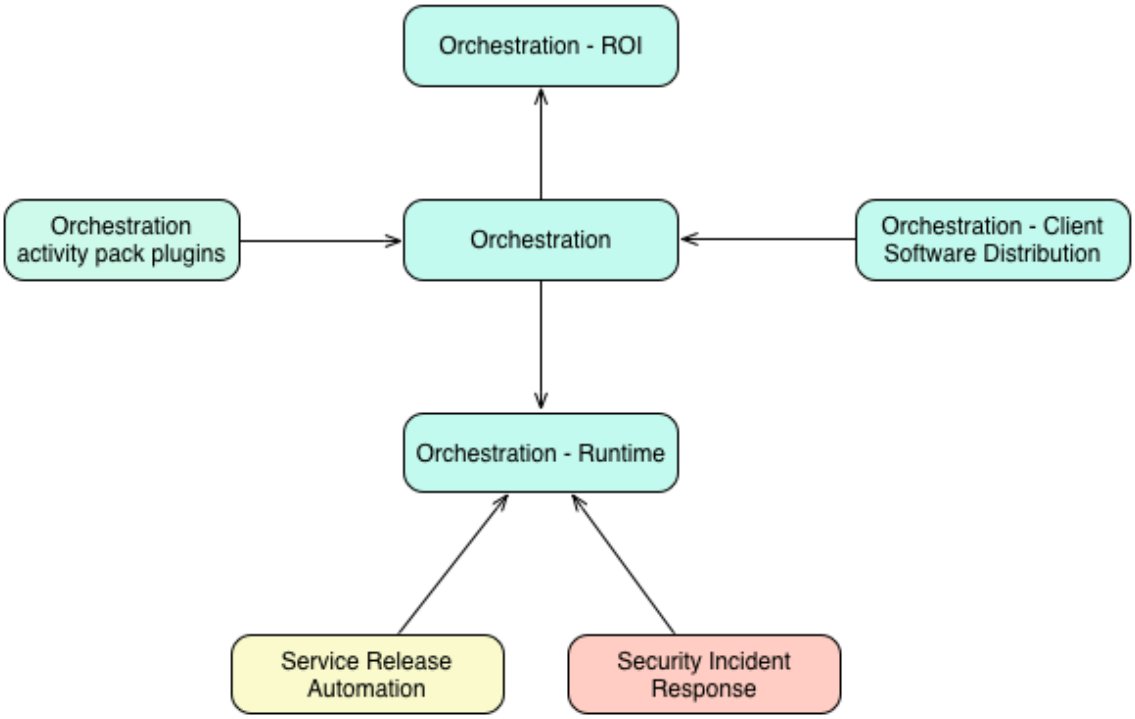
activity packs or to the activity designer. The **Custom** tab in the Workflow Editor is not available without an Orchestration subscription.

Orchestration plugin relationships



Dependencies

The Orchestration – Runtime plugin activates these application plugins:

- Security Incident Response Orchestration
- Service Release Automation

.

Access to activities

Custom activities shipped with ServiceNow® applications are available in the **Packs** tab of the Workflow Editor for use in workflows. To edit these activities, navigate to **Orchestration** > **Activity Designer Activities** and select the activity you want to modify. For information about the provider templates used to create these activities, see Orchestration custom activity templates.

List of Orchestration activities

Use Orchestration activities in a Workflow to integrate with third-party systems.

Several Orchestration activities have been rewritten as Application scope activities using the activity designer and grouped into activity packs. Other non-scoped activities are deprecated and may or may not appear in the Workflow Editor. However, all deprecated activities still function in existing workflows that use them.

Global activities

These activities run in the global scope only. Any activities you create in the global scope are organized in the Global category in the **Packs** and **Custom** tabs in the Workflow Editor.

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Activity	Description
Test Server Alive	Runs a command (including shell scripts) on a Linux or UNIX computer via SSH to validate whether the target system is alive.

Active Directory (AD) activities

All AD Orchestration activities were rewritten in the Geneva release as scoped activities and are available in the Active Directory activity pack. All previous version AD activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Create AD Object	Creates a user account in Windows Active Directory when a user account is created in a ServiceNow instance.
Disable AD User Account	Marks a Windows Active Directory user account disabled, making it inactive.
Enable AD User Account	Enables a Windows Active Directory user account, making it active.
Query AD	Retrieves entries from the Windows Active Directory based on a search filter.
Remove AD Object	Deletes a user account from Windows Active Directory.
Reset AD User Password	Resets the password of a user account in Windows Active Directory.
Change AD User Password	Changes the password of a user account in Windows Active Directory.
Update AD Object	Updates a user account in Windows Active Directory.
Is AD Account Locked	Determines if an Active Directory user account is locked.
Unlock AD Account	Unlocks a locked Active Directory user account.

Azure AD

All these activities are scoped and part of the Azure AD activity pack. They do not have legacy versions.

Activity	Description
Add User to Group	Adds a user to an existing security group in Azure Active Directory.
Assign User License	Assigns an extra Office 365 software license to the named user.
Create User	Creates a user for the Azure Active Directory tenant.

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Activity	Description
Delete User	Deletes the named user's account from the Azure Active Directory tenant.
Get User Info	Returns the named user's information from the Azure Active Directory.
Remove User from Group	Removes an existing user from a security group in Azure Active Directory.
Remove User License	Revokes the specified Office 365 software license for the named user.
Reset User Password	Changes the named user's Azure Active Directory password.

F5 Network Management activities

All these activities are scoped and part of the F5 Network Management activity pack. They do not have legacy versions.

Activity	Description
Add F5 Pool	Creates the load balancer pool.
Check F5 Pool	Checks the status of a pool to validate whether it is available to accept traffic.
Delete F5 Pool	Deletes an F5 pool.
Add F5 Pool Member	Adds a member to an F5 pool.
Get F5 Pool Member	Returns the pool members and verifies the pool status.
Delete F5 Pool Member	Deletes an F5 pool member.
Add F5 Virtual Server	Adds a virtual server.
Modify F5 Virtual Server	Configures a virtual server assigned to an F5 pool with irules and a vlan.
Delete F5 Virtual Server	Deletes a virtual server from an F5 pool.
Add F5 Profile to Virtual Server	Adds a profile to a virtual server assigned to an F5 pool.

Infoblox activities

All these activities are scoped and part of the Infoblox DDI activity pack. They do not have legacy versions.

Activity	Description
DHCP Reserve IP v4 Address Range	Reserves an IP address range for DHCP use.
DHCP Delete IP Reservation	Deletes IP reservations in DHCP using either an IPv4 or IPv6 address range.
DHCP List IP Reservations	Generates a list of all the DHCP range reservations on a specific Infoblox server.

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Activity	Description
List DNS C-records	Retrieves all canonical (CNAME) records from a specified Infoblox server.
Register DNS A-record	Creates a DNS A record on a specified Infoblox server.
Register DNS C-Record	Creates a DNS canonical (CNAME) record on a specified Infoblox server.
List DNS Record	Generates a list of all the DNS entries on a specific Infoblox server.
DNS Delete	Deletes DNS records of any type from in Infoblox server, such as C and A records.
IPAM Register IP Address	Registers an IP address in a network using Infoblox IPAM.
IPAM Reserve IP Address	Reserves an IP address in a network using Infoblox IPAM.
IPAM List IP Reservations	Returns an array of all IP Address within the named Infoblox Server.
IPAM Delete	Deletes an IP Address within a named Infoblox server.
Create Network	Creates networks on a specified Infoblox server.
Get Network Details	Retrieves the information about a specific network on an Infoblox server.
Delete Network	Deletes a network from an Infoblox server.
List Registered Networks	Retrieves all the networks associated with an Infoblox server.

Microsoft Exchange activities

All Exchange Orchestration activities were rewritten in the Geneva release as scoped activities and are available in the Exchange activity pack. All previous version Exchange activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Create Address List	Creates an address list that acts as an alias for emailing all users in the group. This alias cannot be used to manage user permissions.
Delete Address List	Removes an existing address list from an Exchange server.
Get Address List	Retrieves all attributes from the specified Exchange address list.
Move Address List	Moves an Exchange address list to another location in the address hierarchy.
Set Address List	Modifies an Exchange address list.
Update Address List	Adds or removes users from the specified address list and immediately applies any cached address list changes to the server.
Create Mailbox	If a user does not exist, creates a new Active Directory user and associated Exchange mailbox.

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Activity	Description
Delete Mailbox	Deletes the Exchange mailbox of an Active Directory user.
Disable Mailbox	Disables the mailbox associated with a specified Active Directory account.
Enable Mailbox	Creates a mailbox for an existing Active Directory user.
Get Mailbox	Gets the mailbox for the specified user or all mailboxes on an Exchange server.
Set Mailbox	Modifies the settings of an existing Exchange mailbox.

PowerShell activities

These PowerShell activities were rewritten as scoped activities and are available in the PowerShell activity pack. All previous version PowerShell activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Install Windows App	Installs an application on a Windows target machine.
Join Domain	Joins a Windows machine to a domain.
Restart Windows Server	Restarts a Windows server using PowerShell.
Uninstall Windows App	Uninstalls an application from a Windows target machine.
Change Service State	Starts or stops a Windows service on a remote system.

Probe activities

These probe activities were rewritten as scoped activities and are available in the Probe activity pack. All previous versions of these activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Resolve DNS Name	Resolves an IP address or a fully qualified domain name (FQDN) into one or more IP addresses.
SNMP Query	Queries an SNMP device.

SCCM activities

All these activities are scoped and part of the SCCM activity pack. They do not have legacy versions.

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Activity	Description
Add to Device Collection	Adds a device to a Microsoft System Center Configuration Manager (SCCM) device collection.
Add to User Collection	Adds a user to a Microsoft System Center Configuration Manager (SCCM) user collection.
Get Applications	Returns a list of all the applications available on a Microsoft System Center Configuration Manager (SCCM) server.
Get Deployments	Returns the list of deployments performed by Orchestration using a Microsoft System Center Configuration Manager (SCCM) server.
Get Device Collections	Returns the list of available device collections on a Microsoft System Center Configuration Manager (SCCM) host.
Get User Collections	Returns the list of available user collections on a Microsoft System Center Configuration Manager (SCCM) host.
Remove from Device Collection	Removes a device from a Microsoft System Center Configuration Manager (SCCM) device collection.
Remove from User Collection	Removes a user from a Microsoft System Center Configuration Manager (SCCM) user collection.

SSH activities

These SSH activities were rewritten as scoped activities and are available in the SSH activity pack. The SSH activities not converted to scoped activities were moved to the Orchestration - Deprecated category, but are still available for all workflows.

Activity	Description
File Copy	Copies a file on a Linux or Unix computer, via SSH.
File Read	Reads a file on a Linux or Unix computer, via SSH.
File Write	Writes a file on a Linux or UNIX computer.
File Replace String	Finds and replaces a string in a file on a Linux or UNIX computer.
Files Compare	Compares two files on a Linux or Unix computer, via SSH.

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Activity	Description
Reset Linux User Password	Resets the password for a given user on a Linux computer.
Secure Copy	Copies a file from one host to another, without storing the copied file on the MID Server.

SFTP activities

All these activities are scoped and part of the SFTP File Transfer activity pack. They do not have legacy versions.

Activity	Description
Copy File	Copies a file from an SFTP server (source host) to another SFTP server (target host).
Create Directory	Creates a directory on an SFTP server.
Get File List	Returns a list of files from a given directory and its subdirectories on an SFTP server (source host).
Remove File or Directory	Removes a file or a directory on an SFTP server, including subdirectories, when configured.
Rename File or Directory	Renames a file or directory to a new name on an SFTP server.
Set File Attributes	Sets common file attributes, such as timestamps, size, permissions, and UID/GID, for a file or directory on an SFTP server.

Deprecated activities

These activities have been removed from the Workflow Editor and are not available for new workflows, but continue to work normally in existing workflows. You can reactivate the deprecated activity or duplicate the functionality of a deprecated activity as a scoped activity by recreating it using the activity designer.

Activity	Description
Run Probe	Launches a MID Server probe on behalf of a document.
SOAP Request	Executes a SOAP request on a target server. The SOAP Message activity replaces this activity.
Run Command	Runs a command (including shell scripts) on a Linux or UNIX computer.
Run SCP	Uses Secure Copy Protocol (SCP) to copy a file from one computer to another, including the directory in which the file resides. The Secure Copy activity replaces the Run SCP activity.
Run Powershell	Executes Windows PowerShell commands on a MID Server.

Available activity packs

Activity packs are available with your subscription to Orchestration.

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Before you begin

Role required: admin

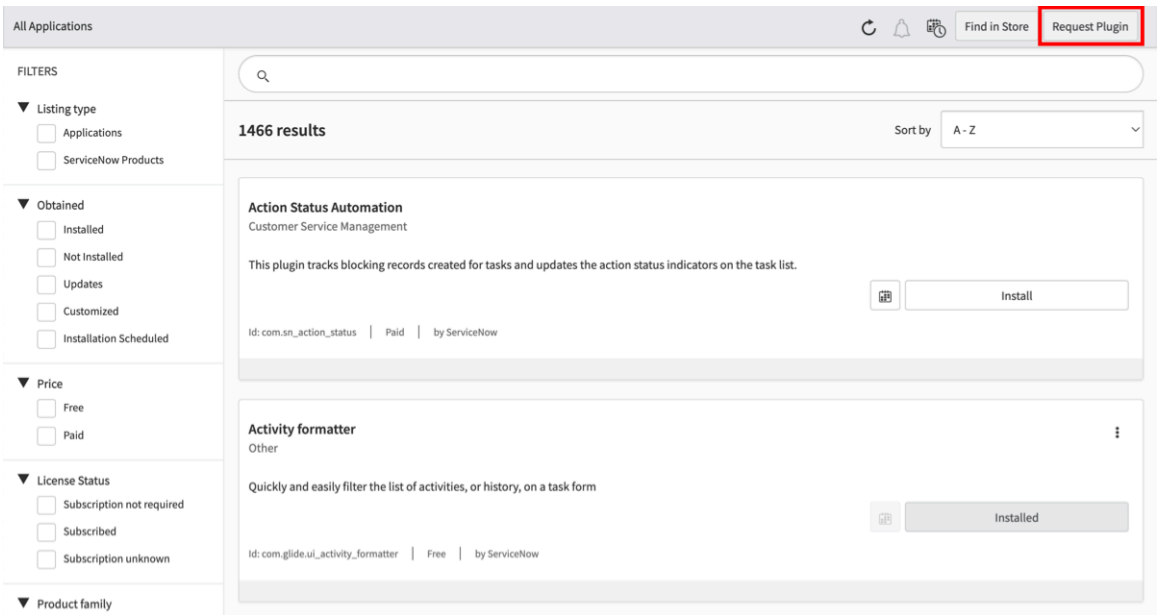
About this task

The following activity packs are available and active with your Orchestration subscription:

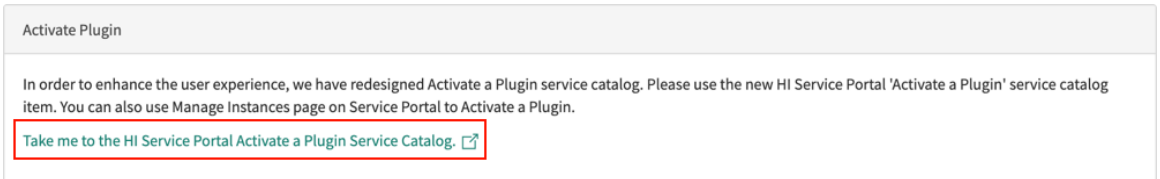
- Orchestration - Active Directory (com.snc.orchestration.ad)
- Orchestration - Azure Active Directory (com.snc.orchestration.azure.ad)
- Orchestration - Exchange (com.snc.orchestration.exchange)
- Orchestration - SFTP (com.snc.orchestration.sftp)
- Orchestration - Infoblox DDI Activity Pack (com.snc.orchestration.infoblox)
- F5 Network Management activity pack (com.snc.orchestration.f5)
- Orchestration - SSH (com.snc.orchestration.ssh)
- Orchestration - PowerShell (com.snc.orchestration.powershell)
- Orchestration - System Center Configuration Manager (com.snc.orchestration.sccm_mgnt)

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the **Activate Plugin** form on Now Support.



3. On Now Support, select the link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.

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6. On the **Activate Plugin** form, provide the following information.

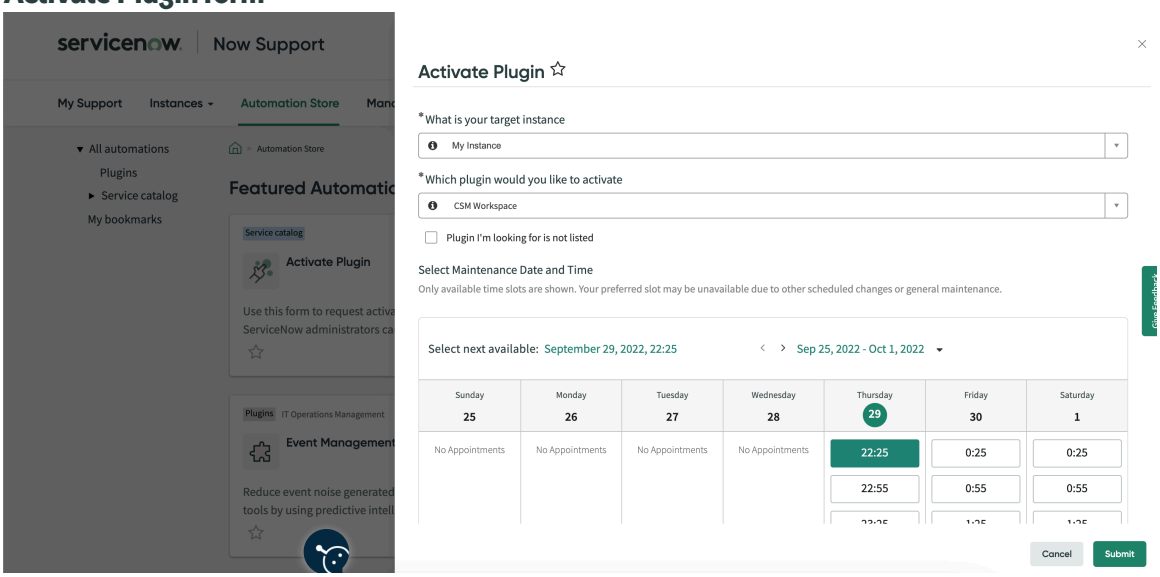
Activate Plugin form

Field	Description
What is your target instance	Instance on which to activate the plugin.
Which plugin would you like to activate	Name of the plugin to activate. **Note:** If the system does not list the plugin you want or if you are activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	The date and time to activate the plugin. **Note:** Plugins are activated in two batches, once in the morning and once in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.

Example

For example, see the following form to activate the CSM Workspace plugin on an instance named My Instance.

Activate Plugin form



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7. Select **Submit**.
   For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

Deprecated Orchestration activities

These Orchestration activities have been deprecated.

Run Probe

The Run Probe activity launches a MID Server probe on behalf of a document. All Orchestration activities that launch a probe on a target machine are based on the Run Probe activity. Your ServiceNow instance must have access to a MID Server configured to use SSH to run this activity.

Important:
This activity is deprecated and is unavailable for new workflows. To replace the functionality of this probe, use the Probe activity template to create a custom activity. Workflows from a previous release that use the Run Probe activity can continue to do so.

Run Probe input variables

Field	Description
Probe	Select a MID Server probe from the list. This is the name of the probe as it appears in the `discovery_probes` table.
Source for probe	Enter the IP address of the host system against which the probe runs (the probe's target).
Sensor script	The script to run using the results of the probe. The output from the probe is contained in a variable called `output`. Any error from the probe is contained in a variable called `error`.

SOAP Request

The SOAP Request activity executes a SOAP request on a target server.

Important:
This activity is deprecated and is replaced by the SOAP Message workflow activity activity. Workflows from a previous release that use the SOAP Request activity can continue to do so. However, this activity is not available for new workflows.

SOAP Request input variables

Field	Description
SOAP URL	The SOAP endpoint.
Username	User name for basic authentication credentials.
Password	Password for basic authentication credentials.
Envelope Script	Script for setting up parameters for the web service.
Sensor Script	The script to execute after the request has been made and a response has been received.

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Reactivate a deprecated activity

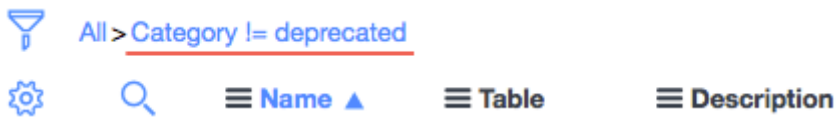
Orchestration activities that were converted to activity packs are deprecated for upgraded and new instances but can be reactivated for use in new workflows.

Before you begin
Role required: workflow_admin, admin

Note:
Reactivation of deprecated activities for use in new workflows is discouraged. Legacy activities cannot use the unique features of the scoped applications, such as reuse of data from the databus and input variable testing.

Procedure

1. Navigate to **All** > **Workflow** > **Administration** > **Activity Definitions**.
2. In the list of activities, clear the condition **Category !=deprecated** from the filter.



3. Open the definition record for the activity you want to reactivate.
4. Select the **What to Display** tab.
5. In the **Category** field, replace the value **deprecated** with another category.
   This can be an arbitrary string.
6. Click **Update**.
   The system creates a new category using the value provided and reactivates the activity, which becomes available in the **Core** tab of the Workflow Editor.

SOAP Message workflow activity

The **SOAP Message** activity uses SOAP messages defined in the System Web Services plugin and can call the messages using a MID Server.

Your instance must have access to a MID Server configured to use SOAP.

Input variables

SOAP Message activity input variables

Field	Parameter	Description
SOAP Message	soap_message	The SOAP Message defined under the System Web Services plugin's Outbound SOAP Message [sys_soap_message] table. (**System Web Services** > **Outbound** > **SOAP Message**)
SOAP Message Function	soap_message_function	The function to call that is defined in the SOAP Message. Functions are listed in the **SOAP Message Functions** related list in each SOAP Message record.
SOAP Endpoint	soap_endpoint	Endpoint to use instead of the **SOAP endpoint** value in the SOAP Message Function record. Leave this field blank to use the defined endpoint in the SOAP Message Function record.

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SOAP Message activity input variables (continued)

Field	Parameter	Description
Variables	variables	Variables to substitute into the SOAP **Envelope** defined in the SOAP Message Function record. Use this format for the string: `name1=value1, name2=value2, . . .` If either the name or value contains a comma or equal sign, escape these characters with a backslash.
Use MID Server	use_midserver	Check box for using a MID Server to send the SOAP message. A MID Server might be necessary to reach an endpoint within a firewall or a sub-network that is not visible from the instance. If this check box is selected (true), but no MID Server is defined in the **MID Server** field, workflow automatically attempts to find a MID Server.
MID Server	midserver	Name of the MID Server to use. This field appears when you select the **Use MID Server** check box. The workflow ignores this parameter if the *`use_midserver`* parameter is disabled. **Note:** You can only select a specific MID Server in the legacy SOAP message activity and REST messages. These legacy activities do not use the MID Server selection available starting with the Istanbul release.
Sensor Script	sensor_script	The script to execute after the request has been made and a response has been received. You can access the full XML response body from the *`activity.output`* object.

Probes used by Orchestration

Certain probes, controlled by MID Servers, perform Orchestration tasks on remote computers, such as restarting a server or creating virtual machines from templates.

How Orchestration probes work

When a Workflow executes an Orchestration activity, that activity launches a probe, which writes an *output* record to the ECC Queue. The MID Server selected for the activity checks the ECC Queue for assignments, and then executes the appropriate probe to do the work on the target machine. The information about the activity (machine restarted, files copied, etc.) that is returned from the target machine by the probe is written to the ECC Queue as an *input* record. This information is then sent from the ECC Queue to a sensor that is built into the Workflow activity. The Workflow is updated, and the next activity is executed.

Note:
The probe parameters are set by the activities that launch the probe.

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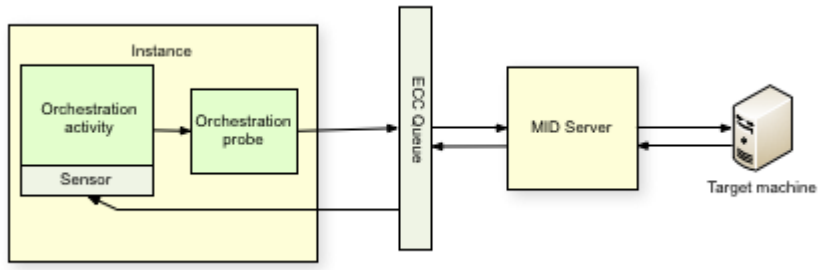
How Orchestration uses probes



Probe List

The base system includes the following Orchestration probes (**Orchestration** > **Definition** > **Probes**).

Probe List

Probe Name	ECC Queue Topic	ECC Queue Name	Description
Command	Command		A probe that runs a local command on the MID server.
DNS Name Resolver	DNSNameResolver		A probe that resolves a fully qualified domain name (FQDN) into an IP address. The probe executes MID Server queries in parallel. It utilizes DNS lookup by the MID Server host OS to make use of the OS maintained DNS cache. It also leverages the hosts file on the OS.
SCPCommand	SCPCommand		A probe that copies files securely from one machine to another. The copy function is performed using the MID Server as a tunnel.
Shazzam	Shazzam		A probe that identifies active devices.
SNMPProbe	SNMP	SNMP Query	This is a generic SNMP probe.
SOAPProbe	SOAPProbe		A probe that sends a SOAP request to target machine.
SSHCommand	SSHCommand		A probe that executes shell scripts from a command line after logging in to a target machine via SSH.
SSHCommandLong	SSHCommandLong		A probe that executes long running shell scripts from a command line after logging in to a target machine via SSH.
VMWare	VMWareProbe		A generic VMware probe that executes the MID Server script include in the *ECC queue name* that is set by a VMware Orchestration activity. This

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Probe List (continued)

Probe Name	ECC Queue Topic	ECC Queue Name	Description
			probe can run any MID Server script include.
Windows - PowerShell	PowerShell	Windows - PowerShell	A probe that runs a Windows PowerShell script on the MID Server. The PowerShell script is provided as the value of a parameter with name ending in `.ps1`. Two variables are available to the script: • `$computer`: The computer pointed to as the source for this probe • `$cred`: A PowerShell credential, using a user name and password from the Credentials table, that logs into `$computer` successfully.

PowerShell activities

PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications.

PowerShell must be installed on any MID Server that uses these activities. MID Servers using PowerShell must be installed on a supported Windows operating system. ServiceNow supports PowerShell 3.0 to 5.1.

The ServiceNow Orchestration plugin adds these basic PowerShell activities to workflows. For instructions on using activities from the PowerShell activity pack, see PowerShell activity pack

Legacy Run PowerShell activity

The Run PowerShell activity executes Windows PowerShell commands on a MID Server.

Important:
This activity is deprecated and is unavailable for new workflows. To replace the functionality of this activity, use the Powershell activity template to create a custom, scoped activity. Workflows from a previous release that use the Run PowerShell activity can continue to do so.

Result Values

The workflow designer can assign a result value using activity.result from within a script field of the activity. By default, the success or failure of the PowerShell commands used determines the result value of the Run PowerShell activity. Possible result values are:

- Success
- Failure

Scratchpad Entries

Information written to `stdout` by the executing script is captured and returned to the activity in the `activity.output` variable. This information can be parsed, processed, or saved (to a scratchpad variable, for example) for future processing in the activity's sensor script.

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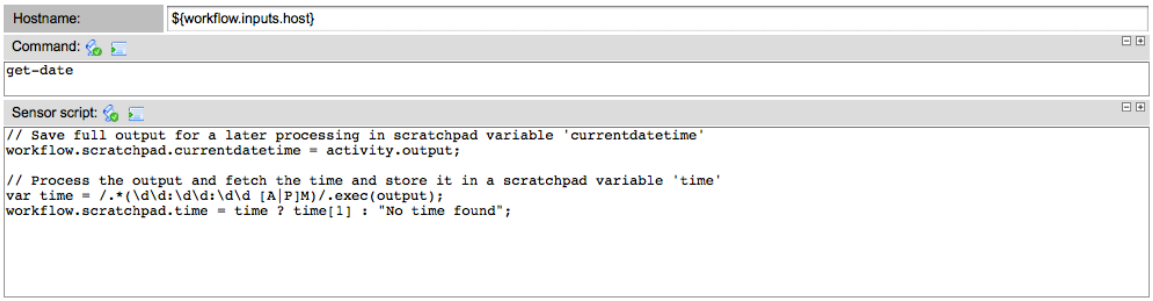
An example would be to run the get-date command to get the MID Server's current time. This sensor script saves the full output received, but we can process it to return and save only the time.

PowerShell activity



Note:
This is an over-simplified example. In most cases, the script operates against some remote Windows computer. However, the principal is the same – whatever is written to `stdout` is returned in `activity.output` and available to process.

Input Variables

Input Variables

Field	Description
Hostname	IP address of the target Windows machine. This value is mapped to the *`$computer`* variable for use in commands (see the example in the **Command** field). A PowerShell credential variable called *`$cred`* that is based on information in the ServiceNow Credentials table will authenticate on the computer pointed to by **Hostname**.
Command	Enter the PowerShell command to run. For example, to execute a simple WMI query against a remote machine pointed to by the *`hostname`* variable, the command is: `get-wmiobject <class> -computer $computer -credential $cred` If no credentials authenticate on the computer, the command runs in the context of the MID Server user. You cannot run both a command and a script file. Specifying a command hides the *`Script file`* variable.
Sensor script	The script to run using the results of the probe. The output from the probe is contained in a variable called *`output`*. Any error from the probe is contained in a variable called *`error`*.
Script file	The Enable script file synchronization for Windows enhanced security. You cannot run both a script file and a command. Selecting a script file hides the *`Command`* variable.
PowerShell script variables	Additional parameters, in JSON format, used by the specified script file.

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States

The activity state tells the workflow engine what to do with the activity.

States

State	Description
Executing	The workflow engine knows to start the onExecute function of the activity.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activty, was cancelled.

Example: Adding Workflow Variables for Command Line: Syntax and Examples

Add workflow variables for the command line using the normal workflow variable syntax. In the example above, if the <class> was in a workflow input variable called *myclass*, the command would look like:

```
get-wmiobject $ {workflow. inputs. myclass } -computer $computer
 -credential $cred
Similarly  if the variable  is a scratchpad variable named
 myclass , the command would look like :
get -wmiobject $ {workflow. scratchpad. myclass } -computer
 $computer -credential $cred
```

HResult codes

When a PowerShell script encounters an error, the Windows machine may return an HResult code as part of the error message.

PowerShell activities can read and interpret this code. Not all PowerShell errors include an HResult code. In the event of a failed PowerShell script, you can use the HResult code to move the workflow through a specific condition.

For example, when resetting an Active Directory password to a password that does not meet policy requirements, such as minimum length or complexity, the PowerShell script returns the HResult code -2146022651. To use this code, create an activity condition with the **Condition** value of *activity.hresult = -2146022651*. If the PowerShell script returns this code when the activity runs, the workflow transitions through this new condition.

SSH activities

SSH activities allow workflows to perform operations on Linux and Unix computers.

Your ServiceNow instance must have access to a MID Server configured to use SSH to run these Orchestration activities.

Run Command activity

The *Run Command* activity runs a command (including shell scripts) on a Linux or UNIX computer.

Important:
The Run Command activity is deprecated in this release. If you have a workflow created in a previous version that uses this activity, your workflow will continue to work normally after upgrading to Helsinki. However, to use this functionality in a new workflow, you must create a custom activity using the SSH activity template in the ServiceNow® activity designer.

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Input variables

Run command input variables

Field	Description
Long running	Select this check box to disable the SSH connection timeout if you think the command will take longer to run than the default 60 seconds. Orchestration periodically checks the running process to determine its status until it is finished.
Hostname	Hostname or IP address of destination server for SSH activity.
Directory	Name of the working directory.
Command	The command to run from this activity.
Sudo	Select this check box to use sudo to run the command on the host machine.
Sensor script	The script to run using the results of the probe. The output from the probe is contained in a variable called *output*. Any error from the probe is contained in a variable called *error*.

Run SCP activity

The Run SCP activity uses Secure Copy Protocol (SCP) to copy a file from one computer to another, including the directory in which the file resides.

Note:
This activity is deprecated in the Geneva release and is not available for use in new workflows. If you have a workflow created in a previous version that uses this activity, your workflow will continue to work normally after upgrading. The custom Secure Copy activity replaces the Run SCP activity in the Geneva release.

Input variables

Run SCP input variables

Field	Description
From Host	Hostname or IP address of the source computer.
From File	Absolute path to the file to copy. This value can be a directory.
To Host	Hostname or IP address of the target computer.
To File	Path to the target file. This path can be absolute or relative to the logged in user's home directory. The specified directory must already exist on the target computer.
Copy Directory	Check box to copy a directory defined in the **From File** variable and all files contained in that directory.

Orchestration applications

Orchestration provides several applications with your subscription.

Orchestration ROI

The Orchestration ROI application allows you to estimate and compute cost savings for tasks in your system that could be automated with Orchestration.

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After you automate the tasks, you can track cost savings by associating Orchestration workflows with corresponding task areas. Configuration in the application allows you to select the hourly rate for performing the task manually, the rules the system uses to select tasks for evaluation, and the time period of the evaluation. Orchestration ROI estimates your savings by multiplying the cost of performing repetitive tasks manually by the estimated number of times the system performs those tasks automatically during a specific date/time range. The system also calculates the actual savings of your automations. Orchestration ROI is included with the base Orchestration subscription.

Orchestration ROI reports offer a number of views of the comparative data and allow you to access the associated records directly from the reports. The standard reports included with the Orchestration - ROI plugin provide summaries, estimated costs, and calculated costs for automated processes. The ROI premium dashboard uses Performance Analytics to provide detailed reports on calculated savings over time. Performance Analytics requires a different plugin and subscription.

Note:
When Orchestration ROI is activated as a dependent plugin of Orchestration, demo data is not installed. If you want to use demo data as a template for your own ROI evaluation, submit a request to ServiceNow® technical support for an Orchestration ROI plugin upgrade with demo data selected.

To set up Orchestration ROI, complete the configuration tasks in the order shown here.

Create Orchestration ROI labor rate cards

Before calculating your Orchestration ROI, you must create labor rate cards for the manual work that would be required to complete the tasks correlated to the ROI calculations.

Before you begin
Role required: orchestration_manager

About this task
The hourly rates defined in the rate cards are used to determine the savings from your orchestrated tasks.

Procedure
1. Navigate to **All** > **Orchestration** > **ROI** > **Labor Rate Cards**.
2. Complete the fields in the form using the descriptions in Manage a labor rate card.
3. Click **Submit**.
4. Create additional rate cards as needed.

Create an Orchestration ROI automation entry record

The ROI automation entry record couples the cost of performing a task with the specific workflow that automates the task, for the purpose of calculating the resulting savings.

Before you begin
Role required: orchestration_manager
Before starting this procedure, verify that the appropriate labor rate cards were created.

About this task
Use this record to apply a manual hourly rate to a task that is performed automatically by your instance. To determine the savings realized from orchestrating a task, the system can evaluate whether those savings were estimated or calculated.

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- **Estimated savings**: Uses the labor rate, the time estimates for completion of the task, and the number of automations that have been run to determine savings.
- **Calculated savings**: Uses the labor rate, the time calculated for completion of the task, based on the configured evaluation period, and the number of automations that have been run to determine savings.

Procedure

1. Navigate to **All** > **Orchestration** > **ROI** > **Automation Entry Form**.
2. Fill in the fields on the form, as appropriate.

Automation Entry Form

Field	Description
Category	Category of the selected workflow automation. The following categories are provided in the base Orchestration - ROI system: ○ **Access & Identity Management** ○ **Datacenter Automation** ○ **IT Service Management** ○ **Other** **Note:** To create a category, open the dictionary record for the Automation Entry Form [automation_entry_form] table and add an option to the choice list.
Item	Unique name for the specific task within the category. This value represents the work to which the labor rate card applies, such as **Password Reset**.
Resource	Labor rate card to apply to this automation entry. You must have IT Cost Management active on the instance for this field to appear.
Associated Workflows	Workflow automations created to automate this manual task. The system uses this field to identify the number of automations that have been run.
Estimated Duration (min) per Task	Estimated time to perform this task manually.
Estimated Volume per Month	Estimated number of times needed to perform this task manually per month.
Read-only fields	
Start time	Start time for the evaluation period. Configure this value in the Time Range for Calculated Averages module.
End time	End time of the evaluation period. Configure this value in the Time Range for Calculated Averages module.
Calculated average duration per task (min)	Actual time required to perform this task manually.

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Field	Description
Calculated average volume per month	Actual average number of times this task is performed manually per month.

3. Select one of these submission options:
   - **Submit**: Saves the record to the table without running any calculations.
   - **Submit and process now**: Saves the record and calculates the savings based on the hourly rate and the number of workflow contexts for this automation entry.

Create an Orchestration ROI correlated task rule

The correlated task rule applies configurable conditions to fields in a selected table that tell the instance which manual tasks correspond to an automation entry record.

Before you begin

Role required: orchestration_manager
Before starting this procedure, make sure you have created labor rate cards and the appropriate automation entry records for the automated tasks you want to evaluate.

About this task

Create conditions that the system can use to correlate manual tasks to the automation entry. For example, a rule on the Incident [incident] table uses these conditions to correlate the employee on-boarding task to values configured in the Employee OnBoarding automation entry record:

- **[Subcategory] [is] [Employee OnBoarding]**
- **[Sort description] [contains] [new employee]**

When a new employee opens an incident to request services or assets which are typically handled manually, Orchestration applies the usual labor rate for the manual work to the potential automated solution, and then computes the actual savings.

Procedure

1. Navigate to **All** > **Orchestration** > **ROI Task Correlation** > **Correlated Tasks Rules**.
2. Click **New**.
3. Fill in the fields on the form, as appropriate.

Automation entry form

Field	Description
Automation entry	Automation entry record that correlates to the manual task defined by these conditions. The entry record names the workflow used to automate the task and defines the labor rate used to calculate the cost of the task.
Table	Table to filter, using these conditions. The rule selects records from this table that match the conditions. Information from these records is used to calculate the actual time to perform a manual task and the actual volume for that manual task.
Condition	Condition builder to use to filter records for this table. Use these conditions to identify all manual tasks correlated to this automation entry.
Read-only fields	

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Field	Description
Processed on	Date and time that the system performs the matching records lookup. The system automatically searches for new manual tasks matching these conditions.

4. Select one of these submission options:
   - **Submit**: Saves the record to the table without running any calculations.
   - **Submit and process now**: Saves the record, looks up all matching tasks, and saves matching record information to the Correlated Tasks [manual_mapping_records] table.
5. To view a rule, select the link in the **Table** column of the **Correlated Tasks Rules** related list for the automation entry you want to see.
6. To view the list of tasks that match all correlated rules in the system, navigate to **Orchestration** > **ROI Task Correlation** > **Correlated Tasks**.
7. To view the list of tasks that match this rule in the system, click **Correlated Tasks** under **Related Links** in this form

Configure the time range for Orchestration ROI calculations

Select a date range to calculate the average number of tasks and the duration per month for the correlated tasks.

Before you begin
Role required: orchestration_manager

About this task
By default, the system creates a range ending at the current date and time and extending back over the previous month. You can change this range at any time and recalculate the ROI instantly.

Procedure
1. Navigate to **All** > **Orchestration** > **ROI Task Correlation** > **Time Range for Calculated Averages**.
2. Enter a new start or end date and time or click the icon to select a date using the calendar.
3. Click **Calculate** to recalculate the ROI based on the new time range and to save your settings.

Installed with Orchestration ROI

Several types of components are installed with the Orchestration - ROI plugin (com.snc.runbook_automation.roi).

Tables installed with Orchestration ROI

Tables are added with activation of Orchestration ROI.

Table	Description
Expense and Savings [run_rate_predicted_savings]	Contains the data for the reports in **Orchestration** > **ROI Reports** > **Predicted Savings**.
Savings Report [savings_report]	Contains the number of automations that have been run before the date specified in the **Processed On** column, based on:

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Table	Description
	• Each automation entry's associated workflows • Estimated savings based on the estimated duration per task. • Calculated savings based on calculated duration.
Detailed Savings Report [detailed_savings_report]	Contains a detailed list for the Savings Report [savings_report] table. This list contains each automation's run date and savings for that automation.
Automation Entries [automation_entry_form]	Contains automation entries that couple labor resources to specific manual tasks. You can specify the estimated duration to perform a task manually and the estimated number of times that a task is performed per month. If this automation entry already has workflow automations implemented, you can specify the associated workflows. The system calculates the savings, based on the labor rate card and the number of workflow automations that have been performed.
Roadmap Planning [roadmap_planning]	Contains roadmap planning for each automation entry to be implemented. You can provide estimated hours to implement a workflow automation, the automation percentage anticipated by the end of the year, and the starting month to implement the workflow.
Correlated Tasks [manual_mapping_records]	Contains all matching manual tasks for each automation entry. Each tasks's information is stored in this table for the system to use to calculate the actual duration and volume for each manual task.
Correlated Tasks Rules [manual_mapping_conditions]	Contains the correlated task rules the system uses to look up manual tasks corresponding to each automation entry.

Plugins installed with Orchestration ROI

Plugins are installed with activation of Orchestration ROI, if they are not already active.

Plugin	Description
Cost Management [com.snc.cost_management]	Provides the labor rate cards Orchestration ROI uses to determine the savings for each automated task. See Cost Management for more information.

Roles installed with Orchestration ROI

Roles are added with activation of Orchestration ROI.

Role title [name]	Description	Contains Roles
Orchestration manager [orchestration_manager]	Manages all activities in the Orchestration ROI module.	• pa_admin • report_admin

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UI actions installed with Orchestration ROI

UI actions are added with activation of Orchestration ROI.

UI actions for Orchestration - ROI

UI action	Table	Description
Savings Report	Automation Entry Form [automation_entry_form]	Displays the savings report specific to this automation entry, if the associated workflows are not empty.
Estimated and Projected Savings	Automation Entry Form [automation_entry_form]	Displays the estimated savings, based on the estimated duration of the task, and calculated savings, based on the calculated duration of the task.
Show Workflow Context	Detailed Savings Report [detailed_savings_report]	Shows the related workflow context.
Submit AND process now	Automation Entry Form [automation_entry_form]	Processes this new entry
Correlated Tasks	Correlated Tasks Rules [manual_mapping_conditions]	Displays all matching tasks from the Correlated Tasks [manual_mapping_records] table.
Detailed Savings Report	Automation Entry Form [automation_entry_form]	Displays the list of automations that have been run, based on associated workflows.
Task	Correlated Tasks [manual_mapping_records]	Displays the task record.
Submit AND process now	Correlated Tasks Rules [manual_mapping_conditions]	Processes a correlated task rule. This action performs matching on the specified table and the filter conditions.

Script includes installed with Orchestration ROI

Script includes are added with activation of Orchestration ROI.

Script include	Description
OrchestrationROIAjax	Script that calculates the actual duration and volume of a task.
OrchestrationROI	Script that calculates the number of workflow contexts, looks up all matching tasks, calculates savings, and other functions used in the UI actions.
ROIDemoDataUtil	Script that updates demo data timestamps.

Client scripts installed with Orchestration ROI

Client scripts are added with activation of Orchestration ROI.

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Client script	Table	Description
Display info for processing rules	Correlated Tasks Rules [manual_mapping_conditions]	Displays annotation on the Correlated Task Rule form advising that new task rules are not evaluated until the time specified in the ROI schedule.

Business rules installed with Orchestration ROI

Business rules are added with activation of Orchestration ROI.

Business rule	Table	Description
Delete corresponding records	Automation Entry Form [automation_entry_form]	When a record is deleted from the Automation Entry Form [automation_entry_form] table, this business rule deletes all records in other ROI tables that reference this entry.
Insert into Run Rate & Savings	Automation Entry Form [automation_entry_form]	When a new automation entry is provided, this business rule calculates the estimated savings, based on the estimated duration of a task and its associated labor rate card.
Insert into Savings Reports	Automation Entry Form [automation_entry_form]	When a new automation entry is provided, this business rule inserts a new record into the Savings Report [savings_report] table with the**automations_run** field set to **0**.

Orchestration ROI reports

Orchestration ROI provides a collection of standard and premium reports to help you calculate savings from automating services in your organization.

The ROI standard reports are included with Orchestration ROI. The premium reports provide enhanced views generated with Performance Analytics and require the Orchestration - ROI Premium plugin.

Orchestration ROI standard reports

The dashboard of standard ROI reports provides summaries, estimated costs, and calculated costs for automated processes. To access the ROI standard dashboard, navigate to **Orchestration** > **ROI Reports** > **Dashboard**.

Summary tab

The Summary tab contains four reports on automation categories.

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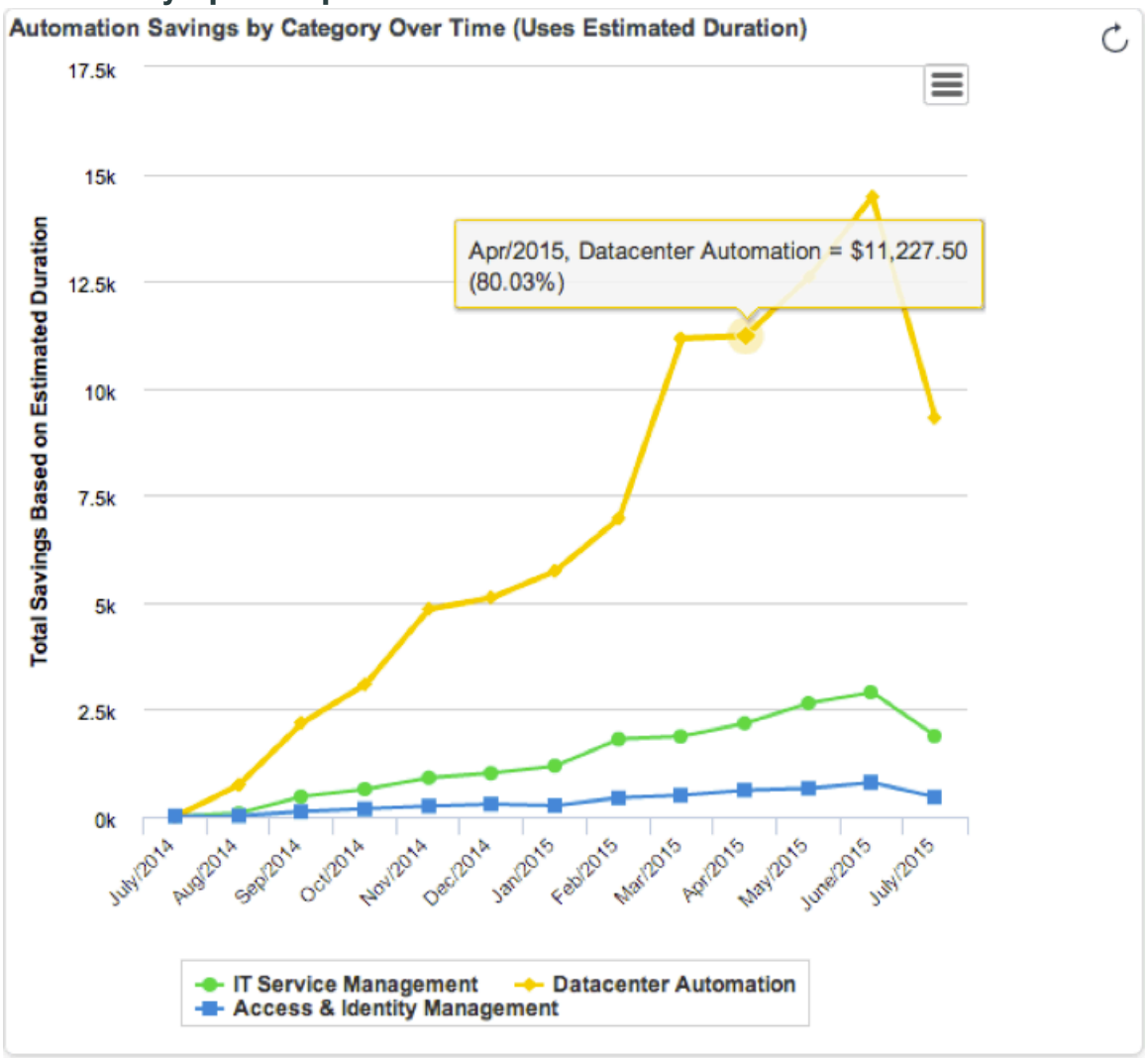
ROI summary report sample



Standard ROI summaries by category

Report	Description
Manual Tasks by Category Over Time	Trend of manual tasks by category over time. For example, if you use automations to perform a portion of the necessary tasks, the report shows the number of tasks still executed manually, decreasing over time. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]
Automations by Category Over Time	Trend of automated tasks by category over time. For example, this chart can show the increase in the number of automated tasks as a workflow automation rolls out slowly over time. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]
Automation Savings by Category Over	Amount of savings from automated tasks over time, based on the estimated duration of the task, the number of automations performed, and the cost from the labor rate card.

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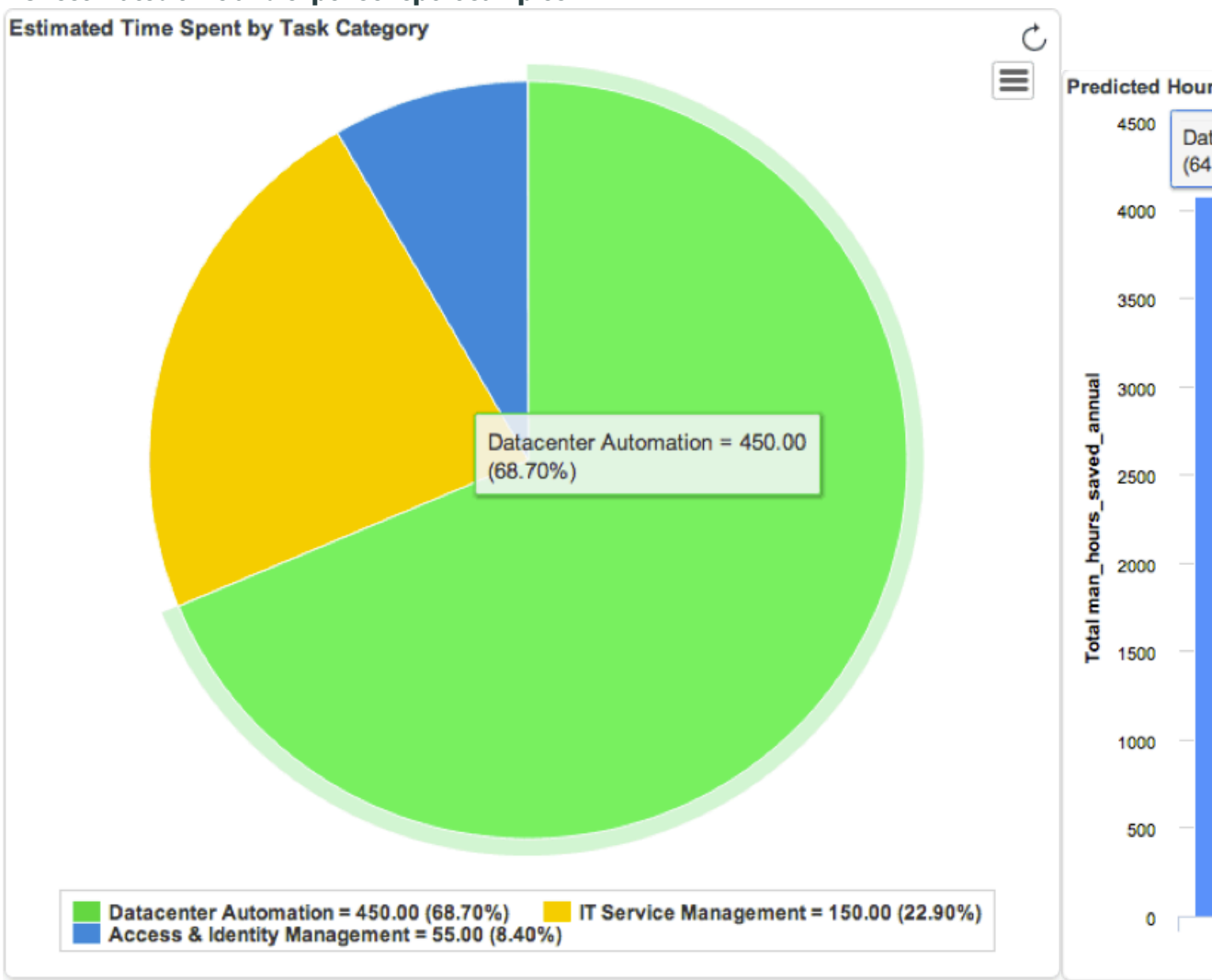
Standard ROI summaries by category (continued)

Report	Description
Time (Uses Estimated Duration)	• **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]
Automation Savings by Category Over Time (Uses Calculated Duration)	Amount of savings from automated tasks over time, based on the calculated duration of the task, the number of automations performed, and the cost from the labor rate card. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]

Estimated Costs tab

The Estimated Costs tab contains eight reports on estimated time and expense for automations.

ROI estimated time and expense report samples



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Standard ROI time and expense estimates

Report	Description
Estimated Time Spent by Task Category	Total estimated time spent, in minutes, on all tasks by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Estimated Volume of Manual Tasks per Month by Category	Total estimated volume of all tasks per month by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Predicted Hours Spent Monthly by Category (Uses Estimated Duration & Volume)	Total predicted hours spent monthly on all manual tasks by category, using the estimated duration of each task and the estimated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Monthly Expense by Category (Uses Estimated Duration & Volume)	Total predicted monthly expense for all manual tasks by category, using the estimated duration of each task, estimated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Hours Spent Quarterly by Category (Uses Estimated Duration & Volume)	Total predicted hours spent quarterly on all manual tasks by category, using the estimated duration of each task and the estimated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Quarterly Expense by Category (Uses Estimated Duration & Volume)	Total predicted quarterly expense for all manual tasks by category, using the estimated duration of each task, estimated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Hours Spent Annually by Category (Uses Estimated Duration & Volume)	Total predicted hours spent annually on all manual tasks by category, using the estimated duration of each task and the estimated volume of each task per month.

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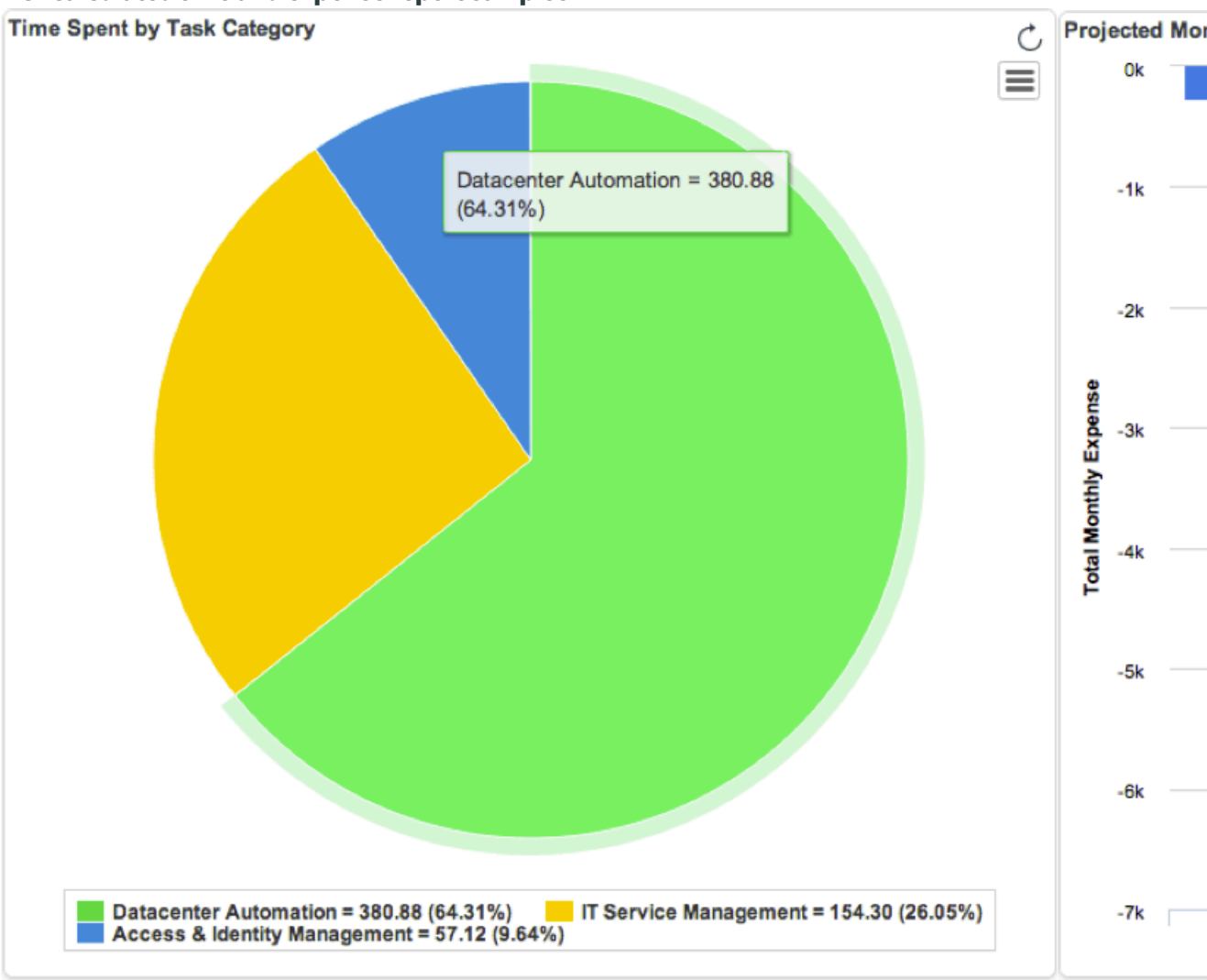
Standard ROI time and expense estimates (continued)

Report	Description
	• **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Annual Expense by Category (Uses Estimated Duration & Volume)	Total predicted annual expense for all manual tasks by category, using the estimated duration of each task, estimated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]

Costs from Correlated Tasks tab

The Costs from Correlated Tasks tab contains eight reports on time and expense for automations based on actual calculations.

ROI calculated time and expense report samples



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Standard ROI calculated time and expense of automations

Report	Description
Time Spent by Task Category	Total actual time spent, in minutes, on all tasks by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Volume of Manual Tasks per Month by Category	Total actual volume of all tasks per month by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Projected Hours Spent Monthly by Category (Uses Calculated Duration & Volume)	Total projected hours spent monthly on all manual tasks by category, using the calculated duration of each task and the calculated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Monthly Expense by Category (Uses Calculated Duration & Volume)	Total projected monthly expense for all manual tasks by category using the calculated duration of each task, the calculated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Hours Spent Quarterly by Category (Uses Calculated Duration & Volume)	Total projected hours spent quarterly on all manual tasks by category, using the calculated duration of each task and the calculated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Quarterly Expense by Category (Uses Calculated Duration & Volume)	Total projected quarterly expense for all manual tasks by category using the calculated duration of each task, the calculated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Hours Spent Annually by Category (Uses Calculated Duration & Volume)	Total projected hours spent annually on all manual tasks by category, using the calculated duration of each task and the calculated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]

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Standard ROI calculated time and expense of automations (continued)

Report	Description
Projected Annual Expense by Category (Uses Calculated Duration & Volume)	Total projected annual expense for all manual tasks by category using the calculated duration of each task, the calculated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]

Schedule Orchestration ROI calculations for standard reports

The scheduled job that calculates Orchestration ROI standard reports is active by default and controlled by system properties.

Before you begin

Role required: orchestration_manager, admin

About this task

The system provides a default scheduled job called Processing ROI Schedule that allows you to configure when Orchestration calculates the ROI for standard reports. This schedule allows scripting for advanced conditions. To modify the schedule or write a script to run, open Processing ROI Schedule from **System Scheduler** > **Scheduled Jobs** > **Scheduled Jobs** and click **Configure Job Definition**. To execute the schedule directly from the job definition, click **Execute Now**

To control the running of the schedule job with the Orchestration properties.

Procedure

1. Navigate to **Orchestration ROI** > **Properties**.
2. Configure the following properties:

ROI schedule properties

Property	Description
roi.processing.active	Activate scheduled job for ROI processing. This property activates the Processing ROI Schedule scheduled job. ○ **Type**: true | false ○ **Default**: true
roi.processing.interval	Scheduled ROI processing interval (hours). This property sets the repeat interval for the scheduled job that processes savings reports and correlated tasks. ○ **Type**: integer ○ **Default**: 24

3. Click **Save** to save your changes.

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Orchestration ROI premium reports

The premium dashboard provides detailed reports on calculated savings over time.

The ROI premium reports require the Orchestration - ROI Premium plugin and are built using Performance Analytics. The Orchestration - ROI Premium plugin is dependent on the Performance Analytics - Premium plugin which requires a separate subscription.

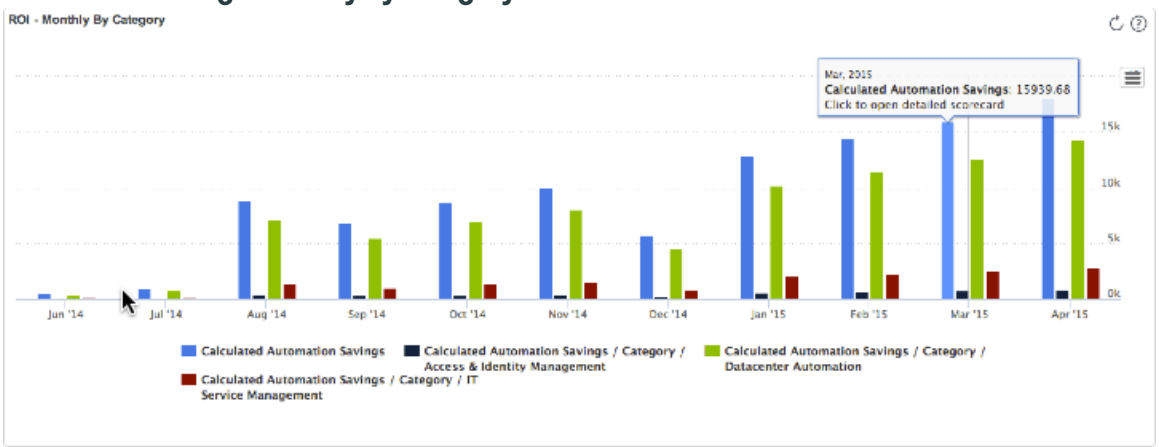
Important:
You must activate the Performance Analytics scheduled collection job before Orchestration ROI premium can display data.

To access the ROI premium dashboard, navigate to **Orchestration** > **ROI Reports** > **Premium Dashboard**.

ROI By Category tab

The ROI By Category tab contains three reports showing the calculated savings over time by category.

Calculated savings monthly by category



Premium reports for calculated savings over time by category

Report	Description
ROI - Monthly By Category	Shows the calculated savings each month by category. The chart displays the total calculated savings against the calculated savings for each category. • **Type**: Column chart • **Table**: Detailed Savings Report [detailed_savings_report]
ROI - By Category	Shows the trend of calculated savings by category. • **Type**: Spline chart • **Table**: Detailed Savings Report [detailed_savings_report]
ROI - Running Sum 12 month period	Shows the running sum of calculated savings for all categories in the last 12 months. • **Type**: Area chart • **Table**: Detailed Savings Report [detailed_savings_report]

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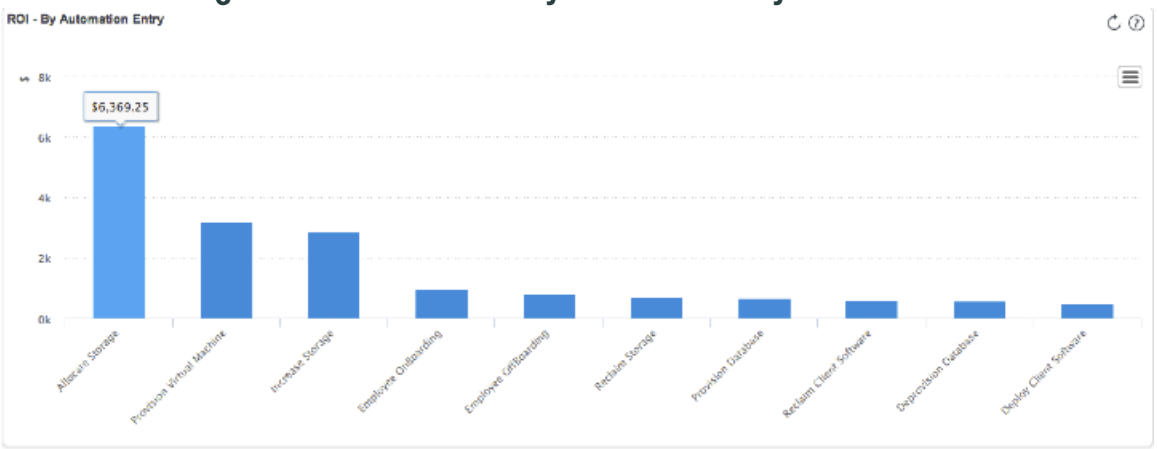
ROI By Automation Entry

The ROI By Automation Entry tab contains two reports showing the calculated savings over time by automation entry.

Calculated savings for the current month by automation entry



Calculated savings over time by automation entry

Report	Description
ROI By Automation Entry	Shows the current month's calculated savings for each automation entry. • **Type**: Column • **Table**: Detailed Savings Report [detailed_savings_report]
ROI - By Automation Entry Top 10 List	Shows the top 10 automation entries that have the most calculated savings in the current month. • **Type**: Scorecard • **Table**: Detailed Savings Report [detailed_savings_report]

Request Orchestration ROI premium reports

To view the Orchestration ROI premium reports, you must request activation of the Orchestration - ROI Premium (com.snc.runbook_automation.roi_premium) plugin. The Orchestration - ROI Premium plugin is included with an Orchestration subscription, but must be activated by request.

Before you begin

The Orchestration - ROI Premium plugin requires the Performance Analytics - Premium plugin, which must be purchased separately.

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the **Activate Plugin** form on Now Support.

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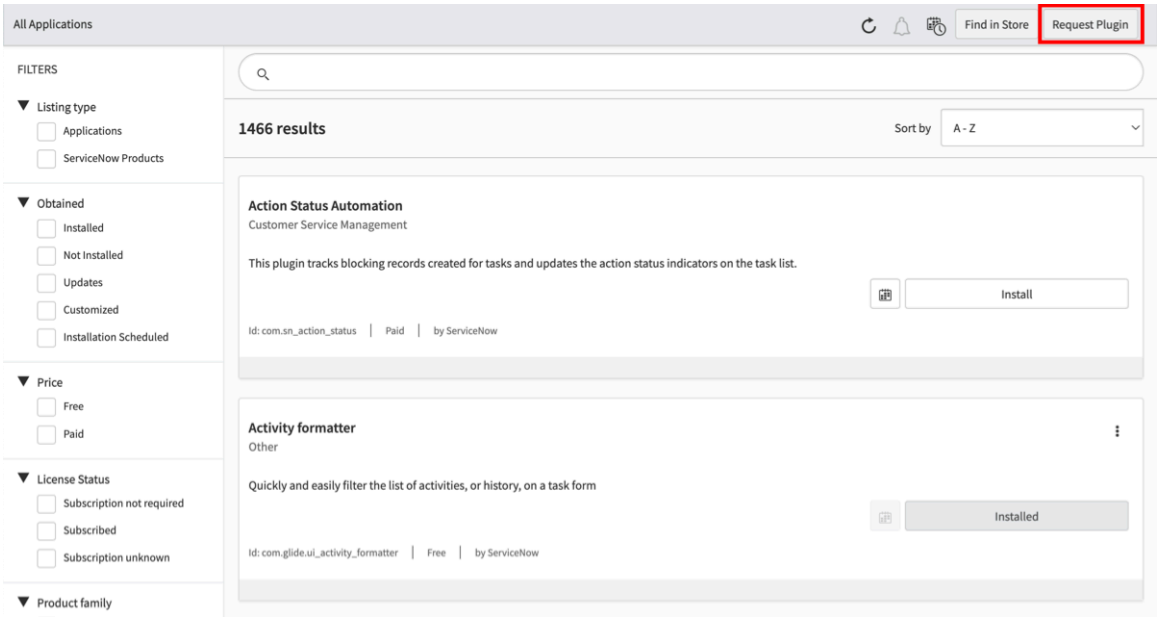
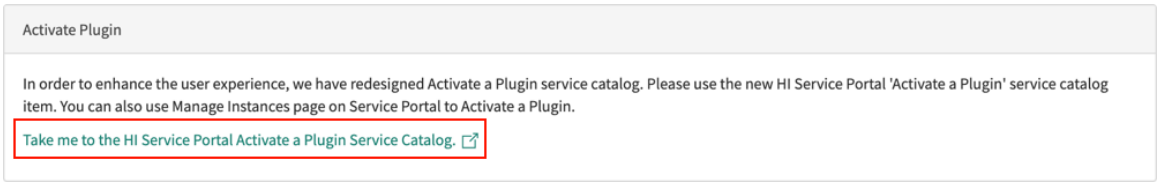


3. On Now Support, select the link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Instance on which to activate the plugin.
Which plugin would you like to activate	Name of the plugin to activate. **Note:** If the system does not list the plugin you want or if you are activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	The date and time to activate the plugin.

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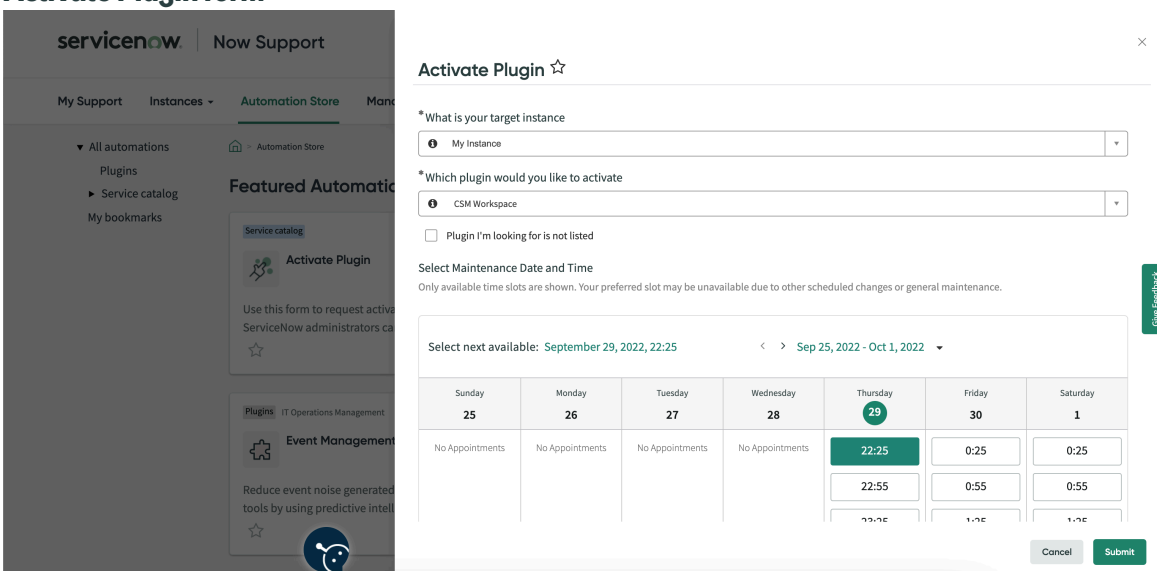
Field	Description
	Note: Plugins are activated in two batches, once in the morning and once in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.

Example

For example, see the following form to activate the CSM Workspace plugin on an instance named My Instance.

Activate Plugin form



7. Select **Submit**.
   For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

Schedule Orchestration ROI calculations for premium reports

Orchestration ROI premium reports use a Performance Analytics job that must be activated before premium reports can be generated.

Before you begin

Role required: orchestration_manager, admin

About this task

The scheduled job required to calculate premium ROI reports is called [PA ROI] Historic Data Collection and is installed with the Orchestration - ROI Premium [com.snc.runbook_automation.roi_premium] plugin. This job is not active by default.

Procedure

1. Navigate to **All** > **Performance Analytics** > **Data Collector** > **Jobs**.
2. Search for the [PA ROI] Historic Data Collection job.

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3. Select the **Active** check box.
4. The scheduling options appear for the value selected in the **Run** field.
   For instructions on creating a schedule, see Create or schedule a data collection job.
5. To execute the schedule directly from the job definition, click **Execute Now**.
6. Click **Update**.

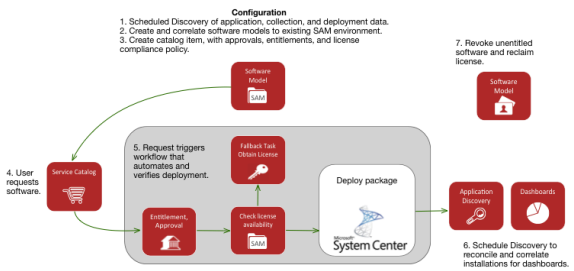
Client Software Distribution

The Client Software Distribution (CSD) application allows administrators to distribute software from the service catalog using third-party management systems.

CSD allows an administrator to create all the records necessary to deploy software from service catalog requests, including software models and catalog items. You can use the CSD application to automate the deployment and revocation of software from an SCCM host using the custom SCCM activity pack. You can define lease periods for software distributed from the Service Catalog and allow lease extensions in some cases, pending approvals. Deployment is accomplished using Orchestration activities and workflows.

CSD also integrates with Software Asset Management to manage license counts for deployed software.

CSD process flow using SCCM



Request client software distribution

Client software distribution requires the Orchestration - Client Software Distribution plugin (com.snc.orchestration.client_sf_distribution), which is available by request with a subscription to Orchestration.

Before you begin

Role required: admin

About this task

The Orchestration - Client Software Distribution plugin activates the Orchestration - System Center Configuration Manager plugin that contains the custom SCCM activities used to deploy or revoke software using an SCCM server. For additional plugin dependencies, see Plugins installed with client software distribution.

Note:
The Orchestration - Client Software Distribution plugin runs in its own application scope.

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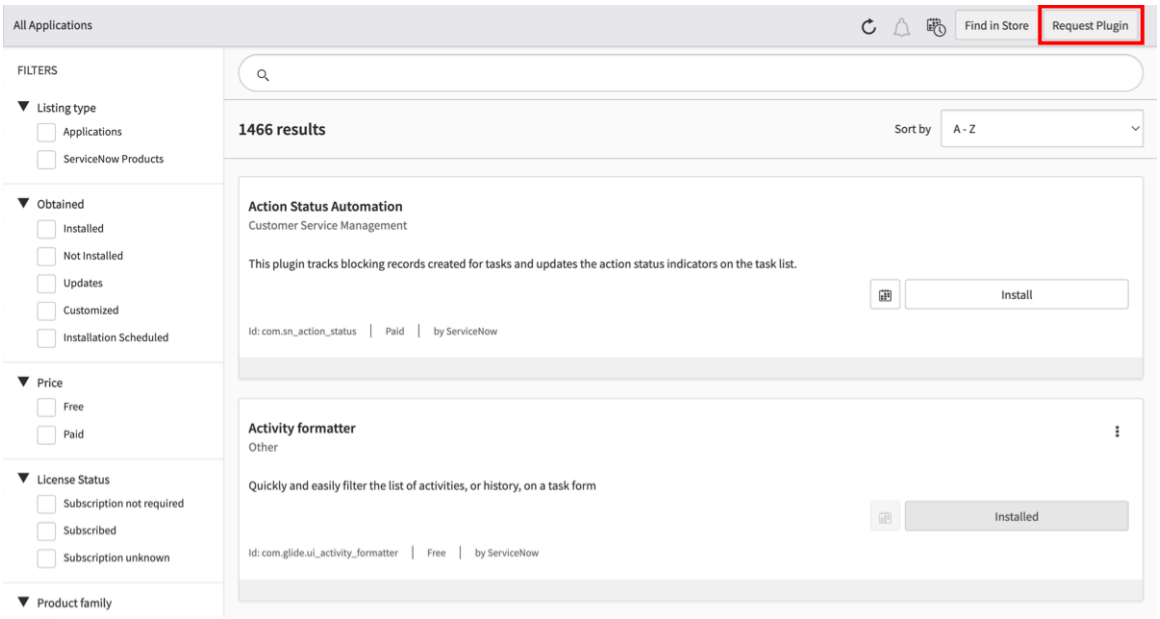
Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the **Activate Plugin** form on Now Support.



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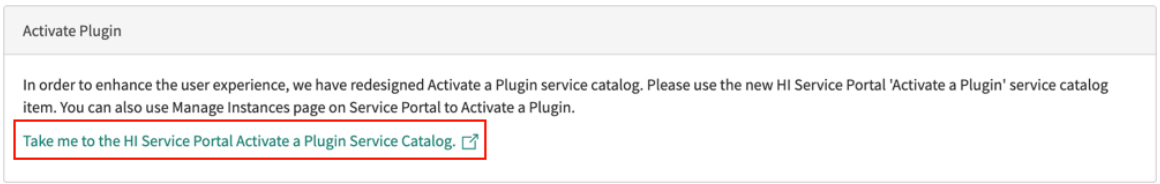

4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Instance on which to activate the plugin.
Which plugin would you like to activate	Name of the plugin to activate. **Note:** If the system does not list the plugin you want or if you are activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.

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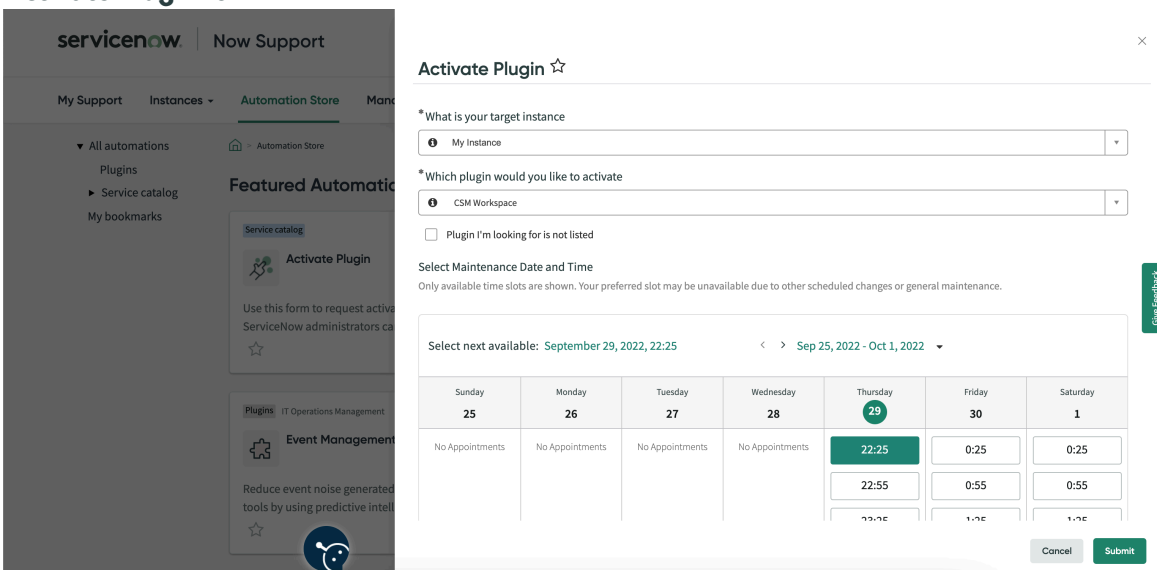
Field	Description
Select Maintenance Date and Time	The date and time to activate the plugin. **Note:** Plugins are activated in two batches, once in the morning and once in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.

Example

For example, see the following form to activate the CSM Workspace plugin on an instance named My Instance.

Activate Plugin form



7. Select **Submit**.
   For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

Installed with client software distribution

Several types of components are installed with client software distribution (CSD).

Tables installed with client software distribution

These tables are installed with the Orchestration - Client Software Distribution plugin (com.snc.orchestration.client_sf_distribution).

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Client software distribution tables

Table	Description
Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item]	Contains all catalog items created for client software distribution. This table extends the Catalog Item [sc_cat_item] table.
Client Software Distribution Software Request [sn_client_sf_dist_req_software]	Contains all requested software, and their statuses.
Client Software Distribution Application [sn_client_sf_dist_application]	Contains all discovered CSD applications.
Client Software Distribution Provider [sn_client_sf_dist_provider]	Contains all software distribution providers.
Client Software Distribution Extension Key [sn_client_sf_dist_extension_key]	Contains the predefined CSD extension keys.
Client Software Distribution Extension Point [sn_client_sf_dist_extension_point]	Contains the customization script for the extension keys.
Client Software Distribution Software Configuration [sn_client_sf_dist_software_config]	Base table for all software provider configurations.
SCCM Server Instance [sn_client_sf_dist_cmdb_ci_sccm_server]	Contains all SCCM server instances. This table extends the Configuration Item [cmdb_ci] table.
SCCM Application [sn_client_sf_dist_sccm_application]	Contains all discovered SCCM applications. This table extends the Client Software Distribution Application [sn_client_sf_dist_application] table.
SCCM Application Catalog Item [sn_client_sf_dist_sccm_app_cat_item]	Contains all catalog items created for SCCM applications. This table extends the Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item] table.
SCCM Collection [sn_client_sf_dist_sccm_collection]	Contains all discovered SCCM collections. Contains all discovered SCCM collections.
SCCM Deployment [sn_client_sf_dist_sccm_deployment]	Contains all discovered SCCM deployments. Contains all discovered SCCM deployments.
SCCM Configuration [sn_client_sf_dist_sccm_sf_config]	Contains the SCCM application, install and uninstall collections, and Discovery model. This table extends the Client Software Distribution Software Configuration [sn_client_sf_dist_software_config]

Plugins installed with client software distribution

These plugins are installed with the Orchestration - Client Software Distribution plugin, if they are not already active.

For instructions on requesting activation of Client Software Distribution (CSD) see Request client software distribution.

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Plugins for Orchestration - Client Software Distribution

Plugin	Description
Orchestration - System Center Configuration Manager [com.snc.orchestration.sccm_mgnt]	Installs the custom SCCM Orchestration activities that do work on the SCCM target host.
Orchestration - Asset Lease Management [com.snc.orchestration.asset_lease_management]	Installs the lease functionality for software distributed through the Service Catalog. This includes starting, stopping, and extending leases.
Service Catalog Scoped API [com.glideapp.servicecatalog.scoped.api]	Installs the API to support application creation in the Service Catalog.
Software Asset Management [com.snc.software_asset_management]	Provides the ability to manage software assets, including the reconciliation of entitlements to licenses for named users, workstation, and enterprise software agreements.

Roles installed with client software distribution

These roles are installed with the Orchestration - Client Software Distribution plugin.

Roles for Orchestration - Client Software Distribution

Role title [name]	Description	Contains Roles
Client software distribution admin [sn_client_sf_dist.csd_admin]	Administrator role for managing client software distribution application.	• sam • agent_admin • report_admin • catalog_admin • itil • workflow_admin

Script includes installed with client software distribution

These script includes are installed with the Orchestration - Client Software Distribution plugin

Script includes for Orchestration - Client Software Distribution

Script include	Description
CSDExtensionPoint	Execute the CSD provider's specific code
CSDUtil	Utility functions for the CSD application.

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Script includes for Orchestration - Client Software Distribution (continued)

Script include	Description
RefQualsCSD	Reference qualifier filter. This script provides the filter functrions for the CSD providers, devices, SCCM application, install collections, and uninstall collections.
SCCMCatItemHandler	Sets the field values of specific SCCM catalog items. These values are the SCCM catalog item table name, catalog item name, SCCM provider, and SCCM software configuration.
SoftwareCatItemCreator	Creates software catalog items
CSDCatItemHandler	Base class for CSD catalog item creation. This script is used by the Create Catalog Item UI action to create and application catalog.
CSDDemoDataUtil	Populates demo data.
CSDDemoDataUtilAjax	Populates demo data.

Properties installed with client software distribution

Properties for client software distribution (CSD) manage the installation status of requested software deployments and configure scheduled Discoveries.

To access CSD properties, navigate to **Client Software Distribution** > **Properties**. The following properties are available:

Client software distribution properties

Property	Name	Description
Status check expiration interval (days)	sn_client_sf_dist.softwareInstallExpDays	Controls how many days the system waits before ignoring the software installation status. The default time limit for installing software is 30 days before the system stops checking the installation status of a deployment. Installation statuses are: • **Not installed**: User has not installed requested software prior to the expiration of the configured time limit. • **Installed**: Software was installed within the configured time limit. • **Status check expired**: Time limit has expired for the user to install the requested software. The system no longer checks the status of this deployment. • **Revoked**: Software was revoked by the administrator.

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Client software distribution properties (continued)

Property	Name	Description
		• **Type**: integer • **Default value**: 30
Reconcile software installation status interval (hours)	sn_client_sf_dist.softwareInstallIntervalHour	Determines when the scheduled job runs that determines the installation status. By default, the system checks the installation status every hour. • **Type**: integer • **Default value**: 24
Set scheduled application Discovery interval (days).	sn_client_sf_dist.discoveryExeDay	Sets the repeat interval for the scheduled job that runs application Discovery. By default, Discovery runs at midnight on the day set with this value. • **Type**: integer • **Default value**: 5
Set lease execution schedule job interval (minutes)	sn_client_sf_dist.lease_execution_interval	Interval in which the CSD Lease Schedule scheduled job checks for requested software leases to start, stop, or extend. • **Type**: integer • **Default value**: 1
Set time prior to lease end to notify requester (days)	sn_client_sf_dist.lease_end_notification	Determines how many days prior to the end of a software lease to notify the requester. If lease extensions are allowed, ensure that this period provides enough time for the approval process to complete before the lease expires. • **Type**: integer • **Default value**: 5

Workflows installed with client software distribution

These workflows are installed with the Orchestration - Client Software Distribution plugin

Workflows installed with client software distribution

Workflow	Description
Discover SCCM	Retrieves lists of applications, collections, and deployments from SCCM servers using custom CSD orchestration activities. An administrator runs this workflow from a UI action in a SCCM Server Instance record.

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Workflows installed with client software distribution (continued)

Workflow	Description
Order Client Software	Runs automatically when a user orders software from the service catalog.
Deploy SCCM Application	Triggered by the Order Client Software workflow to deploy software through SCCM server. This workflow adds either the user or the device into the SCCM collection.
Revoke Client Software	Begins the software revocation process for software deployed by an external provider. Administrators run this workflow from a UI action on the Requested Software record and the Installed Software Not Entitled record. This workflow triggers the appropriate provider workflow that performs the actual recovation. For example, this workflow triggers the Revoke SCCM Application workflow for applications in SCCM uninstall collections.
Revoke SCCM Application	Revokes SCCM applications that are members of an uninstall collection. The Revoke Client Software workflow triggers this workflow to revoke software deployed by an SCCM server. This workflow moves either the user or the device from the SCCM collection into the appropriate uninstall collection.

Related topics

- Using extension points to extend application functionality
- Using scripted extension points in server-side scripts
- Using UI extension points in server-side UI macros
- Using client extension points in client-side UI scripting

Create licenses and counters for distributed software

Licenses and software counters are associated with the software model and must be created if you want to track the license for software deployed by client software distribution (CSD).

Before you begin

Role required: sam or admin

You can create software licenses and counters in Software Asset Management for software items deployed from the service catalog by CSD. CSD depends on the software counter result to determine if the license is available for the requested software. If the license **Valuation** is greater than 0, and the license type is **Not allocated**, CSD assumes that the license is available for the software.

Procedure

1. Navigate to **All** > **Software Asset** > **Software Licenses**.
2. Add a new software license for the software model you used in CSD.
3. Navigate to **Software Asset** > **Reconciliation** > **Software Counters**.
4. Create a software counter for the software model you created.
5. Run the counter to retrieve the software license information.

Client software distribution ordering process

Software deployed by Client Software Distribution (CSD) can be ordered from the service catalog by individual users or by approved users on behalf of others.

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Client Software Distribution catalog items have different options, depending on how ordering is configured.

Lease start and end dates

All software deployed by CSD requires users to specify the beginning date for the lease. This is enforced by the Orchestration - Asset Lease Management plugin that is activated automatically with CSD. The system prepopulates the **Lease start** field with the current date and time.

If the catalog item is configured for revocation (uninstall), the form displays the **Lease end** field, which allows the requester to define an end date and time for the lease. The system validates user input in these fields to ensure that the dates selected define a future window. The **Lease end** field is not mandatory and can be left blank to order software with no end date.

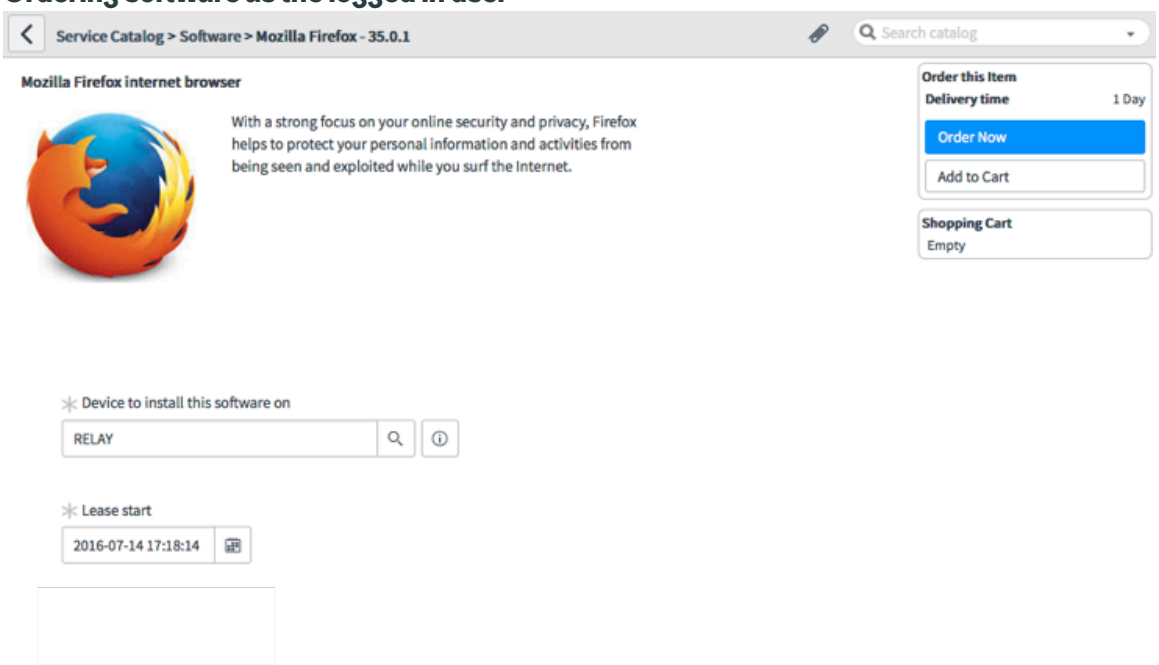
Note:
For systems deploying software from Microsoft System Center Configuration Management (SCCM), the **Lease end** field is only available if the SCCM configuration specifies an uninstall collection.

Software offered only to the logged in user

If the software catalog item is configured with the **Order on behalf of** check box cleared, the **User** field does not appear on the order form. The logged in user selects the device on which to deploy the software from the **Device to install this software on** field. Only those devices assigned to the logged in user appear in the list.

In this example, a user has logged into the service catalog to order Firefox for a computer that is assigned to the user. User selects the machine from a list of owned devices and selects the date and time the lease should begin. This software is deployed through Microsoft System Center Configuration Management (SCCM), but does not have an uninstall collection configured and cannot be revoked automatically by the system. As a result, the **Lease end** field is not available.

Ordering software as the logged in user



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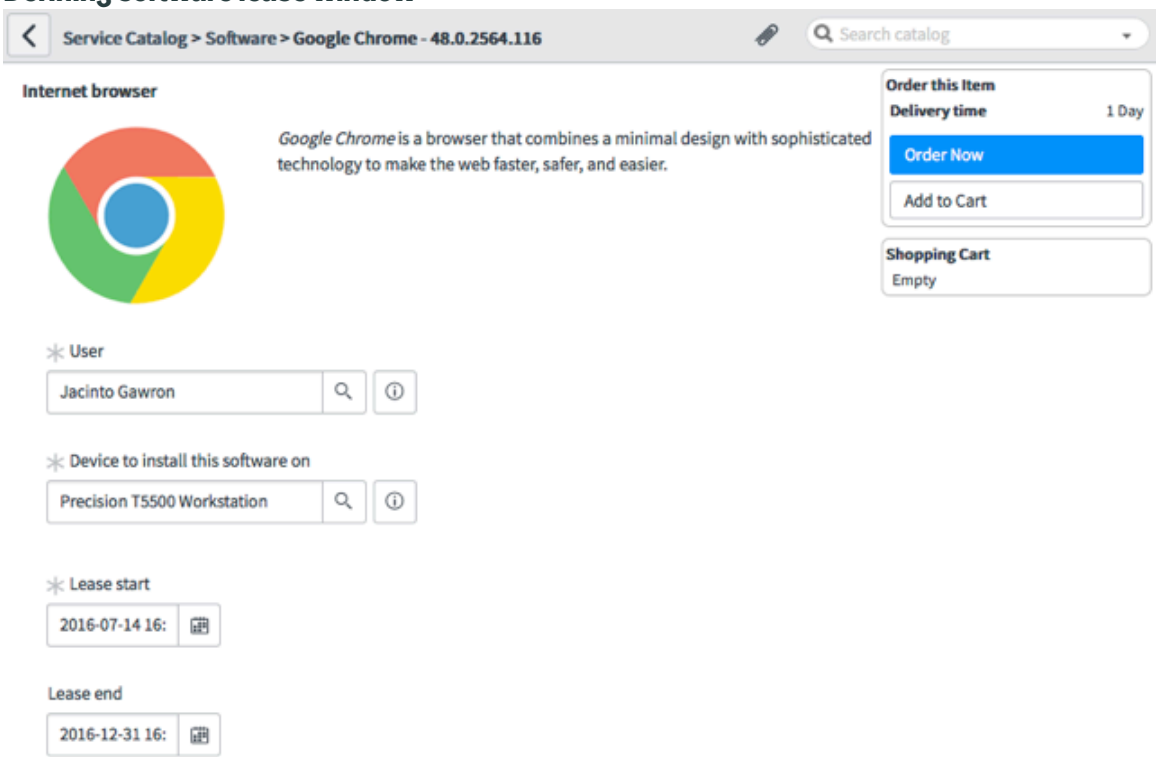
Software ordered on behalf of another user

If the software catalog item is configured with the **Order on behalf of** check box selected, the **User** field appears on the form. The logged in user can select any user from this field. The **Device to install this software on** field only lists the devices assigned to the user selected in the **User** field. If an approval is required for software ordered on behalf of another user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requester is the named user's manager.

In this example, a manager is ordering Google Chrome for a contractor. The manager selects the contractor from the **User** field and then chooses a computer from the list of devices assigned to the contractor. This software has an SCCM uninstall collection configured, which allows the manager to select an end date for the lease that coincides with the end of the user's contract. When the lease expires, SCCM automatically uninstalls the software from the device.

Defining software lease window



Extend a software lease

Users of software deployed by Client Software Distribution (CSD) can request the extension of a lease window, if the software is revocable by a software distribution system.

Before you begin

Role required: Any system user

About this task

If your software has a lease end date defined, and the software status is **Installed**, you can request an extension of the lease, pending any approvals your organization requires.

Procedure

1. Navigate to **All** > **Service Catalog** > **My Requested Software**.
   The list shows only the software you have requested from the service catalog.
2. Select the record for the installed software whose lease you want to extend.

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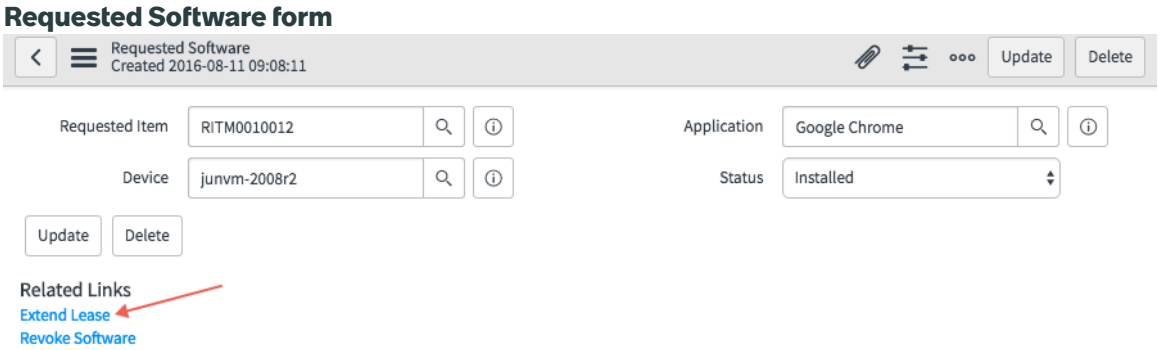
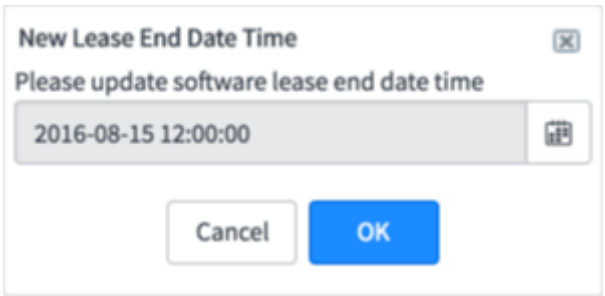
3. Under **Related Links** click **Extend Lease**.



4. In the dialog box that appears, select a new lease end date in the calendar and click **OK**. You must select a date later than the current date.



If the lease extension is subject to manager approval, you are notified of the decision. If the request is approved, a notification shows the new lease end date. If the new end date is within 5 days (the default notification period) of the date when you made the request, CSD sends an immediate end-of-lease notification.

Important:
If lease extensions in your organization require approval, make sure the approver is available and has enough time to process your extension request. If the extension cannot be approved before the original end date expires, the software is revoked.

Client software distribution from SCCM

You can use Client Software Distribution (CSD) to deploy and revoke software deployments from Microsoft System Center Configuration Management (SCCM) and manage distributions on SCCM hosts.

The SCCM activity pack contains Orchestration activities that CSD uses to deploy software from a service catalog request and manage user and device collections on SCCM servers. In addition, CSD can manage license counts for deployed software using ServiceNow Software Asset Management, revoke software deployed by SCCM without user interaction, and manage lease periods.

Configuring SCCM

Follow the SCCM configuration procedures in the order shown.

Configure the Application Administrator role on the SCCM server

To deploy software using ServiceNow® Client Software Distribution (CSD), ensure that an SCCM administrative user has the correct permissions to deploy software and that PowerShell is properly configured.

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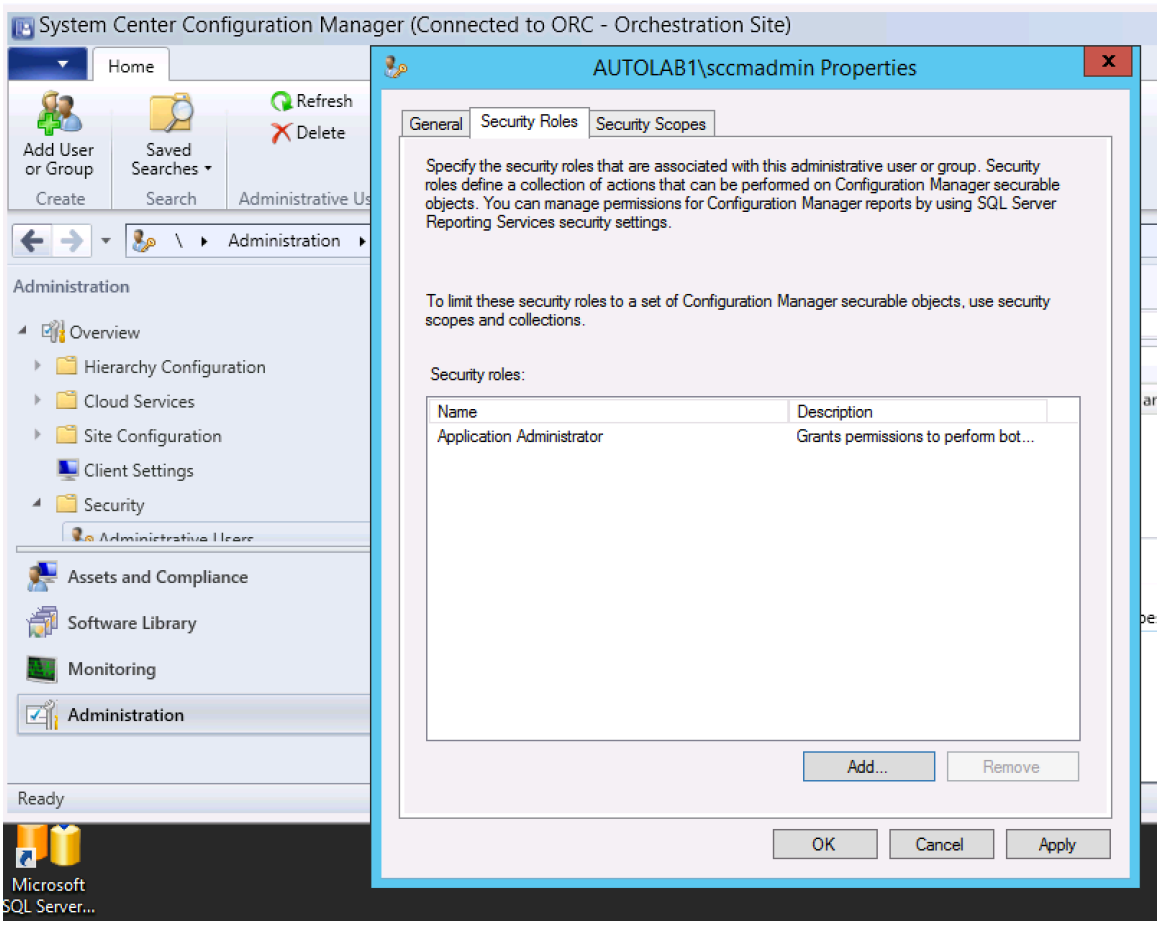
Before you begin
SCCM role required: Application Administrator

About this task
These instructions are for Microsoft 2012 R2 Server.

Procedure
1. In the System Center Configuration Manager console, navigate to **Administration** > **Security** > **Administrative Users**.
2. Right-click the user to whom you want to grant the Application Administrator role.
3. Select **Properties** from the drop-down menu.
4. In the Properties dialog box, select the **Security Roles** tab.
5. Ensure that the user has the Application Administrator role.
6. If the user does not already have this role, click **Add**, select this role from the list, and click **OK**.

Granting the Application Administrator role on the SCCM server



7. Log into SCCM as the user with the Application Administrator role.
8. Open the menu from the upper left corner of the console and select **Connect via Windows PowerShell**.

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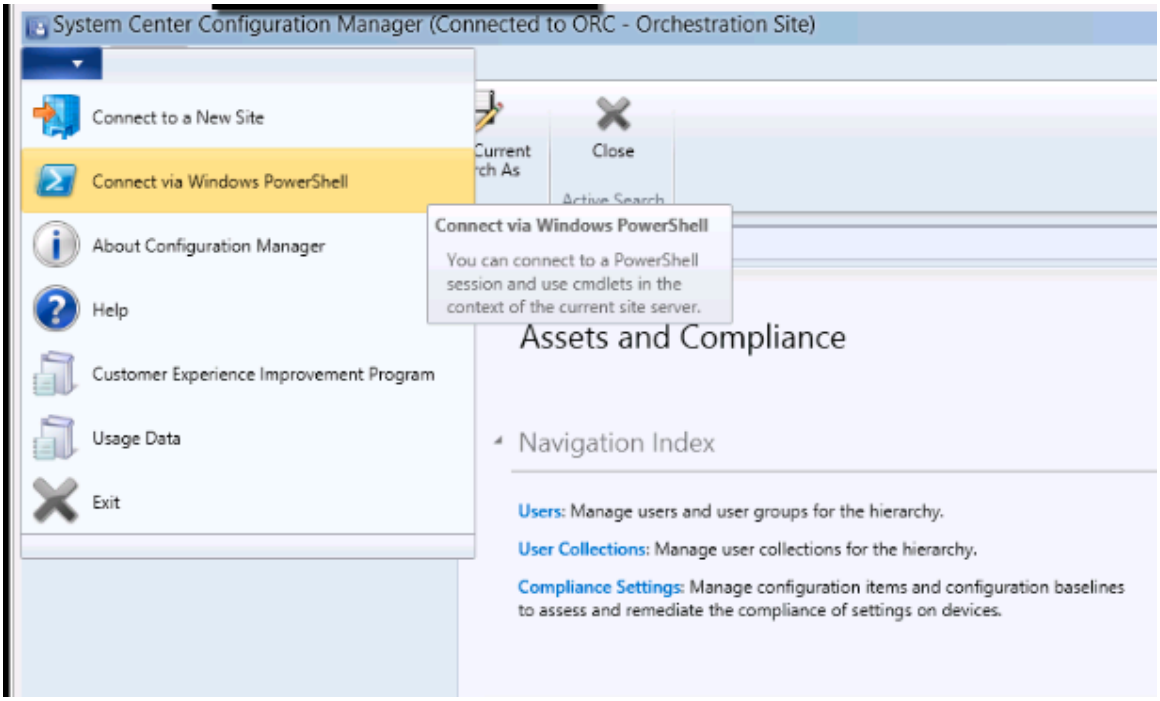
Connect to PowerShell



9. Ensure that the user can access the CM console.
   This action establishes the environment path to PowerShell for the logged in Application Administrator user.

Update the SCCM cmdlet libraries

Ensure that the System Center Configuration Manager SCCM Cmdlet Library is up-to-date.

Before you begin

Role required: Either current user or system administrator, depending on settings.

About this task

The System Center Configuration Manager SCCM Cmdlet Library installs and updates the Windows PowerShell module for SCCM. SCCM checks for library updates on a daily basis. Out-of-date libraries can cause Discovery of the SCCM server to fail, because the system cannot parse the SCCM activity output. This warning message appears in the ECC queue input records for the SCCM GET activities:

```
WARNING: An update to the System Center 2012 Configuration
 Manager Cmdlet
Library is available. Please go to
'http://go.microsoft.com/fwlink/?LinkId=528947' to download the
 latest version.
Running cmdlet version: 5.0.8231.1004 Latest cmdlet version:
 5.0.8328.1155
```

Download the latest version of the cmdlet library from Microsoft. For installation instructions, see https://technet.microsoft.com/en-us/library/dn958404(v=sc.20).aspx.

If you elect to use an earlier version library, use this procedure to disable the CM update check, which allows Discovery to prodeed without issues.

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Procedure

1. Log into the SCCM console as an adminstrator.
2. Open the menu from the upper left corner of the console.
3. Select **Connect via Windows PowerShell**.
4. Run one of these commands to disable the update check:
   - **Per-user**: `Set-CMCmdletUpdateCheck -CurrentUser -IsUpdateCheckEnabled 0`
   - **Per-system**: `Set-CMCmdletUpdateCheck -System -IsUpdateCheckEnabled 0`

   Important:
   The per-system cmdlet must run in an elevated Windows PowerShell session.
5. Run the `Get-CMCmdletUpdateCheck` command to refresh the console and check the settings.
6. Ensure that the value of the `IsEnabled` configuration variable has changed to **False**. This indicates that the warning for an out of date cmdlet library is disabled for the users specified.
7. To re-enable the update check, run the `-IsUpdateCheckEnabled 1` command for either the current user or for the system.

Configure the MID Server for SCCM activities

To use a MID Server with Microsoft System Center Configuration Management (SCCM) activities, configure it to communicate with the SCCM server.

Before you begin

Role required: admin

Procedure

1. In the navigation filter, enter **cmdb_ci_dns_name.list**.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of the SCCM server in the **Name** field.
4. Right-click in the form header and select **Save**.
5. In the **IP Address** related list, click **New**.
6. In the **IP Address** field, enter the IP address of the SCCM server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.
8. Leave the **Netmask** field blank.
9. Click **Submit**.

Create Windows credentials for SCCM deployments

Microsoft System Center Configuration Manager (SCCM) requires the appropriate credentials to deploy applications using the Client Software Distribution application.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin

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About this task
Client software distribution requires Windows credentials that have administrative rights on the SCCM server.

Procedure
1. Navigate to **All** > **Orchestration** > **Credentials**.
2. Click **New**.
3. In the list of credential types, select **Windows Credentials**.
4. Provide a user name and password with administrative rights on the SCCM server.

> **Important:**
> Ensure the following:
> - This user must have the Application Administrator role on the SCCM server.
> - Use the credentials to log into the SCCM Server and connect via Windows PowerShell from the System Center Configuration Manager console at least once to set the path variable for that credential.

5. Fill in the other fields on the form, as appropriate.

   For details, see Windows credentials.
6. Click **Submit**.

Retrieve SCCM data for client software distribution

Retrieve the collections and the list of applications available for deployment from your SCCM servers.

Before you begin
Role required: sn_client_sf_dist.csd_admin or admin

Before starting this procedure:

- Set up your Microsoft System Center Configuration Manager (SCCM) server, create the applications and collections, and configure the deployments you need. For information, see your SCCM documentation.
- Configure a user with the Application Deployment Manager role on the SCCM server.
- Set up the MID Server to communicate with the SCCM server.
- Add Powershell credentials to the ServiceNow Credentials [discovery_credentials] table for the SCCM user who has the Application Deployment Manager role.

About this task
To populate the Client Software Distribution application with SCCM data:

Procedure
1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Server Instance**.
2. Click **New**.
3. In the SCCM Server Instance form, identify the server by name and provide the fully qualified domain name.
4. Click **Submit**.

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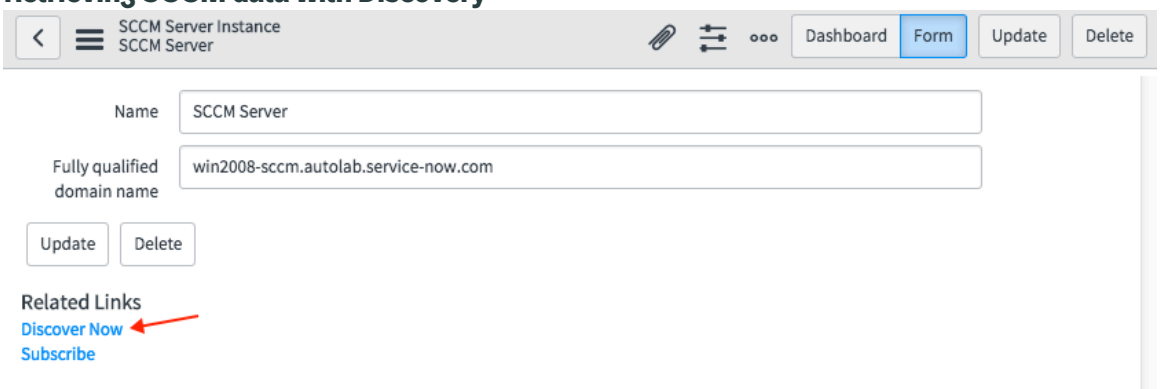
The new SCCM server appears in the list.

5. Open the new SCCM record and click **Discover now** under **Related links**.

   The system runs the Discover SCCM workflow that retrieves the application, collection, and deployment data from the SCCM server.

Retrieving SCCM data with Discovery



SCCM server Discovery for client software distribution

A Discovery workflow populates ServiceNow tables with collection, application, and deployment data retrieved from SCCM servers.

Users run the **Discover SCCM** workflow from an SCCM Server Instance record to populate the following ServiceNow tables:

SCCM data populated in ServiceNow tables

Table	Fields
SCCM Application [sn_client_sf_dist_sccm_application]	• name • publisher • version • model • sccm_server
SCCM Collection [sn_client_sf_dist_sccm_collection]	• name • type • sccm_server
SCCM Deployment [sn_client_sf_dist_sccm_deployment]	• application • collection • type

Note:
For details about the custom activities used in this workflow to extract data from an SCCM server, see Orchestration SCCM activity pack.

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Set up a software model for an SCCM application

Using the applications discovered on the SCCM server, set up a software model used by the Software Asset Management application to manage licenses.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin

Before creating software models, you must discover the applications available for deployment on the SCCM server. See Retrieve SCCM data for client software distribution for details.

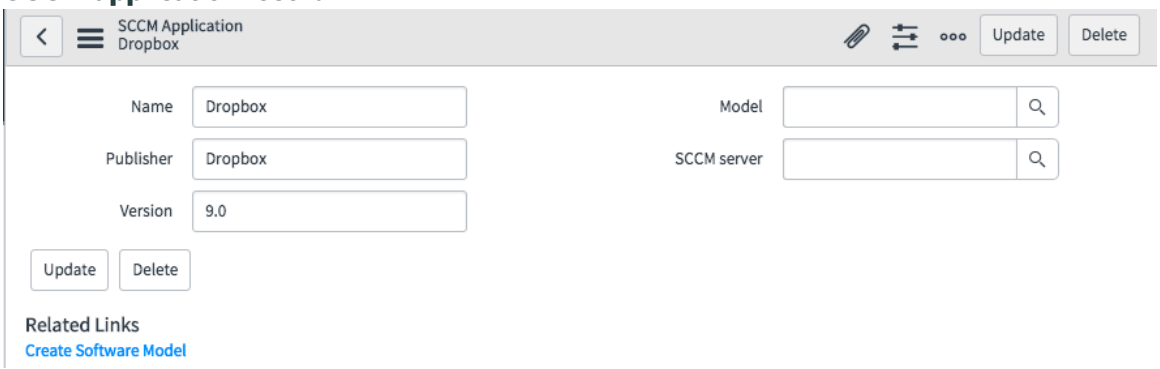
About this task

You can link an SCCM application to an existing software model or create a new model.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
   A list of applications discovered on the SCCM server appears.
2. Open an SCCM application record.
3. To link to an existing model, click the magnifying glass icon in the **Model** field and select a model from the list.

SCCM application record



4. To create a model, click **Create Software Model** under **Related Links**.

   a. Complete the software model fields.
   See for details.

   b. Click **Submit**.
   The view returns to the SCCM Applications form.

Define an SCCM configuration

To create catalog items for SCCM software deployment or to configure your instance to revoke software through SCCM, you must first associate that software with a collection through an SCCM configuration.

Before you begin

Before you create an SCCM configuration record, make sure you have discovered the SCCM applications, collections, and deployments and set up the necessary software models.

Role required: sn_client_sf_dist.csd_admin or admin

About this task

The SCCM configuration process associates software with SCCM collections. To deploy software from an SCCM server, the user or device must be a member of an SCCM collection associated

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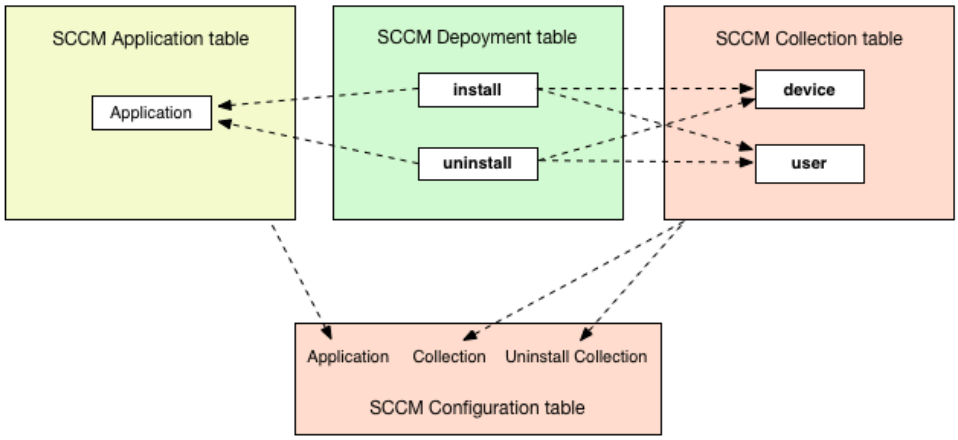
with an **install** deployment. Client Software Distribution (CSD) allows you to revoke unentitled software using an SCCM server when that software can be removed using an **uninstall** collection. Users requesting revokable software from the Service Catalog also have the ability to define lease start and stop dates and request lease extensions.

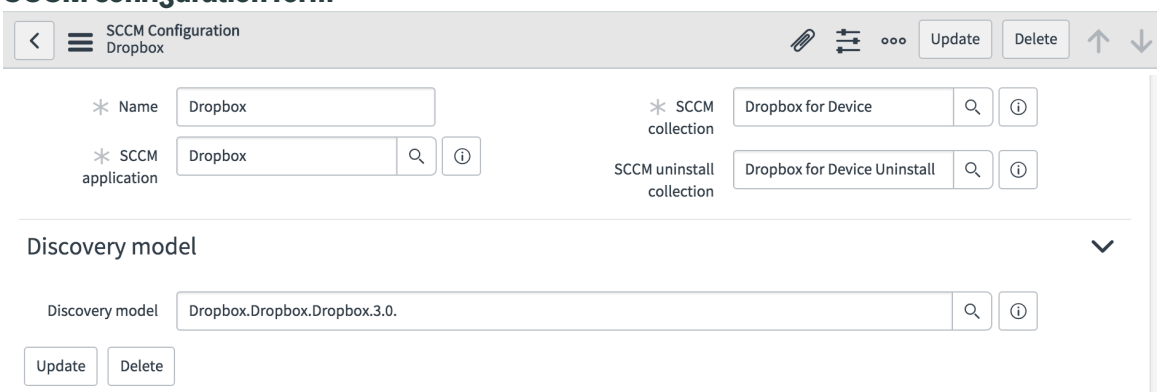
SCCM table references



Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
2. Open an application that has a configured software model.
3. Under **Related Links**, click **Create Software Configuration**.
4. Complete the form, using the fields in the table.

SCCM configuration form



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SCCM configuration fields

Field	Description
Name	Recognizable name for this SCCM software configuration.
SCCM application	Name of an application hosted on the SCCM server.
SCCM collection	Name of the collection associated with the **install** deployment for the selected application on the SCCM server. Only those collections associated with the application are available for selection.
SCCM uninstall collection	Name of the collection associated with the **uninstall** deployment for the selected application on the SCCM server. You must specify an uninstall collection to: ○ Define a lease end date for deployed software. ○ Allow lease extensions. ○ Revoke software from a user's machine.
Discovery model	Discovery model that links the unentitled software installation with the SCCM configuration. From the SCCM configuration record, Client Software Distribution can determine which collection to use to revoke the software. Unentitled software is software found on the user's machine that the user is not entitled to use.

Create a catalog item for an SCCM application

Using the applications discovered on the SCCM server, create a catalog item for an application you want to offer for distribution from the service catalog.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin
Before creating a catalog item, you must link the application to a software model and create at least one software configuration.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
   A list of applications discovered on the SCCM server appears.
2. Open a record for an SCCM application.
3. Under **Related Links**, click **Create Catalog Item**.
   A new SCCM Application Catalog Item record appears with preconfigured information. .

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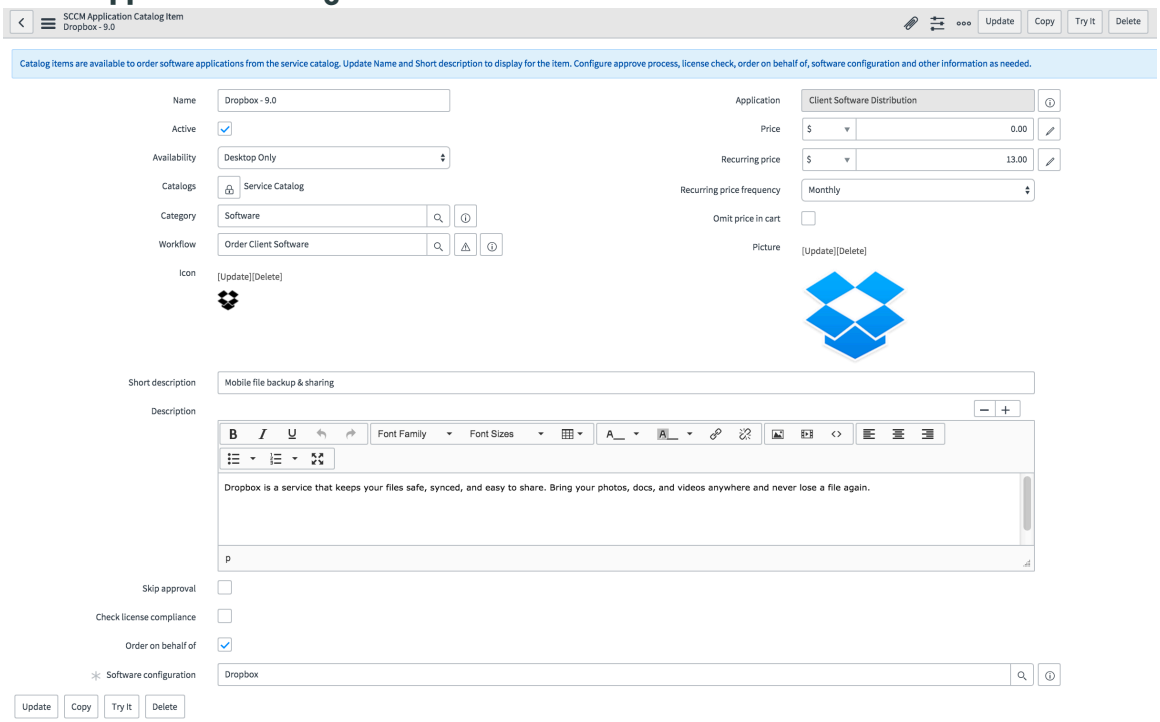
SCCM application catalog item



4. Add price information and complete the following fields added to the Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item] table by the Orchestration - Client Software Distribution plugin:

SCCM fields in the catalog item form

Field	Description
Skip approval (skip_approval)	Check box that allows skipping approval for this item by the requester's manager when a user orders it from the service catalog. Use this field in conjunction with the **Order on behalf of** field to ensure that software ordered by a logged in user on behalf of another user is subject to approval. By default, this check box is cleared, requiring manager approval for all new catalog items. **Note:** There are two levels of approval possible. By default, all category items require group approval for items in excess of $1000. If that approval is given or skipped, the system evaluates the **Skip approval** check box to determine if the software item requires approval by the requester's manager.
Check license compliance (check_license_compliance)	Check box that forces the system to determine if deploying this item is allowed under the current license.
Order on behalf of	Check box that allows the logged-in user to order this software from the service catalog for another user. This permits service desk personnel to order SCCM deployments for other users in the system. By default, this feature is enabled. To prevent unauthorized users from ordering software, ensure that

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Field	Description
	approvals are required for this type of deployment by clearing the **Skip approval** check box. If an approval is required for software ordered on behalf of a user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requestor is the named user's manager. Software items requested from the service catalog on behalf of a different user require the following information: ○ **User**: User selected for deployment. This field is automatically populated with the name of the logged in user. You can select another user from the list. ○ **Device to install this sofware on**: Device belonging to the selected user on which to deploy the software. Only devices belonging to that user appear in the choice list. ○ **Lease start**: Date and time to deploy the software. This is the start time for the lease. A lease can be open-ended or have a lease end time.
SCCM configuration	Name of the SCCM configuration record for this application. This record defines the collection and uninstall collection for this application. This configuration is required for all deployments, revocations, and leases performed by the SCCM server.

5. If the catalog item requires approval because of cost, be sure to configure an approval group in the**Approved By Group** related list.
   By default, the Service Catalog Request workflow runs when an item costing more than $1000 is ordered and looks for an appropriate approval group. If no approval group is configured for the item, this workflow skips approval altogether and ends. The system then runs the Order Client Software workflow, which evaluates the **Skip approval** check box to determine if approval by the requester's manager is required.
6. Click **Update**.
   The view returns to the SCCM Applications list.
7. To see all client software distribution (CSD) catalog items, navigate to **Client Software Distribution** > **Maintain Items** > **Software Items**.

SCCM deployment

Ordering an SCCM application from a client software distribution (CSD) catalog item in the service catalog triggers the Order Client Software workflow.

This process deploys an SCCM application to a user or device through a service catalog order:

1. If the **Skip approval** check box is cleared in the software catalog item, the Order Client Software workflow sends the catalog request to the requesting user's manager for approval.
2. If the **Check license compliance** check box is selected in the software catalog item, the workflow performs a software license check. If there is no license available, the workflow creates a catalog task to procure more licenses and assigns the task to the Client Software Distribution Administrators group.

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3. The Order Client Software workflow triggers the Deploy SCCM Application workflow as a subflow. This workflow adds either the user or the device to the SCCM collection using the Add to User Collection or Add to Device Collection SCCM activity.
4. If the software configuration specifies SCCM uninstall collection in the software catalog item, the Deploy SCCM Application workflow checks if the user or device exists in the uninstall collection. The workflow uses the Is Device in Collection or Is User in Collection SCCM activity. If the user or device exists in the uninstall collection, the workflow removes the device or user. The workflow uses the Remove from Device Collection or Remove from User Collection SCCM activity before adding it to the SCCM install collection.

Client software distribution validation process

After SCCM deploys software to a target computer, client software distribution (CSD) detects the installation and validates its status.

Client software distribution uses the following methods for detecting software installed on the target machine:

- **Discovery**: CSD is configured to leverage Discovery to detect software installations. You can run Discovery manually at any time, or by a scheduled job.
- **Microsoft SCCM Integration**: You can import SCCM data into the CMDB using the features in the Integration - Microsoft SCCM plugin if Discovery is not active on the instance.

The instance uses the data gathered by Discovery or the SCCM integration plugin to populate the Software Installation [cmdb_sam_sw_install] table. To validate installations using this data, CSD runs a scheduled job called Reconcile Requested Software that uses Properties installed settings. This process reconciles the software installation data accumulated in the CMDB and makes these status updates:

- **Not installed** to **Installed**: The user has installed the requested software within the time limit configured in the *sn_client_sf_dist.softwareInstallExpDays* property.
- **Not installed** to **Status check expired**: The time limit has expired for the user to install the requested software. The system stops checking for installation when the time limit expires.

SCCM software revocation

An administrator can revoke software without any user interaction using Microsoft System Center Configuration Manager (SCCM) if the software configuration specifies an SCCM uninstall collection, even if the software was installed by some other process or user.

Revoke software deployed through the service catalog

Software deployed by SCCM can be revoked, but only when the software's status is **Installed** and the application associated with the software configuration has an uninstall collection configured.

Before you begin

- Create an SCCM configuration record for the application that names an appropriate uninstall collection.
- Associate the CSD catalog item for the application with the SCCM configuration that specifies the uninstall collection.

Role required: sn_client_sf_dist.csd_admin or admin

A workflow called Revoke SCCM Application moves either the user or the device from its respective collection and adds it to the appropriate uninstall collection. When SCCM performs

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an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Reports** > **Requested Software**.
2. Open the record for the SCCM software package you want to revoke.
   The package must have a **Status** of **Installed** to be revocable.
3. Under **Related Links**, click **Revoke software**.

   This action runs the Revoke Client Software workflow, which triggers the Revoke SCCM Application subflow that moves the user or device from the install collection to the uninstall collection. When SCCM performs an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Revoke unentitled software

An administrator can revoke software using Microsoft System Center Configuration Manager (SCCM) that a user is not entitled to use even if the software was installed by some other process or user.

Before you begin

To revoke software using SCCM, you must create an SCCM configuration record for the application, in which the appropriate software Discovery model is defined. See Software discovery models.

Role required: sn_client_sf_dist.csd_admin or admin

Client Software Distribution (CSD) uses Software Asset Management to identify unentitled software installations. Discovery detects the software on the user's machine, and SAM determines if the user or device is entitled to use that software. This might include software that was not installed through a catalog request or software that the user installed without approval. If the software installation's Discovery model is associated with an SCCM software configuration that has an uninstall collection defined, then an administrator can use CSD to revoke that software from the user's machine without involving the user.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Reports** > **Installed Software Not Entitled**.
2. Select the record for the installation that has unentitled users.
3. Under **Related Links**, click **Revoke software**.

   This action runs the Revoke Client Software workflow, which triggers the Revoke SCCM Application subflow that moves the user or device from the install collection to the uninstall

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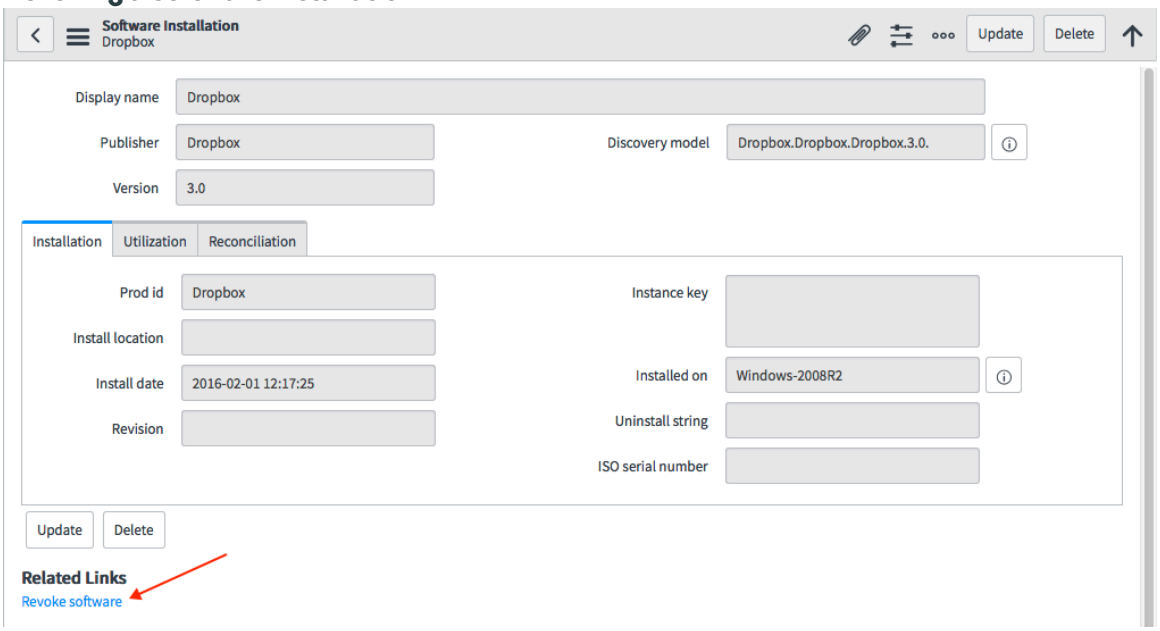
collection. When SCCM performs an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Revoking a software installation



SCCM software revocation workflow

The Revoke SCCM Application workflow moves a user or device from an install collection to an uninstall collection to revoke software installed from Microsoft System Center Configuration Manager (SCCM).

For the revocation workflow to run, the software package must have a status of **Installed** and must be pre-configured for an appropriate uninstall collection. See Revoke software deployed through the service catalog for configuration instructions. When an administrator initiates the revocation process, the system launches the Revoke SCCM Application workflow to move the user or device collection associated with installation to the appropriate SCCM uninstall collection. When the SCCM server performs a policy check, it finds the additions to the user or device uninstall collection and revokes the software package associated with that collection.

The workflow employs two custom activities, Remove from User Collection and Remove from Device Collection, to remove either the user or the device from its original collection. The workflow then adds the user or device to the appropriate uninstall collection on the SCCM server with the Add to User Collection or Add to Device Collection activity.

Note:
This workflow is triggered by the Revoke Client Software workflow as a subflow.

Client software distribution dashboard

The CSD dashboard provides a collection of visual reports for the Client Software Distribution application.

CSD dashboard

To access the CSD dashboard, navigate to **Client Software Distribution** > **Requested Software** > **Dashboard**.

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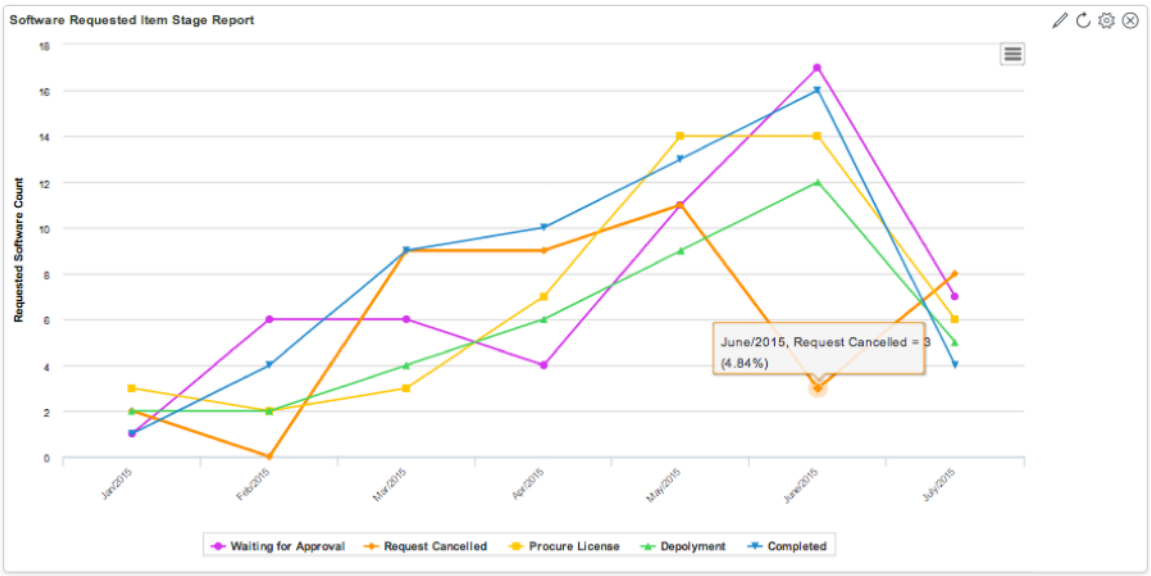
Sample report from CSD dashboard



Client software distribution reports

Report	Description
Open Tasks	Displays all open tasks grouped by the requested item's stage value. • *Type*: Create a basic list report • *Table:* Catalog Task [sc_task]
Top 10 Applications Installed	Displays the top 10 applications installed by request count. • **Type**: Create a bar report • **Table**: Requested Software [sn_client_sf_dist_req_software]
Total Software Request Item Over Time	Displays the total software items requested each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Requests Completed Report	Displays the total of software requests completed each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Installed Software Not Entitled	Displays installed software that users or devices are not entitled to use. This can be software deployed through CSD or by another process that does not comply with licensing. This report is on a Software Asset Management table. • **Type**: Create a basic list report • **Table**: Software Installation [cmdb_sam_sw_install]
Software Installation Status	Displays the count of requested software, grouped by installation status, for each month.

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Client software distribution reports (continued)

Report	Description
	• **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Software Requested Item Stage Report	Displays the sum of all requested items, grouped by the requested item's stage, for each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
License Counts Available	Displays the license counts for all available applications. • **Type**: Create a basic list report • **Table**: SCCM Application Catalog Item [sn_client_sf_dist_sccm_app_cat_item]

Usage Overview dashboard

Navigate to **Client Software Distribution** > **Usage Overview** to view the current transaction count for your instance.

Client software distribution extension framework

Client software distribution (CSD) provides built-in extension points for integrating a ServiceNow instance with client software distribution providers, such as Casper, Altiris, or LANDesk.

Important:
The use of CSD extension points is an advanced procedure intended for use by experienced ServiceNow AI Platform developers only. Instructions for customizing your instance to deploy and revoke software from a software distribution provider can be found in the CSD Extension Implementation Guide.

Configure client software distribution providers

Identify the provider and specify the workflows and extension points for a customized software distribution process.

Before you begin

Perform the development tasks described in the CSD Extension Implementation Guide before attempting this procedure.

Role required: sn_client_sf_dist.csd_admin, admin

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Extensions** > **Providers**.
2. Click **New**.
3. Complete the form using the fields in the table.

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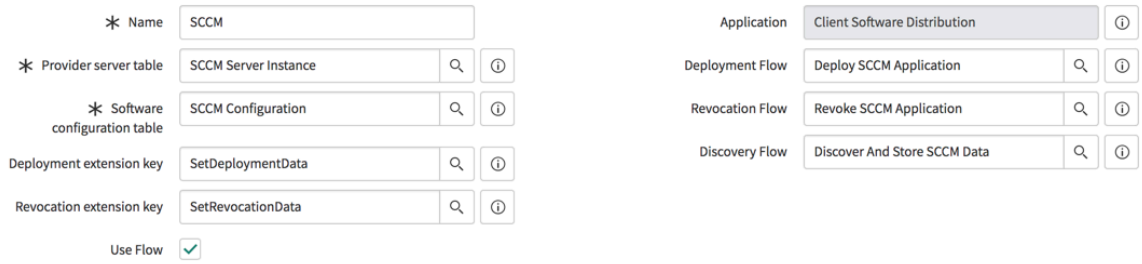

Client software distribution provider fields

Field	Description
Name	Descriptive name of the provider.
Provider server table	Table name of the provider server. You must create this table as an extension of the Configuration Item [cmdb_ci] table. For example, you might call your table Casper Server Instance [cmdb_ci_casper_server_instance].
Discovery flow	Flow that discovers the provider server and returns the data from that server back to the instance. This is the flow you create with custom activities that query the provider server.
Software configuration table	Table name of the software configuration for this provider. You create this table as an extension of the Client Software Distribution Software Configuration [sn_client_sf_dist_software_config] table. For example, you might create a table called Casper Software Configuration [sn_client_sf_dist_casper_sf_config].
Deployment extension key	The **SetDeploymentData** key provided with CSD. This key sets up the data for the software ordering and deployment workflow.
Deployment flow	Flow that deploys software from the provider server. This is the flow you created with custom activities that tells the provider where to deploy an application requested from the service catalog.
Revocation extension key	The **SetRevocationData** key provided with CSD. This key sets up the data for installation revocation.
Revocation flow	Flow that revokes an installation from a provider server. This is the flow you created with custom activities that tells the provider which application to remove from a device.
Use Flow	Option to use Integration Hub flows for client software distribution. When this option isn't

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Field	Description
	selected, Orchestration workflows are used for client software distribution. **Note:**

Client software distribution extension keys

Client software distribution (CSD) extension keys allow you to customize the deployment and revocation of software from distribution providers.

These pre-defined keys allow you to generate input variables for workflows that deploy and revoke software from external distribution providers:

- **SetDeploymentData**: Sets the software order information and generates the input variables for the deployment workflow.
- **SetRevocationData**: Generates the input variables for the revocation workflow.
- **CheckRevocable**: Specifies the conditions that determine if an installation can be revoked. If the software configuration associated with the installed software allows uninstallation, the installed software can be revoked.

Client software distribution extension points

The client software distribution (CSD) extension points create the customization code for the specific provider and the extension keys.

The purpose of the extension points is to associate extension keys with a specific provider, and then create a script that sets input variables for your custom deployment and revocation workflows. Another extension point script tells CSD if the provider has the capability to revoke software. If this is the case, CSD enables the UI action that triggers revocation from the provider.

SetDeploymentData

The script associated with this extension key must set the *csdExtensionResult* object with these attributes:

- *deploymentWorkflowInputs*: Object that specifies the deployment workflow input variables.
- *softwareModel*: Software model sys_id.
- *deploymentType*: An integer. Use **1** for deployment to a user and **2** for deployment to a device.
- *softwareApplication*: Software application sys_id.

CheckRevocable

The script associated with this extension key gets the input parameter *csdExtensionInputs.softwareConfiguration*, which is a Client Software Distribution record in the Software Configuration [sn_client_sf_dist_software_config] table. All providers' software configurations are extended from this table, but may have different attributes.

This script must set the *csdExtensionResult* object to **true** or **false**, depending on whether the software configuration specifies uninstallation.

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SetRevocationData

The script associated with this extension key gets the input parameter *csdExtensionInputs.softwareConfiguration*, which is a Client Software Distribution record in the Software Configuration [sn_client_sf_dist_software_config] table. All providers' software configurations are extended from this table, but may have different attributes.

The script must set the *csdExtensionResult* object with these attributes:

- *revocationWorkflowInput*: Object that specifies the revocation workflow input variables.
- *softwareModel*: Software model sys_id.
- *deploymentType*: An integer. Use **1** for deployment to a user and **2** for deployment to a device.

Related topics

Using extension points to extend application functionality

Using scripted extension points in server-side scripts

Using UI extension points in server-side UI macros

Using client extension points in client-side UI scripting

Orchestration examples

These examples demonstrate how Orchestration can be used to automate common tasks.

Active Directory automation example

A set of six Orchestration Active Directory activities enables organizations to automate their on-boarding/off-boarding processes with auditable, self-documenting workflows that save time and eliminate mistakes.

The activities in the Active Directory activity pack are designed to manage user accounts and reset user passwords. The following activities cover the most common use cases administrators encounter when managing Active Directory user accounts:

- Create AD User Account
- Update AD User Account
- Remove AD User Account
- Disable AD User Account
- Query AD
- Reset AD User Password.

These activities share a common design, have complementary functionality, and share a common set of parameters. They can be used singly or together to create consistent workflows for provisioning and de-provisioning user accounts.

Update Active Directory with Orchestration

An organization plans to make their ServiceNow instance the single system of record for user account data and wants to update Active Directory with the latest changes.

About this task

The solution is to create an Orchestration workflow that pushes changes from the ServiceNow user record down to the Active Directory to create a new user record or update an existing

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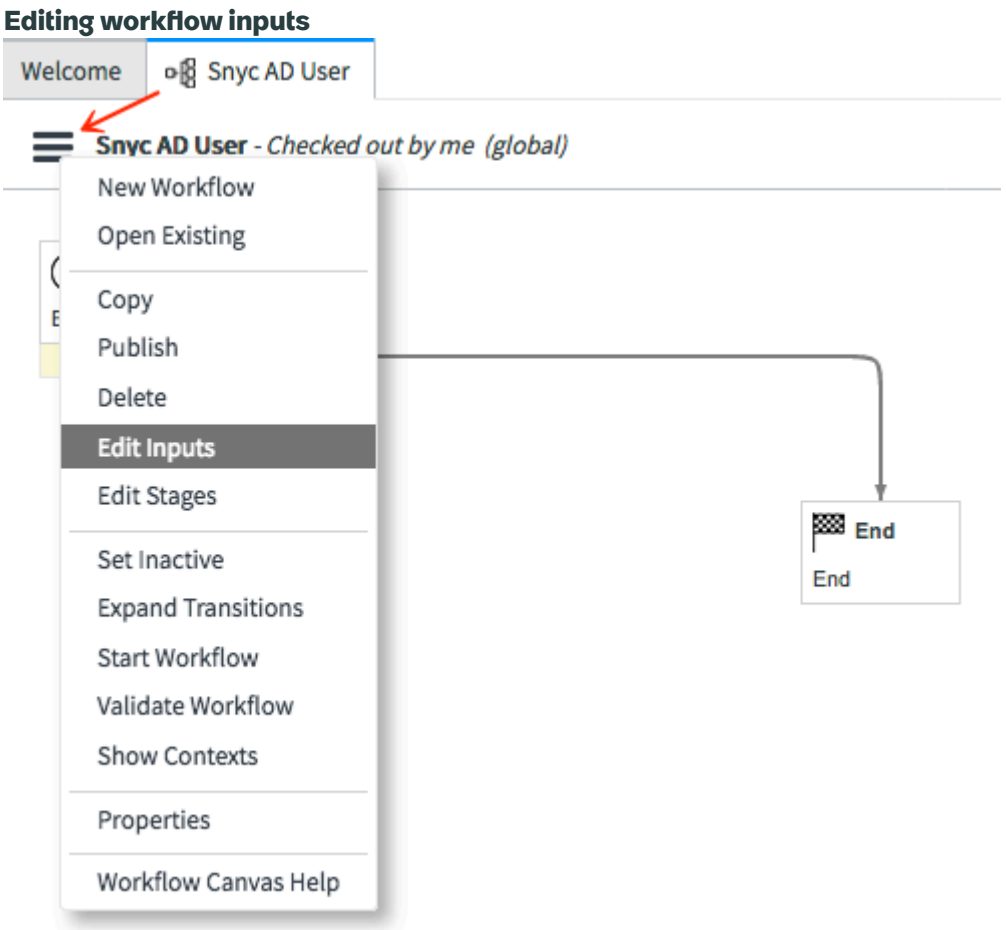
record. This is accomplished by creating an Orchestration workflow that can create and update records in Active Directory based on the data in the ServiceNow User [sys_user] table.

Note:
This example workflow assumes that ServiceNow is configured for LDAP and an LDAP server is configured to accept the new user accounts. The Active Directory user management activities are not dependent on LDAP, but the presence of LDAP makes this example workflow much easier. You must provide the domain controller's IP address to the workflow, either by hardcoding it, adding another workflow input, or using a script to look it up from the CMDB.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. In the **Workflow** tab, click the **+** icon to create a new workflow using these variables:
   - *Name*: Sync AD User
   - *Table*: Global [global]
3. Click **Submit**.
   A basic workflow with a Begin and End point appears on the canvas.
4. Click the menu icon in the upper left corner of the canvas and select **Edit Inputs** from the context menu.



5. In the Workflow Inputs form, click **New** in the **Variables** record list, and create a new variable, using the fields in the table.

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Field	Value
Type	Reference
Label	User
Column name	u_user
Reference Specification > Reference	User (sys_user)

6. Click **Submit**.
7. In the **Custom** tab, expand **Custom Activities** > **Active Directory**.
8. Drag and drop the Update AD Object activity onto the transition line between the Begin and End points of the new workflow.
   This action automatically links the activity with the end point and opens the Workflow Activity property form.
9. Complete the form using the fields in the table.

Field	Value
Name	Enter a logical name such as **Update user data**.
Domain controller	The ServiceNow LDAP integration adds a reference to the LDAP server to which the user's account is linked. To identify the LDAP server, enter the following statement: `${workflow.inputs.u_user.ldap_server.server_url}`
Type	Type of AD object. In this case, the type is **User**, which is the default.
Object name	This example assumes that the ServiceNow user name matches the Active Directory sAMAccountName. Enter the following: `${workflow.inputs.u_user.user_name}`
Object data	Updates the user's account in Active Directory, if the user exists. In this example, the user's title is updated: `{"title" : "QA"}`

10. Click **Submit**.
    The workflow looks like this:

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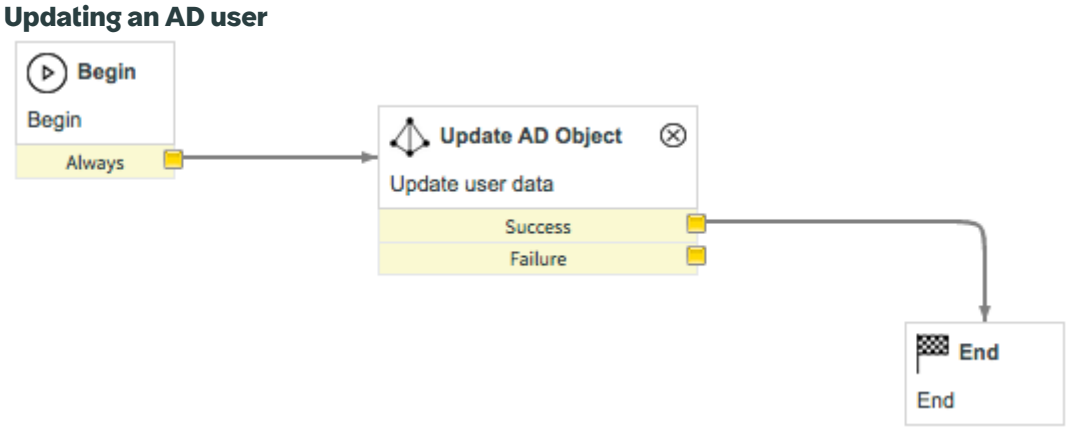

11. Attach both activity outcomes (Success and Failure) to the end point.
At this point, the workflow takes a ServiceNow user record as input and updates the First Name, Last Name, and Title of the corresponding Active Directory account. If the account does not exist in Active Directory, the workflow fails.

> **Note:**
> In a normal workflow, some type of alternate action is desirable upon failure. For example, you might send an Email and SMS notifications if the workflow failed to update the record.

12. To prevent the workflow from failing, add a Create AD Object activity to the transition lines between Begin and the Update AD Object activity.
13. Complete the Workflow Activity property form using the fields in the table.

Field	Value
Name	Enter a logical name such as **Create user data**.
Domain controller	Same as for the update activity. `${workflow.inputs.u_user.ldap_server.server_url}`
Ou	The organizational unit to which this object belongs. For the purpose of this example, you can enter **OU=HQ,OU=Managed Objects**
Object name	Same as for the update activity. `${workflow.inputs.u_user.user_name}`
Object data	Creates an account with only the user name in it. For the purpose of this example, you can enter `{"givenName" : "${workflow.inputs.u_user.first_name}", "SN" : "${workflow.inputs.u_user.last_name}" }`

14. Click **Submit**.
15. Connect the Failure outcome of the Create AD Object activity to End.
For this example, we are ignoring errors. The workflow now looks like this:

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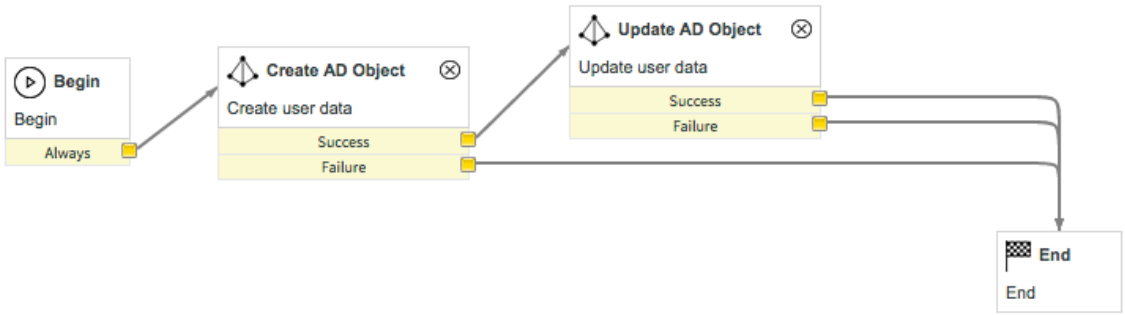
Creating an AD user



This procedure builds a simple workflow that creates a bare-bones Active Directory account consisting of a user name only. The workflow then updates that account with additional information provided by the ServiceNow User [sys_user] table. However, we do not want to execute the Create AD Object activity if the user account already exists. The workflow needs to query Active Directory for matching user records and then branch the workflow based on the results of the query. If an account already exists, then the workflow should update the account. If the account does not exist, then the workflow should create the account in Active Directory.

16. Drag and drop the Query AD activity onto the transition between Begin and Create AD Object.
17. Complete the Workflow Activity property form using the fields in the table.

Field	Definition
Name	Enter a logical name such as **Search for existing account**.
Domain controller	`${workflow.inputs.u_user.ldap_server.server_url}`
Properties	A comma-separated list of Active Directory properties to return. For example, givenName, SN, title. If the parameter field is blank, then all properties are returned. In this workflow, we leave the field blank.
Search filter	An LDAP filter string that defines the search parameters. Use any valid LDAP filtering criteria. To find user accounts matching the input record, we use: `(samaccountname=${workflow.inputs.u_user.user_name})`

18. Click **Submit**.
19. Connect the Failure outcome for the query activity to the End point.
    Remember that we are ignoring errors in this workflow.
20. Connect the Success outcome of the query activity to the Update AD Object activity.
    The workflow now looks like this:

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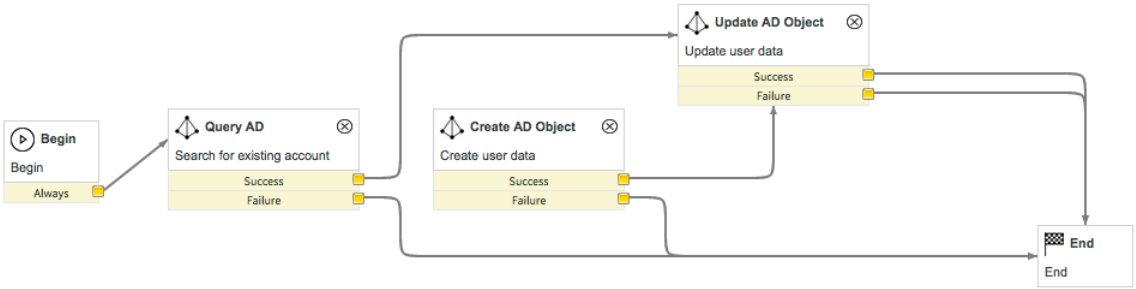
Querying AD for user accounts



The Query AD activity returns its results as a JSON string in the workflow data bus. This JSON string is always an array of objects. Each object corresponds to an Active Directory entry that matched the query. Our workflow should branch, whether that array is empty or not.

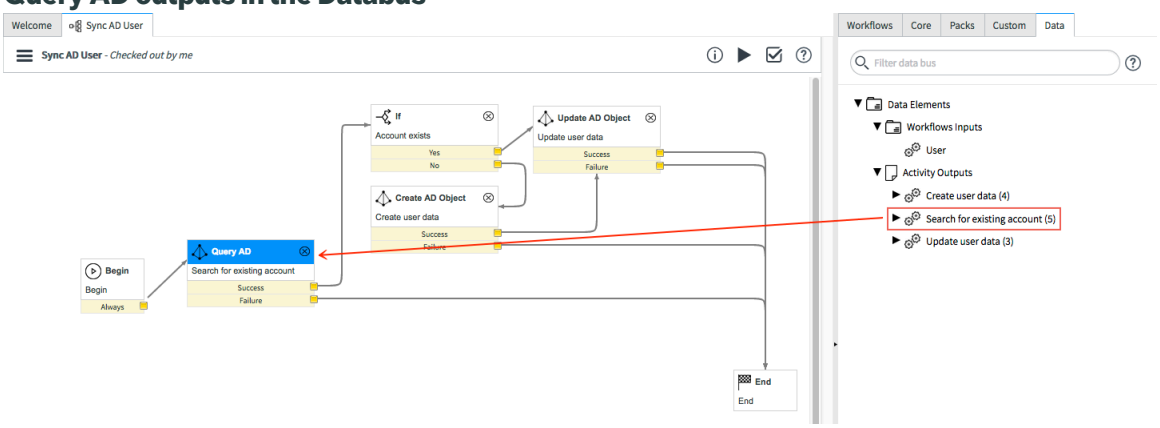
21. Drag a standard *If* activity from the *Conditions* folder in the **Core** tab and drop it onto the transition between Query AD and Update AD Object.
22. Complete the Workflow Activity properties form using the fields in the table.

Field	Value
Name	Enter a logical name such as **Account exists**.
Advanced	Select this check box to open the *Script* field.

Script	For the If activity to work correctly, we must return a **yes** or **no** in the answer variable (var) which corresponds to the Yes and No outcomes of the query activity. Line 1 converts the Query AD results from a JSON string into a Javascript array called queryResults. Line 2 checks the length of that array. If the array is more than 0, a match to the account was found, and we set our answer to yes. Otherwise, the answer is no.
	`var queryResults=new JSON().decode(data.get(5).output);`
	`answer = ( queryResults.length>0 ? 'yes' : 'no' );`

Note:
The expression `data.get(5)` in this script identifies the Query AD output in the Databus by order number, since it was the fifth activity added to the workflow.

Query AD outputs in the Databus



23. Click **Submit**.

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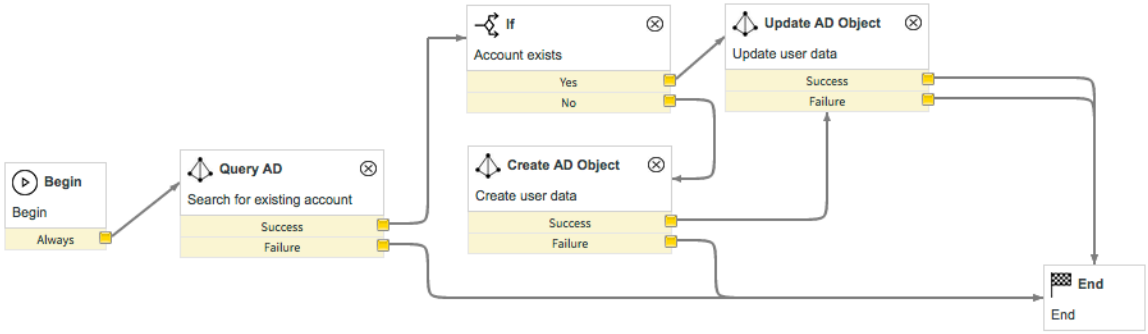
24. In the canvas, create a transition from the Yes outcome of the If activity to the Update AD Object activity.
25. Create a transition from the No outcome of the If activity to the Create AD Object activity. This is the final step. This workflow will query Active Directory to determine if an account already exists. If an account exists, the workflow updates that account. If an account does not exist, the workflow creates the account and then updates the Active Directory with the configured user data set.

Creating the conditional paths



Orchestration activity packs

The base Orchestration system includes packs of custom activities you can use to automate typical IT and business processes in your network.

Activity packs allow you to automate several common business processes, such as managing Active Directory accounts and Exchange server mailboxes. Activity packs can also automate IT functions such as starting and stopping Windows servers, joining domains, assigning IP addresses, and configuring load balancers.

Use an activity pack

The **Packs** tab of the Workflow Editor contains any activity packs downloaded from the ServiceNow Store and any activity packs that you create.

Before you begin

Roles required: admin, activity_admin, activity_creator

About this task

You can organize custom activities into packs and upload them to the ServiceNow Store. Your custom packs do not appear in the tree until at least one activity in the pack is published. Activities added to an existing pack are not displayed until they are published. Activity packs from any Application scope can appear in the **Packs** tab, regardless of the current scope setting for the instance.

Procedure

1. In the Workflow Editor palette, select the **Packs** tab.
2. Click the download icon.

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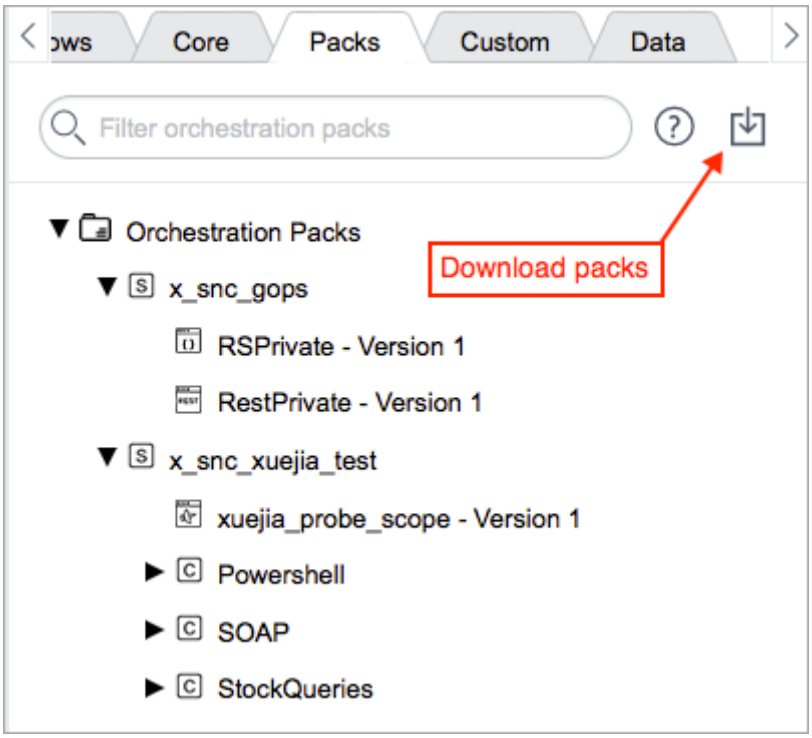
The hierarchy in the tab organizes packs by vendor, scope, category, and activity.



Active Directory activity pack

The Active Directory (AD) activity pack enables an administrator to create, delete, and manage objects in Windows Active Directory, such as users, groups, and computers, using a ServiceNow Orchestration workflow.

Activities in this pack can reset a password automatically from a user request or manage any user account in Active Directory, whether or not it was created by a Orchestration workflow.

Domain controllers are identified by the IP address of the host machine. To use the hostname of the domain controller, add the Resolve DNS Name activity to resolve the hostname into an IP, and then pass the IP into the Active Directory activity.

Your instance must have access to a MID Server configured to use PowerShell to run these activities.

Note:
All Active Directory activities pass through error messages returned from Active Directory. To view these error messages, point to the failed activity in the workflow canvas or select the Workflow Log tab in a Workflow Context record.

Custom Active Directory activities

Orchestration provides custom Active Directory activities that were created with the Orchestration Create a PowerShell activity, starting with the Geneva release. These activities perform the same functions as AD activities by the same name from previous releases and replace those activities for all new workflows. Existing workflows from earlier versions that were created with legacy AD activities continue to function normally after an upgrade to Istanbul. However, all new workflows must use these custom AD activities. The Powershell activity template gives workflow administrators the ability to store input and output variables from the Query AD activity in the Databus.

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Note:
To use the Active Directory custom activities, you must request activation of the Orchestration - Active Directory plugin.

Active Directory credentials with LDAP

If you are using an LDAP Server with MID Servers, note that Orchestration and Active Directory activities do not use the user name and password configured on LDAP Servers. You must create a Windows type orchestration credential record Windows credentials. The username and password in the credentials record is used for LDAP queries that Orchestration and workflow activities perform.

Connection port used by AD Orchestration activities

All Active Directory activities use port 389 for LDAP access. If you are using AD activities with Oracle Virtual Directory (OVD) as a proxy, set up pass-through on port 389 only.

Add User to Group AD activity

The Add User to Group activity adds a user to a group in Windows Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Input variables

Add User to Group input variables

Variable	Description
DomainController	IP address of the domain controller machine.
UserName	Name of the user to add to the group.
GroupName	Name of the group to which this user is added.

Output variables

Add User to Group output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Add User to Group conditions

Condition	Description
Success	User was successfully added to group.

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Add User to Group conditions (continued)

Condition	Description
Failure	An error occurred while attempting to add the user to the group. Additional details may be available in the workflow log.

Change AD User Password activity

The Change AD User Password activity changes the password for an Active Directory user account.

This activity requires the user's current password to run, unlike the **Reset AD User Password** activity. If the new password violates any Active Directory password requirements, such as length or character combinations, the activity fails and returns the appropriate error message. This error message appears in the ECC queue and in hint text when a user points to the activity in the Workflow Editor.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Change AD User Password input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.
New_password	The new password to assign this user.
Old_password	The user's current password.

Output variables

Change AD User Password output variables

Variable	Description
result	One of the following outcomes: • **failure** • **success** • **Policy Failure** • **Incorrect old password**
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

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Change AD User Password output variables (continued)

Variable	Description
hresult	Powershell command result.

Conditions

The activity provides the following conditions:

Change AD User Password conditions

Condition	Description
Success	Password successfully reset.
Policy Failure	Password does not comply with the organization's Active Directory requirements.
Incorrect old password	Password being changed was not entered correctly.
Failure	An error occurred while attempting to change the password. Additional details may be available in the workflow log.

Active Directory credentials with LDAP

If you are using an LDAP Server with MID Servers, note that Orchestration and Active Directory activities do not use the user name and password configured on LDAP Servers. You must create a Windows type orchestration credential record Windows credentials. The username and password in the credentials record is used for LDAP queries that Orchestration and workflow activities perform.

Create AD Object activity

The Create AD Object activity creates an object in Windows Active Directory.

This activity fails if it finds an existing object with matching input variables.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Create AD Object input variables

Variable	Description
DomainController	IP address of the domain controller machine.
Type	The object type to create: user, group, or computer.
OU	The organizational unit to which this object belongs.

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Create AD Object input variables (continued)

Variable	Description
ObjectName	The sAMAccountName of the Active Directory object. **Object name** is also used for the **name** attribute in Active Directory. This behavior is available in **ActiveDirectory.psm1**. Whatever is passed as the **Object name** becomes both the **samAccountName** and the **name** of the new user in Active Directory.
ObjectData	A JSON object containing Active Directory property names and their corresponding values. For example: `{ "givenName" : "John", "SN" : "Doe", "title" : "Sr. Account Specialist", "allowLogin" : true }` This example sets the first name (givenName), last name (SN), and title on the Active Directory user account and allows that user to log in (allowLogin). This field allows expression evaluation via the ${} variable substitution syntax.

Output variables

Create AD Object output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Create AD Object conditions

Condition	Description
Success	A Windows Active Directory object was created successfully.
Failure	An error occurred while attempting to create the AD object. Additional details may be available in the workflow log.

Disable AD User Account activity

The Disable AD User Account activity disables a Windows Active Directory user account, making it inactive.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Disable AD User Account input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.

Output variables

Disable AD User Account output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

Conditions

Disable AD User Account conditions

Condition	Description
Success	AD user account was successfully disabled.
Failure	An error occurred while attempting to disable the account. Additional details may be available in the workflow log.

Enable AD User Account activity

The Enable AD User Account activity enables a Windows Active Directory user account, making it active.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

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Input variables

Enable AD User Account input variables

Variable	Description
User	The sAMAccountName of the Active Directory user account.
DomainController	IP address of the domain controller machine.

Output variables

Enable AD User Account output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Enable AD User Account conditions

Condition	Description
Success	AD user account was successfully enabled.
Failure	An error occurred while attempting to enable the AD user account. Additional details may be available in the workflow log.

Is AD Account Locked activity

The Is AD Account Locked activity determines whether an Active Directory user account is locked.

An account may be locked automatically if a user enters an incorrect password more times than allowed by the Active Directory security policy. You can unlock an account using the Unlock AD User Account activity.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Is AD Account Locked input variables

Variable	Description
DomainController	IP address of the domain controller machine.

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Is AD Account Locked input variables (continued)

Variable	Description
User	The sAMAccountName of the Active Directory user account.

Output variables

Is AD Account Locked output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.
output	The query result.

Conditions

Is AD Account Locked conditions

Condition	Description
Locked	The AD account is locked.
Unlocked	The AD account is unlocked.
Failure	An error occurred while processing the query. Additional details may be available in the workflow log.

Query AD activity

The Query AD activity retrieves entries from the Windows Active Directory based on an LDAP search filter and stores the results as a JSON string that can be used in the data bus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory** > **.**

Note:
This activity replaces an AD activity by the same name available in releases prior to Geneva. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul and will continue to save query results to the scratchpad. However, all new workflows must use the custom version of this activity. This activity was built with the Create a PowerShell activity, which stores input and output variables in the databus instead of the scratchpad.

Input variables

Query AD input variables

Variable	Description
DomainController	IP address of the domain controller machine.

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Query AD input variables (continued)

Variable	Description
Properties	A comma-separated list of Active Directory properties to return. For example, *`givenName,SN,title`*. If this field is blank, then all properties are returned.
SearchFilter	An LDAP filter string that defines the search parameters. Use any valid LDAP filtering criteria. For example, to find user accounts matching the ServiceNow input record, use: `(samaccountname=${workflow.inputs.u_user.user_name})`

Output variables

Query AD output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.
output	The query result.

Conditions

Query AD conditions

Condition	Description
Success	The query completed as expected.
Failure	An error occurred while processing the query. Additional details may be available in the workflow log.

Remove AD Object activity

The Remove AD Object activity deletes an object from Windows Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

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Input variables

Remove AD Object input variables

Variable	Description
DomainController	IP address of the domain controller machine.
ObjectName	The sAMAccountName of the Active Directory object.
Type	The object type to remove: • **user** • **group** • **computer**

Output variables

Remove AD Object output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Remove AD Object conditions

Condition	Description
Success	AD object was successfully removed.
Failure	An error occurred while attempting to remove the AD object. Additional details may be available in the workflow log.

Remove User from Group AD activity

The Remove User from Group activity removes a user from a group in Windows Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Input variables

Remove User from Group input variables

Variable	Description
DomainController	IP address of the domain controller machine.
UserName	Name of the user to remove from the group.
GroupName	Name of the group from which this user is removed.

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Output variables

Remove User from Group output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Remove User from Group conditions

Condition	Description
Success	User was successfully removed from the group.
Failure	An error occurred while attempting to remove the user from the group. Additional details may be available in the workflow log.

Reset AD User Password activity

The Reset AD User Password activity resets the password of a user account in Windows Active Directory.

If the new password violates any Active Directory password requirements, such as length or character combinations, the reset activity fails and returns the appropriate error message. This error appears in the ECC Queue and when you point to the activity in the Workflow Editor.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Reset AD User Password input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.
Password	The new password for the user. This password must comply with the organization's Active Directory requirements.
ForceChange	Makes this password temporary by forcing the user to change it at the next login.

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Reset AD User Password input variables (continued)

Variable	Description
Unlock	Unlock the account if the account is locked.

Output variables

Reset AD User Password output variables

Variable	Description
result	One of the following outcomes: • **failure** • **success** • **Policy Failure**
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.
hresult	Powershell command result.

Conditions

Reset AD User Password conditions

Condition	Description
Success	Password was successfully reset.
Policy Failure	New password does not comply with the organization's Active Directory requirements.
Failure	An error occurred while attempting to reset the password. Additional details may be available in the workflow log.

Unlock AD Account activity

The Unlock AD Account activity unlocks a locked Active Directory user account.

You can use the Is AD Account Locked activity activity to determine if an account is locked.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

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Input variables

Unlock AD Account input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.

Output variables

Unlock AD Account output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Unlock AD Account conditions

Condition	Description
Success	The account was successfully unlocked.
Failure	An error occurred while attempting to unlock the account. Additional details may be available in the workflow log.

Update AD Object activity

The Update AD Object activity updates an object in Windows Active Directory.

This activity only replaces existing values with new values. It cannot add new values to AD records such as adding a new group member to an AD group. For complex AD operations, use the Run PowerShell activity instead. The activity fails if it cannot find an existing account with matching object name and data.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Update AD Object input variables

Variable	Description
DomainController	IP address of the domain controller machine.

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Update AD Object input variables (continued)

Variable	Description
ObjectName	The sAMAccountName of the Active Directory object.
ObjectData	A JSON object containing Active Directory properties and their values. For example, to set the first name, last name, and title of a user, clear the user's manager, and set the VIP flag to true, the Object Data specifies: `{ "givenName" : "John", "SN" : "Doe", "title" : "Sr. Account Specialist", "manager" : null, "msTSAllowLogon" : false }`
Type	The object type to update: user, group, or computer.

Output variables

Update AD Object output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Update AD Object conditions

Condition	Description
Success	AD object was successfully updated.
Failure	An error occurred while attempting to update an AD object. Additional details may be available in the workflow log.

Azure AD activity pack

The Azure AD activity pack enables an administrator to automate employee onboarding and offboarding functions on Azure AD and manage Office 365 licensing.

Use the Azure AD activities to add and remove users to Azure Active Directory, manage security group membership, and assign or remove Office 365 licenses for individual users.

The Azure AD activities were created with the Orchestration REST Web Service activity template.

Add User to Group Azure AD activity

The Add User to Group activity adds a user to an existing security group in Azure Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

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Input variables

Add User to Group input variables

Variable	Description
user_id	Object ID (GUID) of the member to be added.
group_id	Object ID (GUID) of the target group.

Output variables

Add User to Group output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Add User to Group conditions

Condition	Description
Success	Activity successfully added the object ID to the security group.
Failure	Activity failed to update the group's membership, or the activity failed to connect to Azure AD.

Assign User License Azure AD activity

The Assign User License activity assigns an additional Office 365 software license to the named user.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

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Input variables

Assign User License input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.
sku_id	Subscription SKU ID associated with the tenant's enterprise agreement.

Output variables

Assign User License output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Assign User License conditions

Condition	Description
Success	Activity successfully assigned an Office 365 license to a user.
Failure	Activity failed to assigned an Office 365 license to a user, or the activity failed to connect to Azure AD.

Create User Azure AD activity

The Create User activity creates a user for the Azure Active Directory tenant.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

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Input variables

Create User input variables

Variable	Description
display_name	Name of the Azure AD user in the accepted display format, such as **jacinto.gawron**.
user_principal_name	User principal name (UPN) in an email format. For example, you might enter **jacinto.gawron@khitomer.com**.
mail_nickname	User's email alias that redirects to the user's full address.
password	User's Azure AD password. This password must be passed as a workflow input with a type of **Password (2 Way Encrypted)** and must meet the password policy set in Azure AD.
change_password	Control that requires the user to change their password at the next login, if set to true.
account_enabled	Control that sets the user's account is enabled, if set to true.
given_name	First name of the user.
surname	Last name of the user.
other_mails	List of additional email addresses for the user. For example, you might enter `["jac@home.com", "jgawron@fabrikam.com"]`.
country	The country or region in which the user is located. For example, you might enter **US** or **UK**. The default value is set to**US**.
city	City in which the user is located.
department	Name of the department in which the user works.
mobile	User's primary cell phone number.
job_title	User's job title.
physical_delivery_office_name	Office location in the user place of business.
postal_code	Postal code of the user's address.
preferred_language	Language in which the user prefers to communicate. This value must follow the ISO 639-1 Code. For example, you might enter **en-US**. The default value is set to **en-US**.
state	State or province for the user's address.
street_address	Street address of the user's place of business.
telephone_number	Primary telephone number of the user's place of business.

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Create User input variables (continued)

Variable	Description
usage_location	Two letter country code that is required for users who are assigned Office 365 licenses. The default value is **US**.

Output variables

Create User output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
status_code	Contains the status code returned from the Web service.
user_exists	Output variable mapped to the JSON message that contains the `User already exists` error.
user_info	The *`user_info`* array contains attributes that can be leveraged by other activities as inputs. For example, the user *`objectid`* output (GUID) can be passed to the Add User to Group activity as the *`user_id`* input. • *`objectid`*: User's Azure AD identifier. • *`accountEnabled`*: Boolean variable indicating whether the user's account is active or inactive. • *`displayName`*: Users display name, such as **jacinto.gawron**. • *`userPrincipalName`*: User's name in email format, such as **jacinto.gawron@wammo.com**. • *`mailNickname`*: User's email alias.

Conditions

Create User conditions

Conditions	Description
Created user	Activity successfully created the user.
User already exists	User already exists in the tenant domain.
Failure	Activity failed to connect to Azure AD, or an input value was invalid.

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Delete User Azure AD activity

The Delete User activity deletes the named user's account from the Azure Active Directory tenant.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Delete User input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.

Output variables

Delete User output variables

Variables	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Delete User conditions

Condition	Description
Deleted user	Activity deleted the specified user.
User does not exist	Specified user does not have an account in the tenant domain.
Failure	Activity failed to connect to Azure AD.

Get User Info Azure AD activity

The Get User Info activity returns the named user's information from the Azure Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

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Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Check If User Exists input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com** **Note:** Version 2 of this activity enforces input validation. If empty, the following message appears: "Mandatory input 'user_id' is empty" .

Output variables

Check If User Exists output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.
user_info	The *user_info* array contains attributes that can be leveraged by other activities as inputs. For example, the user *objectid* output (GUID) can be passed to the Add User to Group activity as the *user_id* input. • *objectid*: User's Azure AD identifier. • *accountEnabled*: Boolean variable indicating whether the user's account is active or inactive. • *displayName*: Users display name, such as **jacinto.gawron**. • *userPrincipalName*: User's name in email format, such as **jacinto.gawron@wammo.com**. • *mailNickname*: User's email alias.

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Conditions

Check If User Exists conditions

Condition	Description
User exists	Activity found the named user.
User does not exist	Activity was unable to find the named user in the customer tenant domain.
Failure	Activity failed to connect to Azure AD.

Remove User from Group Azure AD activity

The Remove User from Group activity removes an existing user from a security group in Azure Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Remove User from Group input variables

Variable	Description
user_id	Object ID (GUID) of the user to be removed.
group_id	Object ID (GUID) of the target group.

Output variables

Remove User from Group output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

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Conditions

Remove User from Group conditions

Variable	Description
Success	Activity removed the object ID from the security group.
Failure	Activity failed to update the group's membership, or the activity failed to connect to Azure AD.

Remove User License Azure AD activity

The Remove User License activity revokes the specified Office 365 software license for the named user.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Remove User License input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.
sku_id	Subscription SKU ID associated with the tenant's enterprise agreement.

Output variables

Remove User License output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

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Conditions

Remove User License conditions

Condition	Description
Success	Activity removed an Office 365 license from the named user.
Failure	Activity failed to remove an Office 365 from a user, or the activity failed to connect to Azure AD.

Reset User Password Azure AD activity

The Reset User Password activity changes the named user's Azure Active Directory password.

The Azure password policy imposes constraints on the complexity, length, and re-use of a password.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Reset User Password input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.
password	User's Azure AD password. This password must be passed as a workflow input with a type of **Password (2 Way Encrypted)** and must meet the password policy set in Azure AD.
change_password	Control that requires the user to change their password at the next login, if set to true.

Output variables

Reset User Password output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.

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Reset User Password output variables (continued)

Variable	Description
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Reset User Password conditions

Condition	Description
Success	Activity reset the named user's password.
Failure	Activity failed to reset the named user's password, or the activity failed to connect to Azure AD.

Exchange activity pack

The Exchange activity pack allows workflows to manage Microsoft Exchange mail systems.

The use of Orchestration Exchange activities requires the following:

- Microsoft Exchange 2010, 2013, or 2016.
- A MID Server configured to run Powershell 2.0
- A target Exchange server in the same Active Directory domain as the instance.
- Powershell Remoting enabled on the target Exchange server.

Note:
These activities cannot be used to interact with Microsoft Exchange Online.

Orchestration provides custom Exchange activities that were created with the Orchestration activity designer template. These activities perform the same functions as Exchange activities by the same name from previous releases and replace those activities for all new workflows. The custom Exchange activities were built with a Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Note:
Existing workflows from earlier versions that were created with legacy Exchange activities continue to function normally after an upgrade to Geneva. However, all new workflows must use these custom Exchange activities.

To use the Microsoft Exchange custom activities, you must request activation of the Orchestration - Exchange plugin. The custom Exchange activities are available in the Workflow Editor on the **Custom** tab. Expand the **Custom Activities** tree and select the **Exchange** category for the activity you want to use.

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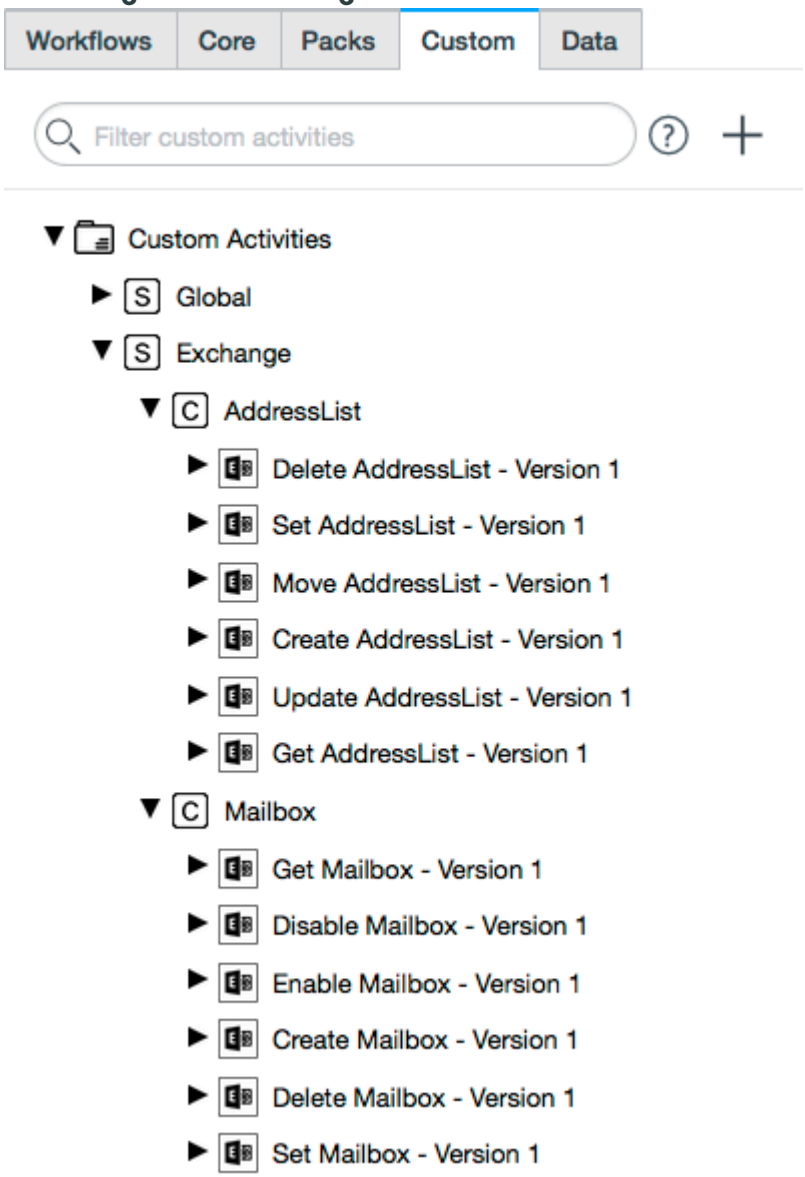
Accessing custom Exchange activities



Configure MID Server for Exchange

Configure a MID Server with defined IP ranges to use Exchange.

Before you begin

Role required: admin

About this task

If the MID Server manages resources within defined IP ranges, instead of all computers on your network, you must perform additional configuration steps to run Exchange activities. You do not need to perform these steps if your MID Server uses the default configuration.

Procedure

1. In the navigation filter, enter `cmdb_ci_dns_name.list`.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of your Exchange server in the **Name** field.
4. Right-click the form header and select **Save**.

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5. In the **IP Address** related list, click **New**.
6. In the **IP Address** field, enter the IP address of your Exchange server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.
8. Leave the **Netmask** field blank.
9. Click **Submit**.

Pass multivalued properties with an Exchange activity

To set a multivalued property using an Exchange activity, you must use a specific parameter format.

About this task

The Optional parameters shared input variable allows you to set multivalued properties.

Procedure

- To set a multivalued property, replacing any existing values, use this format: "`PropertyName`":"(`value1`, `value2`, `value3`)"
- To add values, use this format: "PropertyName":"+(`value1`, `value2`, `value3`);"
- To remove values, use this format: "PropertyName":"-(`value1`, `value2`, `value3`);"
- To both add and remove values, use this format: "PropertyName":"-(`value1`, `value2`, `value3`);+(`value1`, `value2`, `value3`);"

Create Address List activity

The Create Address List activity creates a new address list that acts as an alias for emailing all users in the group.

This alias cannot be used to manage user permissions. This activity implements the Microsoft Exchange New-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Create Address List input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
name	Name of the new address list to create.

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Create Address List input variables (continued)

Variable	Description
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

Output variables

Create Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Create Address List conditions

Condition	Description
Success	The activity succeeded in creating a new address list.
Failure	The activity failed to create a new address list.

Delete Address List activity

The Delete Address List activity removes an existing address list from an Exchange server.

This activity implements the Microsoft Exchange Remove-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

Delete Address List input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to remove.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
recursive	Check box that indicates if the activity should delete Active Directory elements that are children of the specified address list.
whatif	Check box that indicates if the activity should stage the changes without applying them. Use this variable to test your activity settings before using the activity in a live workflow. When this variable is selected, the Exchange server does not make any changes but indicates if the command would succeed or fail. You can review any messages from the Exchange server using the ECC queue.

Output variables

Delete Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Delete Address List conditions

Condition	Description
Success	The activity succeeded in removing the address list from the Exchange server.
Failure	The activity failed to remove the address list from the Exchange server.

Get Address List activity

The Get AddressList activity retrieves all attributes from the specified Exchange address list.

This activity implements the Microsoft Exchange Get-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

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Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Get Address List input variables

Variables	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
identity	Name of the address list to get attributes from. If you enter a value in this variable, leave the **container** and **searchText** variables blank.
organization	Organization to which the specified address list belongs.
searchText	Filter text that causes the activity to return only results that contain this text. This variable can only be used with Exchange 2013 servers. If you enter a value in this variable, leave the **container** and **identity** variables blank.
container	Parent address list of the address list from which you want to retrieve attributes. If you enter a value in this variable, leave the **identity** and **searchText** variables blank

Output variables

Get Address List output variables

Variables	Descriptions
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Get Address List conditions

Condition	Description
Success	The activity succeeded in retrieving the attributes from the address list.
Failure	The activity failed to retrieve the attributes from the address list.

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Move Address List activity

The Move Address List activity moves a Microsoft Exchange address list to another location in the address hierarchy.

This activity implements the Microsoft Exchange Move-AddressList command.

The Exchange server caches the changes from this activity but does not immediately apply them. Use the Update Address List activity after this activity to apply the changes or wait for the Exchange server to automatically apply cached changes.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Move Address List input variables

Variables	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to move.
target	Path to the address list's new location.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
whatif	Check box that indicates if the activity should stage the changes without applying them. Use this variable to test your activity settings before using the activity in a live workflow. When this variable is selected, the Exchange server does not make any changes but indicates if the command would succeed or fail. You can review any messages from the Exchange server using the ECC queue.

Output variables

Move Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

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Conditions

Move Address List conditions

Condition	Description
Success	The activity succeeded in moving the address list to another location.
Failure	The activity failed to move the address list to another location.

Set Address List activity

The Set Address List activity modifies a Microsoft Exchange address list.

Use the Optional parameters variable to pass specific values to the Microsoft Exchange server. This activity implements the Microsoft Exchange Set-AddressList command.

The Exchange server caches the changes from this activity but does not immediately apply them. Use the Update Address List after this activity to apply the changes or wait for the Exchange server to automatically apply cached changes.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Set Address List input variables

Variables	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to modify.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

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Output variables

Set Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Set Address List conditions

Variable	Description
Success	The activity succeeded in modifying the specified address list.
Failure	The activity failed to modify the specified address list.

Update Address List activity

The Update Address List activity adds or removes users from the specified address list and immediately applies any cached address list changes to the server.

Use the optional parameters variable to specify which users to add or remove. This activity implements the Microsoft Exchange Update-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Update Address List input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to update.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
whatif	A check box that indicates if the activity should stage the changes without applying them. Use this variable to test your activity settings before using the activity in a live workflow. When this variable is selected, the Exchange server does not make any changes but indicates if the command would

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Update Address List input variables (continued)

Variable	Description
	succeed or fail. You can review any messages from the Exchange server using the ECC queue.

Output variables

Update Address List output variables

Variable	Description
result	Either **Success** or **Failure**.
error	Error message if the operation fails.

Conditions

Update Address List conditions

Condition	Description
Success	The activity succeeded in adding or removing users from the specified address list.
Failure	The activity failed to add or remove users from the specified address list.

Create Mailbox activity

The Create Mailbox activity creates a new Active Directory user, if that user does not already exist, and a Microsoft Exchange mailbox for that user.

This activity implements the Microsoft Exchange New-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Create Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.

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Create Mailbox input variables (continued)

Variable	Description
	Important: The MID Server must be in the same domain as the Exchange server.
first_name	First name of the user.
middle_initial	Middle initial of the user.
last_name	Last name of the user.
alias	The display name for the mailbox address, the part of the email address to the left of the @ symbol. If no alias is specified, the activity uses First name.Last name as the alias. The alias is also used as the user's principal name (UPN) if none is specified in the optional parameters.
password	Password to use for the new mailbox. The password is encrypted when it is sent to the target host.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Create Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Create Mailbox conditions

Condition	Description
Success	The activity succeeded in creating a new mailbox for the specified user. If no Active Diectory account existed for that user, this activity succeeded in creating a new account.

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Create Mailbox conditions (continued)

Condition	Description
Failure	The activity failed to create a new mailbox or an Active Directory account for the specified user.

Delete Mailbox activity

The Delete Mailbox activity deletes the Microsoft Exchange mailbox of an Active Directory user.

Optional parameters determine how the Exchange server handles the mailbox after deleting the user. This activity implements the Microsoft Exchange Remove-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Delete Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user to delete. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

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Output variables

Delete Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Delete Mailbox conditions

Condition	Description
Success	The activity succeeded in deleting the specified user's mailbox.
Failure	The activity failed to delete the specified user's mailbox.

Disable Mailbox activity

The Disable Mailbox activity disables the mailbox associated with a specified Active Directory account.

This activity implements the Microsoft Exchange Disable-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Disable Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user who's mailbox should be disabled. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type.

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Disable Mailbox input variables (continued)

Variable	Description
	Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Disable Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Disable Mailbox conditions

Condition	Description
Success	The activity succeeded in disabling the specified mailbox.
Failure	The activity failed to disable the specified mailbox.

Enable Mailbox activity

The Enable Mailbox activity creates a new mailbox for an existing Active Directory user.

This activity implements the Microsoft Exchange Enable-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Enable Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.

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Enable Mailbox input variables (continued)

Variable	Description
domain	The name of the Exchange server's assigned domain.
user	Active Directory user who's mailbox should be enabled. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

Output variables

Enable Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Enable Mailbox conditions

Condition	Description
Success	The activity succeeded in creating a new mailbox for the specified user.
Failure	The activity failed to create a new mailbox for the specified user.

Get Mailbox activity

The Get Mailbox activity gets the mailbox for the specified user or all mailboxes on a Microsoft Exchange server.

This activity implements the Microsoft Exchange Get-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

Get Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	User whose mailbox this activity should retrieve. If no user is specified, the activity gets all mailboxes on the Exchange server. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

Output variables

Get Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Get Mailbox conditions

Condition	Description
Success	The activity succeeded in retrieving the attributes of the specified mailbox.
Failure	The activity failed to retrieve the attributes of the specified mailbox.

Set Mailbox activity

The Set Mailbox activity modifies the settings of an existing Microsoft Exchange mailbox.

Use the optional parameters variable to pass specific values to the Exchange server. This activity implements the Microsoft Exchange Set-Mailbox command.

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To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Set Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user whose mailbox you want to modify. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Set Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Set Mailbox conditions

Conditions	Description
Success	The activity succeeded in modifying the settings of the specified mailbox.
Failure	The activity failed to modify the settings of the specified mailbox.

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F5 Network Management activity pack

Orchestration provides custom activities for configuring elements of an F5 load balancer, including pools, pool members, and the virtual servers contained in the pool.

All F5 custom activities are in the F5 Network Management Application Application scope and are activated by the Orchestration - F5 network management plugin, which must be activated by request.

ServiceNow provides custom F5 activities, built from the REST web service activity template, that you can use to perform the following tasks:

- Add, delete, or verify pools.
- Add, delete, or identify pool members.
- Add or delete virtual servers.
- Add a profile to a virtual server.
- Configure the virtual server for vlans, irules, pool, and persistence.

Add F5 Pool Member activity

The Add F5 Pool Member activity adds a member to an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: post

Input variables

Add F5 Pool Member input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.
F5IPAddress	IP address of the F5 console.
MemberName	Pool member IP address and port, such as 192.168.2.19:80.

Output variables

Add F5 Pool Member output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.
output	The REST output.

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Conditions

Add F5 Pool Member conditions

Condition	Description
Success	Activity successfully added an F5 load balancer pool member.
Failure	Activity failed to add an F5 load balancer pool member.

Get F5 Pool Member activity

The Get F5 Pool Member activity returns the pool members and verifies the pool's status.

Use this activity to verify that a pool member was created properly.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: get

Input variables

Get F5 Pool Member input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.
F5IPAddress	IP address of the F5 console.

Output variables

Get F5 Pool Member output variables

Variable	Description
MembersArray	Array for the returned pool member IP address and port, such as 192.168.2.19:80.
status_code	The HTTP status code.
error	The REST error.
result	Success or failure.
output	The REST output.

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Conditions

Get F5 Pool Member conditions

Condition	Description
Success	Activity successfully returned the F5 load balancer pool members.
Failure	Activity failed to return the F5 load balancer pool members

Delete F5 Virtual Server activity

The Delete F5 Virtual Server activity deletes a virtual server from an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 VIP Management
- **REST function**: delete

Input variables

Delete F5 Virtual Server input variables

Variable	Description
F5IPAddress	IP address of the F5 console.
name	The virtual server's name, such as `testVIP`.

Output variables

Delete F5 Virtual Server output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.

Conditions

Delete F5 Virtual Server conditions

Condition	Description
Success	Activity successfully deleted the virtual server from the F5 load balancer pool.
Failure	Activity failed to delete the virtual server from the F5 load balancer pool.

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Check F5 Pool activity

The Check F5 Pool activity checks the status of a pool to determine if it is available to accept traffic.

Use this activity to determine if a pool you just created is up and running with the proper configuration.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Management
- **REST function**: get

Input variables

Check F5 Pool input variables

Variable	Description
F5IPAddress	IP address of the F5 console.
PoolName	Name of this pool, such as `testPool`.

Output variables

Check F5 Pool output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.

Conditions

Check F5 Pool conditions

Condition	Description
Success	Activity successfully returned the status of the F5 load balancer pool.
Failure	Activity failed to return the status of the F5 load balancer pool.

Add F5 Profile to Virtual Server activity

The Add F5 Profile to Virtual Server activity adds a profile to a virtual server assigned to an F5 load balancer pool.

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This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 VIP Profile Management
- **REST function**: post

Input variables

Add F5 Profile to Virtual Server input variables

Variable	Description
name	The virtual server's name, such as `testVIP`
F5IPAddress	IP address of the F5 console.
VirtualServerName	Name of the virtual server, such as `testVIP`.

Output variables

Add F5 Profile to Virtual Server output variables

Variable	Description
result	Success or failure.
output	The REST output.
status_code	The HTTP status code.

Condtions

Add F5 Profile to Virtual Server conditions

Condition	Description
Success	Activity successfully added the F5 load balancer profile to the virtual server.
Failure	Activity failed to add the F5 load balancer profile to the virtual server.

Modify F5 Virtual Server activity

The Modify F5 Virtual Server activity configures a virtual server assigned to an F5 load balancer pool with irules and a vlan.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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REST settings

- **REST message**: F5 VIP Management
- **REST function**: put

Input variables

Modify F5 Virtual Server input variables

Variable	Description
name	The virtual server's name, such as `testVIP`.
F5IPAddress	IP address of the F5 console.
irules	The irules for the virtual server, such as `_sys_https_redirect`. • **pool**: Name of the pool for the virtual server, such as `testPool`. • **persistent**: Persistent profile for the virtual server, such as `cookie`.
vlans	Vlans for the virtual server, such as `internal`.

Output variables

Modify F5 Virtual Server output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
output	The REST output.

Conditions

Modify F5 Virtual Server conditions

Condition	Description
Success	Activity successfully configured a virtual server assigned to an F5 load balancer pool.
Failure	Activity failed to configure a virtual server assigned to an F5 load balancer pool.

Add F5 Virtual Server activity

The Add F5 Virtual Server activity adds a virtual server.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: post

Input variables

Add F5 Virtual Server input variables

Variable	Description
name	The virtual server's name, such as `testVIP`.
description	Description of this virtual server.
ipProtocol	Protocol used for this virtual server, such as `tcp`.
destination	Virtual server IP address and port number, such as 192.168.4.20:80.
mask	Subnet mask for this virtual server, such as 255.255.255.255.
F5IPAddress	IP address of the F5 console.
sourceAddressTranslation	Source address translation mode.

Output variables

Add F5 Virtual Server output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.
output	The REST output.

Conditions

Add F5 Virtual Server conditions

Condition	Decription
Success	Acitivty successfully added a virtual server.
Failure	Activity failed to add a virtual server.

Delete F5 Pool Member activity

The Delete F5 Pool Member activity deletes an F5 load balancer pool member.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: delete

Input variables

Delete F5 Pool Member input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.
F5IPAddress	IP address of the F5 console.
MemberName	Pool member IP address and port, such as 192.168.2.19:80.

Output variables

Delete F5 Pool Member output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.

Conditions

Delete F5 Pool Member output variables

Condition	Description
Success	Acivity succeeded in deleting an F5 load balancer pool member.
Failure	Acivity failed to delete an F5 load balancer pool member.

Delete F5 Pool activity

The Delete F5 Pool activity deletes an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Management
- **REST function**: delete

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Input variables

Delete F5 Pool input variables

Variable	Description
F5IPAddress	IP address of the F5 console.
PoolName	Name of this pool, such as `testPool`.

Output variables

Delete F5 Pool output variables

Variable	Description
result	Success or failure.
error	The REST error.
status_code	The HTTP status code.

Conditions

Delete F5 Pool conditions

Condition	Description
Success	Activity successfully deleted the F5 load balancer pool.
Failure	Activity failed to delete the F5 load balancer pool.

Add F5 Pool activity

The Add F5 Pool activity creates the F5 load balancer pool.

Use this activity to verify that a pool member was created properly.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Management
- **REST function**: post

Input variables

Add F5 Pool input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.

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Add F5 Pool input variables (continued)

Variable	Description
F5IPAddress	IP address of the F5 console.
MemberName	Pool member IP address and port, such as 192.168.2.19:80.

Output variables

Add F5 Pool output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.
output	The REST output.

Conditions

Add F5 Pool conditions

Condition	Description
Success	Activity succeeded in creating the F5 load balancer pool.
Failure	Activity failed to create the F5 load balancer pool.

Infoblox DDI activity pack

This activity pack supports Infoblox DDI management through ServiceNow Orchestration.

The Infoblox DDI activity pack manages the IP addresses used in a network by integrating DNS and DHCP. Custom Orchestration activities use Infoblox Web API (WAPI) REST web services to access the Infoblox GRID server.

Important:
Managing IP addresses through the Infoblox server requires a fully functional MID Server.

Starting with the Jakarta release, the Infoblox activity pack updates to version 2. This update supports Infoblox network views, which can restrict the visibility of network data. The view parameter can be passed as a query parameter or payload content, to do operations in a specific view. Version 2 also supports specifying the version of WAPI to use in integration endpoints.

Supported for Infoblox:

- WAPI version 2.0 for REST messages
- NIOS appliance version 7.0

Note:
To use the Infoblox DDI activities and workflow, you must request activation of the Orchestration - Infoblox DDI Activty Pack plugin.

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Create a REST credential for Infoblox activities

All Infoblox activities require a REST credential to manage IP addresses from the Infoblox DDI server.

Before you begin

Before starting this procedure, make sure you have the following:

- A properly configured and running Infoblox DDI Grid Server.
- REST credentials defined on the Infoblox DDI server.

Role required: admin

About this task

You must create a REST credential record on the ServiceNow instance that each Infoblox activity can use to access management features on the Infoblox server.

Procedure

1. Navigate to **All** > **Orchestration** > **Credentials** and click **New**.
2. In the list of credential types, select **Basic Auth Credentials**.
3. Create the credential record with a logical name, such as **InfobloxCred**.
4. Right-click in the header bar of your new credential record and select **Copy sys_id** from the context menu.
   Follow browser instructions to copy the sys_id if browser security measures restrict this function.
5. Paste the sys_id into the **restCredentials** input field of each activity you use.

Infoblox workflows

The Infobox DDI activity pack includes two default workflows, one that reserves and registers IP addresses and another that releases IP addresses.

To access these workflows, navigate to **Workflow** > **Workflow Editor** and select the **Workflows** tab. Click on a workflow to open it, and then click the information icon in the workflow header to display the properties dialog box.

Infoblox Reserve/Register IP in IPAM

Use this workflow to register IPv4 addresses or request the next available IP address on IPAM. Optionally, you can use it to register IP addresses on DNS. The custom Infoblox activities used in this workflow are:

- IPAM Register IP Address
- IPAM Reserve IP Address
- Register DNS A-Record
- Get Network Details

Infoblox Reserve/Register IP input variables

Field	Description
Infoblox Server	IP address of the Infoblox DDI server.
Network	Network containing the target IP address.

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Infoblox Reserve/Register IP input variables (continued)

Field	Description
Zone	The DNS zone for the IP address being registered.
Rest Credentials	The sys_id of the REST credentials from the ServiceNow instance.
DNS Host Name	Name of the DNS server machine on which the IP address is being registered.
IPv4 Address	IP address being reserved or registered.

Infoblox Release IPAM Reservations

Use this workflow to release (delete) all the IPAM reservations associated with an IPv4 address. The custom Infoblox activities used in this workflow are:

- IPAM List IP Reservations
- List DNS Record
- DNS Delete
- IPAM Delete

Infoblox Release IPAM Reservations input variables

Field	Description
Rest Credentials	The sys_id of the REST credentials from the ServiceNowinstance.
IP to Delete	IP address to release.
Infoblox Server	IP address of the Infoblox DDI server.

Infoblox roles and permissions

Define the roles and permissions that the Infoblox activities need to access the various resources on the Infoblox server.

Admin groups

There are three types of admin groups on an Infoblox server:

- Superuser
- Default
- Limited Access

To perform specific operations on the Infoblox server, the Limited Access user must have a minimum set of privileges for the desired resources, using either the user interface or an API. These privileges are based on read and read/write access. For more information, refer to the "About Admin Groups" section in the Infoblox NIOS Administrator Guide.

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Permission hierarchy

1. **User**: A user can be part of multiple groups.
2. **Group**: A group can have many roles.
3. **Role**: Each role consistes of specific resource permissions.

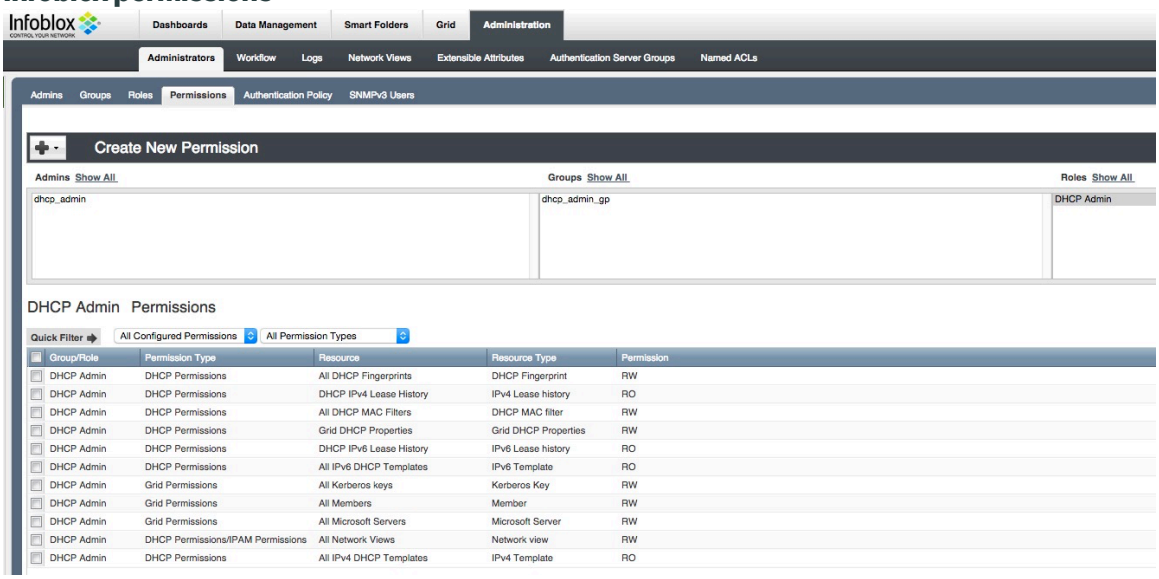
Required permissions

The ServiceNow Infoblox activity pack requires appropriate read and read/write privileges for these resources:

- Network
- DHCP
- DNS
- IPAM

This example shows a default DHCP admin role, its resources, and the related permissions for each.

Infoblox permissions



Infoblox DHCP activities

The Infoblox DHCP activities manage the IP addresses reserved for DHCP in your network.

Use these activities to reserve, list, or delete IP addresses that are used for DHCP assignment in your network.

DHCP Reserve IP v4 Address Range activity

The DHCP Reserve IP v4 Address Range activity reserves an IP address range for DHCP use.

The DHCP activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DHCP**.

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Input variables

DHCP Reserve IP v4 Address Range input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
startIpAddress	Beginning IPv4 address of the range to reserve.
endIpAddress	Ending IPv4 address of the range to reserve.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

DHCP Reserve IP v4 Address Range output variables

Variable	Description
DHCPIpAddressRange	Range of reserved IPv4 addresses.
error	Displays the message for any REST error encountered.

Conditions

DHCP Reserve IP v4 Address Range conditions

Variable	Description
Success	Activity successfully reserved the specified IPv4 address range.
Failure	Activity failed to reserve the specified IPv4 address range.

DHCP Delete IP Reservation activity

The DHCP Delete IP Reservation activity deletes IP reservations in DHCP using either an IPv4 or IPv6 address range.

An automation can obtain an Infoblox DHCP object to delete from either of these activities:

- DHCP List IP Reservations
- DHCP Reserve IPv4 Address Range

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The DHCP activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DHCP**.

Input variables

DHCP Delete IP Reservation input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
ipToDelete	IP address range to delete, in the form: `range/<encrypted code>:<start range>/<end range>/default`
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

Output variables

DHCP Delete IP Reservation output variables

Variable	Description
DHCPDeletedIpRange	Range of deleted IP addresses.
error	Displays the message for any REST error encountered.

Conditions

DHCP Delete IP Reservation conditions

Variable	Description
Success	Activity successfully deleted the specified IP address range.
Failure	Activity failed to delete the specified IP address range.

DHCP List IP Reservations activity

The DHCP List IP Reservations activity generates a list of all the DHCP range reservations on a specific InfoBlox server.

The DHCP activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

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To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DHCP**.

Input variables

DHCP List IP Reservations input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

DHCP List IP Reservations output variables

Variable	Description
reference	Reference value for an array of DHCP address ranges in this format: `range/<encrypted code>:<start range>/<end range>/default`
network	Address of the network containing the IP address range.
network_view	Routing doman associated with the network returned.

Conditions

DHCP List IP Reservations conditions

Variables	Description
Success	Activity successfully returned an array of DHCP IP address ranges.
Failure	Activity failed to return an array of DHCP IP address ranges.

Infoblox DNS activities

The Infoblox DNS activities manage DNS records in your network using an Infoblox DDI Grid Server.

Use these activities to register, list, or delete DNS records managed on an Infoblox server.

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List DNS C-records activity

The List DNS C-records activity retrieves all canonical (CNAME) records from a specified Infoblox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

List DNS C-records input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

List DNS C-records output variables

Variable	Description
error	Displays the message for any REST error encountered.
reference	Reference value for a DNS CNAME record, such as: `record:cname/ZG5zLmJpbmRfY25hbWUkL19kZWZhdWx0LmNvbS50ZXN0LmNuYW1l:cname.test default`
cannonicalName	CNAME record.
name	Name of the network option returned, such as *`domain-name-server`*.
view	The assigned view of the DNS data. A given zone can have multiple views, which are accesse depending on the IP address of the source of the query. The **default** view of DNS data for this activity is the network view.

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Conditions

List DNS C-records conditions

Variable	Description
Success	Activity successfully listed the DNS C records.
Failure	Activity failed to list the DNS C records.

Register DNS A-record activity

The Register DNS A-record activity creates a DNS A record on a specified Infoblox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

Register DNS A-record input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
network	Address of the network containing the IP address to register in the record.
hostName	Name of the actual server machine associate with the IP address in this record.
zone	The DNS zone associated with the record being created.
ipAddress	Specific IP address registered in this record.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

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Output variables

Register DNS A-record output variables

Variable	Description
error	Displays the message for any REST error encountered.
DNSARecord	Name of the record registered, expressed in the format: *record:host/<encrypted code>:<network name>/default*.

Conditions

Register DNS A-record conditions

Variable	Description
Success	Activity successfully created the DNS A record.
Failure	Activity failed to create the DNS A record.

Register DNS C-Record activity

The Register DNS C-Record activity creates a DNS canonical (CNAME) record on a specified Infoblox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

Register DNS C-Record input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
cname	The DNS cannonical record to create, as expressed by the *c_name* value.
recordName	Name of the record to create.
zone	The DNS zone containing the cannonical record to create.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**.

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Register DNS C-Record input variables (continued)

Variable	Description
	Note: If the field is empty, the operation is treated as happening in the default view.

Output variables

Register DNS C-Record output variables

Variable	Desctiption
error	Displays the message for any REST error encountered.
DNSCRecord	Name of the CNAME record registered, expressed in the format: *record:cname/<encrypted code>:<network name>/default*.

Conditions

Register DNS C-Record conditions

Variable	Description
Success	Activity successfully created the cannonical DNS record.
Failure	Activity failed to create the cannonical DNS record.

List DNS Record activity

The List DNS Record activity generates a list of all the DNS entries on a specific InfoBlox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

List DNS Record input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**.

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List DNS Record input variables (continued)

Variable	Description
	Note: If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

List DNS Record output variables

Variable	Description
reference	Reference value for a DNS record, such as: `record:cname/ZG5zLmJpbmRfY25hbWUkL19kZWZhdWx0LmNvbS50ZXN0LmNuYW1l:cname.tes default`
configure_for_dhcp	Returns the status of a DHCP fixed address object.
host	Host machine with which the DNS record is associated.
ipv4addr	The reserved IPv4 address associated with a DNS record.
name	Name of the network option returned. For example, the name of the DNS record object from **reference** example is *cname.test.com*.
view	The assigned view of the DNS data. A given zone can have multiple views, which are acces depending on the IP address of the source of the query. The **default** view of DNS data for th activity is the network view.
error	Displays the message for any REST error encountered.

Conditions

List DNS Record conditions

Variable	Description
Success	Activity successfully listed all the available DNS record.
Failure	Activity failed to list the available DNS record.

DNS Delete activity

The DNS Delete activity deletes DNS records of any type from in Infoblox server, such as C and A records.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Note:
It is faster to create a new record than recover one that has been deleted.

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Input variables

DNS Delete input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
RecordToDelete	Name of the DNS record to delete. The record is expressed in this format: *record:cname/ZG5zLmJpbmRfY25hbWUkL19kZWZhdWx0LmNvbS50ZXN0LmNuYW11:cname.test.default*
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

Output variables

DNS Delete output variables

Variable	Description
DeletedRecord	Name of the deleted DNS record.
error	Displays the message for any REST error encountered.

Conditions

DNS Delete conditions

Variable	Description
Success	Activity successfully deleted the specified DNS record.
Failure	Activity failed to delete the specified DNS record.

Infoblox IPAM activities

The Infoblox IPAM activities manage IP addresses in your network using an Infoblox DDI Grid Server.

Use these activities to register, reserve, list, or delete IP addresses.

IPAM Register IP Address activity

The IPAM Register IP Address activity registers an IP address in a network using Infoblox IPAM.

The output of this activity produces an InfoBlox IP address record that can be used for other IPAM functions in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

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To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM Register IP Address input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
macAddress	Mac address of the computer for which this IP address is registered.
ipAddress	Specific IP address to register.
network	Address of the network containing the registered IP address.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

IPAM Register IP Address output variables

Variable	Description
error	Displays the message for any REST error encountered.
IPAddressRecord	IPAM record of the registered IP address.

Conditions

IPAM Register IP Address conditions

Variable	Description
Success	Activity successfully registered the specified IP address.
Failure	Activity failed to register the specified IP address.

IPAM Reserve IP Address activity

The IPAM Reserve IP Address activity reserves an IP address in a network using Infoblox IPAM.

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The output of this activity produces an InfoBlox IP address record that can be used for other IPAM functions in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM Reserve IP Address input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
macAddress	Mac address of the computer for which this IP address is reserved.
network	Address of the network containing the reserved IP address. The Infoblox server reserves the next available IP address from this network.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

IPAM Reserve IP Address output variables

Variable	Description
error	Displays the message for any REST error encountered.
IPAddressRecord	IPAM record of the reserved IP address.
IPAddress	Selected IP address to reserve.

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Conditions

IPAM Reserve IP Address conditions

Variable	Description
Success	Activity successfully reserved the specified IP address.
Failure	Activity failed to reserve the specified IP address.

IPAM List IP Reservations activity

The IPAM List IP Reservations activity returns an array of all IP Address within the named InfoBlox Server.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM List IP Reservations input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

The output of this activity produces an array of reserved IP addresses in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.

IPAM List IP Reservations output variables

Variable	Description
reference	Reference value of a reserved IP address contained in an array of addresses, such as `fixedaddress/ZG5zLmZpeGVkX2FkZHJlc3MkMTAuMC4xMDMuMTEuMC4u:0.0.0.11/default" ipv4addr: "0.0.0.11"`

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IPAM List IP Reservations output variables (continued)

Variable	Description
ipv4addr	The reserved IPv4 address.
network_view	Routing domain associated with the network returned.
error	Displays the message for any REST error encountered.

Conditions

IPAM List IP Reservations conditions

Variable	Description
Success	Activity successfully retrieved the list of reserved IP addresses from the Infoblox server.
Failure	Activity failed to retrieve the list of reserved IP addresses from the Infoblox server.

IPAM Delete activity

The IPAM Delete activity deletes an IP Address within a named InfoBlox server.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM Delete input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
itemToDelete	The IP address to delete, in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

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Output variables

IPAM Delete output variables

Variable	Description
DeletedRecord	IPAM record of the deleted IP address.
error	Displays the message for any REST error encountered.

Conditions

IPAM Delete conditions

Variable	Description
Success	Activity successfully deleted the specified IP address.
Failure	Activity failed to delete the specified IP address.

Infoblox network activities

The Infoblox network activities manage networks using an Infoblox DDI Grid Server.

Use these activities to create, list, or delete networks on an Infoblox server.

Create Network activity

The Create Network activity creates new networks on a specified Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Create Network input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
network	Address of the network to create.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**.

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Create Network input variables (continued)

Variable	Description
	Note: If the field is empty, the operation is treated as happening in the default view.

Output variables

Create Network output variables

Variable	Description
NetworkCreated	Address of the network created.
error	Displays the message for any REST error encountered.

Conditions

Create Network conditions

Variable	Description
Success	Activity successfully created the network.
Failure	Activity failed to create the network.

Get Network Details activity

The Get Network Details activity retrieves the information about a specific network on an Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Get Network Details input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
network	Address of the network whose details you want to see.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**.

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Get Network Details input variables (continued)

Variable	Description
	Note: This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

The output variables from this activity are objects on the Infoblox server used to identify network details. For more information, refer to the Infoblox documentation.

Get Network Details output variables

Variable	Description
error	Displays the message for any REST error encountered.
NetworkOptions	The *NetworkOptions* array contains these attributes: • *reference*: Reference value for the network requested. This value is in the form of `network/ZG5zLm5ldHdvcmskMTAuMS4wLjAvMTYvMA:10.1.0.0%2F1` • *options*: The *options* array contains these attributes: ◦ *name*: Name of the network option returned, such as *domain-name-server*. ◦ *num*: Index number of the option. For example, the index for *domain-name-server* is *6*. ◦ *use_option*: Indicates whether a DHCP option is used at that level in the network heirarchy. Set this value to **True** to override the Grid Level DHCP option with this option at the network level. ◦ *value*: Value to use for this option. For example, the value for the *domain-name-server* option is the IP address of the server machine. ◦ *vendor_class*: The class of the network object. The options are **DHCP**, **DNS**, or **IPAM**.

Conditions

Get Network Details conditions

Variable	Description
Success	Activity successfully retrieved network details from the Infoblox server.

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Get Network Details conditions (continued)

Variable	Description
Failure	Activity failed to retrieve network details from the Infoblox server.

Delete Network activity

The Delete Network activity deletes a network from an Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Delete Network input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
networkToDelete	Reference number of the network to delete from the Infoblox server. You can obtain this value either by using the List Registered Networks activity or when creating a network with the Create Network activity. An example of the network reference value is: *`network/ZG5zLm51dHdvcmskMTUuMC40NS4wLzI0LzA:15.0.45.0/24/default`*.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

Output variables

Delete Network output variables

Variable	Description
DeletedNetwork	Reference number of the deleted network from the Infoblox server.
error	Displays the message for any REST error encountered.

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Conditions

Delete Network conditions

Variable	Description
Success	Activity successfully deleted the network.
Failure	Activity failed to delete the network.

List Registered Networks activity

The List Registered Networks activity retrieves all the networks associated with an Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Activity input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

Activity output variables

Variable	Description
reference	Reference value of a registered network.
network	Network address.
network_view	Routing doman associated with the network returned.
error	Displays the message for any REST error encountered.

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Conditions

Activity conditions

Variable	Description
Success	Activity successfully retrieved the list of registered networks available on the Infoblox server.
Failure	Activity failed to retrieve the list of registered networks available on the Infoblox server.

PowerShell activity pack

PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications.

Orchestration provides custom PowerShell activities that were created with the PowerShell activity designer template. These activities perform the same functions as PowerShell activities by the same name from previous releases and replace those activities for all new workflows. These custom activities give workflow administrators the ability to store input and output variables in the databus.

Note:
Existing workflows from earlier versions that were created with legacy PowerShell activities continue to function normally after an upgrade to Geneva. However, all new workflows must use these custom PowerShell activities.

Starting with the Washington DC release, there are the following updates to the PowerShell activity pack:

- A new PowerShell probe (V2), which takes advantage of Integration Hub functionality
- The ability to insert debug statements in the PowerShell scripts and produce the resulting messages at runtime

To use the PowerShell custom activities, you must request activation of the Orchestration - PowerShell plugin. These activities are available in the Workflow Editor on the **Custom** tab. Expand the **Custom Activities** tree and select the PowerShell category for the activity you want to use.

ServiceNow supports PowerShell 3.0 to 5.1.

PowerShell activity designer

PowerShell activities are configured to return data to a workflow from a host using Microsoft PowerShell.

You must purchase Classic Orchestration to use this template. For specific information about using the tools in the activity designer, refer to these resources:

- Orchestration activity designer
- Create input variables
- Create a parsing rule

ServiceNow supports PowerShell 3.0 to 5.1.

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PowerShell protocols and troubleshooting

PowerShell uses the Windows Management Instrumentation (WMI) and Windows Remote Management (WinRM) protocols to enable Orchestration activities to run commands on remote Windows hosts.

Windows Management Instrumentation (WMI)

WMI provides a uniform interface for any local or remote applications or scripts that obtain management data from a computer system, a network, or an enterprise. WMI contains these components:

- **Managed objects and WMI providers**: A WMI provider is a COM object that monitors one or more managed objects for WMI. A managed object is a logical or physical enterprise component, such as a hard disk drive, network adapter, database system, operating system, process, or service.
- **WMI infrastructure**: The WMI infrastructure is a Microsoft Windows operating system component know as the WMI service (winmgmt). The WMI infrastructure is composed of the WMI Core and the WMI repository. The WMI repository is organized by WMI namespaces. The WMI service creates namespaces, such as `root\default`, `root\cimv2`, and `root\subscription`, at system startup and preinstalls a default set of class definitions, including the Win32 Classes, the WMI System Classes, and others. The remaining namespaces found on your system are created by providers for other parts of the operating system or products.
- **WMI consumers**: A WMI consumer is a management application or script that interacts with the WMI infrastructure. A management application can query, enumerate data, run provider methods, or subscribe to events by calling either the COM API or the Scripting API for WMI.

WMI installation and configuration

For the MID Server to successfully make a remote connection to the target host, TCP port 135 must be open. The Windows firewall automatically creates an inbound rule for WMI connectivity called Windows Management Instrumentation (DCOM-In).

Windows Remote Management (WinRM)

WinRM is the Microsoft implementation of WS-Management Protocol, a standard Simple Object Access Protocol (SOAP) protocol that allows hardware and operating systems from different vendors to interoperate.

WinRM contains these components:

- **WinRM Scripting API**: This scripting API enables Orchestration to obtain data from remote computers, using scripts that perform WS-Management protocol operations.
- **WMI Service**: The WMI service continues to run side-by-side with WinRM and provides requested data or control through the WMI plug-in. You can continue to obtain data from standard WMI classes, such as as Win32_Process.

WinRM configuration

WinRM is automatically installed on Windows 2008 R2 and above operating systems, but must be configured before use.

1. In a command prompt, enter **winrm quickconfig**. This command is not case sensitive.
2. When the console displays **Make these changes [y/n]?**, enter **y**.

   The `winrm quickconfig` command performs the following operations:

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- Starts the WinRM service, and sets the service startup type to **auto start**.
- Configures a listener for the ports that send and receive WS-Management protocol, using either HTTP or HTTPS on any IP address.
- Creates a firewall exception for the current user profile.

MID Server PowerShell files

PowerShell functions are stored in script files (*.ps1) that use a PowerShell Script module (*.psm1) file name extension.

The PowerShell functions are used by the PowerShell MID Server script files included in these activity packs:

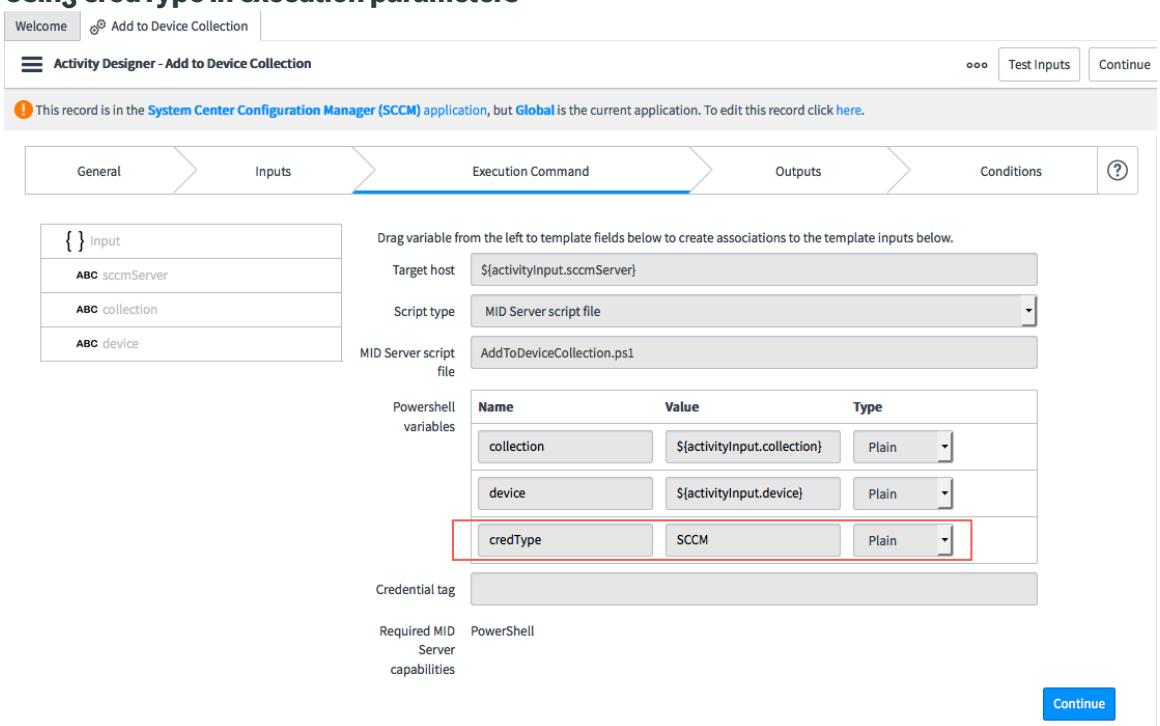
- Active Directory
- Exchange
- SCCM
- PowerShell

PSScript.ps1

This script performs a few tasks, such as credential testing, password encryption, and the execution of scripts configured in the Orchestration Activity Designer or in MID Script Files. However, this document focuses on how PSScript.ps1 uses the `credential.psm1` module for testing access to remote hosts.

The PowerShell variables are generally used directly in the PowerShell execution command or as arguments in the MID Server script file you specify. There are special variables that are passed to PSScript.ps1, such as *`credType`*.

Using credType in execution parameters



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PowerShell credTypes

The PowerShell credential types:

Type	Description
WMI	testCredentialWMI
Exchange	testCredentilExchange
AD	testCredentilAD
SCCM	testCredentilSCCM

If no credential type is passed to the PSScrip.ps1 script, the MID Server defaults to the WMI test function to test access to the target host. If there is a credential type used, the MID Server runs the corresponding test function for that credential type.

Exit codes

These exit codes are returned from the PSScript.ps1 script and logged in the MID Server log file.

PSScript.ps1 exit codes

Type	Test function
0	PowerShell command/script ran successfully.
1	Test finished successfully, but the command/script failed to execute.
2	Incorrect syntax passed to script.
3	All credentials including MID Server service account failed to execute the command/script.
4	Passed test and executed the activity, but an error was returned. Example user cannot be found.

DiagnosticsUtil.psm1

The MID Server uses this module file to perform PowerShell logging that assists debugging any Orchestration activity using PowerShell scripting. You can also add debugging statements directly to custom scripts.

PowerShell diagnostic utilities

Utility	Description
SNCLog-DebugInfo	Log a debug message for a PowerShell script or PowerShell Orchestration activity. Examples: • `SNCLog-DebugInfo -message "My debug message..."` • `SNCLog-DebugInfo "My debug message"`

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PowerShell diagnostic utilities (continued)

Utility	Description
SNCLog-ParameterInfo	Log a function parameter value. For `"function getHostName{ param( [String] $target )"`, the first value to the PowerShell hashtable is a string to indicate which function executes, and the values for each of the function parameters. Examples: • Function with single parameter: `SNCLog-ParameterInfo @("Running getHostName", $target)` **Note:** The debug message shows, 'Running getHostName $target: [actual value of $target]'. • Function with multiple parameters: `SNCLog-ParameterInfo @("Running functionName", $param1, $param2, $param3)`
SNCObfuscate-Value	Use this utility to encrypt values for security purposes. The function displays `"$variableName":***`, where *** is the obfuscated value. Example: `SNCObfuscate-Value $password` **Note:** The debug message reads: `"$password : ***"`.

Credentials.psm1

The MID Server uses this module file to test access to a target host. The MID Server loops through all Windows credentials stored in its credentials table using the following access type functions, unless the PowerShell activity has a credential type (**credType**) defined. All ServiceNow® authored PowerShell activities are hard-coded to use a specific credential type. As a result, the MID Server only tests credential access against the designated function.

PowerShell test functions

Function	Description
testCredentialWMI	Tests the given user and password on the target host using the *`Get-WMI`* object.
testCredentilAD	Tests the given user and password on the target host using the built-in *`DirectoryEntry`* object.

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PowerShell test functions (continued)

Function	Description
testCredentialExchange	Tests the given user and password to create a session on an Exchange host. This test uses the built-in PowerShell remoting feature on a remote host. WinRM is configured on Exchange servers by default.
testCredentialSCCM	Tests the given user and password to create a session on an SCCM server. This test uses the built-in PowerShell remoting feature on a remote host. This test requires WinRM to be configured.
testNoCredentialAccessWMI	Tests the given user and password on the target host, using the *Get-WMI* object. This test is used when no **credType** is used.

Note:
If the test passes using one of these functions, that credential is used to run the PowerShell script/command. If the tests fail to access the target host using these functions, the MID Server runs the PowerShell script/command under the account of the MID Server service.

This diagram illustrates the dependency of the credential selection behavior on the host being targeted by the PowerShell activity. If the target host is the IP address or host name of the MID Server, the MID Server bypasses all credentials in the Credentials table and uses the account of the MID Server service. If the target host is not the MID Server, then all Windows credentials are used first. If all credentials in the Credentials table are unsuccessful in running the PowerShell activity, then the MID Server uses the MID Server service account.

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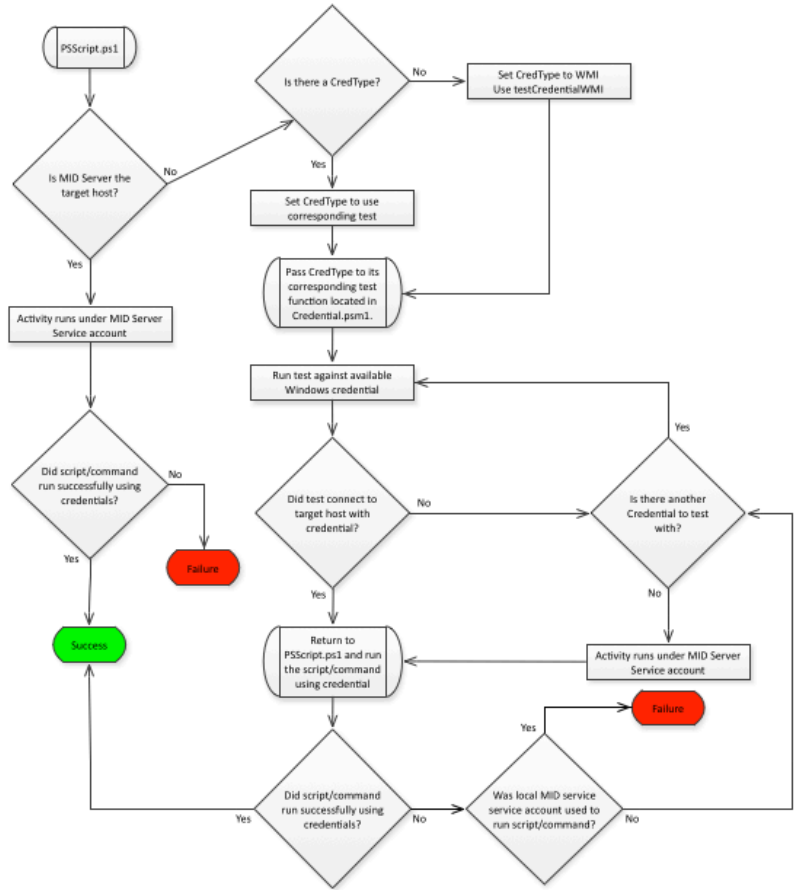
PowerShell credential selection criteria



ActiveDirectory.psm1

This module file stores the functions used by the PowerShell scripts shipped with the Active Directory activity pack.

Exchange.psm1

This module file stores the functions used by the PowerShell scripts shipped with the Exchange activity pack.

SCCM.psm1

This module file stores the functions used by the PowerShell scripts shipped with the SCCM activity pack.

PowerShell troubleshooting

Authentication and access denied errors can prevent PowerShell activities from running a command on a target host.

Use these procedures for troubleshooting authentication failures with Orchestration PowerShell activities and when the Remote Procedure Call (RPC) server is unavailable or when access is denied. The authentication failure error displays when all credentials, including those of the local MID Server service account, do not have the correct permissions to run the Powershell script/command. The same error displays when the target host is unreachable.

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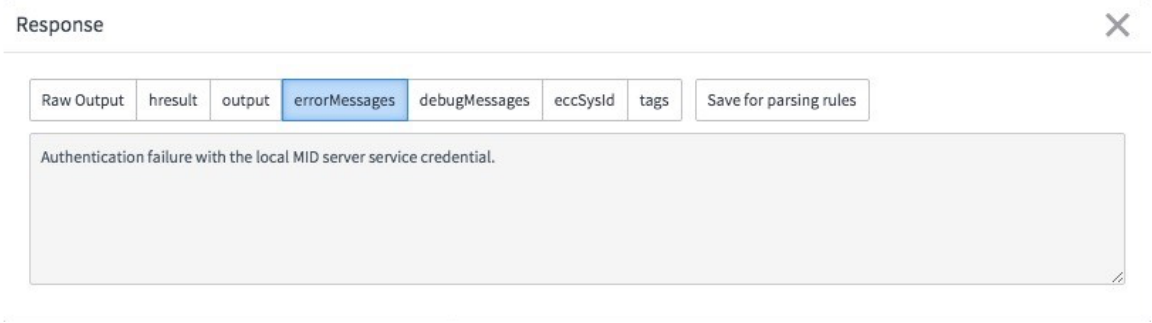
Authentication error message



Authentication failure in an Active Directory activity

This example uses the Create AD Object activity to illustrate troubleshooting authentication failure in PowerShell.

Before you begin

Role required: Permissions to access and create accounts on Active Directory

About this task

Validate that the account you are using has the proper permissions to run the activity.

Procedure

1. Log on to the target machine using the account under which you want to run the activity. Active Directory tools must be installed on this machine.
2. Launch the Active Directory Users and Computers application.
3. Navigate to the OU under which you want to create the Active Directory object.
4. Attempt to create the object.

   If this procedure is successful under the specified user, the following might be the cause of the authentication failure:

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- User name is invalid.
- Password entered incorrectly.
- Domain controller is unreachable.

Note:
The majority of the return codes listed in the MID Server log for this error are **1**s and **3**s. This is because the Active Directory activities use the ADSI provider and not WMI or WinRM. An error code of **1** means the account was able to connect with the test account, but running the script failed.

```
Attempting to use credential with username 'service-now\joel.zamallo
Running command:-> C:\Windows\System32\WindowsPowerShell\v1.0\powers
rShell\PSScript.ps1' -computer '10.11.144.230'   -script 'C:\Users\j
useCred $true -isDiscovery $false -debug $true; exit $LASTEXITCODE}"
Thread name is Powershell is executing...
The exit value from waitFor() is 1
The status code returned from running the command is 1
```

An error code of **3** means that the MID Server attempted to run the PowerShell activity under the MID Server service account but failed.

```
worker-Standard:PowershellProbe DEBUG: Thread name is Powershell is executing...
Gobbling stdout: Powershell is executing... Gobbled: <powershell>
Gobbling stdout: Powershell is executing... Gobbled: <output>
Gobbling stdout: Powershell is executing... Gobbled: </output>
Gobbling stdout: Powershell is executing... Gobbled: </powershell>
worker-Standard:PowershellProbe DEBUG: The exit value from waitFor() is 3
worker-Standard:PowershellProbe DEBUG: The status code returned from running the command is 3
worker-Standard:PowershellProbe DEBUG: Queuing Powershell Windows - Powershell (nodes: 3)
worker-Standard:PowershellProbe Sending to queue: Powershell,Windows - Powershell (nodes: 3),1
worker-Standard:PowershellProbe Document: <?xml version="1.0" encoding="UTF-8"?><results probe
<error>Authentication failure with the local MID server service credential.</error>
```

Authentication failure in an Exchange activity

This example uses the Create Mailbox activity to illustrate troubleshooting authentication failure in PowerShell.

Before you begin

Role required: Permissions to access and create mailboxes on the Exchange server

Procedure

1. Validate that the account you are using has the proper permissions to run the PowerShell activity.
2. Log on to a machine that has the Exchange Management Shell (EMS) installed.
3. Create a user using the `New-mailbox` Exchange commandlet.

Creating a new user in Exchange

```
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>New-Mailbox -Name 'Test P. Smith' -Alias 'test.smith' -OrganizationalUnit 'discolab2.service-no
w.com/Managed Objects/San Diego' -UserPrincipalName 'test.smith@discolab2.service-now.com' -SamAccountName 'test.s
mith' -FirstName 'Test' -Initials 'P' -LastName 'Smith' -Password 'System.Security.SecureString' -ResetPasswordOnNextLog
on $false_
```

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If this procedure is successful under the specified credential, the following is the likely cause of the failure:

- User name is invalid.
- Password entered incorrectly.
- Exchange server is unreachable.

4. If the Exchange server is unreachable, examine the MID Server logs.
   Because the Exchange activities use WinRM to access the Exchange server, the logs can provide more troubleshooting information.

> **Note:**
> Ensure that the error is NOT **WinRM cannot process the request**.

Remote Procedure Call (RPC) server unavailable or access denied

Typically, this error is logged when running a PowerShell script/command that uses WinRM or WMI.

Possible causes of error

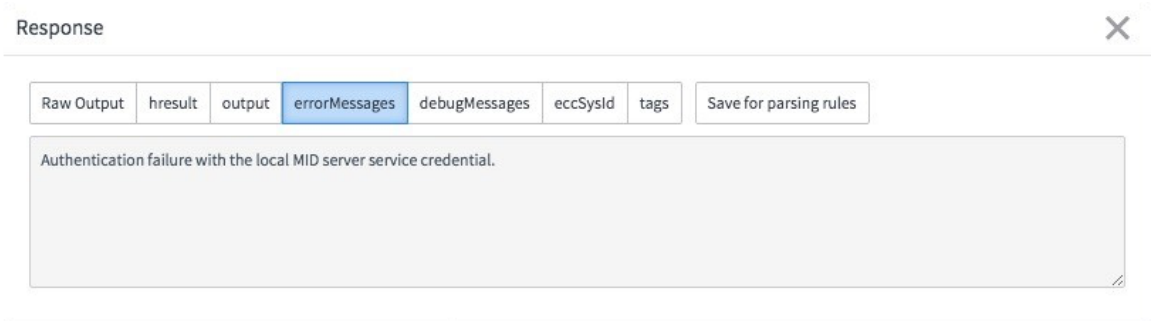
The target host might have one of these issues:

- WinRM isn't configured.
- Firewall is blocking access to the host over TCP port 135 (WMI) or HTTP/HTTPs and TCP port 5985 (WinRM).
- Kerberos issue, caused by hopping to multiple hosts using WMI.

Example WinRM error

The Create Mailbox activity from the Exchange activity pack has generated an error in the ECC queue involving authentication using the MID Server service credential. This occurred because the MID Server credential is the last to be used if the targeted host is not the MID Server.

Authentication failure error message



The MID Server log shows that the MID Server tried to run the activity under specific credentials, but wasn't successful and received an exit code of 1.

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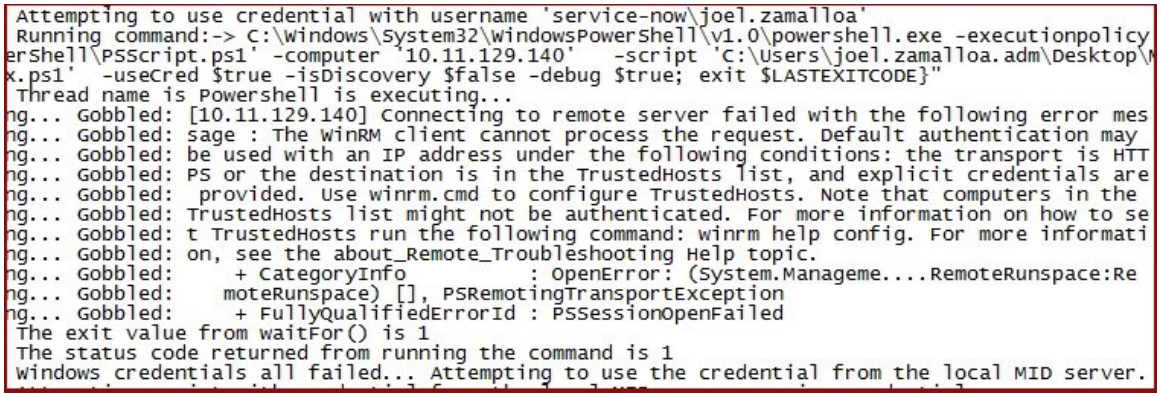
MID Server error code



Join Domain activity

The Join Domain activity joins a Windows computer to a domain.

If the computer is already a member of a domain, this activity completes without modifying the computer. Joining a domain requires a username and password. This user must have domain administration privileges or privileges to join a computer to the domain.

Note:
This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Join Domain input variables

Variables	Description
Hostname	Hostname or IP address of the Windows server that is joining the domain.
Domain	Name of the domain to join.
Domain_user	The name of a user who has domain administration privileges or privileges to join a computer to the domain.
Domain_user_password	The password for the user who has domain administration privileges or privileges to join a computer to the domain.

Output variables

Join Domain output variables

Variables	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

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Conditions

Join Domain conditions

Condition	Description
Success	The activity succeeded in joining the computer to the domain.
Failure	The activity failed to join the computer to the domain.

Install Windows App activity

The Install Windows App activity installs an application from an MSI package on a Windows target machine.

Note:
This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Install Windows App input variables

Variable	Description
hostname	Hostname or IP address of the target Windows machine on which the service is installed. Use the Resolve DNS MID Server capabilities to resolve hostnames into IP addresses.
installerpath	Path to the installer. The installer can be on any machine that is visible to both the MID Server and the target machine (local drive, UNC path, mapped drive, etc.).
installer	Name of the installer file, such as `winzip150.msi`. The installer must be an MSI package.
arguments	The parameter that contains the command line arguments to the MSI package. These are name=value pairs, separated by a space. For example, the argument might appear as: `INSTALLDIR=c:\myinstallfolder ADDDESKTOPICON=0`. These arguments are dependent on the what the actual MSI being installed defines. If there are no arguments, leave the field empty.

Output variables

Install Windows App output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

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Conditions

The activity state tells the workflow engine what to do with the activity.

Install Windows App conditions

Name	Description
Success	The Windows application was successfully installed on the target machine.
Failure	The Windows application failed to install on the target machine

Enable WMI Windows Installer provider

To install software on Windows machines using the Install Windows App activity, enable WMI Windows Installer provider on all target machines.

Before you begin

- It is recommended that the MID Server, the target machine, and the installer source machine be on the same Active Directory domain. However, if these computers are on separate domains, those domains must have a trust relationship established between them.
- If the installer path is a UNC file sharing machine, the Active Directory account of the target computer must be trusted for delegation. For instructions on this configuration, see the posting on the community for installing and uninstalling Windows applications.

About this task

Note:
See WMI Providers for a list of Windows operating systems that provide this tool by default.

Procedure

1. Open the Control Panel.
2. Go to **Add or Remove Programs**.
3. Select **Add/Remove Windows Components**.
4. Double-click **Management and Monitoring Tools**.

   This action opens a secondary window displaying additional selections.
5. Select **WMI Windows Installer Provider** check box.
6. Click **OK** to return to the Windows Components Wizard window.
7. Click **Next**.
   You might be asked for the Windows installation CD to complete this process.

Change Service State activity

The Change Service State activity starts or stops a Windows service on a remote system.

This activity replaces a Powershell activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

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Input Variables

Change Service State input variables

Variable	Description
hostname	Hostname or IP address of the target Windows machine on which the service is installed. Use the Resolve DNS activity to resolve hostnames into IP addresses.
service	Name of the Windows service to start or stop. The *service* parameter is the service name, not the display name of the service affected.
state	There are two actions to select for a service state change: **StartService** or **StopService**.

Output variables

Change Service State output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If there is no error, this value is null.

Conditions

Change Service State conditions

Condition	Description
Success	The target service was successfully started or stopped.
Failure	The update to the target service was unsuccessful, or the service was not found on the target system.

Restart Windows Server activity

The Restart Windows Server activity stops and then restarts a Windows server using Powershell.

Note:
This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

Restart Windows Server input variables

Variable	Description
Hostname	Hostname or IP address of the Windows server to restart.

Output variables

Restart Windows Server output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

Conditions

Restart Windows Server conditions

Condition	Description
Success	The activity succeeded in restarting the Windows server.
Failure	The activity failed to restart the Windows server.

Uninstall Windows App activity

The Uninstall Windows App activity uninstalls an application from a Windows target machine.

The only applications that can be uninstalled using this activity are those that were installed by a Windows Installer.

Note:
This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Uninstall Windows App input variables

Variable	Description
hostname	Hostname or IP address of the Windows target machine on which to uninstall an application.
product	The name of the application to uninstall exactly as it appears in the Windows Add/Remove Programs list.

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Output variables

Uninstall Windows App output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

Conditions

Uninstall Windows App conditions

Condition	Description
Success	The activity succeeded in unistalling the application from the Windows server.
Failure	The activity failed to uninstall the application from the Windows server.

Probe activity pack

Orchestration provides an activity pack customized using the ServiceNow activity designer that runs probes on target hosts to return specific information.

These custom activities were built with the Create a probe activity, which gives workflow administrators the ability to store input and output variables in the databus.

To use the custom probe activities, you must request activation of the Orchestration - Probe plugin.

Resolve DNS Name activity

The Resolve DNS Name activity takes an IP address or a fully qualified domain name (FQDN), which it resolves into one or more IP addresses.

The domain name is sent through the MID Server to the domain name system (DNS) to resolve the name. If a single IP address is returned, it is stored in two variables: *resolved_ip* and *resolved_ips*. If multiple IP addresses are returned, the first IP address is stored in the *resolved_ip* variable, and all the addresses are stored in the *resolved_ips* variable. If an IP address is provided instead of an FQDN, this address is output directly to both variables. Your ServiceNow instance must have access to a MID Server configured to use Resolve DNS to run this activity.

This activity replaces an activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Probe activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Resolve DNS Name input variables

Variable	Description
FQDN	The fully qualified domain name to resolve or an IP address.

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Output variables

Resolve DNS Name output variables

Variable	Desctiption
ip	The first IP address of the resolved DNS name.
ips	Comma separated list of resolved IP addresses.
result	One of the following: • **resolved**: Able to resolve the sprcified DNS name. • **unresolved**: Unable to resolve the specified DNS name.

Conditions

Resolve DNS Name conditions

Condition	Description
Success	Activity successfully resolved the DNS name.
Failure	Activity failed to resolve the DNS name.

SNMP Query activity

The SNMP Query activity queries an SNMP device.

Your ServiceNow instance must have access to a MID Server configured to use SNMP to run this activity.

This activity replaces an activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Probe activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

SNMP Query input variables

Variable	Description
hostname	Hostname or IP address of the SNMP device being queried.
oids	A list of unique object identifiers used to identify SNMP devices.

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Output variables

SNMP Query output variables

Variable	Description
description	Description of the SNMP object.
timeout	Boolean value indicating whether or not the query timed out.
error	Indicates any error that occurred. If no error occurred, this value is null.
oid_data	An array of data objects for all unique object identifiers.

Conditions

SNMP Query conditions

Condition	Description
Success	Activity successfully ran the query on the target device.
Failure	Activity failed to run the query on the target device. Failure could be caused by invalid credentials or a device that is not accessible.

SCCM activity pack

The Microsoft System Center Configuration Management (SCCM) activity pack provides Orchestration activities you can use to manage software deployments and collections on an SCCM server.

You can use SCCM Orchestration activities to deploy and revoke software from an SCCM server or manage user and device collections. The system manages software on an SCCM server using Orchestration activities and workflows.

Client software distribution requires:

- SCCM 2012 R2 and later.
- Powershell 3.x.
- Powershell Remoting enabled.
- The Windows PowerShell x86 execution policy must be set to unrestricted mode.
- Latest version of the SCCM *cmdlet* library installed on the SCCM server.
- Use the credentials to log onto the SCCM Server and connect via Windows PowerShell from the System Center Configuration Manager console at least once to set the path variable for that credential.

Request SCCM activities

The Orchestration - System Center Configuration Manager plugin installs the SCCM activity pack that deploys software from an SCCM host and manages user and device collections.

Before you begin

Role required: admin

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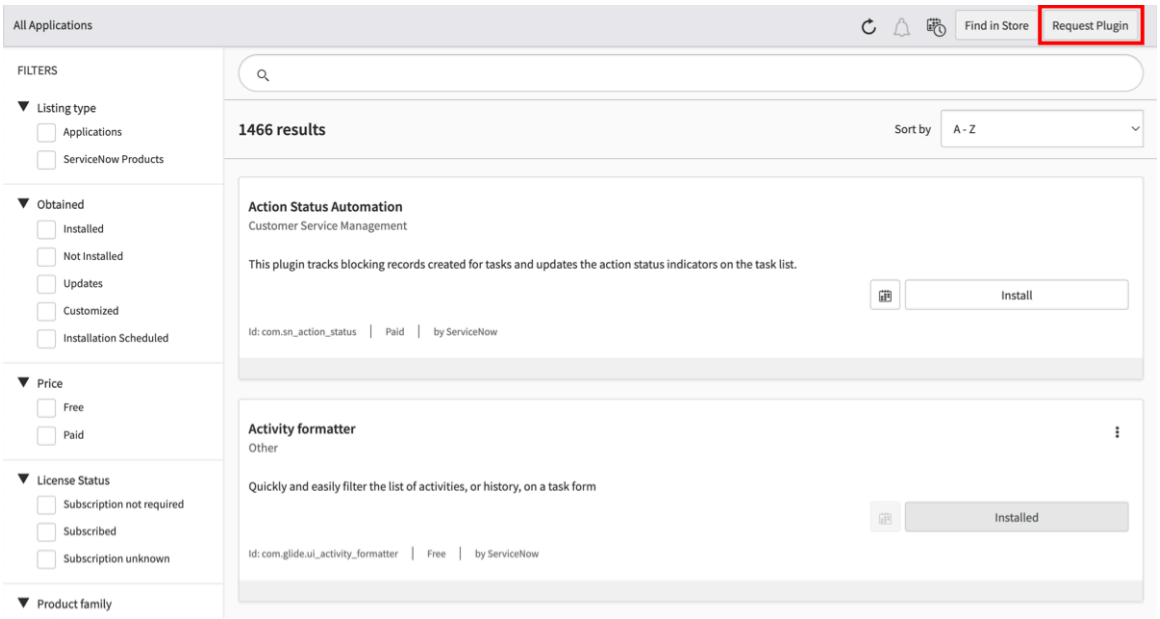
About this task

The SCCM plugin is activated automatically when the Orchestration - Client Software Distribution [com.snc.orchestration.sccm_mgnt] plugin is activated, but can be activated separately.

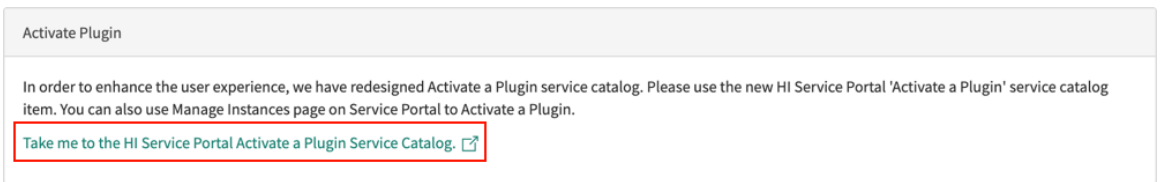
Note:
The activities in the SCCM plugin run in the System Center Configuration Manager scope.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the **Activate Plugin** form on Now Support.



3. On Now Support, select the link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Instance on which to activate the plugin.
Which plugin would you like to activate	Name of the plugin to activate.

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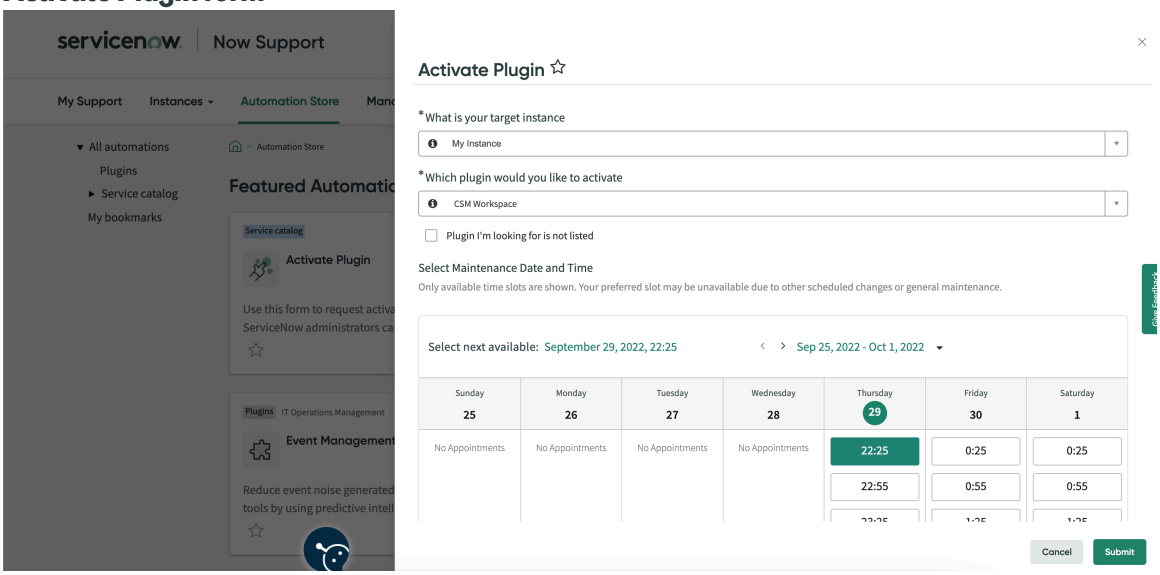
Field	Description
	Note: If the system does not list the plugin you want or if you are activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	The date and time to activate the plugin. **Note:** Plugins are activated in two batches, once in the morning and once in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.

Example

For example, see the following form to activate the CSM Workspace plugin on an instance named My Instance.

Activate Plugin form



7. Select **Submit**.
   For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

Configure the MID Server for SCCM activities

To use a MID Server with Microsoft System Center Configuration Management (SCCM) activities, configure it to communicate with the SCCM server.

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Before you begin
Role required: admin

Procedure

1. In the navigation filter, enter **cmdb_ci_dns_name.list**.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of the SCCM server in the **Name** field.
4. Right-click in the form header and select **Save**.
5. In the **IP Address** related list, click **New**.
6. In the **IP Address** field, enter the IP address of the SCCM server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.
8. Leave the **Netmask** field blank.
9. Click **Submit**.

Add to Device Collection activity

The Add to Device Collection activity adds the specified device into a Microsoft System Center Configuration Manager (SCCM) device collection.

The Add to Device Collection activity uses the Powershell activity template to add a specified device to an SCCM device collection. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called *`AddToDeviceCollection.ps1`* to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Add to Device Collection activity does not use pre-processing or post processing scripts.

Input variables

Add to Device Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the device collection.
device	Name of the device to add to the collection.

Output variables

Add to Device Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow.
error	Variable that contains the activity output error message.

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Conditions

Add to Device Collection conditions

Condition	Description
Success	Activity successfully added the device to the SCCM device collection.
Failure	Activity failed to add the device to the SCCM device collection.

Add to User Collection activity

The Add to User Collection activity adds a user to a Microsoft System Center Configuration Manager (SCCM) user collection.

The Add to User Collection activity uses the Powershell activity template to access the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called `AddToUserCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Add to User Collection activity does not use pre-processing or post processing scripts.

Input variables

Add to User Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the user collection.
user	Name of the user to add to the collection.

Output variable

Add to User Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow.
error	Variable that contains the activity output error message.

Conditions

Add to User Collection conditions

Success	Activity successfully added a user to the SCCM user collection.
Failure	Activity failed to add a user to the SCCM user collection.

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Get Applications activity

The Get Applications activity returns a list of all the applications available on a Microsoft System Center Configuration Manager (SCCM) server.

The Get Applications activity uses the Powershell activity template to access the applications on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called `GetApplications.ps1`. This script filters the results of the GET, so that only specific attributes are returned for the applications on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable application data. The list of available applications is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Get Applications activity does not use a pre-processing script.

Input variables

Get Applications input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

Output variables

The output variables for the Get Applications activity contain an array of objects called `applications` and an error message. Each object in the array contains the attributes in this table.

Get Applications output variables

Variables	Description
applications	The `applications` array contains these attributes: • `id`: Primary key of the SCCM application. • `ciUniqueId`: Unique ID of the SCCM application. • `name`: Name of the application. • `manufacturer`: Manufacturer of the application. • `version`: Version of the application. • `isDeployable`: True/false value indicating if this application is deployable. • `isDeployed`: True/false value indicating if this application is already deployed. • `numberOfUsersWithApp`: Count of users with this application installed.

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Get Applications output variables (continued)

Variables	Description
	• *numberOfDevicesWithApp*: Count of devices on which this application is installed. • *application*: Object containing the data set listed above for this application. Use the script to parse additional data from this set that you might need.
error	Variable that contains the activity output error message.

Conditions

Get Applications conditions

Variables	Description
Success	Activity successfully retrieved the list of applications available on the SCCM host.
Failure	Activity failed to retrieve the list of applications available on the SCCM host.

Get Deployments activity

The Get Deployments activity returns the list of deployments performed by Orchestration using a Microsoft System Center Configuration Manager (SCCM) server.

The Get Deployments activity uses the Powershell activity template to access the deployments on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called *GetDeployments.ps1* that returns the deployments on the host. This script filters the results of the GET, so that only specific attributes are returned for the deployments on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable deployment data. The list of available deployments is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Get Deployments activity does not use pre-processing scripts.

Input variables

Get Deployments input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

Output variables

Get Deployments output variables

Variable	Description
deployments	The *deployments* array contains these attributes:

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Get Deployments output variables (continued)

Variable	Description
	• *id*: Primary key of the SCCM application. • *applicationId*: Primary key of the SCCM application. • *softwareName*: Name of the software that will be deployed. • *collectionId*: Primary key of the SCCM collection. • *collectionName*: Name of the SCCM collection. • *desiredConfigType*: Possible values are: *Install* (1) and *Uninstall* (2). • *deploymentIntent*: Intended purpose of the deployment. Possible values are: **Available** (1) and **Required** (2) . • *numberSuccess*: Number of clients that successfully installed the deployment. • *numberErrors*: Number of clients with an error when installing the deployment. • *deployment*: Object containing the data set of attributes listed here for this deployment. Use the post-processing script to parse additional data from this set that you might need..
error	Variable that contains the activity output error message.

Conditions

Get Deployments conditions

Condition	Description
Success	Activity successfully retrieved the list of deployments performed by Orchestration using an SCCM host.
Failure	Activity failed to retrieve the list of deployments performed by Orchestration using an SCCM host.

Get Device Collections activity

The Get Device Collections activity returns the list of available device collections on a Microsoft System Center Configuration Manager (SCCM) host.

The Get Device Collections activity uses the Powershell activity template to access the collections on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called *GetDeviceCollections.ps1* that returns the device collections on the server. This script filters the results of the GET, so that only specific attributes are returned for the device collections on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable device collection data. The list of available collections is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

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Note:
The Get Device Collections activity does not use pre-processing scripts.

Input variables

Get Device Collections input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server..

Output variables

Get Device Collections output variables

Variable	Description
deviceCollections	The *deviceCollections* array contains these attributes: • *id*: Primary key of the SCCM device collection. • *name*: Name of the SCCM device collection. • *collectionType*: Type of SCCM collection. In this case, the value is **device**. • *localMemberCount*: Count of device collection members visible at the local SCCM site. • *memberCount*: Count of all device collection members. • *deviceCollection*: Object containing the data set of attributes listed here for this device collection. Use the post-processing script to parse additional data from this set to use.
error	Variable that contains the activity output error message.

Conditions

Get Device Collections conditions

Condition	Description
Success	Activity successfully retrieved a list of device collections available on the SCCM host.
Failure	Activity failed to retrieve a list of device collections available on the SCCM host.

Get User Collections activity

The Get User Collections activity returns the list of available user collections on a Microsoft System Center Configuration Manager (SCCM) server.

The Get User Collections activity uses the Powershell activity template to access the user collections on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called *GetUserCollections.ps1* that returns the user collections on the host. This script filters the results of the GET, so that only specific attributes are returned for the user collections on the SCCM server. Filtering the results in this

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manner controls the size of the payload, while providing the most desirable user collection data. The list of available collections is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Get User Collections activity does not use pre-processing scripts.

Input variables

Get User Collections input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

Output variables

Get User Collections output variables

Variable	Description
userCollections	The *`userCollections`* array contains these attributes: • *`id`*: Primary key of the SCCM user collection. • *`name`*: Name of the SCCM user collection. • *`collectionType`*: Type of SCCM collection. In this case, the value is **user**. • *`localMemberCount`*: Count of user collection members visible at the local SCCM site. • *`memberCount`*: Count of all user collection members. • *`userCollection`*: Object containing the data set of attributes listed here for this user collection. Use the post-processing script to parse additional data from this set to use.
error	Variable that contains the activity output error message.

Conditions

Get User Collections conditions

Condition	Description
Success	Activity successfully retrieved the list of available user collections on an SCCM host.
Failure	Activity failed to retrieve the list of available user collections on an SCCM host.

Is Device in Collection activity

This activity verifies if a device exists in an SCCM device collection.

The Is Device in Collection activity uses the PowerShell activity template to verify if a specific device exists in an SCCM device collection. The activity is configured to use a MID Server with

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PowerShell capabilities and to run a MID Server script called `IsDeviceInCollection.ps1` to perform the test.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Is Device in Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the device collection.
device	Name of the device to verify is in the collection.

Output variables

Is Device in Collection output variables

Variable	Description
output	Variable that contains the test result: True/False
errorMessage	Variable that contains the activity output error message.

Conditions

Is Device in Collection conditions

Condition	Description
Exist	The device exists in the collection.
Not exist	The device does not exist in the collection.
Failure	Activity failed.

Is User in Collection activity

This activity verifies if a user exists in an SCCM user collection.

The Is User in Collection activity uses the PowerShell activity template to verify if a specific user exists in an SCCM user collection. The activity is configured to use a MID Server with PowerShell capabilities and to run a MID Server script called `IsUserInCollection.ps1` to perform the test.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Is User in Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

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Is User in Collection input variables (continued)

Variable	Description
collection	Name of the user collection.
user	Name of the user to verify is in the collection.

Output variables

Is User in Collection output variables

Variable	Description
output	Variable that contains the test result: True/False
errorMessage	Variable that contains the activity output error message.

Conditions

Is User in Collection conditions

Condition	Description
Exist	The user exists in the collection.
Not exist	The user does not exist in the collection.
Failure	Activity failed.

Remove from Device Collection activity

The Remove from Device Collection activity removes a device from a Microsoft System Center Configuration Manager (SCCM) device collection.

The Remove from Device Collection activity uses the Powershell activity template to remove a device from a device collection on a Microsoft SCCM server. The activity is configured to use a MID Server with Powershell capabilites and to run a MID Server script called `RemoveFromUserCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Remove from Device Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the device collection.
device	Name of the device to add to the collection.

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Output variables

Remove from Device Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow
error	Variable that contains the activity output error message.

Conditions

Remove from Device Collection conditions

Condition	Description
Success	Activity successfully removed the device from the SCCM device collection.
Failure	Activity failed to remove the device from the SCCM device collection.

Remove from User Collection activity

The Remove from User Collection activity removes a user from a Microsoft System Center Configuration Manager (SCCM) user collection.

The Remove from User Collection activity uses the Powershell activity designer template to access a user collection on a Microsoft SCCM target host. The activity is configured to use a MID Server with Powershell capabilites and to run a MID Server script called `RemoveFromUserCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Remove from User Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the user collection.
user	Name of the user to add to the collection.

Output variables

Remove from User Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow.
error	Variable that contains the activity output error message.

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Conditions

Remove from User Collection conditions

Condition	Description
Success	Activity successfully removed the user from the SCCM user collection.
Failure	Activity failed to remove the user from the SCCM user collection.

SFTP File Transfer activity pack

Use the SFTP File Transfer activities to manage files and directories on an SFTP server and to move files from one SFTP server to another.

The SFTP activity pack includes scoped activities for common file transfer tasks and a ready-to-use workflow that includes these activities. Use the SFTP workflow to control which files are going to be moved, what conditions the files need to meet, the order in which the files are moved, and which overwrite options are executed.

Note:
To use the SFTP File Transfer activities and workflow, you must request activation of the Orchestration - SFTP plugin.

SFTP File Transfer workflow

The SFTP File Transfer activity pack includes a scoped workflow that uses multiple activities to manage files on SFTP servers.

The maximum activity count for the SFTP File Transfer workflow is set to 10,000. This allows the workflow to move up to 1000 files from one server to another.

Accessing the workflow

- Navigate to **Workflow** > **Workflow Editor** and select the **Workflows** tab.
- Click on the SFTP File Transfer workflow to open it.
- Click the information icon in the workflow header to display the properties dialog box.

Input variables

SFTP File Transfer workflow input variables

Variable	Description	Default value
Source host	Name or IP address of the server containing the files you want to move.	
Source port	Port number to use to communicate with the source server.	22
Source directory	Full path to the directory where the source files are located.	
Source files	Names of specific source files to move. Separate the file names in this list with semi-colons. This field supports the use of wild cards. For information about how the values in this field are affected by options in other fields, see the section below the table.	

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SFTP File Transfer workflow input variables (continued)

Variable	Description	Default value
Excluded files	Names of specific source files to exclude from the move. The system moves all other files found in the source directory or subfolders. Separate the file names in this list with semi-colons. This field supports the use of wild cards. For information about how the values in this field are affected by options in other fields, see the section below the table.	
Target host	Name or IP address of the server to which the files are being moved.	
Target port	Port number to use to communicate with the target host.	22
Datetime format	Timestamp format to apply when the `$[DateTime]` variable is used in the **Target directory** or **Target files** field. The system uses the current time from the instance to create timestamp values.	yyyy-MM-dd
Target directory	Path to the directory in the target host where the files are being moved. You can specify a target directory whose name includes the timestamp by adding the `$[DateTime]` variable to the directory name. For example, you might enter this path to a target directory: `/user/jacinto.gawron/documents/projects_$[DateTime]`. This produces the `projects_20150505` directory. When the timestamp variable is used, the system uses the format specified in the **Datetime format** field.	
Target file	Format to use for target file names when a timestamp is added. You can configure the system to add the timestamp as a prefix to the file name or insert the timestamp into the name, using these variables: • `$[DateTime]`: Current timestamp, using the format defined in the **Datetime format** field. • `$[SourceFile]`: Complete file name. • `$[SourceFile:Base]`: Base file name without the extension. • `$[SourceFile:Ext]`: File extension only. A target file name with the timestamp added as a prefix is expressed as: `$[DateTime]_$[SourceFile]`. This produces a file name that looks like this: `20150505_file1.txt` A target file name with the timestamp inserted into the name is expressed as: `$[SourceFile:Base]_$[DateTime]$[SourceFile:Ext]`. This produces a file name that looks like this: `file1_20150505.txt`	
Apply move conditions	Check box to apply conditions to the file transfer. If this check box is selected, additional fields appear for setting conditions.	false
Minimum file size, in bytes	Condition that defines a target file's minimum size requirement. This setting can help determine if the file is valid. This field appears when the **Apply move conditions** check box is selected.	0

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SFTP File Transfer workflow input variables (continued)

Variable	Description	Default value
Maximum file size, in bytes	Condition that defines a target file's maximum size requirement. This field appears when the **Apply move conditions** check box is selected.	-1
File is not older than	Condition that sets the earliest acceptable date for this file's age range. The range starts at 00:00 (midnight) on the date specified. This field appears when the **Apply move conditions** check box is selected.	
File is not newer than	Condition that sets the latest acceptable date for this file's age range. The range ends at 23:59 on the date specified. This field appears when the **Apply move conditions** check box is selected.	
Include subfolders	Check box to move the files from subfolders in the source directory. For information about how your selection affects other fields in the form, see the section below the table.	
Move order	Order in which the files are moved from the source to the target. The possible options are: • **None** (same order as files in the source directory) • **By timestamp** • **By file name** • **By file size**	
Sort order	Order in which the files are sorted in the target directory, using the option selected in the **Move order** field. Sorting options are **Ascending** and **Descending**.	desc
Maximum number of retries	Number of attempts the activity can make to connect to the target host or to move a file before timing out. When the retry limit to move a file or to connect to the host is exceeded, the system logs a failure. If the maximum number of failures is not exceeded, the system attempts to connect again or to move the next file named.	2
Time between retries, in seconds	Time, in seconds, between repeat attempts to connect to the target or to begin moving a file.	10
Maximum number of failures	Acceptable number of times the system can fail to connect to the target host or to move a file before it quits trying. A failure occurs when the number of configured retries is exceeded. Using the default settings, failure occurs when the system cannot connect to the target or move a file after two retries.	0
Duplicate file action	Action to take if a file being moved already exists in the target directory. The choices are: • **Overwrite if file exists** (default) • **Rename with index** • **Do not move**	overwrite

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SFTP File Transfer workflow input variables (continued)

Variable	Description	Default value
Preserve file attributes	Check box to use the time stamp and mode information from the source files for the copied files. If this check box is cleared, the copied files have a current time stamp and mode. **Note:** This timestamp is a file attribute and is not appended to the file name.	false
Upon success, remove files from source	Check box to delete original files from the source directory when they are copied to the new location. Clear this check box to keep the source files in their current location in the source host.	false
Upon failure, keep moved files on target	Check box to keep any files on the target that were moved successfully, even if the entire file transfer operation ended in failure. If this check box is cleared, the system removes all successfully transfered files from the target when general failure occurs.	true
Credential tag for source	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the source host.	
Credential tag for target	Specific credential tag this activity must use to run SSH commands on the target host.	

File selection logic

When selecting the files to move from the source host, the system uses this logic:

- If the **Source files** and **Excluded files** fields are empty, the system moves all the files in the source directory.
- When the **Include subfolders** check box is selected, the following dependencies exist:
  - If no files are specified in the **Source files** and **Exclude files** fields, the system moves all files in the source directory and all files in all subfolders of the source directory.
  - If the **Source files** field contains file names, the system moves those files from their location on either the source directory or any of its subfolders.
  - If the **Exclude files** field contains file names, the system moves all the files from the source directory and its subfolders except those excluded files.
- When the **Include subfolders** check box is cleared, the system looks only in the source directory for files to move or exclude.

Copy File activity

The Copy File activity copies a file from an SFTP server (source host) to another SFTP server (target host).

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Input variables

Copy File input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to transfer.
sourcePort	Port number to use to communicate with the source server. The default port number is **22**.
sourceFilePath	Full path to the file to copy from the source host.
targetHost	Name or IP address of the server to which you want to move the files.
targetPort	Port number to use to communicate with the target server. The default port number is **22**.
targetFilePath	Full path to the copied file on the target host.
tempFileSuffix	Temporary suffix to use when moving a file. If this field contains a value, the activity deletes the duplicate target file, if it exists, and then copies the source file to a temporary file using *`targetFilePath + tempFileSuffix`* as the name. Upon completion, the activity renames the file to the actual target file name. If this field is blank, the activity copies the source file directly to the target file and overwrites it, if it already exists.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the source host.
targetCredentialTag	Specific credential tag this activity must use to run SSH commands on the target host.

Output variables

Copy File output variables

Variable	Description
errorMessages	The *`executionResult.errorMessages`* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Text message advising that the command was executed successfully.

Conditions

Copy File conditions

Condition	Description
Success	The activity succeeded in copying the file.
Failure	The activity failed to copy the file.

Create Directory activity

The Create Directory activity creates a new directory on an SFTP server.

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Input variables

Create Directory input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to move.
sourcePort	Port number to use to communicate with the source server. The default port number is **22**.
sourceDirectory	Path to the target directory to create.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Create Directory output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Text message advising that the command was executed successfully.

Conditions

Create Directory conditions

Variable	Description
Success	The activity succeeded in creating the directory.
Failure	The activity failed to create the directory.

Get File List activity

The Get File List activity returns a list of files from a given directory and its subdirectories on an SFTP server (source host).

Input variables

Get File List input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to list.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceDirectory	Path to the target directory containing the files to list.
sourceFiles	List of target files to return. This is a comma separated list that accepts wildcards, such as ***.txt**.
excludedFiles	List of target files to exclude. This is a comma separated list that accepts wildcards, such as ***.txt**.

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Get File List input variables (continued)

Variable	Description
includeSubfolders	True/false variable that determines if files from subfolders are included in the list. The default value for this variable is **false**.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Get File List output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed. An activity can examine the error message to customize a condition. For example, if the error message contains *NO_SUCH_FILE*, the activity can be considered successful, depending on circumstances.
result	List of requested files, returned as a JSON string.

Conditions

Get File List conditions

Condition	Description
Success	The activity succeeded in listing the requested files.
Failure	The activity failed to list the requested files.

Remove File or Directory activity

The Remove File or Directory activity removes a file or a directory on an SFTP server, including subdirectories, when configured.

Input variables

Remove File or Directory input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to remove.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceFilePath	Full path to the file or directory to remove. To remove multiple files or directories using a single activity, enter a semicolon-separated list of paths in this field.
isDirectory	True/false variable that determines if the specified file path is a directory. The default value for this variable is **false**.
includeSubfolders	True/false variable that determines if the given directory and all of its subfolders should be removed. The default value for this variable is

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Remove File or Directory input variables (continued)

Variable	Description
	false. If the value for this field is **false**, then the activity can only remove an empty directory. This field appears when the **isDirectory** checkbox is selected.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Remove File or Directory output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Either **success** or **failure**.
deletionResults	The *deletionResults* array contains these attributes: • *fullPath*: Full path to the file or directory targeted. • *status*: Either **succeeded** or **failed**. • *reason*: Text message describing the cause of a failure.

Conditions

Remove File or Directory conditions

Condition	Description
Success	The activity succeeded in removing the file or directory specified.
Failure	The activity failed to remove the file or directory specified.

Rename File or Directory activity

The Rename File or Directory activity renames a file or directory to a new name on an SFTP server.

Input variables

Rename File or Directory input variables

Variable	Description
sourceHost	Name or IP address of the server containing the file or directory you want to rename.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceFilePath	Full path to the file or directory to rename.
targetFilePath	Full path to the renamed file or directory.

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Rename File or Directory input variables (continued)

Variable	Description
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Rename File or Directory output variables

Variable	Description
errorMessages	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	A message saying that the operation has been successful. For example, you might see: `Rename /tmp/sftp_test/subdir1 to /tmp/sftp_test/subdir2 complete`.

Conditions

Rename File or Directory conditions

Condition	Description
Success	The activity succeeded in renaming the file or directory.
Failure	The activity failed to rename the file or directory.

Set File Attributes activity

The Set File Attributes activity sets common file attributes, such as timestamps, size, permissions, and UID/GID, for a file or directory on an SFTP server.

A good practice is to use the Get File List activity to return a list of files and their attributes first. Then, when you moved a file from a source host to a target host, use the Set File Attributes activity to set the source file attributes on the target file. This is demonstrated in the SFTP File Transferworkflow.

Input variables

Set File Attributes input variables

Variable	Description
sourceHost	Name or IP address of the server containing the file or directory whose attributes you want to change.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceFilePath	Full path to the file or directory whose attributes you want to change.
userID	User ID attribute to apply to the file or directory. The UID and GUID variables must be set together as a pair.
groupID	Group ID attribute to apply to the file or directory. The UID and GUID variables must be set together as a pair.

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Set File Attributes input variables (continued)

Variable	Description
permissions	File or directory permissions to set for the user and group specified. This value must be expressed as an integer, such as **16877**, which defines these permissions: *rwxr-xr-x*. **Note:** The permissions number is an internal value returned by the Get File List activity.
accessTimestamp	Override the timestamp when the file or directory was last accessed. The access and modification timestamps must be set together as a pair.
modificationTimestamp	Override the timestamp when the file or directory was last modified. The access and modification timestamps must be set together as a pair.
sizeInBytes	Size of the file or directory, expressed in bytes.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Set File Attributes output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Text message advising that the command was executed successfully.

Conditions

Set File Attributes conditions

Condition	Description
Success	The activity succeeded in changing the attributes of the specified file or directory.
Failure	The activity failed to change the attributes of the specified file or directory.

SSH activity pack

Orchestration provides an activity pack of SSH activities that were customized using the ServiceNow activity designer.

These activities perform the same functions as SSH activities by the same name from previous releases and replace those activities for all new workflows. The custom SSH activities were built with the Create an SSH activity, which gives workflow administrators the ability to store input and output variables in the databus.

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Note:
Existing workflows from earlier versions that were created with legacy SSH activities continue to function normally after an upgrade to Geneva. However, all new workflows must use these custom SSH activities.

To use the SSH custom activities, you must request activation of the Orchestration - SSH plugin.

Secure Copy activity

The Secure Copy activity copies a file from one host to another, without storing the copied file on the MID Server.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Secure Copy input variables

Input variable	Description
from_host	Host name or IP address of the source machine.
from_scp_file	Name of the file to copy, including the absolute path.
to_host	Host name or IP address of the target machine.
to_scp_file	Path to the target file. This path can be absolute or relative to the logged in user's home directory.
debug_mid	Check box that enables debug logging when selected.
debug_ssh	Check box that enables J2SSH debug logging when selected.

Output variables

Secure Copy output variables

Output variable	Description
payload	The *executionResult.payload* from the Activity designer parsing sources.
output	The *executionResult.output* from the parsing sources.

Conditions

Secure Copy conditions

Condition	Description
Success	Activity successfully copied the file from one host to another.
Failure	Activity failed to copy the file from one host to another.

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Files Compare activity

The Files Compare activity compares two files on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Global** > **Orchestration - SSH**.

Input variables

Files Compare input variables

Input variable	Description
Hostname	Hostname or IP address of the destination server for SSH activity.
Directory	Name of the working directory.
OldFile	Name of the first file to compare.
NewFile	Name of the second file to compare.

Output variables

Files Compare output variables

Output variable	Description
contents	File comparison result. This is the difference of the two compared files.
result	Either **success** or **failure**.
return-code	Either **0**, if the two files are the same, or **1**, if the two files are different.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

Conditions

Files Compare conditions

Condition	Description
Success	Activity successfully compared the specified files.
Failure	Activity could not complare the specified files.

File Read activity

The File Read activity reads a file on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows

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must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Global** > **Orchestration - SSH**.

Input variables

File read input variables

Input variable	Description
Hostname	Hostname or IP address of the destination server for SSH activity.
Directory	Name of the working directory.
File	The name of the file to read.

Output variables

File read output variables

Output variable	Description
contents	Content of the file to read.
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

Conditions

File Read conditions

Condition	Description
Success	Activity successfully read the contents of the specified file.
Failure	Activity could not read the contents of the specified file.

File Write activity

The File Write activity writes a file on a Linux or UNIX computer.

The source file can be an absolute or relative path from the Directory. If an absolute path is used, then no value is required in the *Directory* field.

This activity replaces an SSH activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity template, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

File Write input variables

Field	Description
hostname	Hostname or IP address of destination server for SSH activity.
directory	Name of the working (target) directory.
file	Name of the file to be written.
behavior	Select one of the following: • **overwrite**: Creates the file if it does not exist and overwrites the file if it does exist. • **append**: Creates the file if it does not exist and appends the new content to an existing file. • **create only**: Creates the file if it does not exist and fails if the file does exist.
contents	What to write or append (depending on the behavior) to the file

Output variables

File Write output variables

Variable	Description
return_code	Indicates whether or not the file write operation was successful.
error_message	Message that indicates if an error has occurred. Any value other than **0** indicates a failure.

Conditions

File Write conditions

Condition	Description
Success	The activity wrote a file in the target directory.
Failure	The activity failed to write a file in the target directory.

File Copy activity

The custom File Copy activity copies a file on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

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To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Global** > **Orchestration - SSH**.

Input variables

File Copy input variables

Input variable	Description
hostname	Hostname or IP address of destination server for SSH activity.
directory	Name of the working directory.
src_file	Name of the source file.
dst_file	The name of the destination file.

Output variables

File Copy output variables

Output variable	Description
result	Either **success** or **failure**.

Conditions

File Copy conditions

Condition	Description
Success	Activity successfully copied the file on the specified host.
Failure	Activity failed to copy the file on the specified host.

File Replace String activity

The File Replace String activity finds and replaces a string in a file on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

File Replace String input variables

Variable	Description
hostname	Hostname or IP address of destination server for SSH activity.
directory	Name of the working (target) directory.
file	Name of the file in which the string is to be replaced.
find_pattern	A regular expression of the text to replace.

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File Replace String input variables (continued)

Variable	Description
replace_string	The replacement string for the text found by the expression in the *find_pattern* variable.
options	Replacement options: • **first**: Replaces the first occurence of the pattern. • **all**: Replaces all occurrences of the pattern.

Output variables

File Replace String output variables

Variable	Description
return_code	Indicates whether or not the string was replaced successfully in the target file.
error_message	Message that indicates if an error has occurred. Any value other than **0** indicates a failure.

Conditions

File Replace String conditions

Condition	Description
Success	The activity has successfully replaced the string in the file.
Failure	The activity has failed to replaced the string in the file.

Reset Linux User Password activity

The *Reset Linux User Password* activity resets the password for a given user on a Linux computer.

This activity requires that the user executing the command be able to run the **chpasswd** command and, if expiring the password immediately, to run **chage** with MID Server privileged commands.

This activity replaces an SSH activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity template, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

Reset Linux User Password input variables

Variable	Description
hostname	IP address of the target Linux machine.
user	Name of the user whose password is being reset.
password	New password set for this user. The password is a workflow variable that is encrypted either as a **password2** field or by calling the encryption method of a *`Packages.com.glide.util.Encrypter`* object.
force_change	Indicates if this password is temporary and to force the named user to change the password at login.

Output variables

Reset Linux User Password output variables

Variable	Description
return_code	Indicates whether or not the user password reset action was successful.
error_message	Describes any error that occurred during password reset. If no error occurred, this value is null.

Conditions

Reset Linux User Password conditions

Variable	Description
Success	Activity successfully changed specified user's password
Failure	Activity failed to change specified user's password.

Global activities

Global activities are Orchestration activities created in the global scope.

Any activities you create in the global scope are listed in the Global category in the **Packs** and **Custom** tabs of the Workflow Editor.

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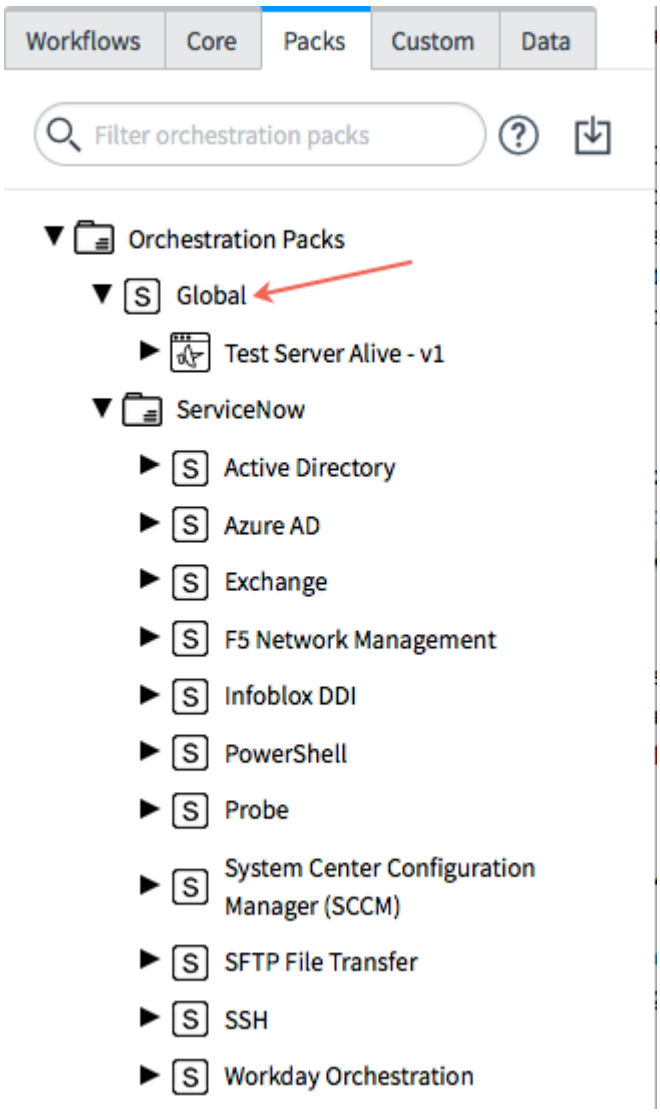
Global activities



Test Server Alive activity

The Test Server Alive activity determines if a target system is alive by its response to a particular protocol.

This activity replaces an activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Probe activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Test Server Alive input variables

Variable	Description
port_probes	A comma separated list of protocols to use to check for signs of activity on the target machine (example: *wmi,wins,https,ssh,http,https,snmp,dns*)
hostname	Hostname or IP address of the target system to check.

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Output variables

Test Server Alive output variables

Variable	Description
alive	Code that indicates whether or not the server is alive. If any value but **'1'** is returned, the server is not alive.

Conditions

Test Server Alive conditions

Condition	Description
Success	Activity determined that the device is running.
Failure	Activity failed to determine if the target device is running. Failure could be caused by a missing protocol or a device that is not accessible.

Orchestration activity designer

The Orchestration activity designer enables a user with either the workflow_admin or activity_creator and workflow_creator roles to construct reusable activities that suit an organization's business needs.

Activities created by the activity designer offer the following advantages over core activities offered in previous releases:

- Reuse custom activities in multiple workflows.
- Upload and download custom activities from the ServiceNow Store.
- Parse data from standard input formats.
- Test input variables against a target host or endpoint and inspect the payload.
- Automatically map values from a test payload to an activity's output variables.
- Share data between activities.
- View previous versions of an activity.

Access to the activity designer requires activation of ServiceNow Orchestration. For instructions about managing transitions and conditions for all activities, see Workflow activities.

Orchestration provides numerous pre-defined activities, which are reusable components that can be used in numerous workflows without having to understand the complexities of the underlying system. These activities are grouped into activity packs, which address specific business needs, such as: Active Directory, Azure AD, Exchange, Infoblox DDI, and PowerShell. There are other ServiceNow applications which provide and maintain their own separate activity packs, such as Security Incident Response, Cloud Management, or Release Automation.

Customers can also build their own activities and activity packs. You can construct custom activities with a specified template through the Orchestration Activity Designer. Custom-built activities built with the Activity Designer are referred to as activity elements. Activity elements provide optimal operations, enable code reuse, and minimize the need to write code. They also

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enable you to follow the flow of data within a given workflow across orchestration activities. Incorporating activity elements limits the dependency on the scratchpad which reduces problems in complex workflows. Limit the use of core activities, like 'Run Script', unless you need direct access the scratchpad, for example, for a counter. Activity elements do not have direct access to the scratchpad. You can, however, pass scratchpad variables as inputs into your activities.

Orchestration activities created by the activity designer:

- Can be uploaded and shared in the ServiceNow App Store
- Use the databus, which allows the activity to have well-defined inputs and outputs
- Share data across activities within a workflow
- Use versioning
- Provide a consistent approach for activity development regardless protocol

Note:
Prior to the Fujirelease, activities were built with Activity Definitions. In Fuji, a new architecture was introduced using the Activity Designer. Orchestration Core activities, built originally as Activity Definitions, have been converted to use the new template format (Activity Elements) and the databus offered with the activity designer. Workflows in upgraded instances that use legacy activities continue to work normally.

For instructions on using activities to construct a workflow, see Add an activity to a workflow.

Introduction to credentials, connections, and aliases for Orchestration

All application integrations in Orchestration require connection information, credentials, and connection and credential aliases to their respective applications to access resources.

Before you can execute an application integration in Orchestration, you must create and configure the corresponding connection information and credentials. The Connections pertains to an integration with a system, such as an IP address or endpoint with protocols. It contains specific details, such as database particulars, when integrating with a database. The associated Credentials are the authentication data required to make the connection.

Connection information and credentials can vary between QA/Development/Production environments for the same integration. The tight coupling between this data and application metadata, such as workflow or job scheduling, make application metadata obsolete when you change environments. To alleviate this problem, the concept of an alias is introduced, for connections and credentials, to decouple this data from application metadata. These aliases allow customers to design their application metadata to couple to an alias, which during runtime resolves to connection and credential data.

There are two types of aliases, a connection and credential alias and a credential alias. There are business rules that enforce certain constraints on these aliases. Names should contain alphabets, numbers, and underscores but cannot have special characters. The alias must be unique in a scope. If you choose to have multiple active connections, you can have more than one active connection in the same domain. If you do not choose this option, you can have only one active connection in per domain.

Note:
If you enable multiple active connections, when the connection records resolve, your application picks one connection based on an established order. The order of the connections depends on the API you use to retrieve connection data.

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You can add additional connection attributes to an alias, which are available in connection data during run time. Variables overridden by connection administration during run time should not affect the alias.

The credential alias resolves only credential data. Along with alias data model, you can use a scriptable API which can get connection and credential data during runtime.

Using Connection and Credential Alias with Orchestration

Define an alias to label a credential or connection record.

The Credential and Connection Alias defines an alias that labels a credential or connection record. It is extended from the sys_metadata table. It requires the admin role. The credential_admin and connection_admin have read access to sys_alias. A connection alias contains:

Name

Name of the alias.

ID

This field is based on the format "scope name.alias name" Unique index on ID to ensure unique record based on scope name + name. If the scope is global, the ID is the alias name.

Type

You can select either 'Credential' or 'Connection and Credential'. The default is Connection and Credential.

Connection type

This field is applicable when the alias type is set to Connection and Credential. There are three connection types: HTTP, JDBC, JMS. The default is HTTP.

If you create a workday alias in global scope, the ID is set to workday

If you create a workday alias in hr app scope, the ID is set to x_hr_app.workday

- Name can only contain alphabets, numbers and underscore.
- During the upgrade, the tag in credential record will be migrated to connection alias. If the tag in previous release's credential record contains special characters other than alphabets, numbers and underscore, the tag data will be preserved during the upgrade. The user still can use these connection alias, but the user cannot update these alias, unless he removes these special characters when do the update.

Using credentials with Orchestration

Orchestration requires credentials to access resources.

Credential table

The credential table (discovery_credential) defines credentials that can be used for integration. In the previous release, the Credential table contains a string-type tag field, which labels a credential and the tag is used in orchestration activities. In the madrid release, we rename tag to credential alias, and change the type from string to GlideList, which is a reference to connection alias table.

Credential types

The following credential types are provided:

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Credential type	Description	Supports Test Credential option
Applicative credentials	The credentials to explore the applications on a device or computer. Discovery patterns used by ITOM Visibility often need applicative credentials.	No
Amazon Web Service credentials	The Amazon Web Services (AWS) master account, access key ID, and secret access key. **Note:** You cannot test AWS credentials through the Test	No
Azure Service Principal and Enterprise Agreement credentials	The Azure service principals required for an Azure subscription.	No
Basic authentication credentials	A user name and password.	No
CIM credentials	The user name and password required to access a CIMOM - Common Information Model Object Manager (CIM) server, which obtains information about VMware ESX servers.	No
Cloud credentials	Credentials that Orchestration uses to access cloud resources.	No
JDBC credentials	A user name and password to access a Java Database Connectivity (JDBC) connection.	Yes
JMS credentials	A user name and password to access to a Java Message Service (JMS).	Yes
OAuth 2.0 credentials	OAuth 2.0 credentials enable ServiceNow to obtain access to user accounts on an HTTP service.	
SNMP community credentials	The community string to access devices via SNMP.	Yes
SNMPv3 credentials	The user name and keys required to access devices on your SNMP v3 network.	Yes
SSH credentials	The user name and password to access Linux and Unix devices.	Yes
SSH credentials	The private key credentials to access Linux and Unix devices. **Note:** For better security, SSH private key credentials are recommended over SSH password credentials.	Yes
VMware credentials	Credentials to access vCenter resources. These credentials are required for any work that is performed on vCenter, such as cloning a virtual machine.	Yes

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Credential type	Description	Supports Test Credential option
Windows credentials	The user name and password required to access Windows computers. Several Windows credentials must be met to use Windows credentials.	Yes

How MID Servers use credentials

By default, Windows MID Servers use the login credentials of the MID Server service on the host machine to discover Windows devices in the network. You should Configure Windows MID Server service credentials so that they have domain or local administrator privileges. For Linux and UNIX machines and network devices, the MID Server uses the SSH and SNMP credentials configured in the instance in **Discovery** > **Credentials**.

MID Servers that Orchestration uses must have access to the necessary credentials to execute commands on computers in the network as specified by the Workflow activities. Orchestration can use the same SSH and SNMP credentials as Discovery, but has two additional credentials designed for specific Workflow activities: Windows (for PowerShell) and VMware.

Encryption and decryption

The platform stores credentials in an encrypted field on the Credentials [discovery_credentials] table. Once they are entered, they cannot be viewed.

When credentials are requested by the MID Server, the platform decrypts the credentials using the following process:

1. The credentials are decrypted on the instance with the password2 fixed key.
2. The credentials are re-encrypted on the instance with the MID Server's public key.
3. The credentials are encrypted on the load balancer with SSL.
4. The credentials are decrypted on the MID Server with SSL.
5. The credentials are decrypted on the MID Server with the MID Server's private key.

Note:
The platform does not have separate encryption keys for multi-tenant instances.

Credential order

Credentials can be assigned an order value in the Credentials form , which forces the application to try all the credentials at their disposal in a certain sequence. If you do not specify an order value, the application tries the credentials in the Credentials [discovery_credential] table randomly, until it finds one that works, such as when Orchestration attempts to run a command on an SSH server (such as a Linux or UNIX machine), or when Discovery attempts to query an SNMP device (such as a printer, router, or UPS).

After identifying the credentials for a device, Discovery and Orchestration create an affinity between the credentials and the device using the Credential Affinity `[dscy_credentials_affinity]` table. All subsequent discoveries or Orchestration activities attempt to match the credentials in this table with a device for which an affinity exists. If credentials for a device change, Discovery and Orchestration try all available credentials again until they create a new affinity.

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Note:
If Orchestration and Discovery are installed, and credential alias is enabled, multiple affinities can exist. In this case, the platform looks up credentials for each affinity and inserts the credential for the affinity with the lowest order into the probe.

Ordering credentials is useful in the following situations:

- The credentials table contains many credentials, with some used more frequently than others. For example, if the table contains 150 SSH credentials, and 5 of those are used to log into 90% of the devices, it is good practice to configure those five with low order numbers, which places them at the top of the execution list. Discovery and Orchestration will work faster if they try these common credentials first. After the first successful connection, the system knows which credentials to use the next time for each device.
- The system has aggressive login security. For example, if the Solaris database servers in the network only allow three failed login attempts before they lock out the MID Server, configure the database credentials with a low order value.

Credential alias

Credential alias allows flow and workflow creators to:

- Assign individual credentials to any activity in an Orchestration workflow
- Assign individual credentials to any action in Flow Designer
- Assign different credentials to each occurrence of the same activity type in an Orchestration workflow.
- Assign different credentials to each occurrence of the same action in designer flow.

Credential alias also works with credential affinities.

External credential stores

If you do not want credentials stored in your instance, you can use external credential repositories. External credential stores save the credentials in an external site that your instance can access. Only CyberArk is supported.

Connections with Orchestration

Use the connections table to setup a JMS, JDBC, or HTTP(s) connection to a target host.

Connection Table

The Connection table (sys_connection) is the base table for all connection tables. You can setup connections for the following protocols:

- JDBC
- JMS
- HTTP(s)

The connection table references the connection alias table, which couples the connection alias to connection information. Every connection records the following information:

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Base connection properties

Field	Description
Name	Name of the connection. This field must be unique on the table.
Credential	Specify the credential to use with this connection. This is optional.
Connection alias	The connection alias resolves your connection and credentials at run time. Only one connection is active per Connection alias at any one time.
Active	Check to make the current connection active.
Domain	Domain to which the connection belongs.

Credential is unique across active connections, if not empty.

Upgrading connection information

The JDBC connection (jdbc_connection) and JMS connection (orch_jms_ds) tables are existing Orchestration connection tables. In madrid, we re-parent them to extend from Connection (sys_connection) table. They move from Orchestration run time plugins to Credentials & Connections plugins. They are originally extended from sys_metadata. The sys_metadata related data will be removed. JDBC field name changes:

- JDBC server is renamed to host
- Database port is renamed to port

Create custom activities using custom activity designer templates

You can create and update different types of custom activities in the Workflow Editor using a custom template.

Before you begin

Roles required: workflow_admin or activity_creator

About this task

The Activity Designer contains common steps which are applicable to all the activities that you create. This procedure guides you through the common steps and the order they should be set up. You specify an activity template before you create a custom activity.

Procedure

1. Navigate to **All** > **Orchestration** > **Workflow Editor**.
   The **Welcome** tab of the Workflow Editor opens.
2. On the **Custom** tab in the palette, click **+** to create a new activity select the appropriate template from the list.

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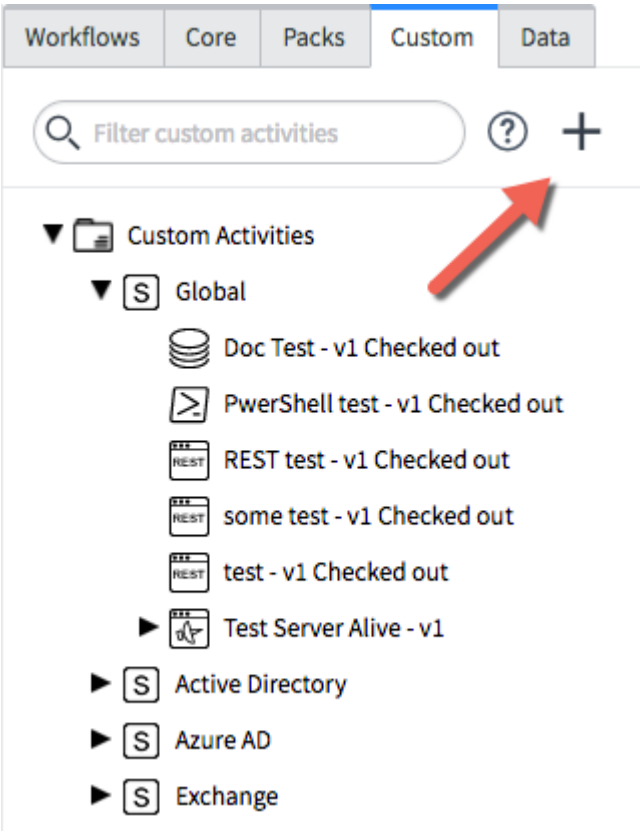
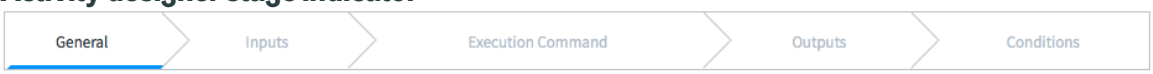


The Activity Designer form appears, with a stage indicator at the top. All new activities start at the **General** stage. The current stage shows with a blue underscore.

Activity designer stage indicator



3. Add the general properties.
   This information is standard for each custom activity, include a name, description, and other related information.
4. Create the template Create input variables for the template.
   Create the variables to pass into the activity in the Inputs form of the activity designer.
5. **Optional:** Add a pre-processing script.
   For input validation or transforming input data, you might need a pre-processing script.

   Note:
   This step is not included in the Run Script activity.

6. Click **Continue** to open the Execution Command form, then fill out the **Execution Command** step based on the corresponding execution templates:
   - Create a SOAP web service activity
   - Create a JDBC activity
   - Create a JavaScript Probe activity
   - Create a PowerShell activity
   - Create a REST web service activity
   - Create a Probe activity
   - Create an SFTP activity

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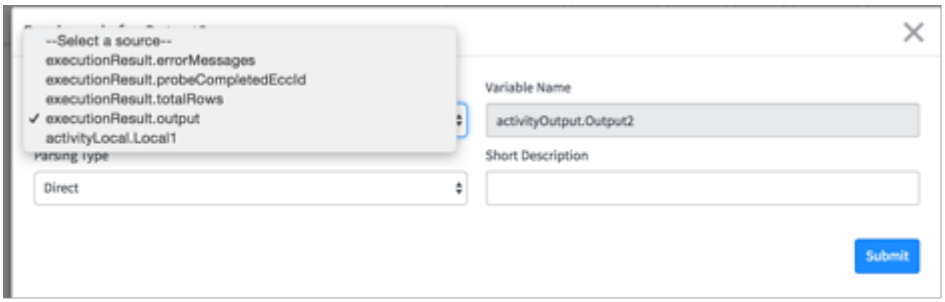
- Create a Run Script activity
- Create an SSH activity
- Create a JMS activity

7. **Optional:** Test your inputs.
8. **Optional:** In the Outputs form, define local and/or output variables.
   Local variables can be used for temporary storage when cascading parsing rules. For example, you might extract an XML payload from within a JSON payload. A local variable can access the XML document and use that as a source for another parsing rule. The graphic shows a *Local1* variable source to parse data for *Output2*.

Define local variable



9. Use one of the options to assign values to Outputs.

Option	Description
Parsing rule	You can create a parsing rule and map them to the output fields by dragging and dropping the variables into the parsing rules structure. The REST, SOAP, and JDBC templates pro vide auto-mapping to create the parsing rules automatically. If available from the test inputs form, auto-mapping should be used when possible.
Post-processing	Post-processing scripts allow you to code your own output data validation, output pars ing code, and related tasks. Post-process ing executes after the execution command results have been returned and before the parsing rules and conditions are run. Click **Go to Post-Processing (Advanced)** to create a post-processing script. **Note:** If you create a script, this step reflects as a stage in the indicator.

10. Click **Continue** to open the Conditions form to create exit condition rules for your activity and then click **Save**.

General properties for activity designer templates

The following General Property fields are common to all activity designer templates.

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General Property fields common to all activity designer templates

Fields	Description
Name	Descriptive name of the activity. Select a unique name that makes the activity easily identifiable in the palette. If you do not name the activity, it is identified in the **Data** tab of the Workflow Editor with an index number when it is added to a workflow. This index reflects the order in which the custom activity was added to the workflow. Only custom activities and their output variables appear in the **Data** tab.
Short description	Brief description of what the activity does.
Image	Icon that identifies an activity of this type in the workflow palette.
Execution template	Predefined template selected for this activity.
Application	Current Application scope set on the instance. To view the scope, click the gear icon on the right side of the title bar in any record or list and look at the value in the **Application** field. The activity runs in this scope within a workflow. You cannot view or change the scope for the instance in the Workflow Editor.
Accessible from	Accessibility setting for this activity, by scope. The following options are available: • **All application scopes**: This activity is available to all application scopes. • **This application scope only**: Use of this activity is restricted to the scope named in the **Application** field.
Category	Category for this activity in the **Custom** and **Packs** tabs. All categories are listed under their scope in the collapsible hierarchy.
Description	Detailed description of the activity.

Create input variables

Create the variables to pass into the activity in the **Inputs** form of the activity designer.

Before you begin

You must name your activity in the **General** form before you can advance to the **Inputs** stage.

Roles required: workflow_admin or activity_creator

Note:
Variable strings in the **Inputs** form have a 255 character limit.

Procedure

1. Click the **+** icon to create a new input variable.

   The designer creates a default variable called **Input1**.

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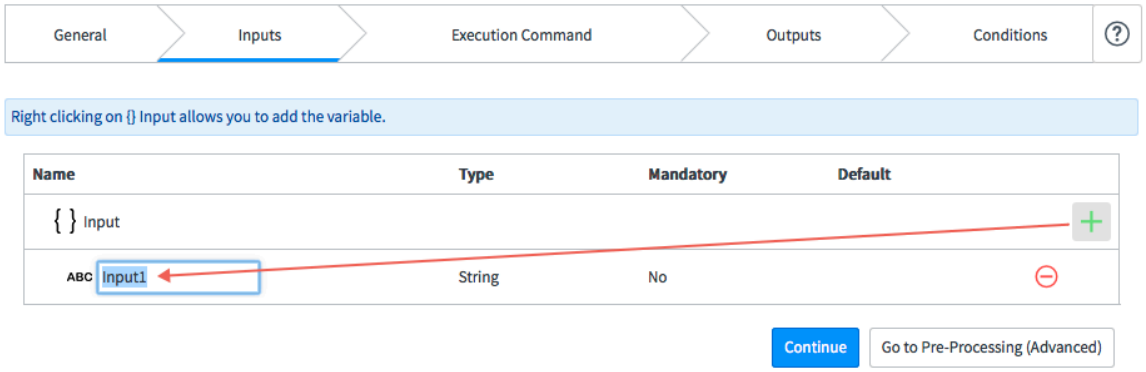

2. Type your new variable name in the field.
3. To change the name of a variable or any of its attributes, double-click the value and then select or enter a new value in the field that appears.
4. Configure your variable using these fields:

Variable configuration

Field	Description
Type	Data type for this variable. Double-click on the field to display the choice list. In addition to the usual data types, you can create input arrays and encrypt individual variables that contain sensitive data. Encrypted variables are passed to the ECC Queue and then decrypted by the MID Server when they run on the target host. Sensitive data returned from running these variables on the host can then be passed to another activity through encrypted output variables.
Mandatory	Marks an input variable as mandatory. Variables marked as mandatory are required fields in the properties form for the activity in the workflow. The input testing feature allows you to filter on mandatory variables.
Default	Default value for this input variable. Default values are prepopulated for variables in the properties form for the activity in the workflow. You can override this value when you test the variables.

5. To reorder the variable list, select a row and then drag the row to its new location.

   When you select a row to move it, the pointer icon changes to an up/down arrow icon ( ).
6. To delete a variable, click the delete icon ( ) in the row.
7. Click **Continue** to advance to the **Execution Command** stage or click **Go to Pre-Processing (Advanced)** to create a script that runs before the activity executes.

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Map an input variable

After you create the input variables, map them to the fields in the Execution Command form.

Before you begin

Role required: activity_admin, activity_creator

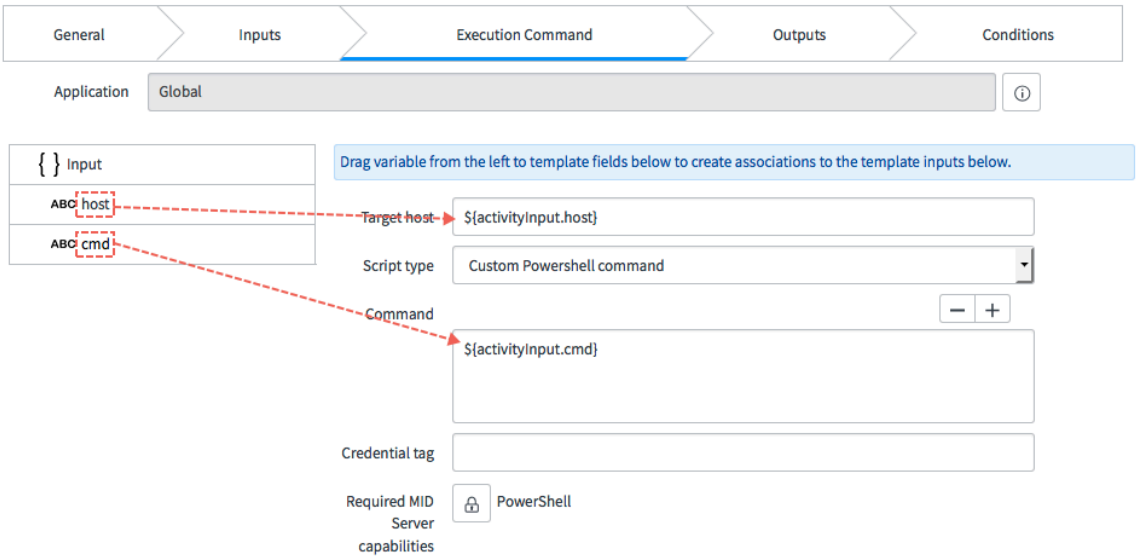
About this task

These fields contain values required by the target host or endpoint to authenticate and query for data. Included in this example are fields for a command to run on the target and the MID Server to use, if one is required.

Procedure

To map a variable, drag it into the appropriate field.

The designer automatically expresses the variable in the syntax the system requires.



Configure the PowerShell execution command

Use the input variables you created to configure the command that Orchestration executes on the Windows target machine.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

> **Note:**
> You can test the PowerShell connection between the MID Server and the target computer without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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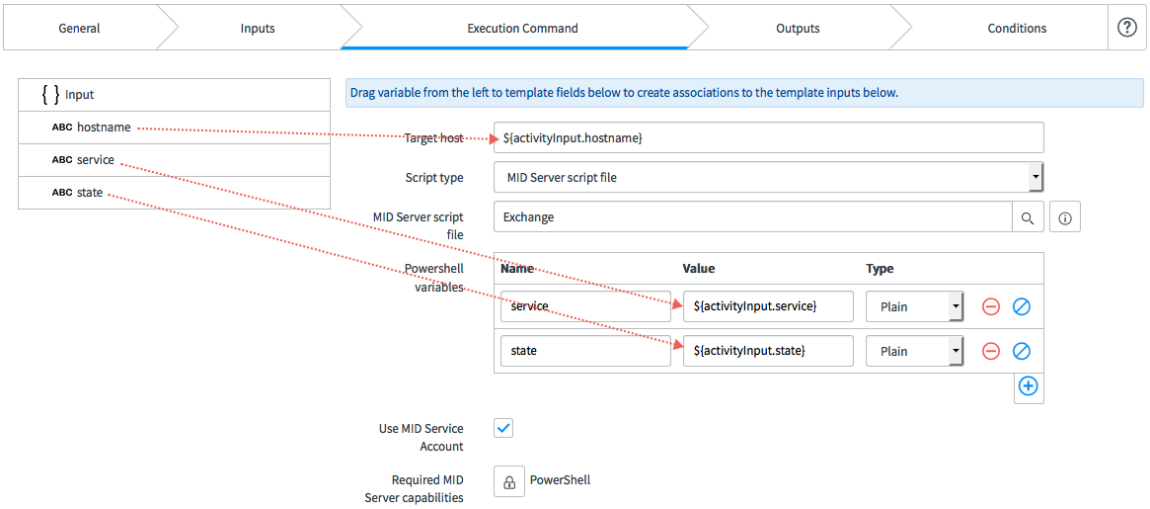
PowerShell execution command



2. Complete the fields shown in the table.

Powershell command fields

Field	Description
Input	Input variable builder. Create variables to map to available fields.
Target host	Host name or IP address of the target server for this PowerShell activity.
Script type	Type of script to run on the PowerShell host. Available options are: ○ Custom Powershell command ○ MID Server script file
MID Server script file	MID Server script file to run. This field is available when the **Script type** selected is *MID Server script file*.
Command	Command that this activity runs on the target host. This field is available when the **Script type** selected is *Custom Powershell command*. You can drag and drop input variables from the variable builder into this field to create your command.
Powershell variables	Name-value pairs to pass to the host with Powershell. You can create these variables manually, or drag input variables into the **Value** field. Encrypted input variables retain their encryption, regardless of the data type settings in this field. If you type in a value and select the **Encrypted** data type, your value appears in plain text in this field and is only encrypted when it passes to the ECC Queue.
Use MID service account	Forces this activity to authenticate on the target host using the credentials of the MID Server service account only, without trying any other credentials. When this check box is selected, the **Credential tag** field is not available.
Credential tag	Specific Credential aliases for Orchestration activities this activity must use to run Powershell commands on the host. If this field is left blank, the MID Server tries all the available credentials until it finds a valid one, ending with the MID Server service account. If a credential alias is defined, the MID Server tries the credentials for that alias only and does not try the MID Server service account. This field is not available when the **Use MID service account** check box is selected.

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Field	Description
Required MID Server capabilities	MID Server to use for querying Powershell, by capabilities. By default, the system selects a Powershell MID Server.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Test activity template inputs

You can test the input parameters of a custom activity during its development without having to run the activity in a workflow context.

Before you begin

Create input variables and map them to fields in the **Execution Command** form or provide actual values for these fields.

Role required: web_service_admin, activity_admin, activity_creator

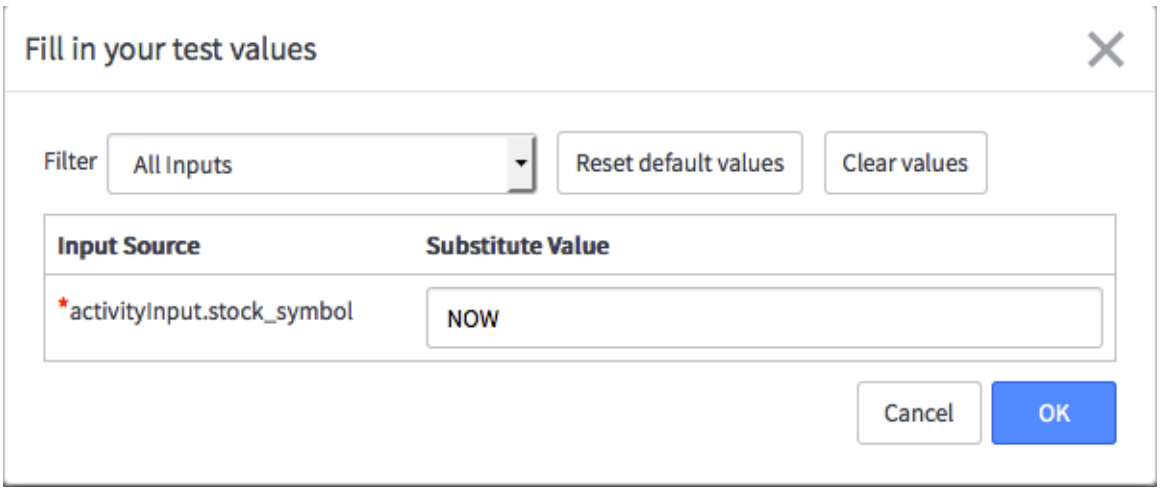
About this task

An input test executes only the input parameters against an endpoint and not the pre-processing or post-processing scripts. You need to use a workflow to test a pre-processing or post-processing scritp. You do not need to check out the activity to test it, and you can test input variables from any stage in the activity designer, if your activity is properly configured. Typically, the **Execution Command** stage is the point at which your inputs are ready for testing.

Note:
If you intend to use auto-mapping, you must test your input variables.

Procedure

1. Click **Test Inputs**.
   The list of input source variables appears. If you added default values for these variables, those values appear in the **Substitute Value** column. Mandatory variables are marked with a red star. In this example, a SOAP endpoint returns a value for a stock quote variable.



2. Filter the variable list with these controls:

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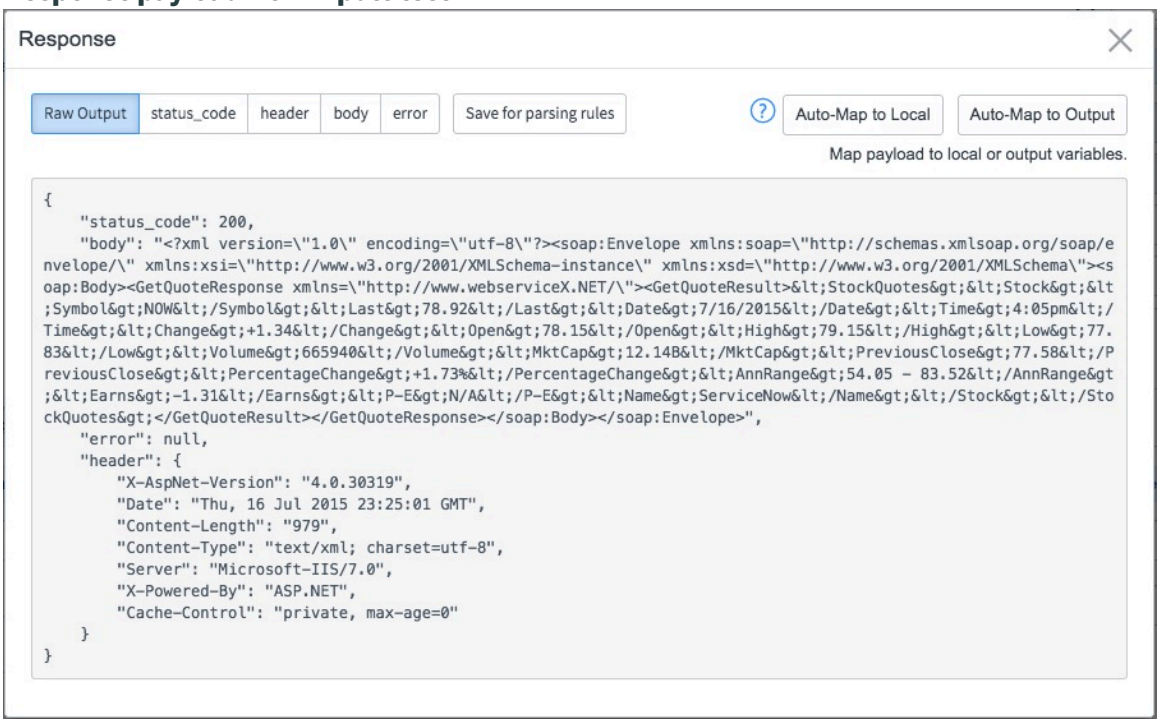
- **All Inputs**: Displays all input variables. This is the default view.
- **Mandatory Inputs**: Displays only mandatory input variables.
- **Inputs Without Defaults**: Shows input variables that do not have assigned default values.

3. Reset values as needed.
   - **Reset default values**: Replaces any test values set in this form with the default values, if they are present.
   - **Clear values**: Clears all values in the input variable list, even if default values exist.
4. When your test values are configured correctly, click **OK**.
   The system runs the values for all the inputs configured against the specified target and returns the resulting payload. The buttons in the Response form display different views of the payload. The entire payload appears in the **Raw Output** window.

Response payload from inputs test



5. To map appropriate parameter values in the payload to variables in the **Outputs** stage automatically, select an auto-mapping option.
6. Alternately, you can click **Save for parsing rules** to copy the entire payload to the parsing rules. This allows you to manually select values for the output variables directly from the payload. This action completely overwrites any previous payload that existed in the parsing rules.
7. Click the **X** in the upper right corner of the window to close it.

Data encryption for activity variables

You can protect sensitive data passed from Orchestration activities by encrypting input and output variables.

The system never stores encrypted variables as clear text. If the MID Server is used to fulfill the activity, the corresponding ECC Queue's input payload is encrypted if an encrypted output variable is defined in the template. Output variables passed to a downstream activity as input variables maintain their encryption throughout processing.

Inputs that require data encryption come from one of these sources:

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- Workflows: These inputs are provided through the Workflow Editor and must be in the password2 format for two-way encryption.
- Service catalog requests: These input values are provided to an activity as encrypted variables from a service catalog item.
- GlideRecord: These are variables attached to any ServiceNow table. The source column in the table must be a password2 type variable.
- Activity outputs: These are variables passed as outputs from one activity to a downstream activity as inputs, through the data bus.
- Empty string: The system allows you to define encrypted input variables but never pass a value into the variable.

Activity designer template pre-processing fields

Use the **Pre Processing** form of the activity designer to define a script to run before the activity executes.

Pre-processing fields

Field	Description
Input process script	Script to run before the activity executes.
Variables	Input variables that are available to use as building blocks in the input process script. Click the arrow above the field to open the variables list. Click an item in the tree to add it to your script in the appropriate syntax. The list displays execution parameters and input variables you passed into the activity on the **Inputs** form. All activity variables added in the **Inputs** form are read-only and are expressed in the pre-processing script with this syntax: `activityInput.variable`. Before the activity executes and makes a call to the service or host, you can override the effective execution value of this variable by assigning values to the `executionParam.variable_name` execution parameter. Refer to the specific execution parameters for your template.

Logging

Activity designers can add logging to the pre-processing using the *`ActivityLogger`* API, which works for scoped or global applications. Logged data from the script appears in the **Workflow Log** related list in the context records for any workflow that uses the activity. The **Source** for these messages in the workflow log is **ACTIVITY**.

Important:
To display the debug messages in the workflow log, set the *`glide.workflow.log.debug`* property to **true**.

The supported messages are:

- `ActivityLogger.debug("Pre Processing Log Message");`
- `ActivityLogger.info ("Pre Processing Log Message");`
- `ActivityLogger.warn ("Pre Processing Log Message");`
- `ActivityLogger.error("Pre Processing Log Message");`

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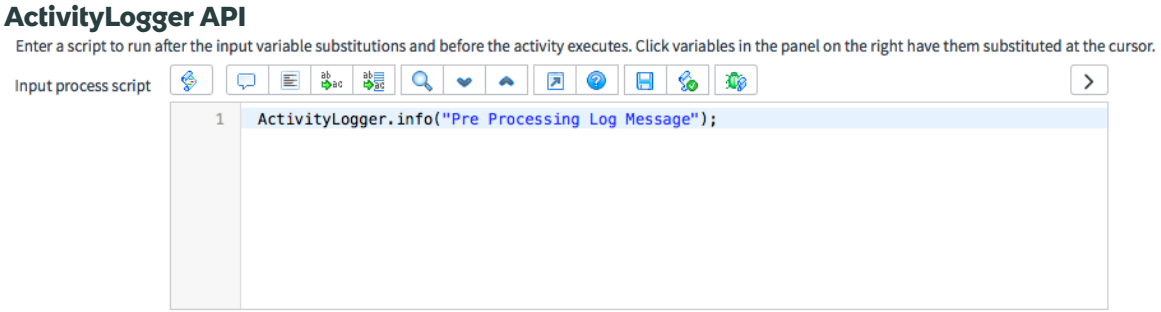

Template post-processing fields

From the **Post Processing** form in the activity designer you can define a script to run after the activity executes.

Post-processing fields

To use the results returned by the activity, append the `executionResult.` prefix to these parameters.

Field	Description
Output process script	Script to run after the activity executes.
Variables	Input variables that are available to use as building blocks in the output process script. Click the arrow above the field to open the variables list. Click an item in the tree to add it to your script in the appropriate syntax. The list displays execution results and the variables you passed into the activity on the **Inputs** form. All activity variables added in the **Inputs** form are read-only and are expressed in the post-processing script with this syntax: `activityInput.variable`. For parameter descriptions, refer to the table in the post-processing parameters topic for this activity.

Logging

Activity designers can add logging to the post-processing script using the *`ActivityLogger`* API, which works for scoped or global applications. Logged data from the script appears in the **Workflow Log** related list in the context records for any workflow that uses the activity. The **Source** for these messages in the workflow log is **ACTIVITY**.

Important:
To display the debug messages in the workflow log, set the *`glide.workflow.log.debug`* property to **true**.

The supported messages are:

- `ActivityLogger.debug("Post Processing Log Message");`
- `ActivityLogger.info ("Post Processing Log Message");`
- `ActivityLogger.warn ("Post Processing Log Message");`
- `ActivityLogger.error("Post Processing Log Message");`

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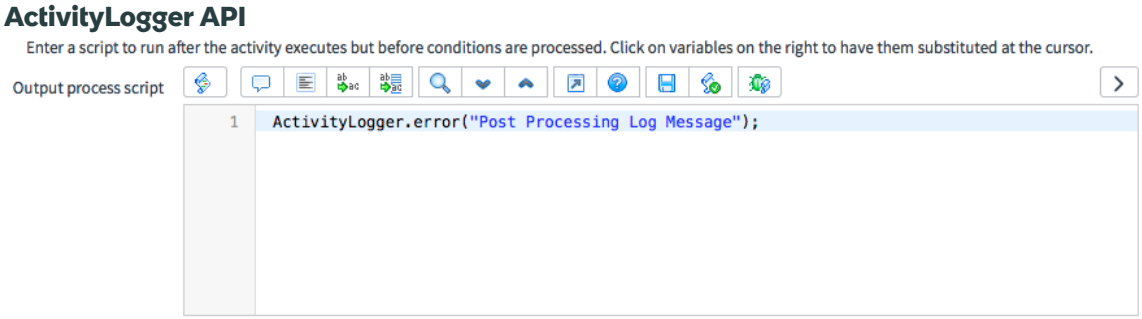


Auto-map activity output variables

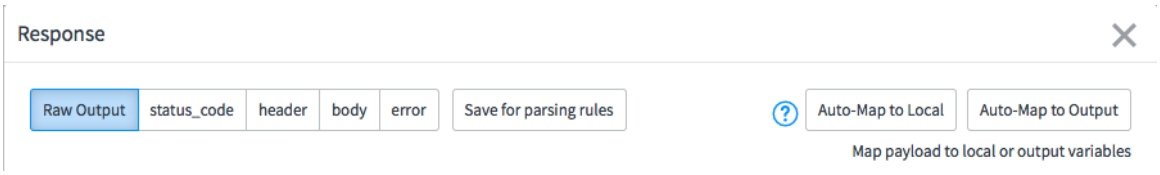
You can map parameter values in a test payload to variables in the **Outputs** tab automatically.

Before you begin

Role required: admin

Procedure

1. From the Execution Command in the template, select the **Inputs** tab.
2. Click **Test Inputs** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
3. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



4. Select an auto-mapping option.

Option	Description
Auto-Map to Local	Translates the entire payload into a JSON object and places it in the data bus. This al lows for post-processing manipulation in JavaScript. This selection causes the entire data field on the right to disappear and the inputs structure to be auto-populated with these default variables: ○ output ○ totalRows ○ errorMessage ○ eccSysId

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Option	Description
Auto-Map to Output	Automatically populates the output variables in the activity with the same default variables used as inputs for the local variable.

Note:
No parsing rules are available with auto-mapping selections.

Create an output variable

The **Outputs** form in the designer contains a variable builder for creating data structures of objects and arrays.

Before you begin
Roles required: activity_admin, activity_creator

About this task
Elements in this structure are mapped with Create a parsing rule to specific data contained in payloads returned from an endpoint or host. These variables and their values are then made available locally or for reuse in other activities.

Procedure

1. Click the **+** icon in the **Outputs** column to create a local or output variable.

   Local variables are only available within an activity and are not visible in the data structures displayed in the **Custom** tab. Output variables are available for reuse in other activities, either individually or as an entire data structure. When you create a new variable of either type, the designer provides a default name of **Local1** or **Output1**.

2. Type your new variable name in the field and select a data type.

   Variable names must be unique within an array or an object. You can assign a data type of **Encrypted** to output variables that contain sensitive data. Data protected by encryption is passed to other activities or processes encrypted and is never displayed in plain text.

3. To change the name of a variable or any of its attributes, double-click the value, type a new value in the editing field, and then press **Enter**.

   The icon to the left of the name reflects the data type of the variable.

4. To reorder the variable list, select a row and then drag the row to its new location.

   When you select a row to move it, the pointer icon changes to an up/down arrow icon ( ).

5. Drag the row into another location.
6. Choose from the following options.
   - To reuse a variable from another activity, drag it from the **Custom** tab in the palette to the **Local** or **Output** heading at the top of the variable list.
   - To copy an entire data structure, drag the parent object or array into the variable list header.

   The designer duplicates the copied data structure in the outputs variable builder.

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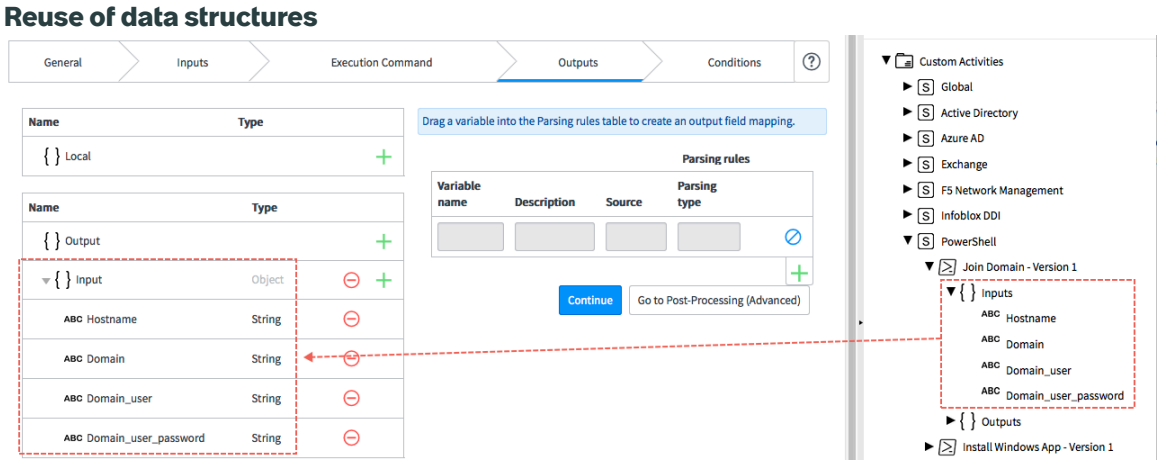

7. To delete a variable, click the delete icon ( ) in the row.

Activity designer template outputs

Output variables contain messages returned from a destination that are available to other activities in a workflow or internally to the activity.

Activity designer output fields

Field	Description
Variable name	Name of a variable, either **Local** or **Output**, that this activity passes.
Local	Variable that contains a value used within an activity. For example, use a local variable to identify metadata that is processed within an activity before the final value is exported to an output variable.
Output	Variable that contains a value that is passed to other activities in the workflow.

Map an output field

Mapping is configured with parsing rules that allow you to build expressions in the appropriate data format for the selected payload.

Before you begin

Role required: activity_admin, activity_creator

About this task

When you are finished creating the output data structure, map each variable to the specific data you want to extract from the target host.

Procedure

To map a variable, drag it from the **Outputs** variable builder and drop it into an empty **Variable name** field in the Parsing rules section.

See create a parsing rule for instructions on configuring parsing for output variables.

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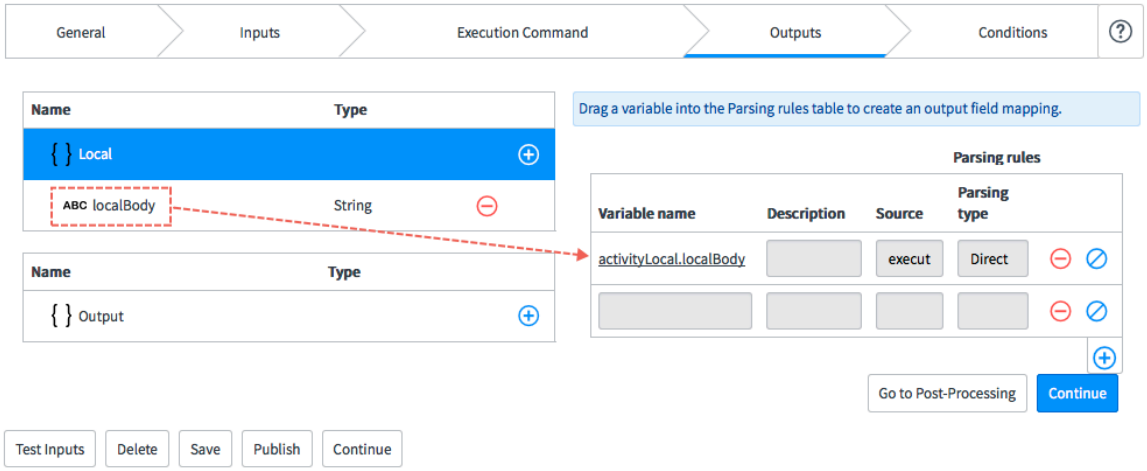


Create a parsing rule

Populate output variables defined in a custom activity with payload data returned from an inputs test on an external host or endpoint.

Before you begin

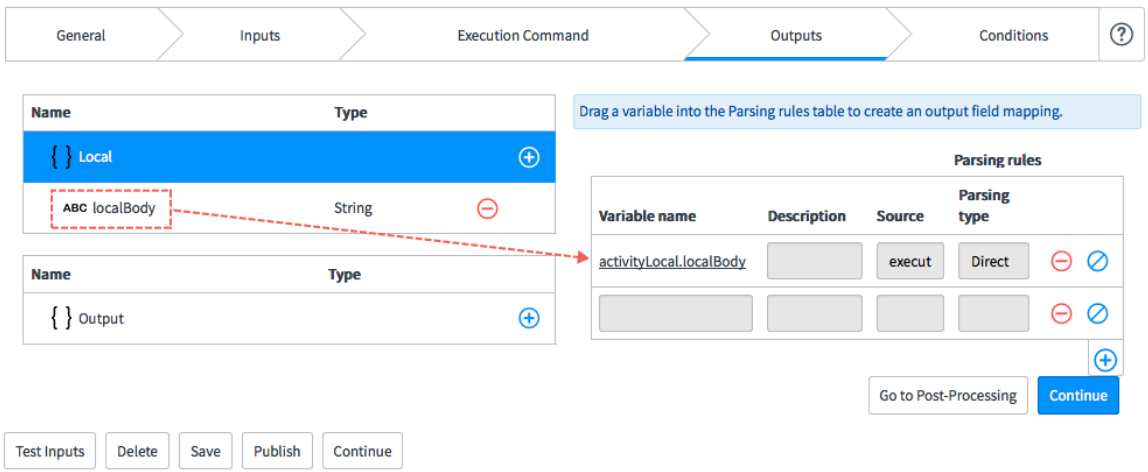
Roles required: activity_admin, activity_creator

About this task

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. From the **Custom** tab in the palette, open a custom activity.
3. In the Activity Designer form, advance to the **Output** stage.
4. Drag an output variable from the data structure builder into the **Variable name** field in the **Parsing rules** builder.

Mapping variables to parsing rules



   The parsing rules form appears for the selected variable. By default, the parsing type is set to **Direct**, which populates the variable with all the data from the selected payload, without parsing the contents. Each template has a specific default parsing source.

5. Complete the form using the fields in the table.
   In this example, the parsing type selected is **XML**, which allows you to select specific parameters from the payload to parse.

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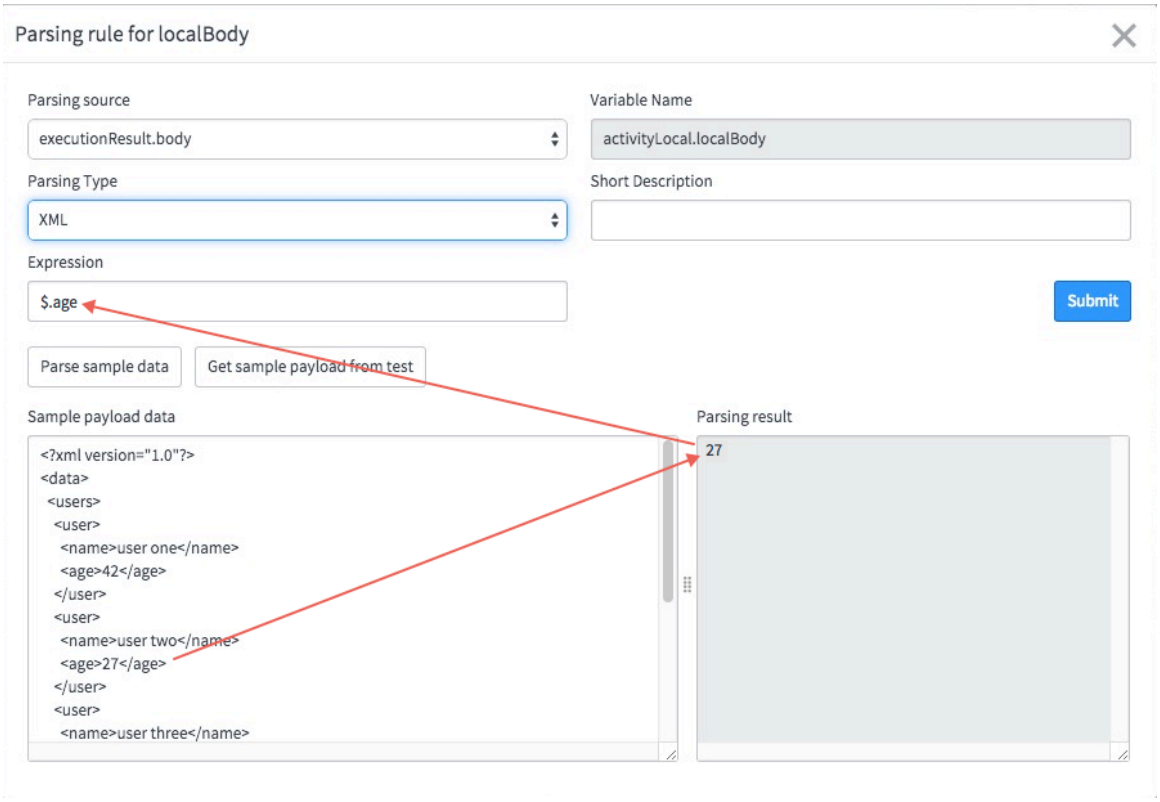

Parsing rules fields

Field	Description
Parsing source	Source of the data returned from the target host or endpoint. Each template opens to a specific, default payload. Available choices depend on the execution template selected for the activity. You can also use local variables as a parsing source if a parsing rule has previously been defined for them. For a list of the available payloads for each template, see Activity designer parsing sources.
Expression	Expression used to extract specific data from the selected parsing source. This expression is created from clickable data in the sample payload and appears in the format selected in the **Parsing type** field. When testing, the expression can return multiple results. Discern which choice gives reliable or predictable results before choosing your expression. **Note:** The system cannot generate clickable **RegEx** expressions from sample data. You must write all regular expressions manually.
Variable name	Revised variable name as it is used in the final output expression. The system adds the **activityOutput** or **activityLocal** prefix to the variable you specify.
Parsing type	The language to use for querying the target host's payload. The selections are: ○ **Direct**: Maps to the entire content of the payload selected in the **Parsing source** field, without any parsing. This is the default parsing type. ○ **XML**: XPath query used for selecting nodes from an XML payload.

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Field	Description
	○ **JSON**: JSONPath query for selecting parts of a JSON payload. ○ **RegEx**: Parsing method that uses a regular expression to extract data from a payload. The RegEx parsing type does not support multi-line parsing and is not case sensitive.
Short description	Brief description of this parsing rule.
Sample payload data	Sample data from the source containing the data requested. This field is not available for **Direct** parsing types. After you click **Parse sample data**, the data in this field cannot be edited, but becomes clickable for the purpose of creating expressions. Click **Edit sample data** to make the field editable again.
Parsing results	Displays the data returned from the source by the selected expression. This field is not available for **Direct** parsing types.

6. To retest the inputs, click **Get sample payload from test**.
   This action reopens the test form, allowing you to substitute different test values and create a different payload.
7. Click **Save** to have the parsing rules overwrite the previous payload with the one you just created.
8. To create an expression for the parsing rule, click the specific parameter you want to see in the sample payload.
   The value for that parameter appears in the **Parsing result** field, and the system creates the appropriate expression in the **Expression** field.
9. Click **Submit** to save the parsing rule for that variable.

Activity designer parsing sources

This table lists the parsing sources available with each execution template.

Parsing sources

Template	Source
SOAP Web Service	• executionResult.body (Default) • executionResult.status_code • executionResult.header • executionResult.error
JDBC	• executionResult.output (Default) • executionResult.errorMessages • executionResult.probeCompletedEccId • executionResult.totalRows
JavaScript Probe	• executionResult.payload (Default) • executionResult.output

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Parsing sources (continued)

Template	Source
	• executionResult.eccSysId • executionResult.errorMessages
Powershell	• executionResult.output (Default) • executionResult.tags • executionResult.hresult • executionResult.eccSysId • executionResult.errorMessages
REST Web Service	• executionResult.body (Default) • executionResult.status_code • executionResult.header • executionResult.error
SFTP	• executionResult.output (Default) • executionResult.eccSysId • executionResult.errorMessages • executionResult.tags
Probe	• executionResult.output (Default) • executionResult.payload • executionResult.eccSysId
SSH	• executionResult.output (Default) • executionResult.eccSysId • executionResult.errorMessages • executionResult.tags
JMS	• executionResult.status • executionResult.standardHeaders • executionResult.customHeaders • executionResult.messagePayload • executionResult.eccSysId • executionResult.errorMessages

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Activity designer parsing rule example

In this example, the parsing rule is configured to populate the *activityOutput.ipv4* variable with the value for the IP address from a domain server, using PowerShell.

Before you begin

Role required: activity_creator, activity_admin

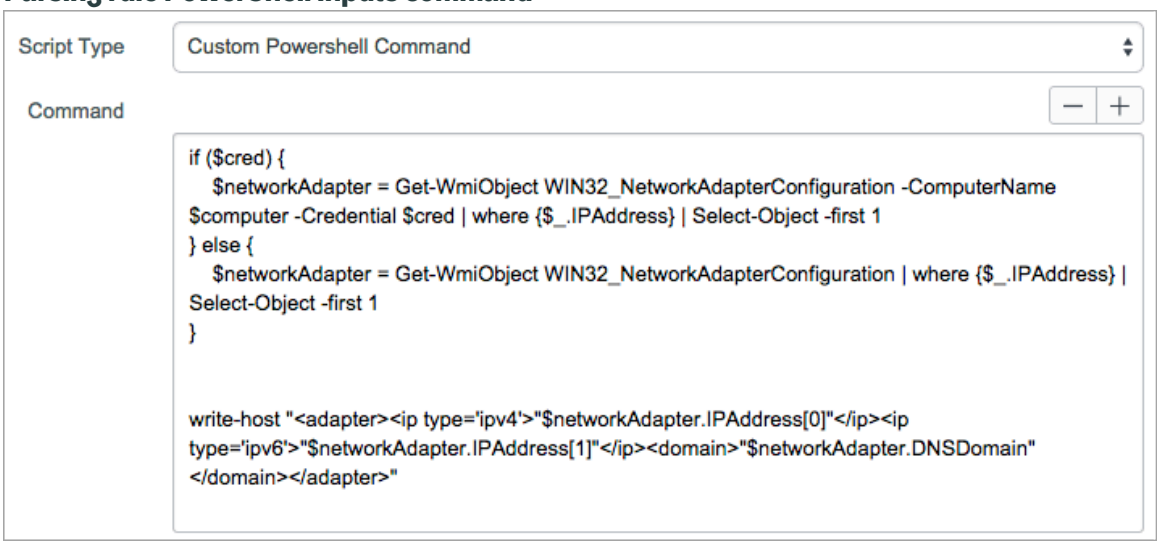
About this task

To generate the sample data, the administrator must actually run the command on the host and then paste the data returned into the **Sample payload data** field when creating the parsing rule. The administrator can then create an expression that returns IP addresses from that sample in two formats: `ipv4` and `ipv6`. In this example, the system produces two expressions to use for the parsing rule.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor** and open the activity that runs on the host.
2. Click the **Inputs** tab, and note the **Command**.

Parsing rule PowerShell inputs command



3. In a PowerShell console, run the **Command** on the host to extract the XML sample that contains the values you need.
4. Copy the data that is returned to the clipboard.
5. In the activity designer, click the **Outputs** tab and paste the returned data into the **Sample payload data** field.

   In this example, the data includes IP addresses in two different formats and the domain name.

6. Select the parsing type for the source.

   Example
   In the following example, you would select **XML**.

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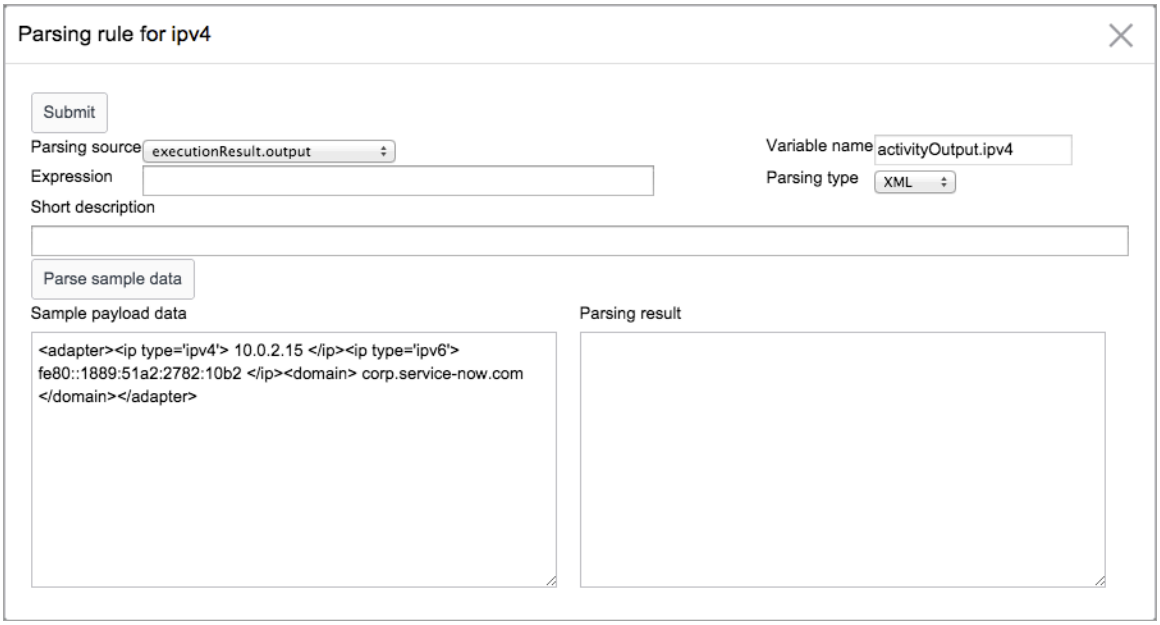
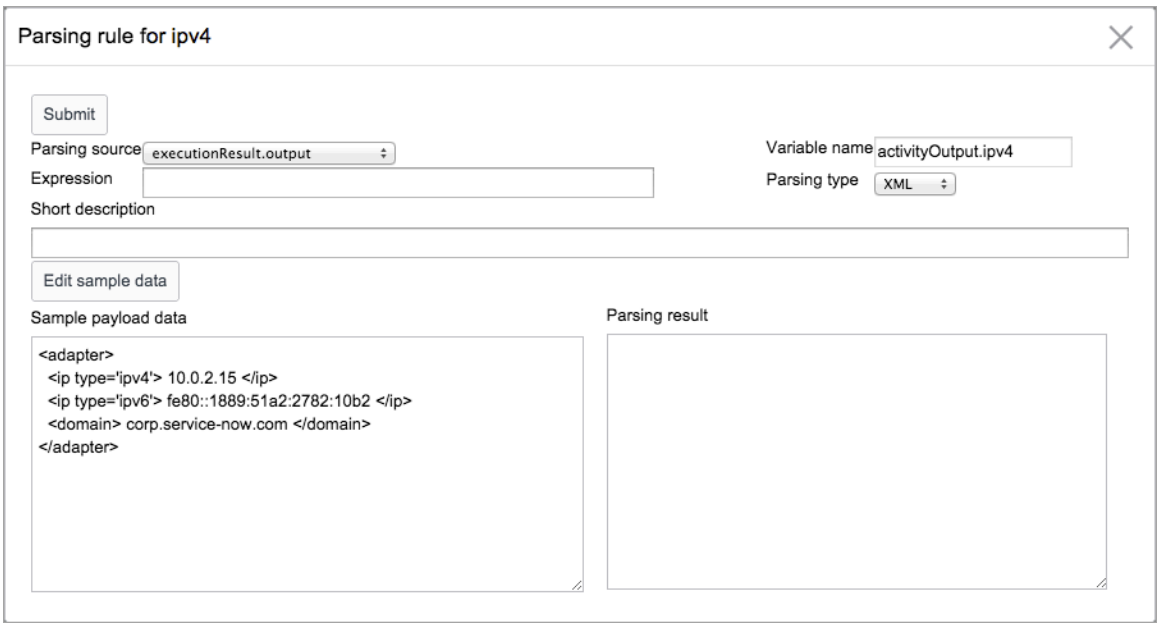


7. Click **Parse sample data**.

   The system displays the XML in the proper format, and it becomes clickable. In this view, the system can translate clicked data from the sample into an expression.



8. To create the expression, click the elements in the data sample you want to map to the variable.

   Based on the sample data you clicked, the system creates two expressions.

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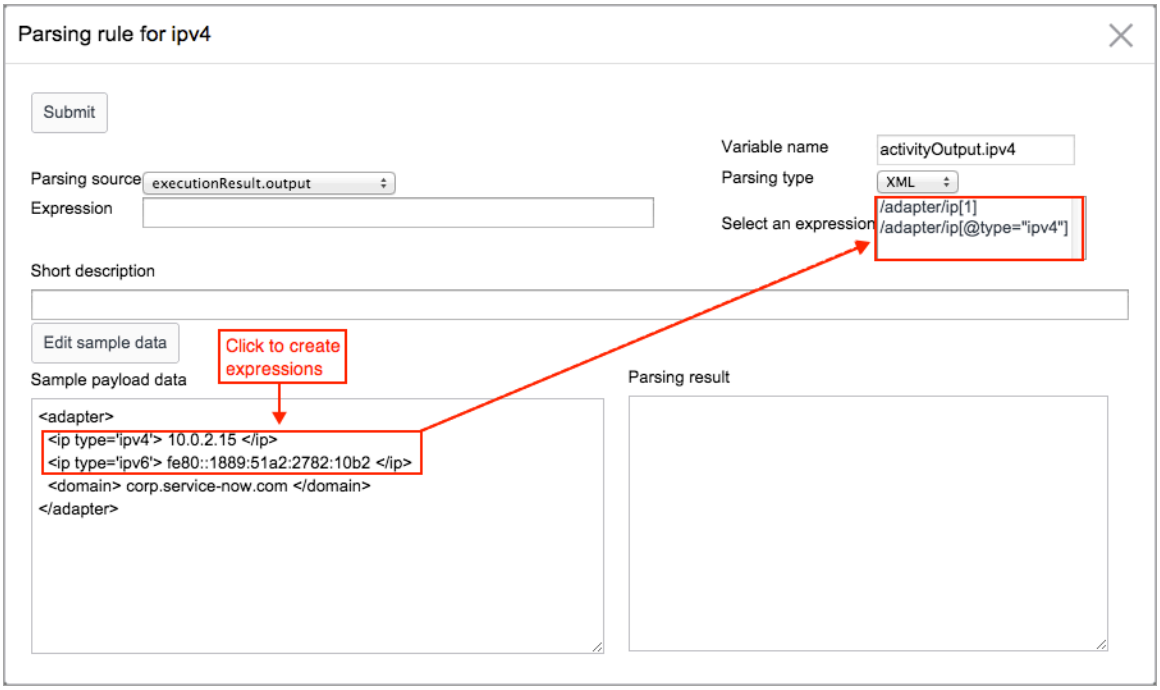

9. Select an expression from the list.

The desired result is the IP address that has a **type** attribute of **ipv4**. The system populates the **Expression** field with this choice.



10. Click **Test expression**.

The system parses the payload using the selected expression and returns the requested data in the **Parsing result** field.

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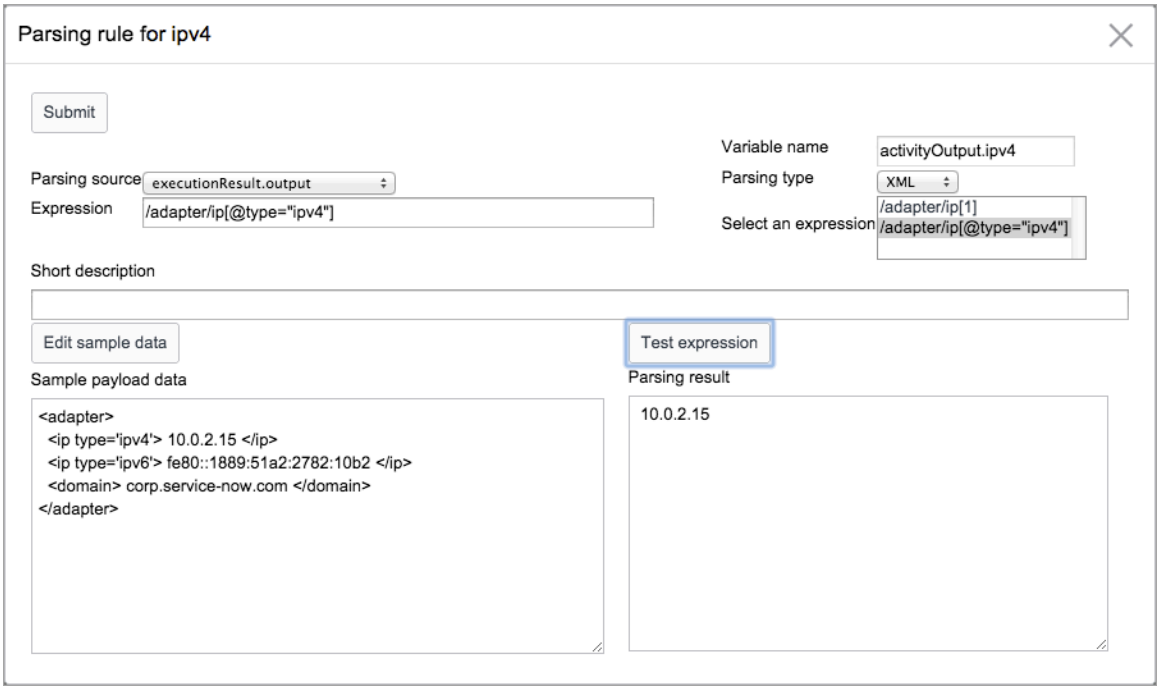

11. Click **Submit**.

The view returns to the **Outputs** tab of the activity designer. The new parsing rule is listed, and a blank row is available for another rule.



Activity conditions

Create the exit conditions for your activity in the **Condition** column and set the order for each..

The system evaluates the condition with the lowest order number first and stops when it finds the first true condition. The system delays evaluation of conditions with an **Else** value set to **true** until all conditions with an **Else** value set to **false** are evaluated. If the system does not find a true condition, it looks for a default condition in which the value for **Else** is **true** and takes this exit. You must have at least one default exit condition, or the activity hangs when the workflow runs.

The following are possible conditions you might create for an activity:

Sample activity conditions

Condition	Evaluation
Success	Tests for a success condition. **Else** is set to **false** and the **Order** is set to **100**. If this condition is true, the activity takes the **Success** exit. If this condition is false, the system evaluates the next condition in order.

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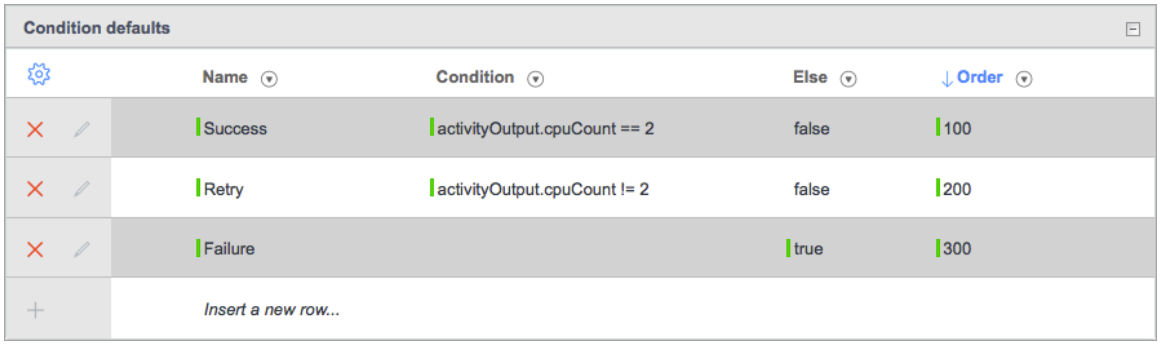
Sample activity conditions (continued)

Condition	Evaluation
Retry	Tests for a condition that runs the activity again. **Else** is set to **false**. If this condition is true, the activity runs again. If this condition is false, the system takes the default **Failure** exit.
Failure	Default condition that allows the workflow to continue if the other conditions in the activity are false. **Else** is set to **true**.



Orchestration custom activity templates

Orchestration provides customizable activity templates to create and manage custom activities in the Workflow Editor.

You create and update different types of Orchestration activities with the Activity Designer using activity templates for SSH, PowerShell, REST, SOAP, JMS, SFTP, JDBC, JavaScript Probes, and Probes.

Hundreds of workflows can share these activities simultaneously. Before you change an activity, you should check the workflows that they are part of by clicking the form menu icon ( ) and selecting **Used In**. Any central change to a versioned activity automatically updates across workflows unless you have pinned that activity .

All the Orchestration Core activities are built using the Activity Designer in scoped applications. Custom activities can be developed in the global scope or their own application scope even if that scope is different from the scope of the workflow. Use Activity scoping when build your own activity packs.

Create a JDBC activity

Create a custom JDBC activity to automate SQL commands and stored procedure calls to relational databases from workflow.

Before you begin

Role required: activity_admin, activity_creator

About this task

The JDBC activity template allows you to execute ANSI SQL statements or stored procedures on a target database. Support for stored procedures with IN, OUT, and INOUT parameters are available in Washington DC. To learn how to set up these parameters, see JDBC stored procedure parameters.

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Note:
If you are transferring bulk data into a ServiceNow instance from an external data source, use Import sets key concepts. The JDBC activities allow you to transfer data between external data sources and ServiceNow within a workflow. It is not intended to replace the bulk import features of data sources.

Procedure

1. Create or verify your JDBC credential.
   Your JDBC credentials must have permission for the target database and proper configuration for the corresponding JDBC connection. Credentials must be set up before you can create a JDBC activity.
2. Create or verify your JDBC connection.
   Your JDBC connection must be configured with valid JDBC credentials set up before you can create a JDBC activity.
3. Create a custom activity.
   This action creates a custom activity using a template.
4. After setting up general properties and creating input variables, configure the JDBC Execution Command.

Option	Description
JDBC Connection	Configure or reference the appropriate JDBC Connection for the database. The connection selected provides the activity with the following information: ○ Target database information (server and database names) ○ Connection URL ○ Target database port (if different from standard port number) ○ Database instance name
Credential	JDBC credential to use for your JDBC connection.
SQL statement	Input the ANSI SQL to execute on the JDBC target database. **Note:** This field is hidden when the Stored Procedure check box is selected. You can map the input variables you created to configure the SQL statements. By default, you can run the following SQL statements. ○ select ○ insert ○ update ○ delete ○ show

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Option	Description
	○ create ○ describe For added security measure, a MID Server property controls the operations that this JDBCOrchestrationProbe executes, which restricts the SQL commands used. This property protects against potentially destructive commands, such as drop database. The mid.property.jdbc_operations contains the MID Server property controls. **Note:** You cannot run multiple statements of different types. For example, you cannot run a select statement and an update statement together, but you can run two insert statements. However, you cannot run multiple select statements in this activity.
Maximum rows	Maximum number of records to retrieve from database. The default is 1000.
Maximum payload size (KB)	You can set a limit on the maximum payload size of data retrieved from the database. The default is 64 kilobytes.
Connection timeout	How long the activity waits to make the connection. This field is populated automatically from the data source, but can be changed for this activity.
Query timeout	Elapsed time to wait after running the query until the data is returned. This field is populated automatically from the data source, but can be changed for this activity.
Required MID Server capabilities	MID Server to use for querying JDBC, by capabilities. By default, the system selects a MID Server that has JDBC capability.
Use stored procedure	If checked, you can run a stored procedure on MySQL, Oracle, or SQL Server databases by entering the procedure name and parameters. See JDBC stored procedure parameters.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

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What to do next

- Test JDBC activity inputs
- Use auto-mapping to generate outputs and parsing rules (recommended for JDBC)
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Related topics

Create custom activities using custom activity designer templates

Create a JDBC connection for an Orchestration activity

The JDBC Connection [jdbc_connection] table provides the information custom JDBC Orchestration activities use to connect to various target databases.

Before you begin

You must have an appropriate JAR file, whether it is supplied with the instance or a custom JAR file.

Note:
The ServiceNow instance supplies `mysql-connector-java-5.1.21.jar`, `sql-server-jdbc-4.0.jar`, and `ojdbc6.jar` files as part of the current release, which supports MySQL, SQLServer, and Oracle databases. Other databases, such as Sybase or DB2 Universal, must use a custom JAR file that must be uploaded to the instance before setting the JDBC connection.

Role required: activity_admin, activity_creator

About this task

JDBC credentials JDBC credentials are retrieved separately by the activity designer template and support external credential storage, such as CyberArk.

Procedure

1. Navigate to **All** > **Orchestration** > **Credentials & Connections** > **JDBC Connections** and click **New**.
2. Complete the form using the fields in the table.
   The database selection in the **Format** field determines which fields are available.

JDBC connection fields

Field	Database Format	Description
Name	All	Unique name of this JDBC connection. For example, you might enter **JDBC MySQLProd**.
Query timeout	All	Maximum elapsed time the JDBC query is allowed to run without a response.
Connection timeout	All	Maximum elapsed time for the JDBC activity to wait while attempting to connect to the target database.
Application	All	Scope for this table. By default, the JDBC Connection [jdbc_connection] table runs in the **Global** scope.
Domain	All	Domain for this table. By default, the JDBC Connection [jdbc_connection] table runs in the **global** domain.
Format	All	Database type for this connection. The default choices are:

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Field	Database Format	Description
		○ **MySQL** ○ **Oracle** ○ **SQLServer** ○ **None** You can add **Sybase** or **DB2 Universal** to the choice list by uploading the appropriate JDBC driver JAR file to the instance. Orchestration automatically recognizes these drivers when they are loaded into the system and adds them to this list.
Server	Oracle, MySQL, SQLServer	Host name or IP address of the database server.
Oracle sid	Oracle	The Oracle database site identifier. The default value is **orcl**.
Oracle port	Oracle	Port that the Oracle database is using. The default value is **1521**.
Database name	MySQL, SQLServer	Name of the database.
Database port	My SQL, SQLServer	Port that the selected database is using.
Instance name	SQLServer	Instance name for the selected SQLServer
Connection URL	All	URL that the MID Server uses to connect to the specified database. The URL is created automatically when you save the form, and is read-only for the default databases. **Note:** If the format selected is not one of the default databases, you must create the connection URL manually so that the MID Server knows how to create the connection.
JDBC driver	None, DB2 Universal, Sybase	The JDBC driver to use for this connection when it is not a default database. **Note:** If you add a Sybase or DB2 Universal database, you must enter the driver name in this field and upload the driver JAR file to the instance.

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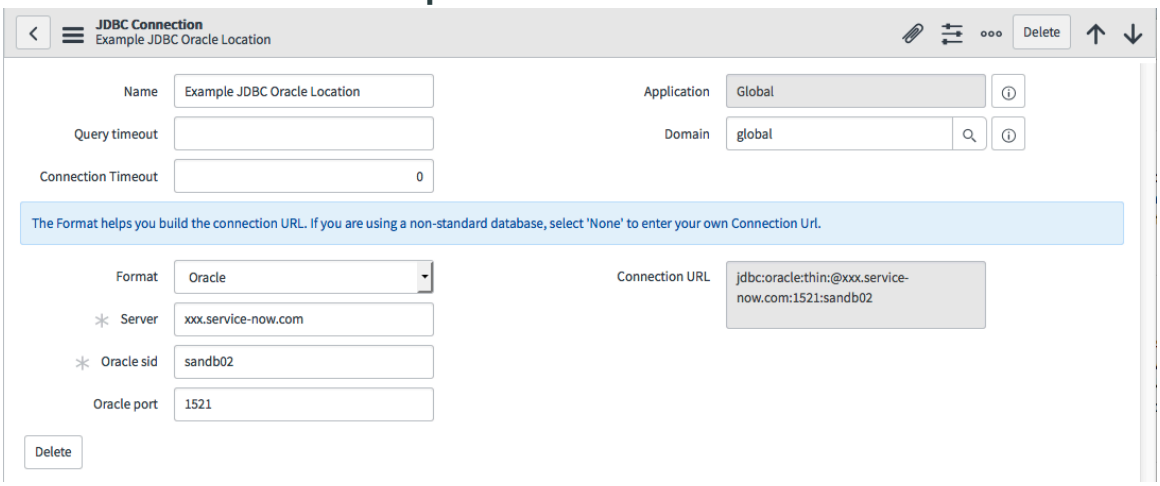
JDBC connection to Oracle example



3. Click **Submit**.

Related topics

JDBC credentials

Auto-map JDBC activity output variables

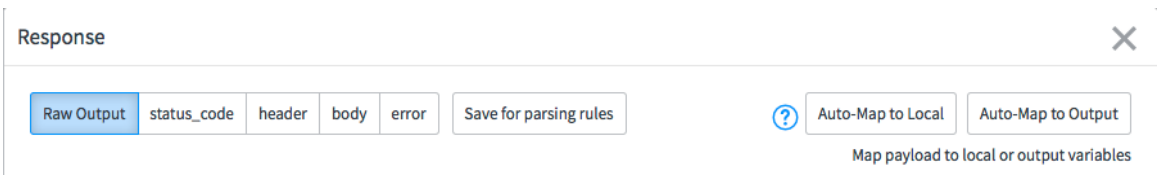
The ServiceNow activity designer allows you to map parameter values in a JDBC test payload to variables in the **Outputs** tab automatically.

Before you begin

Role required: admin

Procedure

1. In the JDBC provider template form, select the **Inputs** tab.
2. Click **Test Activity** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
3. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



4. Select one of these auto-mapping options.
   - **Auto-Map to Local**: Directly maps values to a local variable for use within the activity.
   - **Auto-Map to Output**: Directly maps values to the output variable to pass to other activities in the workflow. Auto-mapping to an output variable creates an array of objects, each of which contains the column names from the query result.

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JDBC stored procedure parameters

You can use Orchestration to run a stored procedure on MySQL, Oracle DB, and MS-SQL databases.

There is support of multiple data types, with the following limitations:

- Only one result-set is returned.
- The order of input and output data types in the stored procedure parameters must match the activity definition.
- Binary, Blob, Varbinary, and LongBinary should be base64 encoded.
- Date, Time, and Timestamp have a specific format:

  Date format: yyyy-mm-dd

  yyyy-mm-dd is the supported format.

  Time format: hh:mm:ss[.sss]

  hh:mm:ss[.sss] is the supported format. Precision is in milliseconds only, microseconds or nanoseconds cannot be handled.

  Note:
  `10:30:59` and `10:30:59.999000` are correct, but `10:30:59.` is incorrect.

  Timestamp format: yyyy-mm-dd hh:mm:ss[.ffffff]

  yyyy-mm-dd hh:mm:ss[.ffffff] is the supported format. Precision is to microseconds.

- ResultSet is the first result set coming back from database server.
- MS-SQL does not support INOUT parameters. If you use INOUT parameters, the Activity Template transparently maps them to OUT parameters.

Note:
If you do not want to do a validation of data types in stored procedure parameters, like the legacy behavior, you set the glide.stored_proc.data_type.validation as false. See MID Server properties for more information.

Stored procedure parameters

Field	Description
Mode	Type of stored procedure parameter. Supported parameters: • IN • OUT • INOUT
Sql Type	A SQL data type. Supported data types: • ARRAY • BIGINT • BINARY • BIT

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Stored procedure parameters (continued)

Field	Description
	• BLOB • CHAR • CLOB • DATE • DECIMAL • DISTINCT • DOUBLE • FLOAT • INT • INTEGER • JAVA_OBJECT • LONGVARBINARY • LONGVARCHAR • NULL • NUMERIC • OTHER • REAL • REF • REF_CURSOR • SMALLINT • STRUCT • TIME • TIMESTAMP • TINYINT • VARBINARY • VARCHAR
Name/Value	Name-value pairs to pass to the host. You can create these parameters manually, or drag and drop input variables into the parameter fields and assign a value.

Note:
Not all database providers support the entire realm of JDBC data types. Reference your database reference manual to understand the supported datatypes for your installation.

Test JDBC activity template inputs

You can test the input parameters of a custom JDBC activity during its development without having to run the activity in a workflow context.

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Before you begin

Create input variables and map them to fields in the Execution Command form or provide actual values for these fields. Role required: web_service_admin, activity_admin, activity_creator

About this task

This test executes only the input parameters against an endpoint and not the pre-processing or post-processing scripts. It is not necessary to check out the activity to test it.

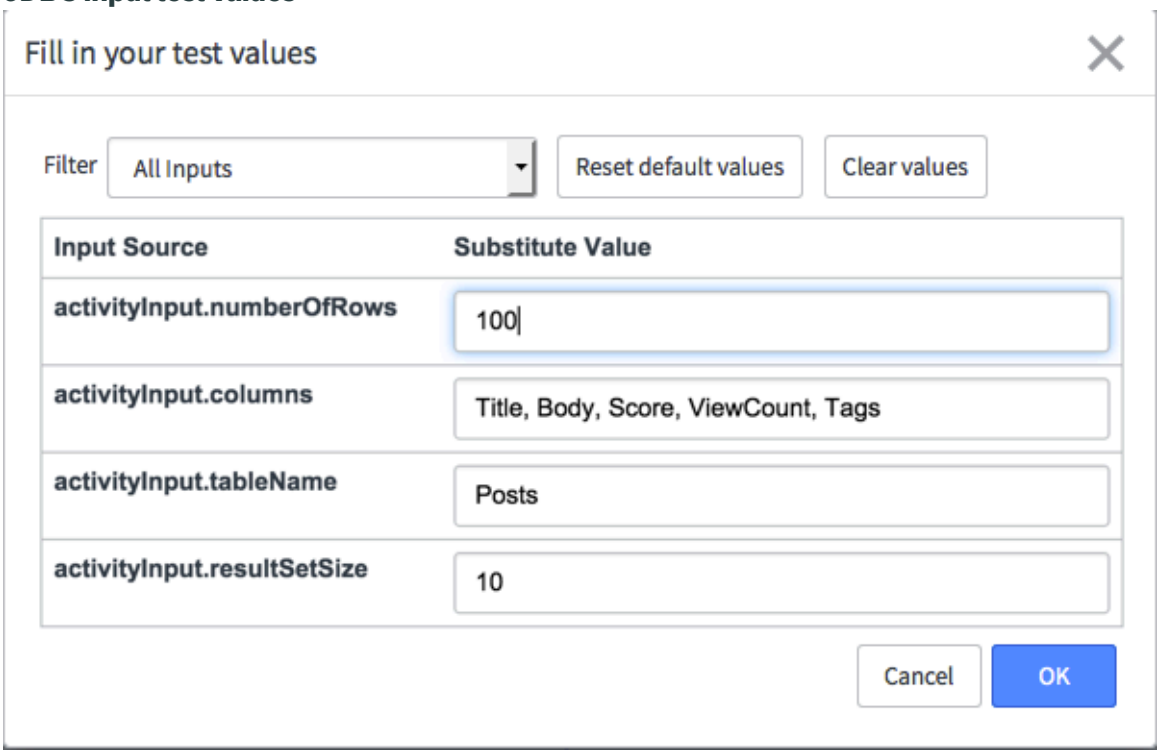
Note:
If you provide enough information for Orchestration to contact the endpoint or host and return data, you can test the input variables. You can test from any stage in the activity designer. Typically, the Execution Command stage is the point at which your inputs are ready for testing.

Procedure

1. From the JDBC Execution Command, click **Test Inputs**.
   The list of input source variables appears. If you added default values for these variables, those values appear in the **Substitute Value** column. Mandatory variables are marked with a red star.

   Note:
   The test fails if the MID Server cannot be found or if it cannot connect to the target.

   JDBC input test values

2. Filter the variable list with these controls:
   - **All Inputs**: Displays all input variables. This control is the default view.
   - **Mandatory Inputs**: Displays only mandatory variables.
   - **Inputs Without Defaults**: Shows input variables that do not have assigned default values.
3. Reset values as needed.

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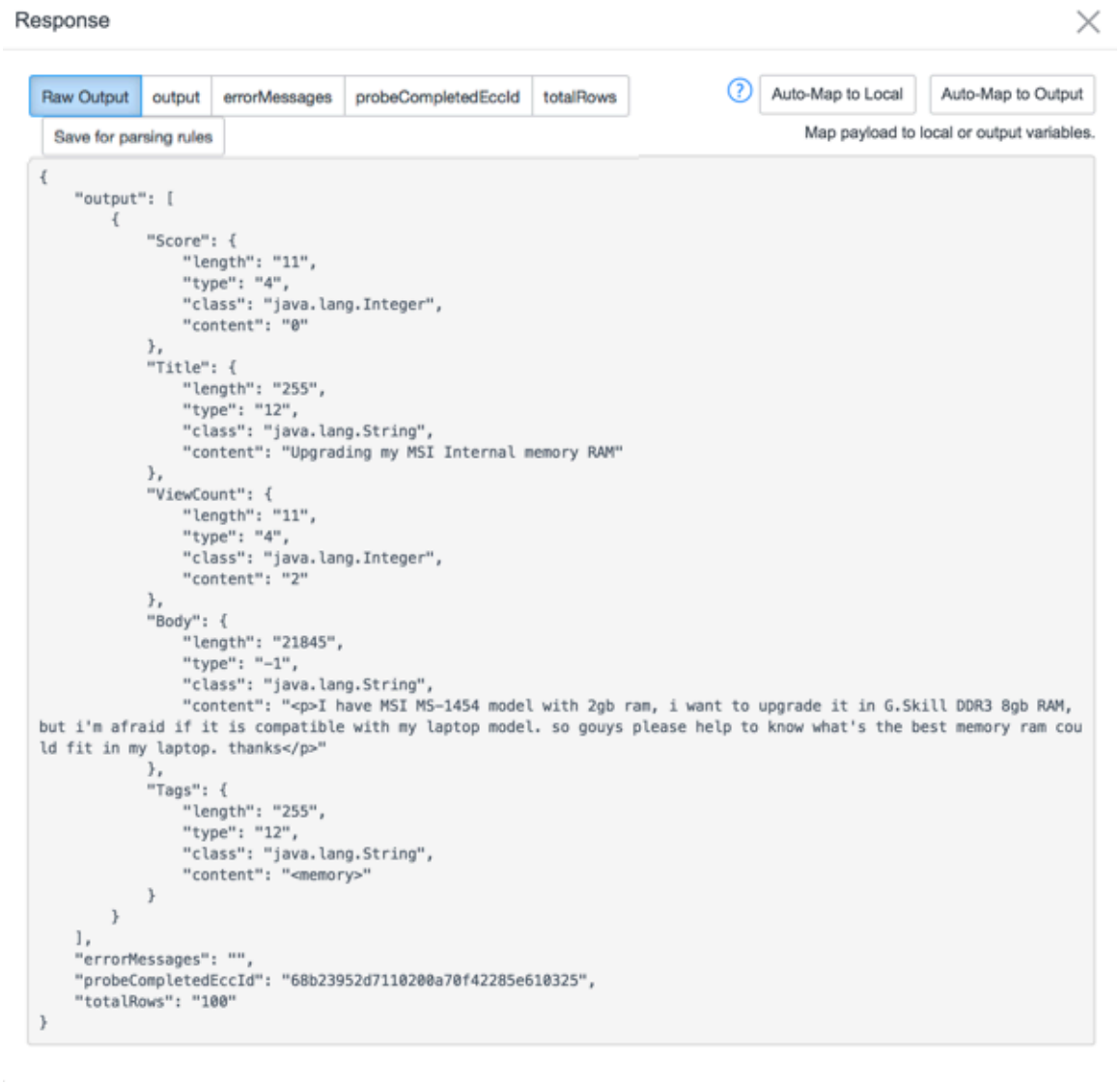
- **Reset default values**: If values are present, this control replaces any test values set in this form with the default values.
- **Clear values**: Clears all values in the input variable list, even if default values exist.

4. When your test values are configured correctly, click **OK**.
   The system runs the values for all the inputs configured against the specified target and returns the resulting payload. The buttons in the Response form display different views of the payload. The entire payload appears in the **Raw Output** window.

Response payload from inputs test



5. To map appropriate parameter values in the payload to variables in the **Outputs** stage automatically, select an auto-mapping option.
6. Click the **X** in the upper right corner of the window to close it.

Create a SOAP web service activity

Use this template to create a custom SOAP activity.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

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About this task

For instructions on using the activity template process flow, see create custom activities.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the SOAP web service Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes on the SOAP web service.
Web service message	Specify the SOAP web service message to use for this activity. If you need information on SOAP web services messages, see SOAP
Web service message function	Specify the SOAP message function available in conjunction with the SOAP web service.
Endpoint	If you enter an endpoint in this field, it over rides the endpoint URL configured in the SOAP message web service. Click the lock icon to open the input field and add the end point.
SOAP message parameters	Name-value pairs to pass to the SOAP end point. You can create these parameters man ually, or drag input variables into the parame ter fields and then assign a value. Parameters defined in the SOAP message that use ${} can be assigned data from this activity tem plate. Use the **Additional attribute** column to configure the system to not escape the text. By default, text sent to the SOAP message is escaped. The **Name** column is auto-populat ed if the users have provided variables using Variable substitution in outbound REST mes in the SOAP message.
Use MID Server	Check box that determines if a MID Server must be used to invoke the SOAP web ser vice. If the SOAP web service message func tion defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the SOAP end point. By default, the system selects a MID Server with SOAP capabilities. This field is available when the **Use MID Server** check box is selected.

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Option	Description
Timeout	Allowed duration of the SOAP web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in SOAP message**: Uses credential definitions from the SOAP message definition. ○ **Override with Basic Authentication credentials:** Uses |Enable basic authentication credentials. Overrides the credentials in the SOAP message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with certificate authentication credentials. ○ **Override with Both Basic and Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with both basic authentication or certificate authentication credentials. ○ **Override with WS-Security Username profile**: Overrides the credentials in the SOAP message definition with credentials defined a
Credentials	Required REST endpoint basic authentication credentials. This field is available when **Override with Basic Authentication credentials** is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the default safe defined in the MID Server configuration file by adding the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *newsafe:orch-test-f5*. See Configure for details.
Protocol Profile	Outbound web services mutual authentication to use for authentication. This field is available when the authentication type is either **Override with Certificate Authentica**

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Option	Description
	tion credentials or **Override with Both Basic and Certificate Authentication credentials**.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

- Use auto-mapping to generate outputs and parsing rules (recommended for JDBC)
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Auto-map SOAP activity output variables

The ServiceNow activity designer allows you to map parameter values in a SOAP test payload to variables in the **Outputs** stage automatically.

Before you begin

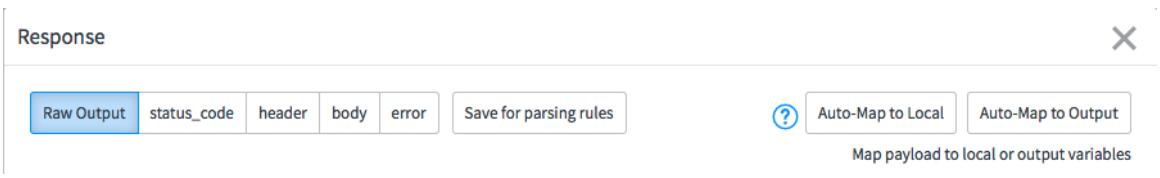
Role required: web_service_admin, activity_admin, activity_creator

About this task

Note:
You can test input variables from any stage in the activity designer if you have provided enough information for Orchestration to contact the endpoint and return data. Typically, the **Execution Command** stage is the point at which your inputs are ready for testing.

Procedure

1. In the activity designer, proceed to the **Execution Command** stage.
2. Define an appropriate MID Server, if requested.
   The test fails if the MID Server cannot be found or if it cannot connect to the target.
3. Click **Test Activity** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
4. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



5. Select one of these auto-mapping options.
   - **Auto-Map to Local**: Directly maps values to a local variable for use within the activity.
   - **Auto-Map to Output**: Directly maps values to the output variable to pass to other activities in the workflow. Auto-mapping to an output variable creates an array of objects, each of which contains the column names from the query result.

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Provide credentials to access a SOAP message WSDL

If the SOAP WSDL you are requesting in a test payload requires authentication, you must provide basic auth credentials in either the SOAP message or the SOAP activity.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

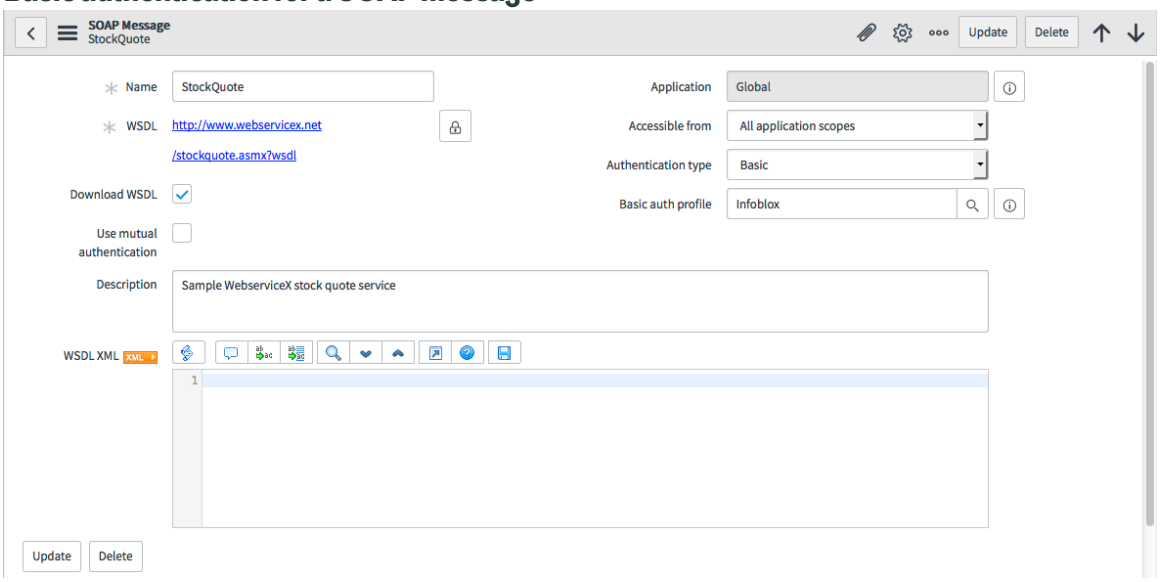
The ServiceNow instance only supports basic auth credentials for accessing a WSDL. If the SOAP function or the SOAP message does not provide these credentials, you must configure them in the SOAP activity template. Orchestration uses these priorities for deciding which basic authentication credentials to use:

- SOAP message: Credentials for a SOAP message are used if no other credentials are defined.
- SOAP function: Credentials for a SOAP function override the credentials configured for the SOAP message.
- SOAP activity template: Credentials for a SOAP activity template override both the SOAP function and SOAP message credentials.

Procedure

1. Navigate to **All** > **System Web Services** > **Outbound** > **SOAP Message**.
2. Select the SOAP message you want the activity to use.
3. In the SOAP Message record, select the **Download WSDL** check box.
4. In the **Authentication type** field, select **Basic**.
   The **Basic auth profile** field appears.
5. Select the basic auth profile to use with this SOAP message.

Basic authentication for a SOAP message



6. Alternately, you can configure basic authentication credentials in Configure the SOAP execution command.

   a. In the **Authentication** field, select **Override with Basic Authentication credentials**.
      The **Credentials** field appears.

   b. Select the basic auth credentials to use to access the WSDL.

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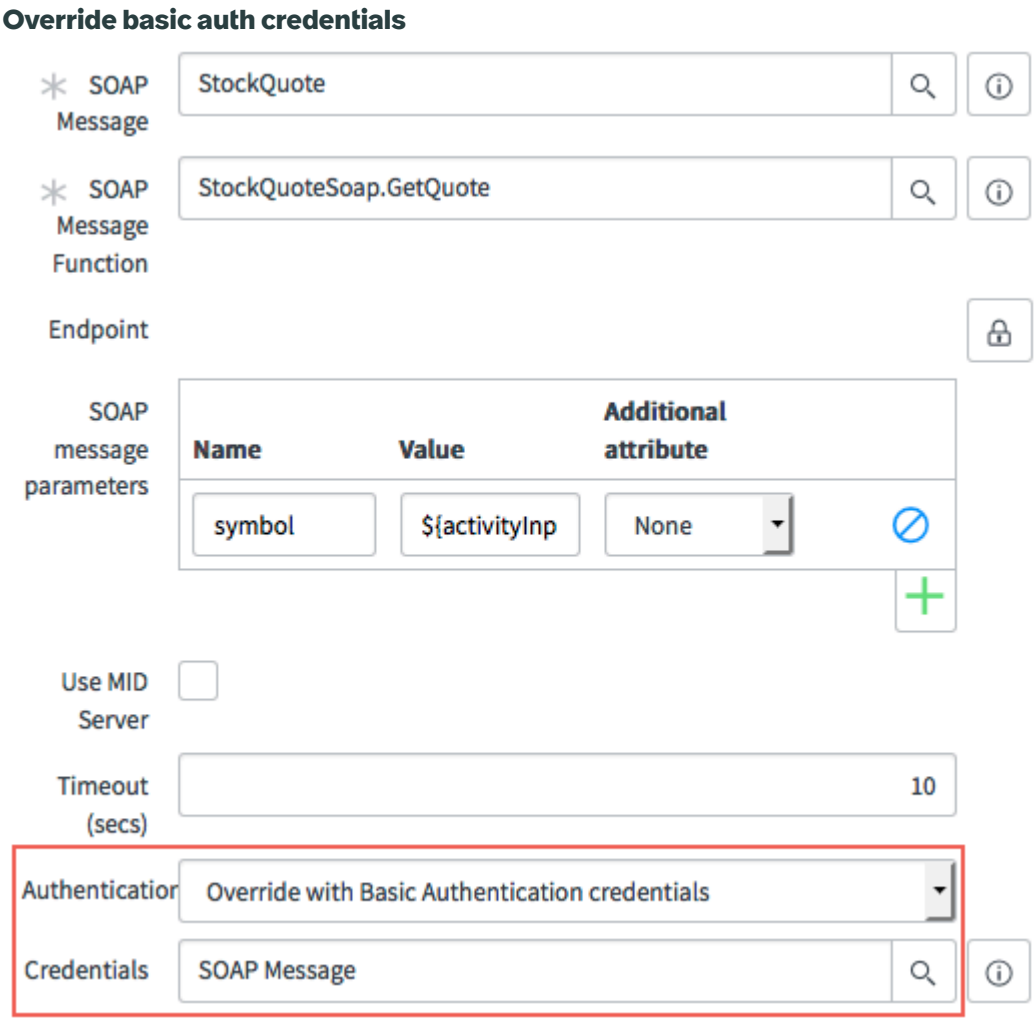
This setting overrides any credentials configured in the SOAP message.



Configure the SOAP execution command

Use the input variables you created to configure the command that Orchestration executes on the SOAP endpoint.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: web_service_admin, activity_admin, activity_creator

Note:
You can test the SOAP connection between the MID Server and the endpoint without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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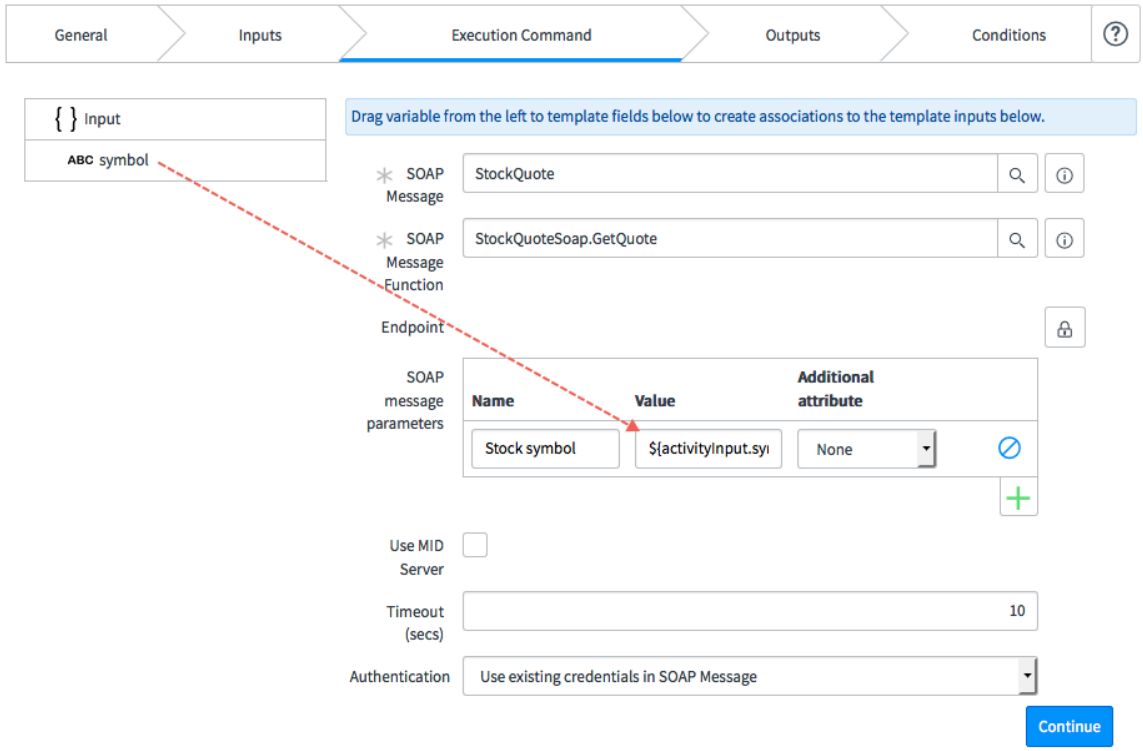
SOAP execution command



2. Complete the fields shown in the table.

SOAP template execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Web service message	SOAP message to use for this activity. Users must have the web_service_admin role to configure this field.
Web service message function	SOAP message SOAP message functions to use for this activity. Users must have the web_service_admin role to configure this field.
Endpoint	Endpoint URL for the SOAP web service this activity uses. Enter an endpoint in this field to override the endpoint configured in the SOAP message. Click the lock icon to open the input field.
SOAP message parameters	Name-value pairs to pass to the SOAP endpoint. You can create these parameters manually, or drag input variables into the parameter fields and then assign a value. Parameters defined in the SOAP message that use ${} can be assigned data from this activity template. Use the **Additional attribute** column to configure the system to not escape the text. By default, text sent to the SOAP message is escaped. The **Name** column is auto-populated if the users have provided variables using Variable substitution in outbound REST messages in the SOAP message.
Use MID Server	Check box that determines if a MID Server must be used to invoke the SOAP web service. **Note:**

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Field	Description
	If the SOAP web service message function defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the SOAP endpoint. By default, the system selects a MID Server with SOAP capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the SOAP web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in SOAP message**: Uses credential definitions from the SOAP message definition. ○ **Override with Basic Authentication credentials:** Uses |Enable basic authentication for outbound SOAP credentials. Overrides the credentials in the SOAP message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with certificate authentication credentials. ○ **Override with Both Basic and Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with both basic authentication or certificate authentication credentials. ○ **Override with WS-Security Username profile**: Overrides the credentials in the SOAP message definition with credentials defined a WS-Security.
Credentials	Required REST endpoint basic authentication credentials. This field is available when **Override with Basic Authentication credentials** is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the Configure the MID Server for CyberArk defined in the MID Server configuration file by adding the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *`newsafe:orch-test-f5`*.
Protocol Profile	Outbound web services mutual authentication to use for authentication. This field is available when the authentication type is either **Override with Certificate Authentication credentials** or **Override with Both Basic and Certificate Authentication credentials**.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

SOAP template execution parameters

You use execution parameters to create the input process script in the **Pre processing** form of the activity designer.

For descriptions of the SOAP web service command fields, see the table in Configure the SOAP execution command.

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Note:
You must use the `executionParam.` prefix with all variables in this table.

SOAP execution parameters

Name	Variable	Type	Usage
Web service message	web_service_message	Reference	The sys_id of the corresponding SOAP message.
Web service message function	web-service_message_function	Reference	The sys_id of the SOAP message function.
Web service endpoint	web_service_endpoint	String	URL of the SOAP endpoint.
Parameters	parameters	Array of JavaScript objects	Array of JavaScript objects, expressed with the `executionParam.` prefix. For instructions on creating arrays using this parameter, see Create a JavaScript array in a SOAP template.
Use mid server	use_mid_server	Boolean	When true, indicates that a MID Server is used.
MidCapabilities	midCapabilities	String (comma separated)	List of references to required MID Server capabilities.
Time out	time_out	String	Allowed duration of the SOAP web service request before it times out, in seconds. The default is **10**.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. Use this example to customize the MID Server selection if there are additional capabilities that are assigned by value: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`
Auth Type	auth_type	Boolean	Type of credentials to use. The choices are: • basic_auth_pick_credentials • use_existing_credentials
Credentials	credentials	Reference	Credentials to use for this SOAP message when the `auth_type` is `basic_auth_pick_credentials`.

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Create a JavaScript array in a SOAP template

These are instructions for creating JavaScript arrays using SOAP execution parameters.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

To add more name-value pairs to the parameter's array, append the values to the existing array.

Procedure

1. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_a
ttribute":"none"};
executionParam.parameters.push(newParameter);
```

   By adding the new parameter JavaScript object to the array, you ensure that any elements already available in the array are not impacted.

2. Make sure to set the value in the **Additional attribute** column in the **SOAP message parameters** input field to **Do not escape text**.

   In this case, the system does not escape the value specified for the **value** attribute. An example of this is:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_a
ttribute":"do_not_escape_text"};
executionParam.parameters.push(newParameter);
```

   Note:
   If the value for the **additional_attribute** field is **None**, then the system escapes the value specified by the **value** attribute. In the first example, `parameterValue` is escaped.

SOAP template post-processing parameters

Use these parameters to create a post-processing script.

Activity designer post-processing parameters

Name	Variable	Type	Usage
Status code	status_code	Integer	Contains the status code returned from the web service.
Header	header	Hashmap of JavaScript object	Contains the key value paired hashmap associated with the header values passed into the web service. You can access each value with `executionResult.header[keyName]`.
Body	body	String	Contains a string value representing the output from the SOAP message
Error	error	String	Returns the error string from the SOAP web service, unless there are no errors, in which case it returns**null**.

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Create a JavaScript Probe activity

Create a JavaScript Probe activity to instruct a MID server to execute server-side javascript.

Before you begin

Role required: activity_creator or workflow_admin

About this task

The JavascriptProbe activity has the same functionality as making 'Packages' calls into standard Java libraries. It allows you to have more control over the Java libraries on the MID Server. You can load your own JAR files on the MID Server and have the JavascriptProbe make Package calls into those java files.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the JavaScript probe activity Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes on the MID server.
Script type	Select the type of script to include. Available options are: ○ Custom JavaScript ○ MID Server script include
Script	Custom JavaScript to run with this probe. **Note:** This field is available when the **Script type** selected is **Custom JavaScript**.
MID Server script include	Script for the MID Server to run with this probe. **Note:** This field is available when the **Script type** selected is **MID Server script include**.
Select MID Server by host	MID Server on which the probe runs.
Required MID Server capabilities	MID Server to use, by capabilities.
Parameters	Name-value pairs to pass to the host with this probe. You can create these parameters manually, or drag input variables into the **Parameters** fields and assign a value.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

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What to do next

Finish creating your JavaScript probe activity by creating output variables, creating a parsing rule, or Conditions. Refer to the create custom activities topic to know your template options.

JavaScript probe template execution parameters

You use execution parameters to create the input process script in the **Preprocessing** form of the activity designer.

For descriptions of the JavaScript Probe command fields, see the table in Configure the JavaScript Probe execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

JavaScript template execution parameters

Name	Variable	Type	Usage
Script Type	script_type	Enumerated	Type of script to run. The possible types are: • custom_javascript_typ • mid_script_include_type
Script	script	String	Script that runs custom JavaScript when the **script_type** is **custom_javascript_type**.
Mid script include	mid_script_include	Reference	The sys_id reference associated with the MID Server script include to call, when the **script_type** is **mid_script_include_type**.
Source	source	String	Target host on which to run the script.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.
Parameters	parameters	Array of JavaScript object	Array of JavaScript objects, expressed with the `executionParam.` prefix. To add more name-value pairs to the **parameters** array, append them to the existing array. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array. This assigns additional parameters to the message: `var newParameter = {"name":"parameterName","value":"parameterValue"}; executionParam.parameters.push(newParameter);`
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional

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JavaScript template execution parameters (continued)

Name	Variable	Type	Usage
			capabilities that are assigned by value, use this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

JavaScript probe template post-processing parameters

Use these parameters to create a post-processing script.

JavaScript probe post-processing parameters

Name	Variable	Type	Usage
Payload	payload	String	Contains raw payload returned from the JavaScript Probe.
Output	output	String	Contains output data returned from the JavaScript Probe.
EccSysId	eccSysId	String	Contains the reference ID associated with the ECC Queue input message.
Error Messages	errorMessages	String	Contains the error messages returned from the JavaScript probe. If no error messages are returned, this value is null.

Configure the JavaScript Probe execution command

Use the input variables you created to configure the command that Orchestration executes on the JavaScript Probe target host.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note:
You can test the JavaScript Probe connection between the MID Server and the target without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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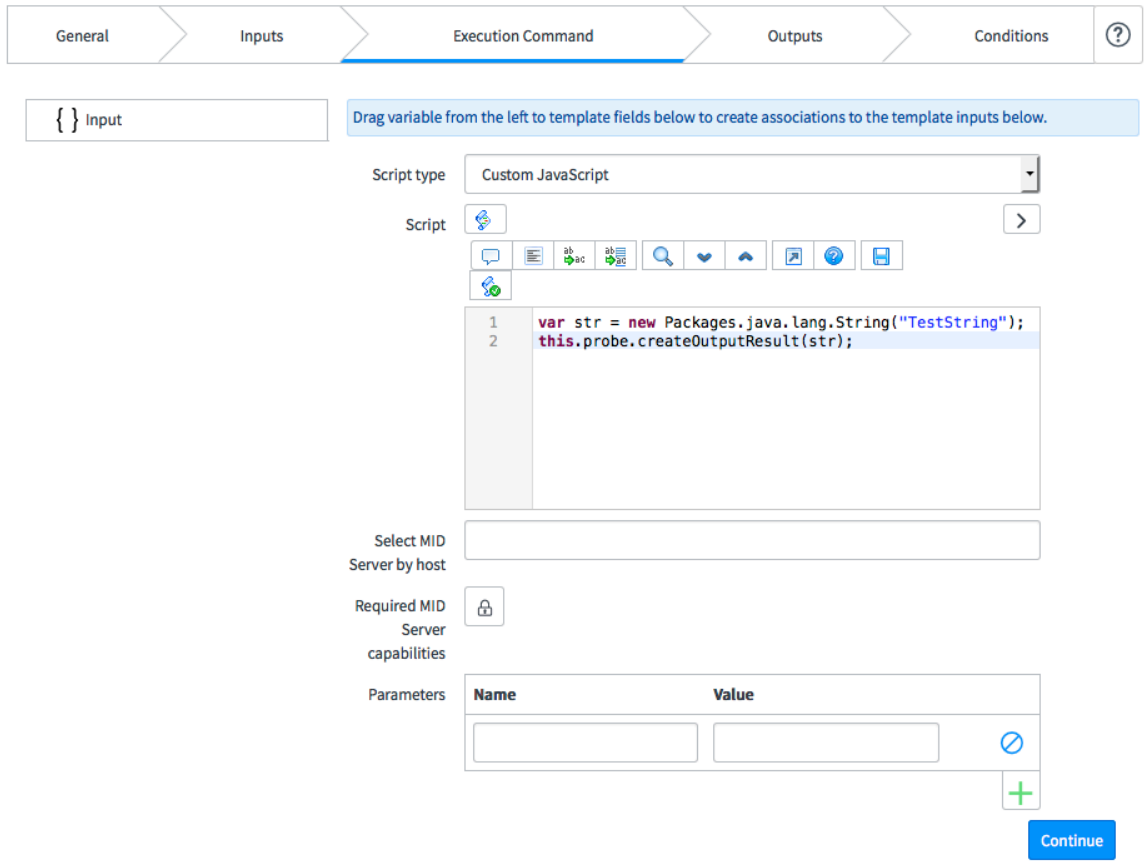
JavaScript Probe execution command



2. Complete the fields shown in the table.

JavaScript Probe execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Script type	Select the type of script to include. Available options are: ○ Custom JavaScript ○ MID Server script include
Script	Custom JavaScript to run with this probe. This field is available when the **Script type** selected is **Custom JavaScript**.
MID Server script include	Script for the MID Server to run with this probe. This field is available when the **Script type** selected is **MID Server script include**.
Select MID Server by host	MID Server on which the probe runs.
Required MID Server capabilities	MID Server to use, by capabilities.
Parameters	Name-value pairs to pass to the host with this probe. You can create these parameters manually, or drag input variables into the **Parameters** fields and assign a value.

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3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create a PowerShell activity

Create a custom PowerShell activity return data to a workflow from a host using Microsoft PowerShell.

Before you begin

Role required: activity_creator or workflow_admin

About this task

ServiceNow supports PowerShell 3.0 to 5.1.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the PowerShell Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes on the MID Server.
Target host	Host name or IP address of the target server for this PowerShell activity.
Script type	Type of PowerShell script to run on the Power Shell host. Available options are: ○ Custom PowerShell command ○ MID Server script file
MID Server script file	The MID Server script file contains the Power Shell scripts. This field is available when the **Script type** selected is MID Server script file.
Command	PowerShell command the activity executes. This field is available when the **Script type** se lected is *Custom PowerShell command*. You can create your commands by dragging and dropping input variables from the variable builder into this field.
PowerShell variables	Name-value pairs to pass to the host with Pow erShell. You can create these variables man ually, or drag input variables into the **Value** field. Encrypted input variables retain their en cryption, regardless of the data type settings in this field. If you type in a value and select the **Encrypted** data type, your value appears in plain text. It is only encrypted when it pass es to the ECC Queue.
Use MID Service Account	If checked, this activity authenticates on the target host using the credentials of the MID

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Option	Description
	Server service account only, without trying any other credentials. **Note:** The **Credential tag** field is not available.
Credential tag	Credential tag this activity must use to run PowerShell commands on the host. If this field is left blank, the MID Server tries all the available credentials until it finds a valid one, ending with the MID Server service account. If a credential tag is defined, the MID Server tries the credentials with that tag specified on ly and does not try the MID Server service ac count. **Note:** This field is not available when the **Use MID service account** check box is se lected.
Required MID Server capabilities	MID Server to use for querying PowerShell, by capabilities. By default, the system selects a PowerShell MID Server.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

Finish creating your PowerShell activity by creating output variables, creating a parsing rule, or Conditions. Refer to the create custom activities topic to know your template options.

PowerShell template execution parameters

You use execution parameters to create the input process script in the **Pre Processing** form of the activity designer.

For descriptions of the Powershell command fields, see the table in Configure the PowerShell execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

Powershell execution parameters

Name	Variable	Type	Usage
Source	source	String	Target host on which to execute the command.
Script type	script_type	Enumeration	Type of script to run. The possible types are:

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Powershell execution parameters (continued)

Name	Variable	Type	Usage
			• **command:** Custom PowerShell command. • **file:** Identifies the MID Server script file to run.
Command	command	String	Command sent to the MID Server for it to run on the target host.
MidScriptFile	midScriptFile	Reference	Reference sys_id of the MID Server script file to execute, when the **script_type** is **file**.
PowershellVariables	powershellVariables	Array of hashmap	Hashmap of JavaScript objects with **name**, **value**, and **type** for each object. The **type** of each object can be one of **plain**, **encrypted**, **boolean**, or **null**, corresponding to the PowerShell variable **type** selected in the inputs tab. For example, you might enter: `var newParameter = {"name":"parameterName","value":"parameterValue", "type": "plain" }; executionParam.powershellVariables.push(newParameter);`
Credential tag	credential_tag	String	Specific credential tag this activity must use to run PowerShell commands on the host.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY': 'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

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Powershell post-processing parameters and payload parsing

Use these parameters to create a post-processing script, payload parsing, and tagging.

Powershell post-processing parameters

Name	Variable	Type	Usage

Tags	tags	Hashmap of tag values to return from the PowerShell command.	Contains the tags used to extract output using the PowerShell commands. The tag output is delimited by double percentage signs, as in **%%tagname%% ... %%**. Set up the command using the format in this example:
			`Write-Host %%tagname1%%`
			`output1 line 1`
			`output1 line 2`
			`…`
			`Write-Host%%`
			
			`Write-Host %%tagname2%%`
			`output2 line 1`
			`output2 line 2`
			`…`
			`Write-Host%%`
			
			The tags returned are JavaScript hashmap objects in which each key is prefixed with **tag** appended with the **tagname**.
			`{"__text__": "",`
			`"tagtagname1":"output1`
			`line1\noutput1 line2\n",`
			`"tagtagname2":"output2`
			`line1\noutput2 line2\n"}`

Hresult	hresult	String	Contains any **hresult** returned from the PowerShell command. If no **hresult** is returned, this parameter is **null**.
Output	output	String	Contains the raw output from the PowerShell command.
EccSysID	eccSysID	String	Contains the reference ID associated with the ECC Queue input message returned by the activity.
ErrorMessages	errorMessages	String	Contains any error messages retrieved from the PowerShell command. This value is **null** if there are no error messages.

Create a REST web service activity

Use this procedure to create a custom REST web service Orchestration activity.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

To create and use a REST web service workflow activity:

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- Create a Create a REST message if an appropriate one is not already configured.
- Assign the web_service_admin role to any user who must create or edit a custom REST activity.
- Determine an application, or Application scope, for this activity.
- Determine the Create a REST message to use for the activity. Use this value to override the endpoint configured in the REST message.
- Optionally, create basic authentication credentials. Use this value to override the credentials configured in the SOAP message.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the REST web service Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes.
REST message	Name of an existing REST message to use in this activity.
REST message function	REST message function to use for this activity.
Endpoint	Endpoint URL for the REST web service this activity uses. Enter an endpoint in this field to override the endpoint configured in the REST message. Click the lock to open the in put field.
Variable substitutions	Name-value pairs to pass to the REST end point. You can create these parameters manu ally, or drag input variables into the parameter fields, and then assign a value. Parameters defined in the REST message that use **${}** can be assigned data from this activity template. Use the **Additional attribute** column to config ure the system to not escape the text. By de fault the text sent to the REST message is es caped. If the users have provided variables using Variable substitution in outbound REST in the REST message, then the **Name** column is automatically populated.
Additional Headers	Additional HTTP header parameters for the REST message selected. You can also use these values to override parameters inherited from the REST message.
Additional Query Parameters	Additional query parameters for the REST message selected. You can also use these val ues to override parameters inherited from the REST message.

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Option	Description
Use MID Server	Check box that determines if a MID Server should be used to invoke the REST web service. **Note:** If the REST web service message function defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the REST endpoint. By default, the system selects a MID Server with REST capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the REST web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in REST message**: Uses credential definitions from the REST message definition. ○ **Override with Basic Authentication credentials**: Uses Enable basic authentication credentials to override the credentials in the REST message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Uses a certificate, such as a private key, to override the credentials in the REST message definition. ○ **Override with Both Basic and Certificate Authentication credentials**: Uses both basic authentication and certificate authentication to override the credentials in the REST message definition. ○ **Override with OAuth Authentication credentials**: Uses OAuth 2.0 credentials to override the credentials in the REST message definition. The REST message selected for this activity must have its OAuth set to **OAuth 2.0** and its OAuth profiles and configured appropriately.
Credentials	Required REST endpoint basic authentication credentials. This field is available when

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Option	Description
	Override with Basic Authentication credentials is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the default safe defined in the MID Server configuration file. See Configure for details. Add the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *newsafe:orch-test-f5*.
Protocol Profile	Certificate authentication to use. This field is available when the selections in the **Authentication** are either **Override with Certificate Authentication credentials** or **Override with Both Basic and Certificate Authentication credentials**.
OAuth profile	Profile for the OAuth provider for this REST message. See for more information.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next
Finish creating your Rest web service activity by creating output variables, creating a parsing rule, or Conditions. Refer to the create custom activities topic to know your template options.

Auto-map REST activity output variables

The ServiceNow activity designer allows you to map parameter values in a REST test payload to variables in the **Outputs** stage automatically.

Before you begin
Role required: web_service_admin, activity_admin, activity_creator

About this task
Note:
You can test input variables from any stage in the activity designer if you have provided enough information for Orchestration to contact the endpoint and return data. Typically, the **Execution Command** stage is the point at which your inputs are ready for testing.

Procedure
1. In the activity designer, proceed to the **Execution Command** stage.
2. Define an appropriate MID Server, if requested.
   The test fails if the MID Server cannot be found or if it cannot connect to the target.
3. Click **Test Activity** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.

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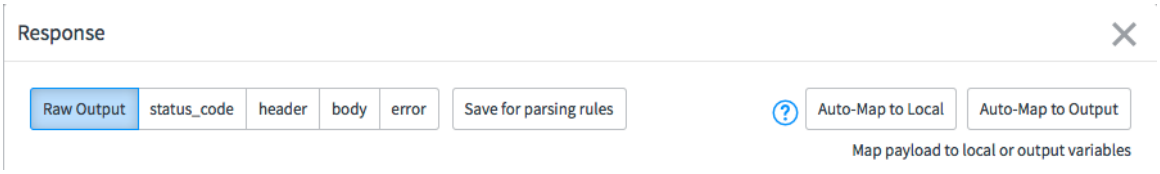
4. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



5. Select one of these auto-mapping options.
   - **Auto-Map to Local**: Directly maps values to a local variable for use within the activity.
   - **Auto-Map to Output**: Directly maps values to the output variable to pass to other activities in the workflow. Auto-mapping to an output variable creates an array of objects, each of which contains the column names from the query result.

REST template execution parameters

You use execution parameters to create the input process script in the **Pre Processing** form of the activity designer.

For descriptions of the REST web service command fields, see Configure the REST execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

REST template execution parameters

Name	Variable	Type	Usage
Web service message	web_service_message	Reference	The sys_id of the corresponding web service message.
Web service message function	web_service_message_function	Reference	The sys_id of the REST message function.
Web service endpoint	web_service_endpoint	String	URL of the REST endpoint.
Parameters	parameters	Array of JavaScript objects	Array of JavaScript objects, expressed with the `executionParam.` prefix. For instructions on creating arrays using this parameter see Create a JavaScript array in a REST template.
Use mid server	use_mid_server	Boolean	Selects whether or not to use the MID Server. A value of **true** uses the MID Server, and a value of **false** does not use the MID Server.
MidCapabilities	midCapabilities	String (comma separated)	List of references to required MID Server capabilities.

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REST template execution parameters (continued)

Name	Variable	Type	Usage
Time out	time-out	String	Allowable time out duration, expressed in seconds.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. Use this example to customize the MID Server selection if there are additional capabilities that are assigned by value: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`
Auth Type	auth-type	Boolean	Type of credentials to use. The choices are: • basic_auth_pick_credentials • use_existing_credentials
Credentials	credentials	Reference	Contains the credentials to use for this REST message when the **auth_type** selected is **basic_auth_pick_credentials**.

Create a JavaScript array in a REST template

These are instructions for creating JavaScript arrays using REST execution parameters.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

To add more name-value pairs to the parameter's array, append the values to the existing array.

Procedure

1. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_attribute":"none"};
executionParam.parameters.push(newParameter);
```

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By adding the new parameter JavaScript object to the array, you ensure that any elements already available in the array are not impacted.

2. Make sure to set the value in the **Additional attribute** column in the **REST message parameters** input field to **Do not escape text**.

   In this case, the system does not escape the value specified for the **value** attribute. An example of this is:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_a
ttribute":"do_not_escape_text"};
executionParam.parameters.push(newParameter);
```

Note:
If the value for the **additional_attribute** field is **None**, then the system escapes the value specified by the **value** attribute. In the first example, `parameterValue` is escaped.

REST template post-processing parameters

Use these parameters to create a post-processing script.

Activity designer post-processing parameters

Name	Variable	Type	Usage
Status code	status_code	Integer	Contains the status code returned from the REST web service.
Header	header	Hashmap of JavaScript object	Hashmap of key value pairs associated with the header values passed into the web service. You can access each value with `executionResult.header[keyName]`.
Body	body	String	Contains a string value representing the output from the REST message
Error	error	String	Returns the error string from the REST web service, unless there are no errors, in which case it returns**null**.

Configure the REST execution command

Use the input variables you created to configure the command that Orchestration executes on the REST endpoint.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: web_service_admin, activity_admin, activity_creator

Note:
You can test the REST connection between the MID Server and the endpoint without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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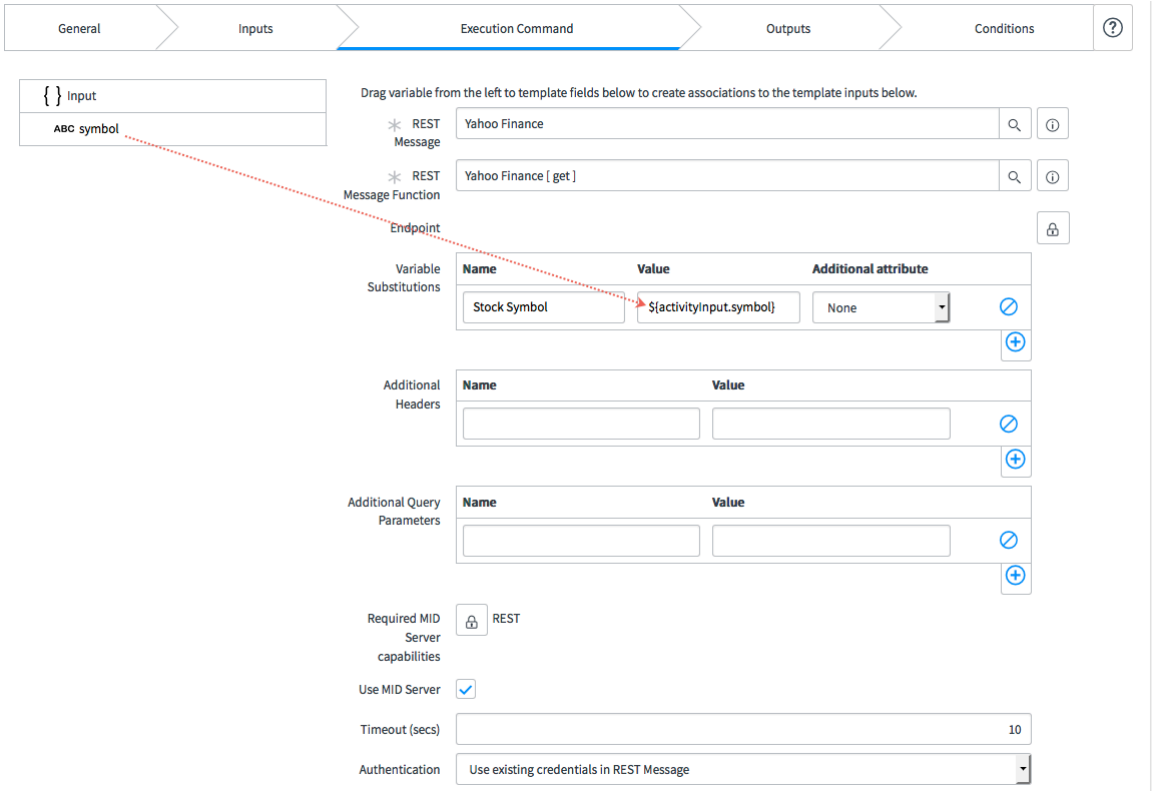
REST execution command



2. Complete the fields shown in the table.

REST execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
REST message	Name of an existing REST message to use in this activity. Users must have the web_service_admin role to configure this field.
REST message function	REST message function to use for this activity. Users must have the web_service_admin role to configure this field.
Endpoint	Endpoint URL for the REST web service this activity uses. Enter an endpoint in this field to override the endpoint configured in the REST message. Click the lock to open the input field.
Variable substitutions	Name-value pairs to pass to the REST endpoint. You can create these parameters manually, or drag and drop input variables into the parameter fields, and then assign a value. Parameters defined in the REST message that use **${}** can be assigned data from this activity template. Use the **Additional attribute** column to configure the system to not escape the text. By default the text sent to the REST message is escaped. The **Name** column is automatically populated if the users have provided variables using Variable substitution in outbound REST messages in the REST message.
Additional Headers	Additional HTTP header parameters for the REST message selected. You can also use these values to override parameters inherited from the REST message.

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Field	Description
Additional Query Parameters	Additional query parameters for the REST message selected. You can also use these values to override parameters inherited from the REST message.
Use MID Server	Check box that determines if a MID Server should be used to invoke the REST web service. **Note:** If the REST web service message function defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the REST endpoint. By default, the system selects a MID Server with REST capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the REST web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in REST message**: Uses credential definitions from the REST message definition. ○ **Override with Basic Authentication credentials**: Uses Enable basic authentication for outbound SOAP credentials to override the credentials in the REST message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Uses a certificate, such as a private key, to override the credentials in the REST message definition. ○ **Override with Both Basic and Certificate Authentication credentials**: Uses both basic authentication and certificate authentication to override the credentials in the REST message definition. ○ **Override with OAuth Authentication credentials**: Uses OAuth 2.0 credentials to override the credentials in the REST message definition. The REST message selected for this activity must have its OAuth 2.0 tutorial - create a REST message set to **OAuth 2.0** and its OAuth profiles and scopes configured appropriately.
Credentials	Required REST endpoint basic authentication credentials. This field is available when **Override with Basic Authentication credentials** is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the Configure the MID Server for CyberArk defined in the MID Server configuration file by adding the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *`newsafe:orch-test-f5`*.
Protocol Profile	Certificate authentication to use. This field is available when the selections in the **Authentication** field is either **Override with Certificate Authentication credentials** or **Override with Both Basic and Certificate Authentication credentials**.

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Field	Description
OAuth profile	Profile for the OAuth provider for this REST message. See Specify an OAuth profile for more information.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create an SFTP activity

Create an activity that executes basic SFTP commands on a remote server.

Before you begin

Roles required: activity_creator or workflow_admin

About this task

You can create a custom activity that manages files and directories on a target host or copies a file from one SFTP server to another. The file content is streamed through a MID Server, which avoids having to store the data on the hard drive of the MID Server host machine.

Note:
This activity requires the credentials of a user who can execute SFTP commands on the source host. The Copy File activity, provided in the activity pack, requires separate credentials to access the target host.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the SFTP Execution Command.

Option	Description
Command	Type of activity to create. The choices are: ○ Copy file ○ Create directory ○ Get file list ○ Remove file or directory ○ Rename file or directory ○ Set file attributes **Note:** The fields that display on the form de pend on the command you select.
Source host	Name or IP address of the server containing the files targeted by the activity.
Source port	Port number to use to communicate with the source server. The default port number is **22**.
Source file path	Full path to a file (`/temp/test_data_file.txt`) or directory (`/temp/test_dir`) on a source host depending on the se

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Option	Description
	lected command. Field available on following commands: ○ Copy file ○ Remove file or directory ○ Set file attributes
Source directory	Path to the directory where the source files are located. Field available on following com mands: ○ Create directory ○ Get file list
Source files	Names of specific source files to include in the file transfer. Separate the file names with semi-colons. This field supports a semi-colon separated list of wild-card patterns. For ex ample: `*.txt; a?cd.pdf`. If this field is blank, all files are included. Field available on following command: Get file list **Note:** For information about how the values in this field affect options in other fields, see the logic explanation which follows.
Is a directory	If checked, specifies the file path is a directo ry. Field available on following command: Re move file or directory
Credential tag for source	Specific credential tag this activity must use to run SFTP commands on the source host.
Credential tag for target	Specific credential tag this activity must use to run SFTP commands on the target host. Field available on following command: Copy file
Excluded files	Names of specific source files to exclude from the file transfer. The activity acts on all other files found in the source directory or subfold ers. Separate the file names with commas. This field supports comma-separated list of wild-card patterns. For example: `*.txt, a?cd.pdf`. Field available on following com mand: Get file list **Note:** For information about how the values in this field affect options in other fields, see the logic explanation which follows.
Include subfolders	If checked, includes the files from subfolders in the source directory. Field available on fol lowing command: Get file list

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Option	Description
	Note: For information about how your selec tion affects other fields in the form, see the logic explanation which follows.
Target host	Name or IP address of the server to which the files are being transferred. Field available on following command: Copy file
Target port	Port number to use to communicate with the target host. The default port number is **22**. Field available on following command: Copy file
Target file path	Full path to a file on a target host. Field avail able on following commands: ○ Copy file ○ Rename file or directory
Suffix for temporary file	If a file exists on a target host, this command enables a temporary suffix to use for a file name. If this field contains a value, the activity first copies the source file to a temporary file on the target host using *`targetFilePath + tempFileSuffix`* as the name. Up on completion, the activity renames the file to the actual target file name. If this field is blank, the activity copies the source file direct ly to the target file and overwrites it, if it exists. Field available on following command: Copy file
UID	User ID attribute to apply to a file or directory. The UID and GID values must be set together as a pair or they are ignored. The UID and GID numbers are internal values returned by the Get File List activity. Typically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a target host and set the source file attributes on the target file. This flow is demonstrated in the SFTP File Trans fer workflow. Field available on following com mand: Set file attributes
GID	Group ID attribute to apply to a file or direc tory. The UID and GID values must be set to gether as a pair or they are ignored. The UID and GID numbers are internal values returned by the Get File List activity. Typically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a target host and set the source file attributes on the target file. This flow is demonstrated in the SFTP File

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Option	Description
	Transfer workflow. Field available on following command: Set file attributes
Permissions	File or directory permissions to set for the user and group specified. This value must be expressed as an integer, such as **16877**, which defines these permissions: *rwxr-xr-x*. The permissions numbers are internal val ues returned by the Get File List activity. Typ ically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a tar get host and set the source file attributes on the target file. This flow is demonstrated in the SFTP File Transfer workflow. Field available on following command: Set file attributes
Access timestamp	Override the timestamp when the file or direc tory was last accessed. The access and mod ification timestamps must be set together as a pair. Field available on following command: Set file attributes
Modification timestamp	Override the timestamp when the file or direc tory was last modified. The access and modi fication timestamps must be set together as a pair. Field available on following command: Set file attributes
Size in bytes	Size of a file, expressed in bytes. Field avail able on following command: Set file attributes
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the source and target servers.

The system uses this logic to determine which files to move from the source host:

- If the Source files field is empty, the system selects all the files in the source directory. Otherwise, it only selects those files whose names match one of the file name patterns given in the field.
- If the Excluded files field is empty, the system excludes nothing. Otherwise, it excludes those files whose names match one of the file name patterns given in the field.
- The exclude rule has a higher preference than the include rule. If a file name matches one of the file name patterns in the Excluded files field, it does not get into the selection regardless of the include rule.
- When the Include subfolders check box is cleared, the system looks only in the source directory for files to include or exclude. Otherwise, it looks in the source directory and any of its subfolders for files to include or exclude.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

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What to do next

- Use auto-mapping to generate outputs and parsing rules (recommended for JDBC)
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

SFTP template execution parameters

You use execution parameters to create the input process script in the **Preprocessing** form.

For descriptions of the command fields, see Configure the SFTP execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

SFTP execution parameters

Name	Variable	Type	Usage
Command	command	String	Identifies the function of this activity. The possible commands are: • Copy file • Create directory • Get file list • Remove file or directory • Rename file or directory • Set file attributes
Source	source	String	Identifies the source host.
Source port	source_port	Integer	Identifies the port used to communicate with the source host.
Source directory	source_directory	String	Path to the source directory of the files to be moved.
Source files	source_files	String	Names of the files on the source to be moved.
Excluded files	excluded_files	String	Lists the files excluded from the operation.
Source file path	source_file_path	String	Path to the source files to be moved.
Target host	target_host	String	Identifies the target host.
Target port	target_port	Integer	Identifies the port used to communicate with the target host.
Target directory	target_directory	String	Full path to the target directory on the target host.
Target file path	target_file_path	String	Full path to a file or directory on the source host or on the target host. For example, this value is used in the Rename File or Directory activity in the activity pack.

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SFTP execution parameters (continued)

Name	Variable	Type	Usage
Temp file postfix	temp_file_postfix	String	Temporary file name extension used by the Copy File activity when moving a file. If this field contains an extension, the source file is copied to a temporary file using *target file name + temp_file_postfix*, before being renamed to the actual target file. If this field is blank, the source file is copied directly to the target file.
Is directory	is_directory	Boolean	Indicates whether the given file path is a directory.
Include subfolders	include_subfolders	Boolean	Indicates whether the system looks into subfolders of the source directory for files to include and exclude.
File attribute uid	file_attribute_uid	Integer	User ID associated with a file or directory.
File attribute gid	file_attribute_gid	Integer	Group ID associated with a file or directory.
File attribute permissions	file_attribute_permissions	Integer	File or directory permissions for the user and group specified.
File attribute atime	file_attribute_atime	Integer	Access time stamp from the file attributes.
File attribute mtime	file_attribute_mtime	Integer	Modification time stamp from the file attributes.
File attribute size	file_attribute_size	Integer	Size of the file, in bytes.
Source credential tag	source_credential_tag	String	Credential aliases for Orchestration activities used to run the command on the source host.
Target credential tag	target_credential_tag	String	Credential tag used to run the command on the target host.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.

SFTP post-processing parameters and payload parsing

Use these parameters to create a post-processing script, payload parsing, and tagging.

SFTP post-processing parameters

Name	Variable	Type	Usage
Output	output	String	Contains output data returned by the query.

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SFTP post-processing parameters (continued)

Name	Variable	Type	Usage
EccSysId	eccSysId	String	Contains the Reference ID associated with the ECC Queue input message.
ErrorMessages	errorMessages	String	Contains the error messages returned from the query. If no error messages are returned, this value is null.

Tags	tags	Hashmap of tag values returned from the SSH command	Contains the tags used to extract output using the SSH commands. The tag output is delimited by double percentage signs, as in `%%tagname %% ... %%`. Set up the command using the following format:
			`%%tagname1%%`
			`output1 line 1`
			`output1 line 2`
			`...`
			`%%`
			
			`%%tagname2%%`
			`output2 line 1`
			`output2 line 2`
			`...`
			`%%`
			
			The tags returned are JavaScript hashmap objects in which each key is prefixed with `tag` appended with the tagname.
			`{"__text__": "",`
			`"tagtagname1":"output1`
			`line1\noutput1 line2\n",`
			`"tagtagname2":"output2`
			`line1\noutput2 line2\n"}`

Configure the SFTP execution command

Use the input variables you created to configure the command that Orchestration executes on the SFTP target.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note:
You can test the JDBC connection between the MID Server and the target without having to run the activity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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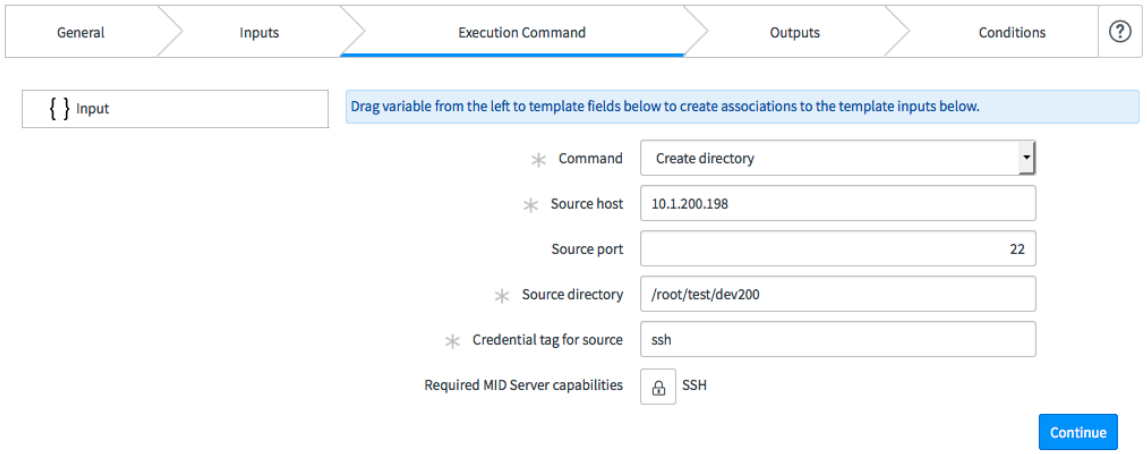
SFTP execution command



2. Complete the fields shown in the table.

SFTP command fields

Field	Description	Command
Command	Type of activity to create. The choices are: ○ Copy file ○ Create directory ○ Get file list ○ Remove file or directory ○ Rename file or directory ○ Set file attributes **Note:** The fields displayed on the form depend on the command selected.	All
Source host	Name or IP address of the server containing the files targeted by the activity.	All
Source port	Port number to use to communicate with the source server. The default port number is **22**.	All
Source file path	Full path to a file on a source host.	○ Copy file ○ Remove file or directory ○ Set file attributes
Source directory	Path to the directory where the source files are located.	○ Create directory ○ Get file list

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Field	Description	Command
Source files	Names of specific source files to include in the management action. Separate the file names in this list with semi-colons. This field supports the use of wild cards. If this field is blank, all files are included. For information about how the values in this field are affected by options in other fields, see the section below the table.	Get file list
Is a directory	Check box that determines if the specified file path is a directory.	Remove file or directory
Credential tag for source	Specific Credential aliases for Orchestration activities this activity must use to run SFTP commands on the source host.	All
Credential tag for target	Specific credential tag this activity must use to run SFTP commands on the target host.	Copy file
Excluded files	Names of specific source files to exclude from the management action. The activity acts on all other files found in the source directory or subfolders. Separate the file names in this list with semi-colons. This field supports the use of wild cards. For information about how the values in this field are affected by options in other fields, see the section below the table.	Get file list
Include subfolders	Check box to manage the files from subfolders in the source directory. For information about how your selection affects other fields in the form, see the section below the table.	Get file list
Target host	Name or IP address of the server to which the files are being transferred.	Copy file
Target port	Port number to use to communicate with the target host. The default port number is **22**.	Copy file
Target file path	Full path to a file on a target host.	○ Copy file ○ Rename file or directory
Suffix for temporary file	Temporary suffix to use for a file name if the file already exists on a target host. If this field contains a value, the activity deletes the duplicate target file if it exists, and then copies the source file to a temporary file using *`targetFilePath + tempFileSuffix`* as the name. Upon completion, the activity renames the file to the actual target file name. If this field is blank, the activity copies the source file directly to the target file and overwrites it, if it already exists.	Copy file
UID	User ID attribute to apply to a file or directory. The UID and GID values must be set together as a pair or they are ignored.	Set file attributes
GID	Group ID attribute to apply to a file or directory. The UID and GID values must be set together as a pair or they are ignored.	Set file attributes
Permissions	File or directory permissions to set for the user and group specified. This value must be expressed as an integer, such as **16877**, which defines these permissions: *`rwxr-xr-x`*. The permissions number is an internal value returned by the Get	Set file attributes

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Field	Description	Command
	File List activity. Typically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a target host and set the source file attributes on the target file. This is demonstrated in the SFTP File Transfer workflow.	
Access timestamp	Override the timestamp when the file or directory was last accessed. The access and modification timestamps must be set together as a pair.	Set file attributes
Modification timestamp	Override the timestamp when the file or directory was last modified. The access and modification timestamps must be set together as a pair.	Set file attributes
Size in bytes	Size of a file, expressed in bytes.	Set file attributes
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the source and target servers. By default, the system selects an SSH MID Server.	All

The system uses this logic to determine which files to move from the source host:

- If the **Source files** field is empty, the system select all the files in the source directory. Otherwise, it only selects those files whose names match one of the file name patterns given in the field.
- If the **Excluded files** field is empty, the system excludes nothing. Otherwise, it excludes those files whose names match one of the file name patterns given in the field.
- The exclude rule has a higher preference than the include rule. A file whose name matches one of the file name patterns in the **Excluded files** field does not get into the selection, even though it would be selected by the include rule.
- When the **Include subfolders** check box is cleared, the system looks only in the source directory for files to include or exclude. Otherwise, it looks in the source directory and any of its subfolders for files to include or exclude.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create a probe activity

Create an activity that runs a probe on the target host that is configured to return specific information..

Before you begin

Role required: activity_creator or workflow_admin

About this task

For instructions on using the activity template process flow, see create custom activities.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the Probe Execution Command.

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Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes.
Probe	Probe to run with this activity, from the list of probes in the system
Target host	Host name or IP address of the target server for this activity.
Parameters	MID Server to use, by capabilities.
Required MID Server capabilities	Name-value pairs to pass to the host with this probe. You can create these parameters man ually, or drag and drop input variables into the parameter fields and assign a value.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Probe template execution parameters

You use execution parameters to create the input process script in the **Pre Processing** form.

For descriptions of the command fields, see Configure the Probe execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

Probe activity execution parameters

Name	Variable	Type	Usage
Probe	probe	Reference	The sys_id of the MID Server probe.
Source	source	String	Intended target host
Parameters	parameters	Array of JS object	Array of JavaScript objects, expressed with the `executionParam.` prefix. To add more name-value pairs to the **parameters** array, append them to the existing array. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array. This assigns additional parameters to the message: `var newParameter = {"name":"parameterName","value":"parameterValue"};`

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Probe activity execution parameters (continued)

Name	Variable	Type	Usage
			`executionParam.parameters.push(newParameter);`
MidCapabilities	midCapabilities	String (comma separated)	List of required MID server capabilities.

ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection:
			`var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'};`
			`executionParam.valueCapabilities.push(valueCapability);`

Probe template post-processing parameters

Use these parameters to create a post-processing script.

Probe post-processing parameters

Name	Variable	Type	Usage
Payload	payload	String	Contains raw payload returned from the probe.
Output	output	String	Contains output data returned from the probe.
EccSysId	eccSysId	String	Contains the reference ID associated with the ECC Queue input message.

Configure the Probe execution command

Use the input variables you created to configure the command that Orchestration executes on the target.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note:
You can test the activity connection between the MID Server and the target without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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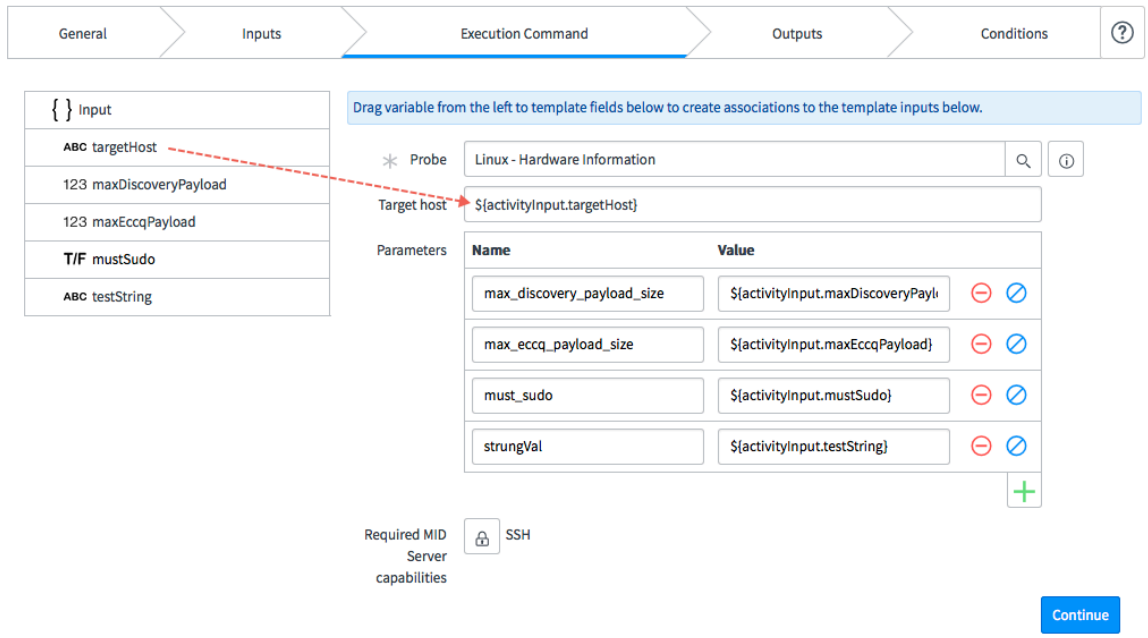
Probe execution command



2. Complete the fields shown in the table.

Probe execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Probe	Probe to run with this activity, from the list of probes in the system.
Target host	Host name or IP address of the target server for this activity.
Required MID Server capabilities	MID Server to use, by capabilities.
Parameters	Name-value pairs to pass to the host with this probe. You can create these parameters manually, or drag and drop input variables into the parameter fields and assign a value.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create an SSH activity

Create an activity that extracts data from a target host that uses the SSH network protocol.

Before you begin

Role required: activity_creator or workflow_admin

About this task

For instructions on using the activity template process flow, see create custom activities.

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Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the SSH Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes.
Target host	Host name or IP address of the target server for this activity.
Command	Command this activity runs on the target host. You can invoke a MID Server script from this field using any script type that the SSH command line supports. For more information, see **Advanced SSH script options** below the table.
Directory	Directory on the target host where the command is run.
Credential tag	The Orchestration credential tag to use when running the command.
Required MID Server capabilities	MID Server with the appropriate capabilities for connecting to the host. By default, the system selects a MID Server with SSH capabilities.
Long running	If checked, disables the SSH connection timeout for commands that might take longer to run than the default 60 seconds. Orchestration periodically checks the running process to determine its status until it is finished.
Must Sudo	If checked, enables the use of [redacted] to run commands.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

Example: Advanced SSH script options

To run a MID Server script on the target host, specify the script type and pass the name of the script into the `${syncFile()}` parameter. The system uses this parameter to locate the named script in the MID Server Script File [ecc_agent_script_file] table and run it on the target host. For example, a bash script can be expressed as:

```
bash ${syncFile("<MID script name>")} argument1 argument2
 argument3
```

A base script (`main_script.bash`) can reference another script (`my_include.bash`) as well as a separate file (`.my_profile`) located on the target host. Both scripts and the file referenced must be synced to the MID Server, using the `${syncFile()}` parameter, to execute properly.

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```
source ${syncFile(".my_profile")}
cp ${syncFile("my_include.bash")} /usr/ssmith/my_include.bash
bash ${syncFile("main_script.bash")} one two three four five six
rm /usr/ssmith/my_include.bash
```

A Python example with inline comments might look like this:

```
set $LIB_DIR=/usr/bin;.
# Sync a file that is referenced inside myF5CreateLBPool.py
cp ${syncFile("specialFunctions.py")} ~/specialFunctions.py
# set up environment variables
source ${syncFile(".python_profile")}
# call script that sets up dependencies on the box from remote
 package repos
python ${syncFile("setupPythonDependencies.py")} pycontrol
# call a script that requires functions from the package as well
 as a function from myIncludedFile
python ${syncFile("myF5CreateLBPool.py")} snow_pool
 myActualValue
# user is responsible for their own cleanup
rm ~/specialFunctions.py
```

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

SSH template execution parameters

Use execution parameters to create the input process script in the **Pre Processing** form of the activity designer.

For descriptions of the command fields, see Configure the SSH execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

SSH execution parameters

Name	Variable	Type	Usage
Source	source	String	Intended target or host.
Command	command	String	Comment to run on the host.
Directory	directory	String	Directory on the host in which to run the command.
Credential tag	credential_tag	String	Orchestration credential tag to use when running the command.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use

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SSH execution parameters (continued)

Name	Variable	Type	Usage
			this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`
Long running	long_running	Boolean	Indicates whether or not the command is long running. A value of true indicates that the command is long running.
Must sudo	must_sudo	Boolean	Indicates whether or not this activity must use sudo to run root commands. A value of true indicates that sudo SSH credentials must be used.

SSH post-processing parameters and payload parsing

Use these parameters to create a post-processing script, payload parsing, and tagging.

SSH post-processing parameters

Name	Variable	Type	Usage
Output	output	String	Contains the output returned from the SSH command.
EccSysID	eccSysID	String	Contains the reference ID associated with the ECC Queue input message returned by the activity.
ErrorMessages	errorMessages	String	Contains the error messages retrieved from the SSH command. This value is **null** if there are no error messages.

Tags	tags	Hashmap of tag values returned from the SSH command	Contains the tags used to extract output using the SSH commands. The tag output is delimited by double percentage signs, as in `%%tagname%% ... %%`. Set up the command using the following format:
			`%%tagname1%%`
			`output1 line 1`
			`output1 line 2`
			`...`
			`%%`
			
			`%%tagname2%%`
			`output2 line 1`
			`output2 line 2`
			`...`
			`%%`

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SSH post-processing parameters (continued)

Name	Variable	Type	Usage
			The tags returned are JavaScript hashmap objects in which each key is prefixed with `tag` appended with the tagname. `{"__text__": "", "tagtagname1":"output1 line1\noutput1 line2\n", "tagtagname2":"output2 line1\noutput2 line2\n"}`

Configure the SSH execution command

Use the input variables you created to configure the command that Orchestration executes on the host target.

Before you begin

Create the input variables you need in the **Inputs** form before you advance to the **Execution Command** stage.

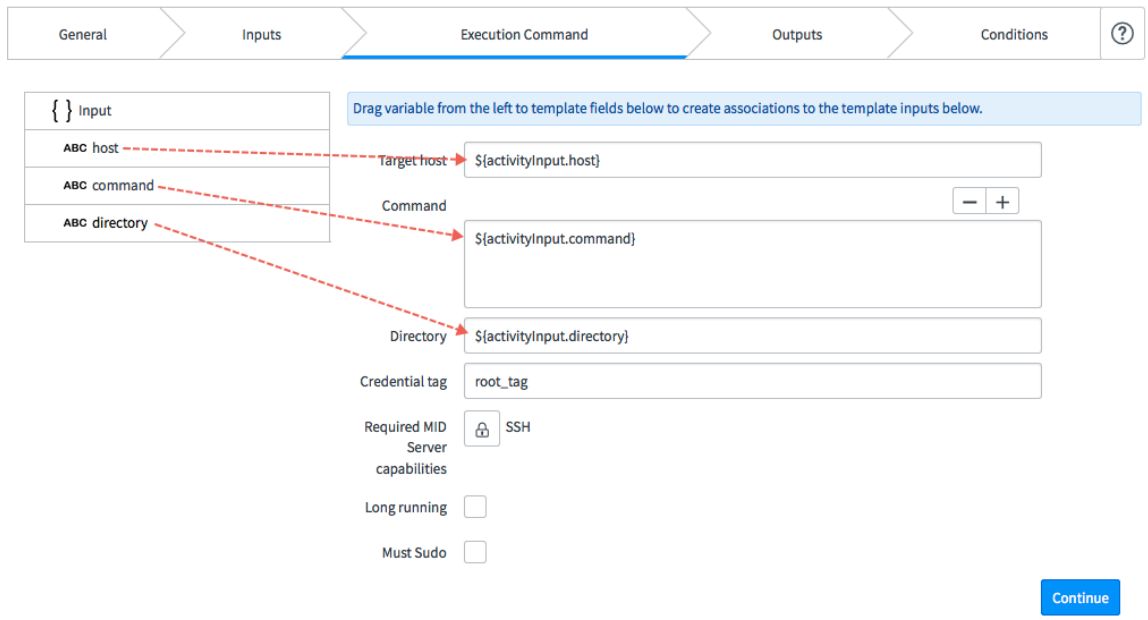
Role required: activity_creator, admin

Note:
You can test the SSH connection between the MID Server and the target without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

SSH execution command



2. Complete the fields shown in the table.

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SSH activity inputs

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Target host	Host name or IP address of the target server for this activity.
Command	Command this activity runs on the target host. You can invoke a MID Server script from this field using any script type that is supported by the SSH command line. For more information, see **Advanced SSH script options** below the table.
Directory	Directory on the target host where the command is run.
Credential tag	The Credential aliases for Orchestration activities to use when running the command.
Select MID Server by capabilities	MID Server with the appropriate capabilities for connecting to the host. By default, the system selects a MID Server with SSH capabilities
Long running	Check box to disable the SSH connection timeout for commands that might take longer to run than the default 60 seconds. Orchestration periodically checks the running process to determine its status until it is finished.
Must Sudo	Check box to allow the use of SSH credentials to run commands.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create a run script activity

Create an activity that runs any script.

Before you begin

Role required: activity_creator or workflow_admin

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the Run Script Execution Command:
   Create a script for this activity to execute.

> **Note:**
> You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

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Run Script template processing script

Use the Run Script custom template Script form to enter a script to call and use with other activities.

Run Script processing script

Field	Description
Processing script	Script that the activity runs.
Variables	Input variables that are available to use as building blocks in the input process script. Click the arrow above the field to open the variables list. Click an item in the tree to add it to your script in the appropriate syntax. The list displays input variables you passed into the activity on the **Inputs** form. All activity variables added in the **Inputs** form are read-only and are expressed in the processing script with this syntax: `activityInput.variable`.

Create a JMS activity

Create a custom JMS activity to retrieve or send messages to external systems using the Java Messaging Service.

Before you begin

Role required: activity_creator or workflow_admin

About this task

The JMS activity supports third party JMS providers whose JMS client application is written with a typical Java EE pattern and can support these operations:

- Using JNDI to find a ConnectionFactory object.
- Using JNDI to find one or more destination objects.
- Using the ConnectionFactory to create a JMS connection object.
- Using the JMS connection to create one or more JMS session objects.
- Using a JMS session and the destinations to create the MessageProducer and MessageConsumer objects.
- Starting the JMS connection to enable delivery or consumption of messages.

Note:
The JMS activity designer has been tested with the JMS providers ActiveMQ and Tibco EMS. When connecting to a JMS provider, refer to your third party user documentation.

Procedure

1. Create or verify your JMS credential .
   Your JMS credentials must have permission for the target database and proper configuration for the corresponding JMS connection. Credentials must be set up before you can create a JMS activity.
2. Create or verify your JMS connection .
   Your JMS connection must be configured with valid JMS credentials set up before you can create a JMS activity.
3. Create a custom activity .
   This action creates a custom activity using a template.

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4. After setting up general properties and creating input variables, configure the JMS Execution Command.

Option	Description
Configure your credential	Fill in the fields necessary for your database connection.
Connection Factory	Name of the JMS Connection Factory. You should create or verify your JMS connection. This configuration links the name of the Ini tial Context Factory with the URL of the JMS provider.
Destination Type	Type of destination used for this message: ○ **Queue**: Message is queued for point-to-point communications. **Note:** The **GET** operation is only supported for the Queue destination type. ○ **Topic**: Message is used for publish and sub scribe communication.
Destination Name	Name of the queue or topic destination that is configured on the JMS provider.
Message Type	The JMS message type value. Only the **Text Message** type is supported. The queue or top ic destination must be configured to receive or send only Text Message. Other message types are dropped, since the JMS Activity can not process them.
Operation	The programmatic operation to perform on the destination. The choices are **PUT** or **GET**.
Timeout (Secs)	Allowed time to wait for a message in the mes sage queue before it times out, in seconds. The default is **30**.
Custom message headers	The custom header values in a name/value pair format, that is available on the JMS desti nation. **Note:** This is only supported for a **PUT** opera tion.
Message payload	Actual message content or payload that is sent to the JMS destination. **Note:** This is only supported for a **PUT** opera tion.

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Option	Description
Credential tag	A tag for an individual credential for a JMS activity in an Orchestration workflow.
Required MID Server capabilities	MID Server to use, by capabilities.

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Create a JMS connection for an Orchestration activity

Configure your system to use Java Messaging Service (JMS) with a custom Orchestration JMS activity.

Before you begin

Role required: admin

About this task

The MID Server must have the correct JMS connection factories for your organization. Configure those values in the *mid.property.jms.command.allowed_factory_names* property, found in **MID Server** > **Properties**. The default values for this property can be changed to any value or comma-separated list of values that the third-party JMS provider advertises.

Procedure

1. Navigate to **MID Server** > **JAR Files**.
2. Click **New** and add.

Option	Description
Name	A unique and descriptive name for identifying the file in the instance.
Version	A version number for the file, if one is available.
Source	Location of the JAR file for reference purposes. Source information is not used by the system.
Description	Short description of the JAR file and its purpose in the instance.

3. Click the paper clip icon in the banner and attach the JMS driver jar file.
   The JMS driver jar file should be available as part of JMS provider installation. Few JMS vendors make them available as a separate product. Refer to the JMS provider documentation to determine which JMS client driver jar files require the client applications to connect to the JMS provider. For example, if you are trying to connect to ActiveMQ V5.10 (JMS provider), you need the `activemq-all-5.10.1.jar` file.
4. Navigate to **Orchestration** > **Credentials & Connections** > **JMS Connection Factory**.
5. Click **New**, add the following, and click **Submit**.

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Option	Description
Name	Unique name of this connection factory.
Initial Context Factory	Name of the JNDI class that is used to create the InitialContext. **Note:** For example, to connect to Active MQ V5.10 (JMS Provider), the value is `org.apache.activemq.jndi.ActiveMQInitialContextFactory`.
Provider URL	Location of the running JMS provider installation. **Note:** For example, to connect to ActiveMQ V5.1: `tcp://ipAddressOrHostName:61616`.

6. Navigate to **Orchestration** > **Credentials**.
7. Click **New**, select **JMS Credentials**, and provide the user name and password the MID should use to communicate with the JMS provider.
   For more information, see JMS credentials JMS credentials.
8. Click **Submit**.
   You are ready to create a custom JMS activity.

JMS template execution parameters

You use execution parameters to create the input process script in the **Preprocessing** form.

You must use the `executionParam.` prefix with all variables in this table.

JDBC execution parameters

Name	Variable	Type	Usage
Jms ds	jms_ds	Reference	Selected JMS data source.
Destination type	destination_type	Enumerated	
Destination name	destination_name	String	
Message type	message_type	Enumerated	
Operation	operation	Enumerated	
Time out	time_out	Integer	Length of time to wait for the query to return results.
Custom headers	custom_headers	Array of JavaScript objects	

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JDBC execution parameters (continued)

Name	Variable	Type	Usage
Message payload	message_payload	String	
Credential tag	credential_tag	String	List of required MID Server capabilities.
MidCapabilities	midCapabilities	String (comma separated)	
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

JMS template post-processing parameters

Use these parameters to create a post-processing script.

JMS post-processing parameters

Name	Variable	Type	Usage
Status	status	String	Status of the operation (Put or Get) on the JMS destination.
StandardHeaders	standardHeaders	String	All the standard headers, as specified by JMS, that are obtained as part of the JMS message during a Get operation. This field is applicable only for Get operations.
CustomHeaders	customHeaders	String	All custom headers added by a producer or publisher application that are obtained as part of the JMS message during a Get operation. This field is applicable only for Get operations.
MessagePayload	messagePayload	String	Message payload that is obtained as part of the JMS message during a Get operation. This field is applicable only for Get operations.
EccSysID	eccSysID	String	Contains the reference ID associated with the ECC Queue input message returned by the activity.
ErrorMessages	errorMessages	String	Contains any error messages retrieved from the JMS command. This value is **null** if there are no error messages.

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Activity scoping

Custom activities run in their own scope, even if it is different from that of the workflow.

Any script that runs inside a custom activity with a scope can only access outside artifacts that are within the scope of that activity or artifacts that are configured to run in any scope. Conversely, an outside artifact can only access the script inside that private activity if the outside artifact is running in the same scope. Activities with public scopes can interact with outside artifacts in any application scope.

You can use private activities as part of a workflow that has a public application scope. These activities are protected from reaching outside of the workflow or from being reached from outside the workflow. For details about setting application scoping for custom activities, see the field description table for the appropriate activity template.

Note:
Custom activities uploaded to the ServiceNow Store must be configured as accessible to all application scopes.

Publish a custom activity

When a user creates a custom activity and saves or submits it, that activity appears in the **Custom** and **Packs** tabs of the designer palette, but is visible only to the user who created it.

Before you begin

Roles required: admin, activity_admin, activity_creator

Procedure

1. When you finish configuring the activity, click **Publish**.

   This makes the activity accessible to other users on the instance with the workflow_admin or activity_creator role. Published activities are available for upload to the ServiceNow Store, can be added to workflows, and can be edited by any user with the proper roles.

2. To edit a published activity, click **Checkout**.

   When an activity is checked out by a user, only that user can modify it. The fields of a checked out activity are read-only for all other users.

3. When you are finished editing the checked out activity, publish it again.

   The system adds a new version of this activity to the **Custom** tab in the Workflow Editor palette.

   Note:
   Activities you create and publish are visible in the **Packs** tab only if they were created in the current application scope.

Return a locked activity to a published state

Problems can arise if an activity version is checked out by a user and not checked back in. An activity in this state cannot be checked out for update.

Before you begin

Role required: admin, activity_admin, activity_creator

About this task

An administrator can return a locked activity to a published state.

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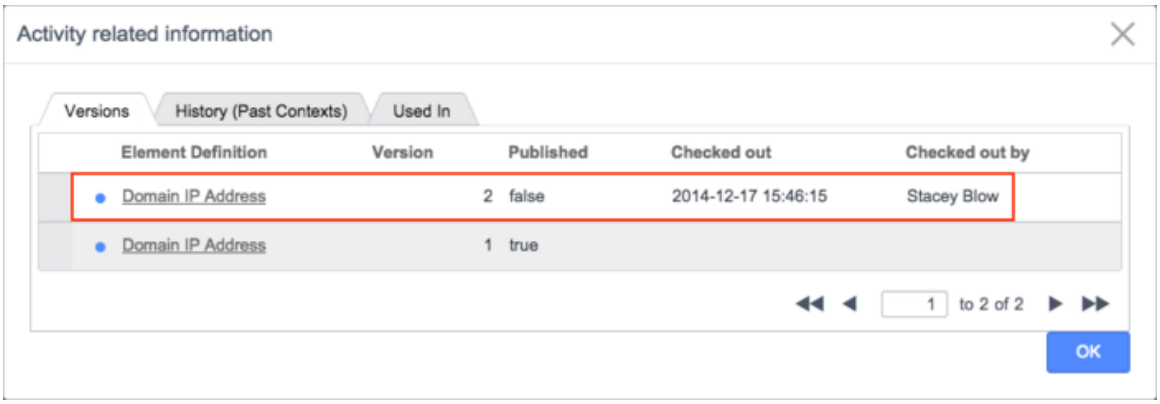
Procedure

1. Open the Workflow Editor.
2. From the **Custom** tab, open the activity that is locked.
3. Click the menu icon in the title bar and select **Versions** from the context menu.

   A list of all the versions of that activity appears. The locked version displays the user who checked it out.



4. Select the checked out version.

   The system opens the record in the activity designer.

5. Click the menu icon again and select **Force Checkout** from the context menu.

   The activity fields become editable.

6. Click **Publish**.

   The activity becomes available to users with the appropriate roles.

Copy a custom activity

You can copy activities for reuse from the **Custom** tab in the global scope.

Before you begin

Role required: admin, activity_admin, activity_creator

About this task

Note:
You cannot copy an activity in a private scope.

Procedure

1. To reuse an activity in the global scope, expand the parent category to display the activities.
2. Right-click the activity you want to copy and select one of these options:

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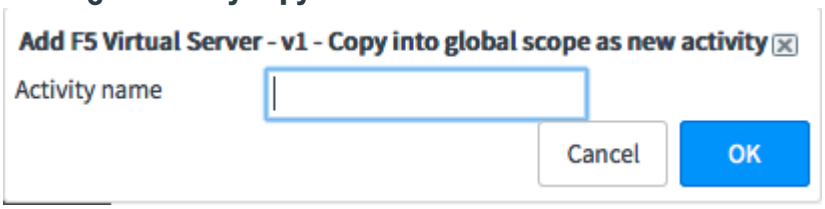
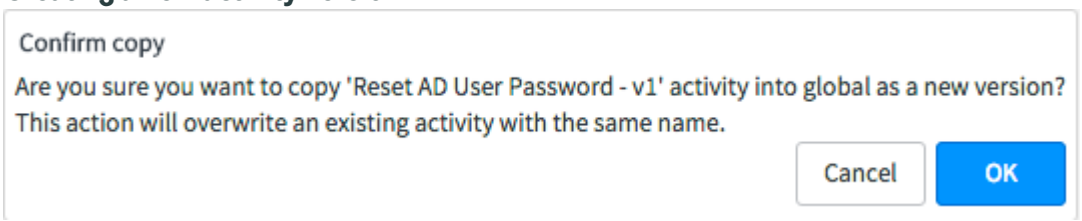
- *Copy into global scope as new activity*: Copies the activity with the new name you provide, uses the same version number as the original activity, and moves it to the global scope in the **Custom** tab.

Naming an activity copy



- *Copy into global scope as new version*: Copies the activity using the same name, increments the version number, and moves it to the global scope in the **Custom** tab. The system automatically adds the parent category to the **Custom** tab if it does not already exist. This action will overwrite another activity with the same name and version number.

Creating a new activity version



Note:
If the activity is in any other scope but global, the system displays this message: `Cannot copy privately scoped activity.`

Orchestration databus

The databus allows workflow designers to track the flow of data through an Orchestration workflow and provides access to output data that can be consumed by other custom activities.

Data is made available in a workflow when you use activities created with the Orchestration activity designer. The activity designer provides the ability to specify well defined inputs and outputs for your activities. When you use those activities on the workflow canvas, the outputs appear in the **Data** tab and are available for use as inputs in subsequent activities.

Note:
Orchestration does not filter the data you are given for reuse in the **Data** tab. You must make sure an activity in the workflow canvas has executed before you consume its output data.

When you drop a custom activity onto the workflow canvas, the system assigns it an index. If you delete an activity from the canvas and add a new one, the indexes are not reused. This ensures that you don't accidentally start subscribing to data you did not intend to use. If you update an activity in the activity designer, the system automatically updates the activity on the canvas to ensure the data you are subscribing to downstream is not affected.

Reuse data in the activity designer

The **Data** tab in the Workflow Editor lists all custom activities used in the current workflow that produce data and displays that data for reuse in other custom activities.

Before you begin

Roles required: workflow_creator

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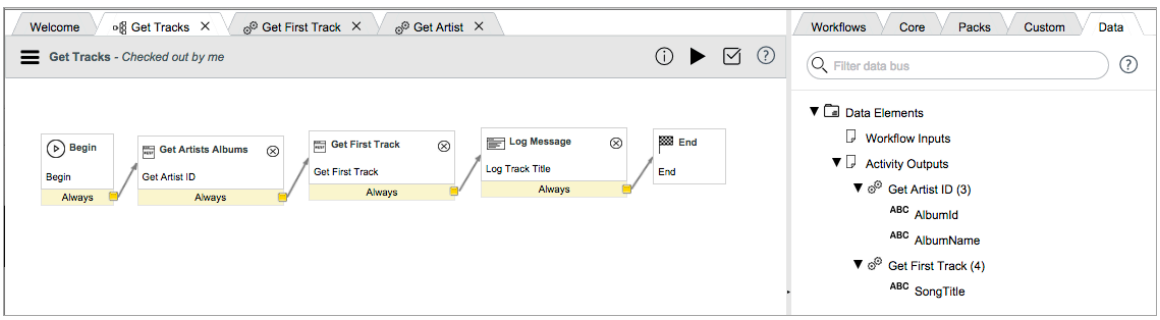
About this task

Activities are categorized by application in this tab and are available for use as data sources for other activities. The **Data** tab is a graphical representation of the workflow Databus, which manages all the temporary data used by the current workflow.

Procedure

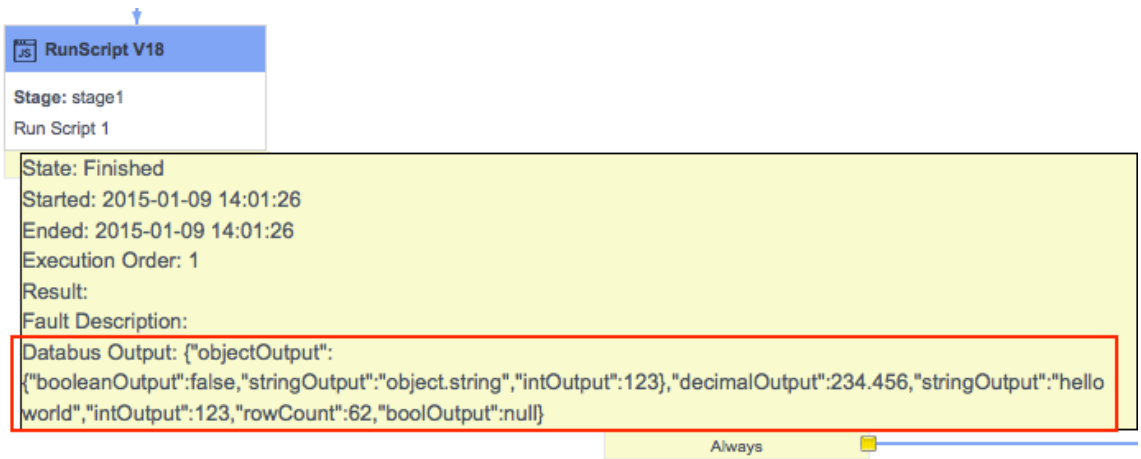
1. Drag output variables from an activity in this tab into the inputs of another activity on the workflow canvas to link the activities together.

   You can use any of the outputs in the structure, regardless of the application to which they belong. An index number in parenthesis after the activity name provides a unique identifier for the parameters that you use as input data in other activities. If you do not name a custom activity, the only identifier for that activity in the **Data** tab is the index number. Index numbers indicate the sequence in which custom activities were added to the workflow and are not reused. When you drag a custom activity onto the workflow canvas, the system adds that activity and its output data to the structure. Conversely, if you remove a custom activity from the canvas, that activity and its outputs disappear from the data list.



2. Point to an activity to display information about it in a pop-up window.

   Any output data reused by the activity is listed in the **Databus Output** field of the pop-up window.



MID Servers for Orchestration

Orchestration automatically selects an appropriate MID Server based on the capabilities that you configure in activities, the IP addresses of target devices, and the application that the MID Server is allowed to use.

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To allow a MID Server to work with Orchestration, it must have the **Orchestration** application or the **ALL** application assigned to it. See Configure a default MID Server for each application for instructions.

You can have MID Servers focus on different capabilities and separate sections of your network. See:

- MID Server capabilities
- Map an IP address to a DNS name

You can also specify a default MID Server to use if no MID Servers meet the capability and IP range criteria for an activity. SeeSelect the default MID Server for Orchestration.

Related topics

MID Server capabilities

MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range.

Nmap capability

The **Nmap** capability is only assigned to MID Servers for which the Network Mapper (Nmap) scanner has been installed for credential-less Discovery. This capability cannot be added to or removed from any MID Server manually. For instructions on installing or uninstalling Nmap, see Install and uninstall Nmap on a MID Server

MID Server capability values

Capabilities provided in the base system do not have a defined value string. The capability value can be blank, a single value, or a * (wildcard). A MID Server configured to use a capability that has no value can locate any device using that capability's protocol. If a capability has a defined value, the MID Server using that capability finds only those devices using that protocol that match the value string exactly. The exception to this is the Resolve DNS capability, which is configured to resolve any DNS name into an IP address using a partial string match. The * (wildcard) will match a request capability specifying any non-blank value.

Starting with the Madrid release, the **[capability name]:[value]** combination appears in the slushbucket when you add a capability to a MID Server. This combination allows you to see all the capabilities that have different values, even if the capability name is the same. For example, if you are using the Cloud Management capability, and you use the value field to specify the us-west logical datacenter on one of the capability records, you can see the combination in the **Collection** list.

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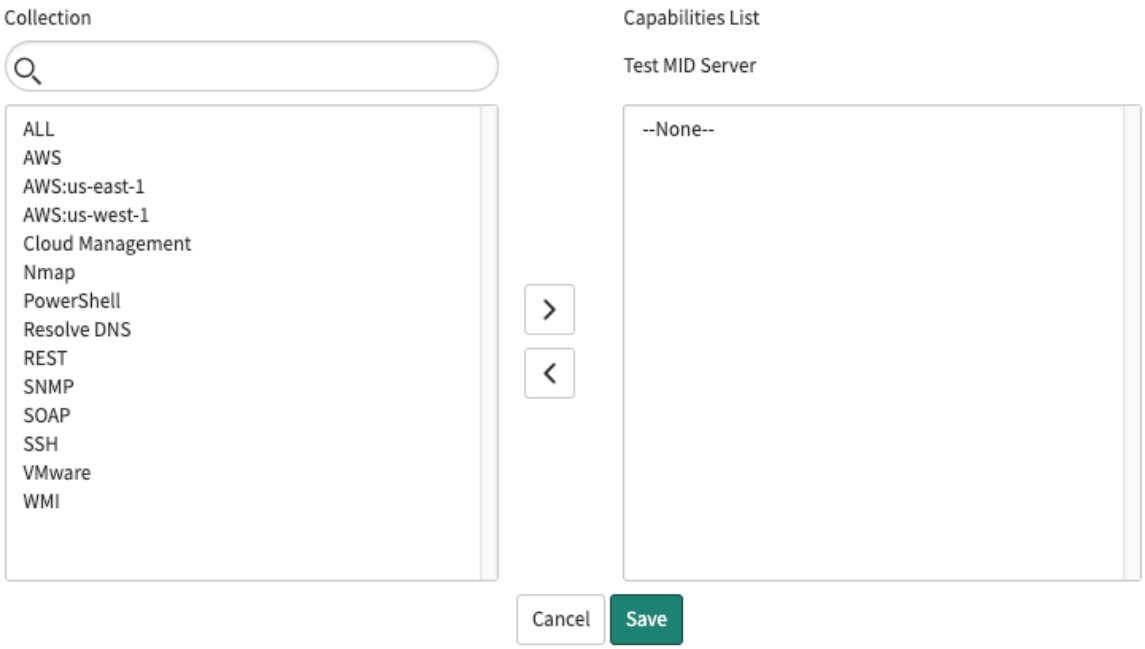

MID Server selection

The MID Server is selected using an algorithm based on the capabilities available. The selector produces a list of suitable MIDs using filters in the following order: **server status** > **applications** > **IP range** > **capabilities**. The algorithm searches the capabilities in the following sequence and, if a step finds at least one MID server, the remaining steps are skipped:

1. **Exact value match:** Find each MID Server containing capabilities with name/value pairs with an exact match to all requested capability name/value pairs. Blank is a valid value. * (wildcard) values are ignored.
2. **Wildcard value match:** The same as an exact value match, but also allows a non-blank request value to match MID server capability records containing value *.
3. **Special capability name ALL:** Find each MID Server containing the special capability name ALL, ignoring capability's value field.

Note:
If the requested capability name does not exist in the ecc_agent_capability table, **BadArgumentException** is thrown rather than falling back to the ALL capability.

Scripted MID Server capability value matching

You can use value tests to create capabilities that find devices using values without requiring exact string matching. Action on these values is controlled by a user-defined script.

The Resolve DNS capability is provided in the base system and is configured to resolve DNS names into IP addresses for devices whose names end with a specified domain name. The capability **Value** entered is automatically prefaced with a dot during processing to match domain syntax. This value can contain one or more sub-domains, but must include the end of the domain string. Matching devices must end with the identical syntax. The script for the Resolve DNS capability determines if a device name matches the criteria defined by **Value**. If a match exists, the platform performs the address resolution automatically. For example, if the value for the Resolve DNS capability is `service-now.com`, the MID Server with this capability finds `lnxlab01.sandiego.service-now.com` and `dbsrv101.sanjose.service-now.com`. If the value is changed to `sandiego.service-now.com`, then the MID Server finds only `lnxlab01`.

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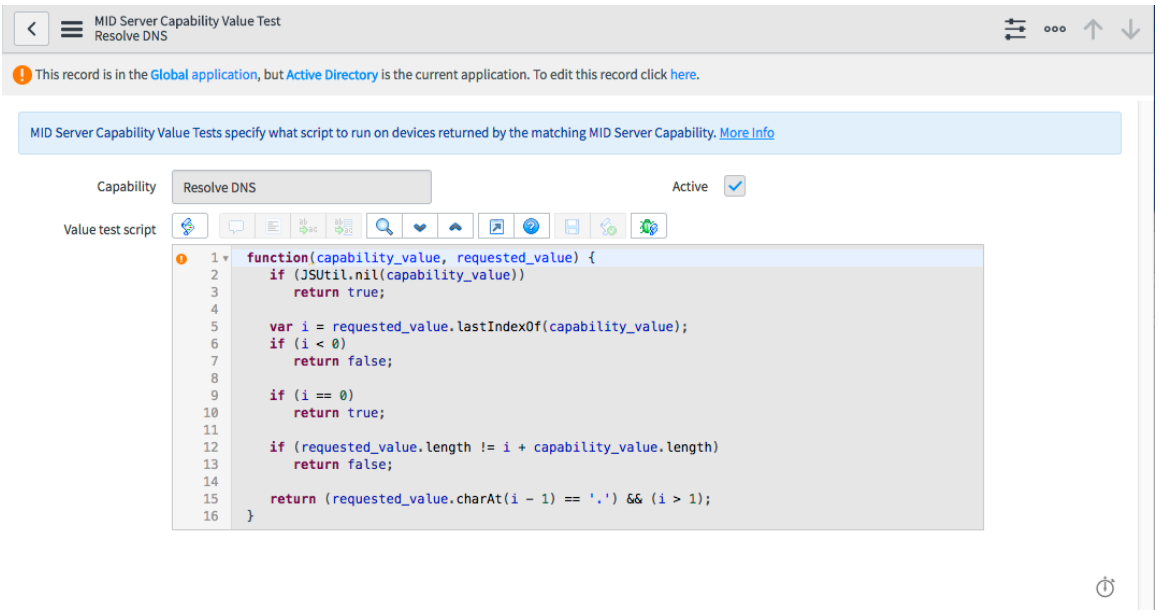
Note:
If **Value** in the Resolve DNS capability is blank, then all domains match.

To view the script for evaluating this capability, navigate to **MID Server** > **Capability Value Tests** and select **Resolve DNS** from the list.



Configure MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range, allowing an application to select the most appropriate MID Server. Configure capabilities on MID Servers for applications like Orchestration, Cloud Management, and Service Mapping.

Before you begin

Role required: admin or sm_admin

About this task

Several applications use capabilities, IP ranges, and MID Server selection to narrow the pool of MID Servers the applications need.

Note:
At least one capability is required for each MID Server used by Orchestration. See MID Servers for Orchestration for more information.

The following capabilities are available by default with Discovery:

All	IBM	Resolve DNS
Ansible	JDBC	REST
AWS	NetApp	SNMP
Azure	Nmap	SOAP
Chef	OpenStack	SSH
Cloud Management	PowerShell	VMware
Google	RCA	WMI

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Procedure

1. Navigate to **All** > **MID Server** > **Capabilities**.
2. Select an existing capability or select **ALL** to include all capabilities.

   Note:
   Ensure that each IP address range has MID Servers with the necessary capabilities to complete the Orchestration activities on that network segment.

3. Create a new capability:

   a. Select **New**.

   b. Configure the value for a custom capability.

   Example
   An example is a capability for **DOMAIN**, with a value of **service-now**.

   c. Select **Submit**.

4. Select **Edit** in the MID Servers related list to add MID Servers to the capability.
5. Select one or more MID Servers for this capability from the **Available** list.
6. Select **Save**.

   The capability defined here also appears in the primary record for this MID Server.

Select the default MID Server for Orchestration

Orchestration uses the default MID Server if it cannot find a MID Server with the correct IP range and capability.

Specify the default MID Server in either of these locations:

- The **Default MID Server** field on the Orchestration application record. See Configure a default MID Server for each application for instructions.
- The **Default MID Server to use for Orchestration Activities** property. Navigate to **Orchestration** > **MID Server Properties** to set this value.

These two values are automatically kept in synch. You can change the default MID Server in either location.

PowerShell probe version 2 system property

View detailed PowerShell credential information and view extended logging information.

Starting with the madrid release, there is a new system property for the PowerShell probe which enables the version 2 of the probe. This new version enables you to view detailed credential information on why PowerShell credentials fail or succeed. You can also view logging information for an ECC Queue payload and Workflow Context log.

mid.server.rba_powershell_v2

Enables the PowerShell probe version 2 for use with all PowerShell activities. The default value is true. If you choose false, the legacy PowerShell probe is used. Unless there are issues, use version 2, as the legacy version is going to be deprecated.

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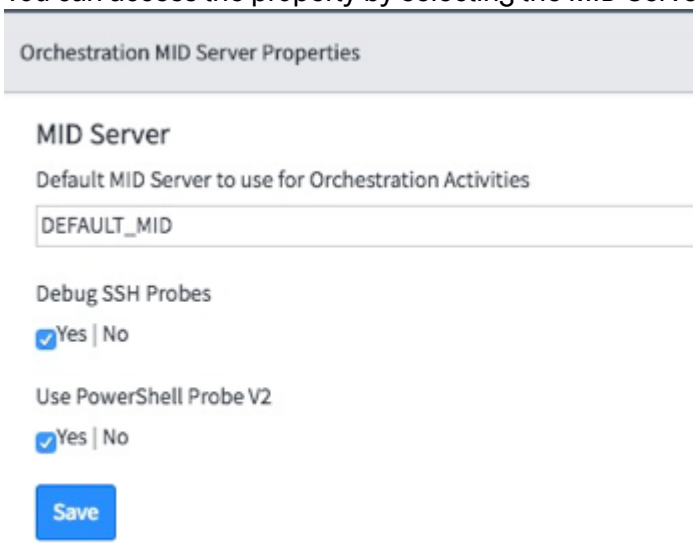
Note:
This property only applies to Orchestration activities. Discovery probes are not affected.

You can access the property by selecting the MID Server Properties link in the navigation pane:



PowerShell log property

Enable debug messages to display from PowerShell.

This property enables control of when and where to display debug messages generated by debug statements embedded in the PowerShell scripts.

mid.property.powershell.log_info

The new MID Server PowerShell log property:

- Displays logging information.

  Note:
  Once logging is enabled, OOB PowerShell scripts log information.

- Adds logging information to your developed PowerShell scripts and PowerShell activities.

  Note:
  Logging information is only available when property is enabled.

- Logging is not enabled by default.

If the property is set to true, debug messages display from the workflow context or from the Response popup after you test inputs. The ecc_queue entry payload for each of the PowerShell activities is going to show all the debug messages that were logged.

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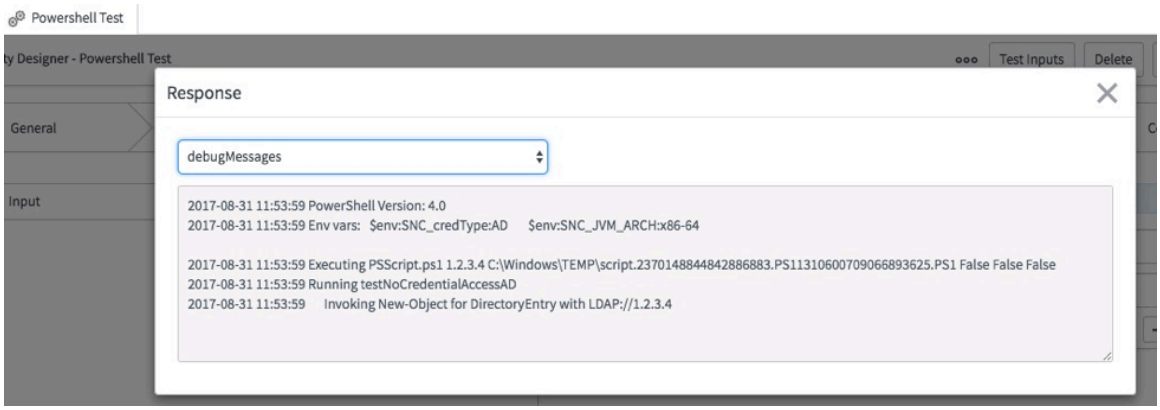

Enable the PowerShell log property for each MID Server. If the MID Server field is empty, the property applies to all MID Servers. There are separate credential debug messages that always come back regardless of this setting. The credential debug messages show which credentials have been used and other related information.

Note:
All the debug messages that come back to the instance are also saved to the MID Server log file. The log file might have additional debug messages generated from Java code, which might help the debug process.

Use the Orchestration Usage dashboard

This dashboard shows an overview of Orchestration usage metrics to show customers how their organization uses Orchestration and to support license compliance.

Before you begin

Role required: orchestration_manager

Procedure

1. To view the dashboard, navigate to **Orchestration** > **Operations & Troubleshooting** > **Orchestration Usage Dashboard**.
   The Orchestration Usage dashboard is displayed. The tabs on the dashboard include Licensable Usage and Orchestration Usage. Reports on these tabs include:

Orchestration Usage Metrics

Metric	Description
Transaction Summary Last 12 months	A running transaction count of all Orchestration transactions over the last 12 months. Includes: ○ The count of orchestration transactions associated with the HR Application ○ The count of Orchestration transactions associated with the Security Operations Application
Transaction Summary YTD	Cumulative count of all transactions since the time the Orchestration plugin was activated or the customer upgraded to Geneva.
365 day Running Average of Server	The running average over the last 365 days for cmdb_ci_computer - cmdb_ci_server. This

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Metric	Description
	includes all physical and virtual client nodes and excludes server nodes from the count.
365 day Running Average of Client	The running average over the last 365 days for cmdb_ci_server. This includes all physical and virtual server nodes.
Orchestration Transactions by Month for Last 12 Months	
Average Client Nodes Orchestrated Last 365 Days	
Average Server Nodes Orchestrated Last 365 Days	
Number of Orchestration Activities Developed Last 365 Days	The aggregate number of activity definitions you have developed and OOB activity definitions you have modified. This number includes activity elements (Activities build with the Activity Designer) you have developed and OOB activity definitions you have modified. **Note:** his number excludes activity elements that are shipped with ServiceNow Applications that use the Orchestration Runtime e.g. ServiceNow Security Operations and Human Resources Apps.
Cumulative Client Nodes Orchestrated by Month	
Cumulative Server Nodes Orchestrated by Month	
Usage by Provider Last 12 Months	Breaks down emphasis by provider, such as PowerShell, JDBC, SSH, etc.
Top 10 Orchestration Activities	

2. **Optional:** You can add more widgets to the dashboard by clicking the **Add Content** icon ( ) in the upper right corner of the dashboard.

Note:
You should not modify the first tab in this Dashboard. If you want a different dashboard experience, add a tab and customize that with your usage reports.

Legacy: Chat

Chat is deprecated in the Istanbul release.

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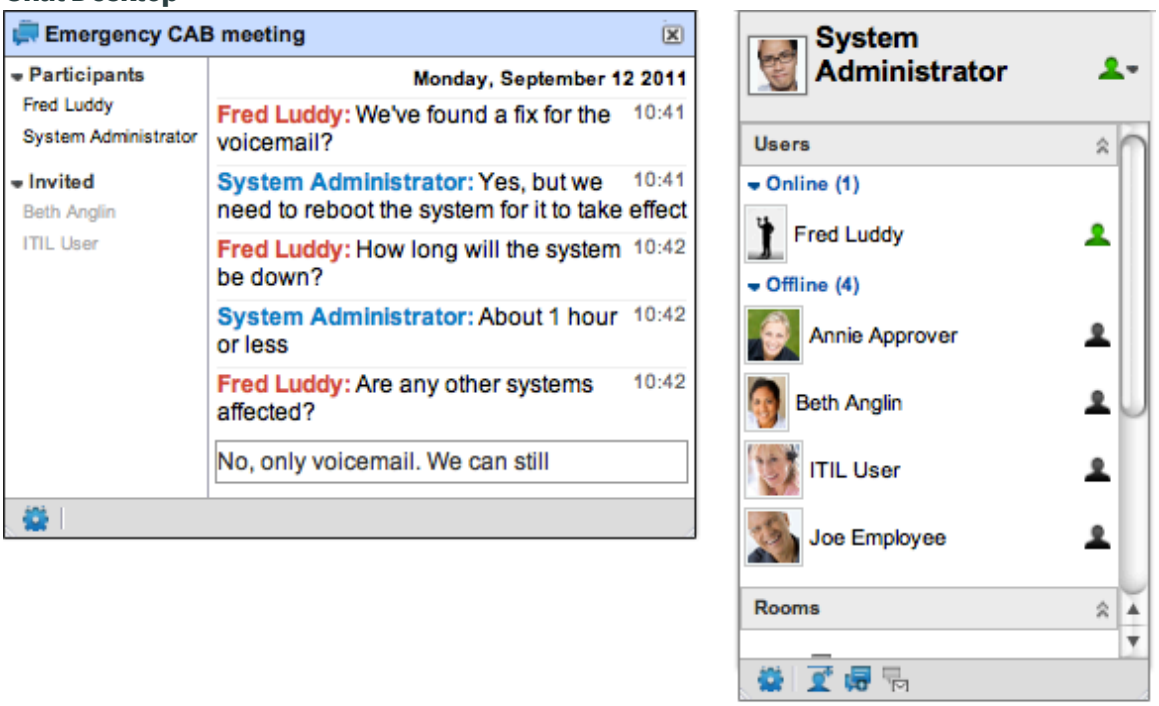
Note:
The Connect feature provides an updated instant messaging platform, which is activated by default for new instances. The legacy chat and Connect features should not be used concurrently. There is no migration path from legacy chat to Connect.

Chat provides real-time communication via instant messaging between users in a ServiceNow instance. Features include:

- One-to-one chats (instant messaging) between users.
- Chat rooms for conversations with multiple users. Chat rooms may be public (any user can join) or private (only invited users can join).
- Chat rooms linked to task records. Users can work together to solve issues, and conversation history can be shared by everyone who needs to reference it.
- Help desk chat. End users can access live support via instant messaging. Service desk staff can resolve basic issues in real-time or create incidents directly from chat requests for more extensive issues.

Chat Desktop



Legacy: Get started with Chat

Get started with legacy chat.

Before you begin

Role required: admin

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Procedure

1. Establish use guidelines.
   Social media can improve communication and aid productivity. To get the most out of these tools, establish clear and simple social media guidelines that foster information sharing and a comfortable work environment.
2. Activate the Chat plugin to enable the legacy chat and legacy Help Desk Chat features.
3. Configure security settings.
   Users must log in to use the legacy chat features in the base system. The standard system security settings and Social IT-specific security settings are available. To learn more about setting up these features, refer to the plugin activation pages.
   - Chat rooms may be Public (any user can join) or Private (only invited users can join).
   - Administrators can limit who can read chat messages on tasks and who can create chat rooms.

Legacy: Installed with Chat

What components are installed with legacy chat.

Demo data is available for legacy chat. The demo data creates a chat queue called Help Desk Chat that is supported by the assignment group Chat Support. Additionally, the Help Desk Chat link is added to the header of the Employee Self-Service portal. To learn more, see Set Up Chat Queues for Help Desk Chat.

Other:

- Event: A new event called **chat.invite** is registered to trigger an email notification when users are invited into a chat room.
- Email Notification: An email notification called Chat Room Invite is added to send when users are invited to a chat room.

Legacy: Fields installed with legacy chat

Legacy chat adds fields.

Display name [Table name]	Description
Header [content_block_header]	Adds the Help Desk Chat link to the ESS portal page.

Legacy: Properties installed with legacy chat

Legacy chat adds properties.

Name	Description
glide.chat.invite_fields	Comma-separated list of fields used to generate the invites when creating a chat room from a task. The user is presented with check boxes for each of the specified fields to select the invites for the chat room. The fields should be references or glide_lists of sys_user or sys_user_group.

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Name	Description
	• **Type**: string • **Default value**: assignment_group,watch_list • **Location**: **Social IT** > **Chat Administration** > **Properties**
glide.chat.show_emoticons	Setting that determines whether to display emoticons in conversations. • **Type**: true | false • **Default value**: true • **Location**: **Social IT** > **Chat Administration** > **Properties**
glide.chat.sound.message_received.mp3	Sound played when a message is received in chat (mp3). • **Type**: string • **Default value**: media/rcvmsg.mp3x • **Location**: **Social IT** > **Chat Administration** > **Properties**
glide.chat.sound.message_received.ogg	Sound played when a message is received in chat (ogg). • **Type**: string • **Default value**: media/rcvmsg.oggx • **Location**: **Social IT** > **Chat Administration** > **Properties**
glide.chat.sound.queue_beep.mp3	Sound played when a new user enters the chat queue (mp3). Both this property and *`glide.chat.sound.queue_beep.ogg`* must be defined for either property to work. • **Type**: string • **Default value**: media/button_toggle_on.mp3x • **Location**: **Social IT** > **Chat Administration** > **Properties**
glide.chat.sound.queue_beep.ogg	Sound played when a new user enters the chat queue (ogg). • **Type**: string • **Default value**: media/button_toggle_on.oggx • **Location**: **Social IT** > **Chat Administration** > **Properties**

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Name	Description
glide.chat_room.create_roles	Comma-separated list of roles that are allowed to create chat rooms. • **Type**: string • **Default value**: itil • **Location**: **Social IT** > **Chat Administration** > **Properties**
glide.short_poll_delay	Short polling delay for XMPP requests. Enter a value in milliseconds. The minimum value is 250. With short polling, the browser sends a request to the server in fixed intervals defined by the property. To minimize performance impact, it is recommended that this value is set greater than or equal to the default value. • **Type**: integer • **Default value**: 1000 (one second) • **Location**: **Social IT** > **Chat Administration** > **Properties**

Legacy: Script includes installed with legacy chat

Legacy chat adds script includes.

Name	Description
ChatUtils	Provides utilities for chat conversations.

Legacy: Tables installed with legacy chat

Legacy chat adds tables.

Table	Description
Chat Actions [chat_actions]	Defines additional chat window menu items. Access at **Social IT** > **Chat Administration** > **Actions** (administrator and chat_admin).
Chat Channel [chat_channel]	Stores chat channels, which are chats between members. This table is extended by Chat thread [chat_thread] (a one-to-one chat) and chat_room (a multi-user chat). Extending or modifying data in this table is not recommended.
Chat Channel Member [chat_channel_member]	Relationship table that associates channels and members. Extending or modifying data in this table is not recommended.
Chat Message [chat_message]	Stores instant messages sent from any chat window. Extending or modifying data in this table is not recommended.
Chat Presence	Stores presence (status) information for a user. Extending or modifying data in this table is not recommended.

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Table	Description
[chat_presence]	
Chat Queue [chat_queue]	Stores the groups and schedules for providing support via instant message. Defined at **Social IT** > **Chat Administration** > **Queues** (administrator and chat_admin).
Chat Queue Entry [chat_queue_entry]	Stores user requests for live support. Extends Task [task]. On a chat queue record, the Chat queue entries related list displays the entries that are associated with that chat queue. Extending or modifying data in this table is not recommended.
Chat Room [chat_room]	Stores chat rooms (multi-user chat). Extends Chat channel [chat_channel]. Can be modified if necessary (such as to change a chat room from public to private), but should almost always be managed by system functionality.
Chat Roster [chat_roster]	Maintains users that are associated with a user's My Friends list. Extending or modifying data in this table is not recommended.
Chat Roster Member [chat_roster_member]	Tracks users that are members of a chat room. Extending or modifying data in this table is not recommended.
Chat Thread [chat_thread]	Stores one-to-one chats. Extends Chat channel [chat_channel]. Extending or modifying data in this table is not recommended.
Live Headline [live_headline]	Sends system messages. For example, the system may send a message when a user enters or leaves a chat room. Extending or modifying data in this table is not recommended.
Live Poll Message [sys_live_message]	System table that stores and manages chat messages. Extending or modifying data in this table is not recommended.
Live User [sys_live_user]	System table that stores and maintains chat users. Extending or modifying data in this table is not recommended.
Stores the last live sequence number [sys_live_last_sequence]	Stores the last sequence ID. Extending or modifying data in this table is not recommended.

Legacy: Business rules installed with legacy chat

Legacy chat adds business rules.

Name	Table	Description
Chat Queue [Task.active] Updater	Chat Queue Entry [chat_queue_entry]	Sets the chat queue entry Action field to Waiting when the action changes.

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Name	Table	Description
SNC - Chat Queue Average Wait Time	Chat Queue Entry [chat_queue_entry]	When a chat queue entry is accepted, calculates the average wait time for the queue by averaging the last 20 chat queue entries.

Legacy: Chat use

Legacy chat allows you to interact and collaborate through real-time instant messages with other users in an instance.

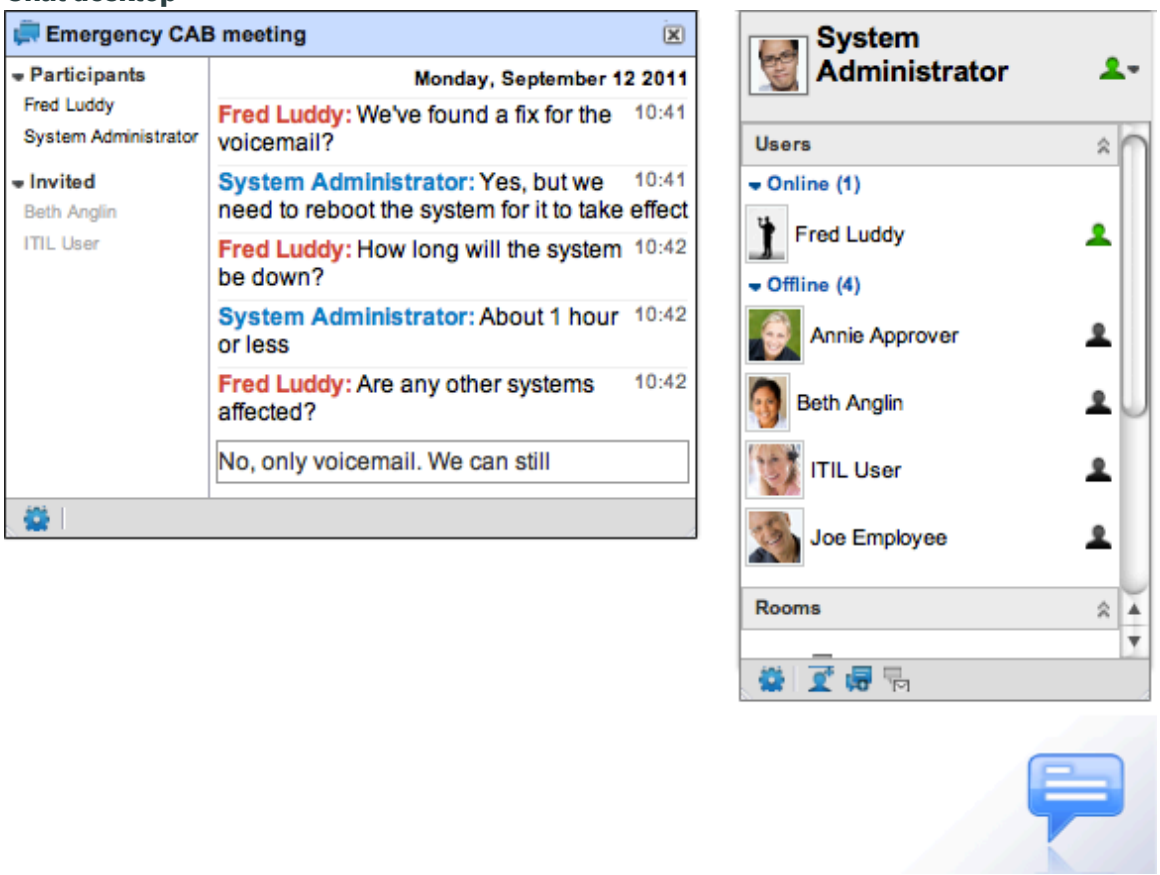
Use legacy chat to:

- Initiate or participate in chat conversations with one or multiple users.
- Initiate or participate in chat conversations that are attached to task records (such as an incident).
- See when other users are available to chat.

To open the chat desktop, navigate to **Social IT** > **Chat**.

Note:
Service desk staff may also provide live support to other users via help desk chat.

Chat desktop



Legacy: Update your profile

Your profile identifies your contributions to legacy chat conversations.

Before you begin
Role required: agent

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About this task

Your profile identifies your contributions to conversations. It is created automatically the first time you use chat and consists of:

Profile

Title	Description
Name	From your user account in ServiceNow. Your name appears on your messages and in the member list of any chat room you join.
Picture	Select any picture. Your picture appears beside your name in other users' favorites list and at the top of your favorites list.

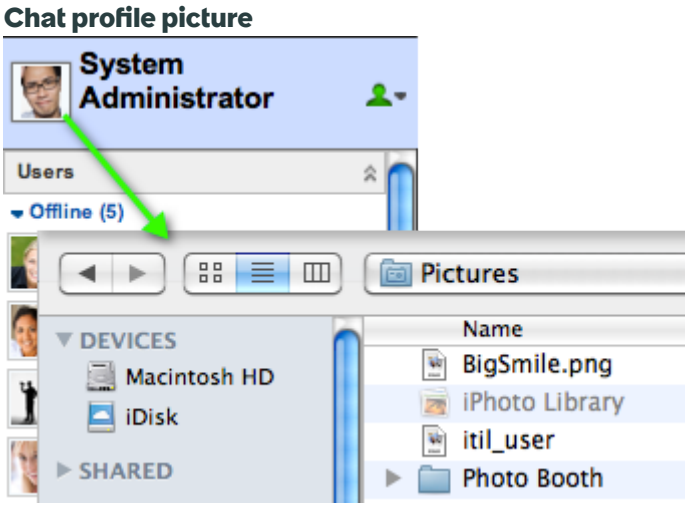
To update your profile picture:

Procedure

1. Click your picture in the top of the favorites list.
2. Browse to the desired picture file and click **Open**.

Note:
Changes to your profile picture affect legacy chat and live feed if the Live Feed plugin is activated).

Chat profile picture



Legacy: Update your status

In legacy chat, your status lets other users know whether you are available to chat.

Before you begin

Role required: agent

About this task

Your status lets other users know whether you are available to chat. Your current status is indicated by the color of the icon in the upper right of your favorites list, beside your name. View the status of other users in your favorites list.

To change your status:

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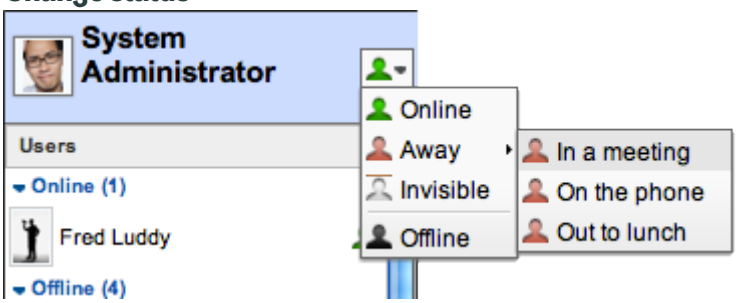
Procedure

1. Click the status icon beside your name.
2. Select a status (see table).

Change status



Change status

Status	Description	Appears to others
Online	Indicates that you are available to chat.	Green icon: **Chat available** Beth Anglin
Away	Indicates that you are not available because you are away.	Red icon: **Chat away** Beth Anglin *Away*
Away with a message	Indicates that you are not available and gives a reason: ○ In a meeting ○ On the phone ○ Out to lunch You cannot create a custom message from the chat desktop.	Red icon and message: **Chat away msg** Beth Anglin *In a meeting*
Invisible	Indicates that you are not available. You can send and receive messages when your status is *Invisible*. You appear as *Offline* to other users.	Black icon: **Chat offline** Beth Anglin
Offline	Indicates that you are not available. You cannot send or receive messages when your status is Offline. Users that are not logged in appear as Offline.	Black icon: **Chat offline** Beth Anglin

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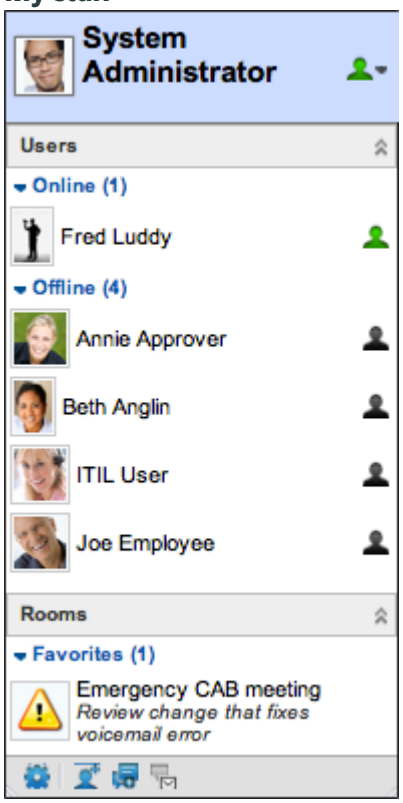
Legacy: Use your favorites list

In legacy chat, your favorites list appears on your chat desktop and provides certain functions.

Favorites list

My stuff



- Users:
  - Add another user in the system to your favorites list.
  - See if your favorite users are available to chat. Users are organized alphabetically and in sections by status.
  - Start a conversation by double-clicking a name.
  - Expand or collapse a section by clicking **Online** or **Offline**.
- Rooms:
  - See the list of your favorite chat rooms.
  - Join a chat room by double-clicking its name.
- Favorites list toolbar:
  - Options (

    Chat window menu

    ): access a menu with options to add a favorite user, view online users, create a chat room, and view chat rooms.
  - Add User (

    Add friend

    ): add a favorite user.
  - Create Room (

    Add room

    ): create a chat room.
  - Invitations (

    Chat invitation

    ): respond to invitations to join chat rooms.

To expand or collapse a section in the favorites list, click the section header or click the arrows (^) on the section header.

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Legacy: Add a favorite user

How to add a user to your favorite users list in legacy chat.

Before you begin
Role required: admin

Procedure
1. Click the **Add User** button.

   Add friend

   

2. Begin typing a user name and select a user from the list, or click the reference lookup and select a user from the table.

   Search icon

   

3. Click **OK**.

Legacy: Remove a favorite user

How to remove a favorite user in legacy chat.

Before you begin
Role required: admin

Procedure

To remove a user from your favorite users list, right-click the user's name and select **Remove From List**.

Legacy: View an online user

How to view a list of all users who are available to chat (status of Online) in legacy chat.

Before you begin
Role required: admin

Procedure
1. Right-click the Users section header or click **Options** on the toolbar.

   Chat window menu

   

2. Select **Show Online Users**.

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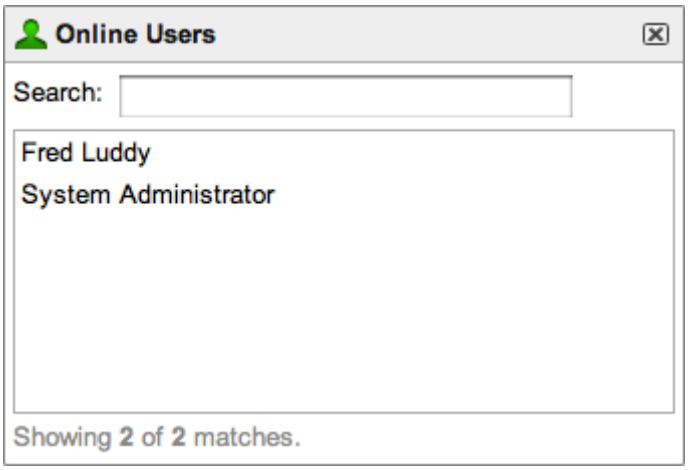
- Start a one-to-one chat with a user on the list by double-clicking a name.
- **Send Message** or **Add To Friend List** by right-clicking a name.

Online users



Legacy: View a room

How to view a list of all public chat rooms in legacy chat.

Before you begin

Role required: admin

Procedure

1. Right-click the **Rooms** section header or click **Options** on the toolbar.

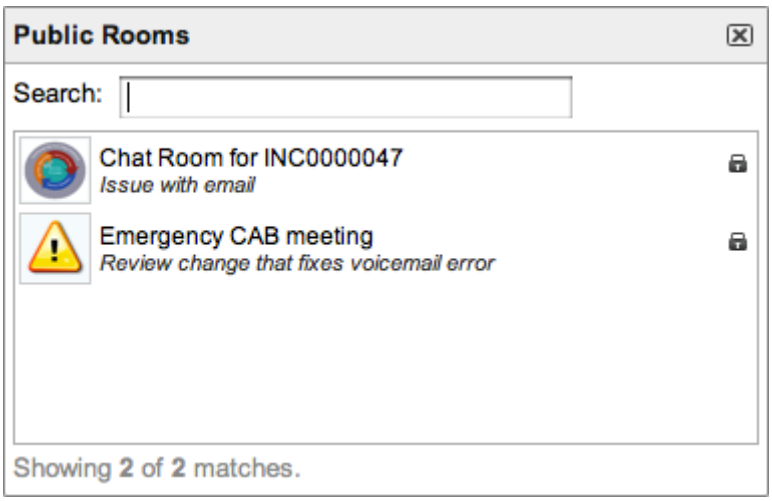
Chat window menu



2. Select **Public Rooms**.

To join a room, double-click a name or right-click and select **Join Room**. See Joining Chat Rooms.

Rooms



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Legacy: Start a one-to-one chat

How to start a one-to-one chat in legacy chat.

Before you begin
Role required: agent

Procedure

- To start a chat with one user in your favorites list, double-click the user's name or right-click and select **Send Message**.
- To start a chat with one available user, double-click the user's name on the online users list. See Viewing Online Users.

  Send a message to start a conversation.

Legacy: Create a chat room

How to start a chat with multiple users from the legacy chat desktop.

Before you begin
Role required: agent

About this task
To start a chat with multiple users from the chat desktop (requires zaccess rights):

Procedure

1. Click **Create Room** on the favorites list toolbar.

   

2. Enter the room details (see table).
3. Click **Create Room**.
   An invitation appears in the favorites list of all invited users and a new chat window opens on your chat desktop.

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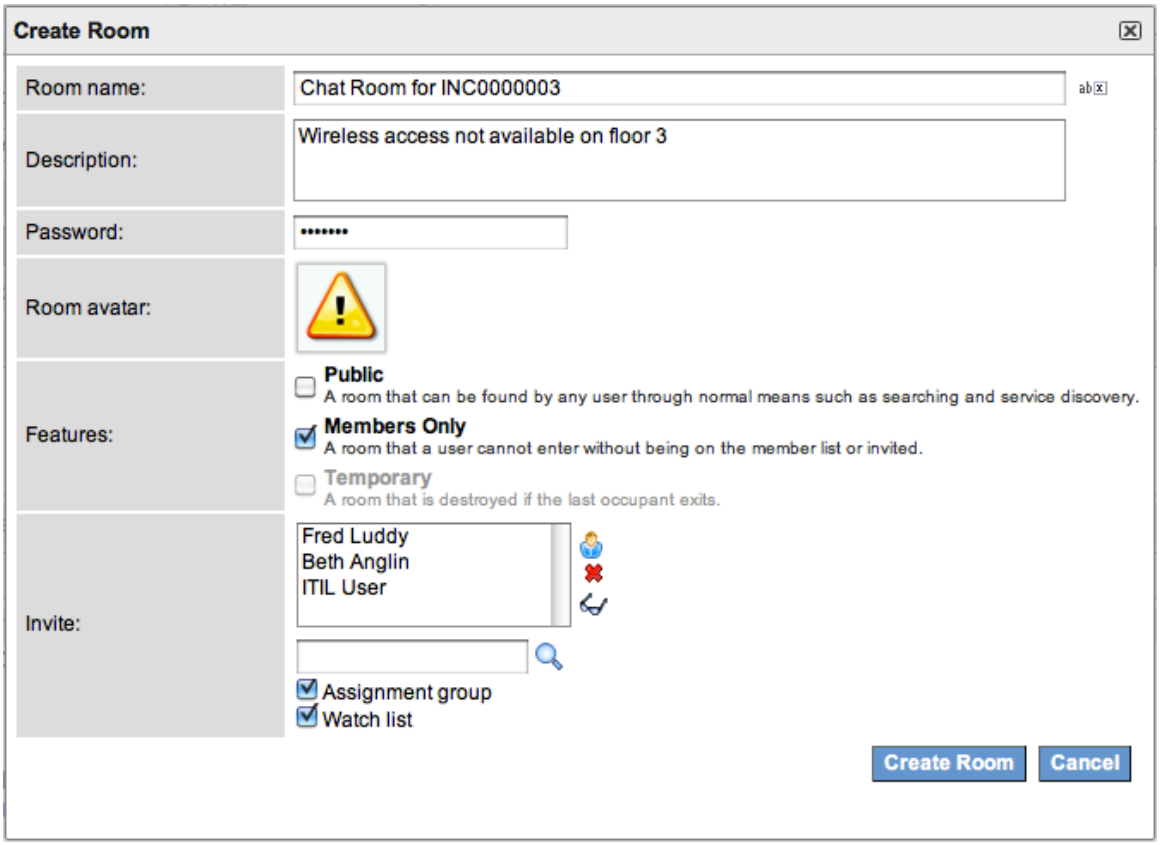
Chat task create



Chat task create

Field	Value
Room name	Enter a name to appear on the chat window header or click the **Generate a unique room name** button (**Room name generator**) to use a system-generated name. The default name for a room created from a task is Chat Room for <Task Number>.
Description	Enter a room description that appears under the name in the rooms list. The default description for a room created from a task is <Short Description>.
Password	Enter a password, if desired. If a password is specified, only users with the password can join the chat room.
Room avatar	Upload an image that appears beside the room name in the list of rooms. Click the picture and browse to the desired image file.
Features	Select all applicable check boxes: ○ *Public* if all users can see the room in the rooms lists. ○ *Members Only* if only invited users can join the room. ○ *Temporary* if the room is not saved once all participants have left. This feature is not available for rooms created from tasks; task chat rooms are always available on the task record.

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Field	Value
Invite	Add invited users by using the Add users to a watch list. For a room created from a task, you can also select all applicable check boxes: ○ *Assignment group*: invite all users in the assignment group for the task. ○ *Watch list*: invite all users on the watch list for the task.

Legacy: Create a chat room for a task

How to start a legacy chat with multiple users from a task record.

Before you begin

Role required: agent

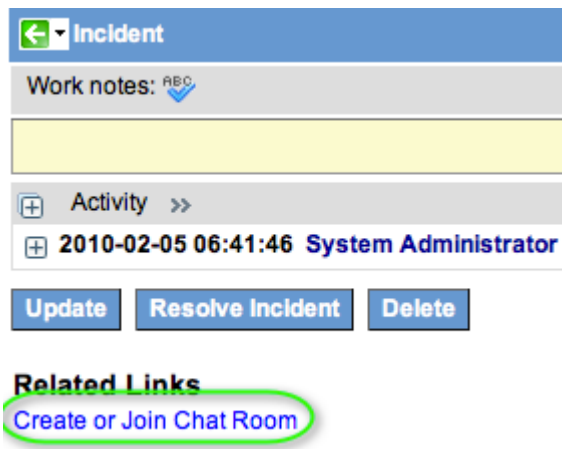
About this task

Note:
This procedure is not possible if the Connect feature is enabled.

Procedure

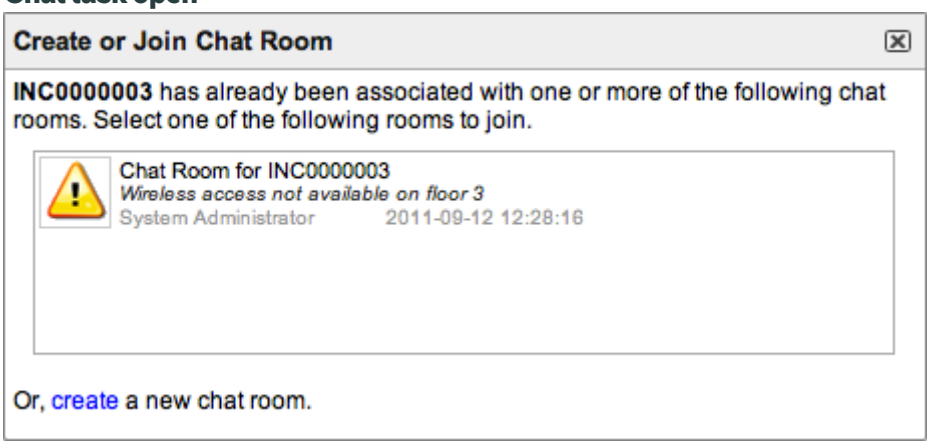
1. Open the record (example, an incident on which you are working).

Chat task link



2. Click the **Create or Join Chat Room** related link.
3. If a chat room already exists, click a name to join the existing chat room.
   If no chat room exists, continue to the next step to create a new room.

Chat task open



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4. Click the **create** link at the bottom of the window.
5. Enter the room details as you would for a chat room.
6. Click **Create Room**.
   An email notification is sent and appears in the favorites list for all invited users (the assignment group and the watch list, if selected, and additional invited users).
7. In the *New Room Created* message, click **Join Room**.

   - A new chat window opens on your chat desktop.
   - All invited users are listed in the chat member list. Invited users that are not currently participating in the chat are listed in gray.

Legacy: Join one-to-one chats

In legacy chat, when another user starts a chat by sending a message to you, a chat window opens on your chat desktop. To join the chat, click the window.

Legacy: Join a chat room

How to join a chat room in legacy chat.

Before you begin

Role required: agent

Procedure

1. If another user invites you to join a chat room, an invitation appears in your favorites list.

   Chat invitation

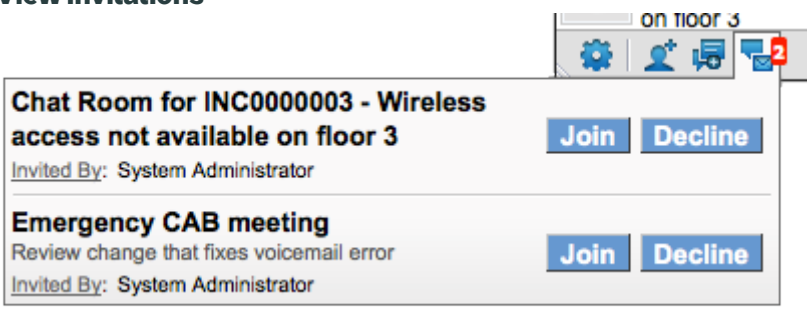
   

2. To respond, click the invitation.

   A window opens that displays the room name, room description, and the name of the user who invited you.

   - To join the chat, click **Join**. When the chat window opens on your chat desktop, click the window.
   - To ignore the invitation, click **Decline**.

   View invitations

   To rejoin a favorite chat room that you have left, click the chat room name in the Rooms section of the favorites list.

   To join a public chat room without an invitation, right-click the Rooms section header and select **Public Rooms**. Double-click a room name on the list.

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Legacy: Join a chat room for a task

In legacy chat, if another user invites you to join a chat room from a task record, you receive an email notification.

Before you begin
Role required: agent

Procedure

1. Click the link in the email notification.
2. If a prompt for a password appears, enter the password listed in the email notification.
3. When the chat window opens on your chat desktop, click the window.

Legacy: Join a chat room from a task record without an invitation

How to join a chat room in legacy chat without an invitation.

Before you begin
Role required: agent

About this task

Note:
This procedure is not possible if the Connect feature is enabled.

Procedure

1. Open the task record.
2. Click the **Create or Join Chat Room** related link.
3. Click a chat room name.
4. If a prompt for a password appears, contact the person who created the chat room for the password.

   If a chat room has a password, only users with the password can join the chat.
5. When the chat window opens on your chat desktop, click the window.

Legacy: Chat windows

In legacy chat, a chat window appears on your chat desktop for each chat conversation that you start or join.

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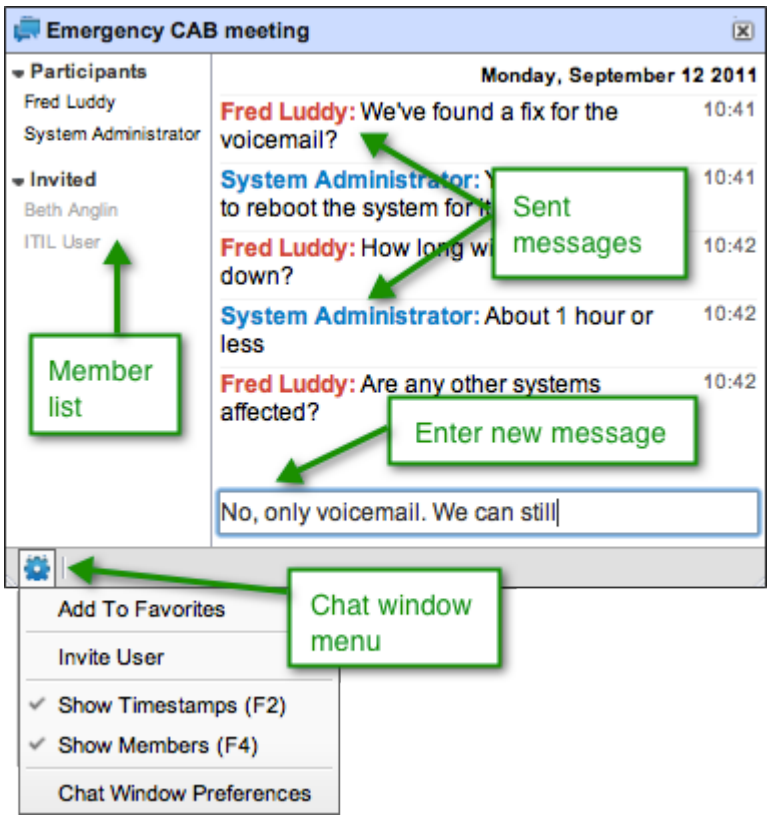
Chat window



Legacy: Send messages in legacy chat

How to send messages in legacy chat.

To chat with other users that have joined the conversation, enter your message in the text field at the bottom of the window and press **Enter**. The message appears in the other users' chat windows.

To send a link, type the full URL (example, http://www.service-now.com). When the message is sent, the text appears blue and any user in the conversation can click it to follow the link.

To send a smiley face, type a colon followed by a close parentheses (:)). When the message is sent, a smiley face (🙂) appears in place of the text. For more emoticons, see Sending Emoticons in Messages (Smileys).

Chat activity is indicated with the following alerts:

- When a new message is posted to an inactive browser tab, the tab name blinks.
- When a new message is posted to an inactive chat window, the window header appears in yellow and blinks.
- When a user joins or leaves a room, a message appears in the other room members' chat windows.

Legacy: Send emoticons in legacy chat messages (smileys)

How to send emoticons (smileys) in legacy chat.

To send an emoticon (smiley), type text from the following table. When your message is sent, the emoticon appears in place of the text. For example, enter colon followed by a close parentheses (:)) and a smiley face (🙂) appears in your message.

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Emoticons

Text	Image
:) :-)	Smiley 
B) B-) BD B-D	Shades 
:D :-D	Big smile 
:* :-*	Kiss 
:(:-(	Frown 
<3	Heart 
;) ;-)	Wink 
:P :-P	Playful 
:O :-O	Surprise 
X(X-(	Angry 
:") :">	Blush 
:((:-((	Crying 
(A)	Halo 
:? :-?	Undecided 

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Legacy: Change the display

How to change the display of legacy chat.

To view the chat window menu, click the gear button (

Chat window menu



) in the bottom left.

- To show or hide timestamps, select **Show Timestamps** from the chat window menu or press **F2**.
- To show or hide the chat member list, select **Show Members** from the chat window menu or press **F4**.

To resize the window, point to the lower corner (left or right). When the pointer changes shape, drag the window to the desired size.

To move the window, point to the header. When the pointer changes shape, drag the window anywhere on your chat desktop.

To close a chat window, click the **X** in the upper right corner.

Legacy: Invite a user into a chat

How to invite another user into a chat in legacy chat.

Before you begin

Role required: agent

Procedure

1. Select **Invite User** from the chat window menu.

   Chat window menu

   

2. Begin typing a user name and select a user from the list, or click the reference lookup and select a user from the table.

   Search icon

   

3. Click **OK**.

   An invitation is sent to the selected user. One-to-one chats are automatically converted into temporary chat rooms.

Legacy: Add a favorite room

How to add a favorite room in legacy chat.

Before you begin

Role required: agent

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Procedure

To add a room to your favorites, click the chat window and select **Add To Favorites** from the chat window menu.

Chat window menu



Legacy: Remove a favorite room

How to remove a favorite room in legacy chat.

Before you begin

Role required: agent

Procedure

To remove a room from your favorites, right-click the room name and select **Remove From List**.

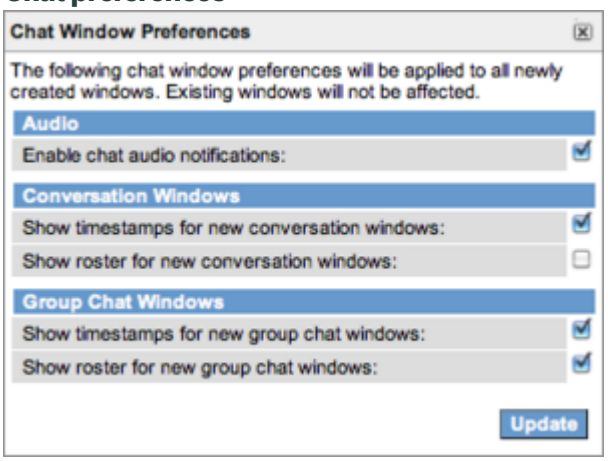
Legacy: Set your chat preferences

Use the Chat Window Preferences to set audio notifications and default chat window display options in legacy chat.

Use the *Chat Window Preferences* to set audio notifications and default chat window display options. The default display options control how a chat window looks when you first open it. You can still control the display options for an individual window as described in Changing the Display.

To view your chat preferences, click your name in the upper left corner of the chat desktop and select **Chat Preferences**.

Chat preferences



To set your preferences, select or clear the check boxes next to the options, then click **Update**.

Preferences

Title	Description
Audio	Turn audio notifications on or off.
Conversation Windows	Set default options for showing timestamps and members in one-to-one chats.

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Preferences (continued)

Title	Description
Group Chat Windows	Set default options for showing timestamps members in chat rooms.

Legacy: Delete a chat room

You can delete chat rooms in legacy chat.

Before you begin
Role required: chat_admin

About this task
Note that when you delete a chat room, the system also deletes the records for any chat members and messages.

Procedure

1. In the application navigator filter, enter `chat_room.list`.
2. Delete multiple chat rooms from the list or open a chat room record and click **Delete**.

Legacy chat administration

Users with the chat_admin role can administer various aspects of legacy chat.

Define chat room access rights

Control the access rights for creating a chat room so that not all users can create a chat room.

Before you begin
Role required: chat_admin

About this task
To define the access rights for creating chat rooms:

Procedure

1. Navigate to **All** > **Social IT** > **Chat Administration** > **Properties**.
2. Locate the property **Comma-separated list of roles that are allowed to create chat rooms**.
3. Enter user roles.
   A user must have one of the specified roles to create a chat room.

Change chat room message read access

In legacy chat, you can associate a chat room with a record, such as an incident, and add the chat messages to a **Chat Activity** journal field on the form.

Before you begin
Role required: chat_admin

About this task
By default, a user can read the chat messages for a room if either of the following is true:

- The room is public
- The user is a member of the room

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To change chat room message read access:

Procedure

Modify the Chat message access control rule or create a new rule.

Read access to the messages displayed is handled by the access control list security operation `chat_messages_read` on the Chat room [`chat_room`] table.

View a legacy chat message as a journal field

You can view all chat messages in one place by viewing them as a journal field.

Before you begin
Role required: agent

About this task
Chat rooms can be linked to any task record in the following ways:

- Create a room from the record.
- Create a record from a chat room, such as creating an incident from a Help Desk Chat.

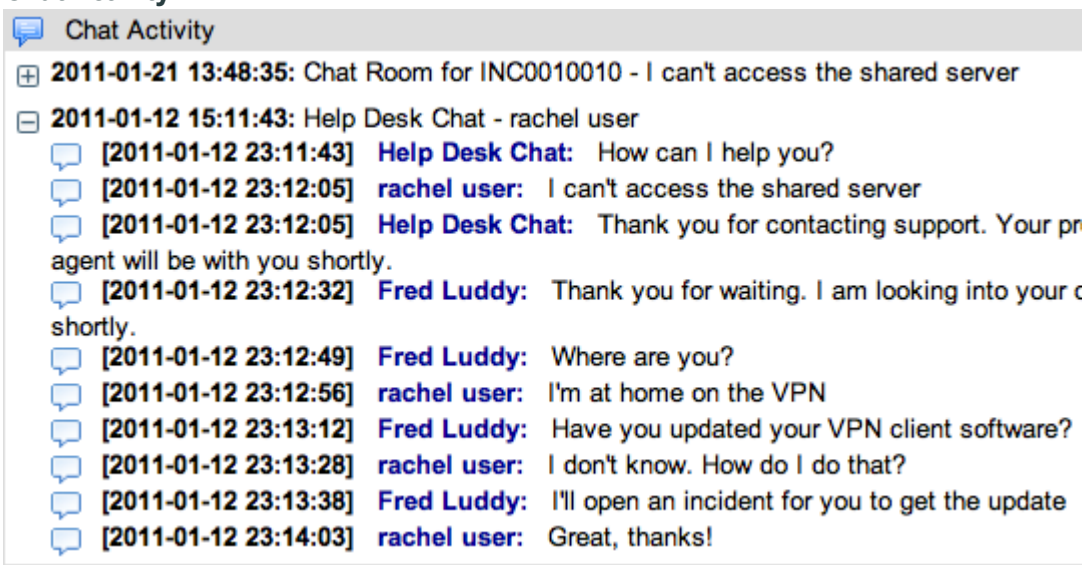
To view the chat messages as a journal field:

Procedure

Configure the task record form to select the **Chat Activity** field.
The maximum number of chat messages that are displayed by this field is 1000.

Example:

Chat Activity



Chat actions

Chat actions are additional items that appear in the chat window menu (requires the Chat plugin). Administrators and users with the chat_admin role can define chat actions.

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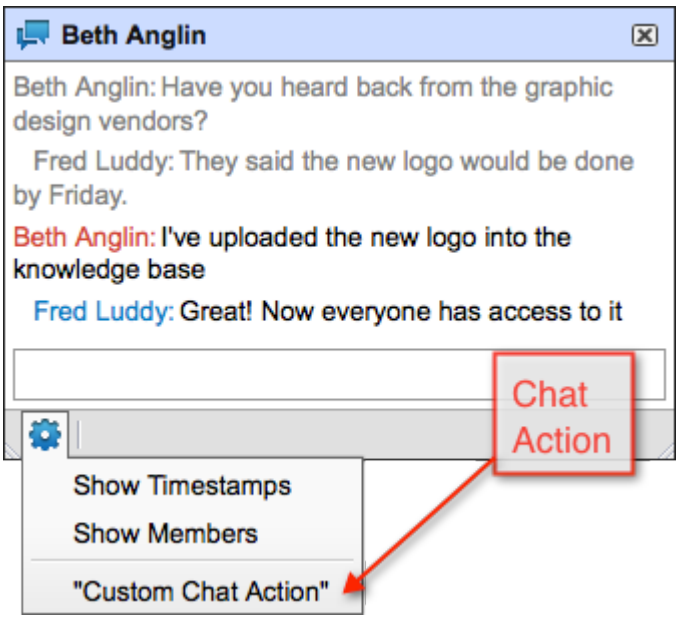
Chat actions



Add actions to the legacy chat window menu

You can create new actions and add them to the chat window menu.

Before you begin

Role required: chat_admin

Procedure

1. Navigate to **Social IT > Chat Administration > Actions**.
2. Select an action to edit or click **New**.
3. Enter the chat action details and click **Update** or **Submit**.

Example:

The following example demonstrates how to add a chat action that appears only on windows where the user is a Help Desk Agent. The action appears on the menu as **Show User Type** and opens a popup window that indicates a current user of queue_agent.

- **Action Name**: Show User Type
- **Active**: Select the check box.
- **Order**: 100
- **Client Show Condition**:

```
answer = g_chat.getChatType() == 'queue_agent';
```

- **OnClick Action Script**:

```
alert('The current user is: ' + g_chat.getChatType());
```

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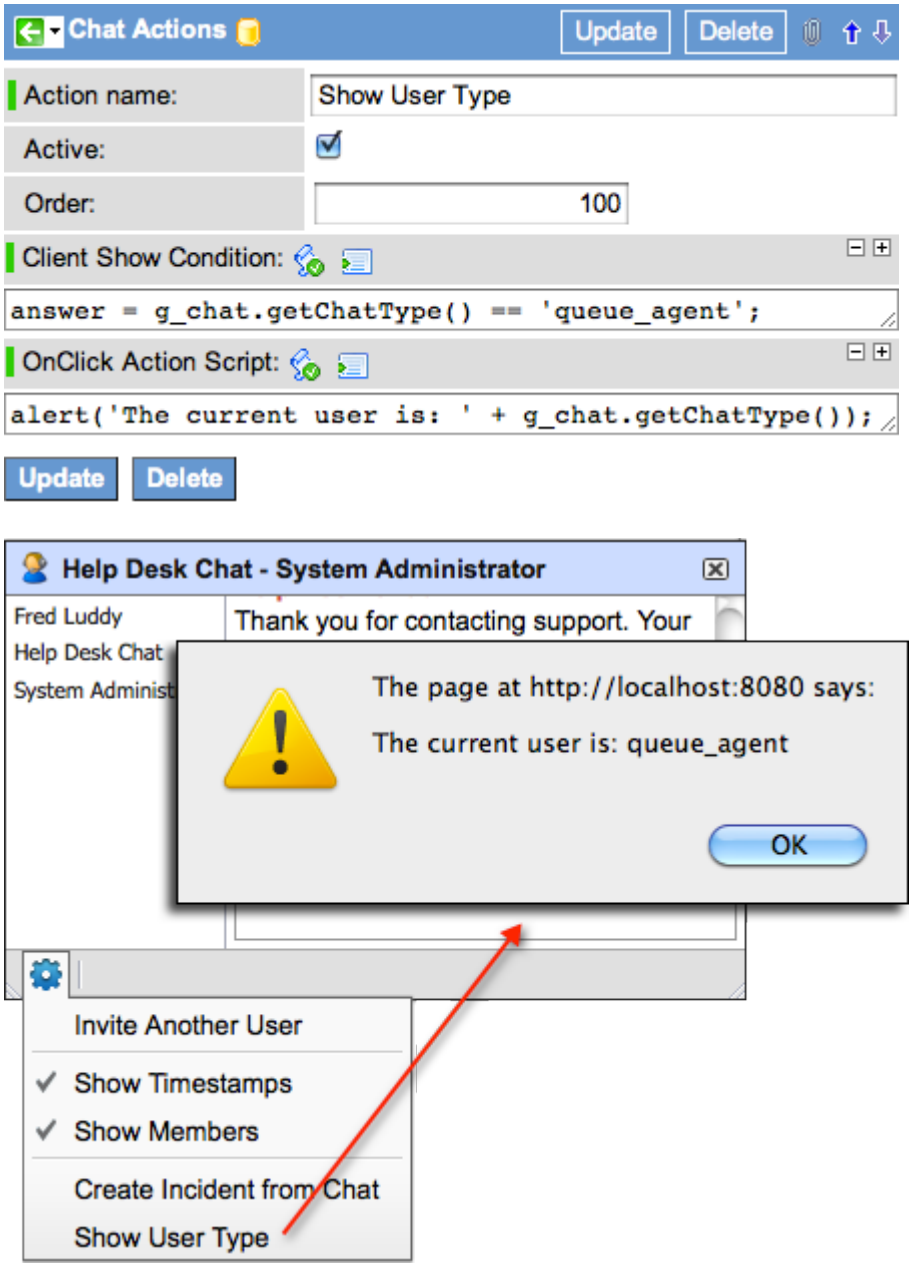

Chat action details

You can define a chat action name and the script that runs when the action is selected.

Chat action details

Field	Description
Action Name	Enter a label for the action as it appears in the menu.
Active	Select the check box to activate or clear the check box to deactivate the action. Only active actions may appear in the menu.
Order	Enter the order in which the action appears in the menu. Standard menu items (such as **Show Timestamps**) always appear at the top of the chat menu, followed by chat actions in order.

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Field	Description
Client Show Condition	Define the conditions under which this menu option appears. The show condition must set the pre-defined *answer* variable to a boolean value.
OnClick Action Script	Enter the JavaScript code that runs when the menu item is selected.

Available methods associated with the g_chat variable

The g_chat variable is a legacy chat window object that is available in the **Client Show Condition** and **OnClick Action Script** of a chat action definition.

Method Summary

The following table defines the available methods associated with this object.

Return Object	Details
Array	*getActiveUsers()* Returns the active users. Returns: Array - Returns the active users.
String	*getChannelJID()* Returns the channel JID, which is a *sys_id* for a record chat_channel table. Returns: String - Returns the channel JID.
String	*getChatType()* Determines the chat window type. Returns: String - Returns one of the following values that specifies the type of user: • queue_agent: Help Desk Chat support agent • queue_user: Help Desk Chat end user • group_chat: The individual is a member of a chat room (multiple users) • conversation: The individual is a member in a private chat with another user
String	*getChatQueueAgent()* Returns the *sys_id* for agent that is administering this thread. Returns: String - Returns the *sys_id* of the chat queue agent.

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Return Object	Details
String	*getChatQueueUser()* Returns the *sys_id* for end user of the chat queue. Returns: String - Returns the *sys_id* of the chat queue user.
String	*getThreadID()* Returns the thread ID. This returns the same value as *g_chat.getChannelJID().getID()*. Returns: String - Returns the thread ID.

Legacy: Help desk chat

Communicate with service desk staff using instant messaging.

Note:
The Connect Support feature provides an updated messaging platform similar to help desk chat. The help desk chat and Connect Support features should not be used concurrently. There is no migration path from help desk chat to Connect Support.

Users can communicate directly with service desk staff using instant messaging in a ServiceNow instance (requires the Chat plugin.)

- Users access live support from the Employee Self-Service portal.
- Service desk staff provide support from the chat desktop.

Legacy: Use help desk chat to get support

You can contact service desk staff.

Before you begin

Role required: agent

Procedure

1. Open the Employee Self-Service Portal (https://<instance web address>/ess).
2. Log in to your ServiceNow account.
   Only logged in users can use chat.
3. In the upper right, click the **Service Desk Chat** button.
   A chat window opens.
4. Enter your question in the text field at the bottom of the window and press **Enter**.
   a. A message confirms that you have entered the chat queue and indicates your position and estimated wait time.
   b. When a service desk staff member accepts your chat and begins working on your question, another message appears.

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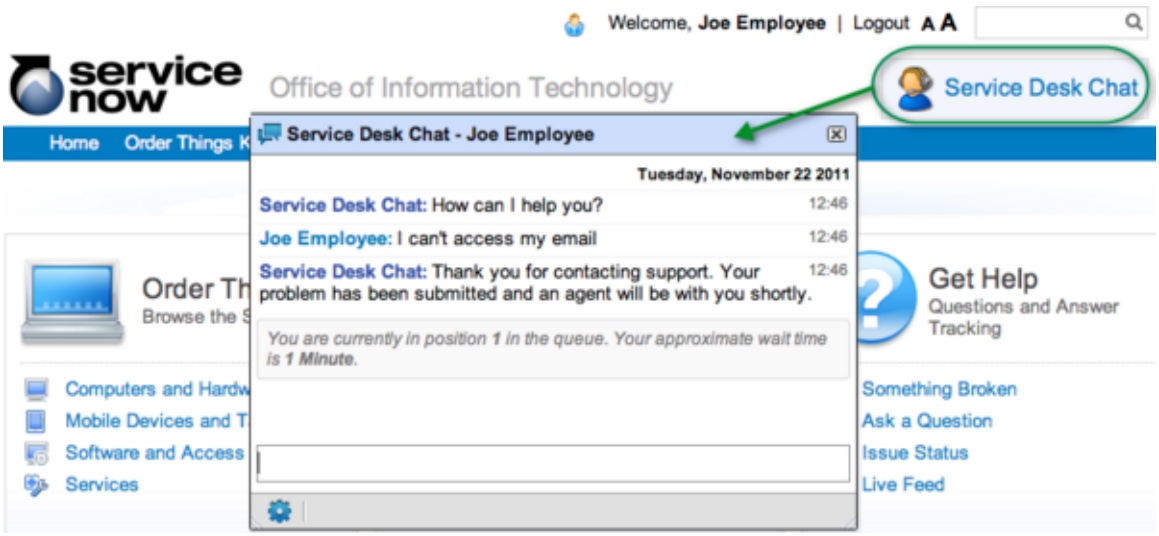
5. Chat with your service desk agent via instant messaging.

   service desk staff may lead you through troubleshooting, ask clarifying questions, or create an incident record to address your question.

Result

Note:
Administrators can configure Service Desk Chat to be accessible on content management (CMS) pages.

Service Desk Chat Window



Legacy: Use help desk chat to provide support

Staff who are assigned to chat support can provide live support via instant messaging. Administrators and users with the chat_admin role can assign chat support staff (see Set Up Chat Queues for Help Desk Chat).

Before you begin
Role required: agent

Procedure

1. Navigate to **All** > **Social IT** > **Chat** to open your chat desktop.
   - A chat queue agent window appears on your chat desktop for each chat queue you are assigned to. If no agent windows appear, ask an administrator to add you as a member of the **Assignment group** for a chat queue.
   - The chat queue agent window displays the number of users in the queue and how long they have been waiting.
   - Every member of the assignment group sees the associated chat queue agent window.
2. Click **Answer Next User** to answer the next user or click **Answer** beside a specific user in the queue.
   A chat window opens. Only the agent and the user can see the chat window.

Result
Provide support via instant messaging. Chat queue agents can access additional support functions in the chat window menu:

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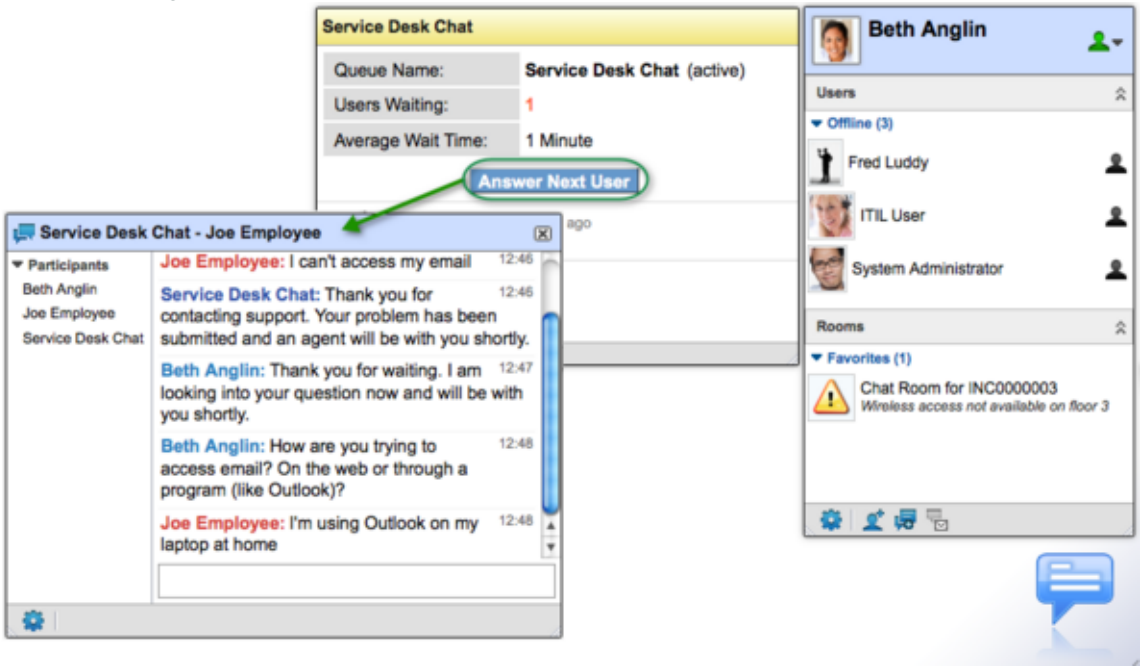
- **Invite User:** invite another expert to assist with a support chat. An invitation appears in the favorites list of an invited user.
- **Create Incident from Chat:** create a new incident record with the initial question as the short description and the support chat as a linked chat room (accessible from the **Create or Join Chat Room** related link on the Incident form).

Note:
Administrators can edit this action or add additional actions to the chat window menu.

Chat Queue Agent



Legacy: Set up chat queues for help desk chat

Help desk chat allows users to communicate directly with Service Desk staff via instant messaging in an instance.

Chat queues define the schedules, staff, and system messages for help desk chat. Administrators and users with the chat_admin role can set up chat queues.

Define a chat queue for legacy chat

How to define a chat queue for legacy chat.

Before you begin

Role required: admin

About this task

Note:
The Chat Queue [chat_queue] table is also used by Connect Support. Legacy chat and Connect Support should not be used concurrently.

Procedure

1. Navigate to **All** > **Social IT** > **Chat Administration** > **Queues**.
2. Select a chat queue to edit or click **New**.
3. Enter the chat queue details and click **Update** or **Submit**.

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Chat queue details

Field	Description
Name	Enter the name that end users see as a title for the queue.
Active	Select the check box to activate or clear the check box to deactivate the chat queue.
Assignment group	Select the group that contains the support staff for the chat queue. Every agent sees the chat queue on their chat desktop and can answer any user that is waiting in the queue. To assign staff members to the group, see Assign Service Desk Staff to a Chat Queue.
Schedule	Select a schedule that defines when a queue is available (see Creating and using schedules). If the queue is always available, clear the field.
Question	Enter the initial question that end users see when they open a new Help Desk Chat. For example, How can I help you?
Confirm problem	(Optional) Enter the confirmation message that end users see when they enter an initial question. For example, Thank you for contacting support. Your problem has been submitted and an agent will be with you shortly.
Initial agent response	(Optional) Enter the message that end users see when an agent accepts their chat. For example, Thank you for waiting. I am looking into your question now and will be with you shortly.
Not available	Enter the message that end users see when a Help Desk Chat request is not accepted because the queue is outside its scheduled availability (defined by the Schedule field).

Assign service desk staff to a chat queue

Chat queue agents are Service Desk staff that are members of a chat queue's assignment group.

Before you begin

Role required: chat_admin

About this task

To assign agents to a chat queue:

Procedure

1. Navigate to **All** > **User Administration** > **Groups**.
2. Select an existing assignment group or click **New**.
3. Enter or modify the group details (see Create a Group).
4. Right-click the header and select **Save**.
5. In the *Group members* related list, click **Edit**.
6. Using the slushbucket , add support staff to the group.
7. Navigate to **Social IT** > **Chat Administration** > **Queues**.
8. Select the chat queue for which the group provides support.

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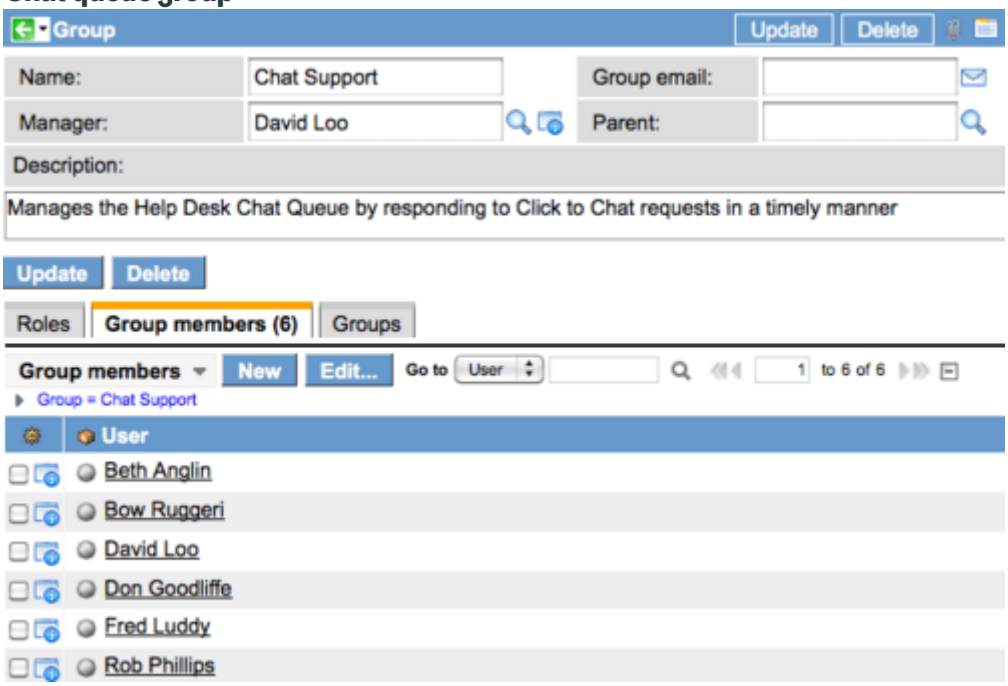
9. In the *Assignment Group* field, select the group.

Chat queue group



Make help desk chat accessible to an end user

Users access live support from the Employee Self-Service Portal (ESS Portal).

Before you begin

Role required: admin

About this task

Users access live support from the Employee Self-Service Portal (ESS Portal). To make a Help Desk Chat queue accessible to end users, add a link to the ESS Portal (requires the Content Management Plugin).

To change the default link in the ESS header:

Procedure

1. Navigate to **All** > **Content Management** > **Headers**.
2. Open **Portal - Header**.
3. In the *Chat queue* field, enter the chat queue that users access by clicking the link in the ESS header.
4. Clear the field to remove the chat queue link.

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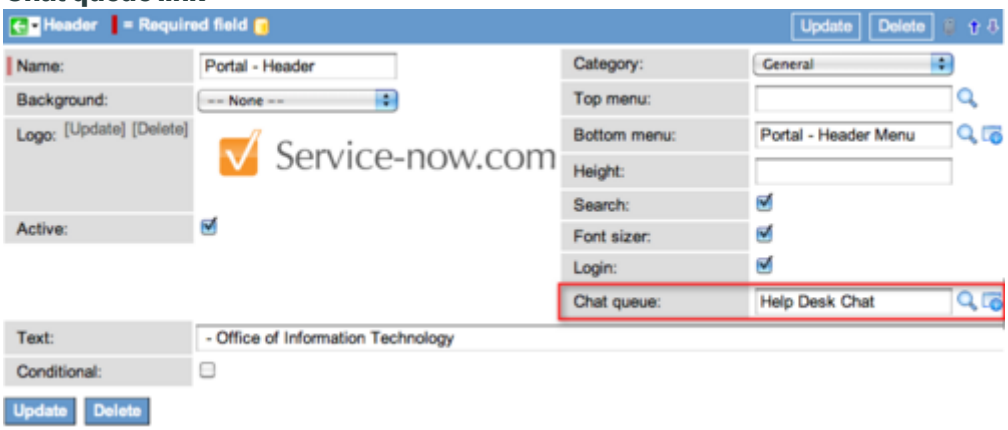
5. Click **Update**.

Chat queue link



Add a custom link elsewhere on the ESS portal

How to add a custom help desk chat link on the ESS portal.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Content Management** > **Static HTML**.
2. Click **New**.
3. Enter a *Name*.
4. In the *Static content* field, click **Toggle HTML Source** to edit the field in HTML source mode.

HTML editor button

5. Create a link to the desired Help Desk Chat queue (see Link Syntax).
6. Click **Submit**.
7. Add the new content block to the desired location on the portal (see Add content to a page).

Link syntax

To open a Help Desk Chat queue from a custom link on the ESS Portal, you must call the CustomEvent.fire method using appropriate arguments.

To open a Help Desk Chat queue from a custom link on the ESS Portal, you must call the CustomEvent.fire method using appropriate arguments. Details of the API call and an example that generates an anchor link are provided below.

API Call:

```
CustomEvent.fire(LiveEvents.LIVE_EVENT,
 LiveEvents.LIVE_WINDOW_JOIN_QUEUE_QUERY, CHAT_QUEUE_SYS_ID,
 CHAT_QUEUE_SYS_NAME);
```

where the variables are:

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- CHAT_QUEUE_SYS_ID: Specifies the sys_id for the chat queue.
- CHAT_QUEUE_SYS_NAME: Specifies the name of the chat queue (must match the value the Name field of the chat queue record).

Example: This example creates an anchor link that opens the Help Desk Chat queue.

```
<a href="#" onclick="CustomEvent.fire(LiveEvents.LIVE_EVENT,

 LiveEvents.LIVE_WINDOW_JOIN_QUEUE_QUERY,

 'c54f0abf0a0a0b452db84664f409c79c',
                                        'Help Desk Chat'); return
 false;">
  Help Desk Chat
</a>
```

Monitor chat queues

Chat queues can yield useful Key Performance Indicators (KPI) for evaluating support effectiveness.

- Queue Wait Time: amount of time a user waits in the queue before a help desk agent accepts the request.
- Percentage of Chats Abandoned: users that exit the queue before an agent responds (user stopped waiting).
- Percentage of Chats Accepted: requests that are answered by an agent.

Note:
This information is not calculated automatically. Administrators may calculate these values based on data collected by chat queues.

Monitor help desk chat tasks

Help Desk Chat requests are tracked in the Chat queue entries table, which appears as a related list on the associated chat queue record.

Help Desk Chat requests are tracked in the Chat queue entries table, which appears as a related list on the associated chat queue record. Because this table extends the Task table, administrators can take advantage of core task functionality. For example, administrators can attach Service Level Agreements (SLAs) to chat queue entries to evaluate the response time of Help Desk Chat support.

Legacy Notify

Legacy Notify enables organizations with a Twilio account to send notifications using text and voice messages.

Note:
This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

Legacy Notify also allows conference calls between ServiceNow users to enable quick communications.

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When Legacy Notify is active, you can configure ServiceNow to automatically generate and send notifications to selected contacts, for instance when a new incident communication plan is raised in the incident communications management process.

Users with the notifynow_admin role can set properties and monitor message and conference call activities.

Legacy Notify has been implemented for use within Incident Communications Management. Refer to the Notify API documentation for details on how to implement Legacy Notify for use within other ServiceNow applications.

Working with Legacy Notify

Follow this process to enable and use Notify.

Before you begin

Role required: notifynow_admin

About this task

This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

Procedure

1. Set up a Twilio account to provide phone connectivity for Notify.
2. Activate Notify.
3. Configure Notify to use Twilio.
4. Begin using Notify immediately within Incident Communications Management.
5. Use the Notify API with other ServiceNow applications to provide SMS, voicemail, email, and conference calls for those applications.

View a Legacy Notify question

Questions contain a response action and a set of response choices. Use these questions to simplify communications. Then, you can monitor the resulting communication thread.

Before you begin

Role required: notifynow_admin

About this task

This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

For example, the process can be used to ask members of a specific on-call group to acknowledge or reject an incident. Depending on the answer from the first team member, the incident is assigned to that person or an SMS question is sent to the next on-call member. In this example, the questions are used as part of a workflow.

To see a list of predefined questions both Notify and On-Call Scheduling need to be active.

Procedure

1. Navigate to **All** > **Notify** > **Questions**.
2. Click the question **On-Call responsibility Accept/Reject** to see the question details.

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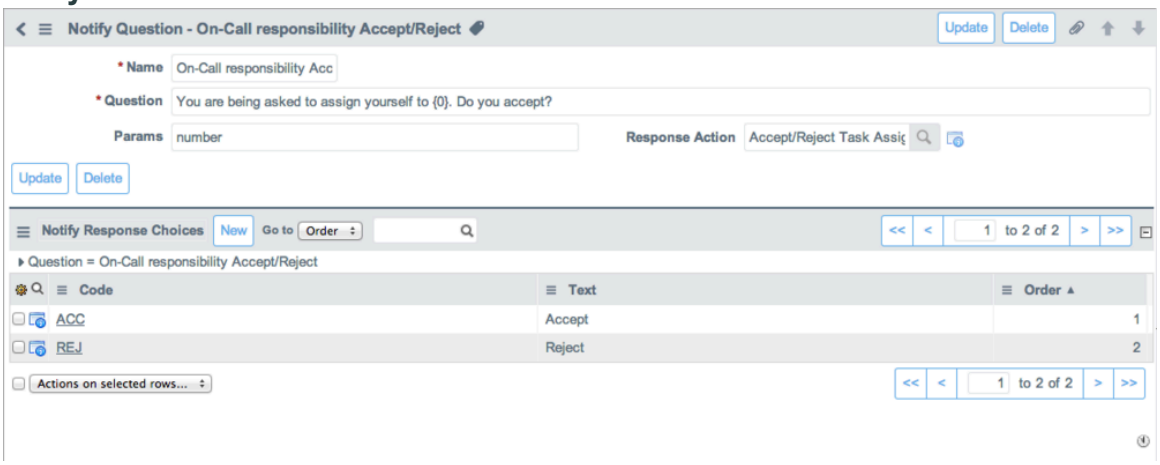
Notify Question



3. Click the **Notify Response Choices** related list to view or edit the choices.
   The person who receives the SMS question can either choose to accept or reject the assignment. If the assignment is accepted, the **Response action** can be that the incident is actually assigned to that person. The response action is a script that you can modify or replace. If the assignment is rejected, an SMS question may be sent to the next person in the escalation chain, and so on. You can combine questions with a workflow to automate a process like on-call scheduling escalation.

Create a question in Legacy Notify

Define a question that can be sent to users.

Before you begin

Role required: notifynow_admin

About this task

This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

Procedure

1. Navigate to **All** > **Notify** > **Questions**.
2. Click **New**.
3. Fill in the fields, as appropriate.

Notify New Question form

Field	Description
Name	Enter a description of the question.
Question	Enter the question you want to send. You can enter variables in the question with the { } tags, for example, {0}. When using more than one variable, use consecutive numbering. When using multiple variables, reference them by specifying their position in the parameter list, starting from {0}. The variable is picked up by the script and translated into, for example, an incident or a problem number.
Params	Enter parameters which map to the fields on the record that the workflow was triggered for. This enables the message to show dynamic data. Multiple parameters should be separated by a comma. For example, *number*, shows the

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Field	Description
	incident number in case the workflow was triggered from an incident. A second parameter could be, for example *short_description*.
Response Action	Select the action that must be taken. This is a script that can be modified, or you can create a new script by clicking the search button and selecting **New**. Several examples of scripts are shown. Write your own script and click **Submit**.

4. Click **Submit**.

Create a new response choice in Legacy Notify

Create a new response choice to allow users to select that response for a Notify question.

Before you begin
Role required: notifynow_admin

About this task
This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

Procedure
1. Navigate to **All** > **Notify** > **Questions**.
2. Open the notify question you have just created.
3. Click New to create a new notify response choice.
4. Fill in the fields, as appropriate.

Notify New Response Choice form

Field	Description
Code	The abbreviation for the response choice in the text message. For example, *ACC* for accept or *REJ* for reject.
Text	The text displayed for this response choice.
Order	A number indicating the order in the list of response choices. Choices with lower order numbers are listed before choices with higher order numbers.

5. Click **Submit**.

View Legacy Notify messages

Applications implementing Notify, such as Incident Communications Management, can send Short Message Service (SMS) text messages to relevant contacts under predefined conditions, such as when a new incident communication plan has been created.

Before you begin
Role required: notifynow_admin

About this task
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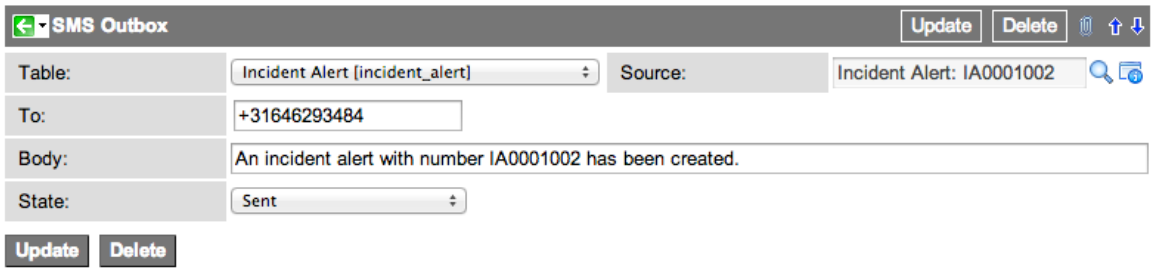
Procedure

1. Navigate to **All** > **Notify** > **Messages**.
2. Click a message to see the message details.

SMS Outbox Details



View Legacy Notify conversations

The Notify Conversation [notifynow_conversation] table tracks bi-directional communications and adds the ability to have more than one active conversation with the same phone number at the same time.

Before you begin

Role required: notifynow_admin

About this task

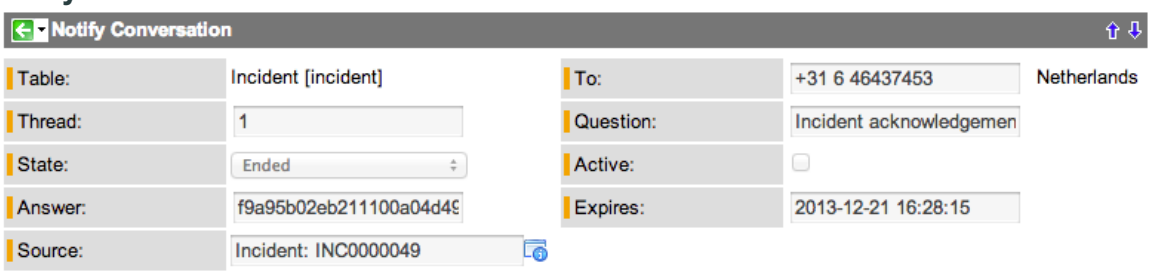
This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

The thread number is combined with the phone number to link the SMS or email response to the correct conversation. Conversations remain active until a response is received or until they are automatically deactivated after the thread release time runs out. The default thread release time is 10 days. To change this value, add the *nn.thread.release.age* property.

Procedure

1. Navigate to **All** > **Notify** > **Conversations**.
2. Click a conversation record to see the conversation details.

Notify Conversation Details



The State of the conversation can have one of the following values:

Notify Conversation State Descriptions

Value	Description
Ended	The conversation has been completed.
Failed	The conversation has failed.

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Value	Description
Pending	The SMS or email is waiting to be sent.
Sent	The SMS or email has been sent.
Unanswered	The SMS or email has not been answered.

Note:
The mode of conversation cannot be changed during one conversation thread. For example, you cannot switch between SMS and email during one conversation.

View Legacy Notify conference calls

Applications that use Notify, such as Incident Communications Management, can launch and maintain conference calls between involved parties.

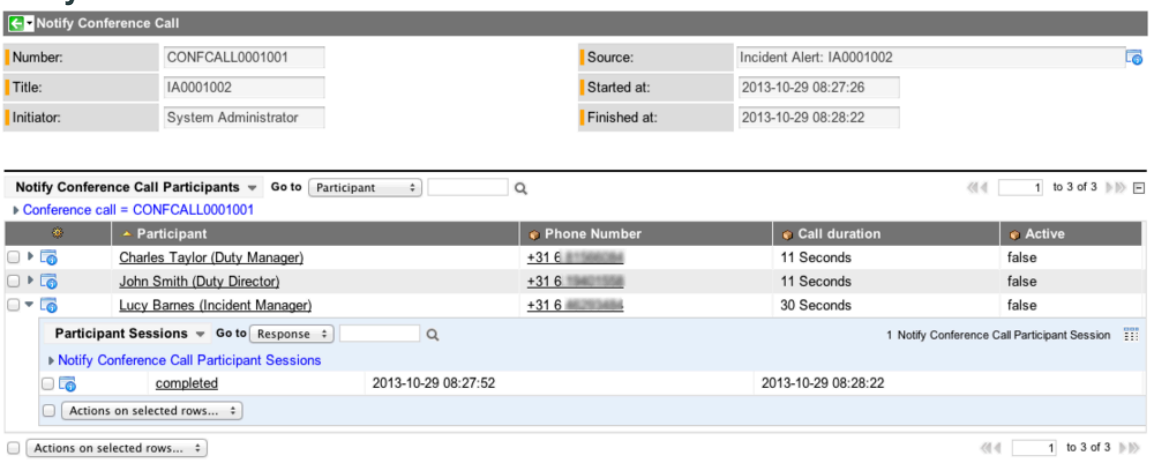
Before you begin
Role required: notifynow_admin

About this task
This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

Procedure

1. Navigate to **All** > **Notify** > **Conference Calls**.
   You can also access conference call information from the relevant record, such as the **Conference Calls** related list in an incident communication plan record.
2. Click a conference call in the list to view details.

Notify Conference Call Details



3. Click the arrow beside the check box to expand a **Participant** entry.
   This shows participant session information, including details of the conference calls that the participant has been involved in.

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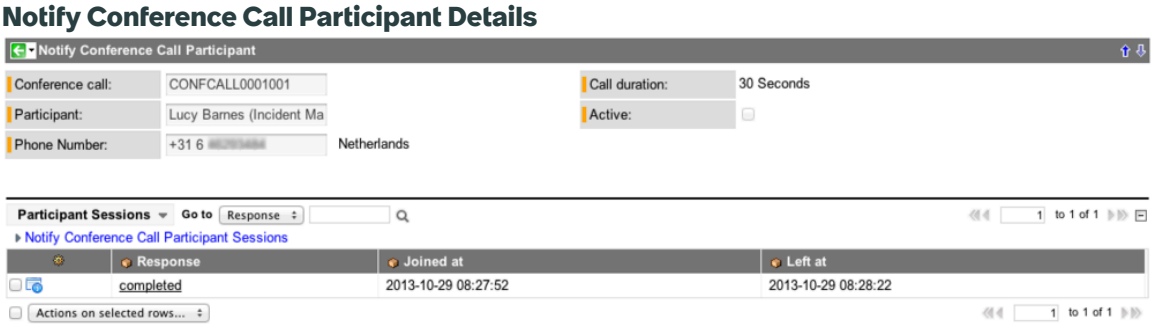
4. Click a **Participant** name to see more detailed information about that participant.



Related topics

Manage Legacy Notify conference call participants

Legacy public conference calls

A Notify conference call can be public.

> **Note:**
> This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

The **Private** field on the conference call record indicates if a call is private (selected) or public (not selected). By default, all calls created automatically, such as those created through Incident Communications Management, are public. You can create private calls using the Notify API initiateConferenceCall method.

When created, public conference calls generate an associated **Code** which is sent via SMS to all invited participants. These participants can distribute the code to allow other users to join the public call. An administrator can control the format of the code using the property glide.notifynow.conference_call.code.pattern. Anyone with the code can connect to a public conference call using one of these methods:

- By calling the Twilio phone number and entering the code for that conference call.
- By sending the code in an SMS message to the Twilio phone number. Participants that join a public call this way are considered ad-hoc participants, indicated on the participant record.

Administering Legacy Notify

An administrator can set up Notify, manage Notify properties and conference call participants.

> **Note:**
> This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

Configuring legacy Notify to use the Twilio service

Each ServiceNow instance using Notify requires a valid Twilio account and telephone number. Refer to the Twilio documentation for detailed instructions.

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Note:
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After the Twilio account is set up, perform the following to use that account with Notify:

- Associate the account with Notify
- Configure Twilio with ServiceNow endpoints

Associate a Twilio account with Legacy Notify

Associate a Twilio account with your instance to use that account for legacy Notify.

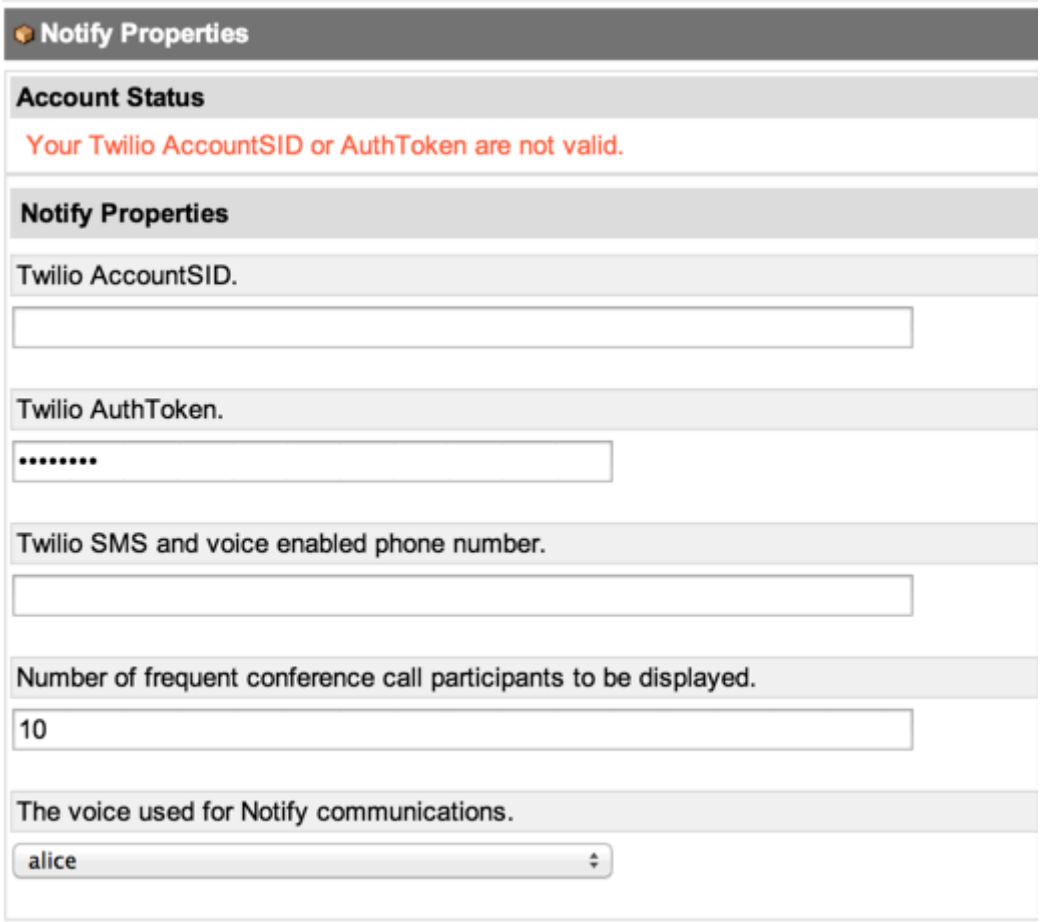
Before you begin
Role required: notifynow_admin

About this task
This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Properties**.

Notify Properties



2. Enter the **AccountSID**, **AuthToken** and **phone number** values.
   These values can be obtained from the Twilio dashboard:

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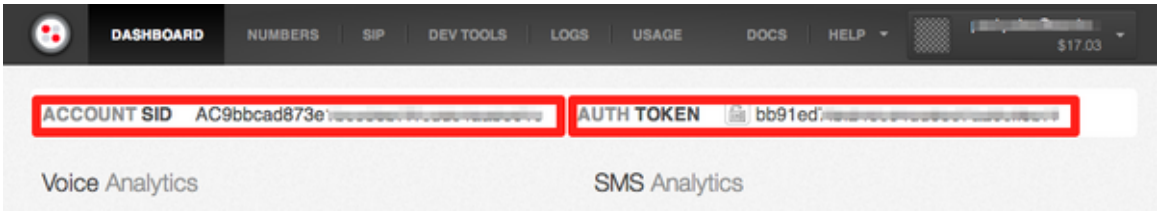
Twilio Dashboard



When the Twilio account details are entered in the Notify Properties page, the account status is updated.

3. **Optional:** To use Notify on multiple ServiceNow instances, activate Notify on each instance and create a separate Twilio account and telephone number for each instance.

Note:
Some telephone numbers are voice capable, but not SMS capable. This is shown in the Notify properties with relevant messages. Two methods are available to check this: `isSMSCapable` and `isVoiceCapable`.

Configuring the Twilio service with endpoints in legacy Notify

In order for the Twilio service to receive Notify commands, the **Request URL** field value for every Twilio telephone number must point to the ServiceNow instance that uses Notify with that Twilio telephone number.

Note:
This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

To set these values, do one of the following:

- Define them manually in the Twilio service dashboard.
- Ensure the fields are blank in the Twilio service dashboard, then open the Notify Properties page. Notify automatically configures the correct endpoints if the **Request URL** fields are blank.

Set these values from within the Twilio service dashboard.

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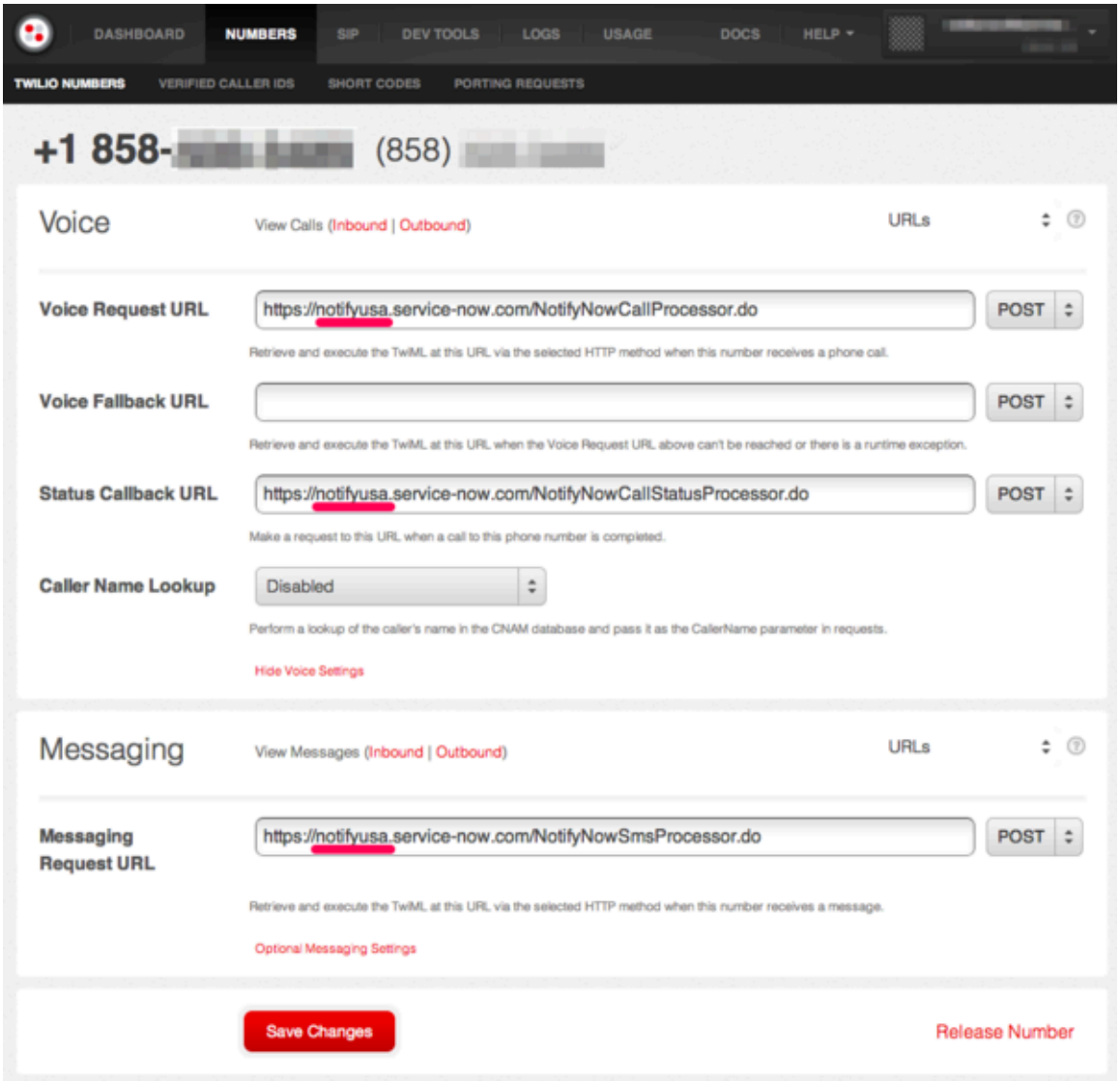
Twilio Numbers Dashboard



The `notifyusa` values underlined in the image should be replaced with your ServiceNow instance name, for:

- Voice Request URL: `https://notifyusa.service-now.com/NotifyNowCallProcessor.do`
- Status Callback URL: `https://notifyusa.service-now.com/NotifyNowCallStatusProcessor.do`
- Messaging Request URL: `https://notifyusa.service-now.com/NotifyNowSmsProcessor.do`

View and edit legacy Notify properties

You can view and edit Notify properties.

Before you begin

Role required: notifynow_admin

About this task

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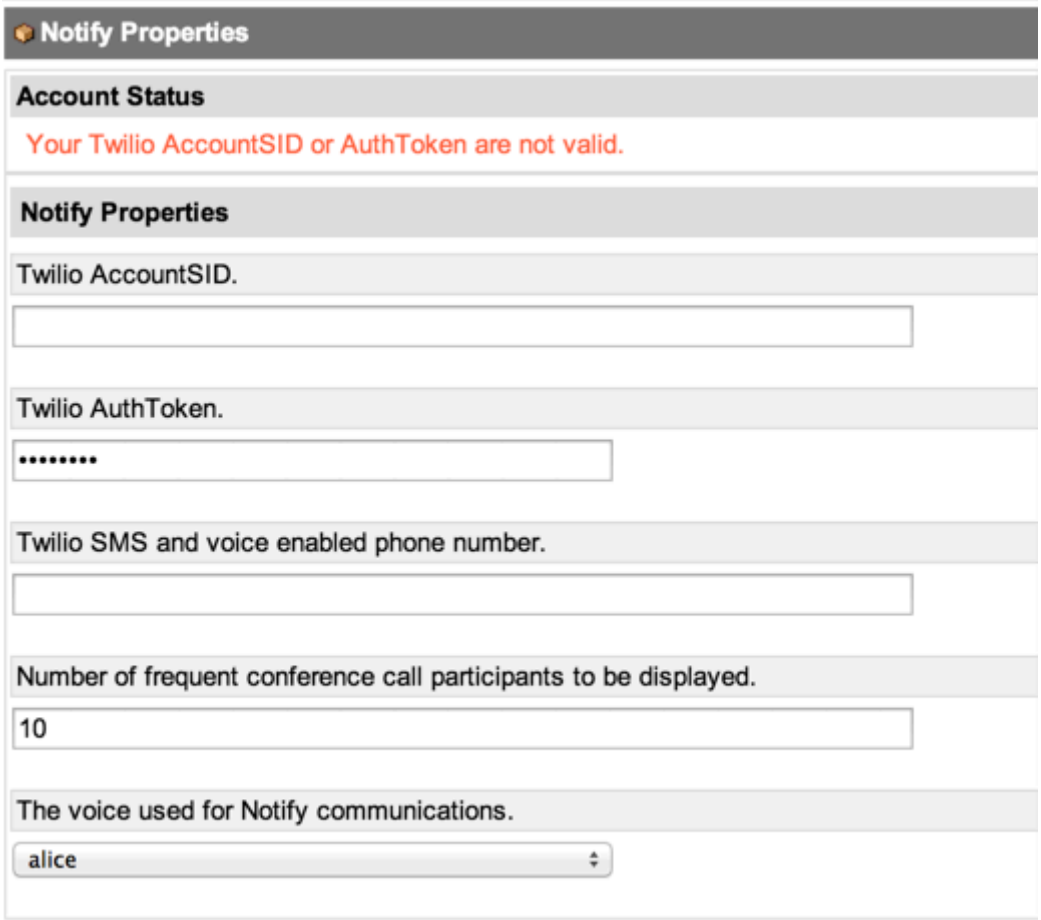
Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Properties**.

Notify Properties form



2. Fill in the fields.

Notify Properties form

Field	Description
Account Status	Information showing the status of the associated Twilio account.
Twilio AccountSID	The Twilio account AccountSID, acting as the user name for that account.
Twilio AuthToken	The Twilio account AuthToken, acting as the password for that account. See Associating a Twilio Account.
Twilio SMS and voice enabled phone number	The Twilio number that Notify will use. Telephone numbers must be entered in the E.164 format and need to exist under the Twilio account. See Associating a Twilio Account.
Number of frequent conference call participants to be displayed	The number of people to display in the frequently called list.

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Field	Description
Voice	The voice used for Notify communications. Select **woman** or **man** to provide female or male voice support for English, Spanish, French, German, and Italian. Select **alice** to provide female voice support for a wider range of languages.

3. Click **Submit**.

Legacy Notify account status messages

Account status messages are visible on the Notify Properties page.

Account Status Message Descriptions

Message	Description
Your account is ready for use	Notify is correctly configured and ready for use.
Your Twilio AccountSID or AuthToken are not valid	An incorrect value has been entered in the AccountSID or AuthToken fields in the Notify properties.
Your Twilio phone number is not valid	Incorrect telephone number information is defined in the Notify properties.
Your Twilio phone number does not have properly configured endpoints	The Request URL endpoint settings have not been properly configured.
Your Twilio account is not configured properly	One or more of your Twilio account settings is incorrect. Open the Twilio dashboard and check the settings.

Manage Legacy Notify conference call participants

As a Notify administrator, you can mute, unmute, and kick participants on a conference call.

Before you begin

Role required: notifynow_admin

About this task

This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

Muting a participant prevents that person from speaking on the conference call but does not notify any participants, including the muted participant. Kicking a participant removes that person from the conference call and sets the **Response** field for the participant session to kicked.

Procedure

1. Navigate to **All** > **Notify** > **Conference Calls**.
2. Select an active conference call.
3. In the **Notify Conference Call Participants** related list, select a participant.
4. Click the button for the action you want to perform, such as **Mute** to mute the participant.

   You can perform these actions for multiple participants as a single operation using the **Actions on selected rows** choice list on the **Notify Conference Call Participants** related list.

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Related topics

View Legacy Notify conference calls

Installed with Legacy Notify

Activating the Notify plugin adds or modifies tables, user roles, script includes, and other components.

Note:
This content applies only to the Legacy Notify application, available prior to the Geneva release. For information about the Notify application available starting with Geneva, see Notify.

Tables

Notify adds or modifies the following tables.

Tables

Display Name [Table Name]	Description
Answer [notifynow_answer]	Information for possible answers to the SMS question sent.
Conversation [notifynow_conversation]	Information for the conversation thread.
NotifyNow Conference Call [notifynow_conference_call]	Information for conference call records.
NotifyNow Participant Session [notifynow_participant_session]	Information regarding conference call sessions for individual conference call participants.
Participant [notifynow_participant]	Information regarding individual conference call participants.
Question [notifynow_question]	Information for the possible questions in the SMS.
Response_action [notifynow_response_action]	Information for the notify response action associated with the question.
Response_choice [notifynow_response_choice]	Information for the notify response choice associated with the question.
SMS Messages [notifynow_message]	Information for the actual SMS messages sent.

Properties

Notify adds the following system properties.

Properties

Property	Description
glide.notifynow.frequent_participant_count	The number of frequent conference call participants to be displayed.
glide.notifynow.voice	The voice used for Notify communications.

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Properties (continued)

Property	Description
glide.notifynow.twilio.accountsid	The Twilio account AccountSID.
glide.notifynow.twilio.token	The Twilio account AuthToken.
glide.notifynow.twilio.phonenumber	The Twilio number that Notify will use.
glide.notifynow.twilio.answering_machine_detection	A boolean flag to enable or disable answering machine detection. Set to true to use answering machine detection. Set to false to continue the call.
nn.thread.release.age	The number of days after which the conversation thread release time runs out. Defaults to 10 days.
glide.notifynow.conference_call.code.pattern	The pattern used to generate a conference call code for public conference calls. Number signs (#) in the pattern are replaced with random numbers when a code is generated.
glide.notifynow.fix_invalid_phone_number	A boolean flag to enable or disable automatic correction of invalid phone numbers. Twilio might incorrectly prefix non-US phone numbers with 1. When this property is true, the instance automatically removes the 1 for non-US calls. When this property is false, you might be incorrectly identified when reconnecting to a callusing SMS.

User Roles

Notify adds the following user roles.

User Roles

Role	Contains Roles	Description
notifynow_admin	None	Administrator with privileges for Notify functionality.

UI Actions

Notify adds the following UI actions.

UI Actions

UI Action	Table	Description
Initiate Conference Call	Incident Communication Plan `[incident_alert]`	Adds a link to the Incident Communication Plan form, if that plugin is activated, which displays a dialog box for starting a conference call with selected participants.

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UI Actions (continued)

UI Action	Table	Description
Invite to Conference Call	NotifyNow Conference Call [notifynow_conference_call]	Adds a link to the Notify Conference Call form which displays a dialog box for adding more users to an active conference call.

Script Includes

Notify adds the following script includes.

Script Includes

Name	Description
IncidentAlertConferenceCall	A utility JavaScript Prototype class allowing users to initiate the conference call and add other users to the conference call. Should be used in conjunction with the slushbucket UI page (notifynow_participant).

Business Rules

Notify adds the following business rules.

Business Rules

Business Rule Name	Table	Description
SMS on new Incident Communication Plan	Incident Communication Plan [incident_alert]	Sends an SMS to any default contacts added when an incident communication plan record is created.
Conference Call Allowed	Incident Communication Plan [incident_alert]	Displays or hides the **initiate conference call** UI action by storing **true** or **false** in `g_scratchpad.conferenceCallAllowed` .
Update Conference Call Started IA Activity	NotifyNow Conference Call [notifynow_conference_call]	Logs when a conference call started by writing to an incident communication plan's comment field if the source record is from the incident_alert table.
Update Conference Call Finished IA Activity	NotifyNow Conference Call [notifynow_conference_call]	Logs when a conference call ended and what actions the conference call participants took by writing to an incident communication plan's comment field if the source record is from the incident_alert table.

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Workflow Activities

Notify adds the following workflow activities.

Workflow Activities

Activity Name	Activity Category	Description
Send Notify SMS	Notify	Sends an SMS message (maximum 1600 Characters) to an E.164 compliant mobile phone number of the selected recipients and/or groups.
Send Notify SMS Question	Notify	Sends predefined SMS Question message (maximum 1600 Characters) to an E.164 compliant mobile phone number of the selected recipients and/or groups. This is one of two main activities for workflow On-Call Assign by Acknowledgement. In a predefined message, the recipient is asked to assign himself to a newly created incident. The same message also contains predefined answers.
Send Email Question	Notify	Sends email generated from email template containing notification that recipient is the current On-call resource for a newly created task. This is one of two main activities for the workflow On-Call Assign by Acknowledgement. In a predefined message, the recipient is asked to assign himself to a newly created incident. The email contains two links that enable the user to accept or reject assignment.

NotifyNow (Legacy) - Global

The legacy *NotifyNow* API provides functionality for sending emails, sending SMS messages, and setting up conference calls.

Use this when you want to use Notify functionality with applications on your system.

Note:
This API is included with the legacy Notify functionality. For APIs included in the current Notify feature, see the *Notify*, *NotifyAction*, *NotifyPhoneNumber*, and *NotifyClient* APIs.

NotifyNow - getReadyState()

Indicates whether Notify is set up correctly or not.

This method can only be accessed by administrators or users with the notifynow_admin role. Users with all other roles get the message False when trying to run the function in a script.

Parameters

Name	Type	Description
None		

Returns

Type	Description
Boolean	True if Notify is set up correctly, otherwise false.

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```
var nn = new SNC.NotifyNow();
gs.log(((nn.getReadyState()) ? "OK" :  "NOT OK"));
```

NotifyNow - getStatus()

Returns the current status of Notify configuration.

This method can only be accessed by administrators or users with the notifynow_admin role. Users with all other roles get the message Unauthorized when trying to run the function in a script.

Parameters

Name	Type	Description
None		

Returns

Type	Description
String	One of the possible status messages. Status — Description NO_NUMBER_MESSAGE — The account does not have a telephone number set up. Ensure tha NO_ENDPOINTS_MESSAGE — The account does not have its endpoints set up correctly. Ensure t ACCOUNT_OK_MESSAGE — The account is active and ready for use. ACCOUNT_NO_AUTH — The Twilio AuthToken is not valid. ACCOUNT_NOT_CONFIGURED — The Twilio AccountSID or AuthToken is not valid.

```
var nn = new SNC.NotifyNow();
gs.log(nn.getStatus());
```

NotifyNow - initiateConferenceCall(String[] conferenceCallParticipants, String conferenceCallTitle)

Initiate a new conference call.

Parameters

Name	Type	Description
conferenceCallParticipants	String	One or more users, conference call participants, identified by the sys_ids from the sys_user table or E.164-compliant phone numbers.
conferenceCallTitle	String	Title of the conference call. This parameter has a maximum length of 40 characters.

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Returns

Type	Description
GlideRecord	The conference call record, or null if there was an error.

This initiates a conference call with E.164-compliant phone numbers for participants, without the optional source record parameter and and does not send any conference call details via SMS or email.

```
var participants = ['+31205655548', '+31205655552',
 '+31652825393'];
// set up conference call
var nn = new SNC.NotifyNow();
var conferenceCall = nn.initiateConferenceCall(participants,
 "testing12");
gs.log('started conference call: ' +
 conferenceCall.getUniqueValue());
```

NotifyNow - initiateConferenceCall(String[] conferenceCallParticipants, String conferenceCallTitle, GlideRecord sourceRecord, Boolean private)

Initiate a new conference call.

Parameters

Name	Type	Description
conferenceCallParticipants	String	One or more users, conference call participants, identified by the sys_ids from the sys_user table or E.164-compliant phone numbers.
conferenceCallTitle	String	Title of the conference call. This parameter has a maximum length of 40 characters.
sourceRecord	GlideRecord	Source record to associate to the conference call such as an incident or problem number.
private	Boolean	Value to control if a conference call is private. This value defaults to false.

Returns

Type	Description
GlideRecord	The conference call record, or null if there was an error.

This initiates a conference call with participants that have a E.164-compliant phone number and participants from the sys_user table and sends conference call details via SMS and email to all participants.

```
// define phone number participants
var participants = ['+31205655548', '+31205655552',
 '+31652825393'];

// we also want to add two Dutch sys_user participants
var user = new GlideRecord('sys_user');
user.addNotNullQuery('mobile_phone');
user.addQuery('mobile_phone', 'STARTSWITH', '+316');
```

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```
user.setLimit(2);
user.query();

// add users to the participant array
while (user.hasNext() && user.next()) {
 gs.log('adding user ' + user.getValue('name') + ' with phone
 number ' +
             user.getValue('mobile_phone') + ' to the
 participant array');
 participants.push(user.getUniqueValue());
}

// define a source record to associate with the conference call
var source = new GlideRecord("cmdb_ci");
source.query("asset_tag", "P1000167");
if (source.hasNext() && source.next()) {
 // set up conference call
 var nn = new SNC.NotifyNow();
 var conferenceCall = nn.initiateConferenceCall(participants,
 "testing 1 2", source);

 // check if the conference call was successfully created
 if (conferenceCall != null) {
  gs.log('started conference call: ' +
 conferenceCall.getUniqueValue());
 } else {
  gs.log('could not start the conference call :(');
 }
}
```

NotifyNow - isCallable(String participant)

Determines whether a user is callable or not.

A user must have a valid phone number to be callable. A user who is already in an active session is not callable.

Parameters

Name	Type	Description
participant	String or GlideRecord	A sys_user or notifynow_participant record, or an E.164-compliant phone number.

Returns

Type	Description
boolean	Whether this participant can be called or not.

```
var nn = new SNC.NotifyNow();
gs.log('by number: ' + nn.isCallable('+31612345678'));

var user = GlideRecord('sys_user');
user.query('sys_id', '13d39544eb5201003cf587b9d106fea9');
if (user.hasNext() && user.next())
  gs.log('by user: ' + nn.isCallable(user));
```

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```
var participant = GlideRecord('notifynow_participant');
participant.query('sys_id', '33b11430eb1201003cf587b9d106feb9');
if (participant.hasNext() && participant.next())
  gs.log('by participant: ' + nn.isCallable(participant));
```

NotifyNow - isSMSCapable()

Checks if the telephone number associated with the Twilio account is capable of sending SMS messages.

Parameters

Name	Type	Description
None		

Returns

Type	Description
Boolean	Whether the telephone number associated with the Twilio account is capable of sending SMS messages.

```
gs.log('The twilio number is SMS capable: ' + ((new
 SNC.NotifyNow().isSMSCapable()) ? 'yes' : 'no'));
```

NotifyNow - isSMSCapable(String userID)

Checks if a user is able to send SMS messages.

Parameters

Name	Type	Description
userID	String	The sys_id of the user you want to check for an SMS-capable phone number.

Returns

Type	Description
Boolean	If the user can send SMS messages.

```
gs.log('the user is able to send SMS messages (e.g. has a
 SMS device): ' + ((new SNC.NotifyNow().isSMSCapable('<user
 sys_id>')) ?
     'yes' : 'no'));
```

NotifyNow - isVoiceCapable()

Checks if the telephone number associated with the Twilio account is capable of setting up phone calls.

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Parameters

Name	Type	Description
None		

Returns

Type	Description
Boolean	Whether the telephone number associated with the Twilio account is capable of setting up phone calls.

```
gs.log('the Twilio number is Voice capable: ' + ((new
 SNC.NotifyNow().isVoiceCapable()) ? 'yes' : 'no'));
```

NotifyNow - isVoiceCapable(String userID)

Checks if a user is able to make voice calls.

Parameters

Name	Type	Description
userID	String	The sys_id of the user you want to check for a voice-call capable phone number.

Returns

Type	Description
boolean	Whether the user has a voice-call capable phone number.

```
gs.log('the user is able to send SMS messages (e.g. has a SMS
 device): ' +
     ((new SNC.NotifyNow().isVoiceCapable('someuserid')) ?
 'yes' : 'no'));
```

NotifyNow - kick(GlideRecord participant)

Removes a participant from a conference call.

Parameters

Name	Type	Description
participant	GlideRecord	The conference call participant to remove from the call.

Returns

Type	Description
Boolean	True if the participant was removed, otherwise false.

```
var participantId = "<participant sys_id>";
var participant = new GlideRecord('notifynow_participant');
```

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```
participant.get(participantId);
if (participant.isValid()) {
     // kick participant
     result = new SNC.NotifyNow().kick(participant);
     gs.log('participant kicked: ' + result);
}
```

NotifyNow - mute(GlideRecord participant)

Mutes a participant on a conference call.

Parameters

Name	Type	Description
participant	GlideRecord	The conference call participant to mute.

Returns

Type	Description
Boolean	True if the participant was muted, otherwise false.

```
var participantId = "<participant sys_id>";
var participant = new GlideRecord('notifynow_participant');
participant.get(participantId);
if (participant.isValid()) {
     // mute participant
     result = new SNC.NotifyNow().mute(participant);
     gs.log('participant muted: ' + result);
}
```

NotifyNow - umute(GlideRecord participant)

Unmutes a participant on a conference call.

Parameters

Name	Type	Description
participant	GlideRecord	The muted conference call participant to unmute.

Returns

Type	Description
Boolean	True if the participant was unmuted, otherwise false.

```
var participantId = "<participant sys_id>";
var participant = new GlideRecord('notifynow_participant');
participant.get(participantId);
if (participant.isValid()) {
     // unmute participant
     result = new SNC.NotifyNow().unmute(participant);
     gs.log('participant unmuted: ' + result);
}
```

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NotifyNow - sendEmailQuestion(String emailAddress, String question, GlideRecord sourceRecord, String emailSubject)

Send an email question to an email address.

The sendEmailQuestion method produces a question body and requires users to click a link to indicate their choice.

Parameters

Name	Type	Description
emailAddress	String	Email address to send the question to.
question	String or GlideRecord	The question record to send or the sys_id of a question record.
sourceRecord	GlideRecord	An optional source record to associate to the SMS question, such as an incident.
emailSubject	String	Optional text to override the default email subject.

Returns

Type	Description
String	The conversation sys_id.

This example demonstrates using the default email subject.

```
var user = GlideRecord("sys_user");
user.get("email", "someone@somedomain.com");

new SNC.NotifyNow().sendEmailQuestion(user.getValue('email'),
 "b6b34500bf3111003cf585ce2c0739ce", user);
```

This example uses dot-walking and specifies a source record and email subject.

```
new SNC.NotifyNow().sendEmailQuestion("someone@somedomain.com",
 "b6071733bf1111003cf585ce2c07390f", current,
        "Please answer this question");
```

This example uses dot-walking and specifies an email subject but no source record.

```
new SNC.NotifyNow().sendEmailQuestion("someone@somedomain.com",
 "b6071733bf1111003cf585ce2c07390f",
        "Please answer this question");
```

NotifyNow - sendSMS(String phoneNumber, String smsBody)

Sends an SMS message to an E.164-compliant mobile phone number.

Notify supports international numbers. Using this method with a number that does not support sending SMS messages results in an error being logged.

Parameters

Name	Type	Description
phoneNumber	String	The E.164-compliant phone number to send the message to.

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Parameters (continued)

Name	Type	Description
smsBody	String	The message to send, maximum 1600 characters.

Returns

Type	Description
void	

```
new SNC.NotifyNow().sendSMS("+31612345678", "This is a message
 without source record");
```

NotifyNow - sendSMS(String phoneNumber, String smsBody, GlideRecord source)

Sends an SMS message to an E.164-compliant mobile phone number.

Notify supports international numbers. Using this method with a number that does not support sending SMS messages results in an error being logged.

See also: Advanced configuration for SMS.

Parameters

Name	Type	Description
phoneNumber	String	The E.164-compliant phone number to send the message to.
smsBody	String	The message to send, maximum 1600 characters.
source	GlideRecord	The source record to associate with this SMS message.

Returns

Type	Description
void	

```
var source = new GlideRecord("my_table");
source.query("my_field", "my_value");

if (source.hasNext() && source.next()) {
    // send a text message
    var nn = new SNC.NotifyNow();
    var message = "this is just a test";
    var number = "+31612345678";
    nn.sendSMS(number, message, source);
}
```

This example uses dot-walking and the current record as the source record.

```
new SNC.NotifyNow().sendSMS("+31612345678", "this is a test",
 current);
```

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NotifyNow - sendSMSQuestion(String phoneNumber, String question, GlideRecord sourceRecord)

Sends an SMS question.

Parameters

Name	Type	Description
phoneNumber		An E.164-compliant phone number to send the message to.
question	String or GlideRecord	The question record to send or the sys_id of a question record.
sourceRecord		An optional source record to associate to the SMS question, such as an incident.

Returns

Type	Description
String	The conversation sys_id, or null if the SMS was not sent successfully.

```
var question = new GlideRecord("notifynow_question");
question.query();

// get the first question
if (question.hasNext() && question.next()) {
 // send the sms question
        var number = "+31612345678";
 var nn = new SNC.NotifyNow();
 nn.sendSMSQuestion(number, question.getUniqueValue(), current);
}
```

NotifyNow - addConferenceCallParticipant(String conferenceCall, String participant)

Adds ad-hoc users to an ongoing conference call.

When the method is called with a phone number for the participant parameter and there is exactly one sys_user record that matches the phone number, that sys_user record will be related to the participant. The participant's phone number field will be left blank because the phone number is in the sys_user record. If there are several sys_user records that match the phone number, or if there are no results, the participant's phone number field will be filled in, and there will be no stored reference to sys_user because the user is not known.

Parameters

Name	Type	Description
conferenceCall	String or GlideRecord	The sys_id or GlideRecord of an active conference call.
participant	String or GlideRecord	The sys_id or GlideRecord of a user with an E.164-compliant phone number, or an E.164-compliant phone number.

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Returns

Type	Description
GlideRecord	The participant record of the new participant that was added to the conference call.

```
// add a new participant by conference call sys_id (string) and
 phone number (string)
var nn = new SNC.NotifyNow();
gs.log(nn.addConferenceCallParticipant('d193b242eb020100a04d4910
f206fe39', '+31612345678'));
```

```
// add a new participant by conference call sys_id (string) and
 user record (GlideRecord)
var user = new GlideRecord('sys_user');
user.query('user_name', 'myUserName');
if (user.hasNext() && user.next()) {
    var nn = new SNC.NotifyNow();

 gs.log(nn.addConferenceCallParticipant('d193b242eb020100a04d491
0f206fe39', user));

    // you could have added the user by sys_id as well:
    //
 nn.addConferenceCallParticipant('d193b242eb020100a04d4910f206fe
39', user.getValue('sys_id'));
} else {
    gs.log('no such user');
}
```

```
// add a new participant by conference call record (GlideRecord)
 and phone number (string)
var conferenceCall = new
 GlideRecord('notifynow_conference_call');
conferenceCall.query('title', 'IA0001001');
if (conferenceCall.hasNext() && conferenceCall.next()) {
    var nn = new SNC.NotifyNow();
    gs.log(nn.addConferenceCallParticipant(conferenceCall,
 '+31612345678'));
} else {
    gs.log('no such conference call');
}
```

NotifyNow - convertLocalPhoneNumberToE164(String userID, String phoneNumber)

Converts a local phone number to an E.164-compliant phone number based on a user's location.

Parameters

Name	Type	Description
userID	String	The sys_id of a sys_user record to get location information from.
phoneNumber	String	The phone number.

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Returns

Type	Description
String	The E.164-compliant phone number.

```
var localPhoneNumber = '01784 221600';
var userName = 'Heath Vanalphen';

var user = new GlideRecord('sys_user');
user.get('name',userName);
var E164Number = new
 SNC.NotifyNow().convertLocalPhoneNumberToE164(user.getUniqueVal
ue(), localPhoneNumber);
gs.log('converted: ' + localPhoneNumber + ' to ' + E164Number +
 ' based on ' + user.getValue('name') +
     '\'s location (' + user.getValue('location') + ')');
```

NotifyNow - getConferenceCallParticipants(String conferenceCallId, Boolean isCallable)

Returns all participants for a conference call.

Parameters

Name	Type	Description
conferenceCallId	String	The ID of the conference call.
isCallable	Boolean	An optional flag to return either only the users you can call (true) or those you cannot call (false).

Returns

Type	Description
GlideRecord	The participants

```
var nn = new SNC.NotifyNow();
var user =
 nn.getConferenceCallParticipants('c2e91710eb120100f34087b9d106f
e37');

while (user.hasNext() && user.next()) {
    if (user.getValue('participant')) {
        gs.log('user: ' + user.getValue('sys_id'));
    } else {
        gs.log('phone number: ' +
 user.getValue('phone_number'));
    }
}
```

```
var nn = new SNC.NotifyNow();
var user =
 nn.getConferenceCallParticipants('c2e91710eb120100f34087b9d106f
e37', true);

while (user.hasNext() && user.next()) {
```

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```
    if (user.getValue('participant')) {
        gs.log('user: ' + user.getValue('sys_id'));
    } else {
        gs.log('phone number: ' +
 user.getValue('phone_number'));
    }
}
```

```
var conferenceCallId = '32b11430eb1201003cf587b9d106feb8';

// get all participants
gs.log('all conference call participants:');
var nn = new SNC.NotifyNow();
var user = nn.getConferenceCallParticipants(conferenceCallId);
gs.log(user);

// get all callable participants
gs.log('all conference call participants we can call:');
user = nn.getConferenceCallParticipants(conferenceCallId, true);
gs.log(user);

// get all un callable participants
gs.log('all conference call participants that are already in an
 active session and whom we cannot call:');
user = nn.getConferenceCallParticipants(conferenceCallId,
 false);
gs.log(user);
```

NotifyNow - getFrequentlyCalledUsers(Number limit)

Returns a number of frequently-called users, up to the limit parameter, in alphabetical order.

Parameters

Name	Type	Description
limit	Number	The maximum number of results.

Returns

Type	Description
GlideRecord	The frequently called users in alphabetical order.

```
var nn = new SNC.NotifyNow();
var fc = nn.getFrequentlyCalledUsers(10);

while (fc.hasNext() && fc.next()) {
    gs.log("got user " + fc.getValue('name') + ' - ' +
 fc.getValue('sys_id'));
}
```

NotifyNow - getPreferredE164VoiceNumber(GlideRecord user)

Returns a user's preferred E.164-compliant phone number for voice calls.

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Parameters

Name	Type	Description
user	GlideRecord or String	The user record or the sys_id of a user to get the E.164-compliant phone number from.

Returns

Type	Description
String	The E.164-compliant phone number or null.

```
var userID = "<user sys_id>";
var E164Number = new
 SNC.NotifyNow().getPreferredE164VoiceNumber(userID);
gs.log('the preferred phone number for setting up voice calls is
 ' + E164Number + ' for user with id: ' + userID);
```

NotifyNow - getPreferredE164SMSNumber(GlideRecord user)

Returns a user's preferred E.164-compliant phone number for SMS messages.

Parameters

Name	Type	Description
user	GlideRecord or String	The user record or the sys_id of a user to get the E.164-compliant phone number from.

Returns

Type	Description
String	The E.164-compliant phone number or null.

```
var userID = "<user sys_id>";
var E164Number = new
 SNC.NotifyNow().getPreferredE164SMSNumber(userID);
gs.log('the preferred phone number for sending SMS notifications
 is ' + E164Number + ' for user with id: ' + userID);
```

NotifyNow - getPreferredEmailAddress(GlideRecord user)

Returns a user's preferred email address

Parameters

Name	Type	Description
user	GlideRecord or String	The user record or the sys_id of a user to get the email address from.

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Returns

Type	Description
String	The email address or null.

```
var userID = "some user sys id";
var email = new
 SNC.NotifyNow().getPreferredEmailAddress(userID);
gs.log('the preferred email address for sending email
 notifications is ' + email + ' for user with id: ' + userID);
```

Task Communications Management

Task Communications Management (TCM) provides a framework for defining and managing a communication process for any entity that extends the task table.

Explore	Set up	Administer
• Task Communications Management process • Slack Communication	Activate Task Communications Management	Working with Task Communications Management
Use	**Develop**	**Integrate**
NA	• Developer training • Developer documentation	NA
Troubleshoot and get help		
• Ask or answer questions in the Incident Management community • Search the Known Error Portal for known error articles • Contact Customer Service and Support		

Task Communications Management process

Task Communications Management helps you to streamline the process by creating designated communication plans for effective communication during an event. The communication plan, with its defined tasks, helps you to focus on resolving the current issue instead of deciding when to send a communication, what information to share, and whom to inform.

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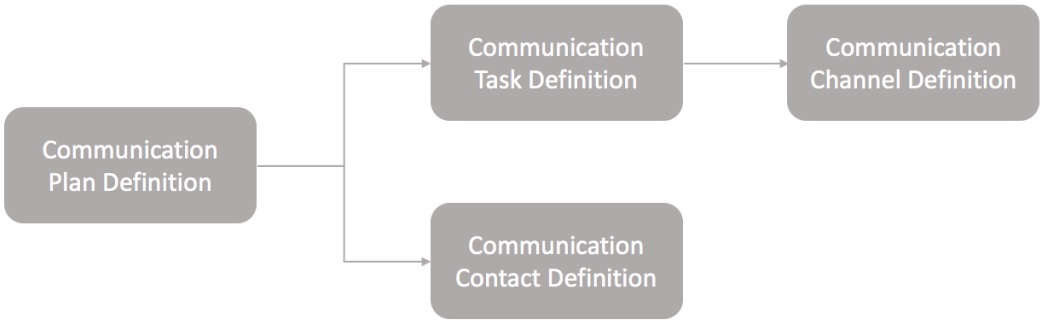
Task Communications Management basic components



How Task Communications Management works

With Task Communications Management, you can predefine a communication plan for an event such as major incident, planned maintenance, and release. Each plan generally involves a series of tasks that define different communication and collaboration activities along with frequency and method of communication. For each task, you must specify the communication channel for contacting the stakeholders. You can also define templates for email and SMS messages.

After defining the task and channel for communication, you can define the contacts or the target audience to be contacted for each task.

After a communication plan is defined, the plan gets associated with the appropriate task table based on the conditions defined. Thereafter, the tasks defined in the plan get executed sequentially and stakeholders are contacted as defined in the plan. The communication plan makes communication and collaboration process smoother and brings a quicker resolution of the issue.

Example: Task Communications Management flow in major incident management

Assume that you want an incident communication plan generated for a high-priority major incident.

- As the major incident manager, you can predefine a communication plan and the conditions that drive its attachment. In this case, the conditions are: Priority = High and Major Incident state = Accepted. Consider that the target audience is the technical stakeholders of the incident and the communication plan definition is named Technical Communications.
- The plan definition can have multiple communication task definitions such as:
  - Initiate Technical Communications
  - Technical Status Update
- Each communication task definition also specifies the channel of communication and the communication frequency (one time or recurring).
  - Initiate Technical Communications uses email as a channel of communication and communication frequency is one time.
  - Technical Status Update uses email and SMS as channel of communication and the communication frequency is recurring.
- The target audience for in the communications is defined as communication contact definitions on the plan definition. In this case, consider Service owners of the affected configuration items (CIs) related to the incident as technical stakeholders.

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- When an incident meets these conditions, an incident communication plan together with its tasks gets attached to the incident record.
- As the major incident manager, you can effectively carry out the communication without any delay in the resolution of the major incident.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Task Communications Management plugins

The Task Communications Management plugins is activated in the base system. The plugin includes demo data.

Activate Task Communications Management

The Task Communications Management plugin (com.snc.task_communication_management) is activated when you activate the Incident Communications Management plugin (com.snc.iam) or the Incident Management - Major Incident Management plugin (com.snc.incident.mim). This plugin includes demo data and activates related plugins if they are not already active.

Before you begin
Role required: admin

About this task
Task Communications Management activates these related plugins if they are not already active.

Plugins for Task Communications Management

Plugin	Description
Contact Management [com.snc.contact_management]	The Contact Management plugin manages the connections between users or groups and other resources in the system.
Targeted Communications [com.sn_publications]	The Targeted Communications plugin provides a way to publish and send out newsletter like articles to targeted internal or external customers.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

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Note:
When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins (Washington DC)

Components installed with Task Communications Management

Several types of components are installed with the Task Communications Management plugin, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Tables installed

Table	Description
Communication Plan Type Lookup [comm_plan_type_lookup]	Stores the communication plan types.
Communication Task Type Lookup [comm_task_type_lookup]	Stores the communication task types.
Communication Plan Definition [comm_plan_definition]	The definition table for the communication plan entity.
Communication Task Definition [comm_task_definition]	The definition table for the communication task entity.
Communication Channel Definition [comm_channel_definition]	Main table for channel definitions.
Communication Channel Definition — Email [comm_channel_def_email]	Defines email as a channel.
Communication Channel Definition — SMS	Defines SMS as a channel.

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Table	Description
[comm_channel_def_sms]	**Note:** This table is available only when you install the Notify plugin (com.snc.notify).
Communication Channel Definition — Conference [comm_channel_def_conference]	Defines Conference as a channel. **Note:** This table is available only when the Notify plugin (com.snc.notify) is installed.
Communication Contact Definition [comm_contact_definition]	Defines the contacts for sending out communications. Contacts can be users, groups, or recipient lists.
Communication Channel Configuration [comm_channel_config]	Lists all available channels for an instance. **Note:** Configuration script for each channel is a script include.
Communication Plan [comm_plan]	Stores the communication plan that outlines the communication activity during an event.
Communication Task [comm_task]	Stores the task to be carried out to communicate with the involved contacts.
Communication Channel [comm_channel]	Main table for channel instances.
Communication Channel — Email [comm_channel_email]	Stores record that indicate email is used as a communication channel for a communication task.
Communication Channel — SMS [comm_channel_sms]	Stores record that indicate SMS is used as a communication channel for a communication task.
Communication Channel — Conference [comm_channel_conference]	Stores record that indicate conference is used as a communication channel for a communication task.
Communication Task Handler [comm_task_handler]	Lists specific handlers for various task types. Example: For incident, CommunicationManagementIncidentHandler. **Note:** Users with the admin role cannot delete this table.

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Roles installed

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Communication Plan Admin [sn_comm_management.comm_plan_admin]

Provides overall accountability of Task Communications Management.

Contains Roles

List of roles contained within the role.

- *Notifications administrator [notify_admin]*
- *Publications recipients list user [sn_publications_recipients_list_user]*

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Important:
Avoid granting an admin role when more specialized roles are available.

This role has create and edit access to Task Communications Management tables including Communication Plan Definitions and other related records.

Communication Plan Viewer [sn_comm_management.comm_plan_viewer]

This role has read access to Task Communications Management tables.

Contains Roles

List of roles contained within the role.

- *Notification viewer [notify_view]*
- *Publications recipients list user [sn_publications_recipients_list_user]*

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Communication Plan Manager [sn_comm_management.comm_plan_manager]

This role has create and edit access to Task Communications Management instance tables such as Communication Plans, Communication Tasks. Users with this role can send impromptu communications.

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Contains Roles

The Communication Plan Manager [sn_comm_management.comm_plan_manager] role contains the *Communication Plan Viewer [sn_comm_management.comm_plan_viewer]* role.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Install Collaboration Services for Task Communications Management

Install the Collaboration Services for Task Communications Management plugin (sn_tcm_collab_hook) from ServiceNow Store to get the Slack functionality.

Before you begin
Role required: admin

About this task

Procedure

1. Navigate to ServiceNow Store.
2. Find the Collaboration Services for Task Communications Management store application.
3. Click the Collaboration Services for Task Communications Management store application and then click **Request App**.

Related topics

List of plugins (Washington DC)

Configure Slack workspace

Components installed with Collaboration Services for Task Communications Management

Several types of components are installed with the Collaboration Services for Task Communications Management (sn_tcm_collab_hook) plugin, including tables.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Tables installed

Table	Description
Communication Channel Definition – Slack [comm_channel_def_slack]	The table extends the Communication Channel Definition [comm_channel_definition] table.

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Table	Description
Communication Channel – Slack [comm_channel_slack]	The table extends the Communication Channel [comm_channel] table.
Communication Plan — Collaboration Service Data [comm_plan_collab_data]	Stores Collaboration Service related data.

Related topics

Configure Slack workspace

Working with Task Communications Management

The section covers topics that help you with a variety of technical concepts related to Task Communications Management such as creating communication plan definition, task definition, channel definition, and contact definition.

Define a communication plan

Define a communication plan for a task record to specify communication task and contact definitions. When specified conditions for the plan definition are met, the communication plan and its associated records are automatically attached to the task record, eliminating manual effort.

Before you begin

Role required: sn_comm_management.comm_plan_admin or admin

Procedure

1. Navigate to **All** > **Task Communications Management** > **Plan Definitions**, and click **New**.
2. On the form, fill in the fields.

Communication Plan Definition form

Field	Description
Name	Unique name for the communication plan.
Table	Table that the plan is attached to when the conditions are met.
Type	Type of communication plan such as Technical, Internal, External, Customer.
Order	Order in which the communication plans must be associated to the table.
Condition based	Option to define whether the plan is attached to a table based on the conditions. For example, if you want to attach a communication plan to an incident of priority = 2, you can mention the condition in the **Condition** field.
Active	Option to define whether the plan definition is active.
Description	Detailed description of the plan definition.

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Field	Description
Condition	Condition under which a communication plan gets attached to a table.

3. Click **Submit**.
   The communication plan is submitted. The following related lists appear in the communication plan definition:
   - Communication Task Definitions
   - Communication Contact Definitions

What to do next

Define a communication task for the plan.

Define a communication task

Define a communication task for a communication plan. When a plan gets attached to a table, the tasks related to the plan need to be executed to resolve the issue. You can associate multiple tasks with a communication plan.

Before you begin

Role required: sn_comm_management.comm_plan_admin or admin

You have defined a communication plan.

Procedure

1. Navigate to **All** > **Task Communications Management** > **Plan Definitions**.
2. Click the communication plan for which you want to define a communication task.
3. Click the Communication Task Definitions related list and then click **New**.
4. On the form, fill in the fields.

Communication Task Definition form

Field	Description
Communication plan definition	Unique name of the communication plan definition that you are defining the task for.
Name	Unique name for the communication task definition.
Type	Type of task, such as internal communication, that is applicable globally or to a particular table. **Note:** The value in the **Type** field helps you to filter a task by its type. The value also helps to generate a report of a particular task type or to create SLAs on any communication task.
Application	Application scope of the task definition. The task definition is available for all applications or for scoped applications.

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Field	Description
Order	Order that the communication tasks appear in the plan. This field indicates which communication task to execute first.
Active	Option to define whether the task is active or not.
Description	Detailed description of the task definition.
Communication frequency	Frequency of the communication task execution. You can send the notification once or the notification can be repeated.
Duration	Time by which you want to send a notification. For example, if the communication frequency is **One time** and the **Duration** is 15 minutes, then the notification is sent only once in 15 minutes. If the communication frequency is **Recurring**, then the notification is sent every 15 minutes.

5. Click **Update**.
   The communication task is defined for the communication plan.

What to do next
Define communication channel for the task.

Define a communication channel

Define a communication channel for each communication task to determine which mode of communication to use for the task when a plan is attached to a table.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

You have defined a communication plan and its related tasks.

About this task

- The modes of communication available are: email, SMS, conference, and Slack.
- For the incident table, the functionality for SMS and conference appears only if you activate the Notify plugin (com.snc.notify) and the *com.snc.iam.notify_number* property value is set to the registered notify number. The notify number is registered while configuring the Twilio account.
- For the incident table, the functionality for Slack appears only if you activate the Collaboration Services for Task Communications Management plugin (sn_tcm_collab_hook). To activate the Collaboration Services for Task Communications Management plugin, navigate to ServiceNow Store and install the Collaboration Services for Task Communications Management application. For more information, refer Collaboration services for Task Communications Management.

  Note:
  For information on how to configure Slack, refer to Configure Slack workspace .

- **Add Channel – Conference** is mutually exclusive to **Add Channel – SMS** and **Add Channel – Email**. If you select **Add Channel – Conference**, you cannot select **Add Channel – Email** or **Add Channel – SMS**.

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Procedure

1. Navigate to **All** > **Task Communications Management** > **Plan Definitions**.
2. Click a communication plan.
3. Click the Communication Task Definitions related list and then click the task for which you want to define the communication channel.
4. On the Communication Task Definition form, click any one of the following related links based on your requirement:
   - **Add Channel – Conference**
   - **Add Channel – Email**
   - **Add Channel – SMS**
   - **Add Channel – Slack**
5. On the form, fill in the fields.

Communication Channel Definition form

Field	Description
Add Channel – Conference	
Communication task definition	Communication task definition that the channel definition is associated with.
Notify provider selector	Lookup icon ( ) to select the selector from the Provider Selector [notify_group_selector] table. **Note:** The selector can be associated with notify number group or conference provider. Each notify number group can have one or more Notify numbers that can be used to make conference calls.
Add Channel – Email	
Communication task definition	Communication task definition that this channel definition is associated with.
Email client template	Lookup icon ( ) to select the email client template used to send emails to the targeted audience. **Note:** This email template must be defined in the Communication task table.
Recipient field	List to select where you want the recipients list to be populated. Options include **To**, **CC**, and **BCC**. The default value is populated based on what you define in the **Default recipient location of emails for Communication Tasks** property (*sn_comm_management.default_email_recipient_fie*
Add Channel – SMS	

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Field	Description
Communication task definition	Communication task definition this channel definition is associated with.
Notify SMS template	Lookup icon to select the notify SMS template used to send an SMS to the targeted audience. **Note:** This SMS template must be defined in the Communication task table.
Notify provider selector	Lookup icon ( ) to select the selector from the Provider Selector [notify_group_selector] table. **Note:** The selector can be associated with notify number group or conference provider. Each notify number group can have one or more Notify numbers that can be used to send SMS.
Add Channel – Slack	
Communication task definition	Communication task definition this channel definition is associated with.
Channel Type	Channel type is Slack.

6. Click **Submit**.
   A communication channel is defined for the communication task.

What to do next
After creating communication tasks and communication channels for those tasks, define contacts for the communication plan.

Define a communication contact

Define the recipients of a particular plan to determine the target audience involved in each communication task and the responsibilities the recipients are expected to handle. A notification for a task is sent to all individuals specified for that task.

Before you begin
Role required: sn_comm_management.communication_plan_admin or admin

You have defined a communication plan.

About this task
You can add or remove any particular communication contact manually.

Procedure
1. Navigate to **All** > **Task Communications Management** > **Plan Definitions**.
2. Click the communication plan that you want to define the contacts for.
3. Click the **Communication Contact Definitions** related list and then click **New**.
4. On the form, fill in the fields.

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Communication Contact Definition form

Field	Description
Type	Type of contact such as user, group, or recipient list that you want to involve in the plan. The contact type is assigned dynamically at the time of the table execution. For information on recipient lists, refer Define a recipient list for communication contact.
Responsibility	Responsibility that the user, group, or individuals in the recipient list are expected to handle.
User	Name of the user, group, or recipient list to be added to the contact list. **Note:** You can use the recipient list to specify dynamic criteria for fetching the list of users for a particular communication plan.

5. Click **Submit**.
   A communication contact is defined for the communication plan.

Define a recipient list for communication contact

A recipient list lets you specify a filter to fetch a list of users. Use the recipient list as the contact for a particular communication plan.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

About this task
Sometimes, the contacts that you want to include in a plan can only be known dynamically. For example, you might want the support group associated with a particular business service in an incident to be involved in the communication plan. The support group might change depending on the business service that you select. In such a case, a recipient list provides the flexibility to add recipients dynamically.

Procedure
1. Navigate to **All** > **Task Communications Management** > **Administration** > **Recipients Lists**.
2. Click **New** to create a new recipient list.
3. On the form, fill in the fields.

Recipients Lists form

Field	Description
Name	Name of the recipient list.
Type	Type of recipient.
State	[Read only] The state of the recipient list.
Setup	
Method	The method used to generate the recipient list.

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Field	Description
	○ Upload File: Upload an Excel file with the recipient information to create a recipient list. This list is static. ○ Dynamic Condition: Use scripts or conditions to receive recipient information.

4. Click **Submit**.
   A recipient list is defined for the contact.

What to do next
Define a communication contact for the task.

Create a plan type

Create the communication plan type and specify whether the plan type is applicable globally or to a particular table. When you create the communication plan type, it is referenced in the communication plan definition. The type of the communication plan helps you to filter the plan by its type, generate a report of a particular plan type, or create SLAs for any communication plan.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

Procedure

1. Navigate to **All** > **Task Communication Management** > **Administration** > **Plan Types**, and click **New**.
2. On the form, fill in the fields.

Communication Plan Type Lookup form

Field	Description
Name	Unique name of the communication plan type.
Global	Option to determine whether the plan type is available for all tables or for a specific table. If the check box is not selected, the **Table** field appears where you can select the table for which the plan type appears.
Application	Application scope of the plan type. The plan type is available for all applications or for scoped applications.
Active	Option to define whether the plan type is active.
Description	Detailed description of the plan type.

3. Click **Submit**.
   A communication plan type is created.

What to do next
Define a communication plan.

Create a task type

Create the communication task type and specify whether the task is applicable to a particular table or is globally applicable. The communication task type helps you to filter a task by its type, generate a report of a particular task type, or create SLAs for any communication task.

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Before you begin
Role required: sn_comm_management.comm_plan_admin

Procedure

1. Navigate to **All** > **Task Communication Management** > **Administration** > **Task Types**, and click **New**.
2. On the form, fill in the fields.

Communication Task Type Lookup form

Field	Description
Name	Unique name of the communication task type.
Global	Option to determine whether the task type is available for all tables or for a specific table. If the check box is not selected, the **Table** field appears where you can select the table the task type appears for.
Application	Application scope of the task type. The task type is available for all applications or for scoped applications.
Active	Option to define whether the task type is active or not.
Description	Detailed description regarding the type of the task.

3. Click **Submit**.
   A communication task type is created.

What to do next
Define a communication task.

Define contact responsibilities

Define the different contacts or target audience involved in the communication process and their responsibility to understand the expectations from those contacts throughout the process.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

Procedure

1. Navigate to **All** > **Task Communication Management** > **Administration** > **Contact Responsibilities**, and click **New**.
2. On the form, fill in the fields.

Contact Responsibility form

Field	Description
Global	Option to determine whether the contact responsibility is available for all tables or for a specific table. If the check box is not selected, the **Table** field appears where you can select the table that you are defining the contact responsibility for.

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Field	Description
Name	Unique name of the contact, such as Business Director or Communication Manager, involved in the communication process.
Type	Type of contact such as user, group, or recipient list.
Table	Table that the contact is activated on when a communication plan is attached.

3. Click **Submit**.
   Contact responsibilities are defined.

What to do next
Define a communication contact for the task.

View communication channel configuration

View the configuration of different communication channels that are used to contact the target audience in the communication process. By default, the communication channels available are email, SMS, Slack, and conference.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

Procedure
1. Navigate to **All** > **Task Communication Management** > **Administration** > **Channel Configuration**.
2. Open any communication channel record.
3. On the form, view the fields.

Communication Channel Configuration form

Field	Description
Type	[Read only] Mode of channel.
Configuration script	[Read only] Lookup icon ( ) to select the script that defines the channel configuration.
Active	[Read only] Option to define whether the communication channel is active or not.
Classification	[Read only] Internally used to group the channels between conference or major incident management workbench.

Configure Slack for a communication task

Configure Slack as a mode of communication for a communication task to send direct message to the users.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

Install the Collaboration Services for Task Communications Management plugin (sn_tcm_collab_hook) from ServiceNow Store.

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Procedure

1. Navigate to **All** > **Incident** > **Communication Plan Definitions**.
2. Open the communication plan where you want to add Slack as a communication channel for a communication task.
3. Open the communication task definition for which you want to add Slack as the mode of communication.
4. Click the **Add Channel – Slack** related links.
5. Click **Submit**.
   Slack gets added as a communication channel for the communication task.

Classic Workflow

Workflow provides a drag-and-drop interface for automating multi-step processes across the platform. Each workflow consists of a sequence of activities, such as generating records, notifying users of pending approvals, or running scripts. The graphical Workflow Editor represents workflows visually as a type of flowchart. It shows activities as boxes labeled with information about that activity and transitions from one activity to the next as lines connecting the boxes.

Note:
As of the New York release, Workflow is a legacy product. Use Flow Designer for any new process automation. As many organizations have workflows in production, use this Workflow documentation to learn how to work with existing workflows.

Explore

- Washington DC
- Workflow movement with update sets
- Workflow activity pinning
- Domain separation and Workflow
- Workflow training on the ServiceNow® Developer Site

Set up

Getting started with workflows

Administer

- Workflow roles
- Administering workflow contexts

Use

- Workflow editor
- Create a workflow
- Workflow activities

Develop

- Developer training
- Developer documentation
- Workflow API reference
- Using variables in a workflow

Troubleshoot and get help

- Ask or answer questions in the Developer Community
- Troubleshoot workflows
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

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Getting started with workflows

The graphical Workflow Editor provides a drag-and-drop interface for automating multi-step processes across the platform.

Parts of a workflow

Workflows consist of these parts.

Properties

Specify configuration settings such as the workflow name, the table whose records the workflow acts on, and the conditions under which to run it.

Activities

Specify the sequence of operations the workflow performs such as generating records, notifying users of pending approvals, or running scripts.

Transitions

Specify the conditions under which to run an activity.

Exit conditions

Specify the conditions under which to run a transition.

Contexts

Store historical runtime information about a specific workflow run in a Workflow Context record.

Versions

Store historical design information about a specific workflow in a Workflow version record.

Workflow life cycle

A workflow starts when a triggering event occurs. Common triggers include a record being inserted into a specific table, or a particular field in a table being set to a specified value. For example, you might create a workflow that runs whenever a user requests approval for an item they want to order from the catalog. You can also schedule workflows to run periodically or call them from scripts such as business rules.

When an activity completes, the workflow transitions to the next activity. An activity might have several different possible transitions to various activities, depending on the outcome of the activity. Continuing the example above, if the user's request is approved, the activity might transition to an activity that notifies someone to order the item. If the user's request is denied, the activity might transition to notifying the user that their request has been denied.

The graphical Workflow Editor represents workflows visually as a type of flowchart. It shows activities as boxes labelled with information about that activity and transitions from one activity to the next as lines connecting the boxes.

At each step in a workflow:

1. An activity is processed and an action defined by that activity occurs.
2. At the completion of an action by an activity, the workflow checks the activity's conditions.
3. For each matching condition, the workflow follows the transition to the next activity.

When the workflow runs out of activities, the workflow is complete. The Workflow Context stores the execution history of the activities and transitions run. The Workflow Version stores the design history of the activities, transitions, and exit conditions available to run.

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Workflow properties

The workflow properties specify when to run a workflow and what records it acts on. For more information about workflow properties, see Workflow properties.

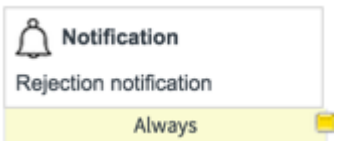
Workflow activities

A workflow activity contains instructions that are processed by the workflow.

Activities can include running scripts, manipulating records, waiting for a set period of time, or logging an event. Workflow conditions determine whether or not the activity is performed. Activities can be added, removed, or rearranged. Transitions can be drawn between activities.

This is an activity that triggers a notification:

Sample activity



Workflow runs activities as the user session that starts them. Workflows started from record operations will run activities as the user session that performed the record operation. Workflows started from schedules or restarted from timers run activities as the System user. Workflows started from script calls run activities as the user session that started the script.

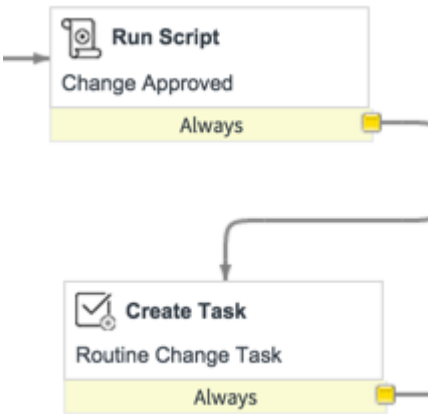
For more information on available activities and their behaviors, see Workflow activities.

Transitions

After the workflow condition is evaluated, the workflow transition determines which activity is performed when the workflow condition is met.

This is a transition that always leads from the *Change Approved* script to the **Change Task** activity:

Sample transition



Exit conditions

After a workflow activity is performed, the workflow condition is evaluated to determine which transition is activated.

The condition determines behavior based on a change being approved or rejected:

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Sample exit conditions

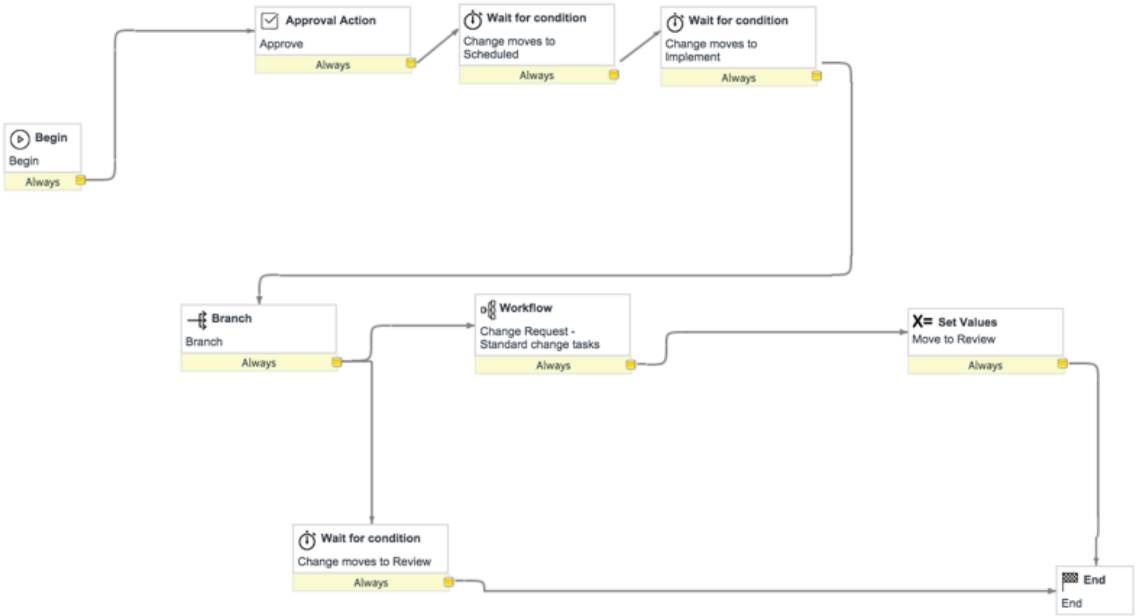


Workflow example

During workflow editing or while an unpublished workflow is running, only the person who checked out the workflow can view the changes.

After a workflow is published, it is available to other users. The workflow moves through the process as defined in the Workflow Editor. The entire workflow is represented in one screen. For example, this is the Standard Change workflow:

Sample change workflow



Workflow editor

The Workflow Editor is an interface for creating and modifying workflows by arranging and connecting activities to drive processes.

You can manage multiple workflows in the same screen, create custom workflow activities, and use existing activities as data sources. Users with the workflow_creator role can create workflows. Users with the workflow_admin role can create, modify, delete, and publish workflows.

To open the Workflow Editor, navigate to **Workflow** > **Workflow Editor**. For information about using the editor, see Create a workflow.

Welcome screen

The editor opens with the **Welcome** page, which displays a list of active, published workflows. From this tab, you can open existing workflows, create new workflows, and open help resources related to workflow.

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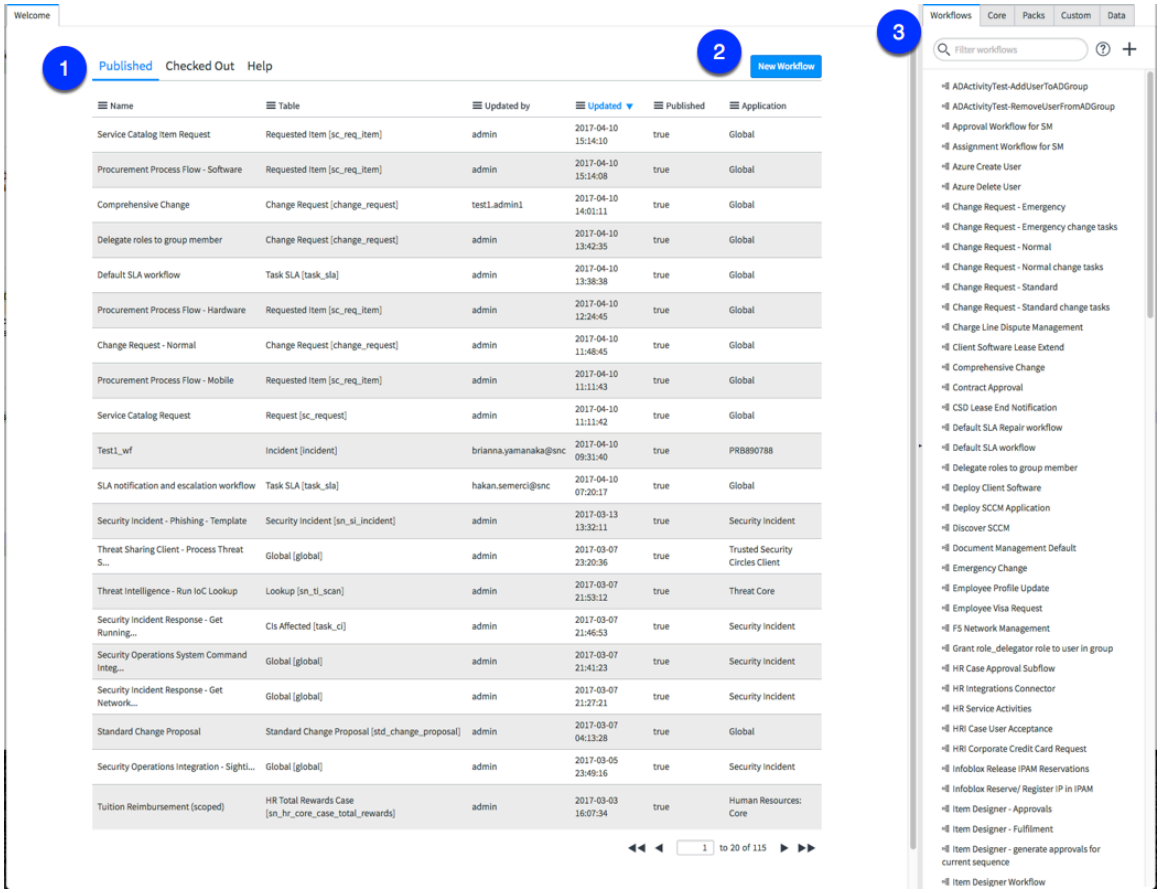

1 List display filters

Published: Click to view list of published workflows

Checked Out: Click to view list of workflows checked out to current user

Help: Click to view links to help resources for workflow

2 New Workflow button

Click to create a new workflow

3 Palette tabs

Workflows: Workflow activities and workflows you can use as subflows.

Core: Available workflow activities appropriate for the selected workflow. Contents can include activities provided by the base system and those purchased with orchestration.

Packs: Orchestration activity packs downloaded from the ServiceNow® App Store, organized by vendor and scope. Custom activities and workflows that you scope also appear as packs. Only visible if the orchestration plugin is installed.

Custom: Orchestration custom activities available. Only visible if the orchestration plugin is installed.

Data: Activities in the current workflow that output data. You can use these activities as data sources for other activities. Only visible if the orchestration plugin is installed.

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Note:
If your workflow welcome page does not look like this example, you may have customized the workflow welcome page before upgrading to Washington DC. You can update the workflow welcome page to the latest version by editing the UI pages .

Navigate to **System UI** > **UI Pages** > **Workflow Editor welcome**. In the UI page record for workflow_editor_welcome, scroll to the **Versions** related list. Select the row for the version corresponding to the upgrade to Washington DC, right-click and select **Revert to this version**.

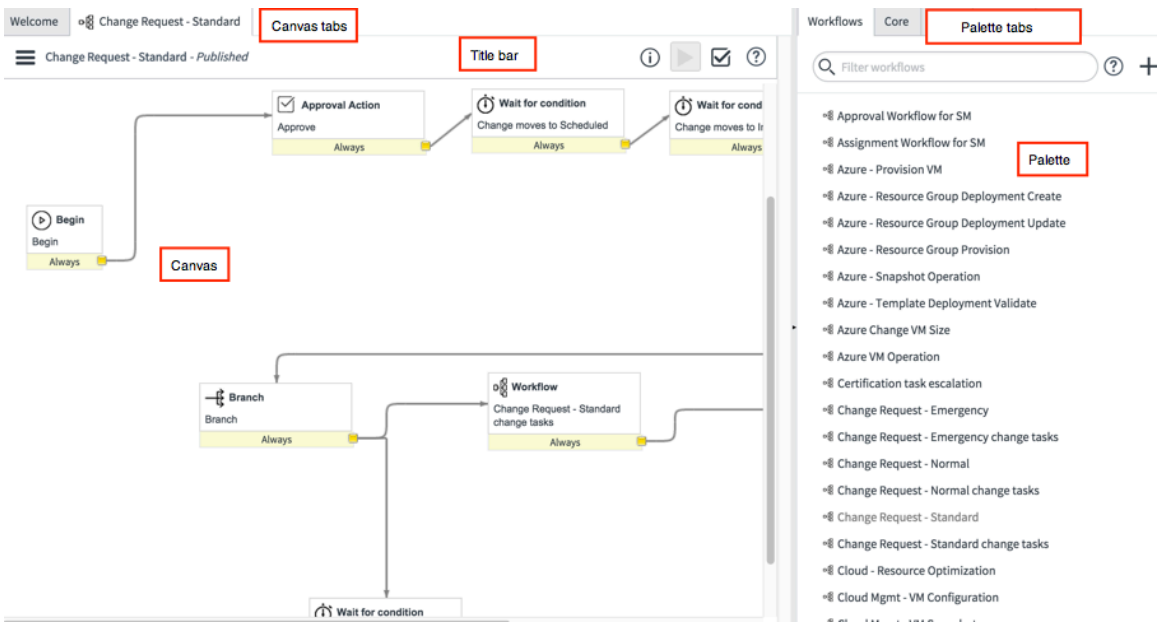
Workflow canvas

After you open or create a new workflow, the system displays the workflow canvas. On the canvas you interact with the Workflow Editor through several different elements: the canvas itself, the canvas tabs, the title bar, the palette, and the palette tabs.

The drawing canvas is where you add activities and configure transitions for checked out workflows. Add an activity by dragging it from the palette to the workflow in the canvas. For more information, see Create a workflow.

- **Canvas tabs**: Contains tabs for accessing workflows being edited or created.
- **Title bar:** Displays the workflow name and status. Provides a menu and controls for configuring, testing, and validating workflows.
- **Canvas**: Provides the working surface for creating new workflows or editing existing ones.
- **Palette tabs**: Contains tabs for accessing activities being edited or created.
- **Palette**: Contains all available workflow activities and existing workflows you can use as subflows. Drag activities and subflows to the canvas to create new workflows or edit existing ones.

Workflow user interface



Workflow palette

The default workflow palette contains workflow activities and existing workflows you can use as subflows.

The basic workflow palette contains these tabs:

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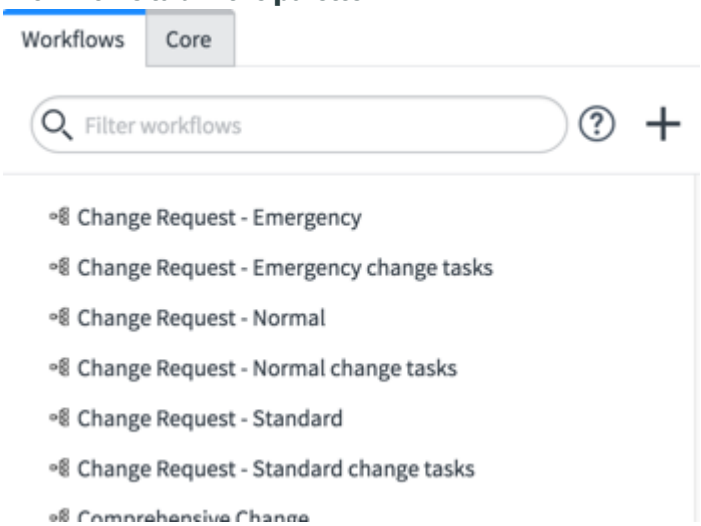
- **Workflows**: Displays existing workflows and provides controls for creating new ones.
- **Core**: Displays baseline workflow activities available to all systems and Orchestration activities (when Orchestration is activated).

Workflows tab

The **Workflows** tab lists existing workflows that you can edit or use as subflows in other workflows. Double-click a workflow to open it in the canvas. To add a workflow as a subflow, drag it to another workflow in the canvas. Click the **+** icon to create a new workflow.

Workflows tab in the palette



Core tab

The **Core** tab contains the standard activities available by default to all workflows and any activities purchased with Orchestration, organized by category. Click the arrow icons to expand or collapse the activity lists under each category. To add an activity to a workflow, drag it to the canvas. For more information, see Add an activity to a workflow.

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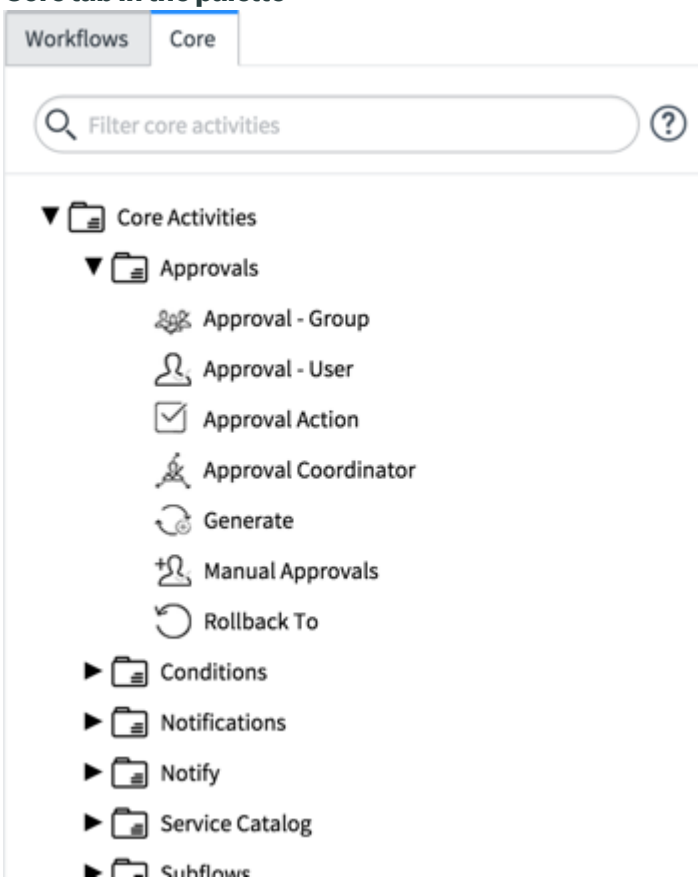
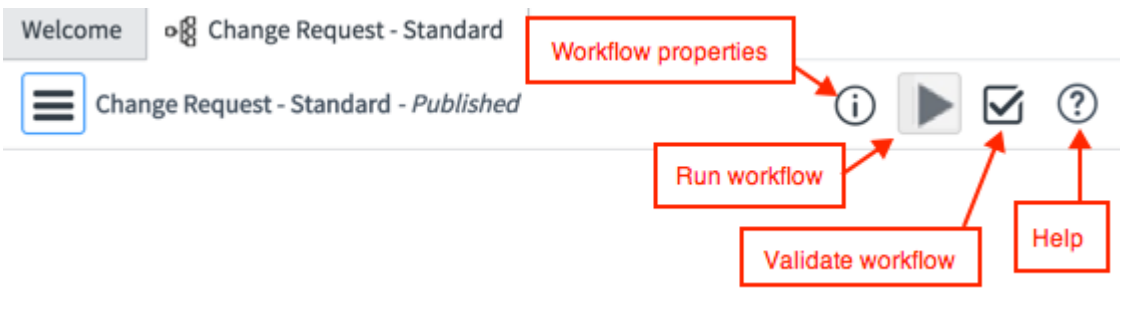
Core tab in the palette



Workflow editor title bar

When a workflow is opened in the canvas, the title bar displays the workflow title and the workflow status in italics. Possible states are **Checked out by <name>** and **Published**.

Workflow editor title bar



Controls on the right side of the title bar manage the workflow.

- **Workflow Properties** ⓘ: Opens the current workflow's properties form.
- **Start** ▶: Runs the workflow. This control is only available for workflows running on the Global table that are accessible from all application scopes. To test workflows that are on other tables, insert a record into that table that meets the condition of the workflow.
- **Validate** ☑: Tests the workflow prior to publication. Validation detects potential problems that can prevent the workflow from publishing or cause the workflow to fail. For more information, see Workflow Validation.
- **Help** ?: Opens documentation to help you create the workflow.

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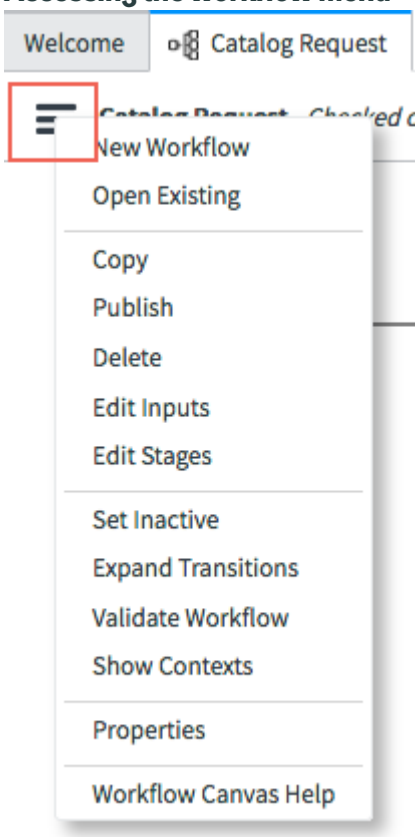
Workflow menu

Click the menu icon in the title bar for additional options to configure the workflow.

Accessing the workflow menu



These menu options are available:

Workflow menu options

Option	Description
New Workflow	Creates a new workflow.
Open Existing	Opens another existing workflow.
Copy	Creates a duplicate of the workflow. Give the copy a different name.
Publish	Makes the personal workflow version public, overwriting the current published workflow version. This option is only available for checked out workflows.
Checkout	Creates a personal version of the workflow for you, which you can edit. This option is only available for published workflows.
Delete	Deletes the workflow. You cannot delete workflows that have contexts associated with them.
Set Inactive	Inactivates the workflow so that it cannot be used.
Expand Transitions	Redraws the transitions so that they do not overlap when they leave the activity condition.

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Workflow menu options (continued)

Option	Description
Start Workflow	Starts a test run of the current workflow.
Validate Workflow	Runs validation tests on your workflow prior to publication. Use this validation to detect potential problems that can prevent the workflow from publishing or cause the workflow to fail. For more information, see Work on workflows.
Collapse Transitions	Redraws the transitions so they overlap when they leave the activity condition.
Show Contexts	Displays all the contexts for the current workflow. You can use this option to troubleshoot a workflow.
Properties	Opens the Workflow Properties form, which defines the workflow's attributes.
Edit Inputs	Opens the Workflow Inputs list of variables that the workflow can accept when used as a subflow. For more information, see Pass a variable from a workflow to a subflow.
Edit Stages	Opens the Workflow Stages list. For more information, see Workflow stages. For tables with a column of Type = Workflow.

Workflow editor keyboard navigation

The platform includes accessibility features that support Web Content Accessibility Guidelines (WCAG) 2.0 level A and make the interface accessible to users with disabilities.

These features improve the user experience when accessing platform functions with Using accessibility features. In general, you use the following set of standard keyboard navigation functions:

- Press **Tab** to navigate major groupings in a pre-defined sequence. This usually includes moving between standard interface controls (fields and lists) in a module, or between records within a tab.

  Press **Shift Tab** to move backwards in a pre-defined sequence.

- Use arrow keys (left, right, up, down) to navigate between individual elements within a group. This usually includes moving between tabs, or between available selections within a specific control (for example, within a list).
- Press **Enter** to select a control or tab, or enter text within a control.

The Workflow Editor is constructed in a unique manner. It includes a series of main (left) panel tabs, a series of side (right) panel tabs, and a drawing canvas for workflow creation or editing. As such, it has its own unique set of keyboard accessibility functions and commands.

Welcome page keyboard commands

Use keyboard commands to navigate and operate the Workflow Editor Welcome page.

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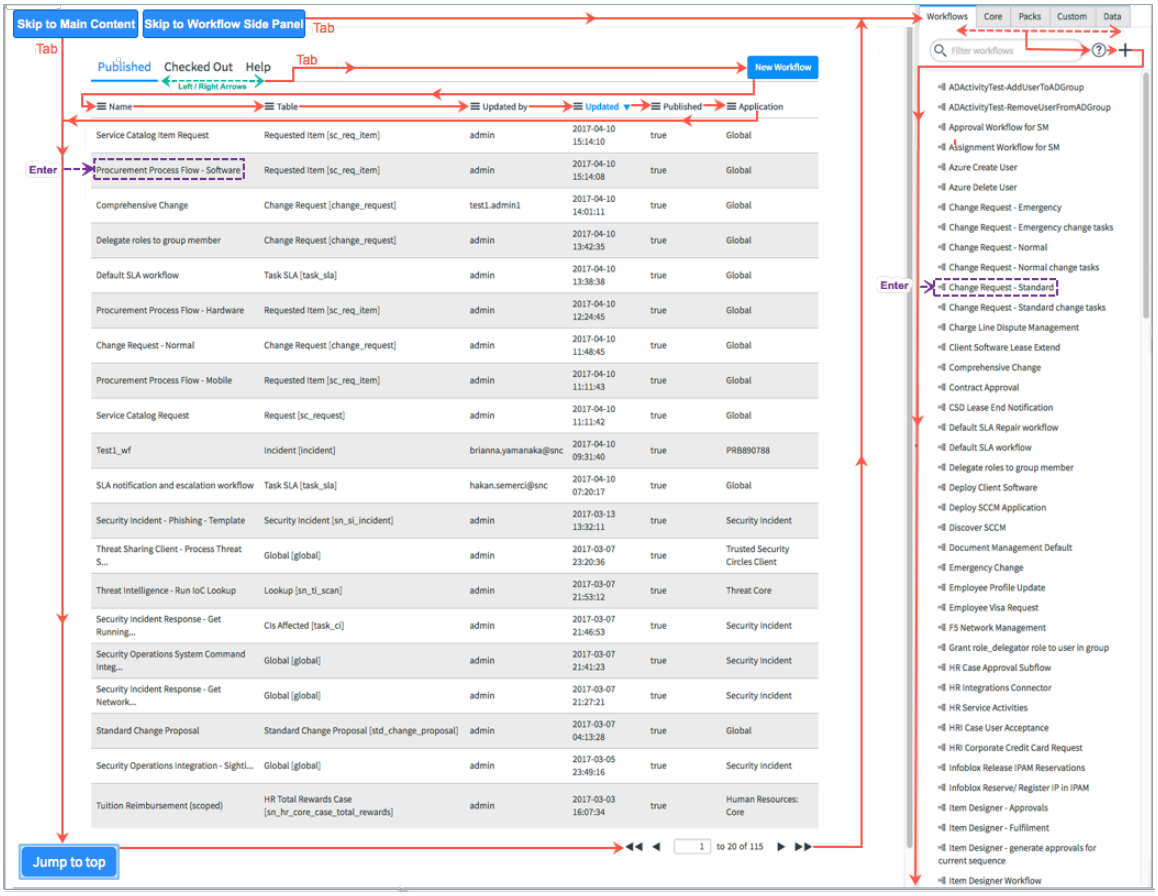

Task or Action	Keyboard Commands
Navigate to main content (left) panel, and select a workflow	**1.** After accessing the Workflow Editor from a menu, press **Tab**. Skip to Main Content appears in the upper left corner. **2.** Press **Enter** to position the cursor in the first record displayed in the **Published** tab. **3.** Press **Tab** to navigate down the listing of workflow records. Press **Enter** to select and open a workflow record in the Workflow drawing canvas.
Select a checked out workflow or a help function in main content panel	**1.** After accessing the Workflow Editor from a menu, press **Tab** until the **Published** tab is highlighted. **Note:** Do not select Skip to Main Content or Skip to Workflow Side Panel.

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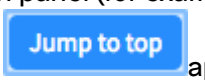
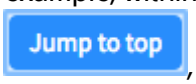
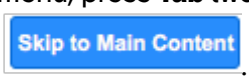
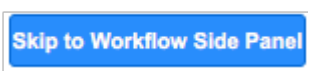
Task or Action	Keyboard Commands
	2. Press the right or left arrow keys to navigate between the **Published**, **Checked Out**, or **Help** tabs. **3.** Press **Tab** to navigate across the columns and down the listing of checked out workflow records or help selections. Press **Enter** to select and open a checked out workflow record in the Workflow drawing canvas, or open a help selection (work or orchestration videos, documentation, community discussions, knowledge base, or live feed).
Create a workflow	**1.** After accessing the Workflow Editor from a menu, press **Tab** until  is highlighted. **2.** Press **Enter** to open New Workflow
Jump to Top	After tabbing through the displayed records in a tab in the main panel (for example, within the **Published** tab),  appears at the bottom of the listing. Press **Enter** to return to the Welcome tab at the top of the Workflow Editor.
Navigate to page selection controls 	**1.** After tabbing through the displayed records in a tab in the main panel (for example, within the **Published** tab), including  , press **Tab** to access the page selection controls. Continue to press **Tab** until you access the desired one. **2.** Press **Enter** to operate the selected page control.
Navigate directly to side (right) panel to open help, create a new workflow, or open an existing one	**1.** After accessing the Workflow Editor from a menu, press **Tab** two times. Do not select   appears in the upper left corner. **2.** Press **Enter** to position the cursor in the **Workflows** tab in the side panel. **3.** To open help, press **Tab** to navigate to  . Press **Enter** to open help, or press **Tab** to skip.

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Task or Action	Keyboard Commands
	4. To create a new workflow, press **Tab** to navigate to +. Press **Enter** to open New Workflow, or press **Tab** to skip. **5.** To open an existing workflow: ○ As needed, stop at the filter field to filter workflows. ○ Press **Tab** to navigate down the workflow list. ○ Press **Enter** to select and open a workflow record in the Workflow drawing canvas,
Add a core activity to a checked out workflow in the Workflow drawing canvas	If a checked out workflow is open in the Workflow drawing canvas, core activity records display in the **Core** tab. To select a core activity and place it in the checked out workflow: **Note:** Core activity records only display when a checked out workflow is open in the Workflow drawing canvas. Other tabs display in the side panel only if Orchestration functions are enabled. **1.** In the Workflow drawing canvas, press **Shift Tab** until Skip to Workflow Side Panel appears in the upper left corner. **2.** Press **Enter** to position the cursor in the **Workflows** tab in the side panel. **3.** Press the right arrow key to navigate to the **Core** tab. **4.** Press **Tab** or the down arrow key to navigate down the listing of core activities. ○ To open a core activities folder (for example, Approvals), press the right arrow key. ○ To navigate up the list, press the left or up arrow keys. **5.** Press **Tab** to select a core activity and open the New Activity dialog to specify properties for it. **6.** After creating the activity, remember to link it to another activity in the workflow. See Create a connection from a condition on one activity to the next activity that follows in Workflow drawing canvas keyboard commands.

Workflow drawing canvas keyboard commands

Use keyboard commands to navigate and operate the Workflow Editor canvas.

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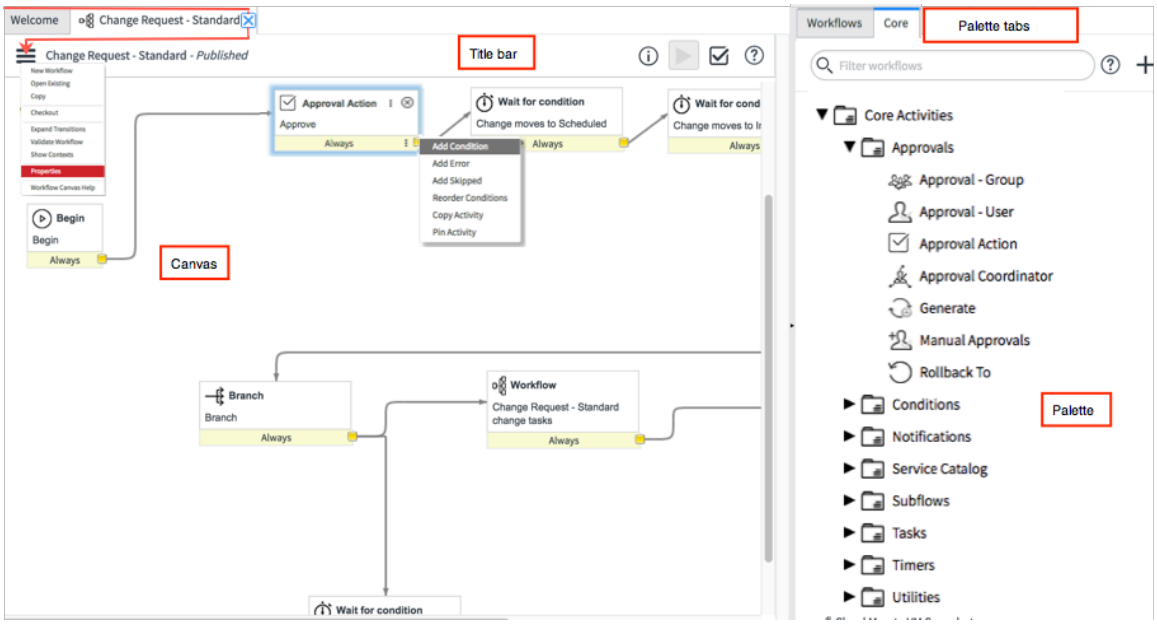

Task or Action	Keyboard Commands
Select Workflow Actions menu command (for example, **Validate Workflow** or **Publish Workflow**)	**1.** Press **Tab** until the context menu (☰) is highlighted. **2.** Press **Enter** to open the context menu. **3.** Use the down arrow key to move to the command, then press **Enter** to select it.
Set general workflow properties	**1.** Press **Tab** until ⓘ is highlighted. **2.** Press **Enter** to open Workflow Properties.
Navigate from activity box to activity box.	Simply press **Tab** or use the arrow keys (right, left, up and down) to navigate from activity to activity within the workflow. **Note:** Depending on the complexity and number of activity boxes in the workflow, the sequence of navigation is not always predictable. Depending on how you are navigating within the workflow, the navigation sequence is generally (but not always) row-by-row, and focus is usually placed on the nearest activity box.
Modify a selected activity.	**1.** Navigate to the activity box, then press **Enter** to select it and place it in Edit mode. When you select an activity box, it appears as highlighted. **2.** Once in Edit mode, use **Tab** to move around within the activity box to change or access elements such as: ○ Activity Properties (☑) ○ Title ○ Node context menu ○ Delete Node (⊗)

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Task or Action	Keyboard Commands
	○ Condition Properties (Always) ○ Node conditional context menu (⋮) ○ Node conditional port options ( ) **Note:** All elements in a selected activity are only accessible when working with a checked out workflow. When working with a published workflow, you can only access its activity properties and title, **3.** Press **Enter** to select an element, or press **Esc** to escape an element without making changes.
Add a condition to an activity.	**1.** Within an activity box, select ... to access **Condition Properties**. **2.** In **Condition Properties**, specify the conditions for the activity.
Create a connection from a condition on one activity to the next activity that follows	**1.** Within an activity box, select **Node conditional context menu** (⋮). **2.** Select **Link to...** to create a connection to the next activity box that follows, or select **Delete** to delete an existing connection.
Add a core or custom activity	**1.** Within an activity box, select **Node conditional port options** ( ). **2.** Select **Add Core Activity** to access Workflow Activity Definitions to add a new core activity, or select **Add Custom Activity** to add a custom activity to the workflow.
Move an activity box	**1.** Press **Tab** to navigate to the activity box, enter press **Enter** to select it. **2.** Use the arrow keys to move the activity box. To move the activity box one pixel at a time, press **Shift** while using the arrow keys.
Validate a workflow	**1.** Press **Tab** until ☑ is highlighted. **2.** Press **Enter** to validate the workflow. You can also select **Validate** from the Workflow Actions menu.
Run a workflow	**1.** Press **Tab** until ▶ is highlighted. **2.** Press **Enter** to run the workflow. **Note:** If the workflow is tied to a database table, this function is disabled. The workflow runs when the proper table conditions are activated (for example, insertion of a new record into the table).

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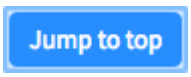
Task or Action	Keyboard Commands
Close workflow drawing canvas	1. Press **Tab** until  (on the right side of the tab that contains the name of the workflow) appears. 2. Press **Enter** to close the canvas.
Publish a workflow	1. Press **Tab** until the context menu () is highlighted. 2. Press **Enter** to open the context menu. 3. Use the down arrow key to move to the **Publish** command, then press **Enter** to select it.
Jump to Top	After tabbing through the entire workflow,  appears at the bottom of the listing. Press **Enter** to jump to the top of the Workflow drawing canvas.

Workflow management

Create, edit, validate, and publish workflows to automate multi-step processes across the platform. Understand workflow activities and variables and how to use them effectively. Take a deeper look at how workflows are constructed, validated, and used.

Create a workflow

Automate a multi-step process by creating a workflow with the Workflow Editor.

Before you begin

Role required:

- You must have the workflow_admin or workflow_creator role to use the Workflow Editor.
- If you're designing the workflow as part of an update set process, see Workflow movement with update sets before creating the workflow.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
   The **Welcome** tab of the Workflow Editor opens.
2. On the **Workflows** tab in the palette, select **New Workflow**.

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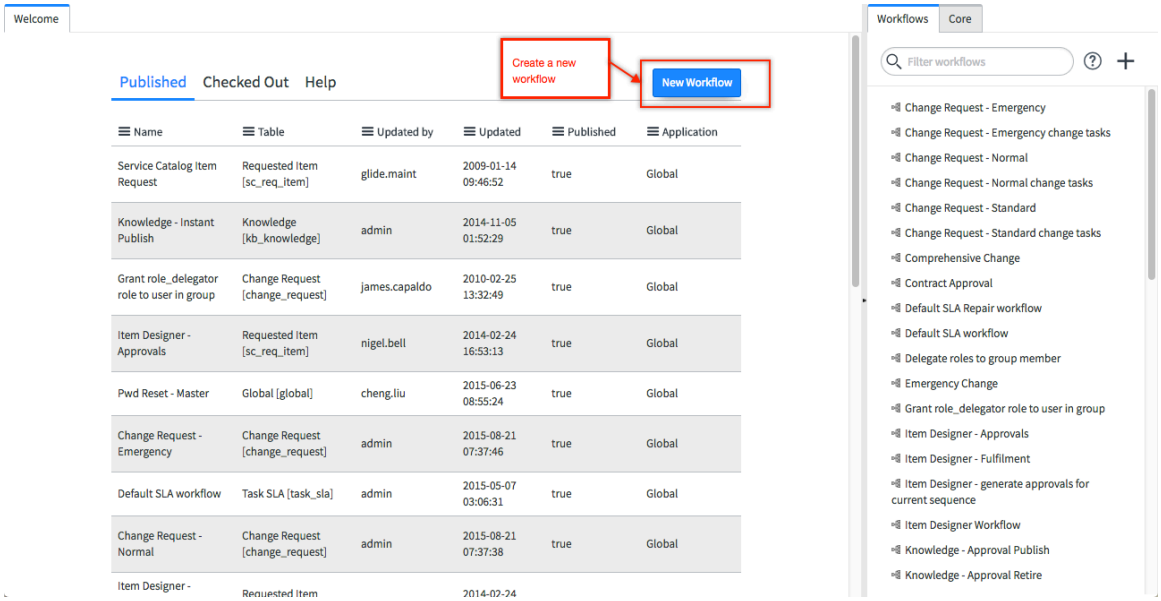


A simplified version of the New Workflow form opens.

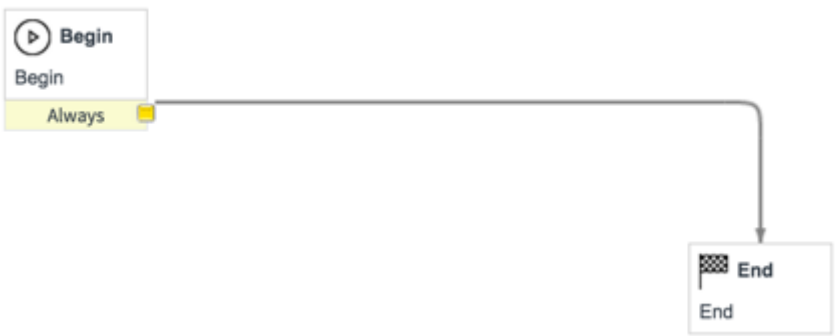
3. Fill in the **Name** and **Table** fields.
4. **Optional:** Add a **Description**.
5. **Optional:** Do one of the following:

   a. If the **Conditions** UI section is displayed, specify a **Condition** if needed and edit the fields.
   The **Conditions** UI section shows only if the selected table supports conditions for launching workflows. For example, if you select the sc_req_item table, conditions are not applicable and the **Conditions** UI section isn't displayed.

   b. If the **Stages** UI section is displayed, verify that the **State rendering** and **Stage order** fields contain the correct information.
   The **Stages** UI section shows only if the selected table supports stages. For example, if you select the sc_req_item table, the **Stages** UI section is displayed.

6. Select **Submit**.

   The new workflow is created with the **Begin** and **End** activities connected by a single transition.



7. Finish creating the workflow by adding activities, validating, and publishing so the workflow is available to other users.

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For more information, see Work on workflows.

8. To change advanced settings for the workflow, select the **Properties** icon ⓘ, and if you make changes, select **Update**.

Workflow properties

In the properties of a workflow, you can configure settings such as its application scope, start conditions, schedule, inputs, stages, and run time metrics. You can also view information such as the workflow author, version, and history.

When you create a new workflow, the following fields are available in the dialog box:

- **Name**
- **Table**
- **Description**
- **If condition matches**
- **Condition**

If you click **Diagrammer view**, in **Related Lists**, the following UI sections are available in the dialog box:

- General
- Conditions
- Inputs
- Activities
- Application
- Schedule
- Stages
- Estimated Runtime

General

Field	Description
Name	A name to identify the workflow.
Table	The table for the workflow to run on. Workflows that run on specific tables can still interact with other tables. Select **Global [global]** to run the workflow on all tables. **Note:** The list shows only tables and database views that are in the same scope as the workflow. Also, all users who edit the workflow must have access to the necessary tables and domains.
Checked out	[Read-only] When the workflow was checked out. Automatically set by the **Checkout** action in the workflow menu.
Checked out by	[Read-only] The user who has this workflow checked out. This value is automatically set by the **Checkout** action in the workflow menu.
Published	[Read-only] Check box to indicate whether the workflow has been published. Automatically set by the **Publish** action in the workflow menu.

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Field	Description
Description	The purpose of the workflow.

Conditions

Create conditions to trigger the workflow. The Conditions section does not appear if you select a table, such as sc_req_item, that does not require a condition.

Field	Description
If condition matches	When the condition evaluates to true, the workflow launches an active context: • **None**: The workflow is not automatically started by the workflow engine. To run this workflow, write a script to start the workflow. • **Run the Workflow**: The default value. The workflow engine starts the workflow if the information in the **Condition** field matches a record that is inserting into the table. • **Run if no other workflows match yet (deprecated)**: The workflow only runs if no other workflows are running on the execution thread that started this workflow. Avoid using. • **Run if no other workflows matched**: The workflow only runs if no other workflows are running on a specific record. For example, there are four workflows inserted into the Incident table, which have a condition such as **short_desc** contains **test**. A new workflow, which has **If condition matches** is set to **Run if no other workflows match yet**, only runs if none of the four workflows have started running on the Incident record.
Condition	A condition builder for specifying workflow conditions that trigger the behavior selected from the If condition matches list.
Order	Numeric value that determines the order of the workflow, relative to other workflows. Workflows are evaluated in order from the lowest order number to the highest. A workflow runs if it is the first to match conditions.

Inputs

The Inputs section lists all the activities in the current workflow that input data, the data type, and the default value. The Inputs section is only available after a workflow has been created. To create a variable, click **New**.

Field	Description
Label	Displayed column label. Localized depending on user locale.
Reference	Input field from another table.
Type	Data type. For example, integer or string.
Default value	Value used if you do not provide a value.

Activities

The Activities section enables you to set activity pinning and maximum activity count.

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Field	Description
Activity pinning	List of options that control updates to custom activities at the workflow level. Pinning protects custom activities from being updated automatically when downloaded from the ServiceNow Store. For more information, see Workflow activity pinning. The possible options are: • **Set by activity**: Allows all activities in the workflow to use their own pinning settings. This is the default pinning option. • **Pin all activities**: Pins all activities in the workflow to their current version. • **Unpin all activities**: Allows all activities in the workflow to be updated.
Max activity count	The maximum number of activities performed by the workflow. This value is used to prevent infinite loops and is set to **100** by default. When the stated maximum count is reached, the workflow is canceled. If this field is blank, the maximum count is set to **-1**, and the workflow is canceled.

Application

The Application section enables you to see application scope and scope restrictions.

Field	Description
Application	[Read-only] Scope of this activity. For more information, see Application Scope.
Accessible from	Scope restrictions for this workflow. Possible settings are: • **All application scopes**: Workflow is accessible to all application scopes. • **This application scope only**: Workflow access is limited to the scope named in the **Application** field. For more information see Workflow scope.

Schedule

Use the Schedule section to create a schedule for this workflow using the schedule builder.

Field	Description
Delivery based on	The schedule type for this workflow. Possible types are: • **User-specified duration**: Duration based on a user-specified value. This is the default schedule type. • **Relative duration**: Duration calculated from a preconfigured schedule, such as **8-5 weekdays**.
Expected time	User-defined interval. This field is visible when the schedule type is **User-specified duration**.
Schedule	Preconfigured schedule that determines when this workflow runs.
Timezone	Time zone for this instance.

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Stages

The Stages section appears if you select a table with **Type** = **Workflow**.

Field	Description
Stage	Displays the workflow stage progress on the selected table. Optionally, select **Stage rendering** and **Stage order** schemes to customize the appearance of the stage field. The default values cover typical scenarios.
Stage rendering	The renderer to use when displaying stage icons on a form or list view. For more information about renderers, see Workflow stage renderers.
Stage order	The order of workflow stages when you view a workflow field in a list. Select **Computed** to let the workflow engine compute the stage order from the order of execution in the workflow. Select **User Specified** to use the **Order** field from that Workflow stages.
Name	The name of the stage as it appears in workflow fields..
Duration	Time allocated for the specific stage.
Order	The order of workflow stages when you view a workflow field in a list. Select **Computed** to let the workflow engine compute the stage order from the order of execution in the workflow. Select **User Specified** to use the **Order** field from that Workflow stages.
Value	The value of the stage when it is referenced from elsewhere in the system, such as in a script.

Estimated Runtime

The **Estimated Runtime** section opens the controls for configuring the **ERT** for the workflow. Core workflows included in the base system are not configured for estimated run time by default. All new workflows are configured with default ERT values automatically. You can edit existing run time estimates or configure new ones for any existing workflow. For details about how estimated run times are configured and calculated, see Workflow run time metrics.

Field	Description
Requires ERT	Check box to indicate that this workflow requires an estimated runtime configuration. You can use the ERT calculations to determine if workflows are running longer or shorter than expected and to identify errors in workflow processing. By default, new workflows require an ERT.
Estimated Run Time	The initial estimate for the workflow's run time.
Number of data points	[Read only] The number of times the system has compared the estimated run time to an actual run time result.
Outlier Percentage Threshold for ERT	[Required] The percentage deviation from the estimated run time that identifies an outlier workflow run time. The system uses a default value of 20. For more information, see Outlying workflow run times.

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Create a workflow from a table

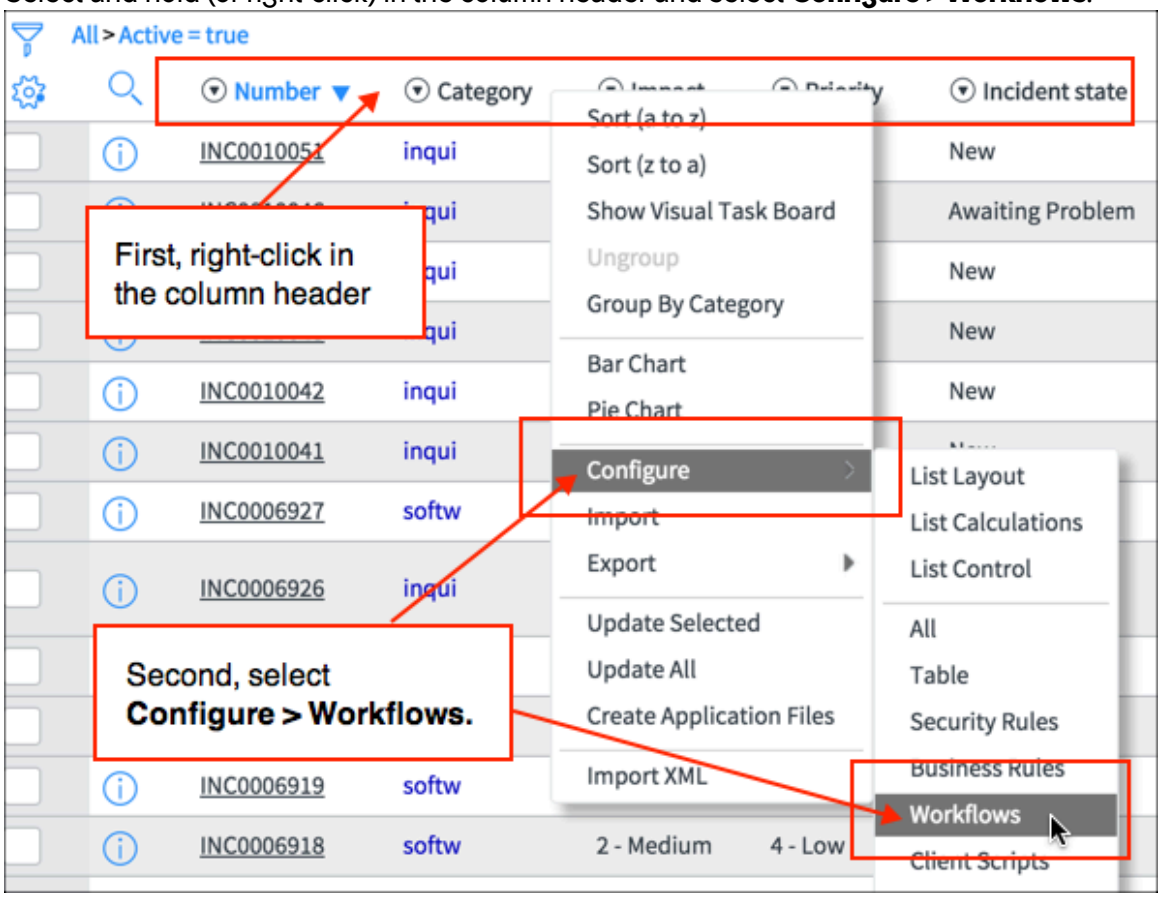
Automate a multi-step process by creating a workflow from the list view of any table that supports workflows.

Before you begin

If you're designing the workflow as part of an update set process, see Workflow movement with update sets before creating the workflow.

Procedure

1. Open a table, such as Incident or Problem, in the list view.
   For example, navigate to **Incident > Open**.
2. Select and hold (or right-click) in the column header and select **Configure > Workflows**.



   The **Workflow Versions** on that table appears in a list.
3. Select**New**.
   The **Workflow Version** opens in **New Workflow** view. The **Table** field is filled in with the table that you selected in step 1 and is read-only.
4. Enter **Name**.
5. **Optional:** Enter **Description**.
6. **Optional:** Edit conditions fields as necessary.
7. Select **Submit**.
   The new workflow is added to the **Workflow Versions** list.
8. Select the workflow **Name**.
   The new workflow is created with the **Begin** and **End** activities connected by a single transition.

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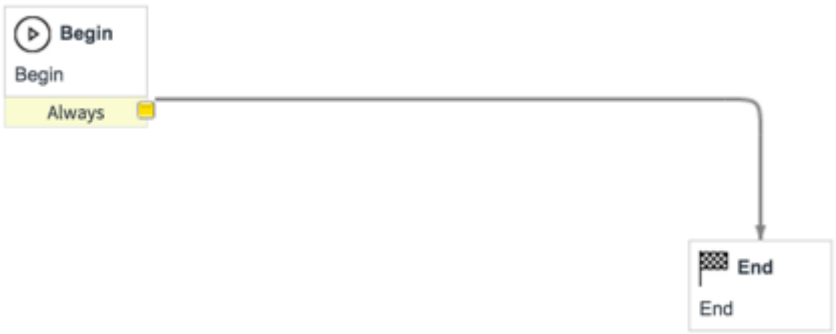

9. Finish creating the workflow by adding activities, validating, and publishing so the workflow is available to other users.
   For more information, see Work on workflows.
10. **Optional:** To change advanced settings for the workflow, select the **Properties** icon, and if you make changes, select **Update**.

Create a workflow for a new service catalog item

When you create a new service catalog item, you can create a new corresponding workflow at the same time.

Before you begin

- If you are designing the workflow as part of an update set process, see Workflow movement with update sets before creating the workflow.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. At the top of the form, next to **Catalog Items**, click **New**.
   The Catalog Item form opens.
3. Add a **Name**.
4. Select the **Process Engine** tab.
5. Next to the **Workflow** field, click the lookup icon .
6. Next to Workflow at the top, click **New**.

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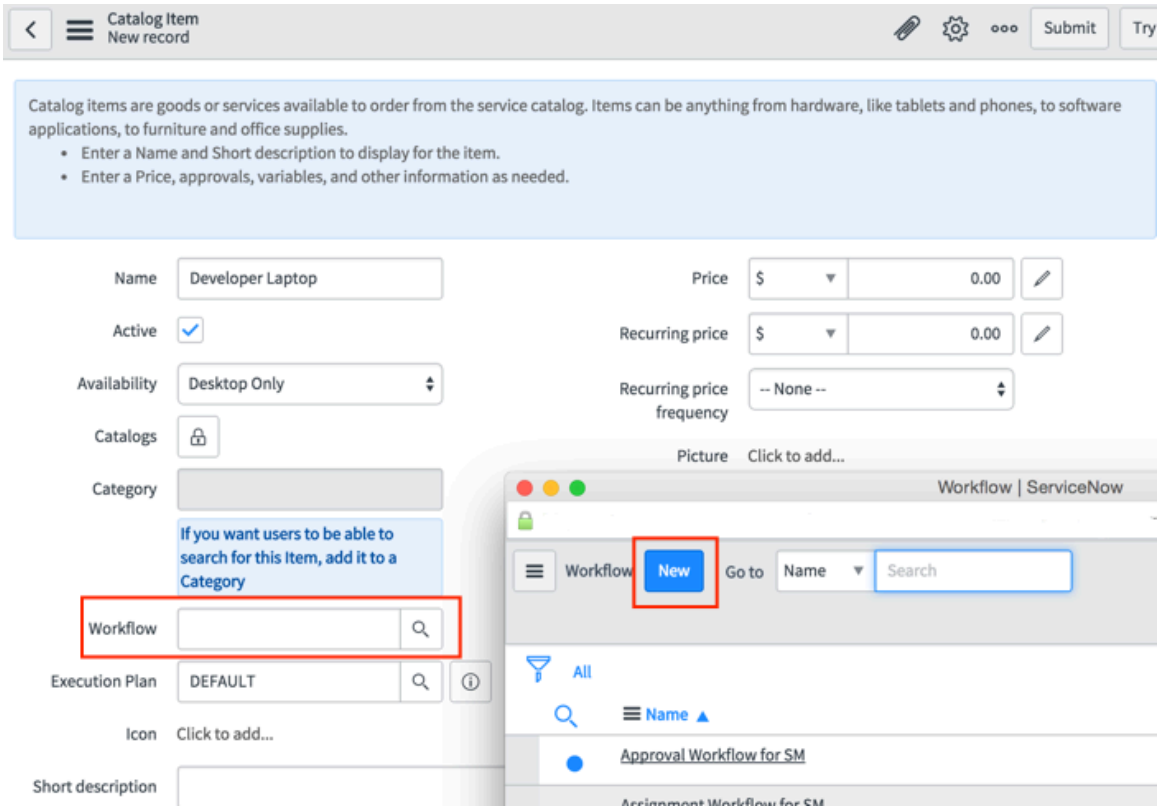

The Workflow version dialog opens in the New Workflow View. The **Table** field is set to **Requested Item (sc_req_item)** and is read-only.

7. Add a **Name**.
8. [Optional]Add a **Description**.
9. [Optional] Change the stage information as necessary.
10. Click **Submit**.
    The new workflow is created with the **Begin** and **End**activities connected by a single transition.



11. Finish creating the workflow by adding activities, validating, and publishing so the workflow is available to other users.
    For more information, see Work on workflows.
12. To change advanced settings for the workflow, click the **Properties** icon.
13. Click **Update**.
    If you close the Workflow Editor, you can see the Catalog Item record. Note that the workflow is added to the Workflow field. The Show Workflow and Information icons appear next to the **Workflow** field. Hover over the information icon to view a read-only summary of the workflow.

Create a workflow for an SLA Definition

Automate a multi-step process by creating a workflow from an SLA definition.

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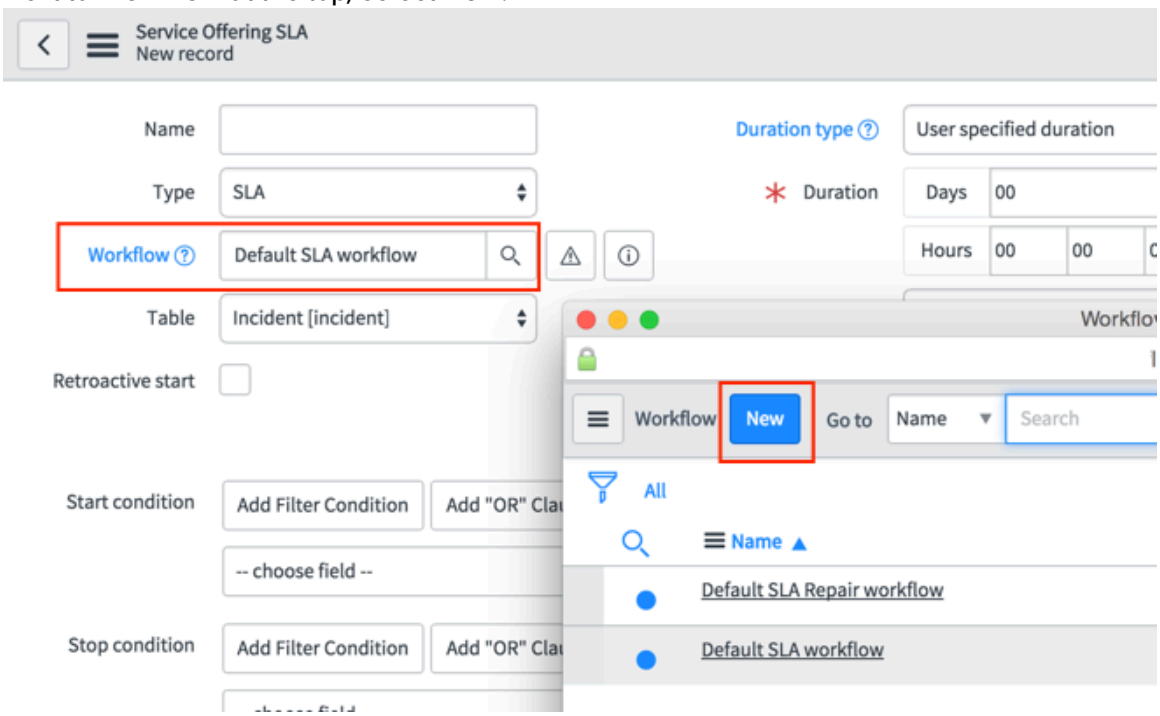
Before you begin

If you're designing the workflow as part of an update set process, see Workflow movement with update sets before creating the workflow.

Procedure

1. Open a list of SLA definitions.
   For example, **Facilities > SLA Definitions** or **Service Level Management > SLA Definitions**.
2. At the top of the form, next to **SLA Definitions**, select **New** New.
3. Select **Contract SLA** or **Service Offering SLA**.
   The SLA Definition or Service Offering SLA form opens.
4. Next to the **Workflow** field, select the lookup icon.
5. Next to **Workflow** at the top, select **New**.



   The Workflow Version dialog shows in the New Workflow view. The **Table** field is set to **SLA Definition (contract_sla)** or **Service Offering SLA (service_offering_sla)** and is read-only.

6. Enter **Name**.
7. **Optional:** Enter **Description**
8. **Optional:** Edit conditions fields as necessary.
9. Select **Submit**.
   The new workflow is created with the **Begin** and **End** activities connected by a single transition.

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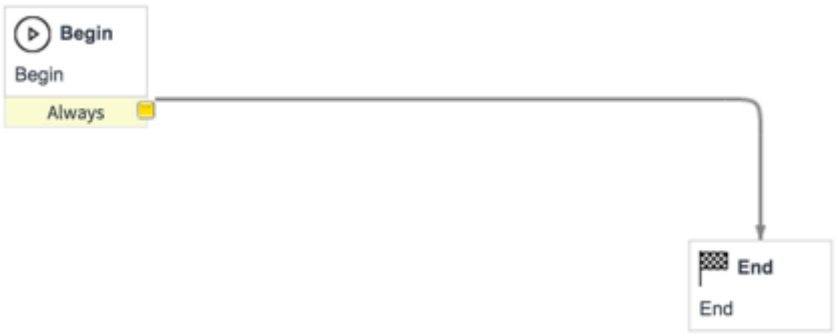


10. Finish creating the workflow by adding activities, validating, and publishing so the workflow is available to other users.
    For more information, see Work on workflows.

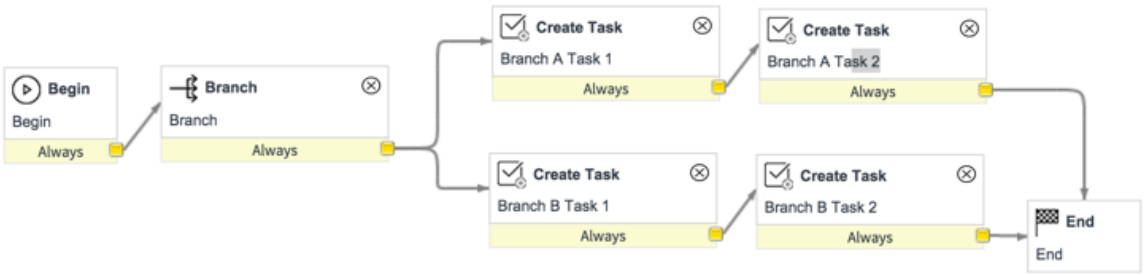
11. **Optional:** To change advanced settings for the workflow, select the **Properties** icon .
    If you make changes, select **Update**.

Ending workflows with multiple branches

A workflow is complete when it reaches the **End** activity, even if there are still active branches of the workflow in progress. To ensure that both branches are completed, add a **Join** activity to resolve the branches.

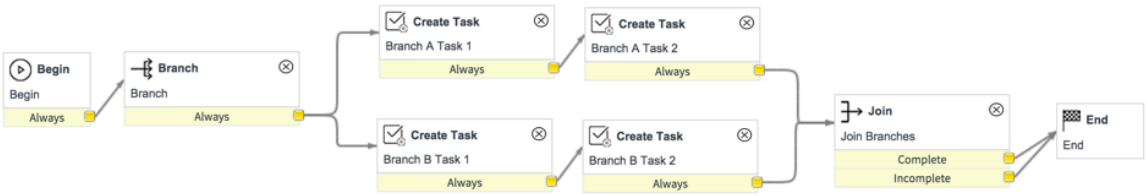
For example, the following figure shows a workflow with two branches that execute independently. When Task 1 and Task 2 of Branch B are completed, the workflow is marked complete even if the Branch A tasks are not completed.

Workflow with uncompleted branch



For both branches to complete, add a **Join** activity to resolve the branches. When one branch reaches the join, the workflow waits for the other branch. When both branches are complete, the workflow reaches the end. The **Incomplete** condition of the a **Join** activity is met only if one of the branches cannot be completed.

Workflow with completed branches



Work on workflows

To complete a workflow, you add workflow activities, validate the workflow, and publish it.

Before you begin

Role required: None.

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Add a workflow activity

Activities determine the functionality of the workflow.

Before you begin
Role required: workflow_admin, workflow_creator, or admin

About this task
When they are created, all workflows contain **Start** and **End** activities.

For more information, see Workflow activities.

Procedure
1. Open a workflow.
2. Check out the workflow.
3. Drag a workflow activity from the Activities menu into the workflow body.
4. Populate the Workflow Activity form that appears.

Validate a workflow

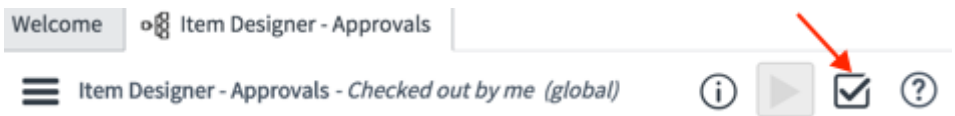
You can manually validate a workflow from the Workflow Editor. You can generate a workflow validation report from the Workflow Version form.

Before you begin
Role required: workflow_admin, workflow_creator, workflow_publisher, or admin

About this task
Running a workflow on a new node automatically attempts to validate the workflow. If validation is successful, the system updates the workflow version record to indicate the workflow has been validated and marks the record as updated by the user who ran the workflow.

Procedure
1. Open the workflow to validate in the Workflow Editor.

   When the workflow is loaded, the workflow validator icon appears in the toolbar.



2. Click the validator icon to run a series of validation tests on the current workflow version and generate a report.

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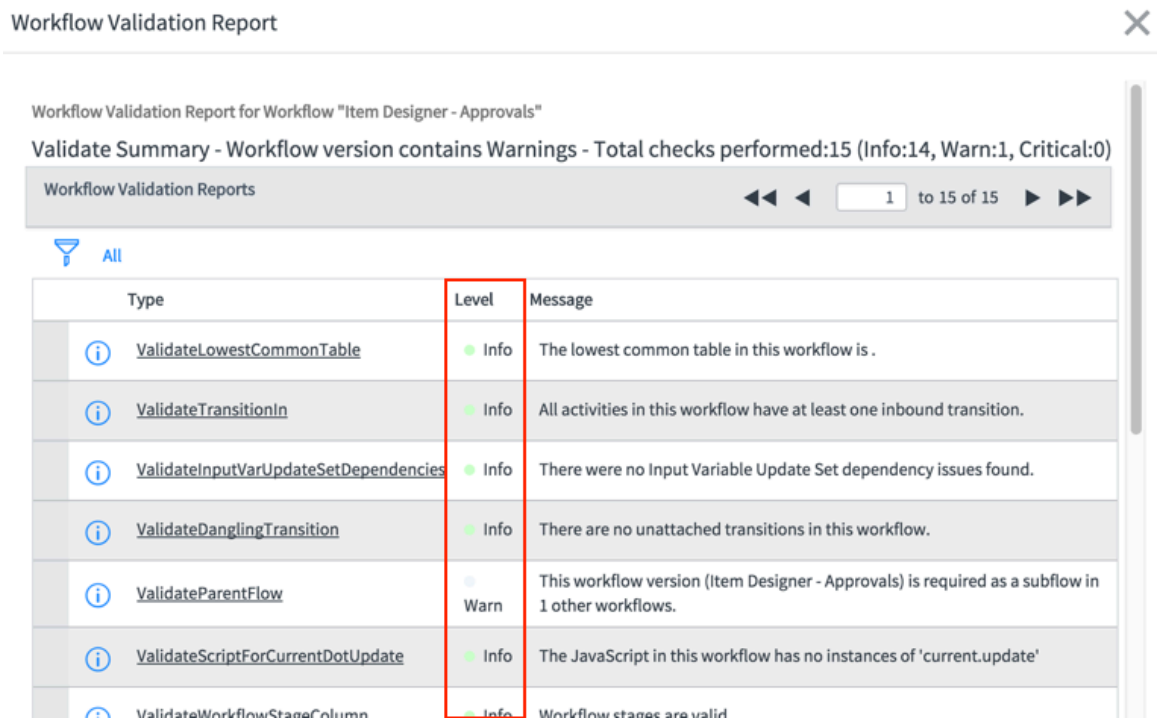

3. Complete the following steps to generate a workflow validation report from the Workflow Version form
   a. Navigate to **Workflow** > **Administration** > **Workflow Versions**, and select a workflow to validate.
   b. Under **Related Links**, click **Validate Workflow**.

Publish a workflow

When a workflow is complete, publish the workflow so that it is available to all users.

Before you begin

Before you publish a workflow, validate it to test it for issues that might cause it to fail, such as missing subflows or disconnected transitions. For more information, see Workflow validation.

Role required: workflow_admin, workflow_creator, workflow_publisher, or admin

About this task

To publish a workflow:

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open the workflow that you want to publish.
3. In the title bar, click the menu icon and select **Publish**.

Result

If you published a new version of workflow, the changes are not applied to running workflow contexts. Any currently running workflow context continues using the workflow version that was available when the workflow started. The next time the workflow runs, it uses the new version.

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Determine whether a workflow can run

A workflow can run only if a checked out version is available to the user who has it checked out, and a valid, published version is available for all users with permission to run it.

Before you begin

Role required: workflow_admin, workflow_creator, or admin

Procedure

1. In the navigation filter, enter `wf_workflow.list`, and then open one of the workflows.
2. In the **Versions** related list, check for the following conditions:
   - There's only one workflow version in a state of **Checked out** and **Checked out by**.
   - There's only one version and it isn't checked out. This version must be both **Active** and **Published**. You may need to personalize the list and add the **Active** column.
   - If there are multiple versions, only one is **Published**.

   These checks determine the only two conditions under which a workflow can run:
   - A checked out version of a workflow is available for the user who has it checked out.
   - A valid, published version of a workflow is available for all users who have permission to run the workflow.

   Main flows containing subflows that don't meet one of these two conditions aren't permitted to execute against a current record transaction. Instead, a critical log entry detailing the subflow state is added to the Workflow Context record.

   To enable the workflow to execute on the next appropriate transaction, remove the subflow from the main flow or modify the published and active states of the subflow.

Edit a published workflow

You can edit a published workflow after you check it out.

Before you begin

Role required: workflow_admin, workflow_creator, workflow_publisher, or admin

About this task

Note:
You cannot check out or delete workflows that are associated with a read-only application file.

To check out a workflow:

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open the workflow that you want to edit.
3. In the title bar, click the menu icon and select **Checkout**.

   A new version of the workflow is created and assigned to you.

   If you are in a different domain than the published workflow, the new workflow version is created in your domain.

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What to do next

After you finish editing the workflow, validate and publish the workflow to make the new version available to other users.

Copy a workflow between two application scopes

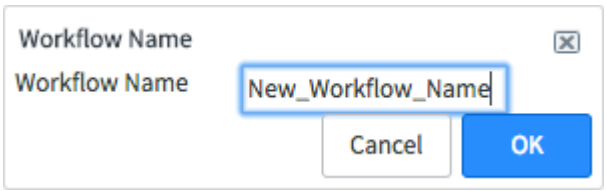
Application scoping protects applications by identifying and restricting access to application files and data. You can copy a workflow created in one application scope (for example, Test) to another (Production) as needed.

Before you begin

Role required: admin

Procedure

1. On the Home page, select , located next to the logged in user name.
2. In the **Developer** tab, in the **Application** field, select the application scope (for example, Test) in which you want to operate the ServiceNow platform.
3. Close the System Settings page.
4. Navigate to **Workflow** > **Workflow Editor**.
5. Create a workflow in the Workflow Editor.
   For more details, see Create a workflow.
6. In the Workflow Editor, select .
7. In the **Application** tab, **Application** is set to the current application scope selected in System Settings.
8. In **Accessible from**, select **All application scopes** if the workflow is available to all application scopes, or select **This application scope only** if it is only available to, and accessible in the current application scope only.
   Only those workflows that are accessible from all application scopes can be copied to another application scope.
9. Go back to the Homepage, select .
10. In the **Developer** tab, in the **Application** field, select the application scope (for example, Production) to which you want to copy the workflow.
11. Navigate to **Workflow** > **Workflow Editor**.
12. Refresh the page, then open the same workflow you created.
    An **Out of scope workflow, workflow belongs to <scope name> scope** message appears, where <scope name> is the application scope in which the workflow was originally created.
13. In the Workflow Editor, select .
14. Select **Copy**.
    The **Workflow Name** dialog appears:



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a. In **Workflow Name**, type the new name for the copied workflow.

b. Select **OK**.
The system creates a workflow in the current application scope.

15. In the Workflow Editor, select ⓘ.
16. In the **Application** tab, **Application** is set to the current application scope.
17. In **Accessible from**, select **This application scope only** if to make the newly copied workflow a private one that cannot be accessed from outside current scope.
18. Select **Update**.

Result
A new workflow record is created in the selected application scope and marked as private if designated as one in the Workflow Editor.

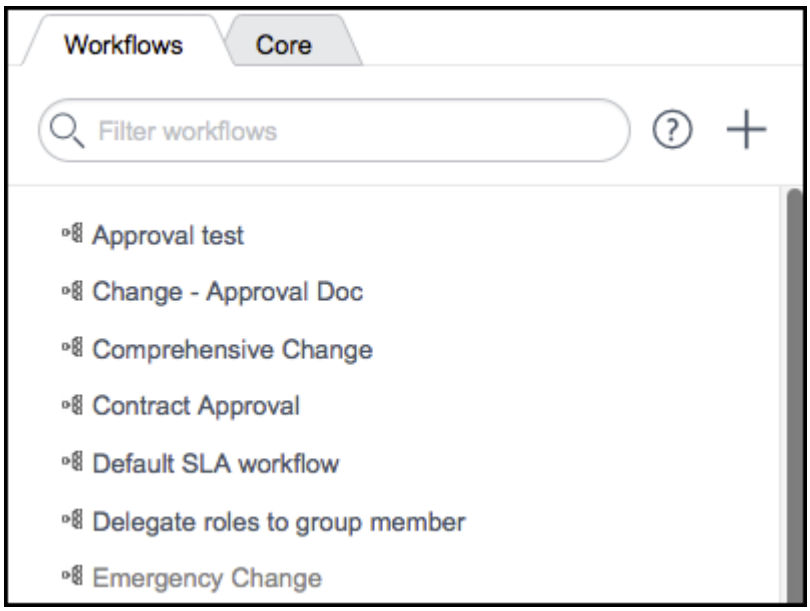
Workflows used as subflows

A workflow can launch another workflow as an activity.

The parent workflow triggers the subflow and then waits for the subflow to complete before continuing. Run the workflow validation tool prior to publishing to detect missing subflows and other dependency problems, such as those involving update sets.

The **Workflows** tab in the Workflow Editor contains a list of the workflows available for use as subflows.

Workflows available to use as subflows



Make sure that the selected subflow is active. If the subflow is inactive, the main workflow will hang with a **Loading** message. If you place an inactive subflow into a workflow, the subflow appears with a red banner, indicating that it cannot run. An active subflow is highlighted in blue when selected.

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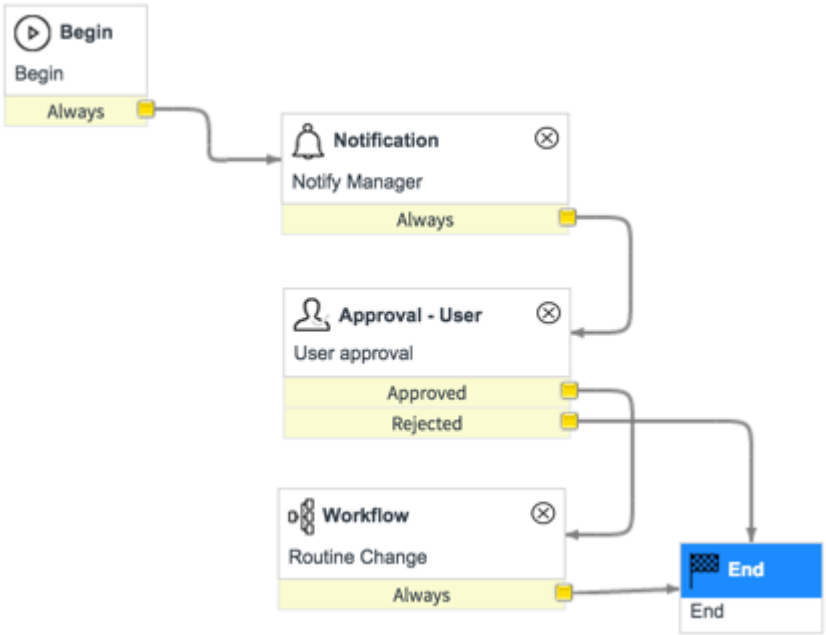
Workflow with active subflows



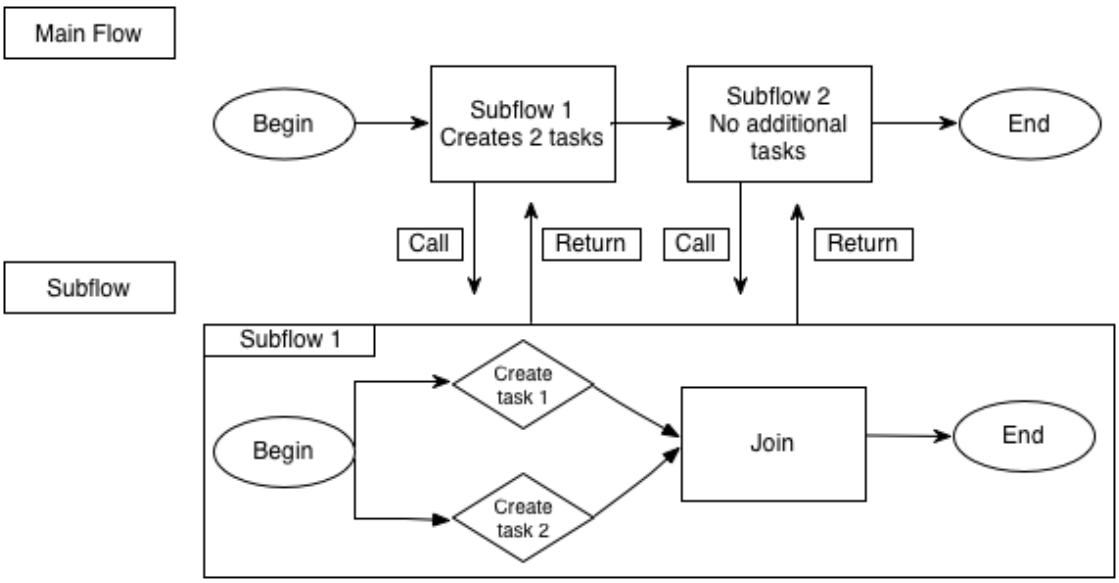
Subflows and the Create Task activity

If a workflow contains a **Create Task** activity that has executed on the current record, additional task activities in the workflow might not execute as expected.

This can happen when the same subflow containing a Create Task activity runs more than once in a parent flow. When the subflow reruns and attempts to execute the **Create Task** activity again, the system reopens the first task activity instead and does not create an additional task.

Note:
An alternative to creating duplicate subflows that use the **Create Task** activity is to add a **Run Script** activity to the workflow that creates a task with a script.

The same create task activity runs twice in a workflow



In this configuration, the workflow does not run the same subflow containing a **Create Task** activity more than once. This allows the workflow to create additional tasks.

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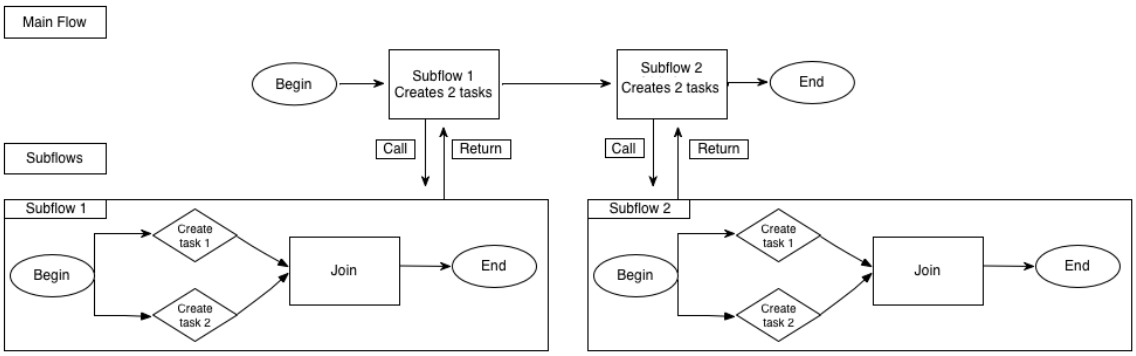
Running different subflows containing the Create Task activity



Pass a variable from a workflow to a subflow

Use this process to pass variables from a parent workflow to a subflow.

Before you begin

Role required: workflow_admin, workflow_creator, or admin

About this task

Note:
You can also use the **Return Value** activity in the subflow to return values to the parent workflow. Make sure to have a **Return Value** on every ending transition path.

Procedure

1. Prepare the subflow to accept variables from the parent workflow by defining the inputs.
2. Include the subflow in the parent workflow and connect the inputs to the parent workflow variables.

Note:
You cannot pass variables to a subflow that runs on the Requested Item [sc_req_item] table.

Define inputs for a subflow

Define the input variables for a workflow to request from parent workflows when it is launched as a subflow.

About this task

All inputs are stored in the Variables [var_dictionary] table.

Procedure

1. In the editor, open and check out the workflow.
2. In the title bar, click the menu icon and select **Edit Inputs**.
3. In the Workflow Inputs window, click **New**.
4. Populate the record with the definition of the variable, including the column name, the label that is displayed to the user, and the type of field.
5. Click **Submit**.

Invoke a subflow in a workflow

Use this procedure to add a subflow to a workflow.

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Procedure

1. In the Workflow Editor, open and check out the parent workflow.
2. Drag the subflow from the **Workflows** tab to the parent workflow.
3. In the New Activity dialog box, define the variables defined by the subflow's **Inputs**.

   These fields can accept both static values or variables in the following format:

   `${variable_name}`

4. Click **Submit**.

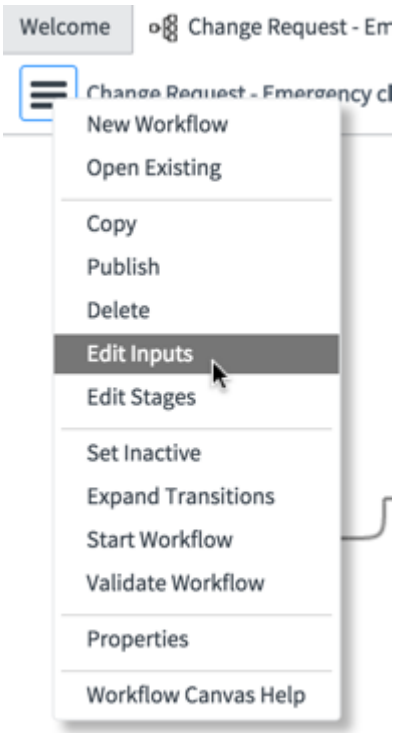
   The workflow triggers the subflow at the appropriate time and passes the variables as indicated by the **Inputs** definition.

Prepare a subflow

Review the process of preparing a subflow for use in a parent workflow, and for preparing the parent workflow to use a subflow.

Procedure

1. In the editor, open and check out the workflow that you want to use as a subflow.
2. In the title bar, click the menu icon and select **Edit Inputs**.



3. In the Workflow Inputs window, click **New** in the **Variables** list.
4. Add a new variable depending on the type of values that it is going to store.

   The following example sets up a string value.

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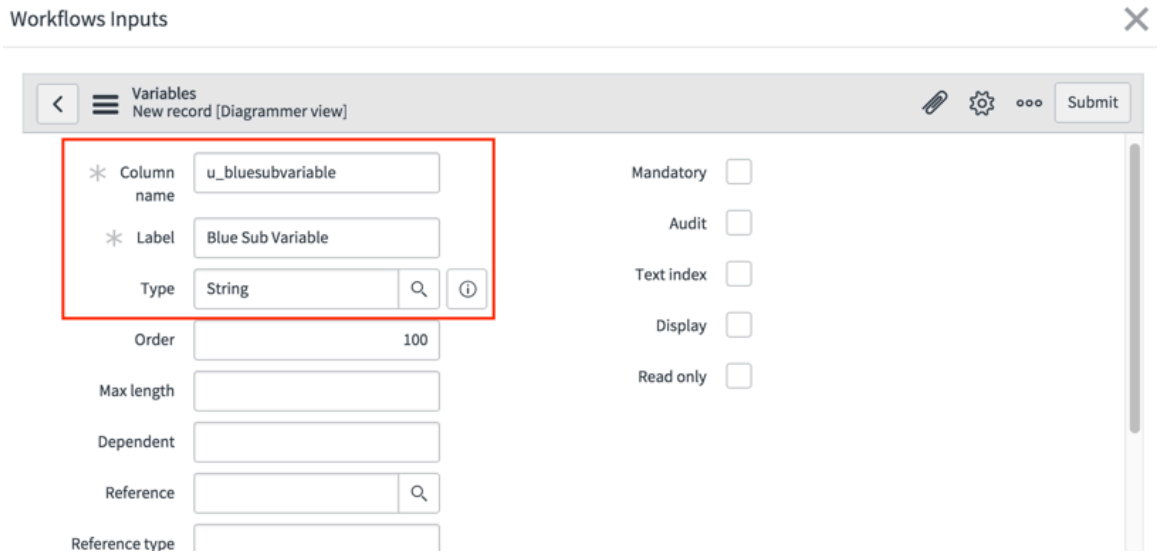
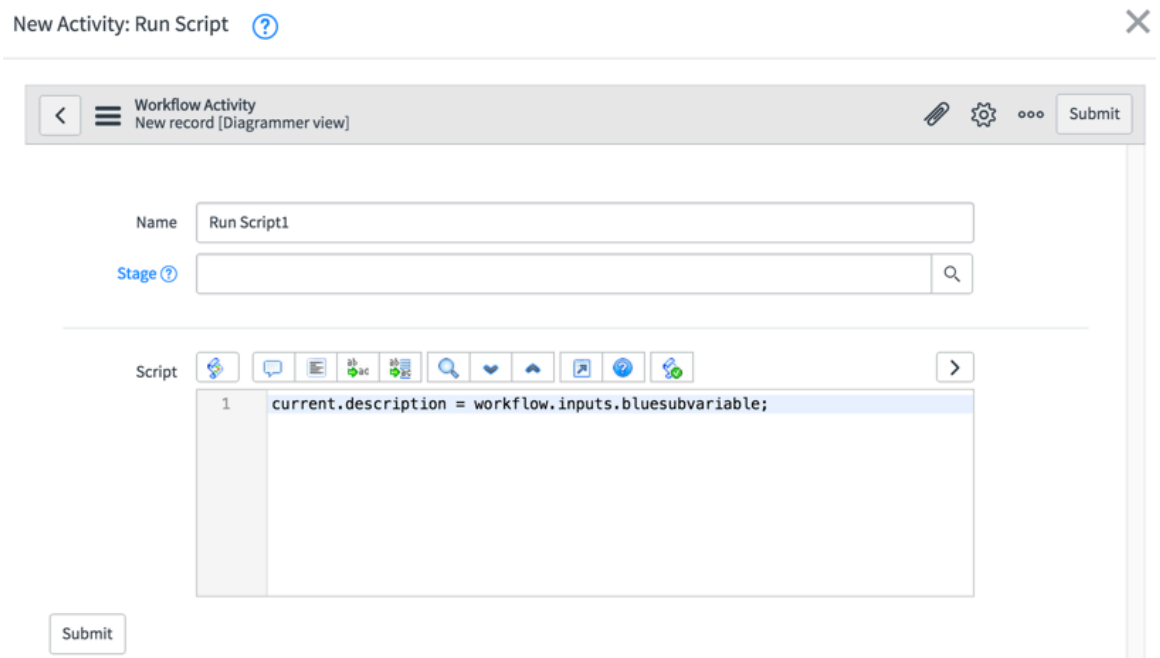


5. Click **Submit**.
6. Close the **Workflows Inputs** dialog.
7. Create a **Run Script** activity on the subflow.
   - Set the value from the parameter to a field on the current form. This is important because the **Notification** activity can only pull values from the current variable and not from the newly added variable. The following example sets the value in the **Description** field.

     ```
     current.description = workflow.inputs.bluesubvariable;
     ```

   - Create a new field on the request form but do not display the field. This serves as temporary storage.



8. Create a **Notification** activity on the subflow and use `${description}` in the subject to return the value from the field.

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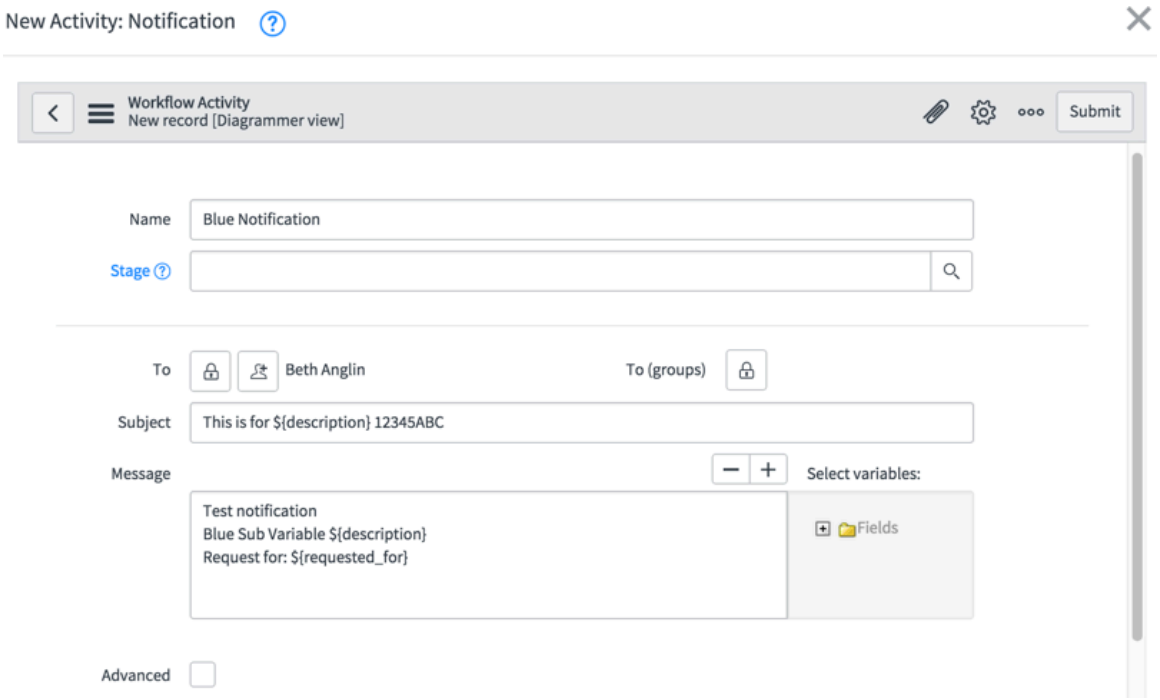


This is what the subflow would look like:



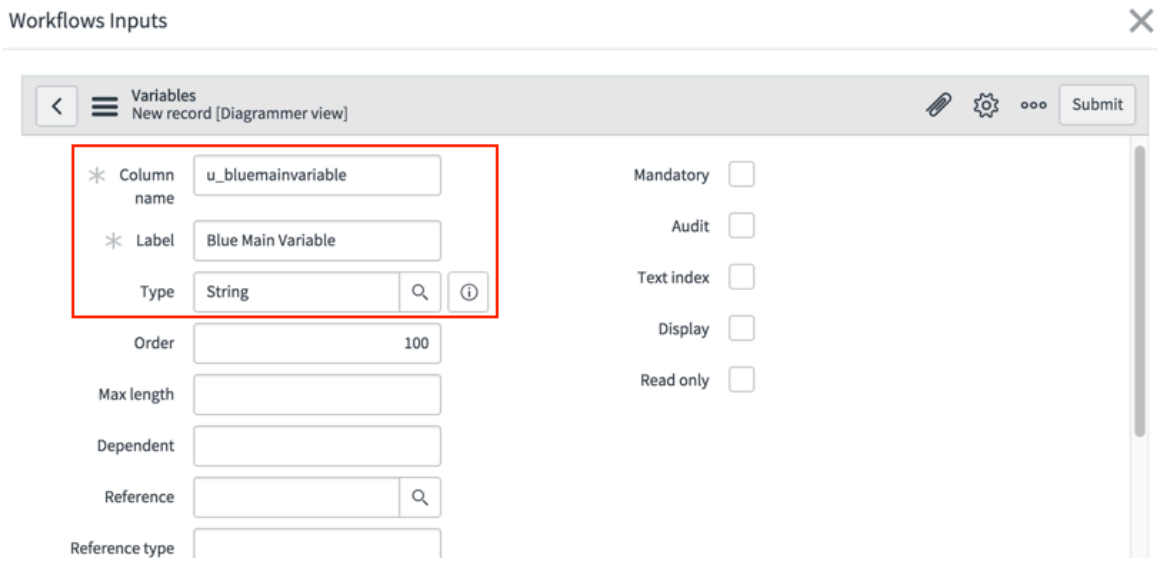
Prepare a workflow to use a subflow

After you create a subflow, use this procedure to prepare the parent workflow.

Procedure

1. On the parent workflow, create a variable similar to what you did on the subflow, but name it something different.

   In the following example, the variable is named **Blue Main Variable**.



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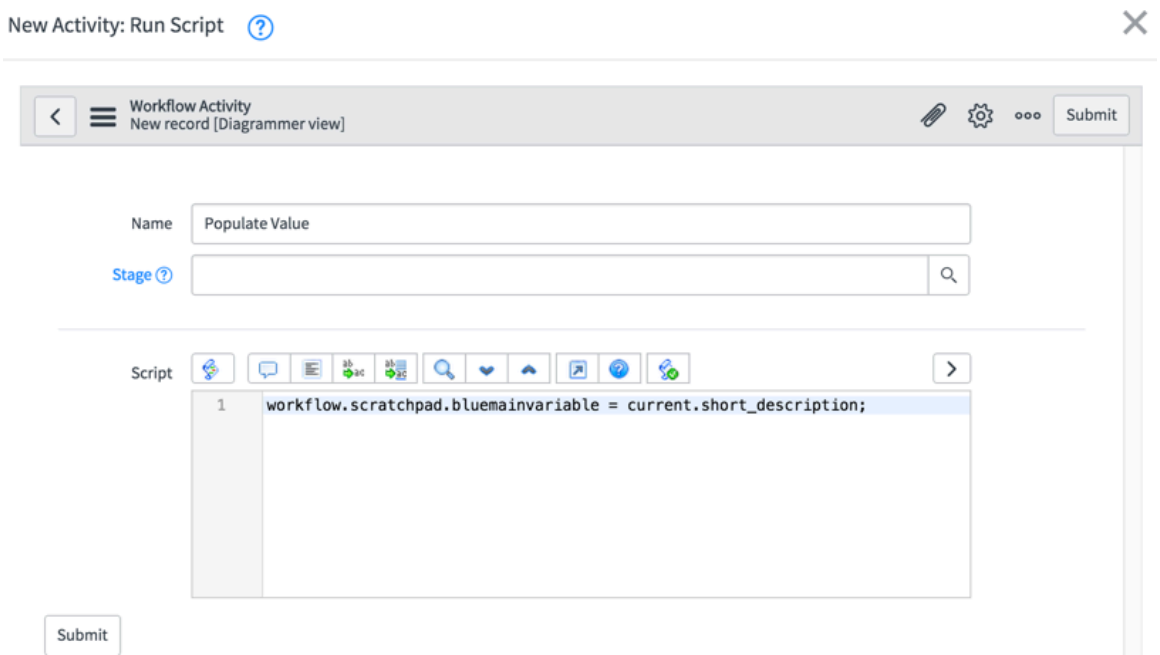
2. Click **Submit**.
3. Insert a **Run Script** activity to return the value from a field to the newly created variable.

   In this example, the value of the **Short Description** field is returned and given to the newly created variable.

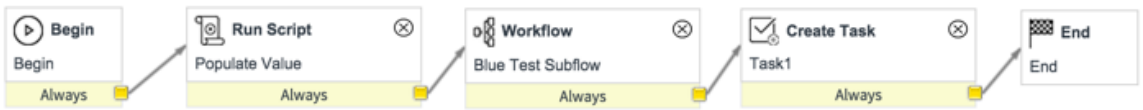
   ```
   workflow.scratchpad.bluemainvariable =
   current.short_description;
   ```



4. Click **Submit**.
5. In the subflow activity, set the **Blue Sub Variable** to pass the `bluemainvariable` to the `bluesubvariable`.

   ```
   ${workflow.scratchpad.bluemainvariable}
   ```

   This is what the main workflow looks like:



Using variables in a workflow

Within workflow there are several different types of variables that are available.

Some variables define, describe, or compose the pieces of the workflow (such as workflow activities). Some variables are available specifically to facilitate the execution of a workflow (such as scratchpad variables). Some variables define, describe, or compose the data records being manipulated by the workflow process (for example, the elements of a Glide Record that are defined in a dictionary.xml file describing a record, such as an incident).

Activity variables

Activity variables are properties specifically associated with a workflow activity.

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Before you begin
Role required: admin

About this task
These are the inputs that appear on the activity definition when a specific activity is dragged onto the workflow canvas. These variables are properties that define, compose or describe the workflow activity, or the work it is designed to perform.

Activity variables are declared in a related list within the Workflow Activity Definition.

To add, view, or modify a variable:

Procedure
1. Navigate to **All** > **Workflow** > **Activity Definitions**.
2. Select a workflow activity, such as **Approval - User**.
3. In the **Activity Variables** section or tab, add, view, or modify the variables.
   Activity variables are defined using the same fields as System dictionary.

   Note:
   If defining a new activity variable that is dependent on another activity variable, put the prefix "vars." before the name of the parent activity variable. For example, if the child field is dependent on a field named **parent**, put the value `vars.parent` in the **Dependent** field.

   To control the visibility of an activity variable on the workflow canvas after the activity has been dragged to the canvas, use a UI policy on the wf_activity table.

   To access the variables or assign values to these variables within the workflow activity, use the *vars* variable of the workflow activity.

```
activity.vars.variable_name = new_variable_value
```

Workflow input variables

Workflow variables are external values that are passed into and referenced by a workflow during its execution.

Before you begin
Role required: admin

About this task
Workflow variables can be declared externally in a script and passed into a main workflow or they can be declared within a main workflow and passed as inputs to a subflow.

Note:
There is a specific kind of input variable for any workflow that is declared against the table Requested Item [sc_request_item]. To understand the use of these variables see Workflow catalog variables.

Workflow variables are declared in a form available from the Workflow Editor gear menu.

To add, view, or modify a variable:

Procedure
1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Edit and checkout a workflow.

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3. Select the Workflow Activities menu and select **Edit Inputs**.
4. Select an existing variable or click **New**.

   Note the **Column name** field. Use this value when accessing the variable from a script.

   Workflow variables do not appear on the workflow canvas, they are only available for view from the Workflow Activity menu.

   The input variables are available to use in scripts. To access an input variable from a script:

```
var input  = workflow. variables. variableName //get the workflow variable identified by column name .
```

Assigning values to variables from outside of workflow

After being declared in a workflow, values can be assigned to the variables from where the workflow is kicked off.

The following example demonstrates how a workflow variable's value can be set in a script include, business rule, or UI action:

```
//Declare an instance  of workflow.js
var wf  = new Workflow ( ) //Get the workflow id
var  wfId  = wf. getWorkflowFromName ( "Workflow Name" ) ;
//Start workflow, passing along name : value pair(s) for mapping
 to variable
//where input_var_name is the name of the variable declared in
 gear menu
//and input_var_value is whatever that value should be for this
 execution of
//workflow
wf. startFlow (wfId , null , "Workflow Name" , {input_var_name :
 input_var_value } ) ;
```

Another example that demonstrates a more readable way of passing multiple variables involves declaring an object, adding the names/values to the object, and passing it:

```
//Declare an instance  of workflow.js
var wf  = new Workflow ( )
//Get the workflow id
var  wfId  = wf. getWorkflowFromName ( "Workflow Name" ) ;
//Start workflow, passing along object containing name/value
 pairs mapping to inputs expected by the workflow
var vars  = { } ;
vars. input_var_name1 = input_var_value1 ;
vars. input_var_name2 = input_var_value2 ;
// add as many variables as your workflow is expecting, then
 pass the object
wf. startFlow (wfId , null , "Workflow Name" , vars ) ;
```

Assigning Values for Subflow Inputs from inside of a Main Workflow

If a workflow that accepts inputs is called from within another workflow, those input values can be set from the workflow canvas within the UI of the workflow activity. Each input variable declared for a subflow will have a text box input area displayed on the activity. Within these text boxes, the variables can be set with any value either from the scratchpad or from within the current record.

For more information, see Workflows used as subflows.

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Reading the Value of a Workflow Input Variable

The value of a Workflow input variable is accessible anywhere within the workflow that accepts javascript by dot walking the current workflow object:

```
var readValue = workflow.inputs.variable_name;
```

Workflow scratchpad variables

Store and share string-based variables as name-value pairs between workflow activities.

The scratchpad is global to the instance of the running workflow and as such, is available equally to all activities.

Declaration

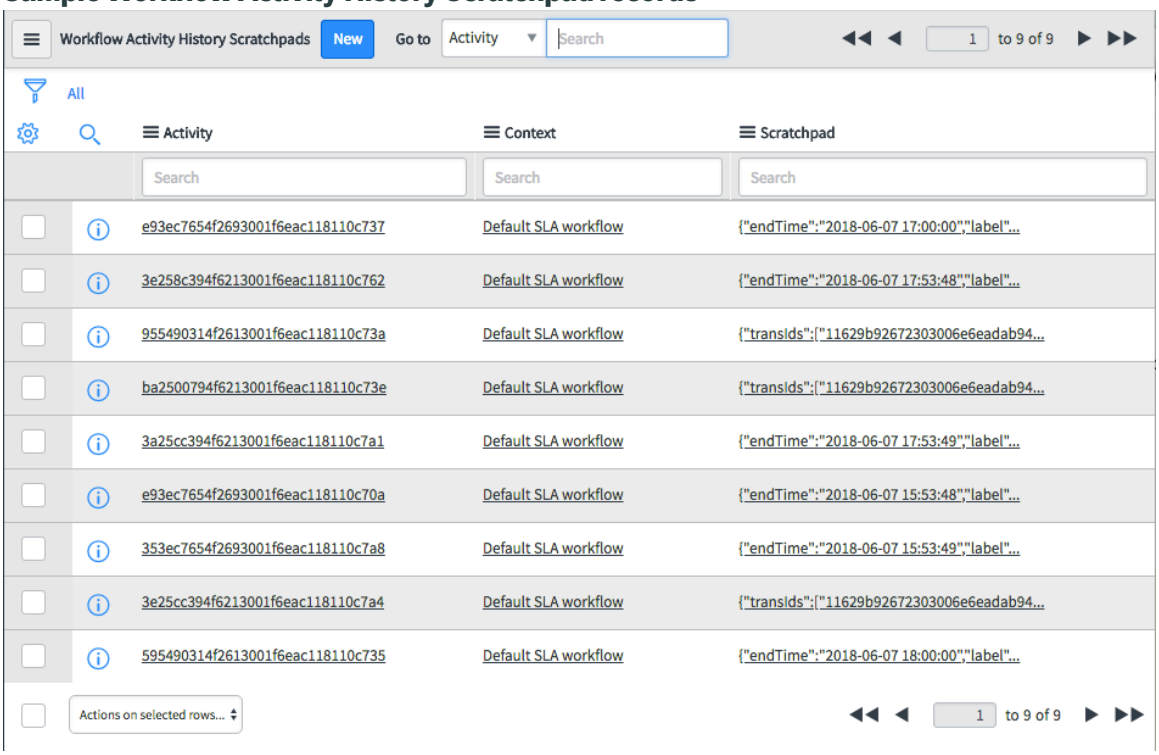
The scratchpad itself is automatically available to an executing workflow and requires no specific declaration. Variables are declared and stored in the scratchpad simultaneously by referencing it. For example:

```
workflow.scratchpad.variableName = variableValue;
```

Display

View activity scratchpad values from the Workflow Activity History Scratchpad [wf_history_scratchpad] table. Workflow Activity History Scratchpad is also an embedded list in Worfklow Activity History records.

Sample Workflow Activity History Scratchpad records



Access and Assignment

Use standard JavaScript object notation to access or assign scratchpad values. For example, use this format to assign a particular scratchpad variable value.

```
workflow.scratchpad.variableName = variableValue;
```

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Use this format to assign a JavaScript variable to a scratchpad variable.

```
var myValue = workflow.scratchpad.variableName;
```

Current variables

Current is the database GlideRecord that kicked off the workflow, either by association to the table in the Workflow properties table or by being associated with a catalog item.

Declaration

Variables in current are the columns that are defined in the `dictionary.xml` file that support the database record. There is no way at runtime to add variables to the current record.

Display

Variables of a current record are displayed on the Glide Forms and Lists throughout the applications that use them.

Access and Assignment

To access the variables or assign values to the variables within the workflow activity, get the value from the current record by referencing the Glide Element.

```
var myVarValue = current.getElement(nameOfTheField);
```

or

```
var myVarValue = current.fieldName;
```

or

```
current.variableName.setValue( "A Variable Value");
```

Workflow catalog variables

Workflows that are associated with the Requested Item [sc_req_item] table have a specific type of workflow input.

The inputs into this workflow are essentially question:answer pairings that, when associated with a specific catalog task, become options on the task form. These options are generated by that catalog task activity within a workflow.

Scope

For the purposes of Service Catalog and workflow, a variable's scope determines its availability to a catalog task activity within a workflow. You can define variables as global or catalog item-specific. When a variable is associated to a catalog item and the workflow generating the catalog task is associated to the catalog item, the variable scope determines which variables are available for mapping within the catalog task activity in a workflow. If a workflow is associated with Requested Item [sc_request_item], and is not specifically associated with a catalog item, any catalog variable with a blank Cat Item field value is available to all catalog task activities within the workflow.

Declaration

You can declare requested item catalog variables at the catalog item level or at a global level.

About this task

You can declare global catalog variables using the Workflow Editor context menu.

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Also see, Global variable declaration option 2.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out a workflow that runs against the Requested Item [sc_req_item] table.
3. Click the menu icon and select **Edit Catalog Variables**.
4. Click **New** to create a new variable or select an existing variable.
5. Select the **Global** check box.
6. Click **Submit**.

Global variable declaration option 2

You can declare global catalog variables using the Service Catalog.

Procedure

1. Navigate to **All** > **Service Catalog** > **Item Variables**.
2. The list of variables that appears in the workspace has a default filter of **Cat Item != <blank>**.
   Change the filter to **Cat Item = <blank>** and run the query.

   The catalog variables that appear are available to any catalog task that is initiated from within a workflow.
3. Click **New** to create a new variable.
4. Leave the **Cat Item** field blank.
5. Select the **Global** check box.
6. Click **Submit**.
   Also see, Global variable declaration option 1.

Catalog item specific variable declaration option 1

You can declare a catalog item-specific variable.

About this task

These variables are only available to the catalog item referenced in the **Cat Item** field on the variable record.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Variables** > **Item Variables**.
   Note the list of variables that appears in the workspace has a default filter of **Cat Item != <blank>**.
2. Enter or select a catalog item in the **Cat Item** reference field.
   Selecting a **Cat Item** restricts the scope and availability of the catalog variable to that specific catalog item.
3. Click **Submit**.
   Also see, Catalog item specific variable declaration option 2.

Catalog item specific variable declaration option 2

You can declare a catalog item-specific variable directly from a catalog item record.

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About this task

Creating a catalog variable in this way automatically sets the **Cat Item** reference to the catalog item selected.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. Select or create an a catalog item.
   Note the **Variables** related list. All variables declared using this related list have a **Cat Item** reference value of the current catalog item.
3. From the **Variables** related list, click **New**.
4. Ensure that the **Cat Item** field correctly references the catalog item previously selected or created.
5. Go to or open the **Question** section or tab.
6. Add a **Question**.
7. Add a **Name**.
   Variable names should not include white space and cannot begin with a number.
8. Click **Submit**.
   Also see, Catalog item specific variable declaration option 1.

Display

Catalog specific item variables are visible in several places depending on where in the process the variable is viewed.

Declaration can happen and variables can be seen from within the menu, inside both the **Maintain Items** module and in the **Item Variable** modules of the Service Catalog.

Within a workflow, the Catalog Specific Item variables are available to the **Catalog Task** activity in the form of a slushbucket at the bottom of the **Catalog Task** activity. Item variables that are selected, are the question and answer pairs that will appear on the task that is generated by that instance of **Catalog Task** when executing that workflow.

If a workflow is associated with a specific catalog item, the association acts as a filter for item variables that appear in the slushbucket of the **Catalog Task** activity.

The last place the variables are seen is in the task form that is generated by the Catalog Task Item. The variables selected in the slushbucket are the question and answer pairs that appear to the user on the task form.

Access and assignment

The Catalog Item Variables are available and assigned to a specific **Catalog Task** activity (thereby to a specific task) using the slushbucket entry of a catalog task.

The user working the task enters the values of the variables.

To access the values of a Catalog Item Variable inside a script:

```
var now_GR  = current ; // or create and query a new GlideRecord
var itemVariable  = now_GR. variables [ variableName
  ] ; //access the service catalog variable identified by the
 variable name.
var itemVariableValue  = itemVariable. getValue ( ) ;
var itemVariableName  = itemVariable. getName ( ) ;
```

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```
var itemQuestion  = itemVariable. getQuestion ( ); //All
 GlideappQuestion API are accessible on itemQuestion
```

Workflow events

The system employs two types of events: registered platform events and workflow events.

Registered platform events

Registered events are created in business rules and are used for such tasks as sending email notifications when records are inserted into the database. Workflow events are registered within workflows only and are not used anywhere else in the platform. Registered platform events can be triggered by a workflow for external use, but cannot be used within a workflow.

Workflow events

Workflow events follow different rules than platform events that are registered using the event registry. Platform events are entered into the Event Registration [sysevent_register] table and are available for platform processes to use. Workflow events are triggered exclusively for the workflow engine and are used only to direct the work of executing workflow contexts. When an event is registered in a workflow, it is attached to a currently executing activity in the **registered_events** column of the Workflow Executing Activity [wf_executing] table.

Workflow events also can be broadcast to a workflow from any scripting source that has access to the workflow context, such as a script include or a **Run Script** activity. In this case, the event, such as **cancel**, is passed to all records in the Workflow Executing [wf_executing] table for a specific context.

Whether by registry or by broadcast, an event is handled by the activity definition associated with the currently executing activity. Each activity definition comes with a set of handlers. For example, most activities come with `onExecute`, `onCancel`, and `onUpdate` event handlers. As an example of a more specific event, the **Approval - User** activity also comes with `onDetermineApprovalState`, which is specific to the work of the approval activity.

Multiple parallel events

A single workflow can have multiple event threads running concurrently, such as when a workflow has timers that overlap on separate workflow branches. If any additional thread completes before the first thread, the system stores event information from the additional thread on the Workflow Queued Commands [wf_command] table. After the first thread completes, the system retrieves the information stored by the additional thread and proceeds through the workflow with the event information from each thread.

Workflow events in the base system

Several workflow events are available in the base system.

Workflow events in the base system

Event	Description	Purpose	To use
activityComplete	String value used by activity definitions to respond to the `onActivityComplete` event handler.	Informs records in the Workflow Executing Activity [wf_executing] table about the completion of other activities in	If the activity is allowed to set the boolean value for `wf_executing.notify_ter` then set the value to `true` `(activity.notify_termin` `true)` during the `onExecute` e

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Workflow events in the base system (continued)

Event	Description	Purpose	To use
		the same workflow context.	
otherEvent	String value used by the **Join** activity to respond to an otherEvent.	Informs records in the Workflow Executing Activity [wf_executing] table about an otherEvent that has completed.	The **Join** activity transitions from **r** preceding activities. These preced all create a wf_executing record, w a check to see if the record alread **Join** already exists, then the **Join** the executing transition sets the w record for deletion.
timer	String value used by workflow activities to respond to a **Timer** activity that has expired.	Allows wf_executing records to be informed about a timer activity that has completed and has fired the timer event.	The **Timer** activity schedules a job script. The script calls fireEvent (w timer).
execute	String value used by workflow activities to respond to a **Timer** activity that has expired.	Informs a record in the wf_executing table with the initial state of **Executing** to proceed with its primary work.	The workflow engine, for each tran executed, creates an executing re state of **Executing**. Once created, record is put in a queue for proces each item in the queue, the Rhino established, the activity definition the executing record is instantiate `run()` function is called. When th record is **Executing**, this function a `onExecute`.
execute (specific to **Lock**)	String value used by the **Lock** activity to respond to a waiting lock that is ready to make another attempt to obtain a specific lock. This execute is different than the previous execute because it is called on a separate thread, at specified intervals, and is treated as an outside event.	Informs a wf_executing record waiting to execute that the specified wait interval has passed and that it should attempt to get the lock again.	**Lock** activity schedules a job with that uses the workflow script inclu `fireEvent(wf_executing, 'execute')` method.
determineApprovalState	String value used by approval activities to respond to a change in the overall approval status of the current record.	Informs wf_executing records for approval activities about an approval that completed and triggered the timer event.	**Approval Coordinator** both regist the event and triggers the event. T approvals have listeners that dete approval state.
cancel (from within activity definitions)	String value used by workflow activities to	Informs all wf_executing records	The **End** activity uses the global `workflow.broadcastEvent`

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Workflow events in the base system (continued)

Event	Description	Purpose	To use
	respond to a request for cancellation.	in a context that the workflow is being canceled.	to interrupt the currently running w records. This changes the state of to **Cancelled**.
cancel (outside current context)	String value used by workflow activities to respond to a request for cancellation.	This event is the same as the cancel event above and handled the same. However, the management of this event is subtly different. This event informs all wf_executing records in a context that the workflow is being canceled. The event is managed via the *onCancel* event handler of each executing activity definition, but the event is called differently. In particular, the call to cancel from outside an activity definition is blocked by the current mutex. This is a significant difference in that the event does not interrupt a currently executing activity that is still operating within the parameters of the current mutex.	Any script can call cancel on a kno context via the workflow script incl example, `var w = new Work w.cancel(context); //wh` is a GlideRecord of the context to
stop (see **End** activity)	The **End** activity checks for this event.	If the stop event is the current event, then the cancel operation of the **End** activity is bypassed.	Only in the **End** activity.
listener	String value that the workflow (subflow) activity triggers as an event.	When a main workflow calls a subflow, the workflow keeps the ID of the subflow's context	The listener event is passed to the context on completion of a subflow managed by the onListener action workflow activity.

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Workflow events in the base system (continued)

Event	Description	Purpose	To use
		in the scratchpad. When the subflow is complete, it triggers the listener event via a business rule.	
probe_complete	String value triggered in the workflow by an Orchestration activity indicating that the MID Server has completed a task.	The probe_complete event is triggered from Orchestration sensor processors via the workflow helper function `handleEventById`.	The `onProbe_complete` event the `WebServiceActivityHa` used by most Orchestration activi
pause	String value sent to a workflow from an SLA to pause the **Timer** activity.	When an SLA is paused, the SLA workflows must be paused if there is a timer running.	Use is exclusive to the SLA timer
resume	String value used by the **Timer** activity to resume a paused timer (see pause).	When an SLA is resumed, the SLA workflows must be resumed as well.	Use is exclusive to the SLA timer.

Glide events relative to workflows

Workflow uses several Glide events.

Workflow Glide events

Event	Description	Purpose	To Use	Source	Thread	Listeners
Insert	Global event set upon the insert of a GlideRecord that causes the script engine, and through that the workflow engine, to wake up.	Starts workflows that are associated with the current GlideRecord either by reference, as in request items and SLA timers, or by conditions associated with the GlideRecord's table.	There is no explicit customer-facing use for this in a workflow. It is part of the Glide engine, and with this event, the only thing workflows can do is start. Workflows can also be started manually using a script.	Workflow Engine, RunEngine	Current thread, current mutex	User action of insert
Update	Global event set upon the	Looks to the Workflow Context	There is no explicit customer-facing use for this in	Workflow Engine, RunEngine	Current thread,	User action of

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Workflow Glide events (continued)

Event	Description	Purpose	To Use	Source	Thread	Listeners
	update of a GlideRecord that causes the script engine, and through that the workflow engine, to wake up.	[wf_context] table to find running workflows that are associated with the current GlideRecord by document ID.	a workflow. It is part of the Glide engine, and with this event, the only thing workflows can do is advance through the next set of transitions.		current mutex	update of a GlideRecord
Delete	Global event set upon the delete of a GlideRecord that causes the script engine, and through that the workflow engine, to wake up.	Looks to the Workflow Context [wf_context] table to find running workflows that are associated with the current GlideRecord by document ID.	There is no explicit customer-facing use for this in a workflow. It is part of the Glide engine, and with this event, the only thing workflows can do is advance through the next set of transitions.	Workflow Engine, RunEngine	Current thread, current mutex	User action of delete of a GlideRecord
Query	Global event set upon the query of the Glide database that causes the script engine, and through that the workflow engine, to wake up.	Looks to the Workflow Context [wf_context] table to find running workflows that are associated with the current GlideRecord by document ID.	There is no explicit customer-facing use for this in a workflow. It is part of the Glide engine, and with this event, the only thing workflows can do is advance through the next set of transitions.	Workflow Engine, RunEngine	Current thread, current mutex	User action of query of a GlideRecord

Workflow event-specific functions

There are several functions that relate specifically to workflow events.

Workflow event-specific functions

Function	Description	Purpose
registerForEvent (eventName)	Function in the workflow environment that writes events represented as strings to the `wf_executing.registered_events` field.	The workflow events are just strings. When an activity that has registered for an event executes, a comma delimited set of events is stored with the Workflow Executing Activity [wf_executing] record. When the event is triggered in the workflow

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Workflow event-specific functions (continued)

Function	Description	Purpose
		context, the wf_executing table looks for all executing records that contain the string that represents the event in the `wf_executing.registered_event` field
unRegisterForEvent (eventName)	Function in the workflow environment that removes a string value representing an event that has been written to the `wf_executing.registered_events` field.	The workflow events are just strings that are written to the `wf_executing.registered_event` field. When an activity unRegisters for an event, the comma delimited set of events stored with the Workflow Executing Activity [wf_executing] record is searched, and if that string is found, it is removed.
fireEvent (eventName)	Function in the workflow environment that examines the contents of the `wf_executing.registered_events` field, comparing its contents to the `eventName` passed in.	The workflow events are just strings that are written to the `wf_executing.registered_event` field. When *`fireEvent(eventName)`* is called by a workflow activity, the workflow engine queues up any executing records that contain the string in the registered field.
fireEvent (eventRecord, eventName)	Function in the workflow environment that sends an event to a specific Workflow Executing Activity [wf_executing] record. The `eventRecord` is a GlideRecord of the type wf_executing.	This event call expects an *`onMyEvent`* event handler in the activity represented in the event record (Workflow Executing Activity [wf_executing] table). When *`fireEvent(eventRecord, eventName)`* is called by a workflow activity, the workflow engine queues up the specific executing record with that event and passes the event into the activity definition for the on<eventName> handler to manage. This event is queued up in its own mutex, so the current queue complete before this event is processed.
fireEvent (eventRecordSysId, eventName)	Function in the workflow environment that sends an event to a specific Workflow Executing Activity [wf_executing] record. The `eventRecordSysId` is the sys_id of a GlideRecord of the type wf_executing.	This is the same as the *`fireEvent`* above except that it accepts an ID and returns the Workflow Executing Activity [wf_executing] record.
fireEvent (eventRecordSysId, eventName, optionalJSONObject)	Function in the workflow environment that sends an event to a specific Workflow Executing Activity [wf_executing] record. The `eventRecordSysId` is the sys_id of a GlideRecord of the type wf_executing.	This is the same as the *`fireEvent`* above except that it accepts a JSON object as a third parameter. This object can specify any data expressible as JSON. You can also specify additional functionality when creating a workflow activity.
broadcastEvent (contextId, eventName)	Function in the workflow environment that sends an event to all currently running Workflow Executing Activity [wf_executing]	This is the same as the *`fireEvent`* above except that it accepts an ID and returns the Workflow Executing Activity [wf_executing] record.

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Workflow event-specific functions (continued)

Function	Description	Purpose
	records in a specified context, regardless of their state.	
broadcastEvent (eventName)	Function in the workflow environment that sends an event to all currently running Workflow Executing Activity [wf_executing] records in the current context, regardless of their state.	This should not be confused with `broadcastEvent` above. This event is only available to current Workflow Executin Activity [wf_executing] records.

Event-specific workflow activities

The following workflow activities trigger events.

Event-specific workflow activities

Activity Name	Description	Purpose	To Use	Source	Thread	Listeners
Create Event	Requires an event from the event registry rather than a workflow event. This activity is located in the **Notification** category of the workflow tree.	Fires the notification event specified in the Workflow Activity [wf_activity] table.	1. Navigate to **System Policy** > **Events** > **Registry** 2. Create an event. 3. Navigate to **System Policy** > **Templates** and create an Email templates. 4. Navigate to **System Policy** > **Email** > **Notifications**. 5. Create an email notification that is triggered by the event you created and sends the template you created. 6. On the workflow canvas, drag the **Create Event** activity onto the canvas and associate it with the newly registered event.	Event Registry	Triggered in the current thread and handled on the worker thread in notifications. Never processed by a workflow	On the notificati thread, outside c workflow

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Event-specific workflow activities (continued)

Activity Name	Description	Purpose	To Use	Source	Thread	Listeners
			When the workflow executes, the event is created and the email associated with the event is sent.			
Wait for WF Event	Listens for workflow events, as described in the Workflow Events in the Base System table, and only within the current context. This activity is located in the **Conditions** category of the workflow tree.	Waits for another transition branch of the current context to trigger an event.	Takes an event name as input. When the activity is executed, the specified event name is added to a string array stored in the **registered_events** column. The values in this column are in a list of all events the activity waits for when it is executing.	The **Wait for WF Event** activity has a generic `onUnhandledEvent` that tests the current event against the value that was passed to the variable. If they match, the **Wait for WF Event** moves the workflow forward.	Triggered in the current thread or from a script include	The `onUnhandled` of the **Wait for W Event** activity

Workflow stages

Workflows can indicate workflow progress by updating any field designated as a stage field.

For example, the Incident [incident] table has an **Incident state** field that indicates progress, but the service catalog uses the **Stage** field.

To indicate the workflow's progress through the possible stage values, the interface updates the **Stage field** selected in the workflow properties. Available fields depend on the table used by the workflow. If the field provides a choice list, then the choices are available as stage values for the workflow. If the field is a workflow field, it displays an icon to indicate the workflow's progress, as with the Service Catalog's **Stage** field.

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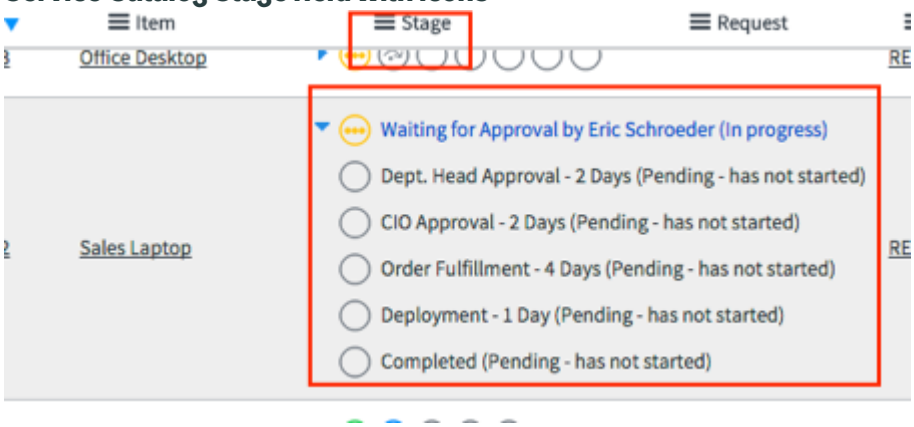
Service Catalog Stage field with icons



After stages are added to the workflow, they can be assigned to each workflow activity. If an activity with an assigned stage is encountered when the workflow runs, the workflow engine assigns the stage to the record associated with the workflow context.

For workflows that use the Requested Item [sc_req_item] table, the stage field is automatically set to the **Stage** field of the table and cannot be changed. The stage state displayed for a workflow running on the Requested Item table is based on the state of the workflow activities.

- If an activity is active, then the stage is shown with the state of **In progress**.
- If an activity is in the **Pending** or **Completed** state, the stage reflects this state.
- If an activity is canceled, **Request Cancelled** appears in the **Stage** field. The "Cancelled" label set in the wf_stage table is a reserved word, and does not display in the **Stage** field.

How stage values are derived

Stage values are derived from various sources in the interface.

Note:
An updated method for managing workflow stages as a set is also available. For information about grouping and reusing stages, see Workflow stage sets.

Stage values are derived from the following sources:

- **Choices for Stage column**: Choices defined for the column selected as the **Stage** column for the workflow.
- **Default stages for table**: Stages defined in the Stage Default [wf_stage_default] table for the table selected.
- **Workflow-specific stages**: Applied only to the workflow for which they were defined in the Workflow Stage [wf_stage] table.
- **Stage values in existing records**: Values from the designated **Stage** column in the table assigned to the workflow are inherited from existing records.

If the stage field for a workflow is the table column named **Stage**, then the progress of the workflow appears in any list view containing the **Stage** column.

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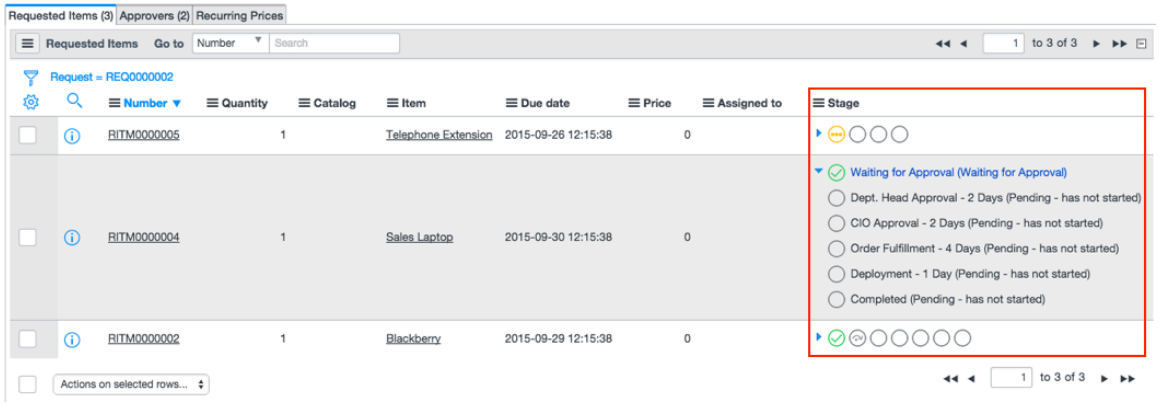
Stages in a list



Stage values shown in the list views are accompanied by the state, based on the workflow activities being executed. If an activity has a stage specified for it, and the activity is currently active in the workflow, then the stage is shown with a state of **In progress**. Similarly, if the activity is in the **Pending** or **Completed** state, the stage reflects this state.

Example

If the workflow table is Request Item [sc_req_item], then the stage field is automatically set to the **Stage** column of that table and cannot be changed. The following stage values for the request item are displayed in a choice list from the Dictionary Entry [sys_dictionary] table:

- Waiting for Approval
- Fulfillment
- Delivery

In addition, the Request Item table has the following default stages:

- Request Cancelled
- Completed

Note:
If an activity is cancelled, Request Cancelled appears in the **Stage** field. The "Cancelled" label set in the wf_stage table is a reserved word, and does not display in the **Stage** field.

When you edit available activity stages in the Workflow Editor, the list displays the following stage values:

- Waiting for Approval
- Fulfillment
- Delivery
- Request Cancelled
- Completed

The following diagram depicts the process used to gather stage values from the Request Item table to populate the **Stages** list in workflow activities.

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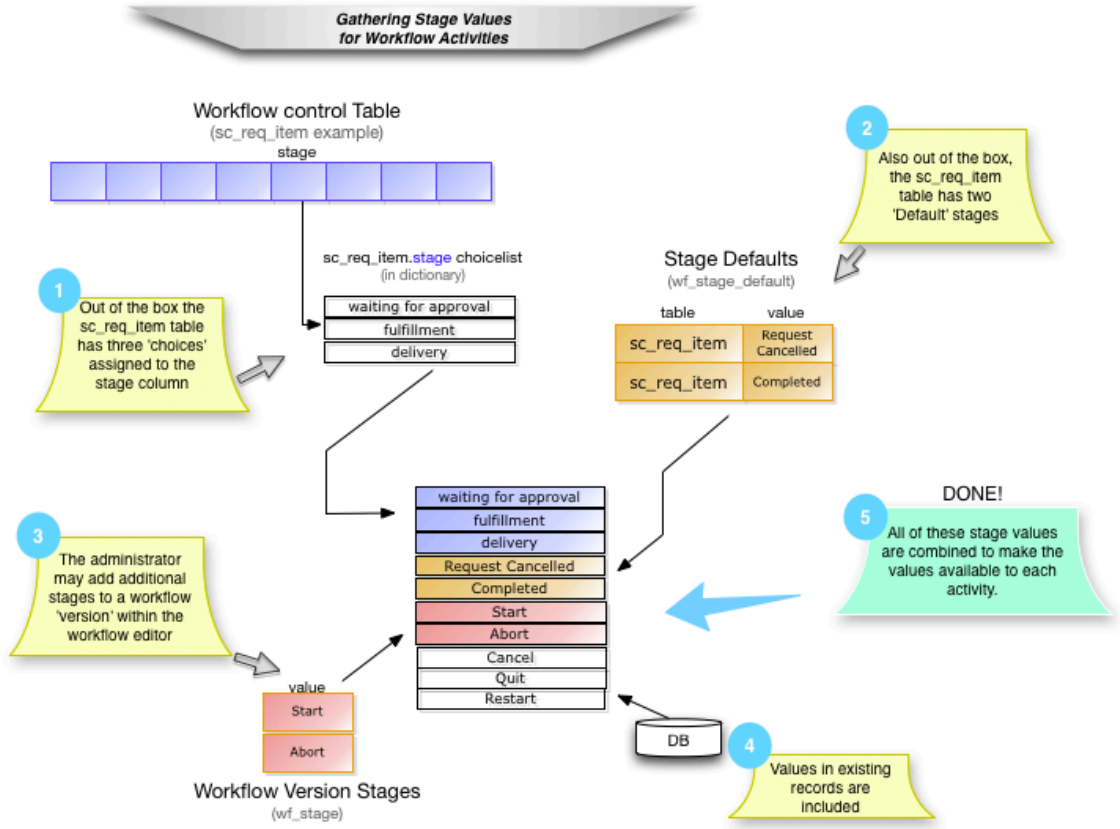

Note:
If you are creating a workflow with a table other than Request Item [sc_req_item], you must select a **Stage field** in the workflow properties for the workflow to have stages.

Use workflow stages

You can add or modify workflow stages.

Before you begin

Role required: workflow_admin, workflow_creator, or admin

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Create a new workflow by clicking **New** or open an existing workflow.
3. In the Workflow Properties form, if the table is not the Requested Item [sc_req_item] table, select a field to display stages in the **Stage** field property.

   Available fields depend on the table selected for the workflow.
4. After assigning a list of stages to the workflow, you can set a stage value in any of the workflow activities that provide a **Stage** field in their dialog box.

   Setting a stage value in a workflow activity tells the workflow engine to assign that stage to the record associated with the workflow context when the activity is encountered during a run.

   When an activity starts with a specified stage, the platform updates the **Stage** field with the current value. In workflows run against the Requested Item [sc_req_item] table, the `sc_req_item.stage` field is defined as a workflow type field.

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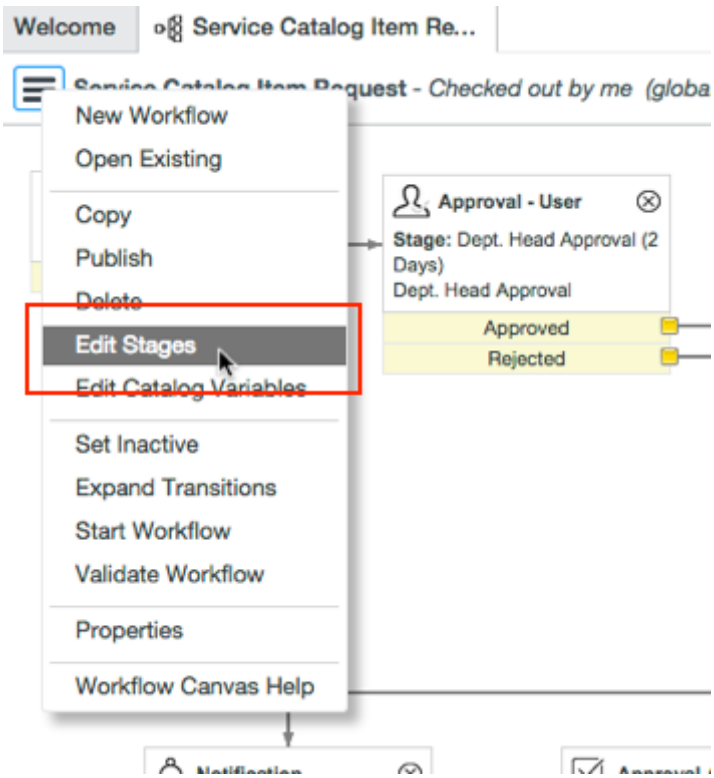
When displaying the stages for a workflow on the Requested Item [sc_req_item] table, the stage state is based on the state of the workflow activities. If an activity has a stage specified for it, and the activity is currently active in the workflow, then the stage is shown with an **In progress** state. Similarly, if the activity is in the **Pending** or **Completed** state, the stage reflects this state.

5. To edit the workflow-specific stages for an existing workflow, click the gear icon in the header bar and select **Edit Stages**.
   Again, these stage values are combined with the choices, defaults, and existing values.



Example: Workflow stages

To optimize the use of stages, you can assign a stage to multiple activities in a workflow. For example, if your workflow uses the following activities to create tasks:

1. Get approval
2. Order equipment
3. Receive equipment
4. Add equipment to CMDB
5. Set up equipment
6. Install software
7. Configure software
8. Deliver to user

The following stages might be used:

- Approval
- Order

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- Configure
- Deliver

A good practice is to assign stages to the activities as follows:

Examples of stages added to workflow activities

Activity	Assigned stage
Get approval	Approval
Order equipment	Order
Receive equipment	Order
Add equipment to CMDB	Order
Set up equipment	Configure
Install software	Configure
Configure software	Configure
Deliver to user	Deliver

When the **Order equipment**, **Receive equipment**, or **Add equipment to CMDB** activity is active, the **Stage** display shows that the **Order** stage is **In progress**.

Add and translate stages

You can add default stages to use for a table, and stages to existing workflow

Add default stages for a table

You can assign a stage set as a default set to any number of tables.

About this task

The stages in the assigned stage set pre-fill the workflow version stages when you create a new workflow for the associated table.

Procedure

1. Navigate to **All** > **Workflow** > **Default Stages (by table)**.
2. Click **New**.
3. Select a stage **Set**.
   You can create a new set by clicking **New**, typing a name, and clicking **Submit**.
4. Select a corresponding **Table**.
5. Click **Submit**.

   The stages in the selected stage set are automatically added to any new workflows that use the corresponding table.

Add a stage to an existing workflow

If a stage required for a workflow has not been imported or is not in the stage set assigned to the workflow table, you can add it to the workflow manually.

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Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Edit Stages**.
4. In the Workflow Stages list, click **New**.
5. On the Workflow Stage form, fill in the fields as appropriate.

   Do not use a **Name** or **Value** field value that already exists in the base system.

   #### Workflow stage fields

Field	Description
Name	The name of the stage as it appears in workflow fields.
Value	The value of the stage when it is referenced from elsewhere in the system, such as in a script.
Duration	The default duration for the stage. Currently not used.

6. Click **Submit**.
7. Publish the workflow.

Add a stage to a workflow activity

After stages are added to a workflow, you can assign them to the workflow activities.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. Double-click the activity.
4. In the **Stage** field on the Activity Properties form, find and select the stage to display when the workflow reaches the activity.
5. Click **Update**.

Translate workflow stages

You can provide translations for workflow stage names so the names appear in the language selected for the instance.

Before you begin

The instance must already have language internationalization plugins installed. For more information, see Activate a language.

About this task

Language-specific text appears in Field types displayed in a list, workflow stage sets, and the Workflow Editor for users with that language selected. Language-specific text does not automatically appear when displaying stages on a form. To translate stages on a form, add translated text to the workflow field choices.

You can add translated text for any language enabled on the instance. For example, to translate workflow stages into French:

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Procedure

1. Set the interface language to **French**.
2. Navigate to **Workflow** > **Workflow Editor**.
3. Open and check out a workflow.
4. In the title bar, click the menu icon and select **Edit Stages**.
5. Edit the **Name** field for each stage and enter the text to display to French users.

   Do not change the **Value** field.
6. Confirm that the workflow stages display the French text.

Result

Alternatively, to translate stages for multiple workflows at once, you can directly edit the Workflow Stages [wf_stage] table. For example, to translate workflow stages from multiple workflows into French:

1. Set the interface language to **French**.
2. In the application navigation filter, enter `wf_stage.list`.
3. Edit the **Name** field for each stage and enter the text to display to French users. Do not change the **Value** field.

Workflow stage sets

Stage sets are named groups of workflow stages commonly used together. Create a stage set and assign it as a default set to any number of tables. You can import the choice list values of a workflow field as stages for a workflow, and export a stage set to create a new one.

A single stage set usually represents a process, such as the stages required to display the progress of a service catalog request. You can also assign a stage set as the default set for workflows on specific tables.

In an active context, workflow stages provide summary-level feedback about the progress of a workflow. Stage icons display the status of each activity as it is being driven by a workflow. The system updates a **Stage** field, defined in the workflow properties, to indicate the progress of the workflow through the possible stage values.

Updates to workflow stage values

During an upgrade, the system makes changes to the **Value** field of records in the Workflow Stage [wf_stage] table.

- All entries are made lowercase.
- All spaces and special characters are replaced with underscores.

These changes support System Localization and enable workflows to display translated text in the **Stage** field.

Create a new stage set

You can create a new stage set by creating a stage set record and adding stage set entries manually.

About this task

Create a stage set record only when you want additional stages that are not available on the table by default.

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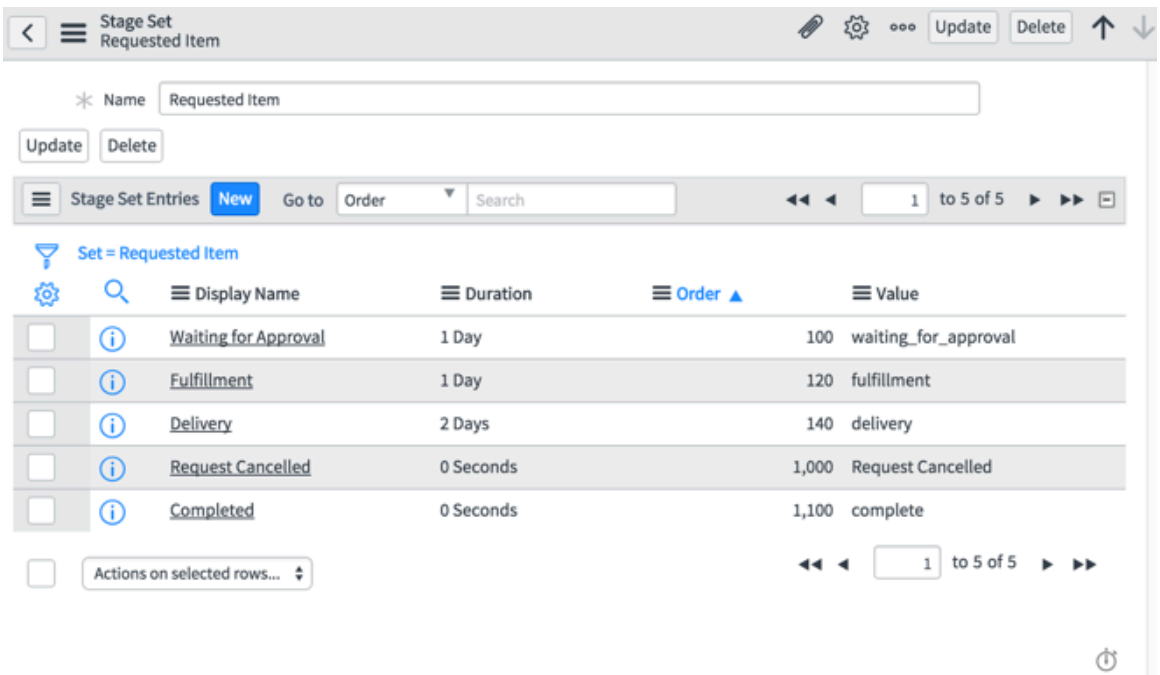
Procedure

1. Navigate to **All** > **Workflow** > **Stage Sets**.
2. Click **New**.
3. Enter a **Name** that indicates the purpose of the stage set.

   Example
   For example, you can create a Requested Item stage set to hold the stages commonly used by inventory tracking workflows or service catalog fulfillment workflows.
4. Click **Submit**.
5. Open the new stage set record.
6. In the **Stage Set Entries** related list, click **New**.
   Each stage set entry can be used as the **Stage** for an activity in a workflow that uses this stage set.
7. Enter a **Name** that indicates the stage name to appear in workflow fields.
8. Enter a **Value** to use when referencing the entry, such as in a script.
9. Click **Submit**.
10. In the **Stage Set Entries** related list, ensure that each entry has a unique **Order** value.
    Enter a low value for stages that should appear early in the workflow and a higher value for later stages.



What to do next

The stage set can be added to a workflow or assigned as the default stage set for workflows that are created for a specific table.

Use a default stage set

You can assign a stage set as a default set to any number of tables.

About this task

The stages in the assigned stage set pre-fill the workflow version stages when you create a new workflow for the associated table.

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Procedure

1. Navigate to **All** > **Workflow** > **Default Stages (by table)**.
2. Click **New**.
3. Select a **Table**.
4. Select the **Set** you want to assign to the selected table.
5. Click **Submit**.

Import stages from a choice list

You can import the choice list values of a workflow field as stages for a workflow.

Before you begin

Create a choice list as follows:

- Add a custom field of Type **Workflow** to the table.
- Configure the custom field to use a choice list.
- If you are creating a new field, set the **Choice List type** to **Display without --None--** and create the choices for the newly created field.

For more information, see Create a workflow stage field.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Properties**
4. In the Workflow Properties dialog box, click the **Stages** tab.
5. From the **Stage field** list, verify that the correct workflow field is selected.
6. In the Related Links section, click **Import Stages from Choice List**.
7. In the dialog box asking you to confirm that you want to import the choice list, click **OK**.
8. Click **Update**.

What to do next

The stage set can be added to a workflow or assigned as the default set for workflows that are created for a specific table.

Export a stage set from a workflow

You can create a new stage set by exporting the stages from an existing workflow as a set, instead of manually adding stage set entries to a stage set record.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow containing stages that you want to export as a new stage set.
3. In the title bar, click the menu icon and select **Edit Stages** to open the Workflow Stages dialog box.
4. In the Related Links section, click **Export to Stage Set**.
5. Enter a unique **Name** for the new stage set.
6. Click **OK**.

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What to do next
The stage set can be added to a workflow or assigned as the default set for workflows that are created for a specific table.

Add a stage set to a workflow

You can add any number of stage sets to an existing workflow.

About this task
When multiple stage sets have stage set entries with the same **Value**, the stage appears on the workflow only once.

Procedure
1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Edit Stages** to open the Workflow Stages dialog box.
4. In the Related Links section, click **Import from Stage Set**.
5. Select the stage set.
6. Click **Ok**.
7. Import additional stage sets as needed for the workflow.

What to do next
After you add all necessary stage sets to the workflow, you can add them to the workflow activities. For more information, see Add a stage to a workflow activity.

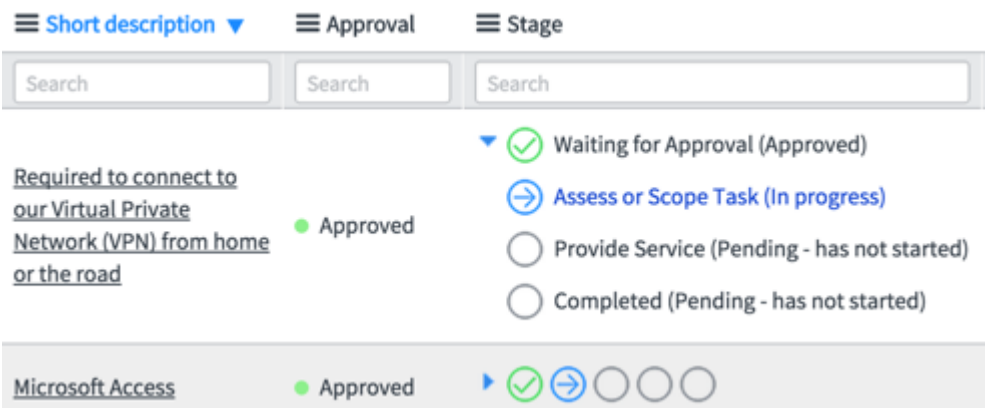
Create a workflow stage field

Workflows can provide a summary of workflow progress by updating any field of the **Workflow** type. If the field is a workflow field, it displays an icon to indicate the workflow stage progress.

Before you begin
Role required: admin

About this task
In a form, the workflow field displays the current stage as a choice list value.

In a list, the workflow field displays stage icons that represent the series of states, stages, phases, or tasks within a workflow. The stage icons are populated using the activity stages from the associated workflow. For more information, see Workflow stages.



To create a workflow stage field:

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Procedure

1. Navigate to **All** > **Workflow** > **Default Stages (by table)**.
2. Right-click near a column header and select **Configure** > **List Layout**.
3. Create a new field in lower right.
4. On the form view of the table used by the workflow, create a field with the **Type** set to **Workflow**.
   For detailed steps, see Add and customize a field in a table.
5. Click **Save**.
6. Right-click the field label and select **Configure Dictionary**.
7. Open a dictionary entry.
8. In the Choice List Specification section of the Dictionary Entries form, select **Dropdown with --None--** from the **Choice** list.
9. Click **Update**.
10. To ensure that the workflow field properly displays stages on the form, define a choice for each workflow stage.
    - To create workflow stages using a choice list that already has choices, you can import the stages from the choice list. A stage is created for each choice defined for the **Stage field** selected in the workflow properties. For detailed steps about importing a choice list, see Import stages from a choice list.
    - The **Value** of each choice must match the **Value** of the corresponding workflow stage.
    - Do not use spaces in the **Value** field for either choices or stages. Use underscores in place of spaces.
    - Make the choice list read-only. If a user changes the stage value for a record from the choice list rather than allowing the workflow to control the value, the workflow-driven, legacy, and linear renders may not work as intended. You can also use business rules or events to ensure the workflow progresses accordingly.

    For detailed steps on defining choice lists, see Define an option for a choice list.
11. To see workflow stages as icons, add the field to the list layout of the workflow table.
    For detailed steps, see Configure the list layout.

What to do next

After you create or update the workflow field:

- Unless the workflow uses the Requested Item [sc_req_item] table, ensure that the workflow field is selected from the **Stage field** list in the workflow properties. For detailed steps, see Select a stage field. If a workflow uses the Requested Item table, the stage field is automatically set to the **Stage** field of the table and cannot be changed.
- Work through the workflow. Any other updates made to the workflow field, such as updates from business rules or other scripts, can interfere with displaying workflow stages.

Select a stage field

A **Stage field** allows the workflow context to show additional workflow information, such as the stage name and the estimated completion time for an activity.

Before you begin

Ensure that the workflow field you want to use as the stage field is configured to properly display stages. For detailed steps, see Create a workflow stage field.

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About this task

Unless the workflow uses the Requested Item [sc_req_item] table, you can specify which field from the workflow table is the stage field. For workflows that use the Requested Item [sc_req_item] table, the stage field is automatically set to the **Stage** field of the table and cannot be changed.

To add or edit a workflow stage field:

Procedure

1. Navigate to **Workflow > Workflow Editor**.
2. Create or check out the workflow.
3. In the title bar, click the menu icon and select **Properties**.
4. In the Workflow Properties dialog box, click the **General** tab.
5. In the **Table** list, verify that the table containing the workflow field is selected.
6. Click the **Stages** tab.
7. From the **Stage field** list, select the workflow field.
8. Click **Update**.

Display approvers in workflow stage fields

Enable workflow stage fields to display approvers, change the number of approvers to display, or disable displaying approvers.

Before you begin

Role required: admin

About this task

By default, only workflow stage fields that use the Workflow-driven renderer can display a list of approvers. Only these workflow stage renderer types support displaying approvers.

- Linear renderer
- Main flow renderer
- Workflow-driven renderer

Procedure

1. Navigate to **All** > **Workflow** > **Administration** > **Properties**.
   The system displays the Workflow Properties page.
2. Set the following properties.

Property	Description
Number of approvers to show if approvers are displayed for workflow stages. Only valid for supported list v2 renderers. glide.workflow.renderer.show_approver_limit	Sets the maximum number of approvers to display within a workflow stage field. The system displays an ellipsis character when there are more approvers than the display limit allows. ○ Type: integer ○ Default value: 5
Show approvers when displaying workflow stages with the Linear renderer.	Enables (true) or disables (false) the Linear renderer to display approvers.

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Property	Description
glide.workflow.renderer.linear.show_approver	○ Type: true | false ○ Default value: false
Show approvers when displaying workflow stages with the Main flow renderer. glide.workflow.renderer.mainflow.show_approver	Enables (true) or disables (false) the Main flow renderer to display approvers. ○ Type: true | false ○ Default value: false
Show approvers when displaying workflow stages with the Workflow-driven renderer. glide.workflow.renderer.workflowdriven.show_approver	Enables (true) or disables (false) the Workflow-driven renderer to display approvers. ○ Type: true | false ○ Default value: true

3. Click **Save**.
4. Add stages to workflows that have associated workflow stage fields.

   Note:
   If you add stages to a subflow, the parent workflow must also have stages.

5. For each approval activity you want to display approvers, select a **Stage** value.

   Example
   For example, the sample workflow **Service Catalog Item Request** has two approval activities. The first **Approval - User** activity has a **Stage** value of `Dept. Head Approval`. The second **Approval - User** activity has a **Stage** value of `CIO Approval`.

Result
The workflow stage field renderers you enabled display approvers up to the approver display limit. For example, a Workflow-driven stage field displays up to five approvers when the workflow reaches an approval stage.

Workflow stage field icons and tooltips

A workflow stage field displays icons to indicate the workflow stage.

Based on the stage renderer selected for the workflow, these icons may display a tooltip with additional information.

Workflow field icons

Icon	Workflow stage
	Current active step
	Approval pending
	Approval rejected
	Complete
	Late (Change/Request) or Canceled (Catalog)

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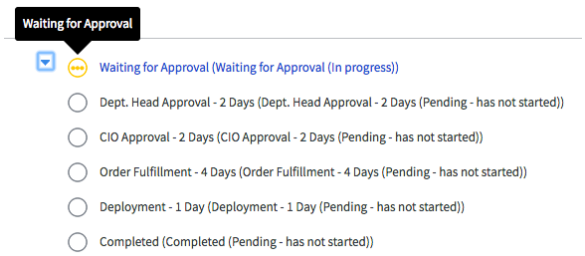
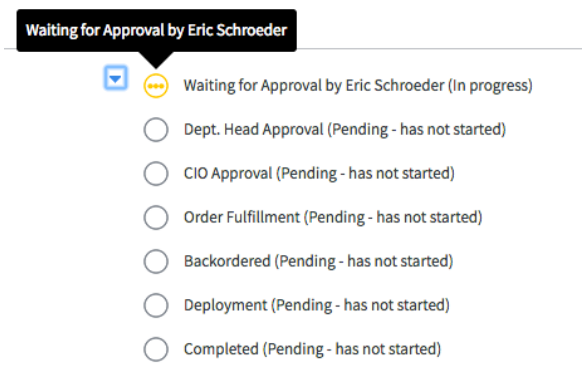
Workflow field icons (continued)

Icon	Workflow stage
	Skipped (Catalog only)

Stage tooltips

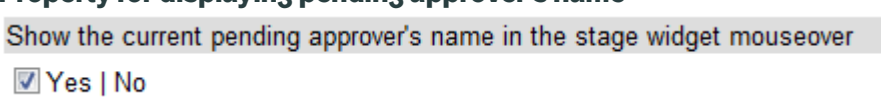
Based on the stage renderer selected for a workflow, workflow stage icons may display tooltips with detailed information about a stage.

Stage renderers and tooltip behavior

Renderer	Tooltip behavior
Legacy	When a user points to a stage, the tooltip displays the name of the stage. In the expanded view, the activity status appears in parentheses next to the stage. 
Other renderers	When a user points to a stage, the tooltip displays the name of the stage. If the stage is a gated approval, the tooltip also shows the name of the approver. In the expanded view, the activity status appears in parentheses next to the stage. 

If you do not want the approver's name included in the tooltip, navigate to **System Properties** > **Service Catalog** and clear the **Show the current pending approver's name in the stage widget mouseover** check box.

Property for displaying pending approver's name



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Workflow stage renderers

Workflow stage renderers determine how a workflow displays stages in a workflow field.

There are multiple renderers available.

Note:
Most workflows should use the workflow-driven renderer. This renderer is used by default for all workflows. Use a different stage renderer only after careful consideration and to satisfy specific requirements for how the stages appear.

Workflow-driven

Use the workflow-driven renderer as much as possible. This renderer displays icons for stages using the stage state controlled by the workflow. Icons are displayed in a way that is meaningful for many situations. This renderer can display stages from a main workflow and subflows. The order of the icons is determined by the expected path of the executing workflow. As the workflow progresses, stages on paths that the workflow did not take are removed from the display. Stages from paths other than the expected path are not included unless the workflow follows that path.

The **Stage order** field on the **Stages** tab has two options:

- **Computed** uses the actual workflow path in order
- **User-specified** uses the order specified in the **Order** column on the Workflow Stages record

Note:
If the workflow context for a request item has been deleted, the stages for that request item can no longer be rendered. This stage history is stored on the workflow context.

Main flow

The main flow renderer displays icons for stages defined in the main workflow only. Use this renderer when you do not want to expose the details of the subflows. For example, a single main workflow may run several subflows to handle implementation details. The stages in these subflows do not provide useful information for the user who starts the workflow, but are useful when editing the subflow. In this scenario, using the main flow renderer leads to the best user experience. The stage field displays the high-level process of the workflow without exposing unnecessary details.

The **Stage order** field on the **Stages** tab has two options:

- **Computed** uses the actual workflow path in order
- **User-specified** uses the order specified in the **Order** column on the Workflow Stages record

Linear

Linear rendering displays all stage icons from the main workflow and all subflows within a single workflow field on a list or form. It displays icons in a linear sequence regardless of the paths the workflow follows as it executes. This renderer uses stages defined in both the main workflow and any subflows that the main flow launches. The icons appear in the user-specified order. Skipped stages do not appear.

Use this renderer when the workflow stages must display in a consistent order and the actual details of how the workflow runs are less important. For example, a workflow may revisit or revert to previous stages based on one or more Condition Workflow activities. Displaying these loops in the stage field does not provide useful information to the user. In this scenario, using the linear renderer leads to the best user experience. The stage field displays the predefined process, including stages from subflows, in a consistent order.

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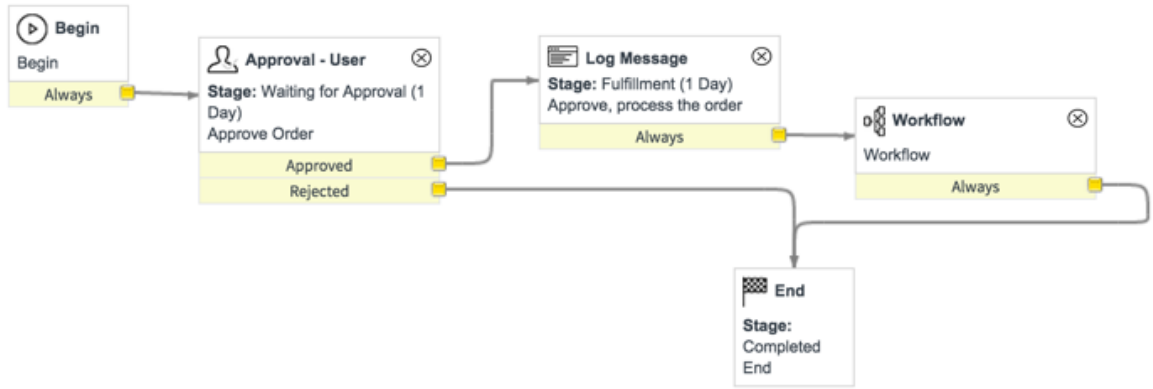
For example, you can create a service catalog workflow that uses a subflow to complete delivery of the requested item. The following images illustrate the main flow and subflow for ordering corporate-branded supplies.

Linear main flow



Linear subflow



The linear renderer displays all these stages in one workflow field. The parent workflow specifies the **Waiting for approval**, **Fulfillment**, and **Completed** stages. The subflow specifies the **Delivery** and **Waiting for Task**, and **Delivery OK** stages.

Progress bar

The progress bar renderer displays a single progress bar instead of a sequence of stage icons. This renderer is particularly useful when you want to display the general progress of the workflow as a percent. Each stage in the workflow controls an equal percentage of the progress bar. For example, if a workflow has 10 stages, reaching each stage causes the workflow field to display an additional 10% of the progress bar. Stage names do not appear in the progress bar.

The progress bar renderer provides a way to display the status of a workflow that has a large number of stages. Other rendering options may provide a better user experience when rendering fewer than four stages in a single workflow.

The **Stage order** field on the **Stages** tab has two options:

- **Computed** uses the actual workflow path in order
- **User-specified** uses the order specified in the **Order** column on the Workflow Stages record

Workflow field progress bar



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Legacy

The legacy renderer displays stages in the same way as releases prior to Dublin. When an instance is upgraded from a release prior to Dublin, all existing workflows are set to use the legacy renderer. Whenever possible, use a different stage renderer instead. If you want your workflow to maintain pre-Dublin behavior, use the Legacy option. The legacy renderer sometimes assigns incorrect data to and/or reports incorrect data from the workflow stage field. If possible, we recommend all workflows use the Workflow-driven renderer.

With the legacy renderer, you can create and reference a custom workflow field icon set by setting the icons attribute to a new script include. For example, to use the `WorkflowIconsSCR` script include to define which icons to use, add the attribute `icons=WorkflowIconsSCR` to the **Attributes** field of the dictionary entry for the workflow field. To use the default icon display behavior, use the attribute `icons=WorkflowIconsStages`.

The legacy renderer works with all tables except the Requested item [sc_req_item] table. In this case, use the requested item renderer instead.

Requested item

The requested item renderer functions the same way as the legacy renderer, but is for use with the Requested item [sc_req_item] table.

Only in Now Mobile, default stage renderer is used.

Select a stage renderer

In most cases, the default workflow-driven renderer should be used. If you have specific requirements for displaying stages, you can select a different stage renderer.

Before you begin

Consider the following when selecting a stage renderer:

- Use the workflow-driven renderer if possible. This is the default renderer that should be used in most cases.
- Use the legacy renderer only if your instance was upgraded from a release prior to Dublin and you want your workflow to maintain pre-Dublin behavior.

To use linear, main flow, or progress bar rendering, satisfy the following requirements.

Linear and progress bar renderer requirements

Renderer	Requirements
Linear	• The parent workflow and all subflows must modify the same current record. • In the properties for all subflows, the **Stage field** value for all subflows must match that of the parent workflow. • The parent flow and all subflows must contain the same stages. Use a stage set to ensure the parent flow and all subflows have the same stages. • On the workflow canvas, each workflow needs only the stages used directly by that workflow. It is not necessary to add stages from subflows to activities on the parent flow, or stages from the parent flow to activities on the subflows.

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Linear and progress bar renderer requirements (continued)

Renderer	Requirements
Main flow	• The workflow contains subflows. • You do not want or need to reveal the details about the subflows.
Progress bar	• The workflow properties must have a **Stage ordering** value of **User-defined** • There must be workflow stages within the workflow. • Because stage names do not appear in a workflow field when using the progress bar renderer, you can simplify stage names to represent a percentage of the workflow. For example, if a process has four main steps, name the workflow stages as 25%, 50%, 75%, and 100%. Enter the numerical value of each stage, such as 25, in the **Value** and **Order** fields.

About this task

To select a stage renderer:

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Properties**.
4. In the Workflow Properties dialog box, click the **Stages** tab.
5. From the **Stage rendering** list, select a stage renderer.
   - If you are using two workflows to update two unique workflow fields on a single record, both workflows must use a non-legacy renderer. You can select a different stage renderer for each workflow but do not select **Legacy** for either one.
   - If you want to use the linear renderer, make sure you select **Linear** in the properties for the parent workflow and all subflows.
6. Click **Update**.

Workflow fields with deleted records

Workflow fields may indicate when a record required by the workflow is deleted.

After a referenced record is deleted, the reference in the primary record is no longer valid. If the stage renderer detects a reference that is no longer valid, the stage field displays a message about the deleted record.

Administrators can restore deleted records. For more information, see Use the Deleted Records module to restore a deleted record.

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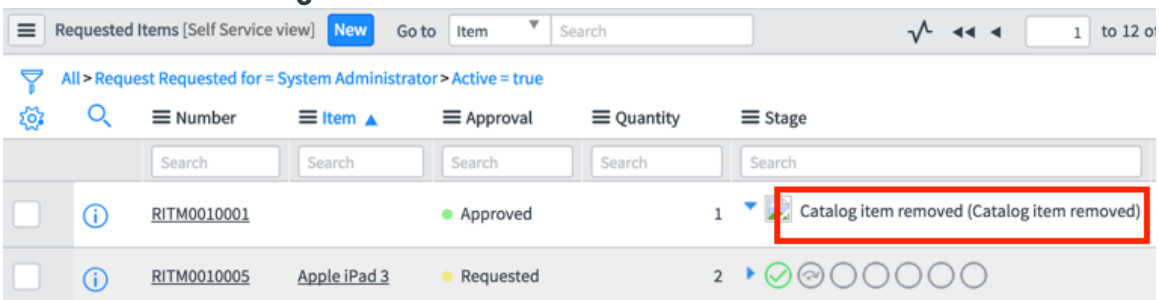
Workflows with missing records



The image shows a list with two workflows. The top request does not have an associated request item. The bottom request has an associated request item, but the item does not have an associated workflow context.

Workflow validation

Workflow validation examines different characteristics of a workflow to locate issues that might prevent the workflow from being published or cause it to fail. The validation report summarizes the results of each separate workflow validation.

Validation prevents workflows with critical flaws from executing and resulting in an unstable or incomplete state. There are a number of validators in the base system that notify workflow designers of potential problems. For example, multiple **End** activities, disconnected transitions, incorrect table references, missing subflows, and dependencies affected by update sets. A workflow validation report displays the results from each validator, including a message explaining what was found. The system automatically validates a workflow when you publish it. You can also run validation on a workflow directly from controls in the Workflow Editor.

Highlighting critical errors

The graphical Workflow Editor highlights critical errors when a workflow is loaded. In this example, a subflow is missing and is not available to the parent workflow for the current user. The graphical Workflow Editor indicates the error when the parent workflow loads by highlighting (in red) the activity that calls the subflow. To correct the error in the parent workflow, click the validate icon in the header bar and inspect the error description in the validation report.

Validate missing subflow



Validations at publishing

If you attempt to publish an invalid workflow or a workflow with potential problems, the system displays an error message and blocks the operation, if necessary. When validation error messages appear, click the validate icon in the graphical Workflow Editor to see the error report.

Validation warning

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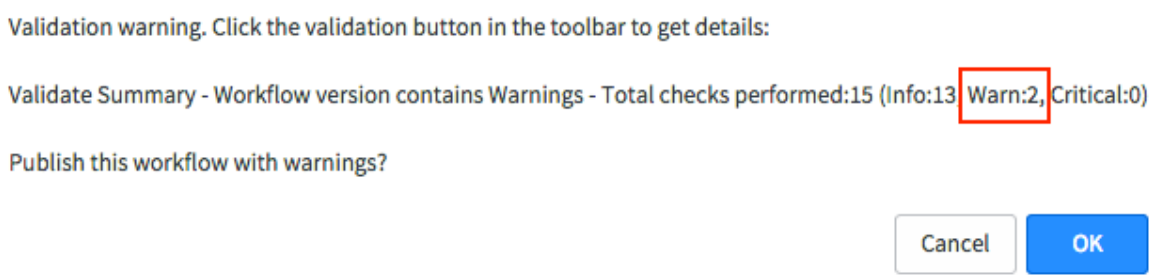
A validation warning notifies you that a potential problem exists in a workflow but permits you to publish the workflow. Validation warnings appear when:

- You edit and then attempt to publish a workflow that is included as a subflow in another workflow. The system cannot determine how your changes will affect the parent workflow and alerts you of the relationship.
- A workflow activity uses a different table than the table assigned to the workflow. The system alerts you of the potential conflict.

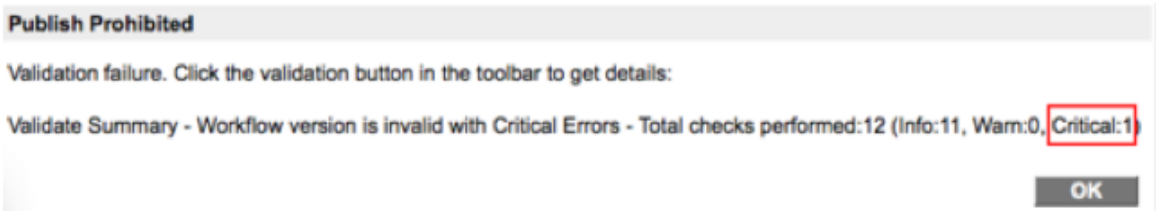
Validation warning



Validation failure

A validation failure notifies you that a critical error has occurred in the workflow that prevents you from publishing the workflow. An example of a critical error is a missing subflow.

Validation failure



Workflow validation report

Validators display three notification levels: CRITICAL, WARN, and INFO. The designer can publish a workflow that returns WARN or INFO level validation, but not a workflow that returns an overall validation level of CRITICAL.

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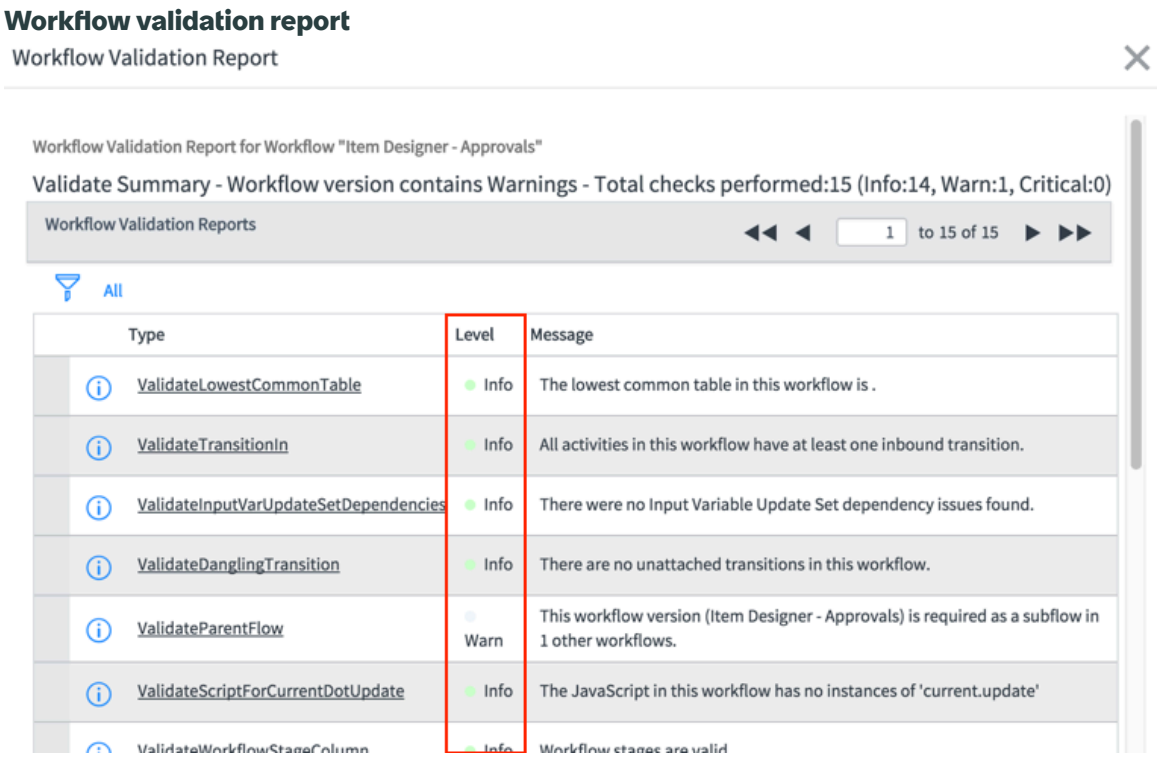

Header summary

The header of the validation report summarizes the entire validation run against the specified workflow.

- **Validate Summary:** The overall score reflects the most severe notification level encountered during the validation.
- **Total checks performed:** The total number of validations run is also broken down to show the number at each notification level.

Report columns

The body of the report displays the results of each individual validation check that was performed. The columns are **Type**, **Level**, and **Message**. You can sort and filter these columns as you would any list.

Workflow termination and external dependencies levels

Name	Implication
Info	Provides information about the current workflow version. An example of an information level message is one that names the lowest common table in the workflow. Workflows at this validation level are considered valid and publishable.
Warning	Alerts the user that the validator detected anomalies in the workflow that might compromise its ability to execute. An example of a warning level message is one that alerts you to a missing activity input transition. Workflows at this validation level are considered valid and publishable.
Critical	Names a workflow element containing a critical error that prevents the workflow from executing successfully. Examples of this are missing or invalid subflows and missing transitions. Workflows at this validation level cannot be published or run in production.

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Message

The validation message provides a detailed description of the results, including table names, update sets, and other specifics.

For the procedure to validate a workflow and generate a validation report, see Validate a workflow

Workflow validator

ServiceNow offers several workflow validators for workflow designers to test their workflows.

This page lists all available workflow validators. See Workflow validation for information on using workflow validators and the workflow validation report to see the type of information that is returned.

Hanging workflows and update sets

Hanging Workflows	Update Sets
Identify workflow design decisions that can result in a hanging workflow	Identify related artifacts being moved in different update sets
ValidateTransitionOut	ValidateUpdateSetDependencies
ValidateTransitionIn	ValidateUpdateSetParentDependencies
ValidateDanglingTransition	ValidateInputVarUpdateSetDependencies
ValidateSubflows	
ValidateScriptForCurrentDotUpdate	

Workflow termination and external dependencies

Unexpected Workflow Termination	External Dependencies
Identify workflows that can end unexpectedly	Identify external artifacts that have potential workflow dependencies
ValidateSingleEnd	ValidateParentFlow

Workflow conflicts

Workflow Properties Conflicts
Identify workflow design decisions that conflict with workflow properties
ValidateLowestCommonTable
ValidateTableChange

ValidateTransitionOut

The **ValidateTransitionOut** validator finds activity conditions with no exit transitions.

Validation summary

- Risk: Activity conditions might not transition to the next activity, which could cause the workflow to hang.
- Severity Level: Warning
- Valid Result: Valid

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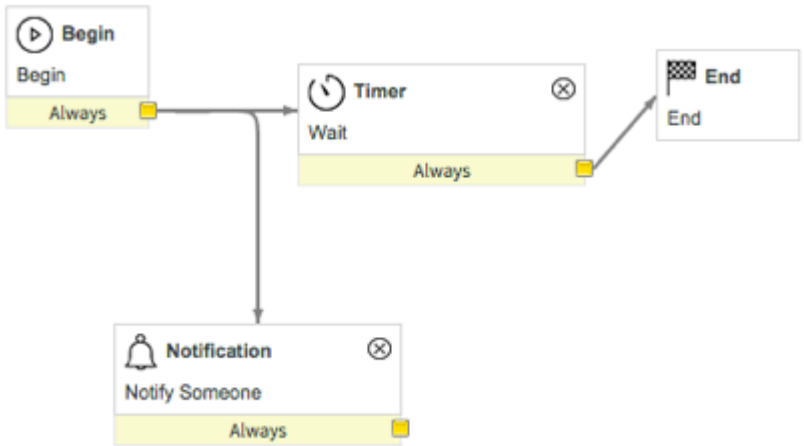
- Valid Message: All conditions have transitions.
- Invalid Result: Invalid
- Invalid Message: This workflow contains <condition count> activity conditions without an output transition.
- Suggested Action: If this is a conscious design decision, there is no corrective action. Otherwise, find the condition cited in the validator and add an appropriate transition to the next activity.
- Publishable: Yes
- Runnable: Yes
- Related Information: None

Troubleshooting

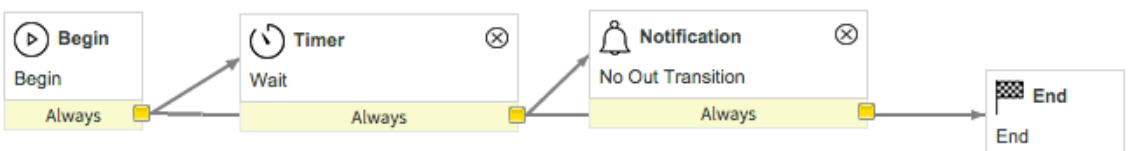
Design choices made when creating a workflow on the canvas might legitimately use an activity without an exit condition. In the first example, the **Notification** and **Timer** activities both execute at the start of the workflow. The **Timer** is the entity that decides when the workflow ends. In this situation, executing the **Notification**, but not transitioning away, keeps the design simple and adds no risk. The validator finds and reports the missing transition from the **Notification** activity as a **Warning** that the designer can ignore.

Condition with no valid transition



In the second example, the **Notification** activity has no exit transition. The designer missed this because of the layout. The transition from the **Timer** activity passes behind the **Notification** activity and appears to connect the exit from the **Notification** activity to the **End**. In workflows with more than 10 or 15 activities, it might be difficult to see all the transitions clearly. This workflow's designer intended for the **Notification** activity to transition to the **End**.

No condition out



This validator directs the designer to the specific activity and condition that does not have an exit transition. The designer then makes the decision whether or not to respond to the warning.

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ValidateTransitionIn

The **ValidateTransitionIn** validator finds activities that do not have inbound transitions and cannot execute in the workflow.

Validation summary

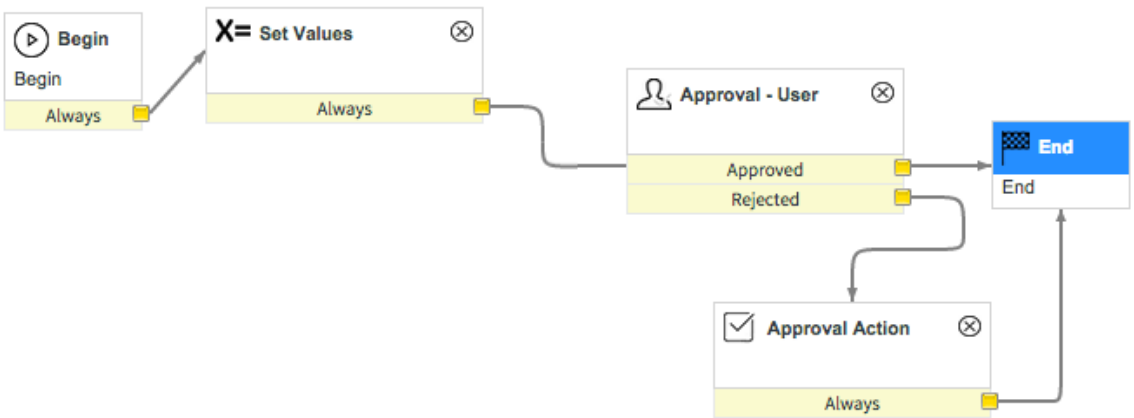
- **Risk:**Activities that do not have inbound transitions have no means of being executed in the workflow. If other logic builds from these activities, the workflow could hang, with no means of moving forward.
- **Purpose:** Find activities that do not have inbound transitions.
- **Severity Level:** Warning.
- **Valid Result:**Valid.
- **Valid Message:** All activities in this workflow have at least one inbound transition.
- **Invalid Result:** Invalid.
- **Invalid Message:**This workflow contains <activity count> activity conditions without an input transition.
- **Suggested Action:**Either remove the activities to reduce confusion and make the workflow easier to understand or provide the appropriate inbound transition.
- **Publishable:**Yes
- **Runnable:**Yes
- **Related Information:**None

Troubleshooting

Although the activities detected in this validator do no harm to the execution of the workflow, the designer needs to know that there are activities on the canvas that cannot execute and serve no purpose, particularly in a production system. This error is typically caused by a visual misinterpretation of the drawing.

This example workflow appears to be perfectly valid. Under closer inspection, however, we see that the transition from **Set Values** does not stop at **Approval - User** (there is no arrow end). Instead, that transition goes directly to **End**. As a result, **Approval - User** cannot execute. Because there is an activity in the workflow based on the approval's condition routing, it appears that the designer intended for the approval to execute and that a correction is needed.

TransitionIn invalid



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This validator directs the designer to the specific activity and condition that has no inbound transition. The designer should establish a transition or remove the activity.

ValidateDanglingTransition

The **ValidateDanglingTransition** validator finds and reports any transitions that do not terminate on an activity.

Note:
These transitions are not drawn on the workflow canvas, but are still present in the database.

Warning:
This is a critical error that prevents a workflow from running.

Validation summary

- Risk: A workflow with dangling transitions will silently hang a workflow with no recovery options.
- Severity Level: Critical
- Valid Result: Valid
- Valid Message: Valid
- Invalid Result: Invalid
- Invalid Message: Invalid
- Suggested Action: Remove or connect the offending transition. Get the source activity name from the validation report details and resolve the issue. Then, run the validation again to test your changes.
- Publishable: No
- Runnable: No
- Related Information: None

Troubleshooting

On rare occasions, the destination of a workflow transition becomes null. The workflow canvas shows no evidence of the transition, but at run time, the workflow hangs when it encounters one of these dangling transitions. If the **ValidateDanglingTransition** validator reports this condition at publishing time, it blocks the publication action until the issue is resolved. If this condition is detected on a runtime check, the workflow is not allowed to execute against a current record's transaction. Instead, the system adds a critical log entry detailing the activity with the faulted transition to the current record's workflow context. To enable the workflow to execute on the next appropriate transaction, remove the faulted transition from the workflow model.

To find and remove the faulted transition:

1. Make note of the workflow version and activity that contains the faulted transition as indicated in the validator details.
2. Navigate to **Workflow** > **Administration** > **Workflow Version**.
3. In the list of workflow versions, select the workflow that has the faulted transition.
4. On Workflow Version form, add the workflow activities related list. Click the menu icon, select **Configure > Related Lists**, move **Workflow Activity-->Workflow Version** from the **Available** list to the **Selected** list, and click **Save**.
5. In the **Workflow Activities** related list, select the activity cited in the validator.

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6. In the Workflow Activity form, view the **Workflow Transitions** section or tab and identify the transition in that list that has no value or a null value in the **To** column.
7. Delete this transition.
8. Return to the workflow version and re-run the validation check.

The **Critical** warning should disappear. The workflow should execute as expected on the next appropriate transaction.

ValidateSubflows

The **ValidateSubflows** validator detects any workflows included as subflows that are either inactive, deleted, or not available as a published workflow for the current user.

Any of these conditions cause the workflow to hang when the workflow activity in the main flow is encountered.

> ⚠ **Warning:**
> This is a critical error that prevents a workflow from running.

Validation summary

- Risk: A parent workflow that transitions to a deleted subflow hangs indefinitely, with no recovery options.
- Severity Level: Critical
- Valid Result: Valid
- Valid Message: This workflow contains <count> valid subflows.
- Invalid Result: Invalid
- Invalid Message: This workflow contains <invalid count> invalid subflow(s) of <total subflow count> total subflows.
- Suggested Action: Remove the link in the parent workflow to the questionable subflow, examine the subflow to ensure that it is valid and published, or that it is checked out to the current user. After making the correction to the state of the subflow, run the validation again to test your changes.
- Publishable: No
- Runnable: No
- Related Information: Workflows used as subflows

Troubleshooting

When a workflow runs, regardless of whether it is a subflow or a main flow, the script engine determines which version of a workflow should execute, given the current user and workflow conditions. When a workflow is checked out by the same user who is running the workflow, the checked out version is the version that executes. If the user is not the same person who has the workflow checked out, the published version of the workflow executes. If there is no published workflow, no workflow runs.

One scenario addressed by the **ValidateSubflows** validator is when a workflow:

- Is checked out to User A.
- Is a subflow in a parent workflow being run by User B.
- Has no published alternative to the subflow being run by User B.

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When this occurs, the parent workflow runs to the execution of the unpublished subflow and then hangs at that activity, with no means to transition forward. Main flows that encounter this condition in a subflow are not permitted to execute against a current record's transaction. Instead, a critical log entry detailing the subflow's state is added to the current workflow's Workflow Context record. To correct the problem, remove the subflow from the main flow, or publish the subflow so it is available to User B. This allows the workflow to execute on the next appropriate transaction.

Another scenario addressed by the **ValidateSubflow** validator is when a workflow:

- Is a subflow in a parent workflow being run by any user.
- Has no published alternative to the subflow, because the workflow has been deleted or all versions of the workflow are unpublished or inactive.

Note:
You cannot delete a from a list or form workflow that is a subflow. However, you can create one of these unstable conditions with advanced scripting, SQL options, or incomplete update sets that contain main flows, but not the referenced subflows. When troubleshooting a workflow that triggered this validator, consider the history of the subflow while assessing the error condition.

ValidateScriptForCurrentDotUpdate

The **ValidateScriptForCurrentDotUpdate** validator finds workflow activities with scripts that use the `current.update()` function.

Calling `current.update()` causes significant performance delays in transaction processing and might cause an instance to hang.

Validation summary

- *Risk*: At best, a workflow that uses `current.update()` in scripts experiences degraded performance. In the worst case, the workflow enters an infinite, recursive loop that crashes the server.
- *Severity Level*: Warning
- *Valid Result*: Valid
- *Valid Message*: The JavaScript in this workflow has no instances of 'current.update()'.
- *Invalid Result*: Invalid
- *Invalid Message*: This workflow uses 'current.update()' in <count of current.update references> JavaScript statements.
- *Suggested Action*: Remove `current.update()` from the activity scripts cited by this validator. Workflows execute within a transaction, and current is updated, or possibly inserted, at the end of the transaction, as appropriate. There is no need to explicitly update the record during the transaction.
- *Publishable*: Yes
- *Runnable*: Yes

Problems with current.update() in workflow scripts

A workflow initiates execution in one of these ways:

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- *Script Engine*: If a workflow is assigned to a specific table, and given a run condition, the workflow runs on INSERT.
- *Script*: Any business rule, script include, background script, or client script can initiate a workflow using the workflow script include and calling `startFlow()`.

The workflow engine initiates a workflow based on the matched criteria of the current record being inserted. The transaction for current is managed by the script engine and not the workflow. Workflows that progress on the `update()` of the current record are not invoked via the workflow engine, but as a call from either a client script or business rule. In either case, the script engine is invoked, and the current record is put in memory. Edits and modifications to any current fields are made and are available to other activities and scripts that are executed in the same transaction.

When appropriate, other engines that run in sequence with the workflow engine, such as the business rule engine or field normalization, are invoked against the same current record transaction. Any changes made to current through these scripts and activities modify the record in memory. These changing values are available for reference in any other transactions called from activities and scripts in the same INSERT transaction. When all expected changes are executed, the current record is inserted.

When one of these scripts calls `current.update()` on a record that has yet to be inserted, the action forces an unnecessary and error-prone database transaction. If a record is not yet in the database, it cannot be updated. Business rules that trigger on `update()` on a record that is in the process of being inserted can cause a very unstable and potentially infinite looping condition.

Troubleshooting

This validator detects the use of `current.update()` in any of the editable script fields. Do not call `current.update()` from within a workflow script. In the event of an INSERT or UPDATE of current, the changes made to current are available to all scripts executing in the same transaction, and the script engine stores all changes in the database. Leave the update of current to the engine. Use the scripts only for setting and referencing the current field values.

ValidateLowestCommonTable

The **ValidateLowestCommonTable** validator reports the lowest table in the Glide hierarchy that the workflow uses.

For example, the Requested Item [sc_req_item] table is the lowest table in a workflow containing a **Catalog Task** activity. This information is significant to a designer who wants to change the table against which an existing workflow runs after adding activities to the canvas.

Note:
This validator provides information only. It does not indicate an error or warning condition.

Validation summary

- Risk: This validator informs only and has no risk associated with it.
- Severity Level: Data/Information
- Valid Result: Valid
- Valid Message: The lowest common table in this workflow is <<table_name>.
- Invalid Result: N/A (informational only)
- Invalid Message: N/A (informational only)
- Suggested Action: None

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- Publishable: Yes
- Runnable: Yes
- Related Information: Workflow activities

ValidateTableChange

The **ValidateTableChange** validator reports any activities in the workflow that are invalid given the table associated with the workflow version.

For example, a workflow version that is associated with the Change Request [change_request] table but has a **Catalog Request** activity on the canvas is invalid, since the activity is not compatible with the selected table.

Validation summary

- Risk: If the current record at runtime does not originate from the table specified by the lowest common table, the activities for the lowest common table cannot set specific values.
- Severity Level: Warning if the table that is associated with a workflow is higher in the table hierarchy than the lowest common table required for the workflow activities.
- Valid Result: Valid
- Valid Message: All activities are valid for the newly selected table
- Invalid Result: Invalid Activity
- Invalid Message: This workflow contains <count of invalid activities> invalid activities for the newly selected table.
- Suggested Action: Make one of these changes:
  - Change the workflow to not require the activities associated with the lowest table reported.
  - Modify the workflow to use a table that contains the lowest common table in its hierarchy.
  - Ensure that the current record meets the requirements of the at-risk activities.
- Publishable: Yes
- Runnable: Yes
- Related Information: Workflow activities

Troubleshooting

Navigate to **Workflow** > **Administration** > **Activity Definitions**. Note the **Table** column in the list. Each activity that is not global is associated with a table.

When you select a table in the Workflow Properties form, the activity menu presents only activities that are compatible with the selected table. Associating a table with a workflow activity enables the system to make certain decisions about the activity that affect value comparison, condition routing, or the setting and getting of field values in the current record.

When a workflow is set to the Global [global] table, it is possible that the process executing the workflow ensures that the current record meets the requirements of the activities identified by this validator. In that case, the activity still works as expected. If that assurance cannot be guaranteed by the user process, do not use the activity identified by the validator without assigning a table that meets the requirements of all the activities on the canvas.

This validation check ensures that the table specified by all the activities in a particular workflow is included in the hierarchy of the table selected for the workflow.

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ValidateParentFlow

The **ValidateParentFlow** validator reports any workflows that use the workflow as a subflow.

Validation summary

- **Risk:** There is no risk in a workflow being a subflow. This is only a warning that other workflows are at risk from dramatic changes to a subflow.
- **Severity Level:**Warning
- **Valid Result:** Valid
- **Valid Message:** Currently <workflow version name> is not a subflow.
- **Invalid Result:** None
- **Warning Message:**This workflow version (<workflow version name>) is required as a subflow in <workflow version count> other workflows.
- **Suggested Action:** Exercise caution when modifying things like input parameters and return values to assure that parent workflows are not adversely affected.
- **Publishable:** Yes
- **Runnable:**Yes
- **Related Information:** Workflows used as subflows

Troubleshooting

The system warns the workflow designer at publishing time and during validation that a workflow is a subflow. This warning reminds the designer that changes to the current workflow have the potential to affect workflows cited in the validation report or other workflows already running in production. Regardless of how simple the change to a workflow that is a subflow, thoroughly test all parent flows cited in this validation report before publication.

When a workflow is a subflow, changes that can cause it to become invalid include:

- Changing the data types of input variables. Verify that all parent workflows cited in this validation report can pass the correct value type.
- Adding input variables. Verify that all parent workflows cited in this validation report are able to pass all variable values into the subflow.
- Changing or removing the return value of a workflow. Verify that any changes to the return value of a workflow are compatible with the requirements of all the parent flows.
- Changing the table on which the workflow runs. Verify that the table selection is compatible with all parent flows.

Note:
To delete a workflow that is a subflow, first remove the dependency by removing the subflow from all parent flows cited in this validation report. After the dependencies are cleared, a user with the proper role can delete the subflow.

ValidateSingleEnd

The **ValidateSingleEnd** validator finds and identifies multiple **End** activities in a single workflow.

Multiple **End** activities in a workflow might be intentional and have no affect on the workflow, or might be a mistake that the designer needs to correct.

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Validation summary

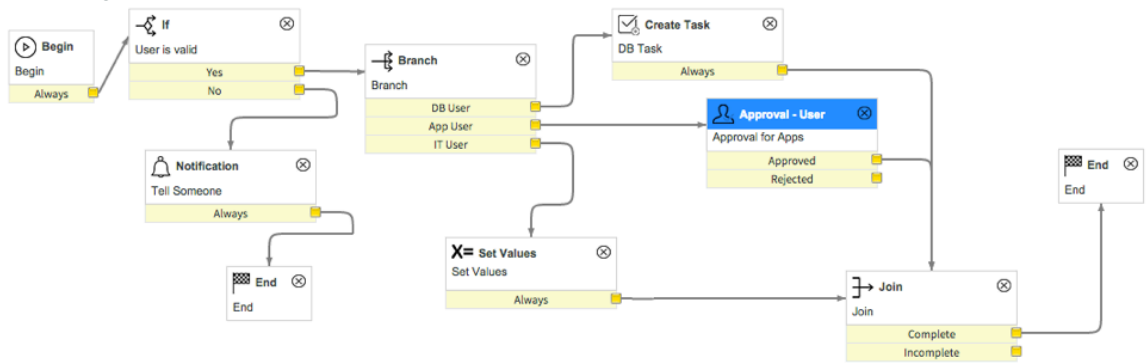
- Risk: If the execution paths to the **End** activities are not mutually exclusive, then the first **End** encountered completes the workflow and cancels all other executing activities.
- Severity Level: Warning
- Valid Result: Valid
- Valid Message: This workflow contains 1 End activity.
- Invalid Result: Invalid Activity
- Invalid Message: This workflow contains <count of ends> End activities.
- Suggested Action: Remove extraneous **End** activities that are not intended as part of the design.
- Publishable: Yes
- Runnable: Yes
- Related Information: None

Troubleshooting

As soon as an **End** activity is encountered in the workflow, the workflow completes even if there are other viable execution paths leading to a second **End** activity that is still executing. Those executing activities are canceled as part of the **End** activity's clean up actions. Therefore, the results of designing workflows with multiple **Ends** must be carefully considered.

In the case of large workflows, it is often more intuitive to read the workflow when there are multiple **End** activities. In the following example, the paths to the two **Ends** are mutually exclusive execution paths. If this was a large workflow, with many activities between **Branch** and the second **End**, the value of the multiple ends becomes apparent. Tracing a **No** response from **User is invalid** to a single **End** behind 33 other activities would be significantly more difficult. There is no risk in this workflow design because there is no reason for other activities to execute if the **End** after the **Notification** activity terminates the workflow.

Mutually exclusive execution paths



The next example has multiple **End** activities in execution paths that are not mutually exclusive. A **Yes** response from **User is valid** causes the **Set Values** activity to finish immediately. By reaching its **End** activity first, this execution path cancels the **Approval for Apps** and the **DB Task** activities, which might not be the desired outcome. If the paths are all expected to complete before **End**, the activities should come to a **Join** (as in the previous example) that transitions to a single **End**.

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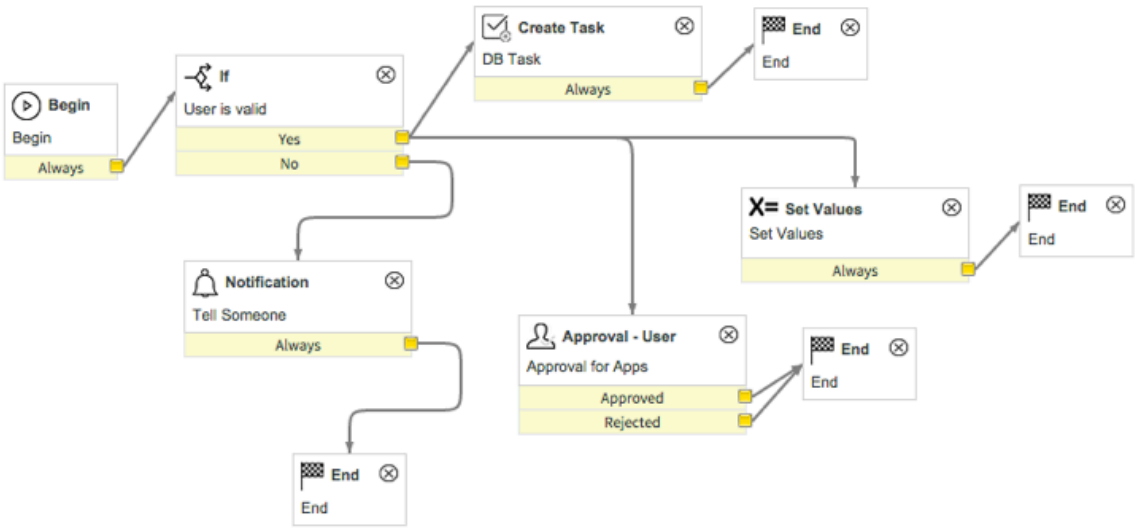
Mutually inexclusive execution paths



Note:
To add the second **End**, right-click to copy the original **End** activity and paste it onto the canvas. In most cases, a single **End** is the best and most reliable way to ensure that all activities expected to execute prior to workflow completion, do so successfully.

ValidateUpdateSetDependencies

The **ValidateUpdateSetDependencies** validator identifies all the subflows called in the current workflow and determines if any of those subflows are being edited in a different (in progress) update set.

This warning informs the user that this workflow and one or more of its dependencies are being actively modified in a way that will not deploy concurrently to another instance without additional effort.

For information about update sets, see Create and select an update set.

Validation summary

- Risk: If a parent workflow is edited in one update set and its dependent subflow is edited in another, the two workflows might not be compatible when moved to a different instance. Making independent changes, such as to common or expected values, can make the two workflows incompatible.
- Severity Level: Warning
- Valid Result: Valid
- Valid Message: There were no Update Set dependency issues found.
- Invalid Result: Invalid
- Invalid Message: This workflow has dependent workflows that are in a different update set.
- Suggested Action: Modify and deploy both workflows in the same update set. If you must modify dependencies in separate update sets, use one of these methods:
  - Ensure that all update sets migrate concurrently.
  - Prior to deploying the main flow update set, merge the dependencies into one update set before completing that update set.
- Publishable: Yes

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- Runnable: Yes
- Related Information: Workflow movement with update sets

Troubleshooting

A workflow is added to an update set only when the workflow is published. This validator issues a warning when either of the following conditions exist:

- A published subflow is in a different update set than the parent workflow and that update set is In progress.
- A subflow is checked out by another user, who is working in a different update set than the current user.

Note:
This validator does not look for update sets that have been closed. It looks only at update sets that are In progress or at the update sets of all subflows being used by the current workflow that are checked out to users who are working in a different update set.

Example

Following is an example of an at-risk development scenario in which two users create dependencies between workflows in different update sets.

User A:

1. Sets Update Set A to the current update set.
2. Checks out Workflow A.
3. Changes the return value of the **String** type in Workflow A to a **Reference/User** type.
4. Publishes Workflow A, causing an entry into Update Set A.

User B:

1. Sets Update Set B to the current update set.
2. Checks out Workflow B.
3. Includes Workflow A as a subflow.
4. Uses the user reference return value from Workflow A as an approval assignment.
5. Publishes Workflow B, causing an entry into Update Set B.

Risks

- User B moves Update Set B to a different instance that has an older version of Workflow A. The return value is not a user reference, which causes the outcome of Workflow B to be different than it was when tested in development.
- User B moves Update Set B to a new instance that does not have a version of Workflow A. Workflow B experiences a validation failure at runtime and cannot execute. A log entry is added to the workflow log of the current record.

Possible solutions

Solution 1

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Migrate the parent workflow and all dependent workflows to a new instance together using the same update set.

1. Set the update set to the one you want to migrate to new instances.
2. Check out and republish the workflows that need to be included, this action forces an entry into the current update set.
3. Complete the update set with all dependencies.
4. Follow standard procedures for migrating update sets to local instances.

Solution 2

Move dependent workflows between update sets.

1. Identify the update set containing the main workflow to be migrated.
2. Navigate to **System Update Sets > Local Update Sets**.
3. Find and select the update set that contains the dependencies to the main workflow.
4. In the **Customer Updates** related list, select the workflow version of the subflow you want to move.
5. Select the update set containing the parent workflow in the **Update set** field. If this field is not on the Customer Update form, configure the form and add the field.
6. Click **Update** and the base system moves the dependent subflow to the update set selected.
7. Repeat steps 4-6 to add additional dependent subflows to the parent flow update set.

ValidateUpdateSetParentDependencies

The **ValidateUpdateSetParentDependencies** validator identifies all the workflows that call the current workflow as a subflow and determines if any of those parent workflows are being edited in a different update set that is in progress.

This warning informs the user that this workflow and one or more workflows that depend on this workflow are being actively modified in a way that will not deploy concurrently to another instance without additional effort.

Validation summary

- Risk: If a parent workflow is edited in one update set and its dependent subflow is edited in another, the two workflows might not be compatible when moved to a different instance. Making independent changes, such as editing common or expected values, can make the two workflows incompatible.
- Severity Level: Warning
- Valid Result: Valid
- Valid Message: There were no Update Set dependency issues found.
- Invalid Result: Invalid
- Invalid Message: This workflow has dependent workflows that are in a different update set.
- Suggested Action: Modify and deploy both workflows in the same update set. If you must modify dependencies in separate update sets, use one of these methods:
  - Ensure that all update sets migrate concurrently.
  - Prior to deploying the main flow update set, merge the dependencies into one update set before setting that update set to complete.
- Publishable: Yes

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- Runnable: Yes
- Related Information: Workflow movement with update sets

Troubleshooting

A workflow is added to an update set only when the workflow is published. This validator issues a warning when either of the following conditions exist:

- A published subflow is in a different update set than the parent workflow and that update set is In progress.
- A subflow is checked out by another user, who is working in a different update set than the current user.

Note:
This validator does not look for update sets that have been closed. It looks only at update sets that are In progress or at the update sets of all parent workflows that call the current workflow and are checked out to users who are working in a different update set.

Example

Following is an example of an at-risk development scenario in which two users create dependencies between workflows in different update sets.

User A:

1. Sets Update Set A to the current update set.
2. Checks out Workflow A.
3. Changes the return value of the **String** type in Workflow A to a **Reference/User** type.
4. Publishes Workflow A, causing an entry into Update Set A.

User B:

1. Sets Update Set B to the current update set.
2. Checks out Workflow B.
3. Includes Workflow A as a subflow.
4. Uses the user reference return value from Workflow A as an approval assignment.
5. Publishes Workflow B, causing an entry into Update Set B.

Risks

- User B moves Update Set B to a different instance that has an older version of Workflow A. The return value is not a user reference, which causes the outcome of Workflow B to be different than it was when tested in development.
- User B moves Update Set B to a new instance that does not have a version of Workflow A. Workflow B experiences a validation failure at runtime and cannot execute. A log entry is added to the workflow log of the current record.

Possible solutions

Solution 1

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Migrate the parent workflow and all dependent workflows to a new instance together using the same update set.

1. Set the update set to the one you want to migrate to new instances.
2. Check out and republish the workflows that need to be included.

   Note:
   This action forces an entry into the current update set.

3. Complete the update set with all dependencies.
4. Follow standard procedures for migrating update sets to local instances. For information about update sets, see System update sets.

Solution 2

Move dependent workflows between update sets.

1. Identify the update set containing the main workflow to be migrated.
2. Navigate to **System Update Sets** > **Local Update Sets**.
3. Find and select the update set that contains the dependencies to the main workflow.
4. In the **Customer Updates** related list, select the workflow version of the subflow you want to move.
5. Select the update set containing the parent workflow in the **Update set** field. If this field is not on the Customer Update form, configure the form and add the field.
6. Click **Update**. The base system moves the dependent subflow to the update set selected.
7. Repeat steps 4-6 to add additional dependent subflows to the parent flow update set.

ValidateInputVarUpdateSetDependencies

The **ValidateInputVarUpdateSetDependencies** validator examines update sets to ensure that workflow input variables for a given workflow have not been deleted in different update sets than those currently **In progress**.

Validation summary

- Risk: Workflows and their input variables are not moved together in a single update set. The deletion of input variables is captured in a different update entry. If these two entries are not in the same update set, the workflow execution can be unstable.
- Purpose: Determine whether input variables that belonged to this workflow were deleted in a different update set.
- Severity Level: Warning
- Valid Result: Valid
- Valid Message: There were no Input Variable Update Set dependency issues found.
- Invalid Result: Invalid
- Invalid Message: There are input variables that have been deleted and logged in a different update set.
- Suggested Action: If the deletion is not intended to be separate from the workflow, ensure that both update sets are committed concurrently to the new instance, or merge both payloads into a single update set.
- Publishable: Yes

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- Runnable: Yes
- Related Information: Workflow movement with update sets

Troubleshooting

Workflow input variables get individual entries in the **Customer Update** related list in the current user's update set. This validator reports to the user when workflow input deletions have happened in an update set other than the current user's update set.

Follow the instructions for Input variable removal when the validator issues this warning.

ValidateWorkflowEndStages

The **ValidateWorkflowEndStages** validator checks that in workflows with stages, the end activity of the workflow has a stage named Complete or Completed.

If the workflow has stages associated with it, but does not have the completed stage on the end activity, then the stage indicator will not show that the workflow completed.

Validation summary

- Risk: The stage indicator will not show the workflow is completed.
- Severity Level: Warning
- Valid Result: Valid
- Valid Message: Workflow end stages are valid.
- Invalid Result: invalid
- Invalid Message: End activity A found with invalid stage "S."
- Suggested Action: If this is not by design, make the appropriate changes.
- Publishable: Yes
- Runnable: Yes
- Related Information: Workflow activities

Troubleshooting

Check the workflow for an end activity. Ensure that this activity assigns a stage named Complete or Completed.

ValidateWorkflowStageColumn

The **ValidateWorkflowStageColumn** validator detects and reports when the stage field (stage column) for a workflow is not correct or is unusable.

Validation summary

- Risk: The stage indicators may not display appropriate information.
- Severity Level: Warning
- Valid Result: Valid
- Valid Message:Workflow stage values are valid.
- Invalid Result: Warning
- Info Summary: Stage warnings found.
- Invalid Messages:

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- Table T does not have a column named C.
- Workflow for table T has stages, but no stage column.
- Table T has a stage column "C," but no stages are set by activities.
- Workflow on table T has stage column "C" that is not type=workflow.

- Suggested Action: If this is not by design, make the appropriate changes.
- Publishable: Yes
- Runnable: Yes
- Related Information: Workflow activities, Workflow stages

Troubleshooting

To check the stage column:

1. Open and check out a workflow.
2. Open the workflow version properties dialog by clicking the menu icon and selecting **Properties**.
3. View the **Stages** tab or section.
4. Check that the assigned stage column is actually a column in the table to which the workflow is associated.
5. Check that the column is type=workflow.

Tip: Stage columns should not be choice lists. If they are, the list appears read-only in form views, since changing that column value outside the workflow engine does not ensure safe tracking of stage states.

ValidateWorkflowStateValues

The **ValidateWorkflowStateValues** validator checks a number of stage aspects in workflow activities for correctness.

This validator has multiple possible error messages.

Validation summary

- **Risk:** The stage indicators may not display appropriate information.
- **Severity Level:** Warning
- **Valid Result:** Valid
- **Valid Message:** Workflow stage values are valid.
- **Invalid Result:** invalid
- **Warning summary:** Stage warnings found.
- **Invalid Messages:**
  - Stage with empty name is not allowed.
  - Stage with empty value is not allowed.
  - Cannot have more than one stage with the same name: x.
  - Cannot have more than one stage with the same value: y
- **Suggested Action:** If this is not by design, make the appropriate changes.
- **Publishable:** Yes

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- **Runnable:** Yes
- **Related Information:** Workflow activities

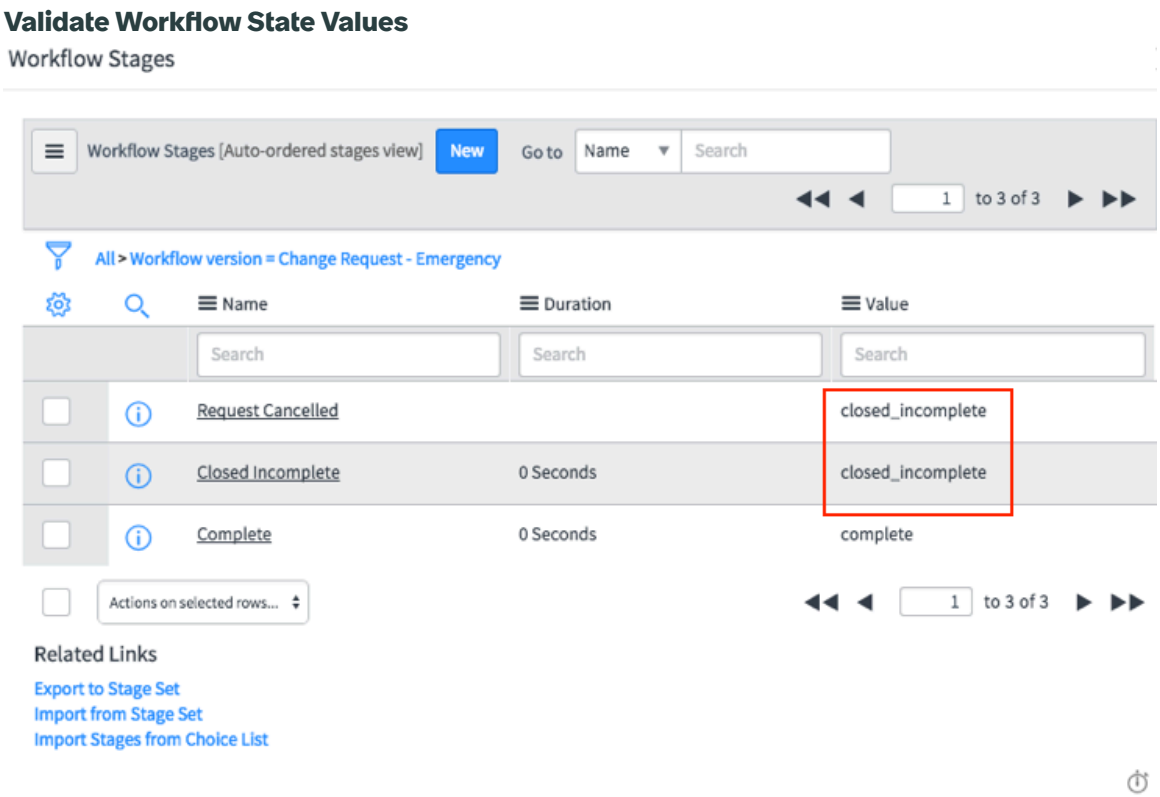
Troubleshooting

Use the following procedure to troubleshoot this validator:

1. Open and check out a workflow.
2. Open the list of stages for the workflow by clicking the menu icon and selecting **Edit Stages**.
3. Check the names and values.

   Ensure that the names and values are unique and are not empty.

4. If the same stage name or value apprears more than once, remove one of the rows. It is then very important to go through the workflow and reassign stages in the activities that used the removed stage.



Tip: Make a list of which activities assign which stages.

Workflow concepts

You can do many things using the Workflow Editor.

- Modify core activities and exit conditions.
- Create custom activities and reuse the data for other workflows.

  See Orchestration activity designer.

- Download activity packs from the ServiceNow Store and create packs for upload.
- Edit workflows graphically.

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- Define transitions between workflow activities.
- For the table that corresponds to the workflow, customize business rules.
- Summarize workflow progress through stages.
- Validate workflows to identify potential problems.
- Publish workflows for other users.
- Edit multiple tables without needing to directly modify them.

Workflow versions

To prevent users from making changes to a workflow that affect other users of the system, workflows must be checked out before they can be edited.

Only one user can check out a workflow at a time. When a workflow is checked out, changes apply only to the user who has the workflow checked out. Other users can continue to use the published workflow. After the changes are complete, the workflow can be published so that it is available to all users.

Note:
Because each workflow has a unique sys_id, different workflows can have the same name. This is typically expected in a domain-separated environment where users in different companies cannot see each other's workflows because they are in different domains. However, this can lead to confusion in other environments. In general, give each workflow a unique name to prevent workflow designers from making changes to the wrong workflow.

When a new version of an existing workflow is published, the changes are not applied to running workflow contexts. Any currently running workflow context continues using the workflow version that was available when the workflow started. The next time the workflow runs, it uses the updated, published version.

Workflow scope

Workflow application scope determines the access that an application has to the information in a workflow, specifically to the data contained in the activities in that workflow.

When a workflow is created, it inherits the application scope from the gear menu for the logged in user. This scope cannot be changed in the Workflow Editor. When the workflow executes, it runs in this scope and can only be called from a different application if the workflow's accessibility setting permits access to all scopes (public). Otherwise, the workflow's application scope is private to the application.

Note:
Any script that is created in the Workflow Editor, such as an advanced script in an *If* activity, runs in the scope of the workflow. All core activities provided in the base system or for Orchestration run in the scope of the workflow.

Custom activities run in their own scope, even if it is different from that of the workflow. The scope of a custom activity can be private or public. Any script that runs inside a custom activity with a scope can only access outside artifacts that are within the scope of that activity or artifacts that are configured to run in any scope. Conversely, an outside artifact can only access the script inside that private activity if the outside artifact is running in the same scope. Activities with public scopes can interact with outside artifacts in any application scope.

You can use private activities as part of a workflow that has a public application scope. These activities are protected from reaching outside of the workflow or from being reached from outside the workflow. For details about setting application scoping for custom activities, see the field description table for the appropriate activity template.

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Note:
Custom activities uploaded to the ServiceNow Store must be configured as accessible to all application scopes.

Workflow scope restrictions

There are some restrictions to public and private application scopes.

During runtime, publicly scoped workflows can access other application resources, as long as these resources are set to be accessible to all application scopes. Privately scoped workflows in a private application scope can only access resources private to its scope. Due to scope access boundaries, any privately scoped workflows that make calls out to other scoped resources fail with either an exception or a hung activity while waiting for returned results. This occurs when making calls to these common global resources:

- ECC queues
- Tasks
- Approvals
- Events
- SLA timers
- Timers
- Script includes
- Business rules
- Workflow APIs

As you design workflows, validate the visibility and accessibility of all resources prior to deployment.

See Application scope.

For information on how to configure the scope for a workflow, see Workflow properties.

Domain separation and Workflow

Domain separation is supported in the Workflow application. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard*

- Includes **Basic** level
- Business logic: Processes can be created or modified per customer by the service provider. The use cases reflect proper use of the application by multiple service provider customers in a single instance.
- The owner of the instance needs to be able to configure MVP business logic and data parameters per tenant as expected for the specific application.

Use case: As an admin, I need the ability to make comments mandatory on close of a record for one tenant, but not for another.

Overview

When domain separation is enabled, workflows and workflow activities inherit the domain of the user who publishes or creates them.

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How domain separation works in the Workflow application

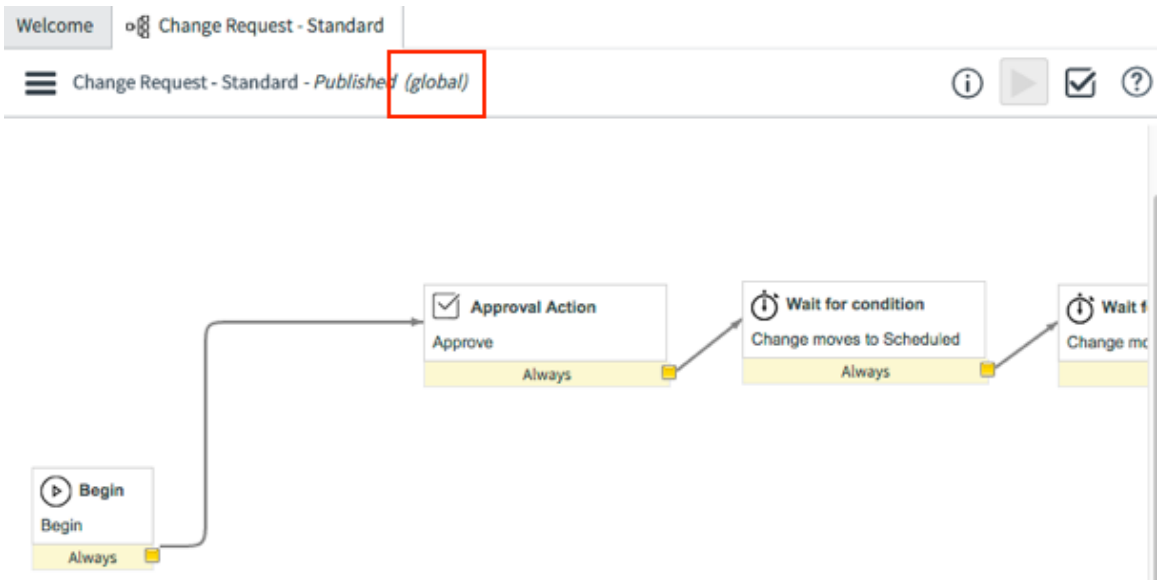
While workflows are managed by multiple tables, only the following tables are used for domain separation features:

- **Workflow [wf_workflow]** and **Workflow Version [wf_workflow_version]**: used for Process administration or process separation.
- **Workflow Context [wf_context]**: used for Understanding domain separation.

Note:
The Workflow Version table [wf_workflow_version] table does not contain a domain field; Workflow Version records inherit their domain from the parent Workflow record.

The Workflow Editor displays a workflow's domain in the title bar after the workflow name.

Workflow editor domain



Related topics

Domain separation for service providers

Workflows and delegated administration

Delegated administration allows child domains to inherit workflows from higher up the domain hierarchy and to override them with domain-specific versions if necessary.

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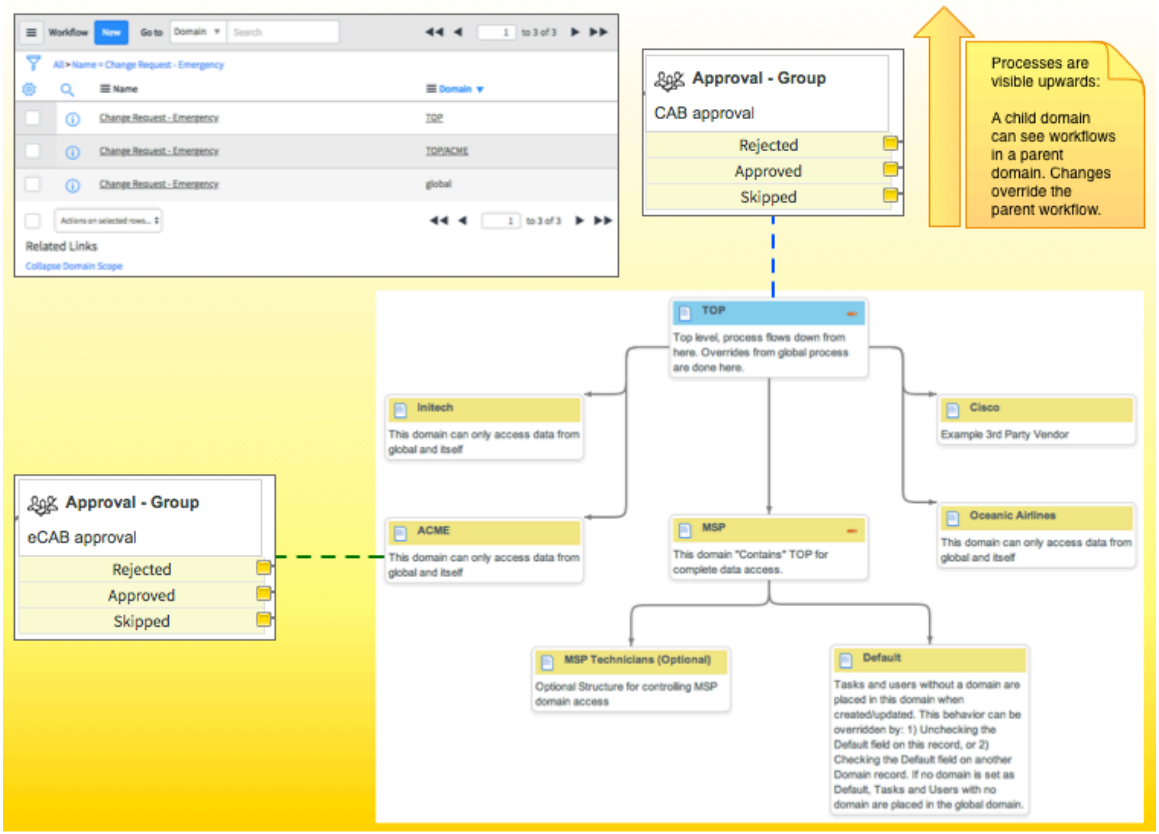
Workflow and delegated administration



Workflow records in the Workflow [wf_workflow] and Workflow Version [wf_workflow_version] tables are considered processes. A user in a child domain may check out but not copy a workflow from a parent domain. When a user in a child domain checks out a workflow from a parent domain, the system creates a version of the workflow in that user's domain. This new version is a unique record in the Workflow [wf_workflow] table. After the user publishes this new workflow, other users in the child domain use the new workflow, which overrides the workflow from the parent domain. The original workflow in the parent domain is no longer visible to users in the child domain.

For example, a managed service provider (MSP) hosts ITSM services for several companies, including ACME and Initech, on a single instance. As administrators, the MSP creates a Change Request - Emergency workflow that applies to all domains because it was created in the TOP domain, which is the highest domain in the domain hierarchy. This workflow overrides the global Change Request - Emergency workflow and specifies that emergency change requests require approval from the CAB approval group. Because of delegated administration, every domain in the hierarchy sees and uses this workflow. Now suppose the ACME domain requires a different approval policy where emergency change requests require approval from the emergency CAB approval group. The MSP creates another version of the Change Request - Emergency workflow in the ACME domain. This workflow overrides the version in the TOP domain and only applies to users in the ACME domain.

Workflow permissions

When a user starts a new workflow, the workflow runs with that user's domain and credentials.

The workflow preserves a user's domain and credentials until an activity causes the workflow to wait, such as an approval activity waiting for approval or rejection. When the stopped workflow resumes, such as when a user approves a request, the workflow uses the credentials of the approving user, but continues to run within the domain of the original user.

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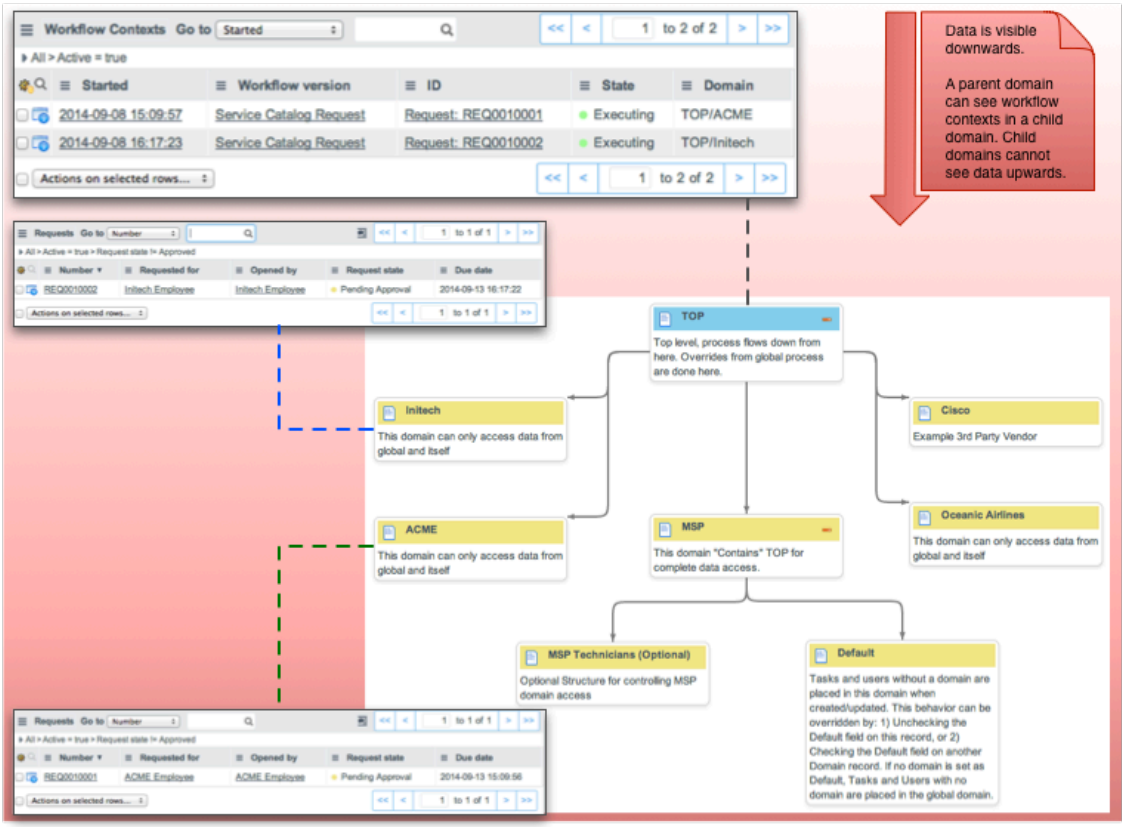
Workflows and data separation

Data separation restricts workflow contexts to users who are either in the same domain of the workflow or are members of a parent domain.

Workflow and data separation



Workflow records in the Workflow Contexts [wf_contexts] table are considered data. Data separation restricts workflow contexts to users who are either in the same domain of the workflow or are members of a parent domain. While a user in a parent domain can see running workflows in a child domain, a user in a child domain cannot see running workflows in a parent domain. If necessary, administrators can use visibility or contains domains to expand who can see domain-specific data.

For example, when an ACME user requests something from the service catalog, a Service Catalog Request workflow context is created in the ACME domain. Similarly, a service catalog request from an Initech user creates a workflow context in the Initech domain. An MSP user in the TOP domain can see both workflow contexts because it is the parent domain for both the ACME and Initech domains. However when an ACME or Initech user logs in, data separation prevents them from seeing each other's service catalog requests. This is expected behavior because each workflow context contains data specific to that domain, such as the item requested and the request's approval history.

Workflow engine operation order

The workflow engine runs in a predefined order relative to business rules and database operations. It caches commonly-used published workflows to improve performance.

The **Run after bus. rules run** workflow property defines if a workflow is **Default** or **Deferred**.

The diagram below shows the workflow engine order of operations and when Default and Deferred flows are executed. For a more general overview of engine operation order, see Execution order of scripts and engines.

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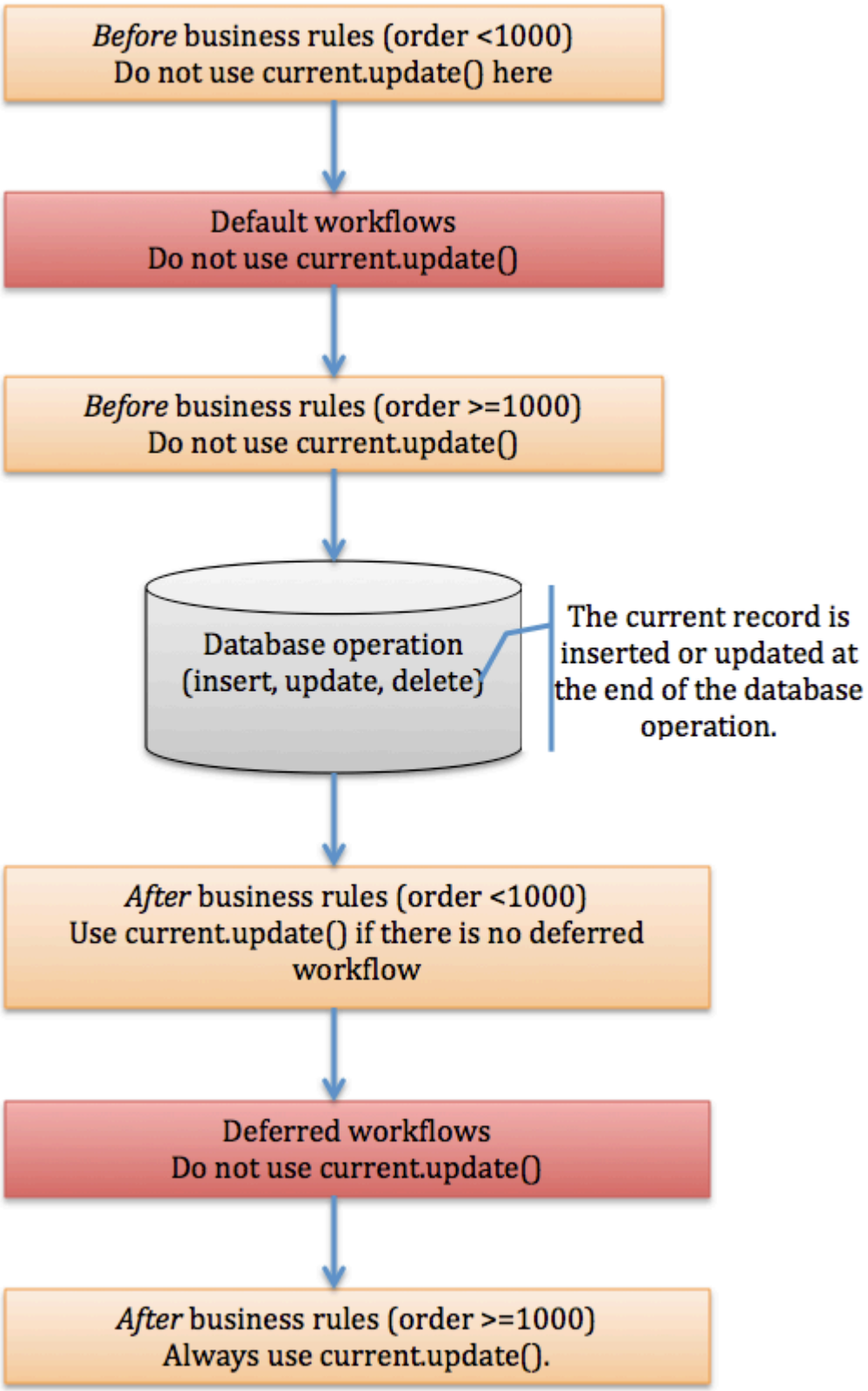
Workflow engine order diagram



Workflow caching

The workflow engine caches commonly-used published workflows to improve performance.

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Caching significantly reduces the number of database queries per workflow. By default, the engine caches up to 300 unique workflow versions. Caching very large workflows may reduce this number as the cache size cannot exceed the Java Virtual Machine (JVM) heap size.

To change the maximum number of cached workflow versions, navigate to **Workflow** > **Administration** > **Properties** and modify the value of the **The max number of models that will be concurrently held in the LRU cache** (*glide.workflow.model.cache.max*) property. You must restart the instance to apply this change.

Workflow tables

For full flexibility, workflows store information over a number of different tables.

Usually tables containing workflow information are not edited one-by-one. Instead, use the Workflow Editor to edit workflows. The following lists are provided for reference purposes.

Workflow tables

Table	Description
Workflows	
Column Renderer [column_renderer]	A renderer widget for a stage column. Stage renderers are written in Jelly as a UI Macro. The default is Workflow-Driven; it covers most workflow related stage scenarios.
Version [wf_versionable]	Tracks different versions of element definitions [wf_element_activity].
Workflow [wf_workflow]	The primary records of workflows.
Workflow Binding [wf_workflow_binding]	History of workflows run and the triggering record. Workflow Binding records prevent the system from running workflows again when the associated Workflow Context record has been deleted.
Workflow Context [wf_context]	Individual instances of a workflow being used.
Workflow Execution [wf_workflow_execution]	Synthetic "current" records for workflows that run on Global.
Workflow Instance [wf_workflow_instance]	Connections of workflows to subflows.
Workflow Version [wf_workflow_version]	Particular versions of a workflow, either published versions or versions that have been checked out.
Activities	
Activity Designer [wf_element_activity]	Custom activity definitions.
Activity Variables [wf_activity_variable]	Variables for activities.
Workflow Activity [wf_activity]	Activities as they are being used in workflows.
Workflow Activity Definition [wf_activity_definition]	Definitions of activities that can be used in a workflow.
Workflow Executing Activity [wf_executing]	Individual instances of activities being performed in active contexts.
Workflow components	

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Workflow tables (continued)

Table	Description
Element Provider [wf_element_provider]	Template definitions for custom activities.
Group approval [sysapproval_group]	Group-level approvals.
Variable [item_option_new]	
Workflow Condition [wf_condition]	All of the defined conditions in workflows.
Workflow Element Definition [wf_element_definition]	Parent table for activity definitions.
Workflow Estimated Runtime Configuration [wf_estimated_runtime_config]	Runtime performance data for completed workflows.
Workflow Queued Command [wf_command]	Temporary internal storage for workflows that are currently executing.
Workflow SC Variable [wf_variable]	The Service Catalog variables for a workflow.
Workflow Schedule [wf_workflow_schedule]	Definitions of the times to run specific workflows.
Workflow Timing [wf_workflow_timing]	Timing performance data for workflows.
Workflow Transition [wf_transition]	All of the defined transitions in workflows.
History	
Workflow Activity History [wf_history]	The history of executed activities.
Workflow Log Entry [wf_log]	All of the events and history of the workflow.
Workflow Transition History [wf_transition_history]	The history of executed transitions.
Stages	
Stage Default [wf_stage_default]	Definitions of default stage fields for tables to use.
Stage Set [stage_set]	A named set of stages that can be used to populate workflow stages for multiple workflows.
Stage Set Entry [stage_set_entry]	The stages that belong to a named stage set.
Stage Set for Table [stage_set_table]	Defines a relationship of a stage set to a table so that the stage set can be used as the default stages when a new workflow is created for the table. This replaces the wf_default_stage table and is the view that shows when you click **Default Stages (by table)** in the menu.
Workflow Stage [wf_stage]	Definitions of stages used by workflows.

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Workflow administration

Tailor workflows exactly the way you want them.

Workflow roles

Certain roles are required to use workflows.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Workflow roles

Role title [name]	Description
Activity creator [activity_creator]	Creates and edits custom workflow activities, reuses custom activity data, and manages activity packs downloaded from the ServiceNow Store.
Web service administrator [web_service_admin]	Accesses and uses REST and SOAP messages in the Orchestration activity designer. Creates and edits custom activities that use the REST web service and SOAP web service templates.
Workflow administrator [workflow_admin]	Checks out, creates, edits, publishes, and deletes graphical workflows. **Warning:** Granting this role to a user is equivalent to giving the user the admin role, because workflow Script activities bypass access controls and grant access to all tables and database operations. Script activities do not bypass application scope settings.
Workflow creator [workflow_creator]	Checks out, creates, edits, and deletes graphical workflows. **Warning:** Granting this role to a user is equivalent to giving the user the admin role, because workflow Script activities bypass access controls and grant access to all tables and database operations. Script activities do not bypass application scope settings.
Workflow publisher [workflow_publisher]	Checks out with force checkout option, validates, publishes, and deletes graphical workflows.

Administering workflow contexts

The workflow context performs the activities and transitions defined in the workflow with the new record as current.

Workflow in ServiceNow names a running workflow a Workflow Context. The Workflow Context maintains the state of the overall process in the Workflow Context record. The Workflow Context maintains the state of the individual activities as they execute in a series of related lists. These lists maintain the state of currently executing activities, the result of finished activities, and the execution path the workflow took through the process model.

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The Workflow Context canvas provides a visual representation of the execution path the workflow took through the process model. The state of each activity (finished, executing, cancelled, error) is represented using the color palette. The executed paths are represented in the color blue; the non-executed paths are represented in grey. Active and historic workflow contexts, as well as the activities within them, can be viewed using the Live Workflows section of the Workflow application menu.

Viewing a workflow context

Workflow contexts can be found in two places:

- From the **Workflow Context** related link on the form of the task being powered by the workflow.
- By navigating to **Workflow** > **All Contexts** and selecting an active context.

Displaying workflow progress

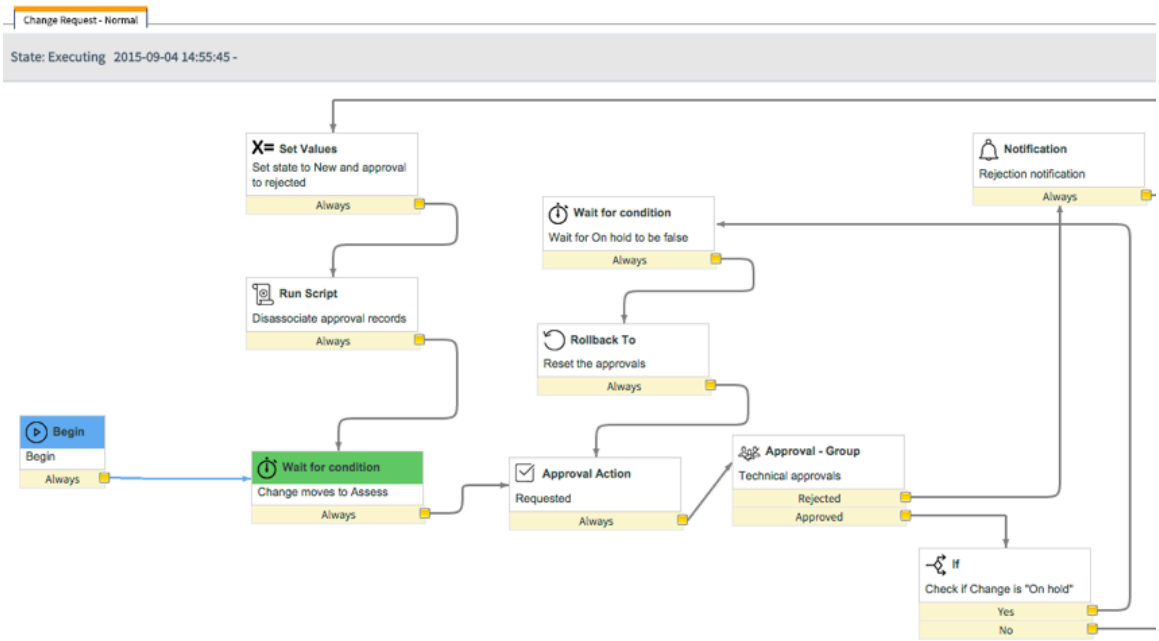
Two related links on the Workflow Context form allow you to view the progress of a workflow in different formats.

- **Show Timeline** displays the workflow context as a timeline.
- **Show Workflow** displays the workflow context in the graphical Workflow Editor.

Graphical interface

To view the workflow context in the graphical Workflow Editor interface, click the **Show Workflow** link from either the workflow context record or the current record.

Show workflow



In the top right hand corner are two controls:

	Refreshes the workflow context.

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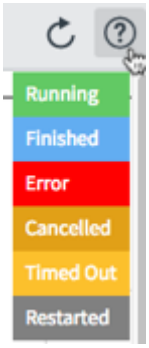
(continued)

	Displays a key of the colors used in the workflow to denote the state of activities and transitions: 

Execution order

View tooltip text in the workflow context graphical view to see the execution order of individual activities.

In **Workflow** > **Live Workflows** > **Active Contexts** or **All Contexts**, Open the context you want to examine. Click **Show Workflow**, and point to a finished or executing activity. The tooltip shows error data, execution time, and the order in which the activity executed in the workflow. Use this data to help troubleshoot activities in an error state.

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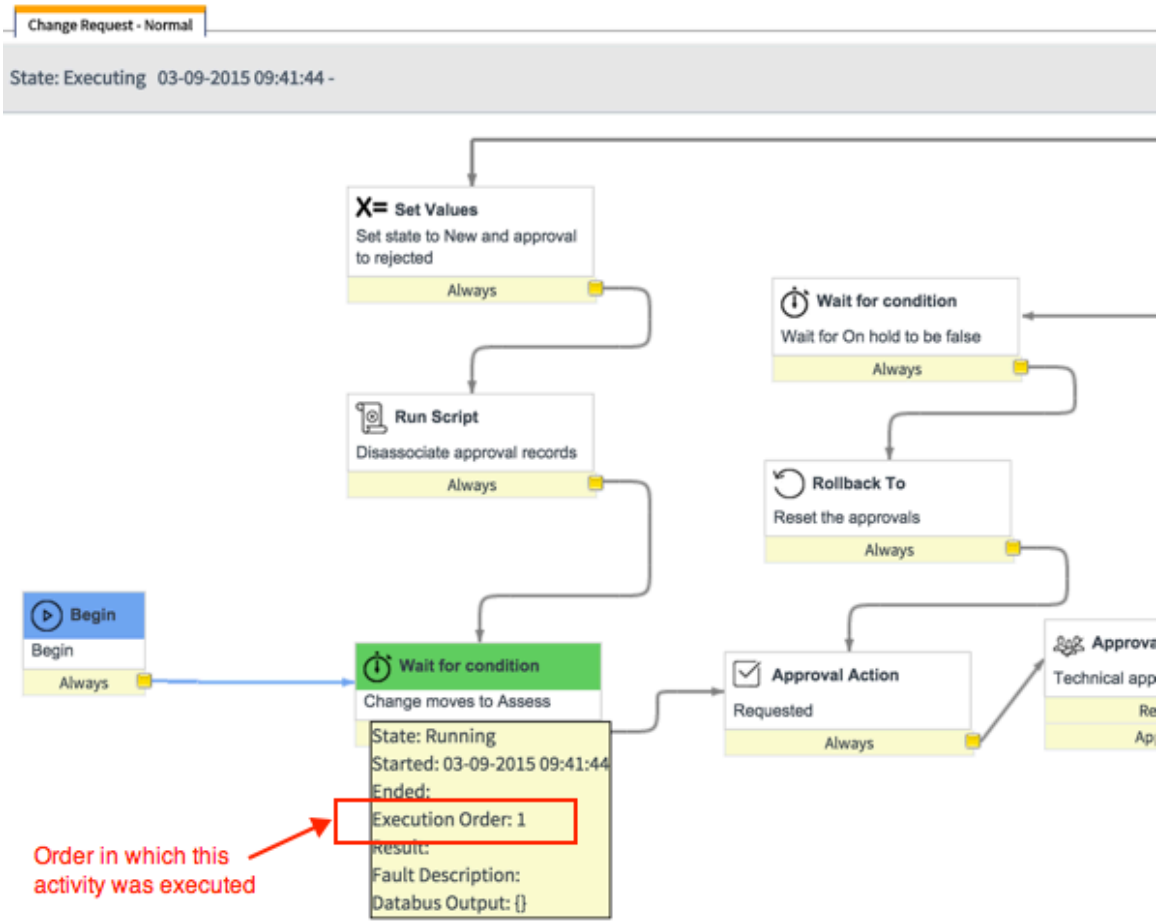
Execution order workflow



Cancel a workflow

Canceling a workflow stops the workflow from executing and sets the workflow context **State** to **Canceled**. To cancel an executing workflow, you can use the `cancelContext(context)` script. You can define an onCancel script to clean up unresolved workflow activities.

Before you begin

Role required: admin or workflow_admin

About this task

Canceling a workflow attempts to stop the workflow gracefully by injecting a cancel command into the workflow engine.

Procedure

1. Navigate to **All** > **Workflow** > **Active Contexts**.
2. Select a workflow context record.
3. Configure form layout to add **On-cancel script** field to form.
   For detailed information about configuring form layout, see Configuring the form layout.
4. Select the **Cancel** related link.
   A confirmation appears.

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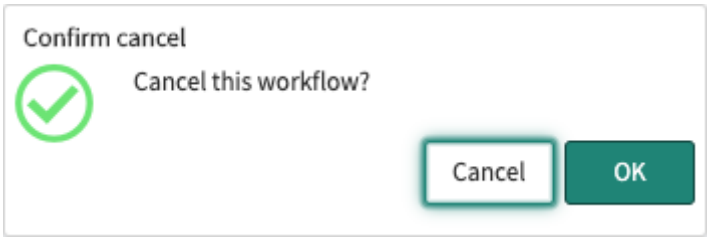
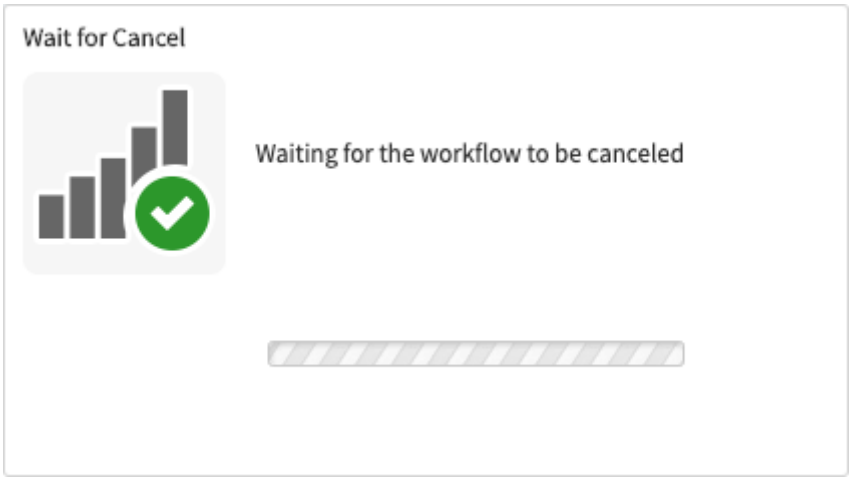
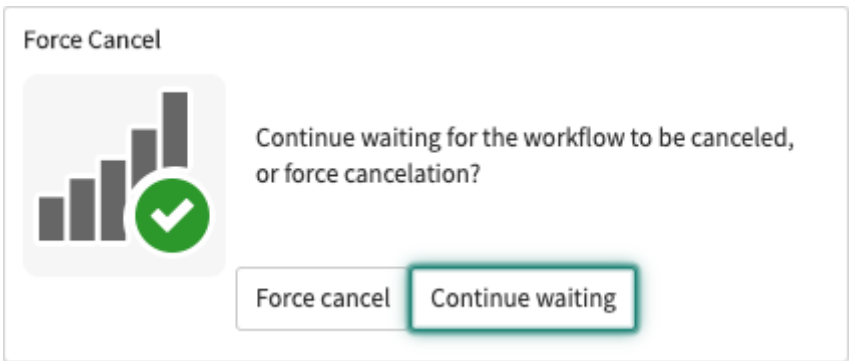


5. Click **OK**.
   The workflow engine attempts to cancel the workflow gracefully.



If the workflow does not respond to the cancel command, the Force Cancel option appears.



6. Click **Force cancel** to interrupt the thread the workflow is actively executing or click **Continue waiting** to continue waiting for the workflow to cancel gracefully.

> **Warning:**
> Whenever possible, allow a workflow to cancel gracefully. Forcing a workflow to cancel can leave related workflows and scripts in an unresolved state. You can use an on-cancel script to clean up unresolved artifacts from a cancelled workflow.

Cancel a workflow with the cancelContext(context) script

To cancel an executing workflow, you can use the `cancelContext(context)` script. This script can be useful in cases where a workflow must be canceled in response to an event or where a user must manually cancel a workflow.

Before you begin
Role required: admin

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About this task

For more information, see the Workflow - cancelContext(GlideRecord context) .

Define an on-cancel script

Canceling a workflow can leave records or scripts in an unresolved state. For example, canceling a service catalog workflow may leave catalog items in the requesting user's cart. An administrator can specify an On-cancel script that runs when the workflow transitions to the Canceled state. This script can notify users, log information, or resolve the state of any scripts run within a workflow activity. The sys_id of the workflow context is available in this script using the context_sys_id variable.

About this task

On-cancel scripts run asynchronously from the global scope. Your instance workload determines when the system schedules and runs the on-cancel script.

Important:
Since the system runs on-cancel scripts from the global scope, they cannot call or run scoped script includes.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Versions**.
2. Select a workflow version that you have checked out.
   Workflow versions that are not checked out are not editable.
3. Edit the **On-cancel script** field.
   You may need to configure the form to add this field.
4. Click **Update**.

Example:

This example script adds a comment to a Requested Item [sc_req_item] record indicating the workflow for that request has been canceled.

```
var grContext = new GlideRecord("wf_context");
grContext.get(context_sys_id);
var grReq = new GlideRecord("sc_req_item");

// The current record may not exist, make sure it exists before
 modifying it.
if (grReq.get(grContext.id)) {
    grReq.comments = "The workflow processing this item was
 Canceled. Contact your system administrator for further
 information.";
    grReq.update();
}
```

Scheduling a workflow

In addition to being run based on conditions, workflows can also be scheduled to perform at a particular time, similar to a scheduled job.

Scheduled workflows do not have a defined current record and do not run on specific records within a table. Due to this behavior, certain activities that depend on a current record, such as **Create Task** or **Catalog Task** are unavailable on scheduled workflows. If your workflow requires one of these activities, consider using a scheduled job that inserts a record to start the workflow instead of using a scheduled workflow.

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To schedule a workflow, navigate to **Workflow** > **Scheduled Workflows** and click **New**. Populate the following fields:

Field	Description
Name	A unique name for the scheduled workflow.
Workflow	Select an existing published workflow to be triggered at the specified date, time, or interval.
Active	If selected, the scheduled workflow will be triggered at the appropriate time.
Application	Specifies the type of application, such as Global.
Run	A choice list to determine when the workflow should be triggered. Options are: • **Daily:** At a particular hour every day. • **Weekly:** On a particular day of the week. • **Monthly:** On a particular day of the month • **Periodically:** After every set duration. • **Once:** At one specific date and time.
Time	For daily/weekly/monthly scheduled workflows, the time of day to run the workflow.
Day	For weekly scheduled workflow, the day of the week to run the workflow. For monthly scheduled workflows, the day of the month to run the workflow.
Repeat Interval	For periodical workflows, the interval between workflows, beginning from the **Starting** date and time.
Starting	For periodical workflows, the first date and time to run the workflow. For scheduled workflows run once, the date and time to run the workflow.

Related topics

Create a scheduled job

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Workflow movement with update sets

The system tracks workflows in update sets differently than other records because workflow information is stored across multiple tables.

Changes made to a workflow version are not added to the update set until the workflow is published, at which point the entire workflow is added into the update set. Update sets store workflows as a single Workflow [wf_workflow] record and only retain the latest version with the update type of Workflow.

For information about update sets, see System update sets.

Workflow update set migration use case - simple

Create a new workflow with no dependencies and then migrate the workflow in an update set.

1. User A selects Update Set A.
2. User A creates a new workflow called Workflow A.
3. User A publishes Workflow A.

   A customer update set record is added to Update Set A containing an XML payload, including the published Workflow A and all activity dependencies. The XML payload also contains the workflow input variables associated with the workflow.
4. User A completes Update Set A and migrates it to the production instance.
5. Update Set A commits successfully.
6. Workflow A works as expected.

Workflow update set migration use case - subflow dependency (success)

Successfully edit and migrate an existing workflow and its dependent subflow.

1. User A selects Update Set B.
2. User A checks out Workflow A.
3. User A adds a subflow called Workflow B to Workflow A.

   Assume that Workflow B was previously published and migrated to the production instance.
4. User A publishes Workflow A.

   A customer update set record is added to Update Set B containing an XML payload, including the published Workflow A and all activity dependencies. The XML payload also contains the workflow input variables associated with the workflow.
5. User A completes Update Set B and migrates it to the production instance.
6. Update Set B commits successfully.
7. Workflow A works as expected with Workflow B as a subflow.

Workflow update set migration use case - subflow dependency (failure)

Edit and migrate an existing workflow from a test instance to a production instance that fails to run on the production instance because of a missing dependent subflow.

1. User A selects Update Set C.
2. User A checks out Workflow A.

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3. User A adds a subflow called Workflow B to Workflow A.

   Assume that Workflow B was previously published, but has not been migrated to the production instance.

4. User A publishes Workflow A.

   A customer update set record is added to Update Set C containing an XML payload, including the published Workflow A and all activity dependencies. The XML payload also contains the workflow input variables associated with the workflow.

   Notably absent from Update Set C is the subflow called Workflow B. Workflow B was published before User A selected Update Set C.

5. User A completes Update Set C and migrates it to the production instance.
6. Update Set C commits with warnings.
7. Workflow A is invoked on the production instance with the following results:

   Workflow A fails the runtime validation check and is prevented from running on the production system. The system adds to the workflow context a workflow log entry detailing the cause of the failure, notably the absence of a dependent workflow.

   To learn more about the validation checks on workflow dependencies and update sets see ValidateUpdateSetDependencies.

Workflow update set migration use case - subflow dependency (risk)

Multiple users migrate a workflow from a test instance to a production instance without proper coordination. This use case can succeed, but only when each user understands the dependencies and properly migrates the dependent parts of the workflow to the new instance.

This example does not represent an update set failure, although update sets are most often blamed in this use case. Validation increases the visibility of workflow dependencies across multiple update sets and provides designers with better information. In most cases, the warnings do not prevent an action, but only identify risk. The designer is responsible for taking action on advice given in the validation checks.

1. User A selects Update Set C.
2. User A checks out Workflow A.
3. User A adds a subflow called Workflow B that returns a **User ID**.

   Note:
   Assume that Workflow B was previously published and migrated to the production instance.

4. User A uses the return value of Workflow B to generate approvals.
5. User B selects Update Set D.
6. User B checks out Workflow B (the subflow in Workflow A).
7. User B modifies the return value of the workflow by changing it from a **User ID** to a **String Message**.
8. User A publishes Workflow A.

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Note:
A dialog box displays warnings associated with Workflow A and encourages User A to validate the workflow before publishing.

9. User A cancels publishing and validates Workflow A.
10. User A is warned that Workflow B was modified by a user in a different update set.
11. User A ignores this warning and publishes Workflow A.

Note:
A customer update set record is added to Update Set C containing an XML payload, including the published Workflow A and all activity dependencies.The XML payload also contains the workflow input variables associated with the workflow.

12. User A completes Update Set C and migrates it to the production instance.
13. Workflow A is invoked on the production instance and runs successfully using the older version of Workflow B already on the system.
14. User B publishes Workflow B.

Note:
User B is not warned of the Update Set C dependency, because the update set is no longer In progress. However, User B is informed via a dialog box that there are warnings associated with the workflow version and is instructed to validate Workflow B. If User B cancels publication and validates the workflow, User B is warned that there are workflows that use Workflow B as a subflow. Knowing the return value was changed, User B should test those workflows as well. See ValidateUpdateSetDependencies to understand the parameters of update set warnings.

15. User B finally publishes Workflow B.

Note:
A customer update set record is added to Update Set D containing an XML payload, including the published Workflow B and all activity dependencies.

16. User B completes Update Set D and migrates it to the production instance.
17. Update Set D commits without warnings.
18. Workflow A is invoked on the production instance and fails to run successfully, because the return value of Workflow B no longer generates a User ID.

Input variable movement

You can add input variables to existing workflows and add them to update sets.

When you submit the new variables, an entry is made into the current update set that reflects the addition of a variable to the Variables [var_dictionary] table. Unlike the workflow version that only writes to the update set when the workflow is published, the variables write individual update entries into the currently selected update set immediately upon submission.

Input variable movement use case - two input variables

An existing workflow already contains two input variables.

1. User A checks out the workflow.
2. User A adds two input variables.

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ServiceNow adds to the current update set one customer update record for each new variable.

The current workflow now has 4 input variables: the two that were present prior to check out and the two new ones.

3. User A publishes the workflow.

   There are now three related customer update records: two for new variables, and one for the published workflow. The XML payload of the new workflow version now includes all input variable database entries. So while the two original input variables do not have individual customer update records, all four variables are migrated to the local instance with the payload of the newly published workflow version.

4. Verify variables included in a specific workflow.
5. User A completes the update set.
6. Adding Input Variables - Success

   User A migrates and commits the update set to a local instance where the original workflow version had previously been committed.

   - The two existing input variables are already present because of the earlier version.
   - The system adds the two new input variables when the user commits the update set.
   - The system preserves the two legacy input variables on the instance receiving the update set. The update set does not overwrite these variables.
   - The new published workflow version uses all four variables.
   - The user tests the new workflow version and it runs as expected.

Verify variables included in a specific workflow

You can verify the variables that are included in a specific workflow.

Procedure

1. Navigate to **All** > **System Update Sets** > **Local Update Sets**.
2. Select the active update set.
3. Select the customer update entry for the workflow.
4. View the **XML Payload**.
5. Search for the name of one of the columns or search for var_dictionary.

   There is one var_dictionary entry for each input variable.

Input variable removal

Deleting workflow input variables, like insert and update actions, creates a customer update record in a user's current update set.

These deletions migrate to a new instance with the update set, regardless of whether the workflow that owns the input variables is published in the same update set. Plan carefully and use caution when editing a workflow and selecting update sets.

Input variable removal risk

An existing workflow already contains two input variables.

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1. The workflow was migrated to a production instance with the two variables.
2. On a development instance, User A selects Update Set A and checks out the workflow.
3. User A removes one input variable and all references to it in the workflow.

   The system enters into Update Set A one customer update record reflecting the deletion of the input variable. No record is added for the new workflow version which no longer depends on the input. This does not happen until the workflow is published.
4. User A continues working on other features in Update Set A that need to be moved to production.
5. User A completes Update Set A and migrates it to the production instance without publishing the workflow.

   The update set entry that deletes the workflow input variable now applies to the production instance. The prior version of the workflow is running on this instance and still references the missing variable.

Input variable removal solution

When editing workflows, particularly when deleting input variables, be sure to use a single update set for all variable editing and workflow publishing.

If necessary, merge the update set into a more general set targeted for deployment after the workflow is published. For information about update sets, see System update sets.

Note:
If a workflow version is already running on a production system and input variables are deleted from a newer version, those deletions could affect transactions already running against the earlier version. Use extreme caution when deleting workflow input variables and plan the migration carefully.

Input variable removal prevention

Prior to publishing a workflow version, the system validates the workflow model to assist the designer in planning for deployment.

This validation warns of critical errors that can prevent a workflow from running successfully, but also warns of dependencies and conflicts in update sets. See ValidateUpdateSetDependencies for more details.

Avoiding duplicate workflows

Update sets manage the published state of all versions of a workflow prior to committing the workflow version on a local instance.

The last version of a workflow committed as an Insert or Update using an update set becomes the currently published version, regardless of the publishing sequence for the workflow versions.

Commit a workflow in an update set

Follow the steps in this page to commit a workflow in an update set.

Procedure

1. Workflow A - Version 1 is created and published in Update Set A.
2. Update Set A is completed and migrated to a local instance.
3. When the update set is committed, the system sets all prior versions of Workflow A to published = false.

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In the first migration, there are no prior versions.

4. Workflow A - Version 1 becomes the only published version of the workflow.

Update set migration example

It is not possible to have multiple published versions as a result of update set commits. However, this does not eliminate risk, and care should be taken when migrating update sets.

Consider this example:

1. Workflow A - Version 1 is migrated and committed to the production instance.
2. Update Set B is created.
3. Update Set C is created.
4. Workflow A - Version 2 is published in Update Set B.

   A customer update record is added to Update Set B with the Version 2 payload.

   A customer update record is added to Update Set B with the Version 1 workflow left unpublished.
5. Update Set B is completed.
6. Workflow A - Version 3 is published in Update Set C.

   A customer update record is added to Update Set C with the Version 3 payload.

   A customer update record is added to Update Set C with the Version 2 workflow left unpublished.
7. Update Set C is completed.
8. Update Set C is migrated and committed to the production instance.

   Workflow A - Version 1 is set to unpublished.

   Workflow A - Version 2 update is skipped since Update Set B, which contains Version 2, was never migrated.

   Workflow A - Version 3 is committed and becomes the only published version of the workflow.

Update set migration risk

Update Set B is migrated and committed to the production instance.

1. Workflow A - Version 3 is set to unpublished.
2. Workflow A - Version 1 remains unpublished.
3. Workflow A - Version 2 is committed and becomes the only published version of the workflow.

   The workflow has gone back a version, perhaps unintentionally. The regressed version becomes the currently published version.

Workflow timelines

The system provides a timeline view of history activities associated with a workflow context.

Timelines display a linear calendar of activities, such as tasks and approvals, defined by their start and end dates. Each activity on the timeline is represented by a span, which is displayed as a horizontal, colored bar. Each span has a label and a tooltip that contains additional information

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about the activity. The left pane displays all the activities in the context (or contexts) in an expandable hierarchy. You can change the timeline's perspective for a more granular view of the data.

Note:
Workflow timelines reflect context history only and are not real-time gauges of workflow activity.

Use a timeline

By default, the timeline displays all activities and transitions requested when first opened.

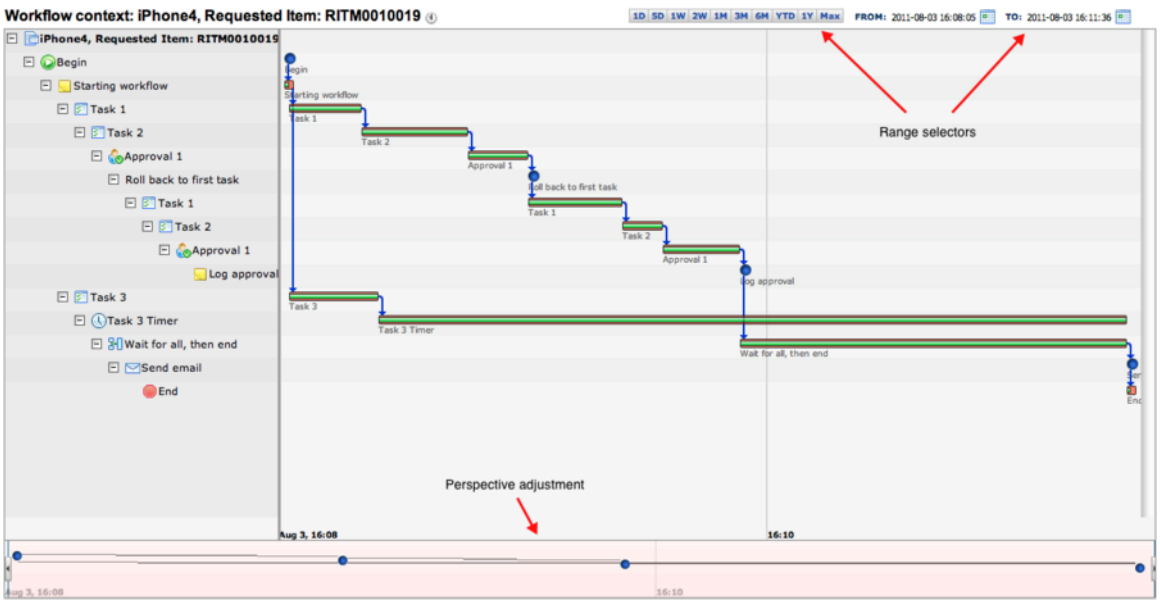
About this task

Collapse any part of the hierarchy in the activity pane and the timeline adjusts automatically. Date/time and duration controls enable you to scale the timeline to view all the elements at once. To display a timeline, click a UI action within a Workflow Context record.

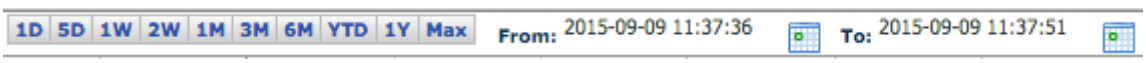
Procedure

1. Navigate to**All** > **Workflow** > **Live Workflows** > **Active Contexts**.
2. Select a context.
3. In **Related Links**, click **Show Timeline** to display the timeline for the entire context.

   The timeline opens with all activities expanded and the view set to **Max**, which displays the entire timeline at the width of the pane. The title of the timeline is in the form Workflow context: <context name>, Requested Item: <requested item number>.



4. Use the Range Selectors at the top of the timeline to change the perspective.



   The increments go from one day to one year. To limit the timeline to an increment between the start date of the first span and the end date of the last span, click **Max**.

5. Use the starting and ending calendar fields to select the timeline perspective.

   These fields control the same perspective as the slider at the bottom of the timeline.

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6. Use the pink slider at the bottom of the timeline to change the perspective.



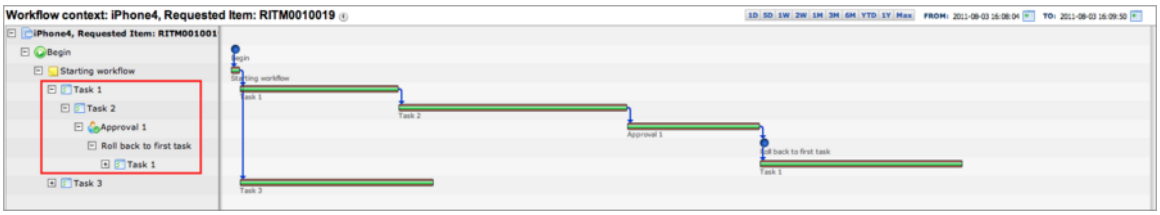
   a. Move the slider from right to left to view all the spans on a long timeline.

   b. Adjust the end points of the slider to make arbitrary changes to the magnification.

      A narrow slider zooms in on the spans and provides a more detailed view of complex timelines. A wide slider pulls the view out and makes more of the timeline visible on the screen.

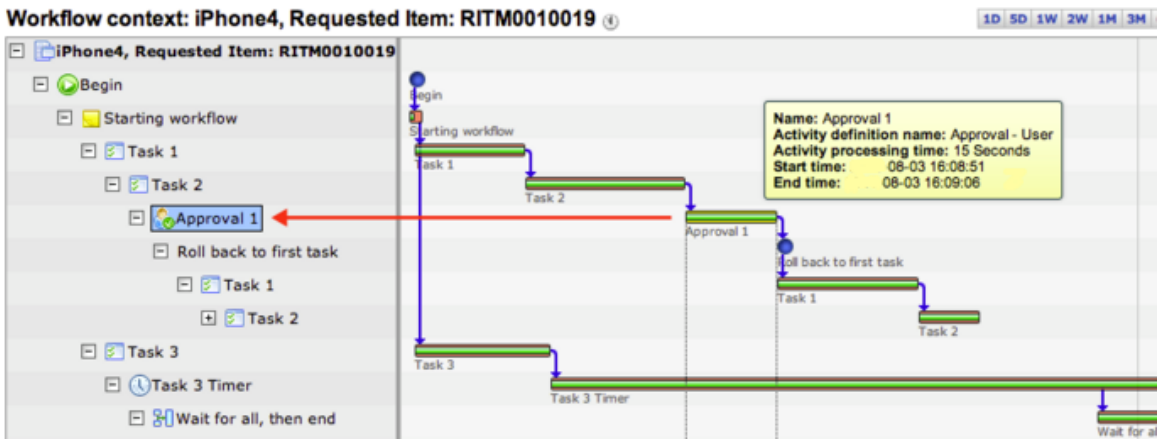
7. To focus the timeline view on selected activities, expand or collapse the activity tree.

   Spans not visible in the activity tree are not shown in the timeline pane.



8. Hover over an activity span to display a tooltip with information about the activity.

   This action highlights the activity in the activity pane.



9. Hover over the transition between two activities to highlight the activity and the predecessor activity in the activity pane.

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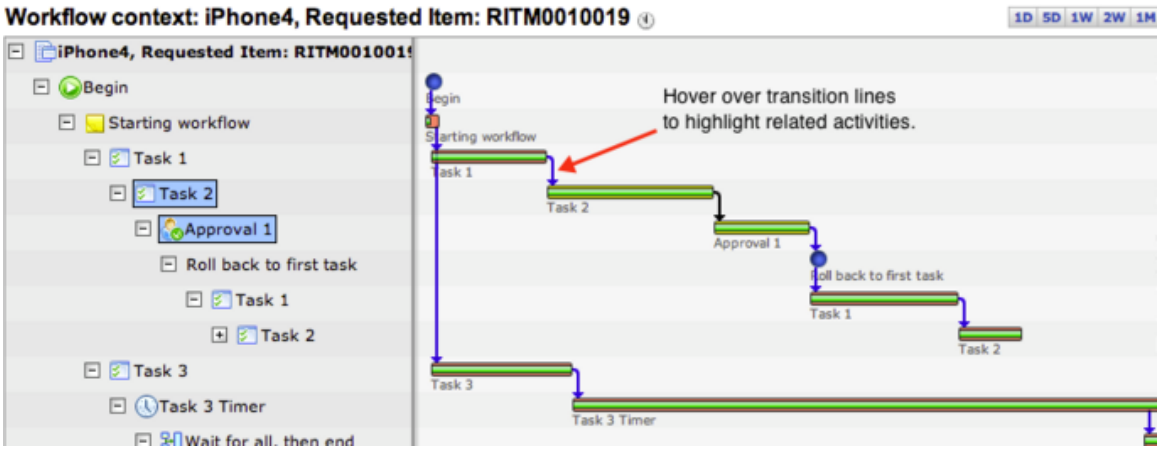
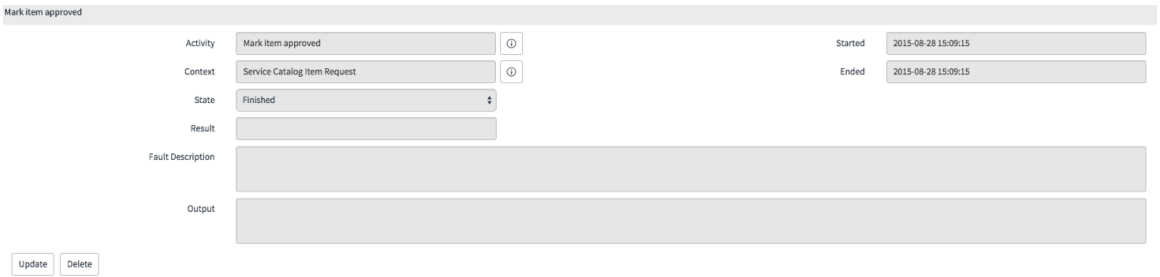


10. Double-click a span to display a history record for that activity.

    History records shows information such as the **State** and the starting and ending times.



Timeline for a selected activity

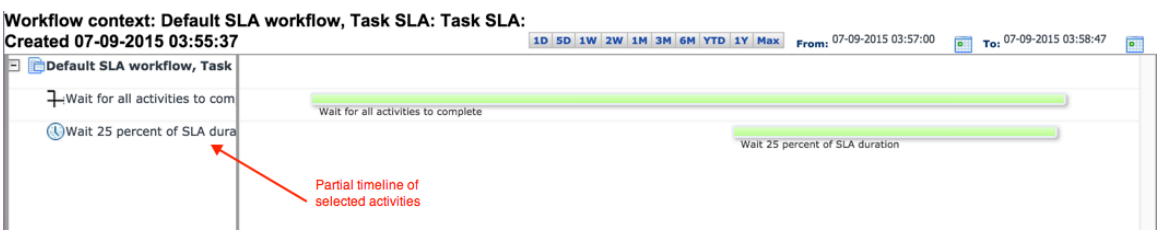
You can display a partial workflow timeline.

Procedure

1. Navigate to**All** > **Workflow** > **Live Workflows** > **Active Contexts**.
2. Open a Workflow Context record.
3. On the **Workflow Activity History** related list, select one or more individual activities.
4. Click **Show Timeline** from the action menu.

   The resulting view is a snapshot of the timeline, showing only the selected activities and their transitions, if any.

5. Collapse the tree to confine the view even further.



6. To view a timeline displaying activities from different contexts:
   You might use this feature to display a subflow's context with the parent workflow context.

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a. Navigate to **Workflow** > **Live Workflows** > **History**.

b. Select individual history items from the list.

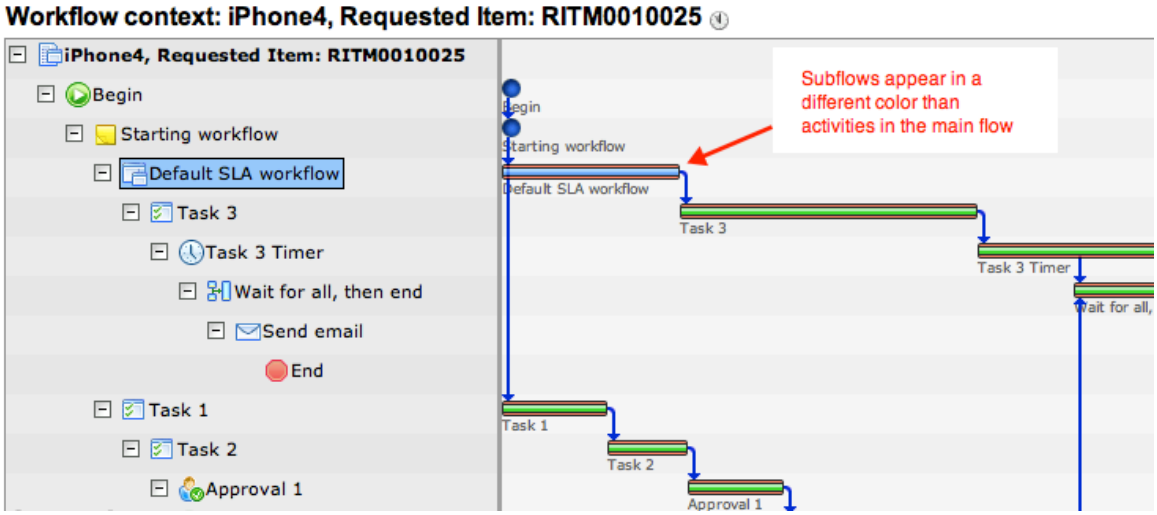
c. Select the **Show Timeline** option from the actions menu.

History items are arranged in a hierarchy in the activities pane under their contexts. The timeline title is **Multiple Contexts**. The timeline draws only the activities and relationships of the history items selected.

View subflows in a workflow timeline

In a workflow timeline, subflow spans appear as a different color than the activities of the main workflow.

Workflow timeline subflow



Workflow error handling

The personalized JavaScript that users create in workflow activity variables is vulnerable to run-time syntax errors. Available error information is available in a tooltip when you point to a workflow activity in an error state.

In the base system, workflow activities do not provide condition routing on the error state. As a result, the workflow progresses based on the state of the current record. For example, a workflow contains an **Approval - User** activity that uses an advanced script to add additional approvers. A syntax error in the script results in no approvers being added. Because a state of **no approvers** is a valid return, even without the syntax error, the approval activity is skipped and the workflow progresses along a positive path. However, this might not be a valid response for the workflow designer who does not want the workflow to progress along the positive path without approvers.

Workflow error handling detects and logs syntax errors and provides a state that the workflow designer can use to add error conditions to the workflow. Use error handling to locate syntax errors in advanced script fields for these workflow activities:

- Approval - User
- Approval - Group
- Catalog Task
- Create Task
- If

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- Run Script
- Notification

Available error information

This table shows which activities support error exits.

Available error information

Activity	Workflow log	Red error indicator	Activity state	Activity result	Fault description	Reroute on error
Approval - User Approval - Group	Yes	Yes	Error	Skipped	Yes	Yes
Catalog Task Create Task	Yes	No	Finished	none	No	No
If	Yes	Yes	Error	none	Yes	Yes
Run Script	No	Yes	Error	error	Yes	Yes
Notification	Yes	Yes	Error	error	Yes	Yes

Workflow error tracking features

Error handling provides visual cues within the workflow, such as error descriptions for activities in pop-ups, and detailed log records.

Banners

Look for an activity with a red banner, indicating that a syntax error has occurred in a script field. All activities that provide error handling, with the exception of **Catalog Task** and **Create Task**, display a red banner for this error.



Tooltips

Point to the activity displaying a red banner to view information about the error. A tooltip shows the **State** and **Result** of the activity and provides a brief **Fault Description** (except for task activities). Note that this approval continued as skipped despite the error given in the fault description. See Workflow error handling for the information available to each activity.

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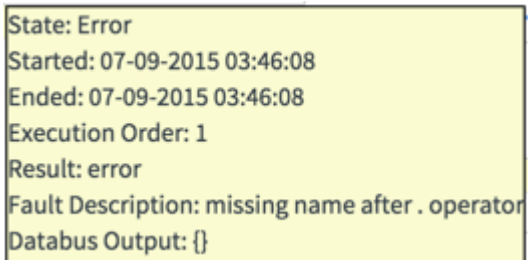


Execution order

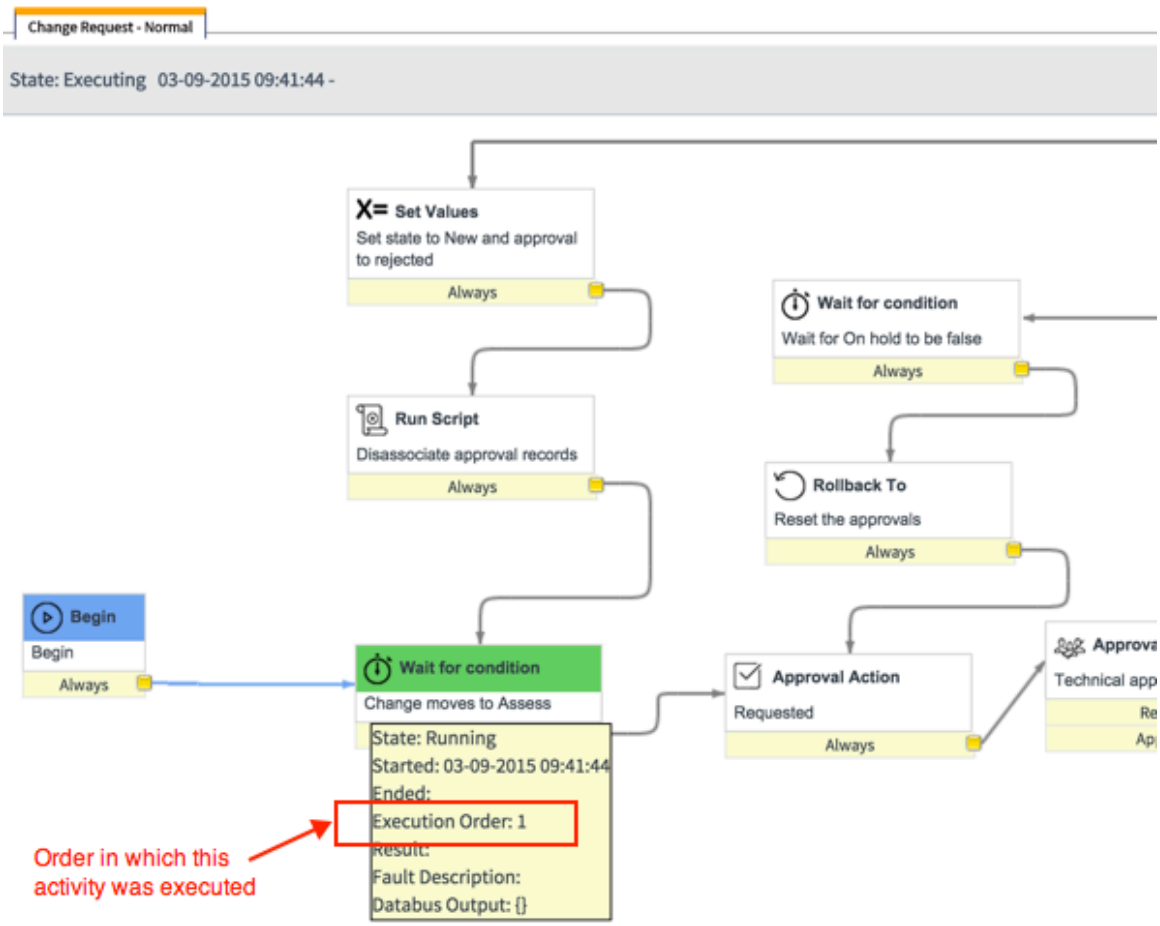
Tooltip text in the Workflow Context graphical view displays the execution order of individual activities, which assists in troubleshooting.

To view the order in which a workflow activity was executed:

1. Navigate to **Workflow** > **Live Workflows** > **Active Contexts** or **All Contexts**.
2. Open the context you want to examine.
3. Click **Show Workflow**.
4. Hover the cursor over a finished or executing activity.

   A tooltip appears showing error data, execution time, and the order in which that activity executed in the workflow. You can use this data to help troubleshoot activities in an error state.

Activity execution order



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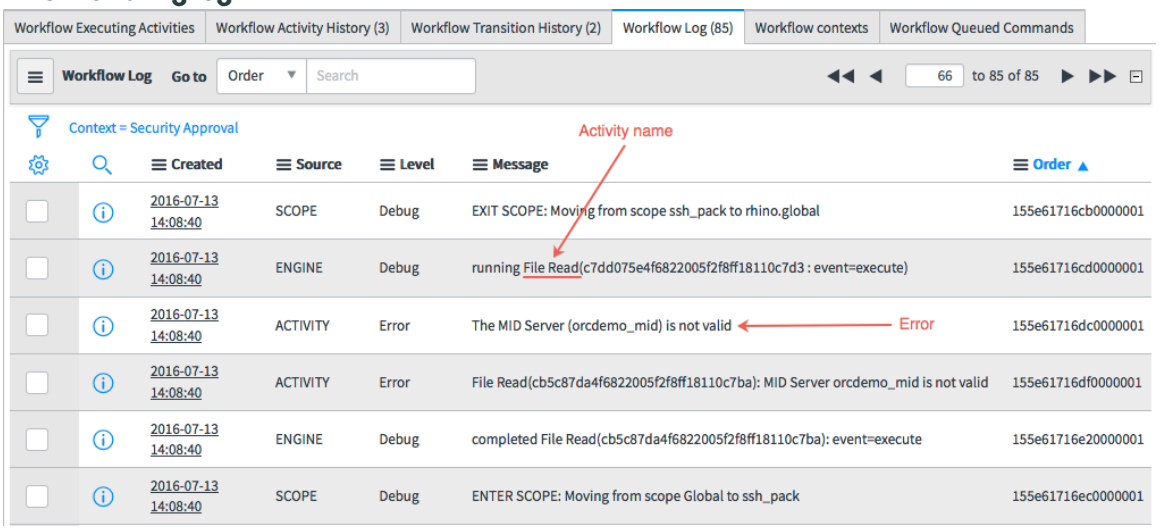
Workflow log

View the log in the Workflow Context form for more information about the syntax error in the activity. Since task activities do not display a red banner when a syntax error has occurred, you must view the log if you suspect the workflow has not run properly. Examine the error description in the log, and then inspect the script in the activity named in the log.

To view the activity by name, navigate to **Workflow** > **Administration** > **Properties** and enable the **Log workflow debug messages** property.

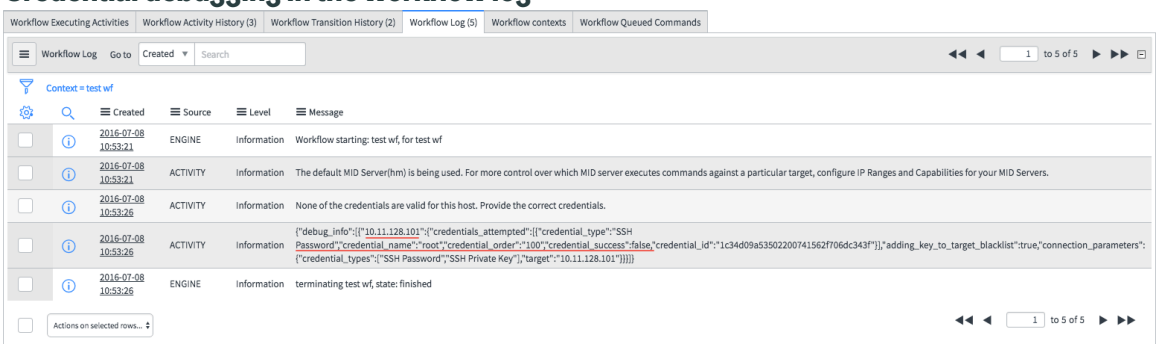
In this example, an SSH activity named File Read specifies an invalid MID Server.

Error handling log



If the credentials used by an activity in the workflow fail, and the activity cannot authenticate on the target, a message describing the failure appears in the **Workflow Log** related list. The message displays the target IP address and the credential details.

Credential debugging in the workflow log



Create an error condition exit

An administrator can reroute the workflow when a script error occurs by creating an error condition exit for specific activities within the workflow. This allows the workflow to process script errors in a predictable way and not create undesirable results.

Procedure

1. Open and check out a workflow.
2. Right-click in the top portion of the activity for which you want to create an error exit.
3. Select **Add condition** from the context menu.

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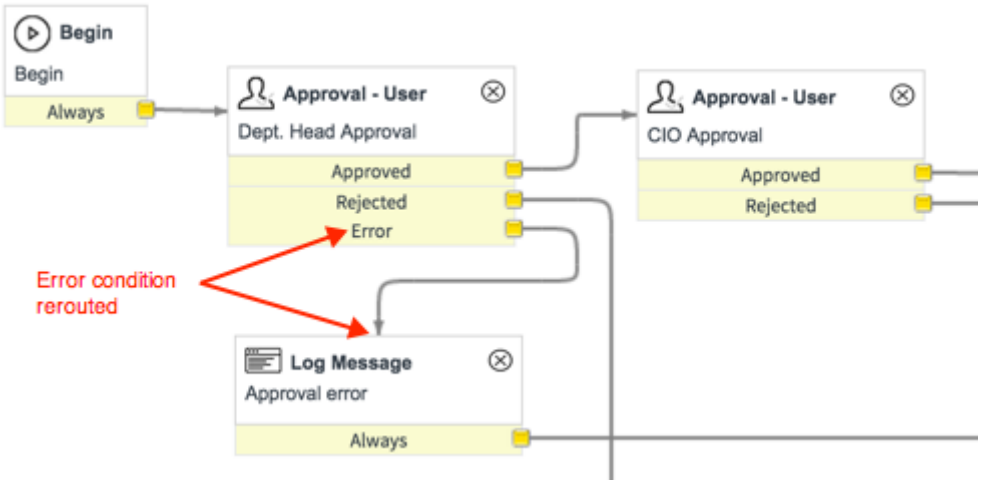
4. Add a condition exit with the following values:
   - Name: `Error`
   - Condition: `activity.state=='faulted'`
5. Click **Submit**.

   The **Error** exit appears on the activity.
6. Connect the **Error** exit to another activity for handling the error state, such as **Notification** or **Log Message**.



Reconfigure an approval condition

Approval activities react differently to script errors than the other activities.

About this task

Approval activity script errors can prevent an approval from being processed successfully. This, in turn, can cause the approval to complete as **Skipped**, which can appear to be an **Approved** state. To prevent this from happening, reconfigure the **Approved** exit as follows:

Procedure

1. Open an approval workflow and make sure it is checked out.
2. On an approval activity, double-click the **Approved** exit.
3. Add the following script to the **Condition** field:

   ```
   && activity.state != 'faulted'
   ```

   This prevents the activity from continuing down the normal path in an error state and ensures that **Skipped** or **Approved** is the desired state.
4. Click **Update**.

Workflow run time metrics

You can enable the collection of workflow run time metrics to determine whether workflows are performing as expected or consuming additional resources.

Outlying run times for a workflow are identified by comparing actual run times to an outlier range calculated with the outlier threshold and estimated run time defined in the workflow properties.

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You can monitor the results of these metrics on the Workflow Operations Dashboard and custom homepages with workflow gauges.

Important:

The functionality found in homepages, arranging information from your instance to tell a story about your data, is found in dashboards on new instances. On upgraded instances with Next Experience enabled, users can view existing homepages if they have a direct URL, but they can't create or edit them. Responsive dashboards and Analytics Center dashboards take over homepage functionality.

Use the Homepage deprecation help tool to convert the homepages on your instance to responsive dashboards.

For more information, see:

- Dashboards in the Analytics Center.
- Working with responsive dashboards.

Enable workflow run time metrics

Provide an estimated run time that can be compared to actual workflow run times.

About this task

For baseline workflows, you must also manually enable the collection of run time metrics. The system automatically enables the collection of run time metrics for new workflows.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Properties**.
4. In the Workflow Properties dialog box, click the **Estimated Runtime** tab.
5. To enable the collection of run time metrics, check that the **Requires ERT** option is selected.
6. Open a configuration from the **Estimated Run Time** column.
7. In **Estimated Run Time**, enter an initial estimate for the workflow's run time.
   The system compares this initial estimate to actual run time results to create outlier reports. The system can automatically update this field in certain circumstances. Workflow designers can also manually update this field.
8. In the **Outlier Percentage Threshold for ERT** field, enter the percentage deviation from the estimated run time that identifies an outlier workflow run time.
   The system uses a default value of **20**.
9. Click **Update**.

Outlying workflow run times

Workflow run times are identified as outliers when they are longer or shorter than the outlier range that is computed for the workflow.

The outlier range is automatically computed with the **Estimated Run Time** and **Outlier Percentage Threshold for ERT** values in the workflow properties. These values are used in the following formulas.

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Formulas for computing workflow outlier ranges

Value computed	Computation used	Example
Outlier Value	**Estimated Run Time** * (**Outlier Percentage Threshold for ERT** / 100)	10 seconds * (20 / 100) 10 seconds * 0.2 = 2 seconds
Outlier Range	(**Estimated Run Time** - *`Outlier Value`*) to (**Estimated Run Time** + *`Outlier Value`*)	(10 seconds - 2 seconds) to (10 seconds + 2 seconds) = 8 to 12 seconds

When a workflow runs within the outlier range, its estimated run time is automatically updated.

If a workflow has an outlying run time, it appears in any outlier workflow gauges on the Workflow Operations Dashboard and custom home pages.

Workflow estimated run time updates

When a workflow runs within the outlier range, its estimated run time is automatically updated.

The estimated run time is updated with the cumulative moving average of the latest run time value in relation to previous run times. The computed value is rounded to the nearest second and stored as a GlideDateTime.

For example:

Data point	Latest value	Cumulative running average (CRA)	CRA after rounding to the nearest second
1	10 seconds	10 seconds	10 seconds
2	12 seconds	11 seconds	11 seconds
3	9 seconds	10.333 seconds	10 seconds

Note:
Because the system rounds to the nearest second, the calculation is less precise with short durations.

You can also manually update the estimated run time in the workflow properties.

Workflow pause utility

Workflow Pause Utility provides functionality you can use to pause or resume all workflow contexts, a subset of qualified workflow contexts, or individual workflow contexts. You designate the data and time of day at which the paused workflows should resume, and can manually resume individual workflows as needed.

Once activated, the Workflow Pause Utility plugin (com.glideapp.workflow.pause) updates several tables when you pause or resume workflows. Each table stores specific data related to each paused or resumed workflow.

wf_pause_request

Records every workflow pause request. The system automatically updates and inserts records in this table whenever you pause workflow contexts. It tracks user-

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specified resume time, whether the pause request is still active, and the total number of workflow activities that paused or resumed.

wf_pause_status

Records the status of each workflow context you pause. When you pause workflow contexts, the plugin waits until the current executing activity finishes, and pauses it before the next activity starts. It tracks the specific activity on which the workflow context was paused and whether it has resumed. If the workflow is paused, it tracks the time at which it is scheduled to resume.

wf_pause_group_request

Pauses the specific set of workflow contexts you designate using filtering in Group Pause Requests. You can manually pause all currently active workflows by clicking the **Pause All** check box.

wf_pause_snapshot

Before pausing and after resuming a workflow, the table records a snapshot of the current state of the workflow context. The table also records the state of the currently executing activity on the paused workflow context.

Use examples

When you take down an instance for maintenance, you can pause all or selected active workflow contexts, and then resume them after you complete the maintenance.

You have an integration workflow context that hits an internal service that is down for maintenance. You can pause all instances of that workflow context from progressing to the next activity, allowing time for the internal service to be restored. Then, the paused workflow contexts can be resumed.

Request workflow pause utility

You can request the Workflow Pause Utility plugin (com.glideapp.workflow.pause) if you have the admin role. This plugin may include demo data and activates related plugins if they are not already active.

Before you begin

Role required: admin

About this task

There are two ways to request a plugin:

- Access the Now Support Service Catalog directly by selecting **All** > **Service Catalog** > **Activate Plugin** on Now Support.
- Access the Now Support Service Catalog through the All Applications page on your instance by following these steps.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the **Activate Plugin** form on Now Support.

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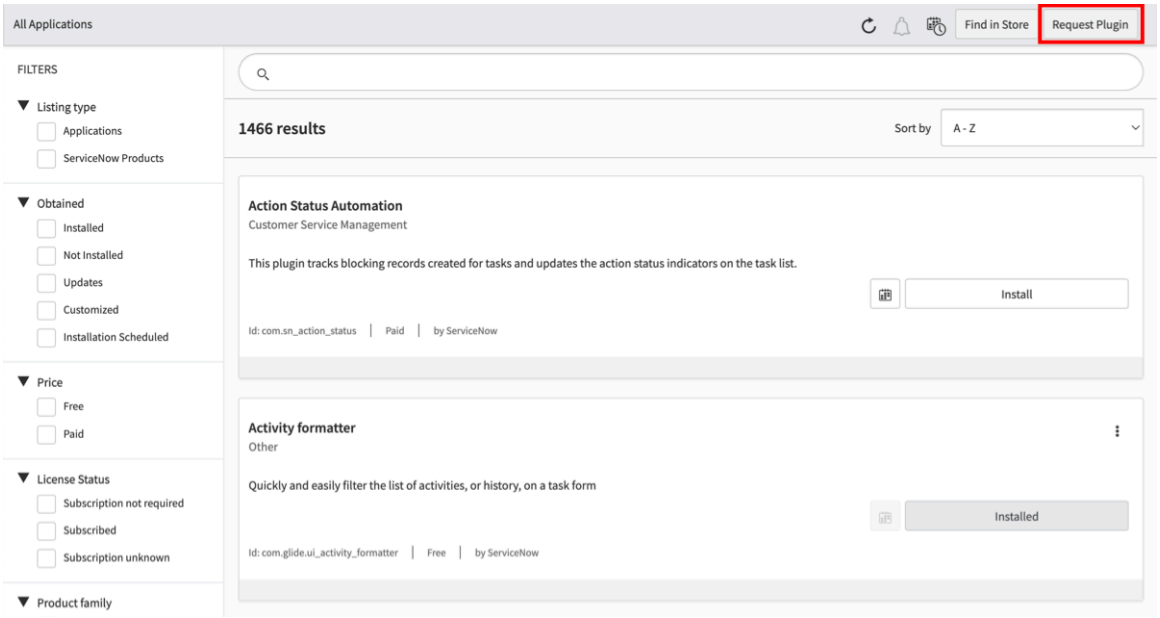
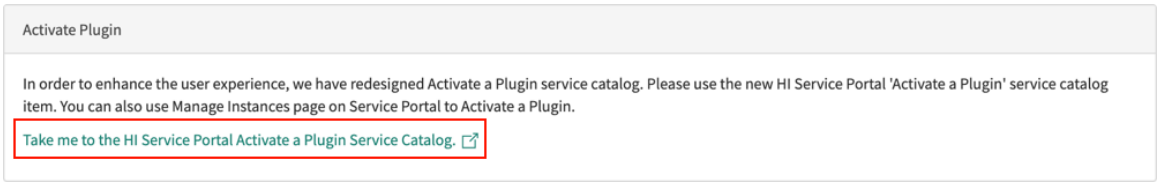


3. On Now Support, select the link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Instance on which to activate the plugin.
Which plugin would you like to activate	Name of the plugin to activate. **Note:** If the system does not list the plugin you want or if you are activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	The date and time to activate the plugin.

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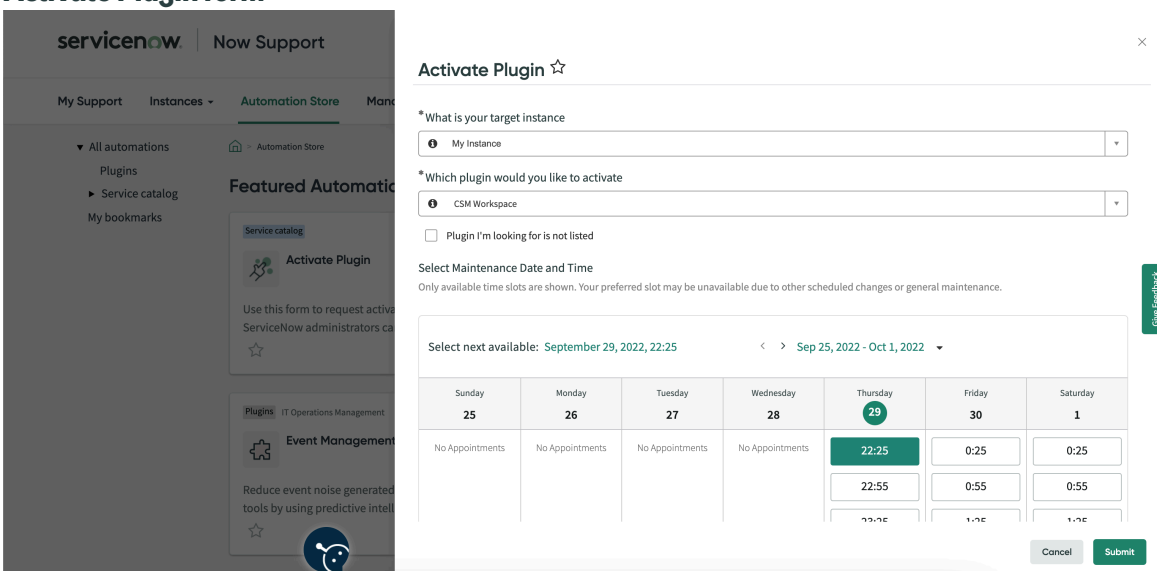
Field	Description
	Note: Plugins are activated in two batches, once in the morning and once in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.

Example

For example, see the following form to activate the CSM Workspace plugin on an instance named My Instance.

Activate Plugin form



7. Select **Submit**.
   For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

Pause and resume individual workflows

To pause individual workflow contexts, specify the date and time when the workflow context should resume. When a workflow context is paused, the system saves basic information about the pause request, such as the resume date and time, in the wf_pause_request table. A workflow context automatically resumes at a specified date and time of day, but a paused workflow context can be manually resumed as needed.

Before you begin

Role required: workflow_publisher, workflow_creator, or workflow_admin
Activate the Workflow Pause Utility plugin.

Procedure

1. Navigate to **All** > **Workflow** > **Live Workflows** > **Active Contexts**.
2. Select the individual workflow context that you're pausing.
   Workflow Context appears.

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3. In **Related Links**, select **Pause**.
   A **Workflow Pause Inputs** dialog appears.
4. In the **Workflow Pause Inputs** dialog:

   a. Select the calendar icon  to choose the date, and enter the time when the workflow should resume.
   You can select the current date or future date, but you must enter a time of day in the future.

   The time should be entered in hours, minutes, and seconds. For example, to pause the workflow context at 13:30:00 (1:30 pm), select the date from the calendar, and then enter `13`, `30`, and `00` into the respective **Time:** fields.

   b. Select the green check mark icon  when finished.

   c. The selected date and time of day appear in the **Resume At** field.

   d. Select **OK** to return to Workflow Contexts.
   The selected workflow is now paused. Use Workflow pause request to monitor its status.

5. Manually resume a currently paused workflow context.
   Paused workflows resume on the date and time specified in the **Resume At** field.

   a. Navigate to **Workflow** > **Live Workflows** > **Active Contexts**.

   b. Select the individual workflow context you are pausing.
   Workflow Context appears.

   c. In **Related Links**, select **Resume**.

Pause and resume all or multiple workflows

Use Workflow Pause Group Requests to pause, or resume, groups of workflows, or all active workflows. If pausing a group of workflows, use filtering functions to select the workflows. If pausing all active workflows, select the Pause All check box to indicate that all currently active workflows should be paused.

Before you begin

Role required: workflow_publisher, workflow_creator, or workflow_admin
Activate the Workflow Pause Utility plugin.

Procedure

1. Navigate to **All** > **Workflow** > **Operations** > **Group Pause Requests**.
   Workflow Pause Group Requests appears and displays existing workflow pause group requests.
2. Select **New**.
   Workflow Pause Group Request appears, and assigns a workflow pause group request ID.
3. To pause all active workflows, select **Pause All**, then select **Update**, but if you want to pause a filtered group of active workflow contexts, skip this step.
   All currently active workflow contexts in the instance are paused until you resume them. Use Workflow pause request to monitor their status.

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4. To pause a filtered group of active workflow contexts, use the **Filter** field, specify the conditions for the search, then select **Update**.
   Workflow Pause Group Requests appears, and displays the results of the workflow group search. It assigns a workflow pause group request ID and indicates if the group is active (true = paused) or inactive (not yet paused).
5. To update, resume or delete a specific workflow pause group request, select it.
   Workflow Pause Group Request appears, and displays the selected workflow pause group request.
6. If the selected workflow pause group request is active (paused), and you don't want to pause it, select **Do Not Pause Incoming Workflows**.
7. If the selected workflow pause group request is inactive (not yet paused), select **Pause** to pause it.
8. For the paused workflow group request, use the **Resume At** field to specify the date and time of day at which the paused workflow contexts should resume.

   a. Select the calendar icon  to choose the date, and enter the time when the workflow contexts should resume.
   You can select the current date or future date, but you must enter a time of day in the future.

   The time should be entered in hours, minutes, and seconds. For example, to pause the workflow context group at 13:30:00 (1:30 pm), select the date from the calendar, and then enter `13`, `30`, and `00` into the respective **Time:** fields.

   b. Select the green check mark icon  when finished.

   c. The selected date and time of day appear in the **Resume At** field.

   d. Select **OK** to return to Workflow Pause Group Request.

9. Select **Submit**.
10. Manually resume currently paused workflow contexts.
    Paused workflow contexts automatically resume on the date and time of day specified in the **Resume At** field.

    a. Navigate to **Workflow Pause Group Requests**.

    b. Select the workflow pause group request to resume.
    Workflow Pause Group Request appears.

    c. Select **Resume**, and then select **Update**.

11. Workflow Group Pause Request also contains the following information fields.

Workflow group pause request form

Field	Description
Active	Indicates if workflow group is paused.
Completed Resume	Number of resumed workflow context activities that are completed.

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Field	Description
Activity Count	
Filter	Standard filtering fields used to specify the conditions for selection of a group of workflow contexts.
Log	Activity work notes generated by the group pause request.
Not Transitioned Workflow Count	Number of workflow contexts that weren't transitioned when the group pause request was placed. When a group pause request is placed, the affected workflow contexts are paused before the start of the next activity.
Resume Act Count	Number of workflow context activities resumed after the group pause completed.
Pause Act Count	Number of paused workflow context activities.
Requester Name	Name of the person requesting the workflow context pause.
Pause percentage	Total percentage of workflow contexts that are paused.
Resume Percentage	Total percentage of workflow contexts that have resumed.
Total Workflow Count	Total number of workflows matching the specified filter conditions that are being paused.
Paused Workflow Count	Number of current paused workflow contexts.

Monitor workflow pause requests

You can monitor the status of workflow pause requests using Workflow Pause Request.

Before you begin

Role required: Workflow_admin or workflow_publisher, workflow_creator
You must install and activate the Workflow Pause Utility plugin.

Procedure

1. Navigate to **All** > **Workflow** > **Operations** > **Pause Requests**.
   Workflow Pause Requests appears and displays existing workflow pause requests.
2. Select the workflow pause request.
   Workflow Pause Request appears, and displays the selected workflow pause request.

Workflow pause request fields

Field	Description
Req Number	Unique assigned pause request number.
Completed Resume Activity Count	Number of workflow context activities resumed after the pause completed.

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Field	Description
Pause Active	Selected indicates the workflow context is currently paused. Cleared indicates it is not.
Transitioned During Pause	Number of workflow contexts that transitioned when the pause request was placed. When a pause request is placed, the affected workflow contexts are paused before start of the next activity.
Workflow Context	Reference number for the paused workflow context.
Log	Activity work notes generated by the group pause request.
Paused Act Count	Date and time of day (h:m:s) at which the paused workflow context is resuming.
Requester Name	Name of the person who requested the workflow pause.
Resume Act Count	Number of workflow context activities resumed after the pause completed.
Resume At	Date and time of day (h:ms:s) at which the workflow contents are scheduled to resume.
Table	Related record table name.
Application	Application in which the workflow context is executing.
Exec Act Count	Number of activities executing when the workflow context was paused.
Group Pause Request	Reference number for the associated group pause request, if any. Appears only if pause request was the result of a group pause request.
Is Workflow Complete	Selected indicates the workflow context is complete. Cleared indicates it is not.
Is Workflow Stuck	Selected indicates the workflow context is stuck. Cleared indicates it is not.
State	Current state of the workflow context - Paused or Resumed.
Stuck Activities Count	The number of workflow context activities that are stuck.
Stuck Act Count To be subtracted for Pause Percentage	Writer to whom the documentation request is assigned.

Encrypted workflow scratchpad

The Encrypted Workflow Scratchpad plugin (com.snc.encrypted.scratchpad) provides encrypted scratchpad support for workflow context and workflow executing activities.

The platform supports encryption on most fields, and workflows can execute on tables with encrypted fields. Encrypted data is typically stored in the workflow scratch pad for workflows that execute using encrypted fields and must access this data after processing an approval, timer, or create task activity.

Data in the workflow scratchpad is not encrypted by default. The Workflow engine supports scratchpad encryption and executing activity records only when the Encrypted Workflow Scratchpad plugin is activated. Once activated, data stored in the wf_context and wf_executing scratchpads is protected by a private workflow engine encryption module, and is prevented from being stored in plain text.

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Incompatibility with domain separation

The Encrypted Workflow Scratchpad plugin is incompatible with domain separation. Activating the Encrypted Workflow Scratchpad plugin on a domain separated instance can produce encryption errors when running some workflows. Consider using a Workflow Studio flow instead.

Request encrypted workflow scratchpad activation

Request activation of the Encrypted Workflow Scratchpad plugin (com.snc.encrypted.scratchpad) from ServiceNow personnel

Before you begin

Role required: admin

The Encrypted Workflow Scratchpad plugin must be activated via a Customer Service and Support request. You should activate and thoroughly test the plugin in a non-production instance. Only after you satisfied with the results should you request activation in a production instance.

When requesting activation in a production instance, you should schedule a low transactional volume time to do so. Prior to its activation, first activate the Workflow Pause Utility (com.glideapp.workflow.pause), and then pause all active workflows. Refer to Workflow pause utility. After activation of the Encrypted Workflow Scratchpad plugin, resume all paused workflows.

About this task

There are two ways to request a plugin:

- Access the Now Support Service Catalog directly by selecting **All** > **Service Catalog** > **Activate Plugin** on Now Support.
- Access the Now Support Service Catalog through the All Applications page on your instance by following these steps.

Encrypted Workflow Scratchpad activates these related plugins if they are not already active.

Plugins for Encrypted Workflow Scratchpad

Plugin	Description
Encryption Support [com.glide.encryption]	Allows text fields and attached files to be encrypted.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the **Activate Plugin** form on Now Support.

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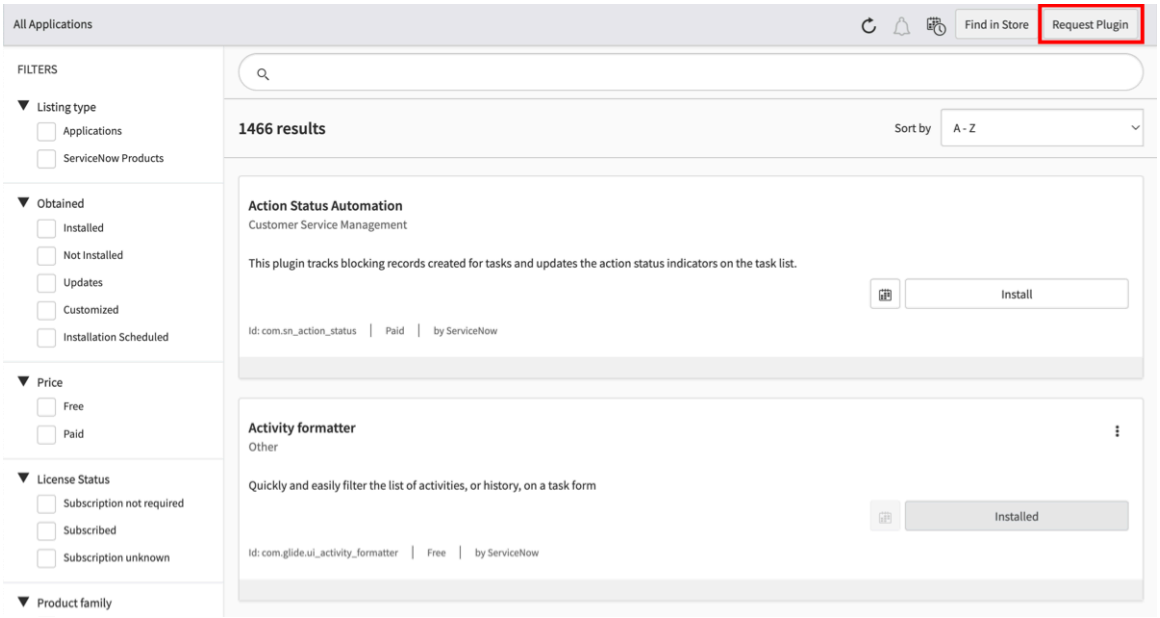
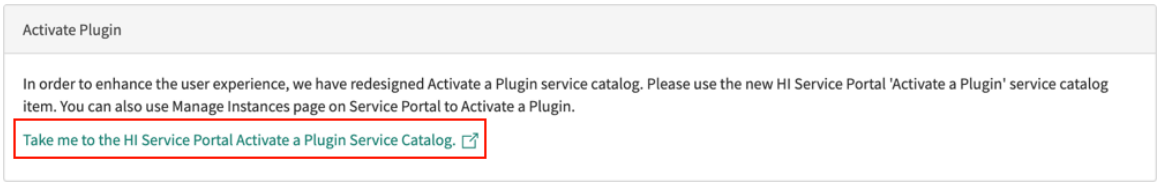


3. On Now Support, select the link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Instance on which to activate the plugin.
Which plugin would you like to activate	Name of the plugin to activate. **Note:** If the system does not list the plugin you want or if you are activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	The date and time to activate the plugin.

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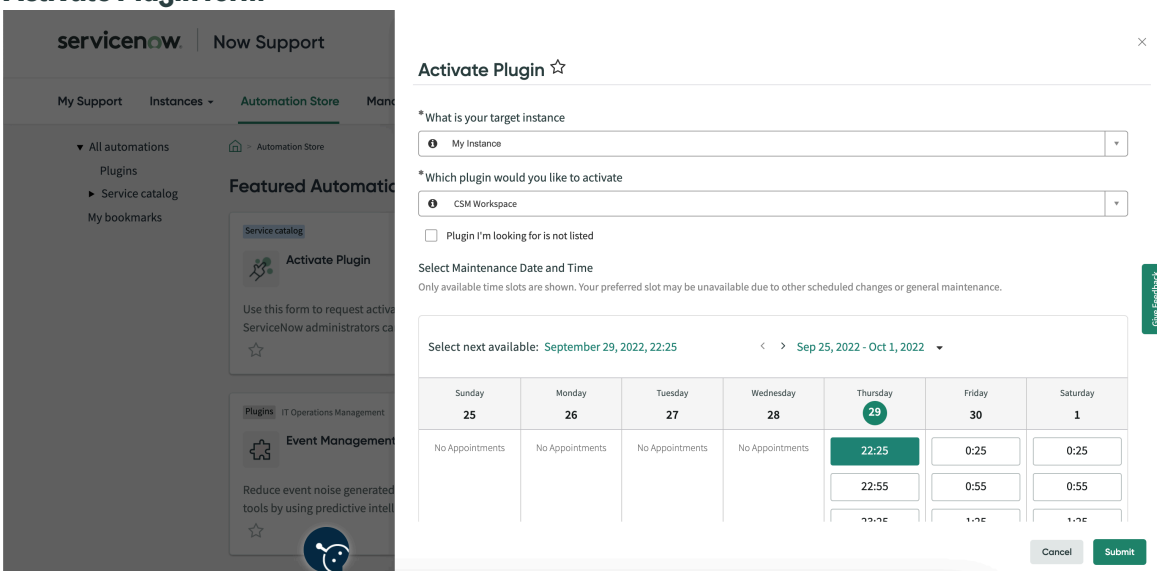
Field	Description
	Note: Plugins are activated in two batches, once in the morning and once in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.

Example

For example, see the following form to activate the CSM Workspace plugin on an instance named My Instance.

Activate Plugin form



7. Select **Submit**.
   For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

What to do next

After plugin activation, resume all paused workflows. Refer to Pause and resume all or multiple workflows.

Related topics

List of plugins

Troubleshoot workflows

Troubleshooting tools for workflows enable administrators to isolate execution paths, compare contexts, and track incomplete activities.

The workflow timeline provides a visual representation of the workflow, including transitions and the elapsed time for each activity. A troubleshooting tool for highlighting execution paths helps users perform forensics on a workflow. The highlighting feature can group multiple execution paths in various colors and can isolate rollback processing. Use the workflow highlighter to

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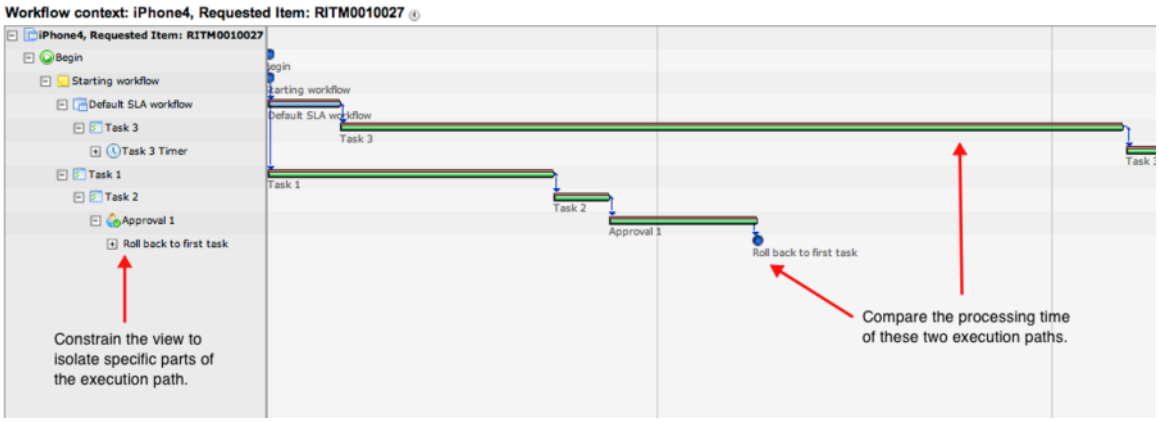
isolate incomplete tasks and approvals. You can also enable a workflow performance timing feature to troubleshoot slow workflows.

Execution path troubleshooting in timelines

Use the controls in a workflow timeline to isolate specific execution paths or compare multiple execution paths over time.

Timelines show how the activities in the workflow progressed in relation to one another over time. Isolate execution paths and follow transition lines between subflows and the main flow. Processing times provide a view of the workflow that you cannot get from the workflow diagram. Tooltips give precise information about each activity, such as duration.

Workflow timeline troubleshooting



Execution history table

Highlight execution paths and rollbacks to locate activities that may have been left in an unresolved state.

About this task

Rollbacks, cancels, and deletions during the execution of a workflow can prevent some activities from fully completing. Use highlighting in the execution history table to determine which activities in the workflow were left in an unresolved state.

Procedure

1. Run the workflow.
2. Navigate to **Workflow** > **All Contexts**.
3. Select a context to troubleshoot.
4. In the Workflow Context form, select the **Workflow Activity History** related list.
5. Right-click an activity and select **Workflow Debug** > **Toggle Execution Path Highlighting** from the context menu.

   All activities in that execution path are highlighted in a color selected by the platform. The debug path shows all activities that completed successfully during the workflow.

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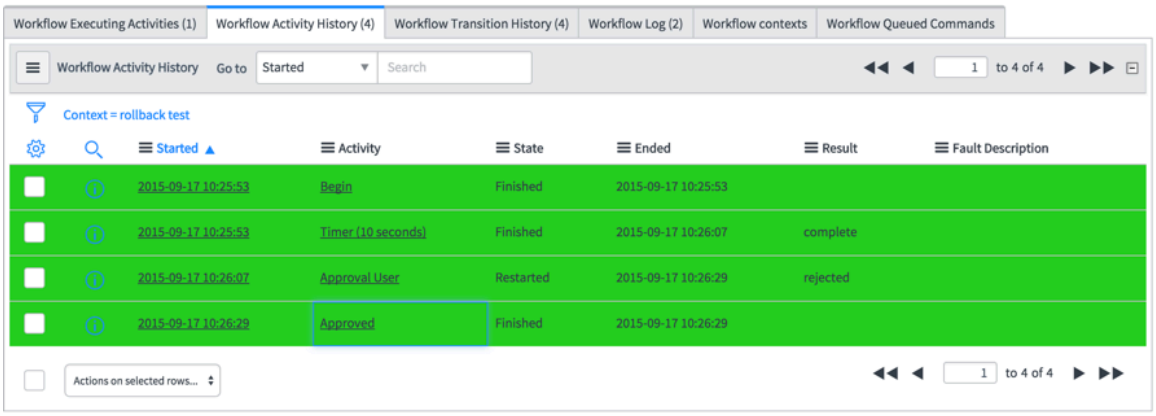
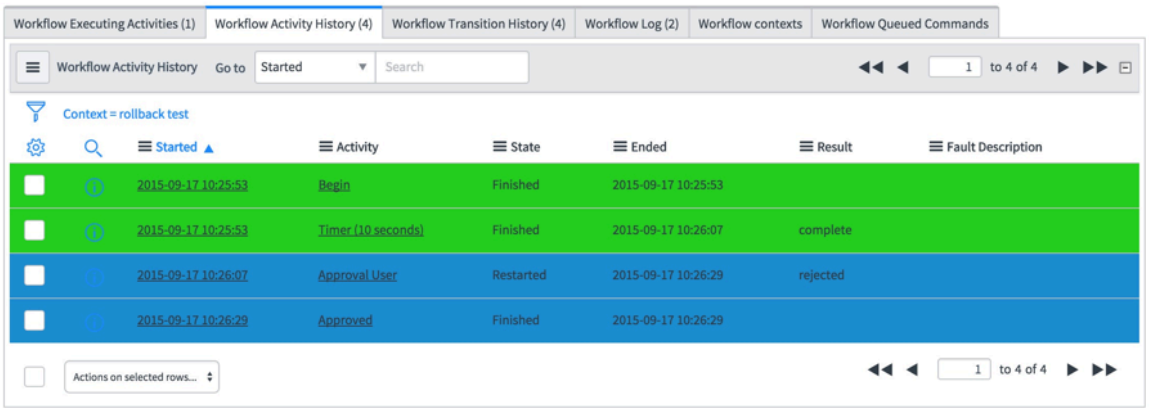


6. Right-click a rollback activity and select **Workflow Debug** > **Toggle Rollback Highlighting** from the context menu.

   The platform highlights the rollback path (restarted activities) in a different color. Each color represents a group of activities that were part of the same rollback execution. The highlighting includes the activity that initiated the rollback. If you right-click an activity that was not part of a rollback, no rows are highlighted.

   Note:
   The rollback activity itself appears in both execution path and rollback highlighting.



7. To remove highlighting, right-click in the list and select an option to clear execution path or rollback highlighting.

   You can clear individual rollback paths or all rollback highlighting.

Use the Workflow Operations Dashboard

On the Workflow Operations Dashboard, view and add widgets to help you monitor workflows. Review the performance of workflows and determine which workflows must be improved.

Before you begin

Role required: workflow_admin
The different levels of access are:

- **View**: View the dashboard and refresh report widgets.
- **Customize**: Refresh, add, delete, and rearrange widgets.

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About this task

On the Workflow Operations Dashboard, you can click widget elements to view the records they represent. You can also add new report widgets that are not displayed by default.

Procedure

1. To view the Workflow Operations Dashboard, navigate to **Workflow** > **Operations** > **Workflow Operations Dashboard**.

   The default reports on the dashboard include:

   - Workflow contexts providing run time metrics
   - Active workflows started during a specified time period
   - Workflows run between yesterday and today
   - Workflows by state for the current month
   - Aged workflow contexts for the past month

2. To find and add more widgets, click the **Add Content** icon ( ) in the upper left corner of the dashboard.

What to do next

If a workflow consistently appears as an outlier and there is no error causing the run time values, you can use its historical run time values to calculate a new estimated run time value. Then update the estimated run time in the workflow properties.

Workflow gauges

Multiple gauges are available to help you review the performance of workflows. You can add these gauges to the Workflow Operations Dashboard or custom homepages.

Important:

The functionality found in homepages, arranging information from your instance to tell a story about your data, is found in dashboards on new instances. On upgraded instances with Next Experience enabled, users can view existing homepages if they have a direct URL, but they can't create or edit them. Responsive dashboards and Analytics Center dashboards take over homepage functionality.

Use the Homepage deprecation help tool to convert the homepages on your instance to responsive dashboards.

For more information, see:

- Dashboards in the Analytics Center.
- Working with responsive dashboards.

Workflow gauges

Content	Description
ERT Dashboard Controls >	
Outlier Finished Workflows for ERT (Percentage Outlier)	Identifies workflows that finished, but did not finish within estimated runtime (ERT) values. Enter an outlier percentage to see workflows that ran outside the specified runtime range.

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Workflow gauges (continued)

Content	Description
Outlier Long Running Workflows for ERT (Percentage Outlier)	Displays workflows running longer than the configured runtime threshold.
Workflow Dashboard >	
Workflows Without Current Record	Displays workflow contexts that do not have an associated current record.
Gauges > **Workflow Context**	
Number of Active Workflows Started Hourly Over Time (Yesterday)	Displays the total number of running workflows per hour over a given time period. By default, it displays the number of workflows that ran per hour over the previous day (yesterday).
Outlier Finished Workflows Not Cumulated to ERT	Displays workflow contexts that are finished outside the estimated runtime outlier value and not cumulated to estimated run time value.
Running Workflow Contexts	Displays the total number of running workflows.
Successfully Finished Workflows Cumulated to ERT	Displays the total number of successfully completed workflows whose running duration is cumulated to the estimated run time value.
Workflows by State (This Month)	Displays the total number of workflows run in a month grouped by the current state.
Aged Workflow Contexts (Running Since Last Month)	Displays the total number of workflow contexts running for a given period of time by workflow name. By default, it displays the total number of workflow contexts running over the last month.
Workflows Run Between Yesterday and Today (by Table)	Displays workflows that have run in the last day grouped by table name.

Workflow performance timing

The workflow engine can generate detailed performance timing data that is useful for troubleshooting slow workflows.

An administrator must enable this functionality.

When workflow performance timing is enabled, the workflow engine tracks key performance data, including various execution speed metrics. The Workflow Timing [wf_workflow_timing] table stores the data, with a record for each workflow context. The workflow timing record is updated when the workflow engine completes the workflow, waits for an activity to complete, or otherwise exits the workflow execution.

Workflow estimated run time properties

Administrators can enable the collection of workflow run time metrics by setting Estimated Run Time (ERT) properties.

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Administrators can use ERT metrics to determine if workflows are running longer or shorter than expected and to identify errors in workflow processing. The system displays run time metrics on the Workflow Operations Dashboard.

Enable workflow performance timing

Workflow performance timing is disabled by default. You can create a system property to enable it.

Before you begin
Role required: admin

Procedure

Add a system property with the following specifications.

Field	Value
Name	glide.workflow.show_timing
Type	true | false
Value	true

Workflow activities

Workflow activity properties reference

Each activity performs a different task, such as running a script, sending notifications, or requesting approvals. Activities can succeed or fail, which can result in actions performed by other activities.

For information about configuring different types of activities, click an activity name in the list below or see Workflow activities reference.

Core activities provided in the base system

- Approval and rollback workflow activities
- Condition Workflow activities
- Notification workflow activity
- Notify workflow activites
- Subflow activities
- Task workflow activities
- Timer workflow activities
- Utility workflow activities

Activities provided with Orchestration

The following activities are included with Orchestration.

- Active Directory activity pack
- Orchestration activities

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- PowerShell activities
- Puppet activities

Templates provided for creating custom activities

If Orchestration is active on your system, users with the proper roles can create custom activities using the ServiceNow Orchestration activity designer. For information about the templates Orchestration provides for creating custom activities that you can upload to the ServiceNow Store, see Activity designer components.

Workflow activities reference

Workflow activity reference, organized by category.

Each activity performs a different task, such as running a script, sending notifications, or requesting approvals.

Workflow runs activities as the user session that starts or advances them. Workflows started from record operations will run activities as the user session that performed the record operation. Workflows started from schedules or restarted from timers run activities as the System user. Workflows started from script calls run activities as the user session that started the script.

Approval and rollback activities

Approval and rollback activities generate and manage approvals. Not all workflows can include approval activities. For more information, read Approval and rollback workflow activities.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval and rollback activities

Activity	Description
Approval Action workflow activity	The **Approval Action** activity performs an approval action on the current task.
Approval Coordinator workflow activity	The **Approval Coordinator** activity creates an approval whose outcome depends on the outcome of one or more child activities, including one or more **Approval - User**, **Approval - Group**, and/or **Manual Approval** activities.
Approval - Group workflow activity	The **Approval - Group** activity creates approval records for each member of a specified group.
Approval - User workflow activity	The **Approval - User** activity creates one or more individual user approvals.
Generate workflow activity	The **Generate** activity immediately creates task or approval records from any task or approval activities placed after the **Generate** activity in the workflow path. These pre-generated tasks and approvals start when the task and approval activities are reached during flow execution. This allows a task to have a set of associated pre-generated sequential tasks or approvals, but still require them to be completed in order.

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Approval and rollback activities (continued)

Activity	Description
Manual Approvals workflow activity	The **Manual Approvals** activity watches and manages any approvals that users add manually outside of the workflow process. This activity only selects approvals that are in the Not requested state.
Rollback To workflow activity	The **Rollback To** activity transitions directly to the activity specified by the outgoing transition line arrow.

Condition activities

Condition activities provide conditional branching and logical operation functionality for workflows.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

Condition activities

Activity	Description
If workflow activity	The **If** activity checks a condition or script to determine if a **Yes** or **No** transition should be taken.
Switch workflow activity	The **Switch** activity checks if the value of a passed field or variable is equivalent to one of several case values.
Wait for condition workflow activity	The **Wait for condition** activity causes the workflow to wait at this activity until the current record matches the specified condition.
Wait for WF Event workflow activity	The **Wait for WF Event** activity causes the workflow to wait at this activity until the specified event is fired.

Notify activities

Notify workflow activities manage calls and SMS messages in Notify.

Notify activities

Activity	Description
Forward call workflow activity	The **Forward Call** activity forwards a Notify call to an E.164-compliant phone number.
Input workflow activity	The **Input** activity creates a phone menu by presenting a list of options on a Notify call.
Hangup workflow activity	The **Hangup** activity disconnects an active Notify phone call.
Play workflow activity	The **Play** activity plays a sound file on a Notify call.
Record workflow activity	The **Record** workflow activity records audio from a user on a Notify call.
Reject workflow	The **Reject** workflow activity rejects an incoming Notify call.

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Notify activities (continued)

Activity	Description
Say workflow activity	The **say** workflow activity allows you to play a message, using text to speech, on a Notify call.
Forward to notify client workflow activity	The **forward to notify client** workflow activity connects a phone call to a Notify WebRTC client.
Call workflow activity	The **Call** activity makes outbound phone calls using a Notify workflow. This workflow activity can be added to any table.
Join conference call workflow activity	The **Join Conference Call** activity connects an incoming or outgoing call to a Notify conference call.
Send SMS workflow activity	The **send SMS** workflow activity to send short text messages using Notify to users' phones. This workflow activity can be added to any table.
Queue workflow activity	The **Queue** activity places an active Notify call in a queue.

Notification activities

Notification workflow activities notify users of events that occur during the workflow.

Notification activities

Activity	Description
Create Event workflow activity	The **Create Event** activity adds an event to the event queue, but does not immediately fire the event.
Notification workflow activity	The **Notification** activity sends an email or SMS message to specified users or groups.

Subflow activities

Subflow activities run and manage workflows from a parent workflow.

Subflow activities

Activity	Description
Parallel Flow Launcher workflow activity	The **Parallel Flow Launcher** activity launches multiple subflows in parallel.

Task activities

Task activities create and modify workflow tasks.

Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

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Task activities

Activity	Description
Add Worknote workflow activity	The **Add Worknote** activity adds text to the *Worknotes* field of the current incident record.
Attachment Note workflow activity	The **Attachment Note** activity adds an attachment to the current record.
Catalog Task workflow activity	The **Catalog Task** activity creates a service catalog task record.
Create Task workflow activity	The **Create Task** activity generates a record on any of the tables that extend Task [task].

Timer activities

Timer activities pause workflows for set periods of time.

Note:
Timer activities run as the System user because the system scheduler advances the workflow.

Timer activities

Activity	Description
SLA Percentage Timer workflow activity	The **SLA Percentage Timer** activity pauses the workflow for a duration equal to a percentage of an SLA.
Timer workflow activity	The **Timer** activity pauses the workflow for a specified period of time.

Utility activities

Utility activities provide controls over the path of the workflow, and other useful tools.

Utility activities

Activity	Description
Branch workflow activity	The **Branch** activity splits the workflow into multiple transition paths from a single activity.
Join workflow activity	The **Join** activity unites multiple execution paths into one transition.
Lock workflow activity	The **Lock** activity prevents other instances of this workflow from continuing past this activity until the lock is released.
Log Message workflow activity	The **Log Message** activity writes a message to the workflow log.
Log Trace Message workflow activity	The **Log Trace Message** activity writes a trace message to the workflow log.
REST Message legacy workflow activity	The legacy **REST Message** activity enables an administrator to override the REST endpoint or supply the variables configured in the REST Message module.

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Utility activities (continued)

Activity	Description
Return Value workflow activity	The **Return Value** activity returns a value to a parent workflow, when run from a subflow.
Run Script workflow activity	The **Run Script** activity runs the specified script in the scope of the workflow version.
Set Values workflow activity	The **Set Values** activity sets values on the current record when the workflow quiesces or ends.
SOAP Message legacy workflow activity	The legacy **SOAP Message** activity uses SOAP messages defined in the System Web Services plugin and can call the messages using a MID Server.
Turnstile workflow activity	The **Turnstile** activity limits how many times a workflow can pass through the same point.
Unlock workflow activity	The **Unlock** activity releases a lock that was previously placed by the **Lock** activity.

Activities provided with Orchestration

The following activities are included with Orchestration.

- Active Directory activity pack
- Orchestration activities
- PowerShell activities
- Puppet activities

Templates provided for creating custom activities

If Orchestration is active on your system, users with the proper roles can create custom activities using the ServiceNow Orchestration activity designer. For information about the templates Orchestration provides for creating custom activities that you can upload to the ServiceNow Store, see Orchestration custom activity templates.

Approval and rollback workflow activities

Approval and rollback activities generate and manage approvals.

Approval and rollback activities are not available in some workflows.

- With two exceptions, approval and rollback activities are only available when the workflow runs on a table that extends Task. The exceptions are the **Approval - User** and **Approval Action** activities, which are available globally.
- Approval and rollback activities are available only if approval engines are turned off for the table on which the workflow runs. If approval engines are enabled for the table, approval activities appear greyed out and cannot be selected. To learn more about how workflow and approval engines interact, read Approval workflow activities and approval engines.

Approval Action workflow activity

The **Approval Action** activity performs an approval action on the current task.

Use this activity to mark the current task record as approved or rejected.

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Note:
When an **Approval Action** activity is used to mark a task approved, the activity marks all pending approvals as **No Longer Required**. This activity behaves differently from **Set Values** or **Run Script** when used to set the **Approval** field's value.

Results

The result value of the activity is the final approval disposition selected by the approver. The result value can be **Approved** or **Rejected**. A workflow designer can assign a result value using the `activity.result` variable from within a script field of the activity.

Input variables

Input variables determine the initial behavior of the activity.

Approval Action activity input variables

Field	Description
Action	The action to perform on the task. Options are: • Mark task approved • Mark task rejected • Mark task requested • Disregard pending approvals: the system sets approval records to **no longer required** and marks the activity as **approved**.

Conditions

The conditions determine which transition runs after this activity.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval Action activity conditions

Condition	Description
Always	The event or condition that causes the approval to move to the next workflow step.
Error	The event or condition that generates an error.
Skipped	The event or condition that allows a skipped approval.

States

The activity state tells the workflow engine what to do with the activity.

Approval Action activity states

State	Description
Executing	The workflow engine starts the `execute` function of the activity.

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Approval Action activity states (continued)

State	Description
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Approval Coordinator workflow activity

The **Approval Coordinator** activity creates an approval whose outcome depends on the outcome of one or more child activities, including one or more **Approval - User**, **Approval - Group**, and/or **Manual Approval** activities.

Note:
This activity is only available when the workflow runs on a table that extends Task.

To create an **Approval Coordinator** activity, first drag the activity onto the workflow canvas, causing the activity form to display. On the activity form, fill in the appropriate fields, then click **Submit**.

After you click **Submit**, the activity appears on the workflow canvas. From there, specify the child activities by clicking the links that appear on the body of the activity.

When the **Approval Coordinator** activity completes, all pending approvals that were created by any of the **Approval Coordinator** approval activities are immediately set to **No Longer Required**. If a single user is called as an approver twice by the same workflow, such as when a single user is both a product approver and an executive approver, any approvals for that user after the first are skipped.

Results

The result value of the **Approval Coordinator** activity depends on the approval actions taken by the approvers and the approval conditions specified in the **Wait for** field. Possible result values are:

- Approved
- Rejected
- Deleted
- Cancelled

Input variables

Input variables determine the initial behavior of the activity.

Approval Coordinator activity input variables

Field	Description
Wait for	Indicate what to wait for to indicate that the approval activity is approved or rejected. Options are:

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Approval Coordinator activity input variables (continued)

Field	Description
	• **Any child activity to be approved:** Any child activity (User, Group, or Manual Approval) that completes with a result of **approved** causes the **Approval Coordinator** activity to complete with a result of **approved**. • **All child activities to be approved:** All child activities of the **Approval Coordinator** activity must complete with a a result of **approved** to cause the **Approval Coordinator** activity to complete with a result of **approved**. • **The first approval or rejection from any child activity:** The first child activity that completes with a result of **approved** or **rejected** causes the **Approval Coordinator** activity to complete with the same result. • **Condition based on script:**Call a script to determine how to manage an approval or rejection.
When a rejection occurs Only appears if **Wait for** is set to **All child activities to be approved** or **Any child activity to be approved**.	Specify what the coordinator should do when it sees a rejection from any one of the child activities. Options are: • **Reject the approval:** Immediately complete the **Approval Coordinator** activity with a result of **rejected**. • **Wait for other responses before deciding:** Wait until we get other responses from other child activities before making an approval or rejection decision. This allows users to change their minds until a decision is made. In addition, if **Wait for** is set to **Any child activity to approve** then a single child activity completion with a result of **approved** will cause the **Approval Coordinator** activity to complete with a result of **approved** even if other child activities have completed with a result of **rejected**.

Approval script
 	
Only appears if **Wait for** is set to **Condition based on script**.
	If the **Wait for** variable is set to **Condition based on script** this script is called to determine how to handle an approval or rejection. The script needs to set the variable *answer* to , approved or rejected to indicate the overall approval status for this approval. When called, the following variable is available to the script:
	`counts.total = total number of child approval activities that are part of this approval`
	`counts.approved = # of child approval activities that approved so far`
	`counts.rejected = # of child approval activities that rejected so far`
	`counts.requested = # of child approval activities that are pending approval`

Conditions

The conditions determine which transition runs after this activity.

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Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval Coordinator activity conditions

Condition	Description
Approved	The users from the groups have approved the request based on the **Wait for** rules.
Rejected	The users from the groups have rejected the request based on the **Wait for** rules.

States

The activity state tells the workflow engine what to do with the activity.

Approval Coordinator activity states

State	Description
Executing	The workflow engine starts the *execute* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Approval - Group workflow activity

The **Approval - Group** activity creates approval records for each member of a specified group.

Note:
This activity is only available when the workflow runs on a table that extends Task.

The group approval is approved or rejected based on the user approvals, according to the logic specified in the **Wait For** field.

Results

The workflow designer can assign a result value using activity.result from within a script field of the activity. By default, the result value is the final approval disposition. This disposition depends on the approval actions take by the approvers and the approval conditions specified in the **Wait for** or **When Anyone Rejects** fields. Possible result values are:

- Approved
- Rejected
- Deleted
- Cancelled

Input variables

Input variables determine the initial behavior of the activity.

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Approval - Group activity input variables

Field	Description
Approval - Group When Specify when this activity generates a group approval record.	
Condition	Conditions which, if met, cause the group approval to be generated. If the conditions are not met, the approval is skipped.
Approval - Group Approvers Specify the groups whose approval will be requested.	
Groups	The groups whose approval will be requested. To edit this field, click the lock icon. To select specific groups by name, use the lookup list. To select groups from field values on the current record at runtime, click the tree icon. Each member of the group will be assigned an individual approval record. If no group is selected, the activity automatically sets the approval to **Approved**.
Approval - Group Condition Specify how the activity decides to approve or reject the group approval, based on the responses from individual members of the group.	
Wait for	A choice between different approval logics to determine which individual approvals or rejections result in approval or rejection of the activity's approval. Options are: • **An approval from each group:** Any user from each group can approve and the first approval from each group causes the activity to complete with a result of **approved** (see below for how a rejection is handled). • **An approval from any group:** Any user from any group can approve and the first approval from any group causes the activity to complete with a result of **approved**. • **An approval from everyone from all groups:** All users from all groups must approve to cause the activity to complete with a result of **approved** (see below for how a rejection is handled). • **First response from each group:** The first approval or rejection from any user in each group is used to indicate the state of the group approval (see below for how a rejection is handled). Indicate what happens when any user rejects their approval request. Options are: • **Reject the approval:** Immediately complete the activity with a result of **rejected**.

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Approval - Group activity input variables (continued)

Field	Description
	• **First response from any group:** The first approval or rejection from any user in any group causes the activity to complete with a result of **approved** or **rejected**. • **Condition based on script:** Each time a user approves or rejects, the **Approval script** is called to determine if the activity should complete.

Approval script
 	
Only appears when **Wait for** is set to `Condition based on script`.
	If the **Wait for** variable is set to **Condition based on script** this script is called to determine how to handle an approval or rejection. The script needs to set the variable *answer* to approved or rejected to indicate the overall status for this approval.
	
	This script is responsible for setting the approval state for each group that is part of this approval activity before returning the overall approval state for all of the groups.
	
	When called, the following variables are available to the script for all the groups that are part of this approval activity:
	
	`counts.total = total number of groups that are part of this approval`
	`counts.approved = # of groups that approved so far`
	`counts.rejected = # of groups that rejected so far`
	`counts.requested = # of groups that are pending approval`
	`counts.not_requested = # of groups that are not pending approval`
	`counts.not_required = # of groups that approval is not required`
	
	And for each group:
	
	`groups[group_id].total = total number of users that are part of this group's approval`
	`groups[group_id].approved = # of users that approved so far`
	`groups[group_id].rejected = # of users that rejected so far`
	`groups[group_id].requested = # of users that are pending approval`
	
	`groups[group_id].not_requested = # of users that are not pending approval`
	
	`groups[group_id].not_required = # of users that approval is not required`
	
	`groups[group_id].approvalIDs[state] = array of user ids that are at the specified approval state`
	
	Note: Iterate the groups using:

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Approval - Group activity input variables (continued)

Field	Description

	`for (var id in groups) { var group = groups[id]; ... group.total ... }`
	
	Note: Get group object using the following code (to get things like the group name being iterated on):
	
	`var objGroup = fncGetGroupObj(id); var strGroupName = objGroup.name;`
	
	`function fncGetGroupObj(sidGroupApproval) { var objGroupApproval = new GlideRecord('sysapproval_group'); objGroupApproval.get(sidGroupApproval); var objGroup = new GlideRecord('sys_user_group'); objGroup.get(objGroupApproval.assignment_group.sys_id); return objGroup; }`
	
	Approval scripts also allow computations. For example, if only half of the approvals are required:
	
	`if (counts.approved/counts.total > .49) { answer = 'approved'; } else if (counts.rejected/counts.total > .50) { answer = 'rejected'; }`

When anyone rejects	A choice between different approval logics to determine which individual rejections result in rejection of the activity's approval. Options are: • **Reject the approval:** Immediately complete the activity with a result of **rejected**. • **Wait for other responses before deciding:** Wait until we get other responses before making an approval or rejection decision. This allows users to change their mind until a decision is made.

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Approval - Group activity input variables (continued)

Field	Description
	Note: If **Wait for** is set to **Anyone to approve**, then a single approval causes the activity to complete with a result of **approved**, even if one or more users reject.
Approval - Group Schedule Specify how workflow calculates the approval record's expected start date and due date. Once you've made a selection for 'Due date based on', and 'Schedule based on', the appropriate fields will display.	
Due date based on	Select how workflow determines the task's duration, due date, and schedule. • **A user specified duration:** The duration is based on a user specified value. • **A relative duration:** The duration is calculated from a relative duration (such as End of Next Business Day). • **A date/time or duration field:** The duration is based on the value of a field on the current record. • **Script:** The duration is returned by a script.
Duration Only appears when **Due date based on** is set to `A user specified duration`	The specific number of days and hours.
Relative duration Only appears when **Due date based on** is set to `A relative duration`	The general number and length of business days.
Due date field Only appears when **Due date based on** is set to `A date/time or duration field`	The date/time or duration field.
Due date script Only appears when **Due date based on** is set to `Script`	The script that sets 'answer' to the number of seconds for the duration.

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Approval - Group activity input variables (continued)

Field	Description
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2 hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are: • **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Only appears when **Schedule based on** is set to `A specific schedule`	The predefined **Schedule** from a list.
Schedule field Only appears when **Schedule based on** is set to `A schedule field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Time zone based on	The time zone for calculating the duration. The time zone may be based on: • **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A specific **Time zone** that you choose from a choice list. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.
Time zone Only appears when **Time zone based on** is set to `A specific time zone` .	Select the time zone you want from the choice list.
Time zone field Only appears when **Time zone based on** is set to	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.

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Approval - Group activity input variables (continued)

Field	Description
`A time zone field.`	
Approval - Advanced If desired, write a script for determining additional users to request approvals from.	
Advanced	Select this check box to write a script for determining additional users to request approvals from. Use the **Additional groups script** to customize group approvals.

Additional groups script	If the **Advanced** check box is selected, this script is called to determine any additional group approvals to be created. The script needs to set the variable *`answer`* to a comma-separated list of group ids or an array of group ids to add as approver groups. For example:
	`answer = [];`
	`answer.push('id1');`
	`answer.push('id2');`

Conditions

The following conditions determine which transition runs after this activity.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval - Group activity conditions

Condition	Description
Approved	The users from the groups have approved the request based on the **Wait for** rules.
Rejected	The users from the groups have rejected the request based on the **Wait for** rules.
Error	The event or condition that generates an error.
Skipped	The event or condition that allows a skipped approval.

States

The activity state tells the workflow engine what to do with the activity.

Approval - Group activity states

State	Description
Executing	The workflow engine starts the *`execute`* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.

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Approval - Group activity states (continued)

State	Description
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Approval - User workflow activity

The **Approval - User** activity creates one or more individual user approvals.

Results

The result value is the final approval disposition. This disposition depends on the approval actions take by the approvers and the approval conditions specified in the **Wait for** or **When Anyone Rejects** fields. Possible result values are:

- Approved
- Rejected
- Deleted
- Cancelled

Input variables

Approval - User activity input variables

Field	Description
Approval - User When Specify when this activity generates a user approval record.	
Condition	Conditions which, if met, cause the individual approval to be generated. If the conditions are not met, the approval is skipped.
Approval - User Approvers Specify the users whose approval will be requested.	
Users	The users for the approval. Use the tree icon to select user reference fields from the current record to create approvals, such as `${assigned_to}`. If no user is selected, the activity automatically sets the approval to **Approved**. **Note:** Workflow only manages approval records generated by the Approval User activity. After starting the workflow, newly added approvals do not affect the workflow context.
Groups	Groups whose members should also receive approvals. Note that this is different than the **Approval - Group** activity, which creates a group approval in addition to the individual approvals. The tree icon can be used to select group reference fields from the current record to create approvals, such as `${assignment_group}`.
Approval - User Condition	

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Approval - User activity input variables (continued)

Field	Description
Specify how the activity decides to approve or reject the approval, based on the responses from individual approvers.	
Wait for	A choice between different approval logics to determine which individual approvals result in approval of the activity's approval. Options are: • **Anyone to approve:** Any user can approve and the first approval causes the activity to complete with a result of **approved**. • **Everyone to approve:** All users must approve (see below for how a rejection is handled). • **First response from anyone:** The first approval or rejection from any user causes the activity to complete. • **Condition based on script:** Each time a user approves or rejects, the **Approval script** is called to determine if the activity should complete.
When anyone rejects	A choice between different approval logics to determine which individual rejections result in rejection of the activity's approval. Options are: • **Reject the approval:** Immediately complete the activity with a result of **rejected**. • **Wait for other responses before deciding:** Wait until we get other responses before making an approval or rejection decision. This allows users to change their mind until a decision is made. **Note:** Note that if **Wait for** is set to **Anyone to approve** then a single approval will cause the activity to complete with a result of **approved** even if one or more users reject.
Approval Column	A string field for the name of the approval field on the table the workflow is running on. The default value is **approval**, which is the field on the Task table. **Note:** Use the field's name, not its label. If using any custom approval column fields and approval column journals, use Set Value activities in the workflow to set the custom Approval column fields.
Approval Journal Column	
Approval Script	If the **Wait for** variable is set to **Condition based on script** this script is called to determine how to handle an approval or rejection. The script needs to set the variable *answer* to approved or rejected to indicate the approval status for this approval. When called, the following information is available:

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Approval - User activity input variables (continued)

Field	Description

	`counts.total = total number of users that are part of this approval`
	`counts.approved = # of users that approved so far`
	`counts.rejected = # of users that rejected so far`
	`counts.requested = # of users that are pending approval`
	`counts.not_requested = # of users that are not pending approval`
	`counts.not_required = # of users that approval is not required`

Approval - User Schedule Specify how workflow calculates the approval record's expected start date and due date. Once you've made a selection for 'Due date based on', and 'Schedule based on', the appropriate fields will display.	
Due date based on	Select how workflow determines the task's duration, due date, and schedule. • **A user specified duration:** The duration is based on a user specified value. • **A relative duration:** The duration is calculated from a relative duration (such as End of Next Business Day). • **A date/time or duration field:** The duration is based on the value of a field on the current record. • **Script:** The duration is returned by a script.
Duration Only appears when **Due date based on** is set to `A user specified duration`	The specific number of days and hours.
Relative duration Only appears when **Due date based on** is set to `A relative duration`	The general number and length of business days.
Due date field Only appears when **Due date based on** is set to `A date/time`	The date/time or duration field.

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Approval - User activity input variables (continued)

Field	Description
`or duration field`	
Due date script Only appears when **Due date based on** is set to `Script`	The script that sets 'answer' to the number of seconds for the duration.
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2 hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are: • **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Only appears when **Schedule based on** is set to `A specific schedule`	The predefined **Schedule** from a list.
Schedule field Only appears when **Schedule based on** is set to `A schedule field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Time zone based on	The time zone for calculating the duration. The time zone may be based on: • **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A specific **Time zone** that you choose from a choice list. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.
Time zone Only appears when **Time zone based on** is set to `A`	Select the time zone you want from the choice list.

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Approval - User activity input variables (continued)

Field	Description
`specific time zone` .	
Time zone field Only appears when **Time zone based on** is set to `A time zone field.`	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Approval - Advanced If desired, write a script for determining additional users to request approvals from.	
Advanced	Select this check box to write a script for determining additional users to request approvals from.

Additional approvers script	If the **Advanced** check box is selected, this script is called to determine any additional user approvals to be created. The script needs to set the variable *`answer`* to a comma-separated list of user ids and group ids or an array of user and group ids to add as approvers. For example:
	`answer = [];`
	`answer.push('id1');`
	`answer.push('id2');`

Conditions

The following conditions determine which transition runs after this activity.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval - User activity conditions

Condition	Description
Approved	The users approved the request based on the **Wait for** rules.
Rejected	The users rejected the request based on the **Wait for** rules.
Error	The event or condition that generates an error.
Skipped	The event or condition that allows a skipped approval.

States

The activity state tells the workflow engine what to do with the activity.

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Approval - User activity states

State	Description
Executing	The workflow engine starts the *execute* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Generate workflow activity

The **Generate** activity immediately creates task or approval records from any task or approval activities placed after the **Generate** activity in the workflow path. These pre-generated tasks and approvals start when the task and approval activities are reached during flow execution. This allows a task to have a set of associated pre-generated sequential tasks or approvals, but still require them to be completed in order.

Note:
This activity is only available when the workflow runs on a table that extends Task.

By default, the workflow does not create any tasks or approvals until it reaches them in the workflow.

The **Generate** activity follows all transitions through the workflow to each activity. For each activity:

- If it is a task activity, creates the task and sets:
  - The **State** to **Pending**
  - The **Expected Start Date**
  - The **Due Date**

  Note:
  Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

- If it is an approval activity, creates the approvals and sets:
  - The approval **State** to **Not Requested**
  - The **Expected Start Date**
  - The **Due Date**

  Note:
  Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Expected start dates and due dates are calculated based on the **Expected Duration** of all of the tasks and approvals between the **Generate** activity and the activity being updated. In the case of a branched path (between a **Branch** and **Join** activity), the longer duration will be used for any post-branch activities.

The **Generate** activity can be used more than once, and any tasks or approvals will be refreshed with updated information. This is useful in situations where the list of approvers or other

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important information is still editable while the workflow is in process and it may be necessary to update or correct the generated approvals or tasks.

To exclude a set of activities from the **Generate** activity, select the **Skip during generate** check box on any condition and its transitions will not be followed during the generate process. By default, the following conditions have the **Skip during generate** check box selected:

- **Rejected** (for any of the approval activities)
- **No** condition of **If** activity
- **Continue** condition of **Turnstile** activity
- **Incomplete** condition of **Join** activity

Input variables

Input variables determine the initial behavior of the activity.

Generate activity input variables

Field	Description
Generate approvals	If selected, approvals are created when running the **Generate** activity. If cleared, the approvals are used to compute their estimated duration, but no approvals are created.
Generate tasks	If selected, tasks are created when running the **Generate** activity. If cleared, the tasks are used to compute their estimated duration, but no tasks are created.

States

The activity state tells the workflow engine what to do with the activity.

Generate activity states

State	Description
Executing	The activity is executing.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.

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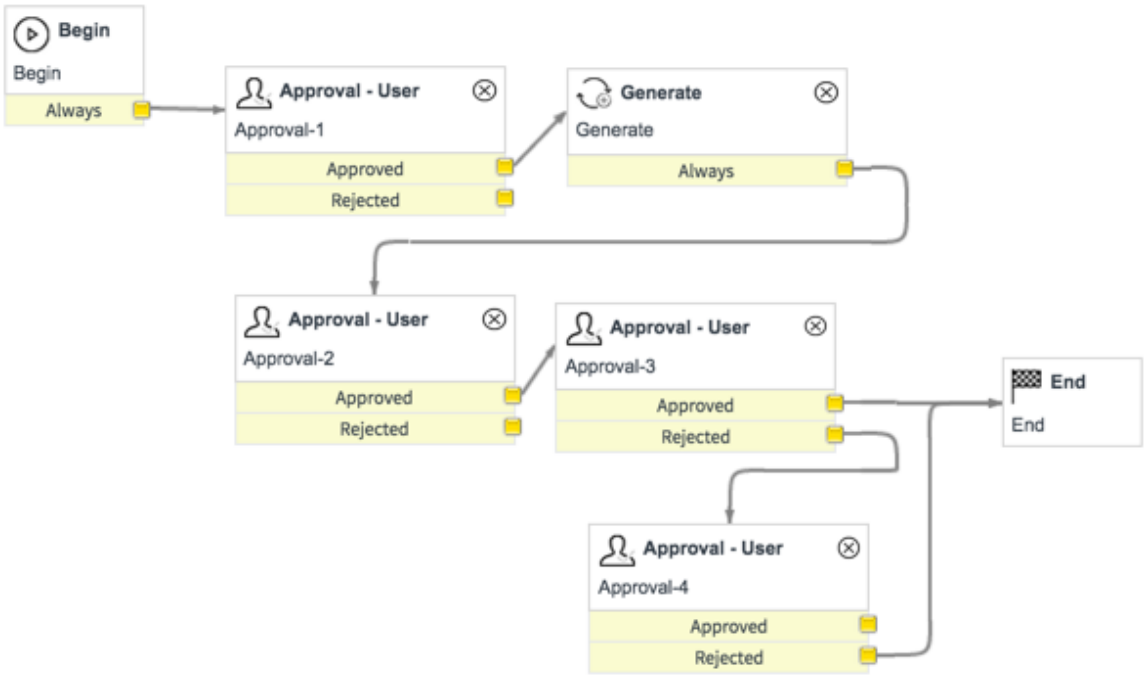
Example

Generate workflow



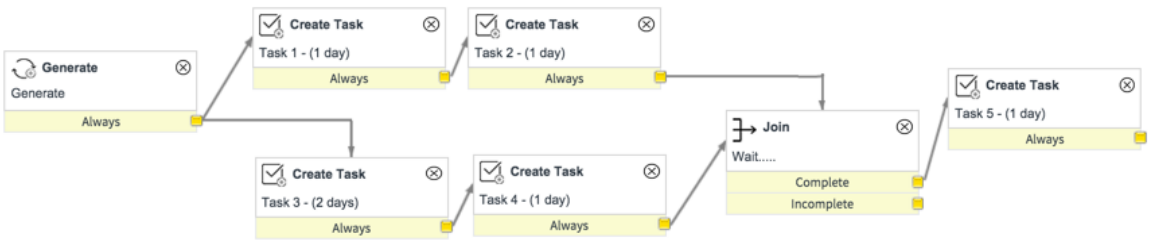
In this example, the following approvals are generated:

- Approval-2
- Approval-3

Approval-4 is skipped since the **Rejected** condition of Approval-3 has **Skip during generate** selected.

Here is an example of using the **Generate** activity that describes the expected start and due dates:

Generate workflow start and due date



In this example, if the **Generate** activity is run on Jan 1, 2016, the following expected start dates and due dates would be set for the generated tasks.

Task	Expected Start Date	Reason	Due Date
Task 1 (1 day)	Jan. 1, 2016		Jan. 2, 2016
Task 2 (1 day)	Jan. 2, 2016	Task 1 is 1 day	Jan. 3, 2016
Task 3 (2 days)	Jan. 1, 2016		Jan. 3, 2016
Task 4 (1 day)	Jan. 3, 2016	Task 3 is 2 days	Jan. 4, 2016

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Task	Expected Start Date	Reason	Due Date
Task 5 (1 day)	Jan. 4, 2016	Task 4 ends the latest before the Join	Jan. 5, 2016

Notice that Task 5 starts on Jan. 4, 2016 since the longest path (based on due dates) to the **Join** is Task 3/Task 4.

Manual Approvals workflow activity

The **Manual Approvals** activity watches and manages any approvals that users add manually outside of the workflow process. This activity only selects approvals that are in the Not requested state.

Note:
This activity is only available when the workflow runs on a table that extends Task.

If there are no pending manual approvals when this activity executes, the activity immediately completes with a result of **approved**. This activity does not create approval records. Use this activity to pause the workflow when a user adds a manual approval to a record with an associated workflow, and it is in the Not requested state. The workflow waits for the approval to be closed before proceeding.

Results

The workflow designer can assign a result value using `activity.result` from within a script field of the activity. By default, the result value of the activity is the final approval disposition determined by the approval actions take by the approvers. Possible result values are:

- Approved
- Rejected
- Deleted
- Cancelled
- Error

Input variables

Input variables determine the initial behavior of the activity.

Manual Approvals activity input variables

Field	Description
Wait for	Indicate what to wait for to indicate that the approval activity is approved or rejected. Options are: • **Any manual user or group approval:** Any user can approve and the first approval causes the activity to complete with a result of **approved**. • **All manual user or group approvals:** All users must approve (see below for how a rejection is handled). • **The first response from any manual approval:** The first approval or rejection from any user causes the activity to complete.
When anyone rejects	Indicate what happens when any user rejects their approval request. Options are:

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Manual Approvals activity input variables (continued)

Field	Description
	• **Reject the approval:** Immediately complete the activity with a result of **rejected**. • **Wait for other responses before deciding:** Wait until we get other responses before making an approval or rejection decision. This allows users to change their mind until a decision is made. In addition, if **Wait for** is set to **Anyone to approve** then a single approval will cause the activity to complete with a result of **approved** even if one or more users reject.

Conditions

The conditions determine which transition runs after this activity.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Manual Approvals activity conditions

Condition	Description
Approved	The users from the groups have approved the request based on the **Wait for** rules.
Rejected	The users from the groups have rejected the request based on the **Wait for** rules.

States

The activity state tells the workflow engine what to do with the activity.

Manual Approvals activity states

State	Description
Executing	The workflow engine starts the `execute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Rollback To workflow activity

The **Rollback To** activity transitions directly to the activity specified by the outgoing transition line arrow.

Note:
This activity is only available when the workflow runs on a table that extends Task.

Rollback To determines which activities to reset based on the actual workflow sequence (transition line attachments) of activities between itself and the transitioned to activity, not the execution order. **Rollback To** then marks all the approvals that have transitioned between the

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rollback and the transitioned to activity as **Not Yet Requested** and the tasks as either **Open** or **Pending**.

Use the **Rollback To** activity for all workflows in which multiple rollbacks are required. **Rollback To** has no variables.

Conditions

The conditions determine which transition runs after this activity.

Rollback To activity conditions

Condition	Description
Always	The event or condition that causes the approval to revert to the previous workflow step.
Error	The event or condition that generates an error.
Skipped	The event or condition that allows a skipped approval.

States

The activity state tells the workflow engine what to do with the activity.

Rollback To activity states

State	Description
Executing	The workflow engine starts the `execute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Rollback To behavior

The **Rollback To** activity transitions directly to the activity specified by the transition line arrow.

Use the **Rollback To** activity for all workflows that use multiple or nested rollbacks. **Rollback To** resets the targeted task (the direct transition) to **Open**. All tasks that have executed between the **Rollback To** activity and the targeted task (rolled back task) are set to **Pending**.

(0) Begin

(1) Log Message

(2) Task 1

(3) Task 3

(4) Task 2

(5) Timer

(6) Approval 1

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(7) Roll back to first task

(8) Task 1

(9) Task 2

(10) Approval 1

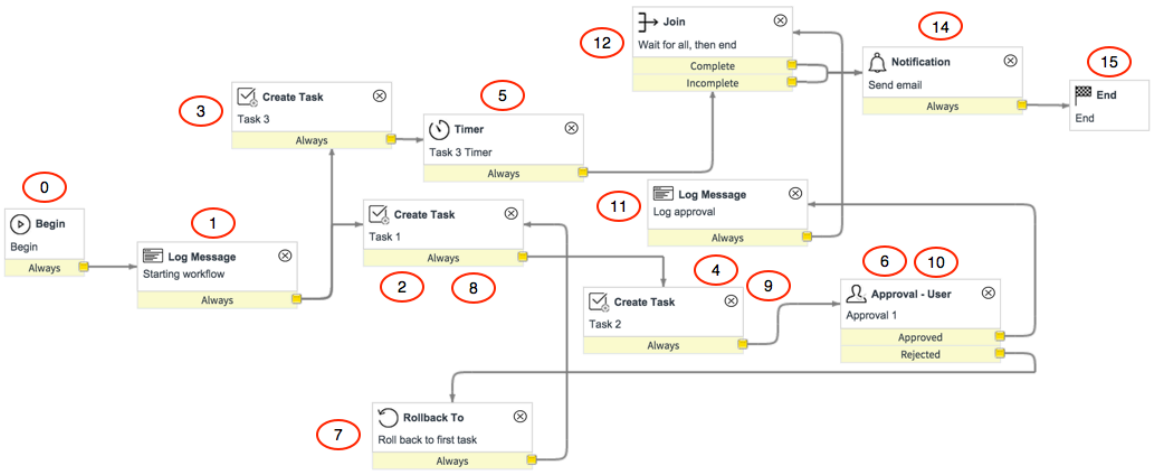
(11) Log approval

(12) Join

(14) Send email

(15) End

Rollback to workflow



Transition history

The state of (3) Task 3 does not change, since this activity does not directly transition from the rollback target activity. To see what activities were rolled back, select the **Workflow Transition History** related list and look at the **Rolled back** column.

The **Rollback To** activity (7) updates the following activities:

(8) Task 1: reset to **Open**

(9) Task 2: reset to **Pending**

(10) Approval 1: reset to **Not Yet Requested**

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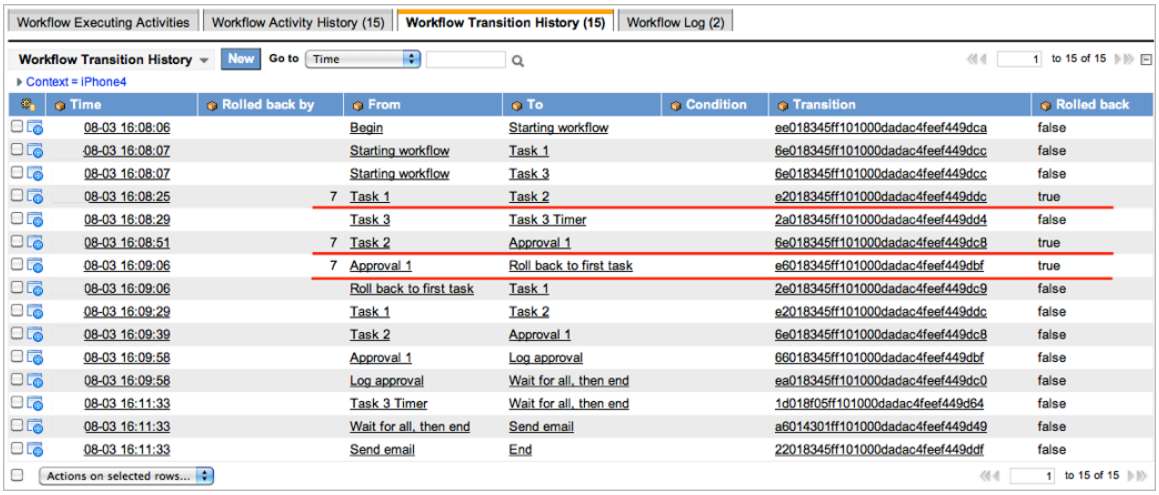
Rollback To workflow transition



Workflow Executing Activities | Workflow Activity History (15) | **Workflow Transition History (15)** | Workflow Log (2)

Workflow Transition History — New — Go to Time — 1 to 15 of 15

Context = iPhone4

Time	Rolled back by	From	To	Condition	Transition	Rolled back
08-03 16:08:06		Begin	Starting workflow		ee018345ff101000dadac4feef449dca	false
08-03 16:08:07		Starting workflow	Task 1		6e018345ff101000dadac4feef449dcc	false
08-03 16:08:07		Starting workflow	Task 3		6e018345ff101000dadac4feef449dcc	false
08-03 16:08:25	7	Task 1	Task 2		e2018345ff101000dadac4feef449ddc	true
08-03 16:08:29		Task 3	Task 3 Timer		2a018345ff101000dadac4feef449dd4	false
08-03 16:08:51	7	Task 2	Approval 1		6e018345ff101000dadac4feef449dc8	true
08-03 16:09:06	7	Approval 1	Roll back to first task		e6018345ff101000dadac4feef449dbf	true
08-03 16:09:06		Roll back to first task	Task 1		2e018345ff101000dadac4feef449dc9	false
08-03 16:09:29		Task 1	Task 2		e2018345ff101000dadac4feef449ddc	false
08-03 16:09:39		Task 2	Approval 1		6e018345ff101000dadac4feef449dc8	false
08-03 16:09:58		Approval 1	Log approval		66018345ff101000dadac4feef449dbf	false
08-03 16:09:58		Log approval	Wait for all, then end		ea018345ff101000dadac4feef449dc0	false
08-03 16:11:33		Task 3 Timer	Wait for all, then end		1d018f05ff101000dadac4feef449d64	false
08-03 16:11:33		Wait for all, then end	Send email		a6014301ff101000dadac4feef449d49	false
08-03 16:11:33		Send email	End		22018345ff101000dadac4feef449ddf	false

Actions on selected rows... — 1 to 15 of 15

Rollback To activity

When conditions in a workflow trigger a **Rollback To** activity, the workflow moves processing backward to a specified activity in the workflow and resets certain activities that have already executed back to their original state. This is useful when handling an unexpected failure or as part of a programmed logical flow.

When an activity is reset during a workflow rollback, the following happens:

- Approvals are reset to **Not Requested**.
- Tasks are reset to either **Open** or **Pending**. A rollback workflow path cannot create new tasks.

Activities that perform external system operations, such as deleting a file or sending an email, are not rolled back. Only approval and task activity states are reset.

A workflow can contain a single rollback, multiple rollbacks, or nested rollbacks in more complex workflows. The **Rollback To** activity resets activities based on the actual workflow sequence (transition line attachments) of activities between itself and the transitioned to activity, rather than using the execution order to determine where processing should restart.

Condition Workflow activities

Condition activities provide conditional branching and logical operation functionality for workflows.

If workflow activity

The **If** activity checks a condition or script to determine if a **Yes** or **No** transition should be taken.

If the workflow creator specifies both the **Condition** and the **Advanced** script, both must evaluate successfully for activity to take the **Yes** transition.

Results

The workflow designer can assign a result value using activity.result from within the **Script** field on the activity record. By default, the result value of the activity is the final result of the condition or script specified. Possible result values are:

- Yes
- No

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Input variables

The following variables determine the behavior of the activity.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

If activity input variables

Field	Description
Condition	If specified and the current record matches the condition, the **Yes** transition is taken.
Advanced and Script	To specify a script, select the **Advanced** check box. You may then enter a script that is evaluated. If your script sets the variable answer to `yes`, then the **Yes** transition is taken. Otherwise, the **No** transition is taken.

Conditions

The following conditions determine which transition comes after the activity.

If activity conditions

Condition	
Yes	Taken when the condition, if specified, matches and the **Advanced** script, if specified, returns yes.
No	Taken when either the condition does not match or the **Advanced** script, if specified, returns no.

States

The activity state tells the workflow engine what to do with the activity.

If activity states

State	Description
Executing	The workflow engine knows to start the *`onExecute`* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activty, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Switch workflow activity

The **Switch** activity checks if the value of a passed field or variable is equivalent to one of several case values.

The switch activity behavior is similar to a switch statement in Java.

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When creating a switch activity, select a **Variable** or **Field** to check against activity conditions for a matching field value. When the value passed in this variable or field matches the value defined in the **Condition** field of the activity condition, the workflow progresses through that activity condition.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

Results

The variable or field selected in the **Variable** or **Field** activity variable determines the possible result values.

Input variables

The following variables determine the behavior of the activity.

Switch activity input variables

Field	Description
Type	Select **Variable** or **Field** as the type of value to check against available conditions. This selection sets the label and available options for the other field.
Variable or Field	Select the source of the value compared against the switch activity conditions. The field label and available options depend on the **Type** selection. • **Variable:** select any service catalog variable. • **Field:** select any field from the **Table** defined in the workflow properties.

States

The activity state tells the workflow engine what to do with the activity.

Switch activity states

State	Description
Executing	The workflow engine knows to start the `onExecute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Example

You can create a switch activity that sets different field values on an incident based on the Assignment group of the incident record.

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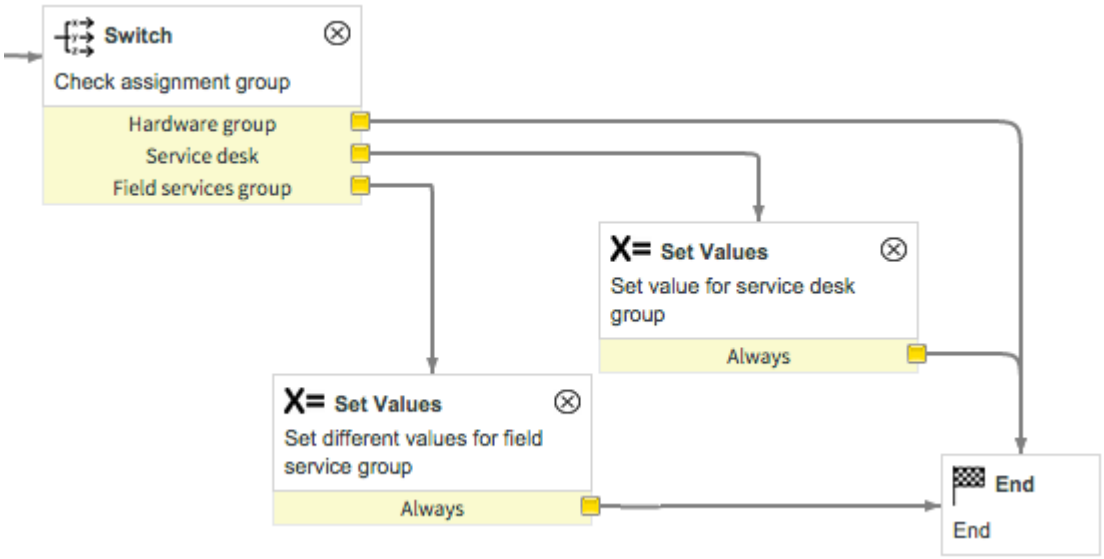
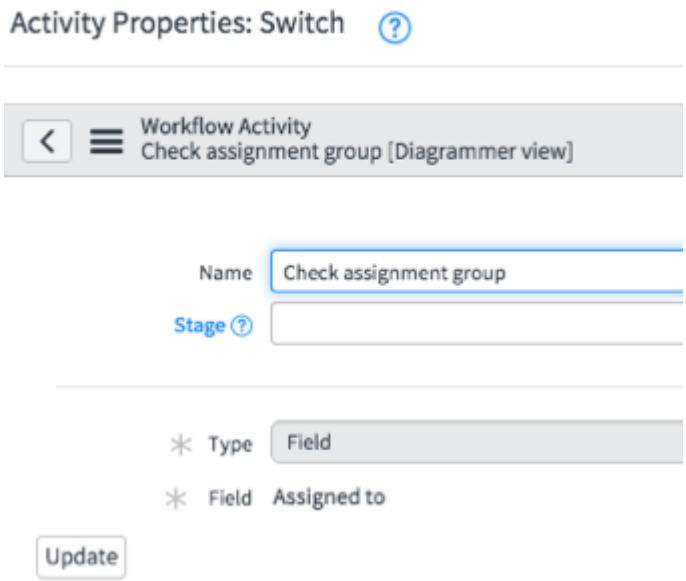
Switch activity example



The **Field** selected is the incident **Assigned to** field.

Switch activity Field



If the value of the **Assigned to** field of the workflow-triggering incident is **Service Desk** or **Field Services**, the workflow populates values on the incident record before continuing. If the **Assigned to** value is **Hardware**, the workflow continues without populating any field values.

Condition type (Standard, Else, or Error) is used. For more information, see Manage workflow activity conditions.

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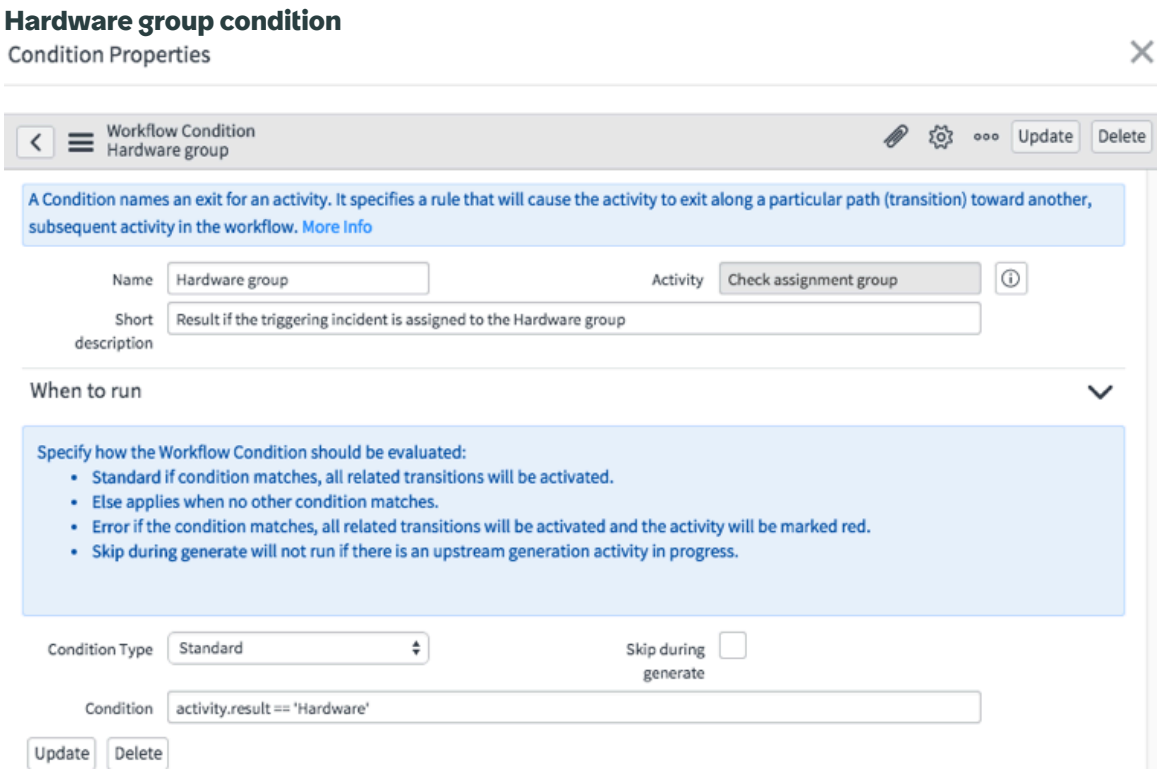

Wait for condition workflow activity

The **Wait for condition** activity causes the workflow to wait at this activity until the current record matches the specified condition.

The workflow evaluates the **Wait for condition** activity each time the current record is updated. Use this activity to pause a workflow indefinitely until a particular criteria is met by a record update. To pause a workflow for a timed duration see Timer workflow activities.

For workflow to consider the condition met, all conditions specified – whether in the builder or in a script – must be true.

Note:
A **Wait for condition activity** should only be used to wait for an external event such as a record update, and not one from a workflow setting a value. If you have a workflow setting a value and want to wait for that same field to be seen as 'changed,' try inserting a one-second timer.

Results

The workflow designer can assign a result value using `activity.result` from within a script field of the activity. The activity transitions when the result value is true.

Input variables

The following variables determine the behavior of the activity.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

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Wait for condition activity input variables

Field	Description
Condition	The workflow is paused at this activity until this condition matches the current record.
Condition script	If specified, the workflow is paused at this activity until this script sets the `answer` variable to true.

States

The activity state tells the workflow engine what to do with the activity.

Wait for condition activity states

State	Description
Executing	The workflow engine knows to start the `onExecute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activty, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Wait for WF Event workflow activity

The **Wait for WF Event** activity causes the workflow to wait at this activity until the specified event is fired.

Use this activity to wait for another activity to fire an event. Events from other activities are fired in a script using the workflow.fireEvent('eventName') API call.

Results

The workflow designer can assign a result value using `activity.result` from within a script field of the activity. This activity transitions when the specified event fires.

Input variables

The following variables determine the behavior of the activity.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

Wait For WF Event activity input variables

Field	Description
Wait for Event	An event name to trigger the workflow.

States

The activity state tells the workflow engine what to do with the activity.

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Wait For WF Event activity states

State	Description
Executing	The workflow engine knows to start the *onExecute* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Notify workflow activities

Notify workflow activities manage calls and SMS messages in Notify.

All Notify workflows that manage a phone call must run on the notify_call table. Call-related Notify activities can be added only to workflows where the **Table** field value is **Notify Call [notify_call]**.

You can identify if an outbound call was answered by a human or by an answering machine from within a Notify workflow by evaluating the *current.is_human* variable, such as with an **If** workflow activity. This variable is set by the telephony provider when an outbound call is answered. This variable is always true for inbound calls.

Note:
Do not add a **Timer** activity between multiple Notify activities that interact with active phone calls.

Important:
When creating a Notify workflow, set the workflow **If condition matches** field to **-- None --**. Notify controls which workflow to run based on the configured number groups.

Related topics

Using variables in Notify workflow activities

Forward call workflow activity

The **Forward Call** activity forwards a Notify call to an E.164-compliant phone number.

If the person receiving a forwarded call hangs up, the **forward call** activity completes and transitions to the next activity. Any further Notify activities in the workflow run for the caller only.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Phone number to call	Enter the phone number to forward the call to.
Timeout (in seconds)	Enter the amount of time to wait for the call to be answered before hanging up.
Record	Select this check box to record the conversation.

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Conditions

The conditions determine which transition comes after this activity.The **forward call** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the phone number to call is invalid.

Input workflow activity

The **Input** activity creates a phone menu by presenting a list of options on a Notify call.

Input Variables

Input variables determine the initial behavior of the activity.

Input Variables

Variable	Description
Number of digits	Specify the maximum number of digits the caller can enter. A caller can enter fewer digits than the maximum and press the **Finish key** to complete the entry.
Finish key	Specify the key a caller can press on their phone when finished selecting a menu option.
Timeout (in seconds)	Specify the amount of time to wait before closing the menu automatically when the caller does not select a menu option.
Advanced	Select this check box to use a script to build the phone menu, instead of using the activity conditions.

Script	Define the script to build the phone menu. The script must specify an *answer* variable as a JavaScript object with the following format:
	`answer = {`
	`  “1": {`
	`  “play”: “https://some_url.com/options/one.mp3“,`
	`  “myCustomData”: “some data here”`
	`  },`
	`  “2”: {`
	`  “play”: “https://some_url.com/options/two.mp3”,`
	`  “myCustomData”: “some other data here”`
	`  },`
	`“3”: {`
	`  “speak”: “type 3 to speak to a representative”,`
	`  “language”: “en-US”,`
	`  “myCustomData”: “some more data here”`
	`  }`
	`};`
	The script may specify either a text-to-speech string and language code using the *speak* attribute or URL of the music to be played using the *play* attribute. You can also add optional attributes to store related information, such as *myCustomData* in the example above.

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Input Variables (continued)

Variable	Description
	Note: The script object continues to support *say* attribute for backward compatibility.

Conditions

The conditions determine the transition that comes after this activity.

The **input** activity does not specify any conditions by default. You must define conditions to build the phone menu. Each condition is one option on the phone menu. Notify reads the text from each condition **Name** to the caller, up to 100 characters per condition.

You can specify a language for each condition by prefixing the message with the language code, in the format **xx-XX:<Message>**. For example, add **fr-CA:** for Canadian French. Available languages are stored on the Notify Language [notify_language] table.

The condition that the activity transitions through depends on the digits entered by the caller. Set the condition **Condition** value to **parseInt(workflow.scratchpad.digits) == <expected digits>**. For example, to transition through a condition when the caller presses the number 3, set the **Condition** to **parseInt(workflow.scratchpad.digits) == 3**.

You can add an error condition to this activity. The activity transitions through the error condition if the advanced script returns an invalid value, or if the text to say for a condition is empty.

Scratchpad Entries

The activity uses the workflow scratchpad to write persistent values.

Values written to scratchpad

Entry	Description
workflow.scratchpad.digits	The digits entered by the caller, as a string.

workflow.scratchpad.menu<activity name>	The entire *answer* variable, if using the advanced script option. You can access this menu from other activities after this activity successfully executes.
	
	For example, if the activity name is `choices`, you can access values from the menu using
	`var previousActivity = "choices";`
	`var choicesMenu = workflow.scratchpad.menu[previousActivity];`
	`var menuItem = choicesMenu[workflow.scratchpad.digits];  // Selects the menu item based on the caller's input.`
	`var selectedValue = menuItem.myCustomData; //get the custom data for the selected menu item.`

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Hangup workflow activity

The **Hangup** activity disconnects an active Notify phone call.

You can use the **hangup** activity to disconnect only calls that have been answered. Use the **reject** activity to disconnect calls that have not been answered.

Play workflow activity

The **Play** activity plays a sound file on a Notify call.

Input Variables

Input variables determine the initial behavior of the activity.

Input Variables

Variable	Description
URL	Enter the URL of a sound file to play. If the URL is inaccessible, or if the audio file mime type is not supported by the telephony provider, the **play** activity is skipped.
Loop	Enter the number of times the sound file should play.

Conditions

The conditions determine which transition comes after this activity. The **play** activity does not specify any conditions by default.

You can create an error condition to handle errors with the sound file. The activity transitions through the error condition if the specified sound file is not available, or has an unsupported mime type. Supported mime types are listed on the Notify Audio MIME Types [notify_mime_type] table.

Record workflow activity

The **Record** workflow activity records audio from a user on a Notify call.

Note:
The Record workflow activity records Notify call but not the Notify conference call. To record the Notify conference call, you can set the **Record** activity variable on the Join Conference Call workflow activity.

Input Variables

Input variables determine the initial behavior of the activity.

Input Variables

Variable	Description
Max duration (in seconds)	Enter the maximum duration, in seconds, allowed for a recording.
Timeout (in seconds)	Enter the amount of time to wait before ending a recording automatically when the caller is silent.
Finish Key	Specify the key a caller can press on their phone to end the recording.

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Scratchpad Entries

The activity uses the workflow scratchpad to store persistent values.

The **record** activity adds the *recording* variable to the workflow scratchpad. This variable stores metadata about the recording, such as URI, ID, and duration. You can access the following values from this variable.

Values written to scratchpad

Value	Description
recording.recordingDuration	The duration of the recording, in seconds.
recording.from_number	The caller's phone number, including country code.
recording.notify_number	The Notify phone number used to respond to the call, including country code.
recording.recordingID	The ID used by the telephony provider to identify the recording.
recording.recordingURL	The URL from the telephony provider to access the recording.

Reject workflow

The **Reject** workflow activity rejects an incoming Notify call.

You can use the **reject** activity to disconnect only calls that have not yet been answered. Use the **hang up** activity to disconnect calls that have been answered.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
reason	Select a reason for rejecting the call, such as **busy**.

Say workflow activity

The **say** workflow activity allows you to play a message, using text to speech, on a Notify call.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Text to say	Specify the text to read.
Language	Select the language and locale to use when reading text.
Advanced	Select this check box to use a script to define the language and message, instead of using the **Text to say** and **Language** values.

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Input variables (continued)

Variable	Description
Script	Define a script to set what text is read on the call. The script must return a string that defines the language and the text to read. For example, to play an English-language message, return {language: 'en-US', text: 'Text to read'}.

Forward to notify client workflow activity

The **forward to notify client** workflow activity connects a phone call to a Notify WebRTC client.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
User	Select the user to connect the call to.
Advanced	Select this check box to use a script to determine which client to connect to, instead of using the **User** variable.
Script	Define a script that controls which client to connect to. This script should return a GlideRecord for a single User [sys_user] record.
Timeout (in seconds)	Enter the amount of time to wait for the call to be connected before hanging up.
Record	Select this check box to record the call.

Conditions

The conditions determine which transition comes after this activity. The **Forward to Notify Client** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if there is an issue with the Notify client.

Call workflow activity

The **Call** activity makes outbound phone calls using a Notify workflow. This workflow activity can be added to any table.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Notify Number	The Notify phone number to make the call from. When you initiate a call, the outgoing call workflow for the number group associated with this number runs.
Phone number to call	The E.164-compliant phone number to call.

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Input variables (continued)

Variable	Description
Advanced	Select this check box to use a script to determine number to call, and the Notify number to call from instead of using the **Phone number to call** and **Notify Number** variables.
Script	Define a script that controls which number to call. This script should return a string listing the Notify number sys_id, as well as the phone number to call, such as {notify_number: 'sys_id', phone_number: '+316...'}

Conditions

The conditions determine which transition comes after this activity. The **call** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the call could not be set up due to invalid data returned by the advanced script.

Join conference call workflow activity

The **Join Conference Call** activity connects an incoming or outgoing call to a Notify conference call.

Notify includes the workflows Notify: (Re)join Conference Call and Notify: Join Conference Call Via SMS to demonstrate how to use the **join conference call** activity to connect inbound and outbound calls, and inbound SMS messages to a conference call.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Record	Select this check box to record the conference call.
Advanced	Select this check box to display advanced configuration options.
Script	Specify advanced configuration options using JavaScript, such as if the new participant should be muted upon joining the conference call. You can access values from the workflow scratchpad.

Conditions

The conditions determine which transition comes after this activity. The **join conference call** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the confernece_call scratchpad variable is not set.

Scratchpad entries

The activity uses the workflow scratchpad to read persistent values.

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Values read from scratchpad

Scratchpad variable	Description
workflow.scratchpad.conference_call	A GlideRecord for a single conference call record. A call processed by this activity is added to this conference call. If this value is not specified, the **join conference call** activity will log an error. When initiating an outgoing call workflow using the Notify API `call(String notifyPhoneNumber, String toPhoneNumber, GlideRecord conferenceCall)` method, this scratchpad value is set automatically to the conference call GlideRecord. For incoming call workflows, or workflows initiated using a different mechanism, you must explicitly set this scratchpad value.

Enable different attributes available with Join Conference Call activity

System administrators can enable any or all of the below attributes and use them in the Join Conference Call workflow activity.

Attribute	Description
hangupOnStar	When hangupOnStar is enabled (set to true), participants in a conference call can press the * button to disconnect from the call. Control is returned to the workflow, which can be used to trigger customer-defined actions.
muted	When muted is enabled (set to true), the participant will join the conference in a muted state.
beepOnEnter	When beepOnEnter is enabled (set to true), a notification beep is played when a user joins the conference.
beepOnExit	When beepOnExit is enabled (set to true), a notification beep is played when a user leaves the conference.
enableImmediateInput	When enableImmediateInput is enabled (set to true), it allows input of a single digit immediately after the conference ends for this user and sets that in workflow.scratchpad.confDigits. This option will be ignored if hangupOnStar is false.

To enable any of the above attributes, perform the following steps:

1. Navigate to **Workflow** > **Administration** > **Workflow Versions**.
2. Open the Notify: (Re)join Conference Call workflow.
3. Click the **Show Workflow** related link.
4. To modify the workflow, click the WorkFlow Actions icon and click **Checkout**.

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5. Open the Join Conference Call workflow activity.
6. Enable the **Advanced** check box to display the **Script** field.
7. Set the **hangupOnStar** attribute to true in the *config* variable in the script. The default setting is false.
8. Click **Update**.
9. Click the WorkFlow Actions icon and click **Publish** to save the changes.

Similarly, you can enable the other attributes.

Send SMS workflow activity

The **send SMS** workflow activity to send short text messages using Notify to users' phones. This workflow activity can be added to any table.

Notify requirements

To send SMS messages, you must add and configure a provider in Notify. For more information about configuring a provider, see Configure a provider in Notify.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
From	Select the Notify phone number to use to send the SMS message.
Advanced	Select this check box to use JavaScript to determine which numbers to send the message to, and the Notify number to use to send the message.
To	Select any number of users to send the message to. The user record must have a E.164-compliant phone number or notification device configured for SMS messages.
To (groups)	Select any number of groups to send the message to. All members of that group with an E.164-compliant phone number or SMS notification device receive the message.
Message	Enter the message to send. You can add field values from the current record by using the **Select variables** box. You can also add values from the workflow scratchpad. If a field and a scratchpad variable have the same name, the field value is used. Because you can use variables in this message, it is not possible to determine the length of the message at design time. If the activity sends a message that is longer than supported by the telephony provider, the message is truncated and the instance logs a warning.
To (script)	Enter a script to determine which numbers to send the message to, and the Notify number to use to send the message. The script should return a JavaScript object with the format `{notify_number: \'...sys_id...\', users: [...], groups: [...], numbers: [...]}`. Specify the users or groups to send the message to as an array of sys_id values. Specify other numbers as an array of E.164-compliant phone numbers.

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Input variables (continued)

Variable	Description
	This field appears only if **Advanced** is selected.

Conditions

The conditions determine which transition comes after this activity. This activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the Notify number used to make the call is not configured correctly or unable to send SMS messages, or if an error occurs while sending the SMS.

Queue workflow activity

The **Queue** activity places an active Notify call in a queue.

Add the **Queue** activity to a workflow on the Notify Call [notify_call] table to put the current call on hold. This activity does not specify any input variables.

The queue that the call is added to is given a random ID.

Workflow notification activities

Notification workflow activities notify users of events that occur during the workflow.

Create Event workflow activity

The **Create Event** activity adds an event to the event queue, but does not immediately fire the event.

The event processor typically processes the event within one minute. This activity triggers any business rules or email notifications that would normally be triggered by the event.

For more information about creating and using system events, see System Events.

Results

Finished: the activity added the event to the event queue.

Input variables

Create Event activity input variables

Field	Description
Event name	The name of the event to create. From the Event Name lookup list, select the event to add to the queue. If the event requires parameters, specify them in the Parameter script field.
Parameter 1	The first parameter of the event. **Note:** If this parameter is a string value, it must be within quotes (" ").
Parameter 2	The second event parameter.

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Create Event activity input variables (continued)

Field	Description
	Note: If this parameter is a string value, it must be within quotes (" ").

Notification workflow activity

The **Notification** activity sends an email or SMS message to specified users or groups.

Input variables

Update the recipients list or delete the activity from the flow if you want to stop the notifications.

Notification activity input variables

Field	Description
Addressees	
To	The users who will be recipients of the email.
To (groups)	The members of the groups that will be recipients of the email.
Advanced	If selected, the script in the **To (script)** field is called to specify additional recipients of the email.
To (script)	If **Advanced** is selected, this script is called and should set the variable `answer` to a comma-separated list of user or group sys_ids that you want to add as recipients of the email.
Message	
Subject	The subject line of the email.
Message	The email body that is sent. To include the value of a field in the message body, place the cursor at the point in the text where you want the field's value inserted. Then click the + icon next to **Fields** and select the field you want.

States

The activity state tells the workflow engine what to do with the activity.

Notification activity states

Field	Description
Executing	The workflow engine knows to start the `run` function of the activity.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.

Timer workflow activities

Timer activities pause workflows for set periods of time.

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Related topics

Use multiple timer activities in one workflow

SLA Percentage Timer workflow activity

The **SLA Percentage Timer** activity pauses the workflow for a duration equal to a percentage of an SLA.

A workflow must run on the Task SLA table to use this activity.

Note:
Timer activities run as the System user because the system scheduler advances the workflow.

Results

SLA Percentage Timer activity results

Result	Description
Complete	The activity successfully reached the specified duration
Cancelled	The activity or workflow was canceled before the timer reached the specified duration

Input variables

Input variables determine the initial behavior of the activity.

SLA Percentage Timer activity input variables

Field	Description
Percentage	The duration to pause the workflow for, as a percentage of the current SLA

States

The activity state tells the workflow engine what to do with the activity.

SLA Percentage Timer states

State	Description
Executing	The activity is in this state very briefly while initializing, after which it immediately changes to **Waiting**.
Waiting	The workflow engine waits until the SLA reaches the specified percentage. The engine then transitions the workflow to the next activity.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Timer workflow activity

The **Timer** activity pauses the workflow for a specified period of time.

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This duration can be an absolute time value or a relative value based on a defined Creating and using schedules. It is best to adjust the **Duration** so the workflow can progress in a timely manner. To pause a workflow indefinitely until a condition is met, see wait for condition.

Note:
Timer activities run as the System user because the system scheduler advances the workflow.

Results

Timer activity results

Result	Description
Complete	The activity successfully reached the specified duration.
Cancelled	The activity or workflow was canceled before the timer reached the specified duration.

Input variables

Input variables determine the initial behavior of the activity.

Timer activity input variables

Field	Description
Timer Information	
Timer based on	How the timer duration is computed. The options are: • **A user specified duration:** The duration is based on the **Duration** fields, such as days and hours. • **A relative duration:** The duration is based on the **Relative duration** (such as End of Next Business Day) and **Wait** fields. • **A date/time or duration field:** The duration is based on the **Field** value and the **Wait** field. • **Script:** The duration is based on a script that returns the number of seconds.
Duration Appears only when **Timer based on** is **A user specified duration**.	The specific number of days and hours to wait before proceeding to the next activity in the workflow.
Relative duration Appears only when **Timer based on** is **A relative duration**	The general number and length of business days to wait before progressing to the next workflow activity. .
Wait	An additional timer adjustment when **Timer based on** is **A relative duration** or **A date/time or duration field**. The options are:

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Timer activity input variables (continued)

Field	Description
Appears only when **Timer based on** is **A relative duration** or **A date/time or duration field**.	• **The full duration:** No modification of the calculated duration. • **A % of the duration:** The duration is adjusted by multiplying the number of seconds by the (**Percentage** / 100). • **Some time before:** The duration is shortened by the **Time before** days and hours. • **Some time after:** The duration is lengthened by the **Time after** days and hours.
Percentage Appears only when **Timer based on** is **A relative duration** or **A date/time or duration field**.	The **Wait** percentage value when **Timer based on** is **A relative duration** or **A date/time or duration field**.
Time before Appears only when **Timer based on** is **A relative duration** or **A date/time or duration field** and **Wait** is **Some time before**.	The modifier time value when **Wait** is **Some time before**.
Time after Appears only when **Timer based on** is **A relative duration** or **A date/time or duration field** and **Wait** is **Some time after**.	The modifier time value when **Wait** is **Some time after**.
Field Appears only when **Timer based on** is **A date/time or duration field**.	The date/time or duration field that contains the elapsed wait-time before moving to the next workflow activity.
Script Appears only when **Timer based on** is **Script**	The script that sets 'answer' to the number of seconds for the duration.
Timer Schedule	
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2

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Timer activity input variables (continued)

Field	Description
	hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are: • **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Appears only when **Schedule based on** is **A specific schedule**.	The pre-defined **Schedule** from a list.
Schedule field Appears only when **Schedule based on** is **A schedule field**.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Timer Time Zone	
Time zone based on	The time zone for calculating the duration. The time zone may be based on: • **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A predefined **Time zone**. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.
Time zone Appears only when **Time zone based on** is **A specific time zone**.	The predefined time zone.
Time zone field Appears only when **Time zone based on** is **A time zone field**.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.

States

The activity state tells the workflow engine what to do with the activity.

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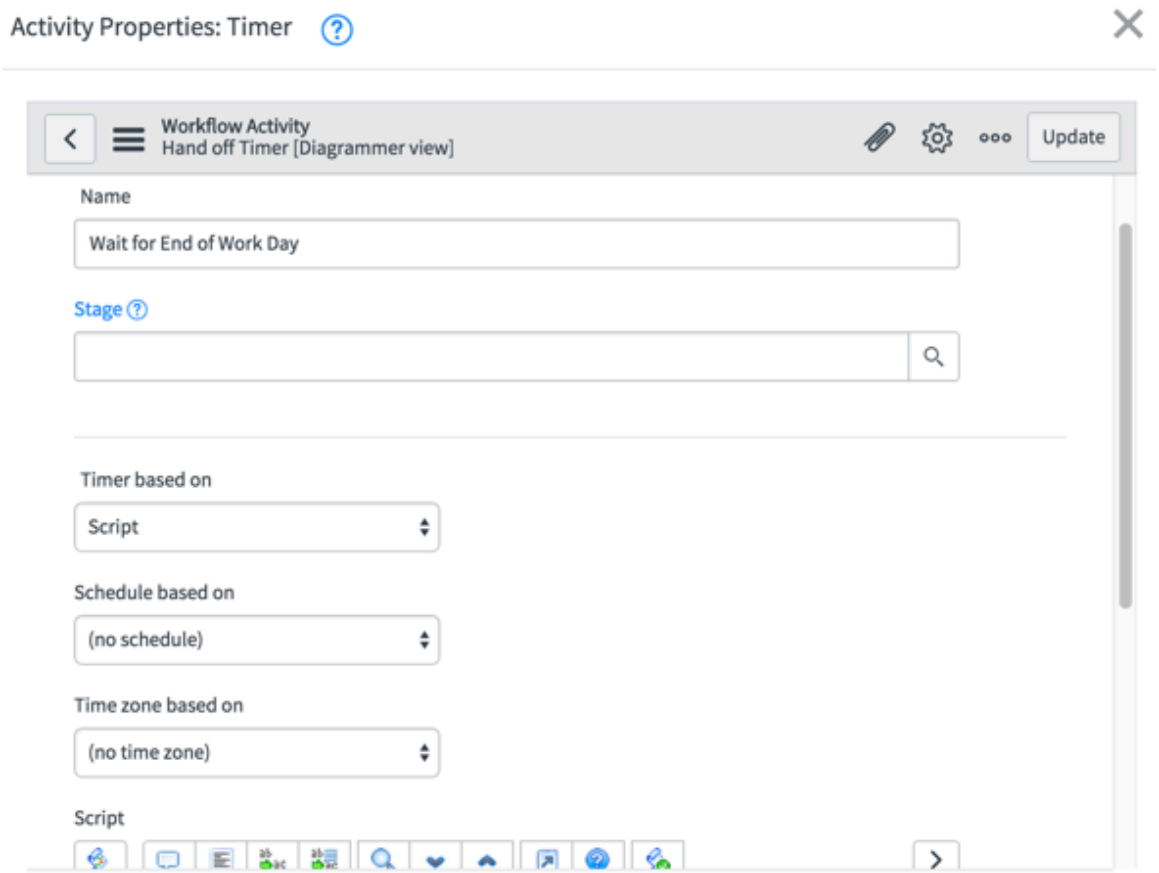
Timer activity states

State	Description
Executing	The **Timer** activity is in this state very briefly while initializing, after which it immediately changes to **Waiting**.
Waiting	The workflow engine waits until the timer reaches the specified duration. The engine then transitions the workflow to the next activity.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Example

You can use a **Timer** activity to pause the workflow until the end of the business day.

Timer example



In this example, the script evaluates the time between the *now* variable and the *eod* variable. The *eod* variable is defined, in 24 hour time, as 4:00 PM. The script then sets the *answer* variable to the difference between these variables, in seconds, and logs a message.

```
// get now and calc end of day (4:00pm)

var now =new Date();

var eod =new Date();
eod.setHours(16);
```

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```
eod.setMinutes(0);
eod.setSeconds(0);

answer =(eod.getTime()- now.getTime())/1000;

workflow.debug('Timer will fire @: '+ eod +'  '+(answer/60)+'
 minutes from now');
```

Task workflow activities

Task activities create and modify workflow tasks.

Task activities are only available when the workflow runs on a table that extends Task.

Add Worknote workflow activity

The **Add Worknote** activity adds text to the *Worknotes* field of the current incident record.

A workflow must run on the Incident table to use this activity.

Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

Input variables

Add Worknote activity input variables

Field	Description
Work Note	The text to add to the incident record.

Attachment Note workflow activity

The **Attachment Note** activity adds an attachment to the current record.

Note:
This activity is only available when the workflow runs on a table that extends Task.

This activity allows the use of irregular HTML tags to reference attachments, specifically the `[code]` tag. Entries in a journal field that use irregular HTML do not work if the *`glide.ui.allow_deep_html_validation`* property is true. This property is set to false by default.

Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

Results

Finished: the activity added the attachment to the record.

Input variables

The following variables determine the behavior of the activity.

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Attachment Note activity input variables

Field	Description
General	
Field	When this activity runs, it makes a note on the current record that a file has been attached. Specify the field on the current record in which you want this note to appear. The options are: • **none** (defaults to Work Notes) • **Additional Comments** • **Work notes**
Attachment note information	
Attachment Name	When this activity runs, it creates a .txt file with the name you specify in this field.
Attachment Data	The content of the .txt file attachment. It can be in plain text or use variables to extract specific data from a table.

Catalog Task workflow activity

The **Catalog Task** activity creates a service catalog task record.

Note:
This activity is only available when the workflow runs on a table that extends Task.

A user must complete the catalog task. This activity is available only for workflows running on the Catalog Request Item [sc_req_item] table.

Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

Results

You can assign a result value using `activity.result` from within a script field of the activity. The final **State** value of the catalog task record determines the result value for the **Create Task** activity. Possible result values are:

- Closed complete
- Closed incomplete
- Closed skipped
- Deleted
- Cancelled

Input fields

The values you enter in the following fields determine the behavior of the activity.

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Catalog task activity information

Field	Description
Catalog Task Activity Settings The following fields specify the behavior of the Catalog Task Activity.	
Task Table	The table on which this activity runs. In most cases, leave set to the default value: [sc_req_item].
Priority	The value you want assigned to the **Priority** field for the new task.
Wait for completion	If selected, the workflow activity waits for the task to complete before continuing. If cleared, the task is created but the workflow proceeds.
Catalog Task Record Settings The following fields specify the field values that this activity sets for the catalog task it creates.	
Task value from	Specify how you want to populate fields on the new task. • **Fields:** a predefined set of fields including **Fulfillment group**, **Assigned to**, **Short description** and **Instructions**. • **Template:** an existing template for the selected task table. • **Values:** values that you specify using a Set Values widget. After you select a value for **Task value from**, additional fields specific to that value appear on the form.
Fulfillment group Only appears when **Task value from** is set to `Fields`	The group that is responsible for completing the task. Populates the **Assignment group** field on the new task.
Assigned to Only appears when **Task value from** is set to `Fields`	The user who is responsible for completing the task. Populates the **Assignment to** field on the new task.
Short description Only appears when **Task value from** is set to `Fields`	A short description for the task. Populates the **Short description** field on the new task.
Instructions Only appears when **Task value from** is set to `Fields`	The task instructions for the user to complete prior to closing the task. Populates the **Description** field on the new task.
Template	The values in the task will be populated from the values in the template you select.

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Catalog task activity information (continued)

Field	Description
Only appears when **Task value from** is set to `Template`.	
SetValues Only appears when **Task value from** is set to `Values`.	Select any field on the task record to a value you specify here.
Advanced	Check **Advanced** if you want to use a script to assign values on the catalog task. When you check **Advanced,** a text box appears where you can enter your script.
Advanced Script Only appears when the **Advanced** field is checked.	Set additional values for the task in this script. This script is run after the task values are set using the **Fields**, **Template** or **Values** you have specified. Use the variable *`task`* when setting additional values, for example: `task.short_description = current.short_description;`
Catalog Task Variables	
Variables on Task Form	Specify optional catalog variables to include on the Catalog task form. The variables you select here will be displayed in a field called **Variable Editor**. If you select no variables here, the **Variable Editor** field in the Catalog Task form will not be visible.
Catalog Task Schedule	
Due date based on	Select how workflow determines the task's duration, due date, and schedule. • **A user specified duration:** The duration is based on a user specified value. • **A relative duration:** The duration is calculated from a relative duration (such as End of Next Business Day). • **A date/time or duration field:** The duration is based on the value of a field on the current record. • **Script:** The duration is returned by a script.
Duration Only appears when **Due date based on** is set to `A user specified duration`	The specific number of days and hours.
Relative duration	The general number and length of business days.

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Catalog task activity information (continued)

Field	Description
Only appears when **Due date based on** is set to `A relative duration`	
Due date field Only appears when **Due date based on** is set to `A date/time or duration field`	The date/time or duration field.
Due date script Only appears when **Due date based on** is set to `Script`	The script that sets 'answer' to the number of seconds for the duration.
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2 hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are: • **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Only appears when **Schedule based on** is set to `A specific schedule`	The predefined **Schedule** from a list.
Schedule field Only appears when **Schedule based on** is set to `A schedule field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Time zone based on	The time zone for calculating the duration. The time zone may be based on:

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Catalog task activity information (continued)

Field	Description
	• **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A specific **Time zone** that you choose from a choice list. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.
Time zone Only appears when **Time zone based on** is set to `A specific time zone` .	Select the time zone you want from the choice list.
Time zone field Only appears when **Time zone based on** is set to `A time zone field.`	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.

States

The activity state tells the workflow engine what to do with the activity.

Catalog Task activity states

State	Description
Executing	The workflow engine knows to start the *`onExecute`* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Create Task workflow activity

The **Create Task** activity generates a record on any of the tables that extend Task [task].

Note:
This activity is only available when the workflow runs on a table that extends Task.

If the **Wait for completion** check box is selected, the workflow context waits for a user action on the task, such as Complete or Incomplete, and then progresses based on the user action.

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Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

Results

You can assign a result value using `activity.result` from within a script field of the activity. By default, the final **State** value of the task record determines the result value for the **Create Task** activity. Possible result values are:

- Closed complete
- Closed incomplete
- Closed skipped
- Deleted
- Cancelled

Input variables

The following variables determine the behavior of the activity.

Create Task activity input variables

Field	Description
Create Task Activity Settings The following fields specify the behavior of the Create Task Activity.	
Task type	The type of task to create. Select from the corresponding task table for the workflow.
Priority	The default priority assigned to the task. If you also set the Task priority in the **Task values from** section, the Task value overrides the default priority.
Wait for completion	If selected, the workflow activity waits for the task to complete before continuing. If cleared, the task is created but the workflow proceeds.
Create Task Record Settings The following fields specify the field values that this activity sets for the task it creates.	
Task values from	The values used to create the task may either come from: • **Fields:** a predefined set of fields including **Fulfillment group**, **Assigned to**, **Short description** and **Instructions**. • **Template:** an existing template for the selected task table. • **Values:** values that you specify using a Set Values widget. **Note:** Any Task priority you set here overrides the default priority set by the **Priority** field.
Fulfillment group	The group that is responsible for completing the task. Populates the **Assignment group** field on the new task.

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Create Task activity input variables (continued)

Field	Description
Only appears when **Task value from** is set to `Fields`	
Assigned to Only appears when **Task value from** is set to `Fields`	The user who is responsible for completing the task. Populates the **Assignment to** field on the new task.
Short description Only appears when **Task value from** is set to `Fields`	A short description for the task. Populates the **Short description** field on the new task.
Instructions Only appears when **Task value from** is set to `Fields`	The task instructions for the user to complete prior to closing the task. Populates the **Description** field on the new task.
Task template Only appears when **Task values from** is set to **Template**.	A template that is used to fill in values for the task.
Set values Only appears when **Task values from** is set to **Values**.	A widget that is used to specify values for any fields of the task.
Advanced	
Advanced	Check **Advanced** if you want to use a script to assign values on the catalog task. When you check **Advanced,** a text box appears where you can enter your script.
Advanced Script Only appears when the **Advanced** field is checked.	Set additional values for the task in this script. This script is run after the task values are set using the **Fields**, **Template** or **Values** you have specified. Use the variable *task* when setting additional values, for example: `task.short_description = current.short_description;`
Task Schedule	
Due date based on	Select how workflow determines the task's duration, due date, and schedule.

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Create Task activity input variables (continued)

Field	Description
	• **A user specified duration:** The duration is based on a user specified value. • **A relative duration:** The duration is calculated from a relative duration (such as End of Next Business Day). • **A date/time or duration field:** The duration is based on the value of a field on the current record. • **Script:** The duration is returned by a script.
Duration Only appears when **Due date based on** is set to `A user specified duration`	The specific number of days and hours.
Relative duration Only appears when **Due date based on** is set to `A relative duration`	The general number and length of business days.
Due date field Only appears when **Due date based on** is set to `A date/time or duration field`	The date/time or duration field.
Due date script Only appears when **Due date based on** is set to `Script`	The script that sets 'answer' to the number of seconds for the duration.
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2 hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are:

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Create Task activity input variables (continued)

Field	Description
	• **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Only appears when **Schedule based on** is set to `A specific schedule`	The predefined **Schedule** from a list.
Schedule field Only appears when **Schedule based on** is set to `A schedule field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Time zone based on	The time zone for calculating the duration. The time zone may be based on: • **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A specific **Time zone** that you choose from a choice list. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.
Time zone Only appears when **Time zone based on** is set to `A specific time zone` .	Select the time zone you want from the choice list.
Time zone field Only appears when **Time zone based on** is set to `A time zone field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.

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States

The activity state tells the workflow engine what to do with the activity.

Create Task activity states

State	Description
Executing	The workflow engine knows to start the `onExecute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Utility workflow activities

Utility activities provide controls over the path of the workflow, and other useful tools.

Branch workflow activity

The **Branch** activity splits the workflow into multiple transition paths from a single activity.

To add a transition path, drag the **Branch** activity onto the canvas. When the Branch activity properties form displays, click **Submit** to add the activity to the canvas. Once the activity is on the canvas, right click in the activity body, then click **Add Condition**.

All transitions from this activity execute concurrently. This activity provides a single **Always** condition. You can draw any number of transitions from this condition. Using this activity is equivalent to drawing multiple transitions from a single condition of another activity.

Branching can affect the behavior of rollback activities. See Rollback To activity for more information.

Join workflow activity

The **Join** activity unites multiple execution paths into one transition.

Use this activity to cause a workflow to wait for all activities in multiple paths to finish before continuing. If multiple concurrent workflow paths meet without a **Join** activity, any subsequent activities execute twice.

To add Join to the canvas, click **Submit**. On the canvas, connect incoming transitions from each activity you want to act as a predecessor to the Join activity. Then connect outgoing transitions to the two exit conditions: Complete and Incomplete.

Results

Provide an Incomplete transition out of a **Join** whenever it is possible for any predecessor activities to follow a transition path that does not lead to the **Join** activity.

Join activity results

Result	Description
Complete	**Join** exits along the Complete path when the system has determined that all predecessor activities have completed and transitioned to the **Join**.

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Join activity results (continued)

Result	Description
Incomplete	**Join** exits along the Incomplete path when the system determines that at least one predecessor activity completed but transitioned along a path that bypassed the **Join** activity.

Lock workflow activity

The **Lock** activity prevents other instances of this workflow from continuing past this activity until the lock is released.

Several instances of the same workflow may run concurrently. For example, if a workflow triggers when a record is added to a particular table. That workflow triggers multiple times if multiple records are added one after the other, once by each record insertion. You can use the lock activity to ensure that this instance of the workflow has finished one or more activities before any other instance of the workflow can proceed.

A workflow can explicitly release a lock with the **Unlock** activity. The lock may also be released when the **Max duration** is reached.

When an instance of the workflow reaches the **Lock** activity, it attempts to obtain a lock using the key specified in the lock activity. If another instance has already obtained the lock and has not yet released it, this lock attempt fails. The instance continues trying to obtain the lock until **Max attempts** has been reached.

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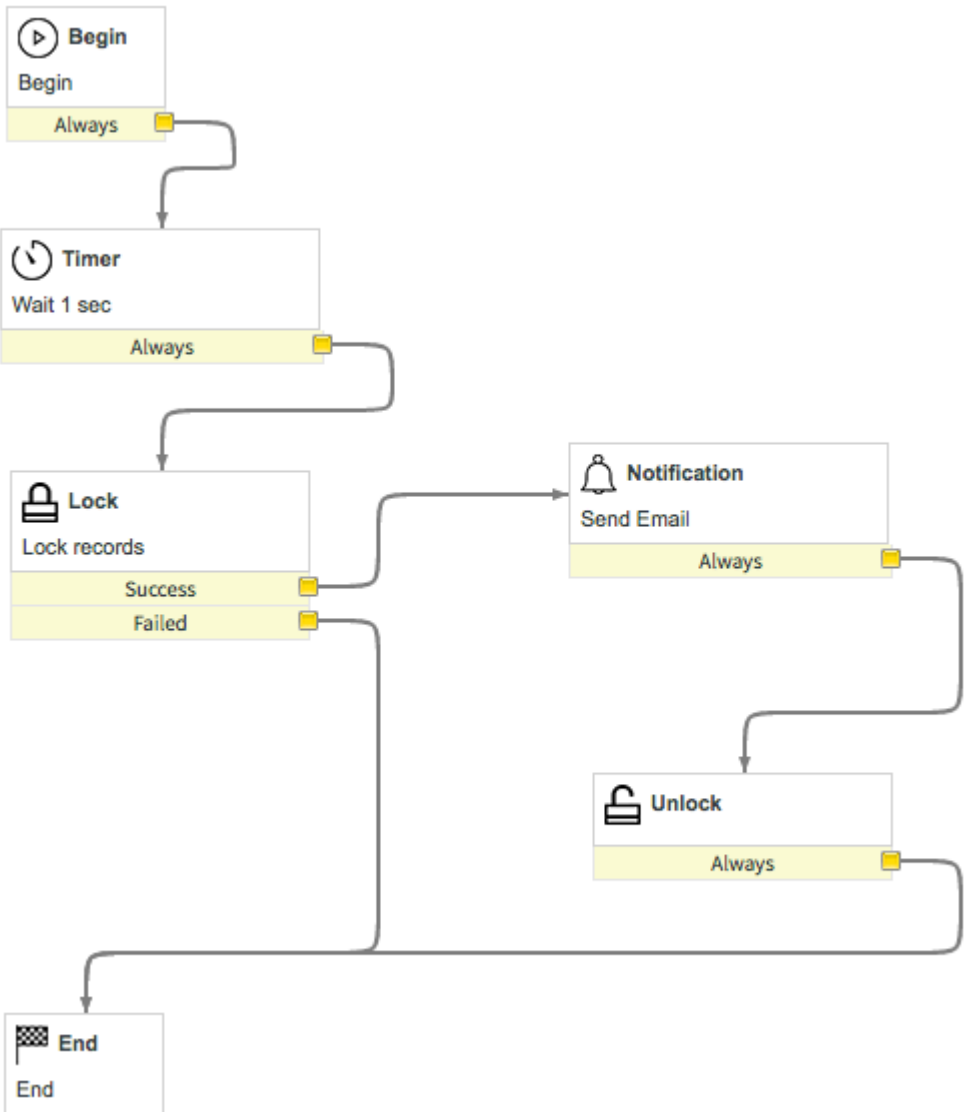
Note:

We recommend placing a one-second timer activity before the lock activity. This helps prevent a rare condition in which the lock activity may not be able to distinguish one workflow instance from another. This condition can occur because the entity owning the lock is not the specific workflow instance, but rather the code-execution thread in which that instance is running. In most cases, each workflow instance runs on a different thread. Adding a timer activity ensures that this is the case.

Example of Lock Activity Preceded by Timer Activity



Since a **Lock** activity can only temporarily prevent processing of other workflow instances, do not add activities that cause the workflow to wait between a **Lock** and **Unlock** activity block. This may cause the **Unlock** activity to be unable to acquire the lock to release it and instead take 60 seconds to complete. Restricted wait activities include:

- Approval activities
- Task activities
- Timer activities
- Wait for condition activity

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- Wait for WF Event activity
- MID server activities such as a PowerShell script

Results

Lock activity results

Result	Description
Success	The activity successfully obtained a lock. This instance of the workflow can proceed past this point, but other instances cannot proceed until the lock is released.
Failure	After attempting to obtain the lock **Max attempts** times, the activity could not obtain the lock.

Input variables

Input variables determine the initial behavior of the activity.

Lock activity input variables

Field	Description
Key	A unique mutex key. The Unlock activity activity uses this key to release the lock.
Duration	
Max. duration	The maximum time the lock persists. The lock is released after it reaches this duration. Releasing a lock this way is equivalent to running the **Unlock** activity.
Lock attempts Specify how the activity behaves if the lock attempt is denied. If the final lock attempt fails, the activity state is set to 'timeout' and the activity result is set to 'failed'.	
Max. attempts	Specify the maximum number of times the activity may attempt to obtain the lock.
Delay between attempts	The amount of time required after a failed lock attempt before another lock attempt is allowed.

States

The activity state tells the workflow engine what to do with the activity.

Lock activity states

State	Description
Waiting	The workflow engine is waiting to obtain a lock.
Finished	The activity successfully obtained the lock.
Timeout	The activity could not obtain a lock within the number of attempts specified by the **Max. attempts** input variable.

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Log Message workflow activity

The **Log Message** activity writes a message to the workflow log.

Use this activity to add entries to the workflow's log for debugging or tracing purposes.

Input variables

Input variables determine the initial behavior of the activity.

Log Message activity input variables

Field	Description
Message	The message to log. This variable can be a string or a JavaScript expression that evaluates to a string.

Log Trace Message workflow activity

The **Log Trace Message** activity writes a trace message to the workflow log.

The trace message includes the activity name, the event that invoked the workflow, and the table of the current record. There are no variables or conditions. To log other data, use the Log Message workflow activity activity.

REST Message legacy workflow activity

The legacy **REST Message** activity enables an administrator to override the REST endpoint or supply the variables configured in the REST Message module.

This activity is deprecated in the Washington DC release and no longer shows up in the Workflow canvas for new workflow development. New workflows should use the Orchestration REST Activity templates instead.

Existing workflows using it will continue to work as designed. To edit this activity in an existing workflow, you must re-activate the activity.

The **REST Message** activity executes a dead link REST function (POST, PUT, GET, or DELETE) on an endpoint using values defined in the function record.

Note:
If you want to use a MID Server to send the REST message, the MID Server must be accessible by the instance and configured to use SSH.

Input variables

REST Message activity input variables

Field	Description
Rest Message	
REST Message	Name of the Create a REST message to run. This is a reference field to the REST Message [sys_rest_message] table (**System Web Services** > **Outbound** > **REST Message**).
REST Message Function	Function to call that is defined in a REST message function. This is a reference field to the HTTP Method [sys_rest_message_fn] table (**System Web Services** > **Outbound** > **REST Message**).

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REST Message activity input variables (continued)

Field	Description
	Available functions are **put**, **post**, **get**, or **delete**. You can edit functions in the **HTTP Methods** related list in each REST Message record.
REST Endpoint	REST endpoint to use instead of the **Endpoint** defined in the HTTP Method record. Leave this field blank to use the defined endpoint in the REST Message Function record.
Rest Message Variables	
Variables	Values to use for Variable substitution in outbound REST messages defined in the HTTP Method record. Use the following format for the string: `name1=value1, name2=value2, . . .` For example, use `name=${nameValue}, id=${idValue}` where *name* and *id* are function variables. If either the variable name or value contains a comma or equal sign, escape those characters with a backslash.
Rest Message MID Server	
Use MID Server	Check this box if you want to use a MID Server to send the REST message. A MID Server might be necessary to reach an endpoint within a firewall or a subnetwork that is not visible from the instance. If this check box is selected, but no MID Server is defined in the **MID Server** field, the workflow automatically attempts to find a MID Server based on IP range and the REST capability.
MID Server	Name of the MID Server to use. This field is available when **Use MID Server** is selected. The workflow ignores this parameter if the *use_midserver* parameter is disabled.
Rest Message Script	
Sensor Script	The script to execute after the request has been made and a response has been received. You can access the full response body from the *activity.output* variable.

Return Value workflow activity

The **Return Value** activity returns a value to a parent workflow, when run from a subflow.

This activity has no variables or conditions. For more information, see Workflows used as subflows.

Use this activity within a subflow to store data that the parent flow can access. The **Return Value** activity adds the data from the subflow's *value* variable to the parent workflow's scratchpad.

Scratchpad entries

The activity uses the workflow scratchpad to read and write persistent values.

Return Value activity scratchpad entries

Variable	Description
value	The activity writes the value from the subflow *value* variable to the parent scratchpad. The parent workflow activity that runs the subflow includes a *Map*

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Return Value activity scratchpad entries (continued)

Variable	Description
	return value to variable that defines where the parent workflow stores the returned data. This data can be scalar, a stringifiable JavaScript object, or an expression that evaluates to a stringifiable JavaScript object.

Related topics

Workflow scratchpad variables

Using variables in a workflow

Run Script workflow activity

The **Run Script** activity runs the specified script in the scope of the workflow version.

Note:
All changes to `current` are automatically updated. There is no need to call `current.update()`

Input variables

Input variables determine the initial behavior of the activity.

Run Script activity input variables

Field	Description
Script	Script to execute.

Set Values workflow activity

The **Set Values** activity sets values on the current record when the workflow quiesces or ends.

Input Fields

The values you enter in the following fields determine the behavior of the activity.

Set Values Activity Input Fields

Field	Description
Set these values	From the list on the left, select the field on the current record whose value you want to set when the workflow quiesces or ends. In the user-input field to the right, select or enter the value to which you want that field set. **Note:** Avoid setting the same fields from different **Set Value** activities. The workflow only sets the value specified by the last **Set Values** activity run before quiescing or ending.

Note:
Using the **Set Values** activity to set the **Approval** field on a task does not cancel pending approvals. To approve a task in a workflow, use the **Approval Action** activity instead.

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SOAP Message legacy workflow activity

The legacy **SOAP Message** activity uses SOAP messages defined in the System Web Services plugin and can call the messages using a MID Server.

This activity is deprecated in the Washington DC release and no longer shows up in the Workflow canvas for new workflow development. New workflows should use the Orchestration SOAP Activity templates instead.

Existing workflows using it will continue to work as designed. To edit this activity in an existing workflow, you must re-activate the activity.

Input variables

SOAP Message activity input variables

Field	Parameter	Description
SOAP Message	soap_message	The SOAP Message defined under the System Web Services plugin's Outbound SOAP Message [sys_soap_message] table. (**System Web Services** > **Outbound** > **SOAP Message**)
SOAP Message Function	soap_message_function	The function to call that is defined in the SOAP Message. Functions are listed in the **SOAP Message Functions** related list in each SOAP Message record.
SOAP Endpoint	soap_endpoint	Endpoint to use instead of the **SOAP endpoint** value in the SOAP Message Function record. Leave this field blank to use the defined endpoint in the SOAP Message Function record.
Variables	variables	Variables to substitute into the SOAP **Envelope** defined in the SOAP Message Function record. Use this format for the string: `name1=value1, name2=value2, . . .` If either the name or value contains a comma or equal sign, escape these characters with a backslash.
Use MID Server	use_midserver	Check box for using a MID Server to send the SOAP message. A MID Server might be necessary to reach an endpoint within a firewall or a sub-network that is not visible from the instance. If this check box is selected (true), but no MID Server is defined in the **MID Server** field, Workflow automatically attempts to find a MID Server.
MID Server	midserver	Name of the MID Server to use. This field appears when you select the **Use MID Server** check box. The workflow ignores this parameter if the *`use_midserver`* parameter is disabled.
Sensor Script	sensor_script	The script to execute after the request has been made and a response has been received. You can access the full XML response body from the *`activity.output`* object.

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Turnstile workflow activity

The **Turnstile** activity limits how many times a workflow can pass through the same point.

Use this activity to prevent infinite loops. This activity is useful alongside the Rollback To workflow activity activity.

Results

You can assign a result value using the `activity.result` variable from within a script field of the activity. By default, the activity script evaluates if the activity should continue to iterate or stop.

Turnstile activity results

Result	Description
Continue	The **Allowed iterations** value is greater than the number of times the workflow accessed this activity.
Cancel	The workflow accessed this activity more times than the **Allowed iterations** value.

Input variables

Input variables determine the initial behavior of the activity.

Turnstile activity input variables

Field	Description
Allowed iterations	Number of times the workflow can pass through this activity before the turnstile ends the loop.

Conditions

The conditions determine which transition comes after this activity.

Turnstile activity conditions

Field	Description
Continue	If the workflow has returned to this point an amount of times less than the allowed iteration.
Cancel	If the workflow has returned to this point an amount of times more than the allowed iteration.

States

The activity state tells the workflow engine what to do with the activity.

Turnstile activity states

State	Description
Executing	The workflow engine knows to start the `onExecute` function of the activity.

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Turnstile activity states (continued)

State	Description
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is triggered.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Unlock workflow activity

The **Unlock** activity releases a lock that was previously placed by the **Lock** activity.

To release a lock, specify the same lock key that was specified in the **Lock** activity. If the **Lock** activity had a **Duration** specified, and that duration has already passed, the lock will already be released.

Input variables

Input variables determine the initial behavior of the activity.

Unlock activity input variables

Field	Description
Lock key	The Mutex key that releases the lock. This key must match the key specified by a **Lock** activity. For more information, see Lock activity.

States

The activity state tells the workflow engine what to do with the activity.

Unlock activity states

State	Description
Finished	The activity successfully released the lock.

Subflow activities in workflow

Subflow activities run and manage workflows from a parent workflow.

The Parallel Flow Launchersubflow activity is available.

Parallel Flow Launcher workflow activity

The **Parallel Flow Launcher** activity launches multiple subflows in parallel.

Workflows running in parallel execute simultaneously and may complete in any order. The activity can launch a single subflow or multiple subflows as needed. You can manage the input values and values returned for each subflow.

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Note:
The Parallel Flow Launcher activity waits until all subflows are completed before proceeding. If any subflow does not finish, the activity waits indefinitely.

Do not launch a large number of subflows with the Parallel Flow Launcher activity. If overused, this activity can overburden the instance. For launching very large numbers of subflows, consider putting the Parallel Flow Launcher inside a loop controlled by a turnstile or other conditional activity and having it do batches.

Activity variables

Activity variables determine the initial behavior of the activity.

Parallel Flow Launcher activity input variables

Field	Description
Parallel Flow Launcher configuration	
Name	A unique name for the activity.
Stage	The stage to display when the workflow reaches the activity.
Inputs	Inputs to the subflows to run. Specify an array of name: value pairs for each input defined in the workflow being launched. The name and data type of each input variable entered must match those used by the subflow that this activity launches. For a detailed example, see Parallel Flow Launcher Example.
Parallel Flow Launcher selection	
Workflow	The workflow to run.
Advanced	Check **Advanced**, to enter a script that uses a WorkflowCoordinator object to manage the subflows. When you check Advanced, a text box appears where you can enter a script that specifies a unique workflow for each set of input variables. See WorkflowCoordinator object for more information.
Parallel Flow Launcher iteration Specify parameters to tune the performance of batched workflows.	
Count	If not specified by an input set, **Count** determines the number of subflows executed in parallel from this activity. If the **Advanced** option is not selected, ensure that this field is populated with a valid number.
Max flows	The maximum number of workflows this activity can launch. If this value is a positive integer, it overrides the max parameter used in the WorkflowCoordinator constructor.
Max simultaneous	The maximum number of parallel workflows this activity can run at one time. If this value is a positive integer, it overrides the poolsize parameter used in the WorkflowCoordinator constructor.
Parallel Flow Launcher Process	
Process flow complete	To specify a script that runs after each subflow completes, check **Process flow complete**. If you check this field, a text box labelled **Flow complete** appears, where you can enter the script to run.
Flow complete	The script that runs each time a subflow finishes. This field is available when the **Process flow complete** option is selected.

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Parallel Flow Launcher activity input variables (continued)

Field	Description
	The same script functions and variables available in other workflow scripts, such as those in the Run Script activity, are available here. For more information, see Completed subflow values in scripts. The variable "flow" is available to this script. It is an object that contains the following information about the flow that is finishing: **flow.output (String)**: The value that the subflow returns to the parent if it executed a Return Value activity before ending. **flow.index (Number)**: The zero-relative index of the subflow that finished. **flow.contextId (String)**: The sys_id of the workflow context for the completed subflow. **flow.inputs (Object)**: The inputs that were passed to the subflow when its context was created and started. **flow.status (String)**: The final state of the context. This corresponds to the **state** column in the subflow context record, which has possible values of **executing**, **finished**, **cancelled**, or **faulted**. (Since the flow is completed, it cannot be **executing** at this point.)
Parallel Flow Launcher Split	

Process finished	To specify a script that runs after all subflows have finished, check **Process finished**. If you check this field, a text box labelled **Finished Script**appears where you can enter the script to run. The 'coordinator' variable is made available to this script and is an object that allows access to any of the finished subflows using the getFlow(index) method. For example:
	
	`for (var i = 0; i < coordinator.getNumFlows(); i++)`
	`writeFlowResultsToTable( i, coordinator.getFlow(i) );`

Finished script	The script that runs after all subflows launched by the activity are complete. You can use variables that contain completed flow information in this script.
	
	The 'coordinator' variable is made available to this script and is an object that allows access to any of the finished subflows using the getFlow(index) method. For example:
	
	`for (var i = 0; i < coordinator.getNumFlows(); i++)`
	`writeFlowResultsToTable( i, coordinator.getFlow(i) );`
	
	This field is available when **Process finished** is selected.

States

The activity state tells the workflow engine what to do with the activity. To view an activity's state, point to the activity. A pop-up window shows the **State** and **Result** of the activity. If the activity is in an error state, the pop-up window provides a brief **Fault Description**.

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Parallel Flow Launcher activity states

State	Description
Waiting	The activity is waiting for all subflows to finish. All subflows have started and some may have finished.
Finished	The activity successfully completed all of the subflows.
Error	The activity encountered an error.

WorkflowCoordinator object

A WorkflowCoordinator object specifies which subflows to run and the input variables to pass to those subflows.

When using a WorkflowCoordinator object, you can create a **Parallel Flow Launcher** activity that launches multiple subflows. When using the activity without a WorkflowCoordinator object, you can only launch a single subflow multiple times. Use one of the following methods to specify a WorkflowCoordinator object for the activity when the **Advanced** activity input variable is selected.

- Reference a workflow scratchpad variable that contains an existing WorkflowCoordinator object. To save a WorkflowCoordinator object to the scratchpad, call the *`save(variableName)`* function on the WorkflowCoordinator object. You can reference the object using the value passed in the *`variableName`* parameter. For example, you can create a WorkflowCoordinator object in a **Run Script** activity, save the object using `<object>.save('coord')`, and then call this object by entering `coord` in the **Workflow** activity variable of a subsequent **Parallel Flow Launcher** activity.
- Define the WorkflowCoordinator within the **Workflow** activity variable. Add the `javascript:` identifier at the beginning of the script. The Parallel Flow Launcher example shows how to use a WorkflowCoordinator object in this way.
- Create a factory class to define the WorkflowCoordinator object. The system does not provide a factory class for WorkflowCoordinator by default.

Completed subflow values in scripts

The **Parallel Flow Launcher** activity exposes additional variables you can use in scripts.

Additional variables

Variable	Description
coordinator	The WorkflowCoordinator used when running the subflows. You can use this variable in the **Finished script** to perform any final operations. Additionally, you can use the WorkflowCoordinator in a later workflow activity by passing the activity name or sys_id to the *`WorkflowCoordinator.load('<Activity>')`* function. For example, to load the WorkflowCoordinator object from a **Parallel Flow Launcher** activity called **Launch Subflows**, enter `var coord = WorkflowCoordinator.load('Launch Subflows');` in a later activity.
flow	The subflow launched by the activity that completed most recently. You can use this variable in the **Flow complete** script to perform any post-processing operations on each subflow. To get a complete subflow from a coordinator object, use `var flow = coord.getFlow(I);` where I is the numeric index of the subflow based on the order it was launched. These values are available from the completed subflow:

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Additional variables (continued)

Variable	Description
	• index: the numerical index of this subflow based on the order it was launched • workflow: the sys_id or name, depending on which you passed to the WorkflowCoordinator constructor, of the workflow used for this subflow • inputs: any input values provided to the launched subflow • status: status of the subflow context • output: the value returned by the subflow • contextId: the sys_id of the workflow context for the subflow

Parallel Flow Launcher example

This example shows how to use the **Parallel Flow Launcher**activity with an array of input values and with a WorkflowCoordinator object.

Sample workflow

This example shows a SQL-based web server with four application nodes. A single subflow runs to provision the database, and multiple parallel subflows each configure an application node. Finally, a separate set of parallel subflows configures the nodes to use a load balancer and sets up the server DNS.

Parallel flow launcher business case



Provision the application nodes

The first **Parallel Flow Launcher**activity launches the **Provision Node** subflow four times. The activity passes a unique IP address to each subflow from an array in the **Inputs** variable. The scripts defined in the **Flow complete** and **Finished script** variables write log messages regarding the status of the subflows.

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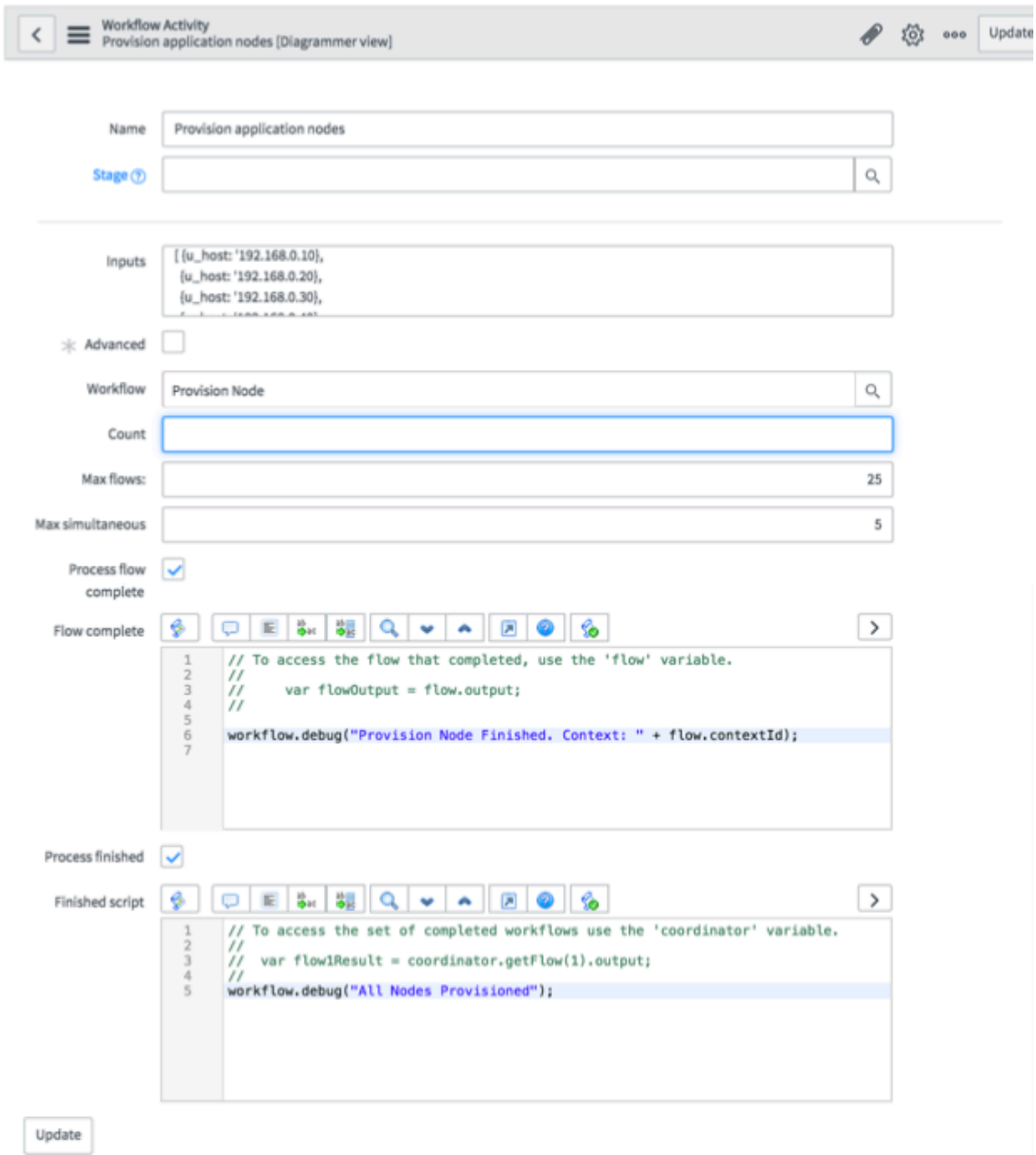
Parallel flow launcher activity properties
Activity Properties: Parallel Flow Launcher



Add nodes to the load balancer

The second **Parallel Flow Launcher** activity uses WorkflowCoordinator objects to specify which subflows to run. The `coordinator` variable stores the completed flow information from the previous **Provision Nodes** activity. The script then retrieves the IP address and port for each node that was provisioned. The `coord2` WorkflowCoordinator object runs the Add Node to Load Balancer subflow once for each node, using the retrieved IP address and port information as input variables. Finally, the `coord2` WorkflowCoordinator object runs the **SetupDNS** subflow once to configure the load balancer.

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Specifying which subflows to run

```
javascript:
var coordinator = WorkflowCoordinator.load('Provision Nodes');
var coord2 = new WorkflowCoordinator({
    workflow: 'Add Node to Load Balancer'
});

for (var i = 0; i < coordinator.getNumFlows(); i++) {
    var ip = coordinator.getInput(i).ip;
    var port = coordinator.getOutput(i);
    coord2.add( {
        ip: ip,
        port: port
    } );
}
var loadBalancerIP = '10.0.20.10';
coord2.add( {ip: loadBalancerIP, hostname:'www.snow1.net'}, 'SetupDNS');

coord2;
```

View workflow activity descriptions

Tooltips are available for workflow activities to help you understand how to use each activity.

Before you begin

Role required: admin

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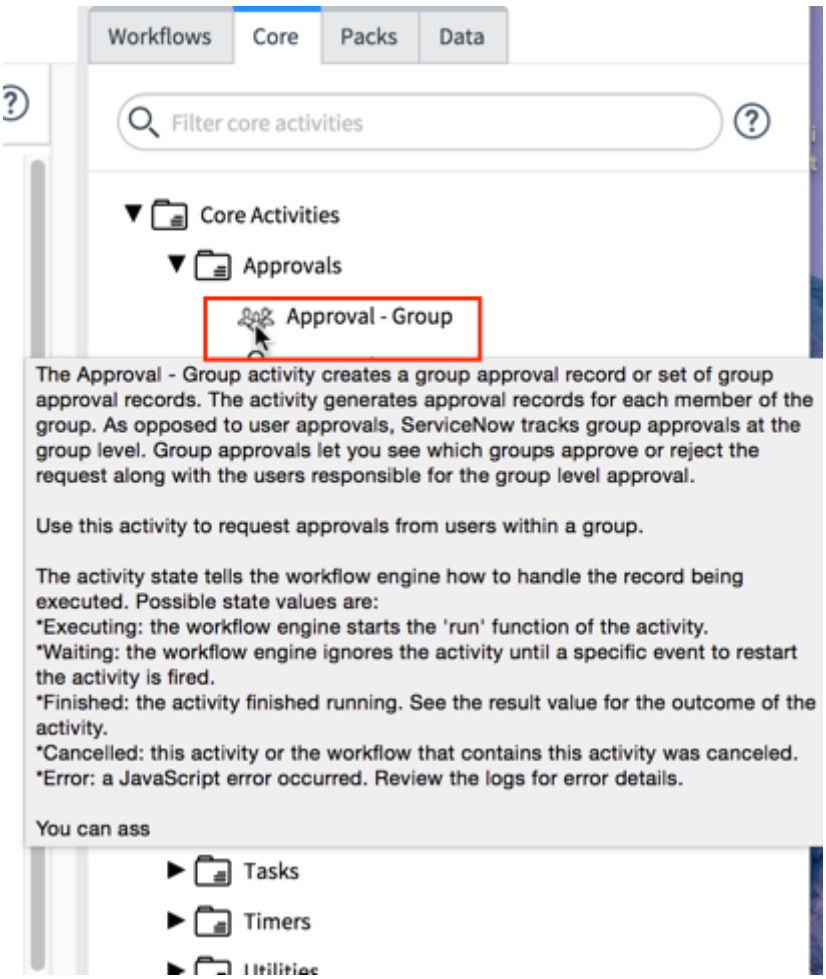
About this task

Procedure

1. To view an activity description in the Workflow Editor, point to the icon for the activity in the palette.



2. To modify activity descriptions, navigate to **Workflow** > **Administration** > **Activity Definitions** and edit the **Description** field.

> **Note:**
> To view more information about an activity, double-click the activity on the canvas and then click the help icon in the title bar of the Activity Properties window.

Elements in workflow activity definitions

Each activity can specify a number of elements that control the behavior of the activity or are controlled by the activity.

Not all activities specify all possible elements. See Workflow activities for links to the activities provided by default. Each activity description includes a detailed explanation of the specific elements offered by that activity.

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Workflow activity elements

Element	Description
Results	The possible **activity.results** value. The activity result usually determines which condition the activity transitions through.
Scratchpad entries	Scratchpad variables the activity depends on to run, or variables the activity writes to the scratchpad.
Input variables	Values that control the behavior of the activity. Fields to set these values appear on the Activity Properties form when a new activity is added to a workflow. See Activity variables for more information.
Conditions	Determines which transition the activity follows after completing. See Manage workflow activity conditions for more information.
States	Determines how the workflow handles the record being executed.

Add an activity to a workflow

Available activities are displayed in the **Core**, **Packs**, and **Custom** tabs in the Workflow Editor palette.

Before you begin

Role required: admin

Procedure

1. In the Workflow Editor, check out a workflow.
2. To add a workflow activity, drag it from the **Core**, **Packs**, or **Custom** tab to the canvas and drop it on a transition line in the workflow body.

   The transition turns blue when it is connected to the new activity. The designer adds the activity to the flow at that point and displays the property form for the new activity.

   If an activity is greyed out, approval engines are enabled for the table on which the workflow runs. To use the activity, turn approval engines off for the table.

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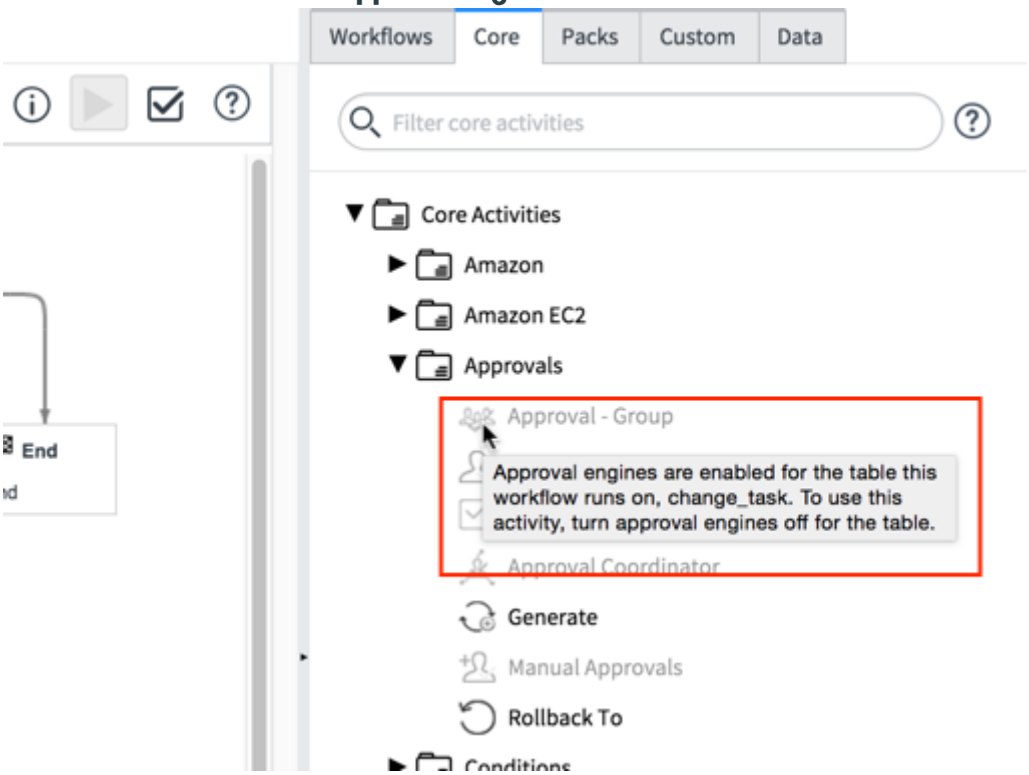
Unavailable activities and approval engines



3. Create any additional conditions needed for the activity and ensure that all exits are connected.
4. Run the workflow validation tool prior to publishing to detect missing or disconnected transitions that can cause a workflow to hang.

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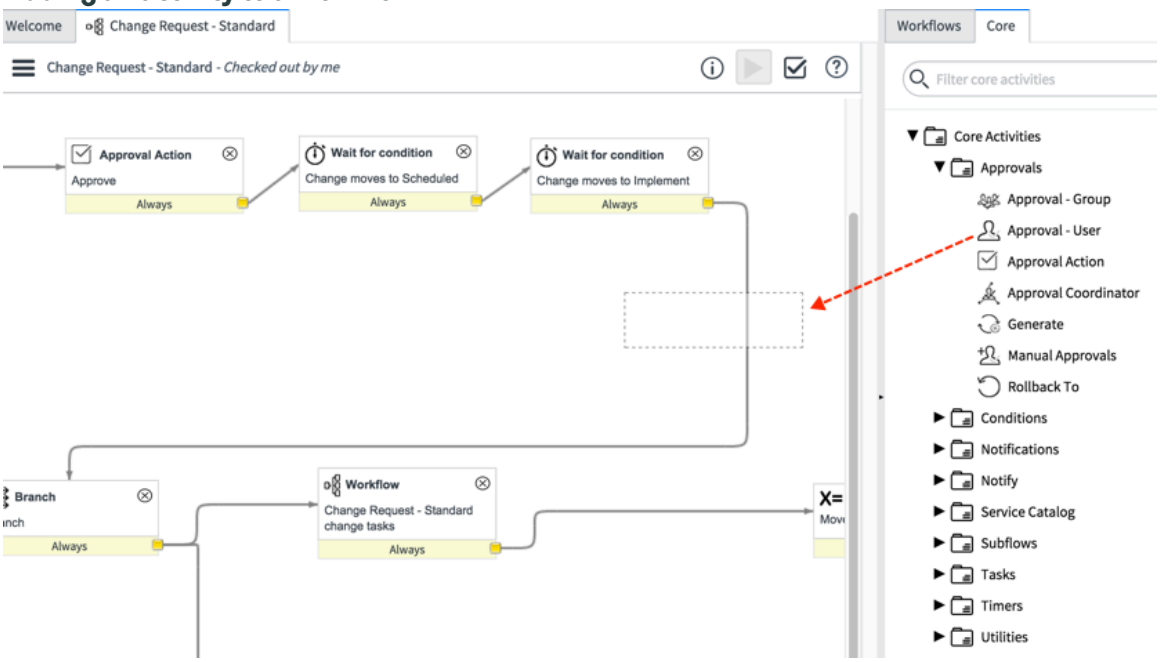
Note:
All activity descriptions have a **Table** value. If this value is **Global**, the activity is available for use with any workflow regardless of the table selected in the workflow properties. Activities that identify a specific table appear in the palette only if the table configured for the workflow matches or extends the table identified in the activity.

Adding an activity to a workflow



Duplicate a workflow activity

You can duplicate an activity used in a workflow, including all the configured properties.

Procedure

1. Right-click the activity and select **Copy Activity** from the context menu.

   The system automatically duplicates the activity, but does not create transitions.
2. Double-click the copy and configure the properties appropriately.
3. Drag the activity to a location in the workflow.
4. Add transitions.

Manage transitions between workflow activities

Transitions define the processing path of the workflow, depending on conditions defined in each activity.

Before you begin
Role required: admin

About this task
All conditions in an activity must have a transition and all transitions must have a connection to another activity or to the **End** activity.

Note:

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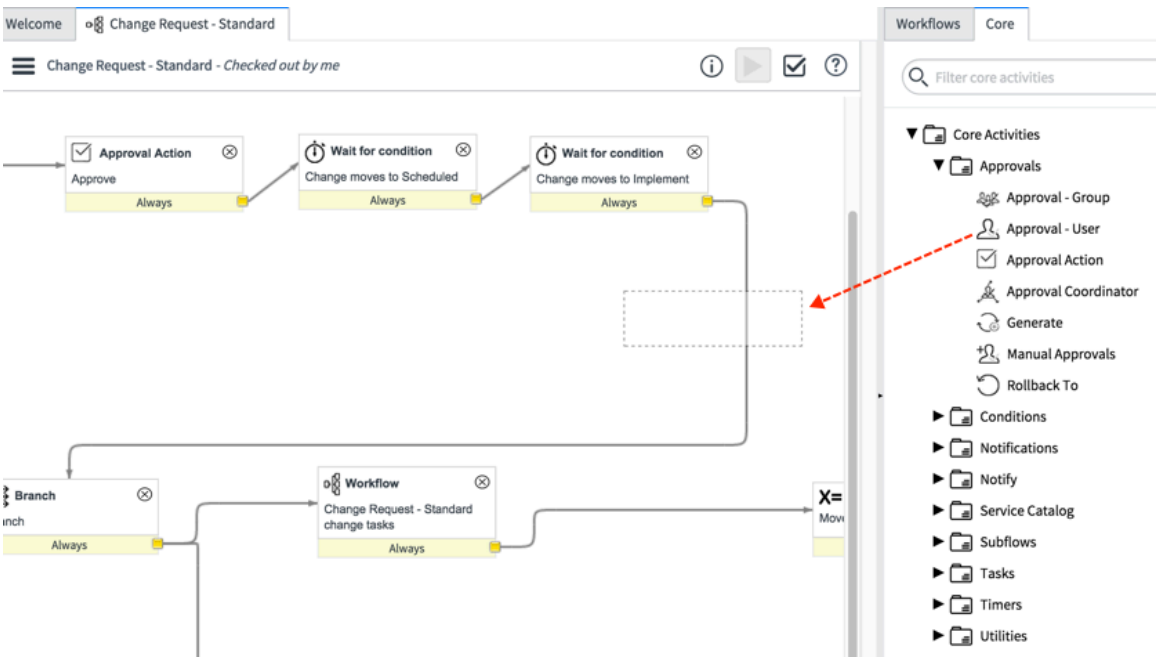
Run the workflow validation tool prior to publishing to detect missing or disconnected transitions that could cause a workflow to hang.

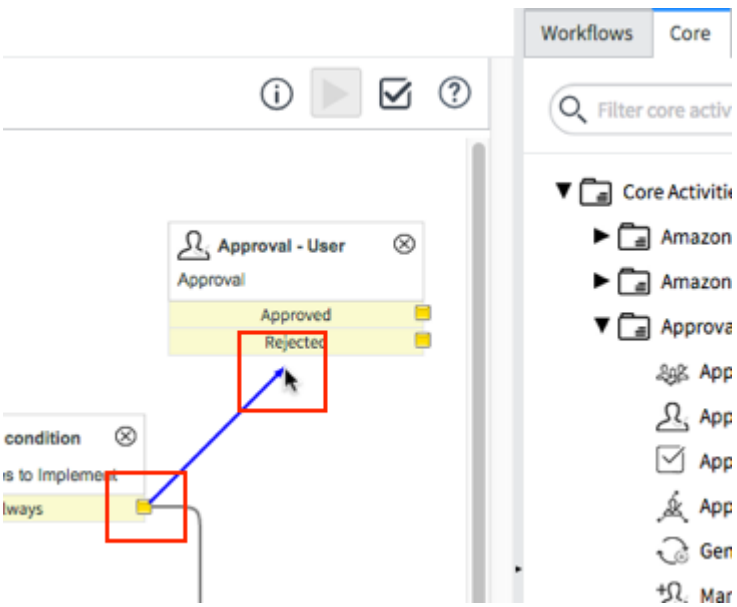
Procedure

1. Add transitions to the workflow using either of these methods:

- Drag and drop an activity directly onto a transition line to connect it to the adjacent activities. The transition line turns blue when the connection is made. The system updates the transitions automatically to reflect the new sequence.



- Drag the activity to an open area in the canvas and create the transitions manually. Click the yellow square on the right side of the activity condition and drag a connector to the next task.



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2. You can draw multiple transitions from the same activity condition if the activity executes concurrently.
3. To remove a transition, click to highlight it, and then press **Delete**.

Custom activity transitions

Controls on the **Approval - User** activity enable an administrator to add additional workflow transitions to the activity other than the default transitions of **Approved** or **Rejected**.

Transitions defined using this method do not become a permanent feature of the **Approval - User** activity. After a new transition is configured, that transition must be applied manually to subsequent instances of the activity, where desired.

Manage workflow activity conditions

Activities contain default conditions that determine which transitions are followed.

Before you begin

Role required: admin

About this task

For example, the **Approval - User** activity has two conditions, **Approved** and **Rejected**.

Example of activity conditions



You can use a JavaScript condition check to create custom conditions on Core workflow activities. Custom activities do not support this feature.

Procedure

1. Right-click the activity and select **Add Condition** from the context menu.
2. In the New Workflow Condition dialog box, fill in the fields as appropriate (see table).

New Workflow Conditions form

Field	Description
Name	The label that is displayed on the workflow.
Activity	Name of the activity for which this condition is submitted. This value is populated automatically by the system.
Short description	Brief description of this condition.
Condition	A JavaScript condition check. The following variables are available: ○ **current**: Current record that the workflow is running against. ○ **activity.result**: Result value set by the activity upon completion.

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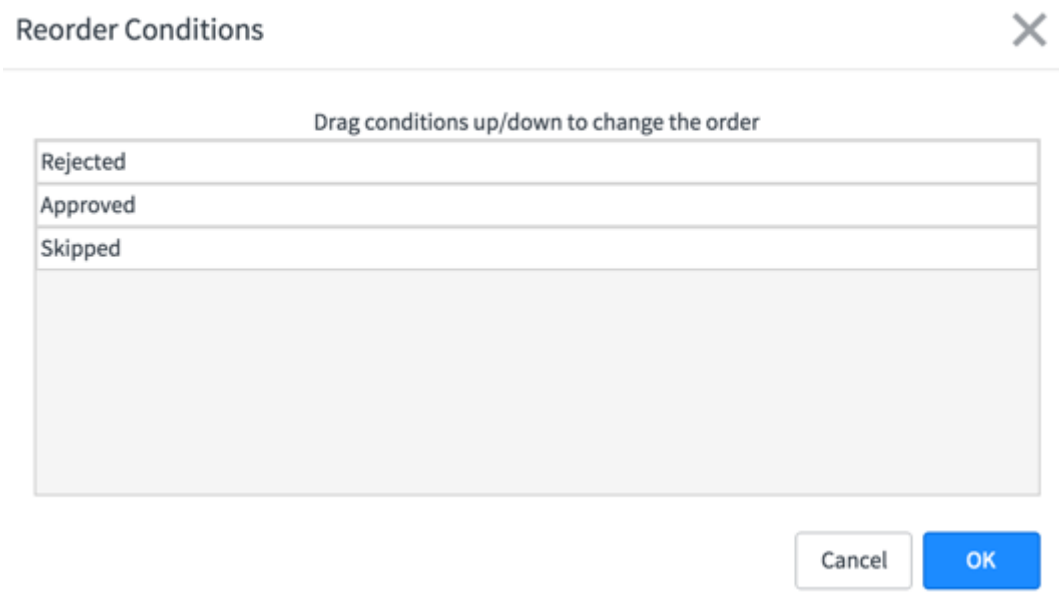
Field	Description
	○ **activity**: Workflow Executing Activity (wf_executing) record. Used for advanced condition checks. ○ **activity.vars**: Variables associated with the Workflow Executing Activity record. Used for advanced condition checks.
Skip during generate	If selected, the **Generate** activity does not follow this transition to generate approvals or tasks.

3. Click **Submit**.
4. To change the order in which conditions appear on the workflow activity, right-click the activity and select **Reorder Conditions**.

   A dialog box appears, with a list of the available conditions.

   List of conditions in the current activity

5. Drag the conditions to a new position in the list.
6. Click **OK**.

Activity result value

The `result` value specified by an activity controls the condition through which the activity transitions.

Use the `result` value as part of the **Condition** field in the activity. For example, if the **Condition** field of an **Approval - User** activity contains `activity.result == 'rejected'`, the activity transitions through that condition when a rejection is received from the approver. Result values are set in the **Script** field of the activity definition.

Edit the workflow activity properties form

Customize which workflow variables appear on an activity properties form and how the variables are arranged on the form.

Before you begin

Role required: admin

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Procedure

1. Navigate to **Workflow** > **Administration** > **Activity Definitions**.
2. Scroll to the activity that you want to work with and click the activity name.
3. On the Workflow Activity Definition form, click the **Edit Variables Layout** related link.
4. On the Form Design page for the Activity Properties form, add and remove activity variables. The activity variables appear as separate items that you can rearrange on the form.

   For more details on using the form design interface, see Using the form designer.

Using workflow approval activities and rolling back workflows

When you work with approvals, you need to understand how approval activities interact with approval engines, how to correct a skipped approval workflow activity, and how rollbacks work.

Related topics

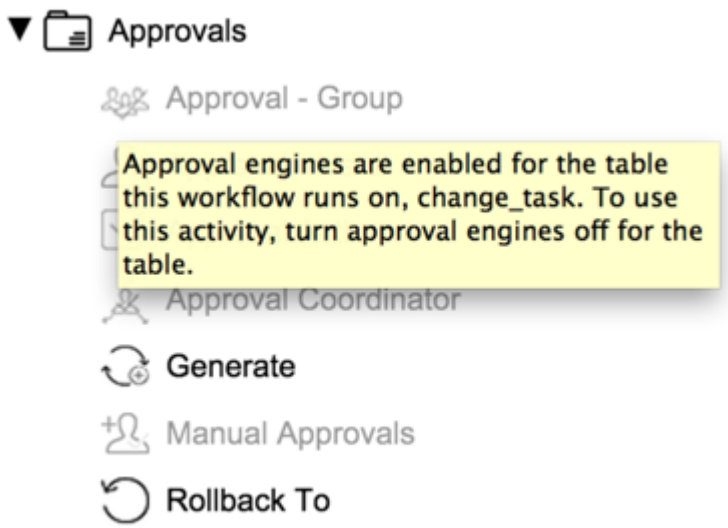
Rollback To workflow activity

Approval workflow activities and approval engines

Approvals can be managed by approval activities or approval engines, but not both. Approval activities can be used if approval engines are not turned on for the table associated with the workflow.

Approvals can be managed by approval activities or approval engines, but not both. Trying to use both can cause a range of issues. Approval activites are not available (greyed out) in the palette if approval engines are used on the specified table. If you hover over a greyed out approval activity in the palette, a comment with more information is provided. For more information about approvals and approval engines, see Classic approvals.

Unavailable approval activities



To turn approval engines off for the table, navigate to the **System Properties > Approval Engines** and change the setting for the table to **Turn engines off.**

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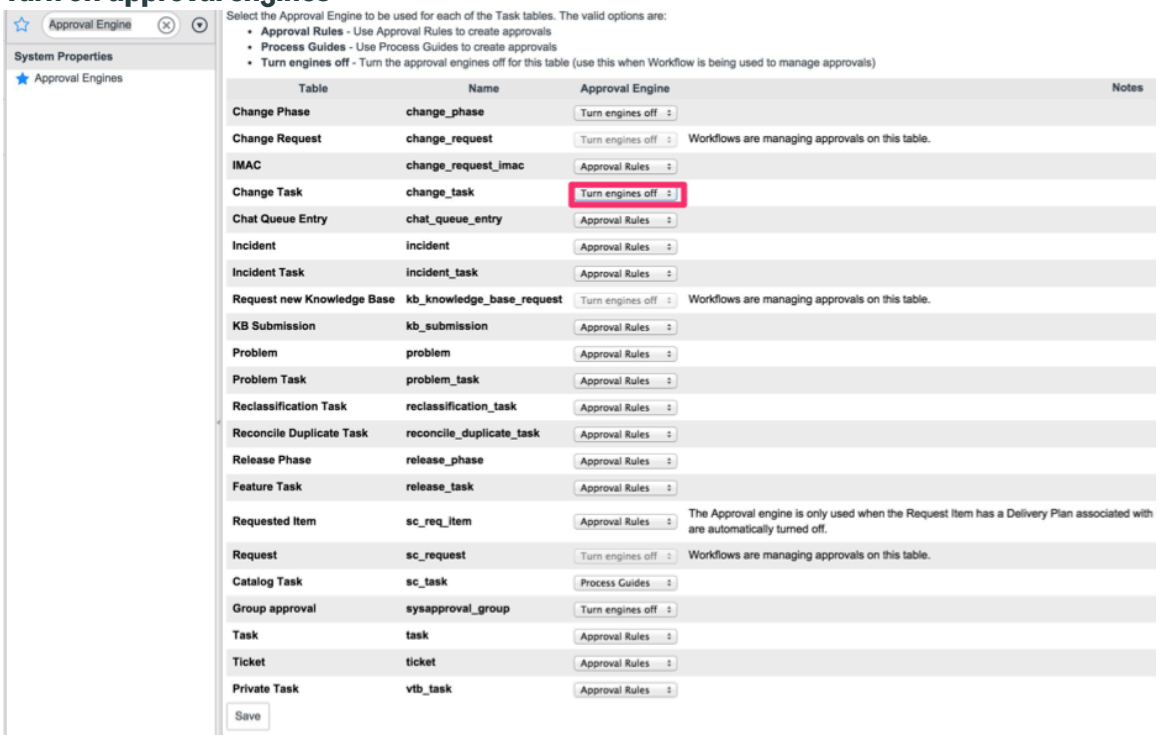
Turn off approval engines



Related topics

Approval and rollback workflow activities

Classic approvals

Correct a skipped workflow approval activity

While a workflow is in an active context, an approval activity can skip to the next activity.

Before you begin

Role required: admin

About this task

An approval activity might skip for the following reasons:

- The approval user or group is missing or invalid (for example, sys_id).
- The approval user or group became inactive after the approval record was created.
- The activity is a Dot-walking to data in related tables field, such as `current.opened_by.department.manager`, and it has a missing or invalid approval user or group.
- The business rule on the table that is associated with the workflow is invalid.

To correct a missed approval activity:

Procedure

1. Navigate to **All** > **Workflow** > **Live Workflows** > **All Contexts**.
2. Select the date and time in the **Started** column for the workflow that is incorrectly processing approval activities.
3. In **Related Links**, select **Show Workflow**.
4. Review the portion of the workflow that executed, and then do one or more of the following:

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- Verify that after approval, the workflow progressed to the next activity. If a workflow failed to progress, check the business rules. For more information, see Debugging business rules.
- Point to each processed approval activity to find activities where the **State** is **Finished** and **Result** is **Skipped**.

5. Navigate to **Workflow** > **Workflow Editor** and open the workflow.
6. Double-click the skipped approval activity.
7. Select **Users** or **Groups**.
8. Assign an active user or group for the approval activity.
   For more information, see Workflow error handling.

Using variables in Notify workflow activities

Certain Notify workflow activities support variable substitution for reading text to callers.

Certain Notify workflow activities allow you to use variables, such as those from the workflow scratchpad, to determine the activity behavior. Each activity supports a maximum of 20 variables. The following activities allow variable substitution:

Activity	Notes
Say	Supports variable substition in the **Text** field only.
Input	Supports variable substition in the **Text** field only.
Play	Supports variable substitution in the **URL** field only.
Forward call	Supports variable substitution in the **Phone number** field only.

Scratchpad variables

You can call variables from the workflow scratchpad or the activity scratchpad using the syntax ${variable_name}. You do not need to include either workflow.scratchpad or activity.scratchpad before the variable name. For example, to use the variable `activity.scratchpad.langCode = 'en-US'`, call ${langCode} within the activity. If the scratchpad does not contain the specified variable, the variable evaluates to an empty value.

You can get values from objects on the scratchpad using the format ${object.value}. For example, you can get the name of a user object, such as `workflow.scratchpad.user = {name:'john.smith'}` by calling ${user.name}.

The digit variable

The **Input** activity exposes the ${digit} variable. Use this variable in each condition presented by the activity. The number read to the user is determined automatically by each condition. The caller can press that number to cause the activity to transition through that condition.

Use multiple timer activities in one workflow

Workflow timer activities store data independently of each other in an activity-specific scratchpad.

Previously, all timer activities in a workflow accessed a single, shared scratchpad, which could lead to conflicts when adding multiple timer activities to one workflow.

Timer scratchpads entries hold these values:

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- workflow.scratchpad.endTime
- workflow.scratchpad.realStartTime
- workflow.scratchpad.retroactiveSecsLeft

Related topics

Timer workflow activities

Publish a custom workflow activity

When a user creates a custom activity and saves or submits it, that activity appears in the **Custom** and **Packs** tabs of the designer palette, but is only visible to the user who created it.

When configuration is complete, the user clicks **Publish**, which makes the activity accessible to other users on the instance with the workflow_admin or activity_creator role. Published activities are available for upload to the ServiceNow Store, can be added to workflows, and can be edited by any user with the proper roles.

To edit a published activity, click **Checkout**. When an activity is checked out by a user, only that user can modify it. The fields of a checked out activity are read-only for all other users. When the checked out activity has been modified successfully, the user publishes it again. The system adds a new version of this activity to the Custom tab in the Workflow Editor palette.

Note:
Activities you create and publish are only visible in the *Packs* tab if they were created in the current application scope.

Locked versions

Problems can arise if an activity version is checked out by a user and not checked back in, for example, when the user is sick or leaves the company. An activity in this state cannot be checked out for update.

A user with the admin role can return a locked activity to a published state. The administrator opens the locked activity from the **Custom** tab of the Workflow Editor, selects the checked-out version, and selects **Force Checkout**, and then **Publish**.

Workflow activity pinning

Workflow administrators can pin a custom activity to prevent the system from automatically updating that activity when a new version is downloaded from the ServiceNow Store.

You can pin or unpin individual activities or set pinning within workflow properties that controls the versions used for all the activities in that workflow. This can result in two workflows using different versions of the same activity.

Note:
Activity pinning and unpinning applies to the custom activities downloaded from the ServiceNow Store only, and does not apply to newly published activity definitions made locally on your instance. To make use of these locally updated custom activities, you must check out your workflow and manually add the activities.

ATF Test Generator and Cloud Runner

ATF Test Generator and Cloud Runner is a tool that enables you to leverage ServiceNow's ability to intelligently generate regression tests for a specific instance.

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The test generator intelligently creates tests by analyzing instance behavior and workflows. The ATF Test Generator integrates with the existing ATF framework providing you with a seamless user experience. You also have the option to execute these tests using ServiceNow's Cloud Runner which runs ATF tests on a headless browser hosted by ServiceNow.

Note:
Check that your instance is using an ADCv2 load balancer. For more information, see the ADCv2 Migration knowledge article. If your instance is not using the ADCv2 load balancer, contact Now Support. Notice that mLTS is activated automatically and causes a rolling restart of the application nodes. See KB1639216 for more information.

ATF Test Generator and Cloud Runner overview

Get started

Explore  Learn about ATF Test Generator and Cloud Runner	**Configure**  Set up the cloud user	**Operate**  Generate the tests
Use  Execute the test using Cloud Runner	**Reference**  Learn about miscellaneous information about the app	

ATF Test Generator and Cloud Runner overview

Use the ATF Test Generator and Cloud Runner application to generate tests depending on the instance behavior and workflows. You can also execute the generated tests using the Cloud Runner option.

These are the main modules in the application.

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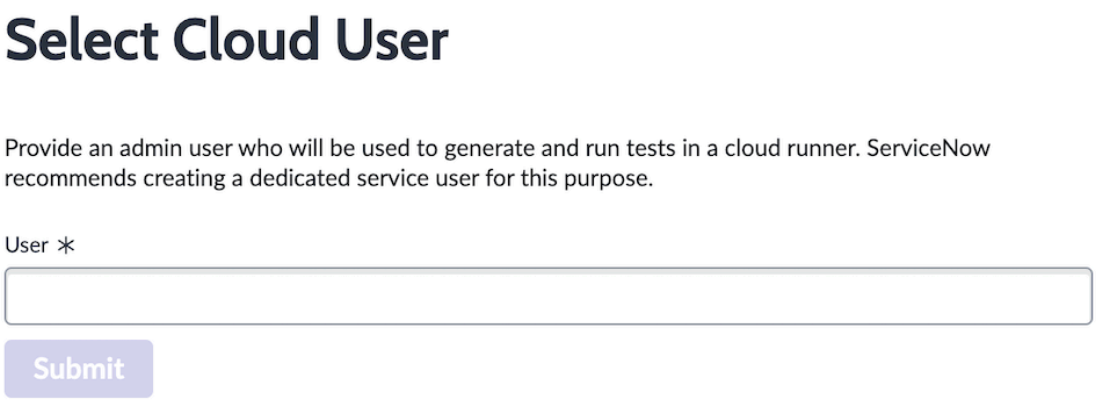
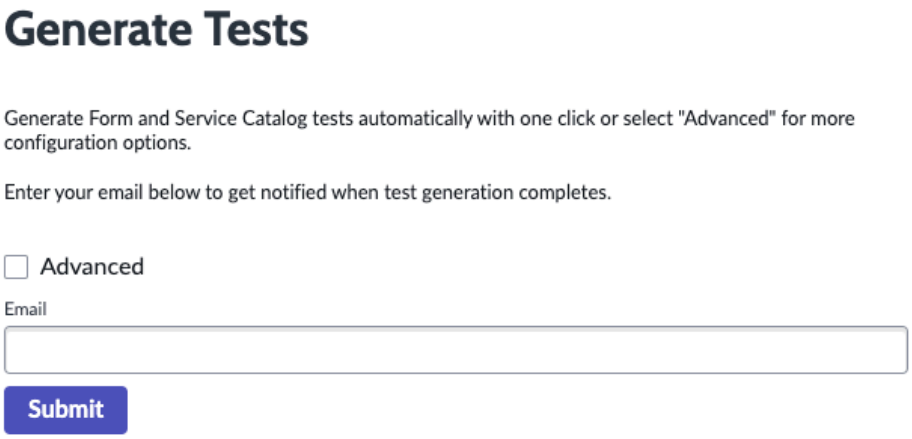
- Select Cloud User: Setting up credentials for cloud runner



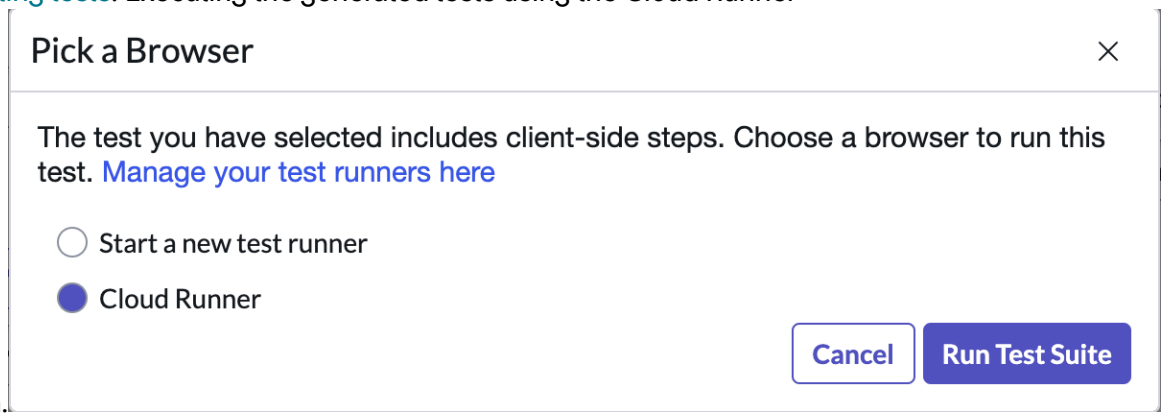
user.

- Generate tests: Auto-generating tests and test suites to be executed on cloud



runner.

- Executing tests: Executing the generated tests using the Cloud Runner



option.

Note:
This dialog box is visible when you try executing an ATF test or suite. See Scheduling test execution for more information.

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Setting up cloud user

Set the credentials for the cloud user to be able to generate and run tests. This is a one time setup after the admin user installs the application.

Before you begin

Role required: admin

Note:
The cloud runner works as expected, even if you have Multi-factor authentication (MFA) set up for your cloud user.

Procedure

1. Navigate to **All** > **Automated Test Framework (ATF)** > **Administration** > **Select Cloud User**.

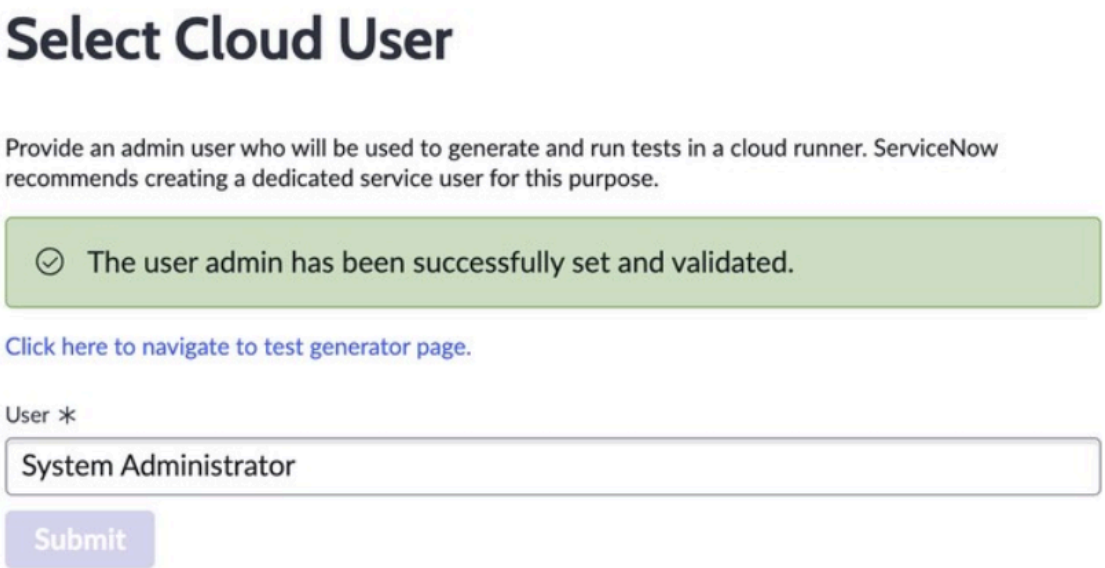
   Note:
   The **Select Cloud User** module is visible only to the admins. Even an ATF test admin can't access the **Select Cloud User** module.

2. Select an admin user from the list.

   Note:
   Even if you are an admin, it is recommended to select a dedicated admin user.

3. Click **Submit**.

   If the admin user is selected successfully, the following message shows up:



   If the selected user is not an admin, an error message shows up.
   The following message is an example of one of the possible error

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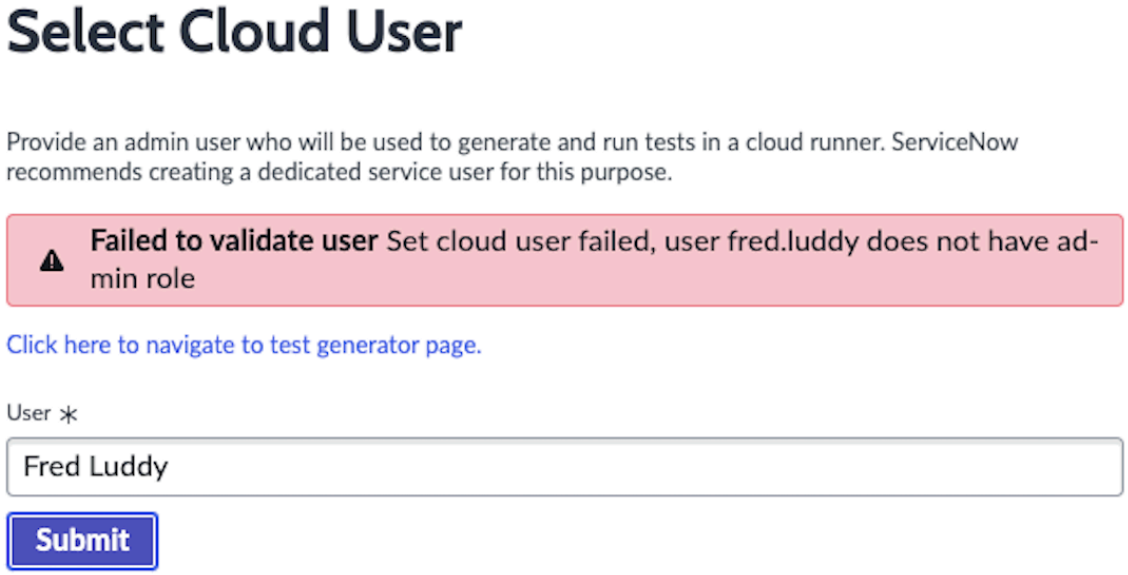
messages. The error messages vary depending on the reason of the



error.

The selection of a cloud user can fail for the following reasons:

- User wasn't found
- User is inactive
- User is locked out
- User needs a password reset
- User doesn't have an admin role
- User has read-only access
- User has web services only access

Note:
Selecting an admin user might take some time because it tries spinning a cloud browser and then log in to the selected user.

Generating the tests

Generate tests automatically by leveraging ServiceNow Test Generation and Cloud Runner application. You can also run these tests with the click of a button.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Automated Test Framework (ATF)** > **Administration** > **Test Generator**.
   If you are on the **Select Cloud User** module and have setup the admin user, click **Click here to navigate to test generator page**.

Note:
The **Generate Tests** module is visible only to the admins. Even an ATF test admin can't access the **Select Cloud User** module.

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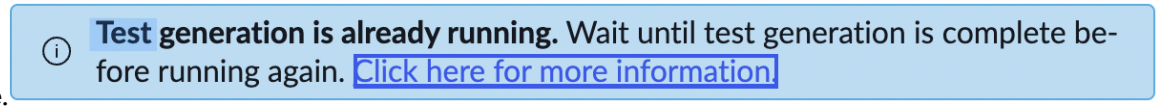
If you already have a test generation running, you will see the following message.

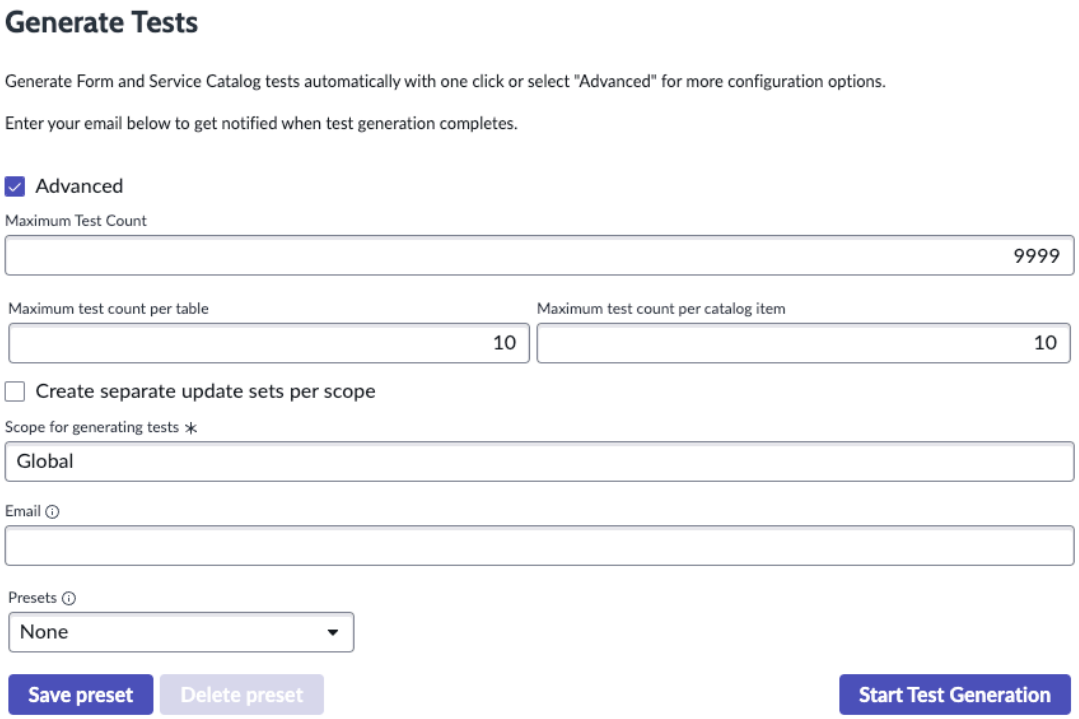


Note:
You can't start more than one test generation process simultaneously, but it will queue up for later execution.

2. **Optional:** If you want to see the currently running test and the queue, navigate to **Automated Test Framework (ATF)** > **Administration** > **Browser Orchestration Queue**.
The Browser Orchestration Queues list shows up.

Note:
You can see the progress and state of each of the test generation and test run in the list.

3. Select one of the two ways to generate tests.



   - Not selecting **Advanced**: Generates tests on every table by default
   - Selecting **Advanced**: Option to specify a specific table to generate tests
     - Maximum Test Count: Upper bound on the number of generated tests. The default value is 2000.
     - Maximum test count per table: Upper bound on the test count for each table. The default value is 5.
     - Maximum test count per catalog item: Maximum number of generated tests per service catalog item, defaulting to maximum 2. You can modify the number of generated tests per service catalog item
     - Create separate update sets per scope: Option to create a separate update set for each scope

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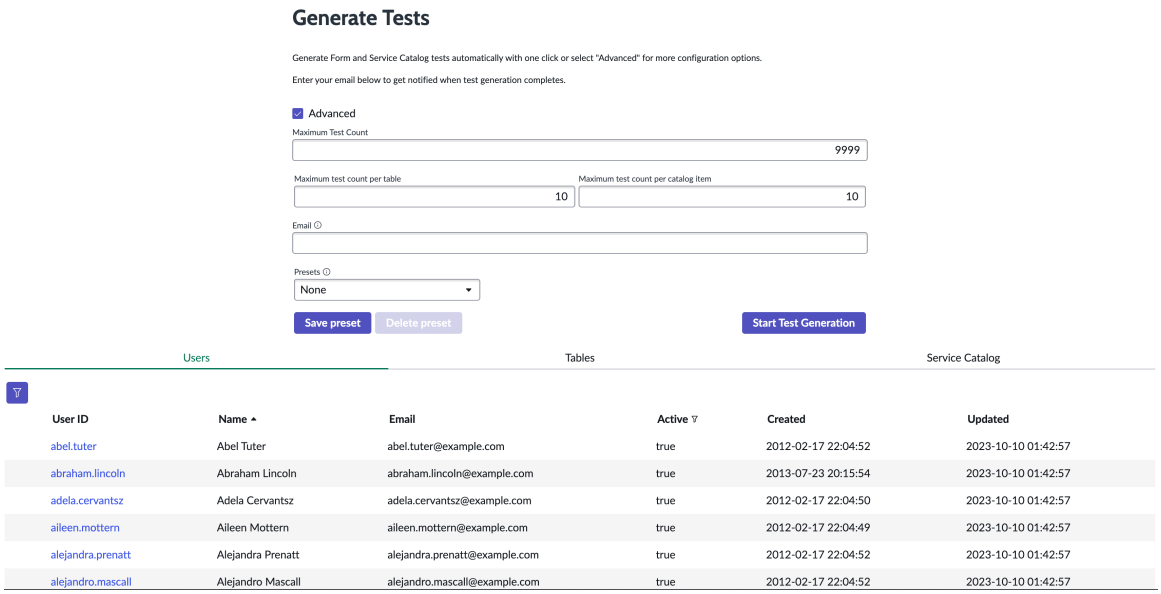
- Scope for generating tests: Ability to have the tables in separate update sets for different scopes. For example, the generator gathers information about the scope of the tables and then saves the tests in a separate update set for each scope

  Note:
  This field is visible only if the **Create separate update sets per scope** field is not selected. You can then select the scope for the generated tests. The default scope is Global.

- Email: Email address of the user to receive notifications about test generation summary
- Presets: Number of user-control generated tests per service catalog item. The maximum default number is 10.

Note:
Since the test generation process is time consuming, check your provided email address regularly to receive the notification about the test generation.

4. **Optional:** Select **Save preset** to implement the preset filter conditions.
   You can also delete a preset by selecting **Delete preset**. All admins who can access the **Generate Tests** module can view the update on the **Presets** field.



Note:
You can't overwrite or delete the default **None** preset. If you try to save the default None preset value, you will see the following message. Some example presets have been provided which can be edited.

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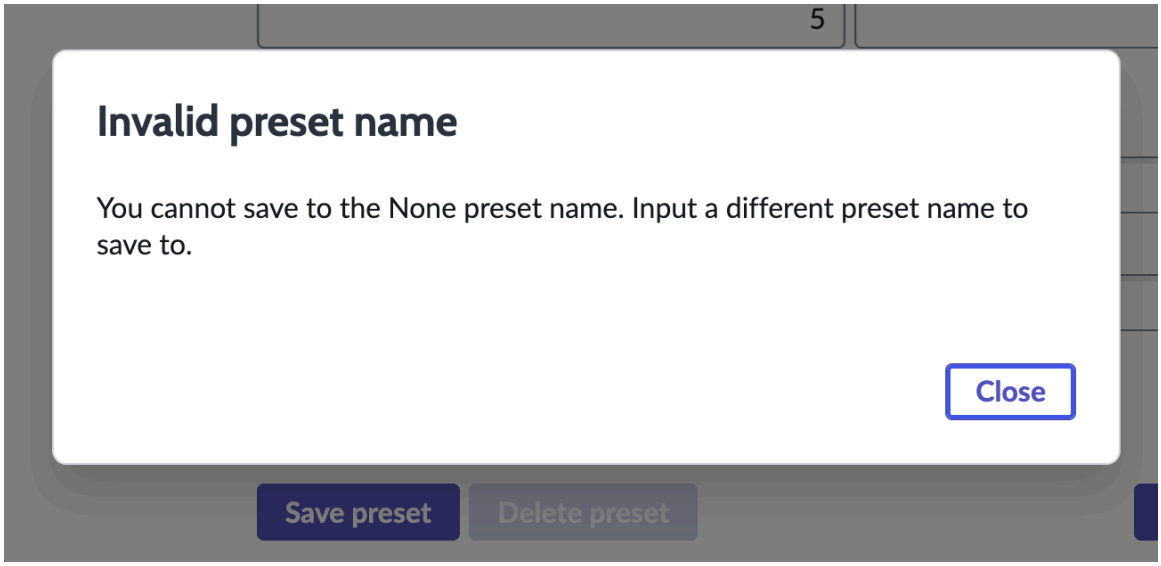
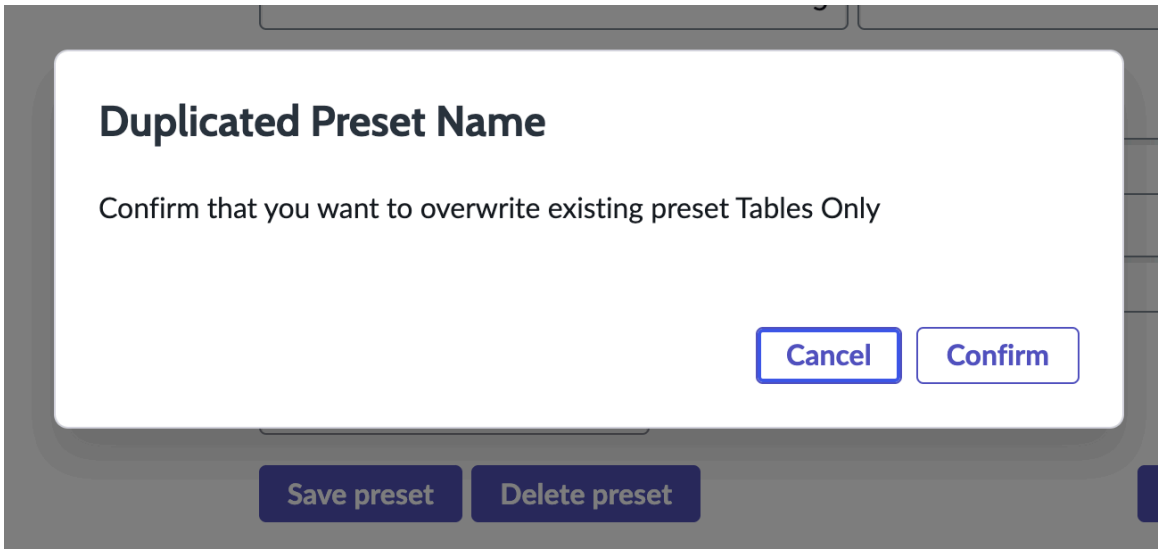


If you overwrite an existing preset, the following confirmation dialog box shows up.



Depending on the query created by the preset values, the following tabs return certain data.

- Users
- Tables
- Service Catalog

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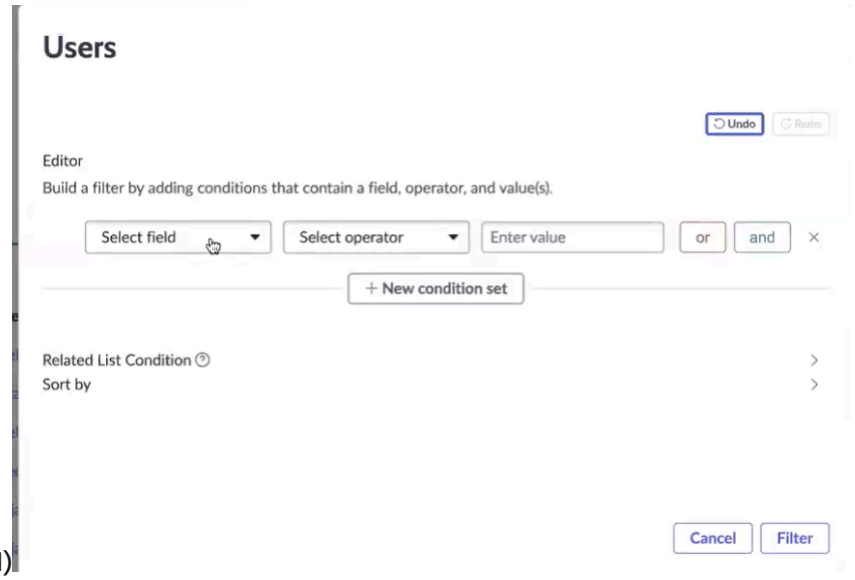
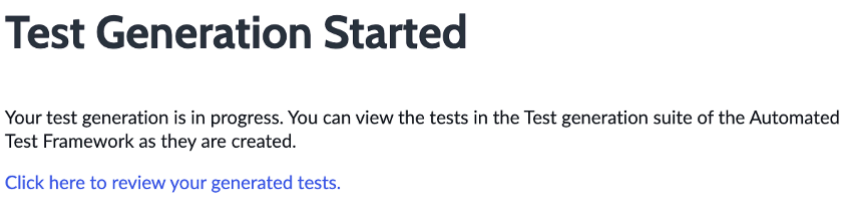
Note:
You can create new condition sets to filter the required information in tabs.

(Optional)

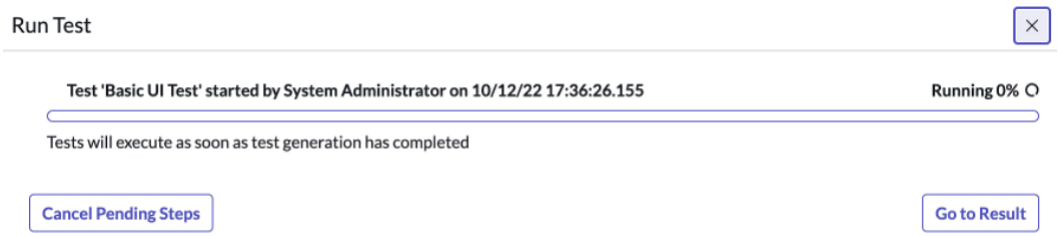


5. Select **Start Test Generation**.
   The Test Generation Started page shows up.



If you run a test or a suite when the test generation is in progress, one of the following messages shows up.

- For test run



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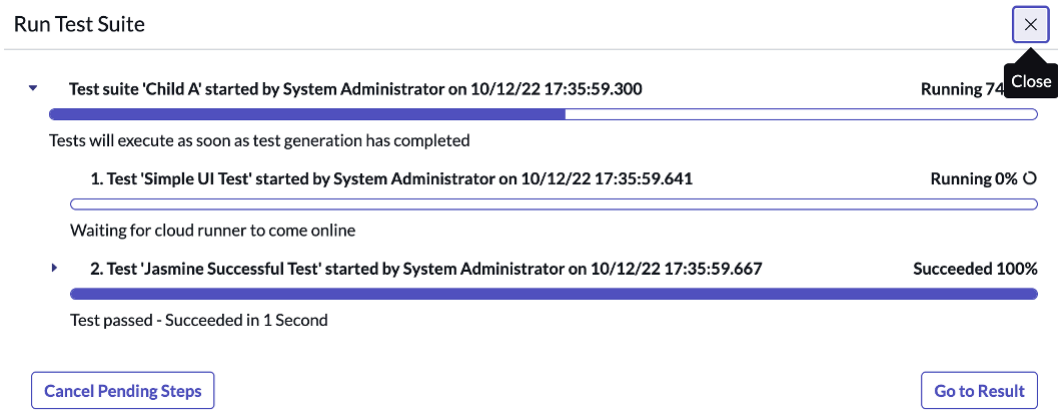
- For suite run



6. Go to Suites to see the generated tests.
   A list of test suites shows up.

   Note:
   The tests start appearing as they are being generated. It is recommended not to run the generated tests or test suite when the test generation is still in progress.

7. Select the **ATF Generated Suite** suite.

   Note:
   It supports only the basic forms and server test steps.

   You can now set the `sn_atf_tg.generation.create_separate_update_set` property to False if you don't want an updated suite every time you run a test generation. The updated records created during tests generation are captured in the suite the user currently has selected. Its default value is set to True and it generates an updated suite after every test generation.

   A list of tests within the selected suite shows up. Only the successful tests show up in this suite.

8. **Optional:** Select the generated suite and scroll down to the Tests related list, if you want to view the generated automated tests using either Record Producer or Service Catalog.
   From the automated tests created, you can view all the users who have used that record or incident. Although the tests steps here are similar to the other test steps, the initial validation is done for the fields on the form. Also, for every mandatory field, a value is set based on the sample data. It also validates after every mandatory step. Once you submit, it does a final record validation.

Executing the tests using Cloud Runner

Execute the generated tests suite using the Cloud Runner browser option.

Before you begin

Note:
ATF test data will temporarily be in the browser session which are stored in our ServiceNow data center. Test data will be removed after all test executions have been completed.

Role required: admin

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Procedure

1. Navigate to **All** > **Automated Test Framework (ATF)** > **Suites** > **ATF Generated Suite**.

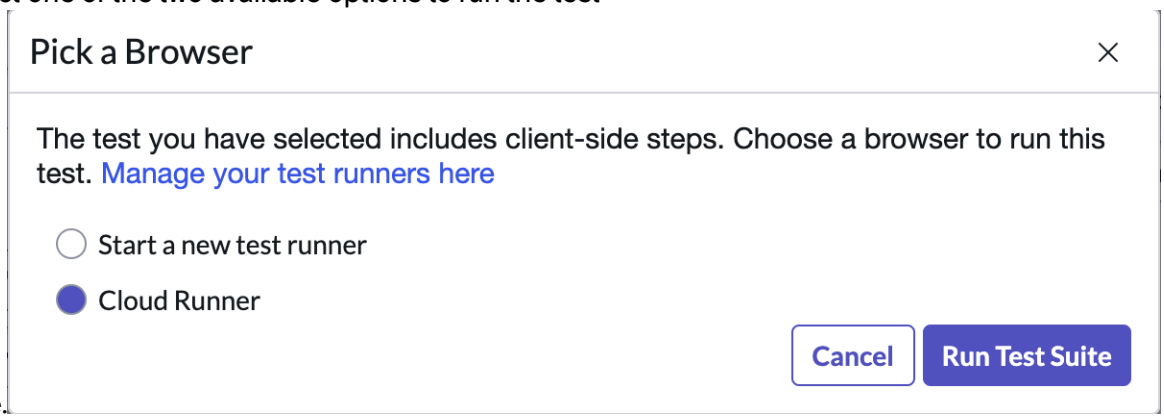
   Note:
   You can also execute an individual test. Navigate to **All** > **Automated Test Framework (ATF)** > **Tests**.

2. Select **Run Test Suite** to execute the selected suite.

   Note:
   You can also execute an individual test using the cloud runner browser option.

   The Pick a Browser dialog box shows up.

3. Select one of the two available options to run the test suite.



   - Start a new test runner: Runs the test by starting a new tab
   - Cloud Runner: Runs the test in the cloud

   Note:
   As an admin user, you can hide the Cloud Runner option on the Pick a browser dialog box by setting the atf_cloud_runner.radio_visible to false. The property is set to true by default.

   Note:
   If you run a test suite using the cloud runner, all the tests within the suite run in parallel. See Parallel testing using Cloud Runner for more information. The order in which the tests in a suite run is random. The parallel suites ignore the execution order and ignore abort on failure.

4. Select **Run Test Suite** on the dialog box after selecting the browser.

   Note:
   The number of cloud runners that can be used simultaneously is two by default. You also have the option of buying five more cloud runners.

   The execution of the tests continues at the background even if you close the progress bar.

5. **Optional:** Select **Go to Result** if you want to review the tests execution results.

Parallel testing using Cloud Runner

Parallel testing using the Cloud Runner involves execution of tests within a suite in parallel.

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Parallel testing of the tests within a single suite starts as soon as you run the suite. When you run a suite using the Cloud Runner, all the tests within the suite run in parallel ignoring the execution order and abort on failure. Parallel testing using Cloud Runner is different from parallel testing without Cloud Runner.

Note:
Parallel testing without Cloud Runner involves running of more than 1 suites in parallel.

Scheduling test execution

Use schedules and nightly runs to execute tests and test suites in ServiceNow's cloud infrastructure allowing you to fully automate ATF test executions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Automated Test Framework (ATF)** > **Schedules**.
   The Suite Schedules page shows up.
2. Select **New** to create a new schedule run.
   The Suite Schedule record shows up.
3. On the form, fill in the fields.

Fields	Description
Name	Name of the schedule run.
Active	Option to activate the scheduled run.
Application	Application that has the schedule run.
Run	Frequency at which the scheduled run should execute
Time	Exact time at which the test run has been scheduled to execute
Run in cloud	Option to execute the scheduled run on cloud runner. The default value is True for new schedules. **Note:** The value is False for any existing schedule runs.

4. Select **Save**.
5. **Optional:** Add any child tests if needed.

   Note:
   If you change the browser name for the child test, it will still run on the cloud runner.

6. Select **Execute Now** to execute the suite.

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ATF Test Generator and Cloud Runner reference

Reference information for the ATF Test Generator and Cloud Runner.

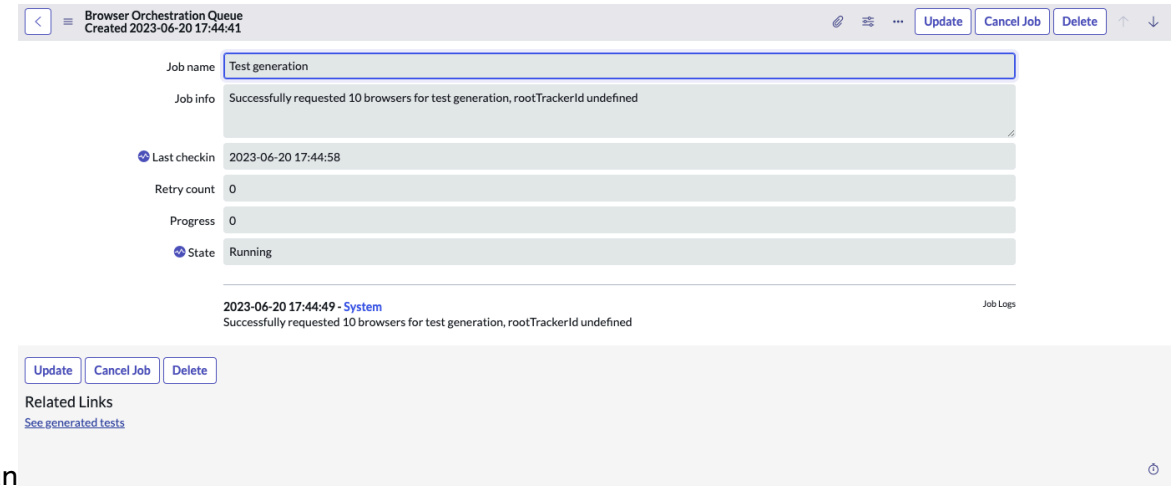
Log entries in the BOQ form

Debug errors or track any critical transactions during the execution of the test suites, setting up the Cloud Runner or generating the tests by viewing the log entries in the BOQ form.

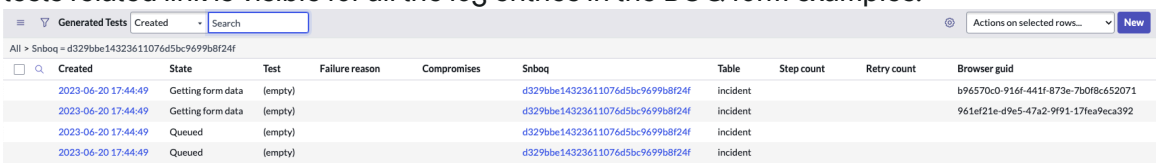
You can now view important log entries in the BOQ form. When you go to the BOQ table, you will see the list of jobs. On entering one of the jobs, you will see some specific job log entries.

The following are some of the examples for log entries in the BOQ form for test execution.

- Successful test run



> **Note:**
> Select See generated tests related link to view the automated tests. The list of generated tests shows up and is not editable. You can also view the state and the reasons of failure of the tests on the list. The See generated tests related link is visible for all the log entries in the BOQ form examples.



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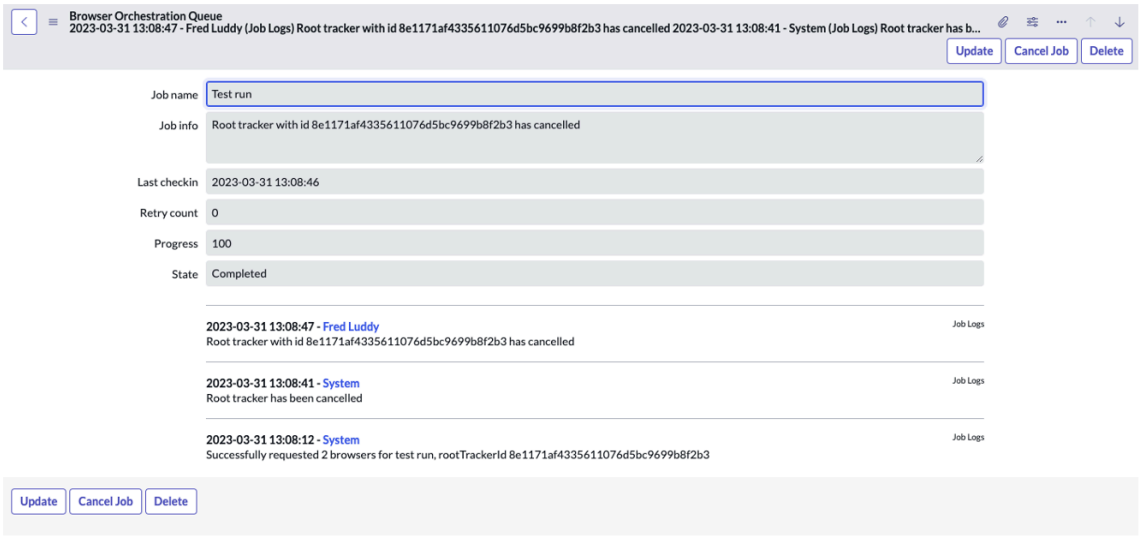
- Test run got cancelled by user via root



tracker

- If BOQ and BOS can be reached on an instance, but login is



redirected.

> **Note:**
> This might happen when the ADCv2 load balancer of the instance is misconfigured and you have a customization that redirects traffic via a client side script.

(the ADCv2 load balancer of the instance is misconfigured, the customer has a customization that redirects traffic via a client side script, etc...)

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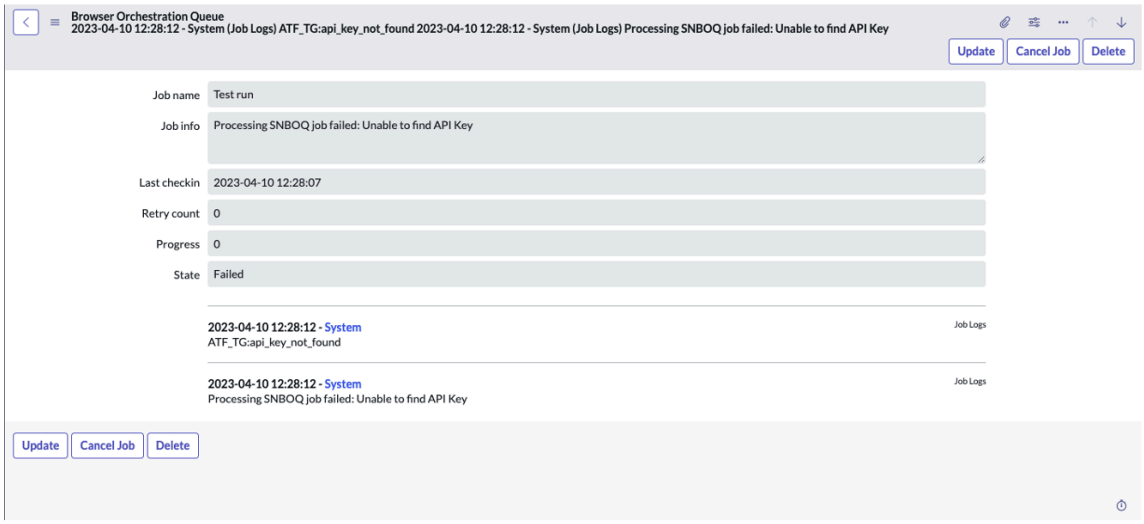
- If you have deleted an API key before the job is sent to BOS/ BOQ



- If the BOS is unable to login to an instance due to some client side script, API key being deleted after request has been sent to BOS/BOQ, etc.



ATF Test Generator and Cloud Runner roles

ATF Test Generator and Cloud Runner is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

System Administrator [admin]

The admin role is required to access and use the ATF Test Generator and Cloud Runner store application.

Contains Roles

Note:
The modules in the store application is only visible to the admins. Even an ATF test admin can't access them. It is recommended to select a dedicated admin user.

List of roles contained within the role.

None.

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Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

It is recommended to select a dedicated admin user who meets the following conditions:

- is not Locked out
- is Active
- is not Web services access only
- is not an Internal Integration User

HTTP Response Headers

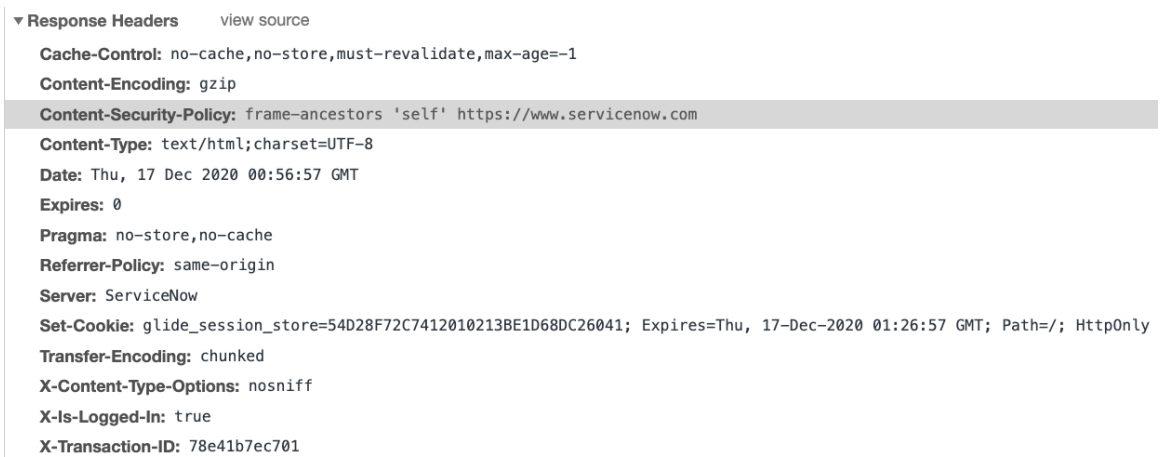
A response header is a simple name-value pair used in an HTTP response to provide additional information about page content or how the client should process it.

You can configure HTTP response headers for all, or specific types of pages, which include Service Portal, UI Page, or UX applications. The ability to configure and pass response headers enables special handling of the page content by a client, most typically a browser.

To learn more about what an HTTP header is, and about configuring the name-value pair for specific HTTP response headers, see:https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers

When configuring response headers, you must look at the definition for the HTTP header to determine how the client would handle the page content.

- For example, you configure an HTTP header for a specific page or all the pages with a Content-Security-Policy: frame-ancestors 'self' https://www.servicenow.com.
- When you invoke the page in a browser such as Chrome, you can review it in the Response Headers section of Chrome Developer Tools.



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To learn more about how browsers handle a page with frame-ancestors, see https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/Content-Security-Policy/frame-ancestors.

Warning:
When using URLs with custom name-value pairs, proceed with caution because there is a potential security risk when doing so. The signed security amendment to the ServiceNow AI Platform contract has implied security. You may potentially or accidentally override it when you use custom name-value pairs in the resulting URLs.

- If you want to entirely disable HTTP response header configuration functions, set the *glide.http.headers_config.enabled* property to **false**.
- Once you set it to false, ServiceNow AI Platform does not use any of the header configurations you defined in the sys_response_header table.

Special handling of the Content-Security-Policy: frame-ancestor header

Normally, the ServiceNow AI Platform automatically includes the X-Frame-Options: SAMEORIGIN header.

- It supports use of this header in all types of browsers, based on the setting of the *glide.set_x_frame_options* global property, which is enabled by default.
- When you configure a page with a Content-Security-Policy: frame-ancestor 'self' URL1 URL2 header, the ServiceNow AI Platform does not automatically include the X-Frame-Options: SAMEORIGIN header. Excluding it prevents the browser from being confused, because Content-Security-Policy: frame-ancestor 'self' already has a similar effect.

Special handling of Content-Security-Policy: frame-ancestor header for Internet Explorer

Using the Content-Security-Policy: frame-ancestor 'self' URL1 URL2 header enables you to configure multiple URL sources to include the page from within an iFrame rendered from a third-party site. However, Internet Explorer does not support this type of header.

- Instead, the Internet Explorer only supports the X-Frame-Options: ALLOW-FROM URL (ALLOW-FROM) directive in this header, although the restriction is for a single host URL.
- If you configure the frame-ancestor 'self' URL1 URL2 header, and Internet Explorer is in use, the ServiceNow AI Platform automatically uses the X-Frame-Options: ALLOW-FROM URL (ALLOW-FROM) header instead.

If the Internet Explorer request includes the referrer URL header:

- It attempts to match it with the host URLs (full or wildcard http://*.example.com type URL format only) configured in the Content-Security-Policy: frame-ancestor 'self' URL1 URL2 header.
- If there is a match, include the matched URL as X-Frame-Options: ALLOW-FROM URL1.
- If there is no referrer header, it uses the first non-wildcard based host URLs configured in the Content-Security-Policy: frame-ancestor 'self' URL1 URL2 header.

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Note:
When configuring URLs, do not include a forward slash at the end of the URL.

- This example of an incorrect configuration that may not work properly with this special handling:
  - Name: Content-Security-Policy
  - Value: frame-ancestors 'self' https://microsoft.com/
- Use this correct syntax instead:
  - Name: Content-Security-Policy
  - Value: frame-ancestors 'self' https://microsoft.com

Related topics

Control request and response content type

Cache-Control HTTP header value

Content-Security-Policy: frame-ancestor 'self' URL1 URL2

X-Frame-Options: SAMEORIGIN

X-Frame-Options: ALLOW-FROM URL

Configure HTTP response headers

Configure standard name-value pairs for HTTP response headers. You designate if the configuration applies to all pages, or to specific types (Service Portal, UI Page, or UX application record).

Before you begin

Role required: An elevated access security_admin role is required to configure an **All Pages** type header. An admin role is required to configure a **Specific Type** header.

Procedure

1. In the Navigator pane, type `sys_response_header.list`.
2. Click **New**.
3. Fill in the fields on the form.

HTTP Response Header

Field	Description
Active	Check box that designates that this HTTP response header configuration is active.
Application	Application scope for this record.
Applies to	Type of record the HTTP response header configuration applies to. **Specific Type** HTTP response header configuration is for the specific type and record you select in the **Type** and **Record** fields. **All Pages**

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Field	Description
	HTTP response header configuration is for all pages and record types. **Note:** Only users with an elevated access privilege security_admin role can configure HTTP response headers for the All Pages type header.
Type	Type of record the HTTP response header configuration applies to. **Service Portal [sp_portal]** Records related to the Service Portal. **UI Page [sys_ui_page]** Standard UI pages in the ServiceNow AI Platform. **UX Application [sys_ux_page_registry]** Standard UX applications in the ServiceNow AI Platform.
Record	Specific record the HTTP response header configuration applies to. To select a record: **a.** Click the Search () icon to access the Select the document form. **b.** In the **Table name** field, the default is the type you selected in the **Type** field. Do not change it. **c.** In the **Document** field, select the record from the table. For example, if you selected **Service Portal [sp_portal]**, you select a specific Service Portal-related record in that table. **d.** Click **OK**. You can only access this field if you selected **Specific Type** in the **Applies to** field.
Name	Name you want to assign to the name-value pair for the HTTP response header.
Value	Value you want to assign to the name-value pair for the HTTP response header.

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Field	Description
Description	Detailed description for the HTTP response header.

4. Click **Submit**.

HTTP header configuration for advanced users

The HTTP response header table (sys_response_header) in the List view contains two additional columns - **Add by** and **Order**.

Column	Description
Order	Adds a default integer order value to a header configuration regardless of the type of header (**All Pages** or a **Specific page**). • When a specific page request takes place, both of the header types are interleaved based on the **Order**. • The net headers, regardless of the type, are sorted first, based on the **Order** and added to the response based on the ordered header list.
Add By	Contains the following values: **Append** (Default value) This option is relevant when multiple headers with the same name are configured. In this case, they are both added to the HTTP response header. **Overwrite** This option is relevant when the same header (a header with the same name) is attempting to add twice in the ordered header list (see **Order** description). The header with the higher order and with an **Overwrite** selection in **Add By** overwrites the same header trying to be set with a lower order.

You may have situations where a couple of similar **All Pages** type header configurations could overwrite a **Specific Type** type header configuration. An example of a **Specific Type** configuration would be one for a specific UI page. You can remedy this situation by adjusting the **Add by** and **Order** columns, as in the following examples.

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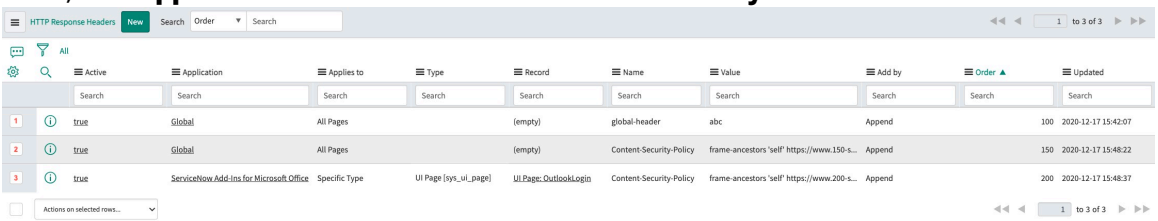
Append example

The ServiceNow AI Platform is trying to set headers in the following order, and **Append** is the default value for each in the **Add By** column.

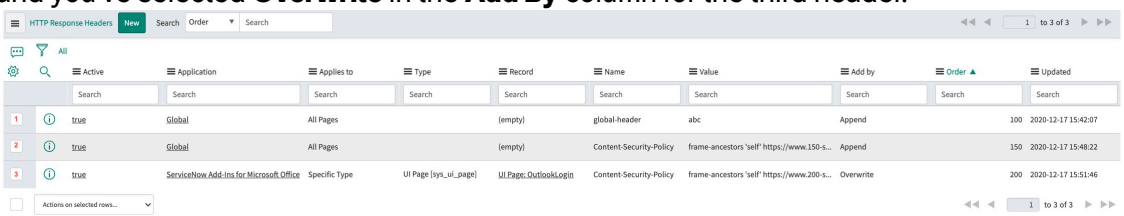


In this example, the second (Header 2) and third (Header 3) response header configurations have the same name (Content-Security-Policy). In this case, Header 3 is appended to Header 2. If a request is made for a specific page you configured with a Header 3 response, the net HTTP response headers are both Header 2 and Header 3.



Overwrite

The ServiceNow AI Platform is trying to set headers in the following order, and you've selected **Overwrite** in the **Add By** column for the third header.



In this example, the second (Header 2) and third (Header 3) response header configurations have the same name (Content-Security-Policy). In this case, Header 3 overwrites Header 2. If a request is made for a specific page you configured with a Header 3 response, the net HTTP response header is only Header 3.

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Response templates

Resolve cases or support issues faster and more efficiently with response templates. Response templates (formerly known as templated snippets) are reusable messages that can be copied to case or task forms to provide quick and consistent messages to users, or to display standard chat response messages to requesters in Agent Chat.

Note:
Response templates are available only for existing records.

Assign response template roles

The following roles are installed when you activate the response templates plugin.

Response template role	Description
Response template administrator [sn_templated_snip.template_snippet_admin]	Grants access to scoped administration of the response templates feature.
Response template writer [sn_templated_snip.template_snippet_writer]	Grants access to create, read, update, and delete (CRUD) response template content.
Response template reader [sn_templated_snip.template_snippet_reader]	Grants access to read response template content.
System Administrator [admin]	Response template administrator [sn_templated_snip.template_snippet_admin]

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Response template role	Description
	Note: Admin inherits this role by default. When the Templated Responses [com.sn_templated_snip] plugin is activated without activating related HR applications, you can still use response templates. • Admin can reassign this role to other users. • Admin can also remove the Contained Role [sys_user_role_contains] table so Admin users do not inherit this role by default. Or: 1. Enter **sys_store_app_list.do** in the Filter navigator search bar of an instance, or **https://YOUR_INSTANCE/sys_store_app_list.do** from a web browser. 2. Search for and select **Templated Snippets**. 3. Scroll down to **Related Links**. 4. Click **Remove from the role contained by admin**.

Before you begin using response templates, you must assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

For example,

- In the HR Service Delivery application, users with the HR administrator role are assigned the response template administrator role, users with the HR manager role are assigned the response template writer role, and users with the HR case writer role are assigned the response template reader role.
- In the Customer Service Management application, users with the customer service manager role (sn_customerservice_manager) inherit the response template writer role. Users with the customer service agent role (sn_customerservice_agent) inherit the response template reader role and can access response templates assigned to all groups to which they belong.

How to use response templates

Users with the response template writer [sn_templated_snip.template_snippet_writer] role can create response templates. Each template is associated with a table that is an extension of the Task [task] or Interaction [interaction] table. Response templates include a short name for specifying a shortcut that can be used to identify the message. For chat response templates used in Agent Workspace, agents use the slash command with a short name to present the standard message during a chat. You can also configure the template to

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- Include variables pulled from a table
- Specify a condition builder to specify the conditions that must be met for the template to be available for use, such as for a specific HR service

For more information, see Create or modify a response template.

Users with the response template reader [sn_templated_snip.template_snippet_reader] role can then copy response template content and use it in their responses to users when working on case or task forms that meet the specified conditions. For example, a response template for payroll discrepancy cases enables HR agents to use a standardized message when responding to that case type. See Copy a response template to an HR case for an HR-specific example.

Example: Response template to escalate payroll discrepancy cases

You are part of an enterprise HR organization using the HR Service Delivery application. You want your HR agents to respond to and, when necessary, escalate payroll discrepancy cases quickly and consistently. Create a response template so that HR agents have a reusable message to use when responding to employees about that case type.

One of your HR managers with the response template writer role is responsible for creating the template to escalate payroll discrepancy cases. The template is associated with the HR Payroll Case [sn_hr_core_case_payroll] table, and a condition filters on cases that match the appropriate HR service called Payroll Discrepancy. In the template body, the response text appears with variables, such as the subject person name in the salutation.

HR case writers with the response template reader role can copy the response template content and use it in their responses to employees when working on cases. Response templates provide a faster and efficient way to resolve cases.

Activation information

To use response templates in your application, you must activate response templates. For information on what components are installed with the feature, see Components installed with response templates.

Activate response templates

You can activate response templates (formerly known as templated snippets) [com.sn_templated_snip] if you have the admin role. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin
Role required: admin

Note:
If you are using Agent Chat, the Agent Chat (com.glide.interaction.awa) plugin automatically activates response templates.

About this task
Response templates activate these related plugins if they are not already active.

Plugins for response templates

Plugin	Description
Scoped Application Restricted Caller Access	Allows scoped applications to restrict access to public tables and script includes.

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Plugins for response templates (continued)

Plugin	Description
[com.glide.scope.access.restricted_caller]	

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins (Madrid)

Components installed with response templates

Several types of components are installed with activation of the Templated Responses (com.sn_templated_snip) plugin, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Roles installed

By default, the following HR roles contain the following response template roles.

Note:
The Templated Responses [com.sn_templated_snip] plugin activates the sn_templated_snip.min_admin_count system property [sys_properties.list]. This property prevents you from deleting your only Response Template admin user by requiring a minimum number (default is two) of active users with this role.

Roles installed with response templates

Role title [name]	Description	Contains roles
Response templates administrator	Grants access to	sn_templated_snip.template_snippet_writer

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Roles installed with response templates (continued)

Role title [name]	Description	Contains roles
[sn_templated_snip.template_snippet_admin]	scoped administration of the response templates feature.	
Response templates writer [sn_templated_snip.template_snippet_writer]	Grants access to create, read, update, and delete (CRUD) response template content.	sn_templated_snip.template_snippet_reader
Response templates reader [sn_templated_snip.template_snippet_reader]	Grants access to read response template content.	None

You can assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

For further information on user administration and how to manage users, see User administration.

Tables installed

Tables installed with response templates

Table	Description
Response Template [sn_templated_snip_note_template]	Stores response template information. Response templates are reusable messages that can be copied to case or task forms. Response templates provide quick and consistent messages to users, or display standard chat response messages to requesters in Agent Chat.
M2M Response Template to Channel [m2m_response_template_to_channel]	Maps channels to response templates.
Response Template Channel [sn_templated_snip_channel]	Stores information about response template channels.

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Tables installed with response templates (continued)

Table	Description
Note Template for Table [sn_m2m_note_template_for_table]	Maps notes to response templates.

For further information on table administration and how to manage data, see Table administration.

Create or modify a response template

Create or modify a response template (formerly known as a templated snippet) to define a reusable message that can be copied to case or task forms or used in Agent Chat sessions to provide quick and consistent messages to users.

Before you begin

Role required: sn_templated_snip.template_snippet_writer

About this task

Each response template is associated with a table that is an extension of the Task [task] table or, if using Agent Workspace, the Interaction [interaction] table. The template can be configured to include variables pulled from that table. You can also use a condition builder to specify the conditions that a case must meet for the template to be available for use, such as for a specific HR service or for chat. For chat response templates, you specify a short name (shortcut) that is used with the slash command as a quick way to present the response message to a user.

Procedure

1. Navigate to **All** > **System Definition** > **Response template configuration**.
2. Select **New** to create a response template.
   Or, select an existing response template to modify from the list.
3. Fill in the fields on the form.

Response template form

Field	Description
Name	Name of the response template.
Short Name	Short description that identifies the response template when using chat in Agent Workspace. Use the short name with a quick command (/) to show the text from the template body of the response template while in chat. This feature provides a fast and consistent way to populate text while in chat. For example, the short name `gm` identifies the chat response template for a Good Morning greeting. Enter **/gm** in a chat window to show the text from this response template.
Table	Name of the table that the response template is associated with.

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Field	Description
	If you are creating a response template for Agent Workspace chat, the associated table is the Interaction [interaction] table. For other response templates, the table must be an extension of the Task [task] table. **Note:** Creating custom COE tables do not allow you to add the Copy to Clipboard UI action. Users can still use the copy and paste function.
Condition	Conditions that determine when the response template is available for use. When defining conditions like case sensitivity or null values, see APIGlideFilter - Scoped, Global. **Note:** The conditions available depend on the table you select. For chat response templates, specify the condition: **[Type] [is] [Chat]**
Application	The application that created the response template.
Group visibility	Indicates what groups have access to the response template. Adding groups filters who can view the response template. **Note:** Leaving this field empty makes the response template available to all groups.
Template body	Text of the response template providing instructions to the agent on how to respond to a specific case or task. You can reference field values by selecting variables from the variables list based on the table you select. You can manually enter custom variable references: ○ Current user: `${current_user}` ○ Current date: `${Date}` Or, place your mouse where you want the custom variable reference to appear and

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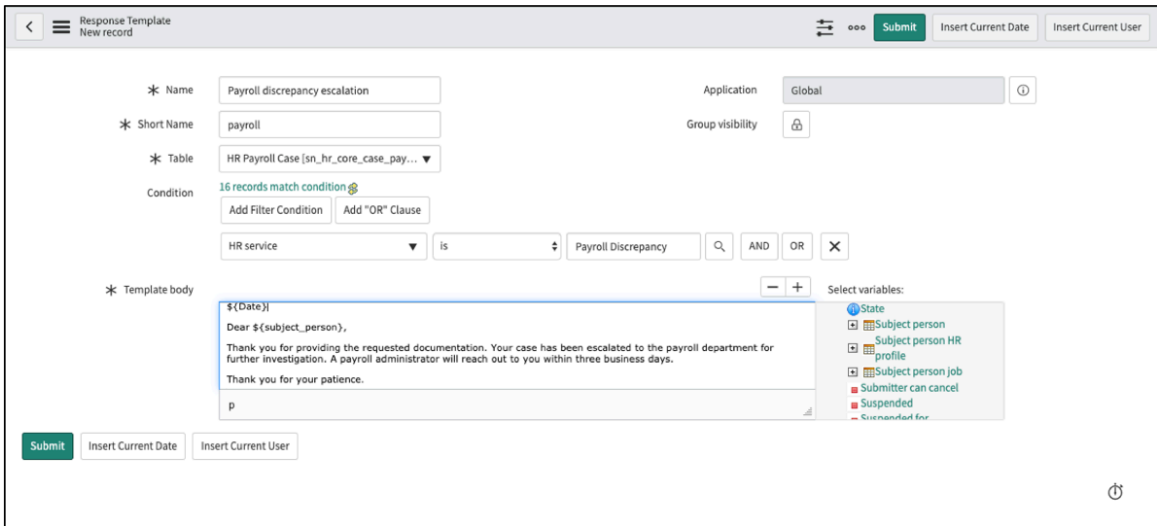
Field	Description
	select the **Insert Current User** or **Insert Current Date** buttons. **Note:** Response templates do not support rich text.
Select variables	Variables you can add to the template body. For example, if you choose the HR Case (sn_hr_core_case) table, you can select the Subject person variable to appear in the Template body and it will replace the variable with the actual name of the subject person when the response template is used. **Note:** The variables available depend on the table you select.

Example

The following GIF shows an example of an HR manager in the HR Service Delivery application creating a response template to escalate payroll discrepancy cases. The template is associated with the HR Payroll Case [sn_hr_core_case_payroll] table, and a condition is set to filter on cases that match the Payroll Discrepancy HR service. The template text is pasted into the body, and then a variable for the subject person is added to the salutation.



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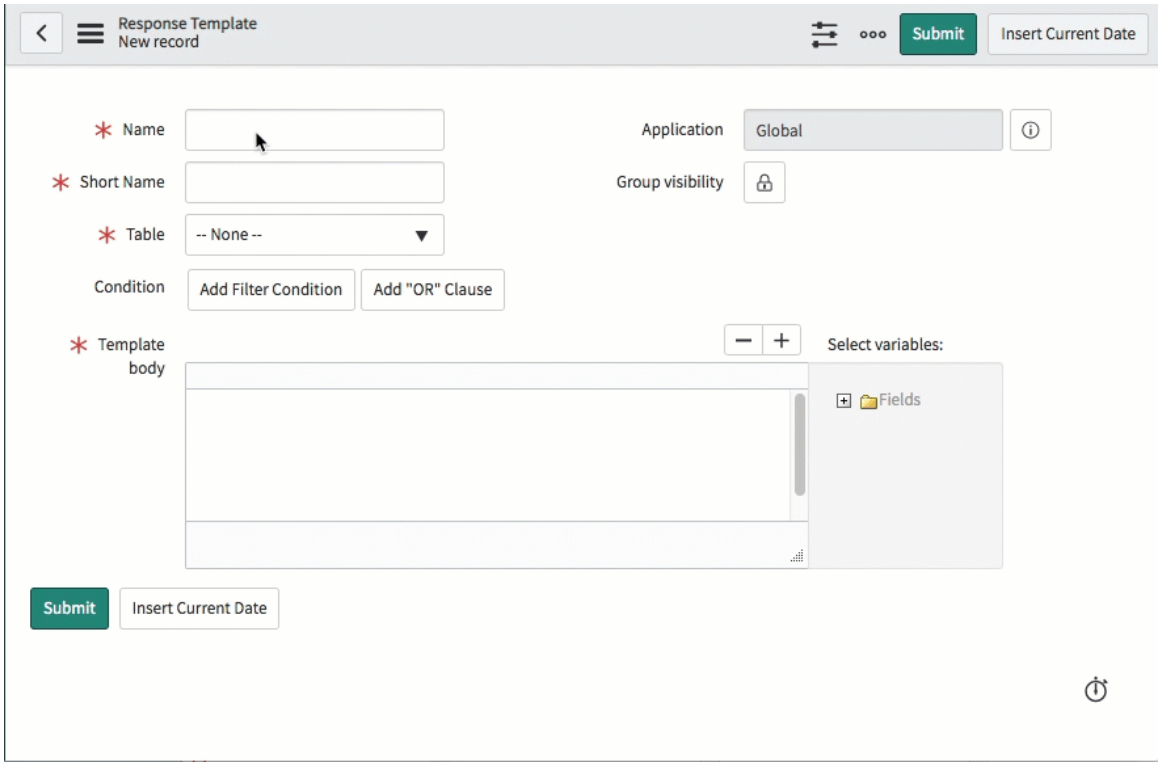

4. Click **Submit** or **Update**.
   Channels limit the response template to only the channels you add. If you leave this blank, the response template is available to no channels. This feature allows you to have different messages for chats, emails, or form. For more information, see Create a response template channel.
   The Channels related list appears.

What to do next

You can copy response template content to any field on a form that meets the specified conditions.

The following GIF shows an example of an HR case writer in the HR Service Delivery application opening a payroll discrepancy case and copying a payroll discrepancy escalation template to the comments field in the HR case form for the employee to read.

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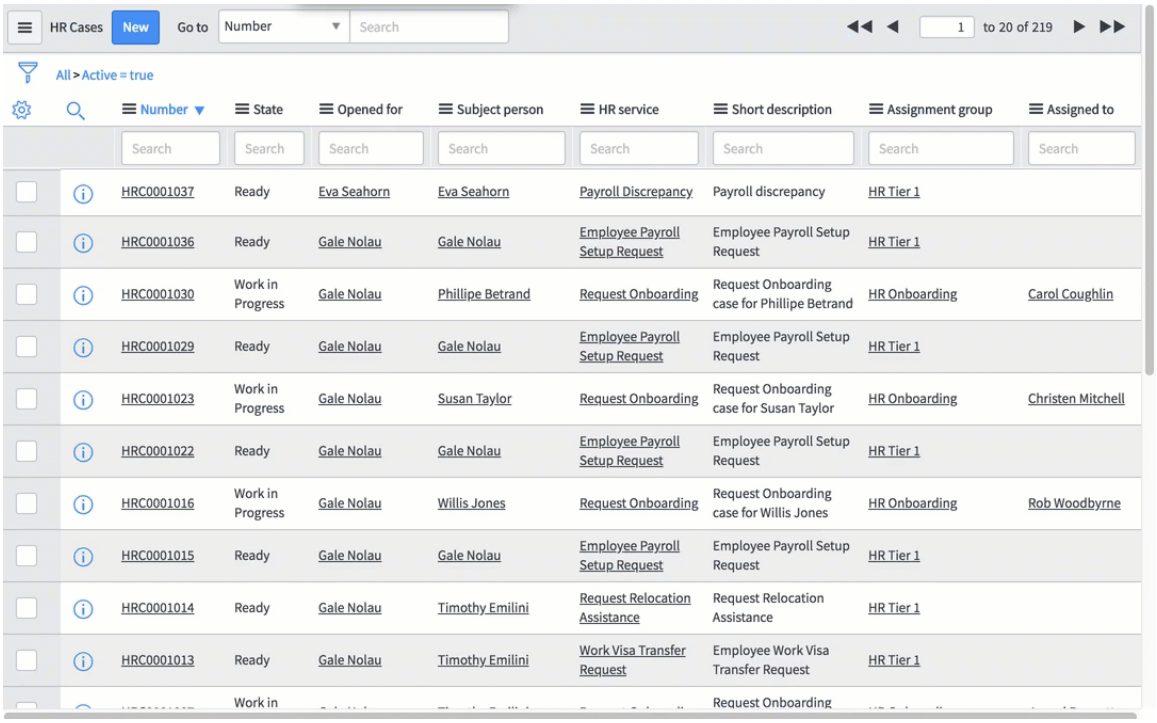

Policy as Code Engine (PaCE)

You can administrate the full life cycle of policies using PaCE in applications by searching, reviewing, and updating existing policies, and creating policies as required. Policies in the applications are powered by PaCE.

Understanding PaCE

PaCE enables you to manage, administer, and audit policies from a centralized location.

A PaCE policy is a set of pre-defined rules and logic that determines the desired behavior of an application or a service. When invoked, the rules in the policy are applied on the provided input, and a decision is reached. This decision-making is the main function of PaCE and helps determine if a policy is compliant or non-compliant. The decision is then relayed to the software calling service or application, so that it can act on it to enforce a desired behavior.

PaCE provides the following capabilities:

- Full life cycle management of policies
- Policy reuse
- Audit and compliance
- Testing and validation of policies
- Central automation of compliance and regulatory processes

PaCE can be used to:

- Identify posture drifts from a desired state in the current application.
- Make decisions (compliant or non-compliant) based on a change in the application or service and enforce the decision to prevent a drift.
- Automate execution of policies and eliminate dependency on humans.

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- Standardize policies so that they can be shared and reused within a service and across services.
- Increase change velocity while including guardrails with automated workflows to provide preventive controls.
- Collect evidence and proof of compliance for audit purposes. This feature can be used by internal auditors to automate the process of collecting evidence for governance and risk requirements.
- Provide business context to PaCE policies by using control objectives to connect PaCE with the Integrated Risk Management and Policy and Compliance Management workspace.

PaCE enables policy developers to view and understand an existing policy, make and assess changes, and decide if a policy can be used as a baseline for another policy. They can also use PaCE before debugging to understand how the policy should work and why it is not working as expected.

PaCE provides a centralized platform for storing, managing, and using policies. By using PaCE, policies can be:

- Well documented and all the requirements clearly defined.
- Reused across the organization.
- Tracked and new versions can be created when a policy is changed.
- Tested and validated before deployment.

Policies are also containers for all the elements that make up a policy. These elements include meta-data related to the policy, the policy versions (including policy scripts and inputs), mapping information, and policy execution history.

You can define any number of policies within PaCE.

Key user personas and roles

This section describes different user personas and roles in PaCE. These personas are defined with the application where PaCE is being used.

All roles except the super administrator role must be assigned to a calling service or application where PaCE is being used. The assigned calling service defines the scope for the user role.

Role	High-level Permissions	Persona
sn_pace.execution_reader	A read-only user with view-only access. This user can view policies, categories, and executions.	Policy user, internal auditor.
sn_pace.code_reader	Can review PaCE versions, policy code, and run tests.	Internal auditor
sn_pace.code_editor	This user has all the sn_pace_code_reader permissions plus the ability to create PaCE policy versions.	Policy developer
sn_pace.policy_reader	This user has all the sn_pace_code_reader permissions	Policy user, internal auditor

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Role	High-level Permissions	Persona
	plus the ability to review policy details and mapping information.	
sn_pace.policy_editor	This user has all the sn_pace_policy_reader and sn_pace.code_editor permissions plus the ability to create policies and mappings.	Policy developer
sn_pace.mapping_admin	This user can map policies and edit config parameters for policy mappings.	Mapping admin
sn_pace.admin	This user has the permissions of all the other roles plus the ability to create categories, policies, mappings, and code.	Policy admin
sn_pace.super_admin	This user has all the sn_pace.admin role permissions across all calling services.	Not applicable
Maint role	Internal user who can create default content.	Not applicable

PaCE administration life cycle

This checklist lists the tasks involved in administering PaCE policies.

Task	Description
Set up and install PaCE.	PaCE is installed as part of the application you want to create policies in.
Create a policy.	See Create a PaCE policy.
Create a new policy version	See: • Create a new variable for a policy version (if required). • Define mappings for a PaCE policy. • Edit a PaCE policy script
Test a policy version	Use the Test Playground for PaCE policies
Publish a new policy version	See Publish a PaCE policy version.
Activate a published policy	See Activate or deactivate a PaCE policy.
Use the policy.	See Execute policies.

Install PaCE

Install PaCE.

PaCE is automatically bundled with the application you want to use PaCE with. PaCE is automatically installed in the following applications:

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- DevOps Config
- Digital Product Release (DPR)
- Cloud Account Management (CAM)
- SecOps Software Bill of Materials (SBOM)
- Social Benefits Playbook

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Administer PaCE policies

Use PaCE to manage the life cycle of a policy and create, update, review, and execute policies.

In addition, you can:

- Evaluate any changes to ensure they meet your organization's policy management requirements.
- Create a policy, modify policy information, copy a policy and its version to a new policy.
- Create a new policy version by copying an existing policy version and modifying it.
- View and define mapping information for any policy.
- Review executed policy activity and execution history for policies and policy versions.
- Use tags and categories to manage your policies more efficiently.

Note:
You can create any number of policies, which can be updated, activated, or deactivated as required.

Manage PaCE policies

You can define and manage your PaCE policies in a single management console.

Policies are containers for all the elements that make up a policy. These elements include metadata related to the policy, the policy versions (including policy scripts and inputs), mapping information, and policy execution history.

You can easily create policies, and search and review existing policies. In addition, you can:

- Assess and implement changes to each policy.
- Determine if a policy should be used as the template for another policy.
- Understand why a policy may not be working as expected.

You can create any number of policies, which can be updated as required.

View existing PaCE policies

You can view a list of all PaCE policies created by you and other policy administrators. The PaCE management console is your gateway to viewing and updating policies, and managing policy versions.

Before you begin
Role required: sn_pace.admin

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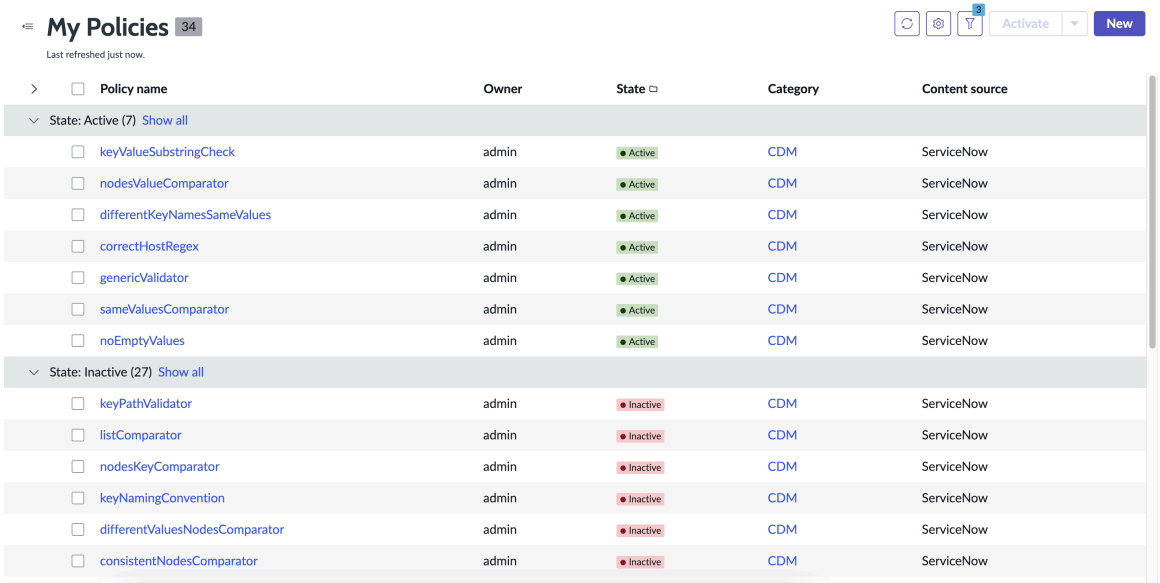
Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

> **Note:**
> To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**. These policies are viewable to all logged in users.



On this page, you can do the following:

- Create a PaCE policy
- Edit a PaCE policy
- Delete a PaCE policy

The My Policies list displays the following columns.

Column	Description
Policy name	The name of the policy as defined by the user.
Owner	The owner of the policy.
State	The current state of the policy: ○ Active: The policy is **Active** and can be used. For details on how to activate a policy, see Activate or deactivate a PaCE policy ○ Inactive: The policy is **Inactive**, and must be activated before it can be used. **Note:** Each policy can only have one Current (published) policy version. Only policies that have a Current version can be activated.

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Column	Description
	See Manage PaCE policy versions for details.
Category	The category assigned to the policy. Only one category can be assigned to a policy. See Managing categories in PaCE for details
Content source	The source used to create the policy: ○ User: This policy was created or copied by a user. ○ ServiceNow: This policy was shipped as part of the PaCE content pack.

2. **Optional:** Use the ServiceNow AI Platform filter controls to filter the displayed list.
3. To view the details of a policy, click the required row in the **Policy Name** column.

Note:
Alternatively, click the information icon to see a quick glance view of the policy.

Create a PaCE policy

Create a PaCE policy to determine if changes to a software service or application comply with a set of pre-defined rules.

Before you begin
Role required: sn_pace.admin

About this task
After you create a PaCE policy, a decision is then made about these changes, and if they are compliant, non-compliant, or compliant-exception according to these pre-defined rules. The policy must be mapped correctly to the relevant object (table and document ID) to invoke the policy when any changes are made to the object.

Note:
Policies are only used if they have active mapping records, and if there was a request to validate an object (tables and document IDs) mapped to the policy. For further information, see Map PaCE policies.

Procedure
1. Navigate to **All** > **Policies** > **My Policies**.

Note:
To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click **New**.
The New policy page appears.
3. Select the New blank policy tile or an existing policy template, then **Create**.
Templates can be filtered by most used, alphabetically, state, and type. By default, inactive templates are hidden.
4. In the Create New Policy form, fill in the fields.

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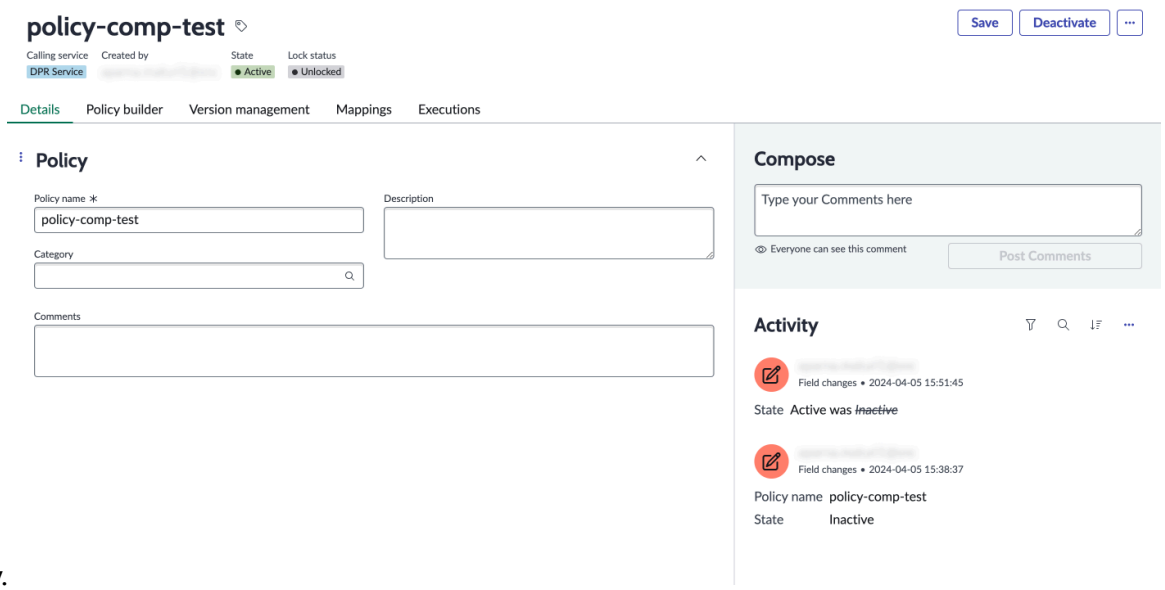
Create New Policy form

Field	Description
Policy name	The policy name. **Note:** The policy name must be unique, and is used as the identifier of the policy.
Document type	Select a document type for the table of items for the policy to be applied to.
Category	Categories enable you to group and manage policies more efficiently. See Managing categories in PaCE for details.
Calling service	The name of the calling service the policy was created in.
Description	Additional details for this policy.
Comments	Comments about the policy.

Note:
You can add additional comments in the Compose text box, that will show up in the Activity stream.

5. Click **Save**.
The form is refreshed to display the newly created



policy.

6. **Optional:** Add tags by selecting the tag icon alongside the policy name to add tags.
For more information about defining tags, Add tags to PaCE policies.

Result
The newly created policy contains the following tabs.

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Tab name	Description
Details	The details of the policy including the policy name, category, date on which it was created, and a description is displayed.
Policy builder	When you create a policy, by default a draft policy version is created. Each policy version contains version meta-data, a policy script, and variable input definitions, which you can modify according to your requirements. Click the **Policy builder** tab to view the Policy builder page. You can: • Edit a policy version. **Note:** You can edit a policy version only if it is a Draft state. • View version details • Create a new version • Switch from low-code to the code editor • Save the policy as a template • Compare versions • Duplicate policy versions For more details, see Manage PaCE policy versions. **Note:** You must publish the (See Publish a PaCE policy version) policy version to make it **Current** before it can be used.
Version management	The Version management tab lists out the previous versions of the policy. You can also create a new version of the policy.
Mappings	The Mappings tab enables you to define the object (table and document ID) to which the policy is to be mapped. For more information, see Map PaCE policies.
Executions	The Executions tab enables you to review the execution activity for the policy.

What to do next

You can perform the following actions:

- Delete a policy that is in an inactive state. See Delete a PaCE policy.
- Duplicate or create a copy of an existing policy.
- Write and test custom PaCE policies. See How to write and test custom PaCE policies.

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Activate or deactivate a PaCE policy

You can activate or deactivate any PaCE policy. Only activated policies can validate object (tables and document IDs) changes. Deactivated policies are not executed, even if the policy is mapped. Deactivating a policy enables you to place the policy into a maintenance-like mode.

Before you begin
Role required: sn_pace.admin

About this task
You can deactivate or activate any policy at any time.

For activated policies:

- The policy must include a Current (published) version. For more information, see Manage PaCE policy versions.
- The policy is auto-validated when you activate it (if the policy has mapping inputs defined). Validation verifies the validity of mapping inputs, and checks that all required inputs were set. For more information, see the Validate mapping inputs section.

Deactivating a policy enables you to place the policy into a maintenance-like mode. You can make changes, safe in the knowledge that no one is using the policy. While deactivated, the policy mappings are kept, but the policy cannot be executed. After you are done with any changes, you can reactivate the policy and any existing mappings are reused.

Note:
The activation or deactivation of a policy is audited for tracking purposes. This audit information is included in the standard ServiceNow AI Platform auditing records.

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Select the check box next to the policy that you want to activate or deactivate.

   Note:
   To activate a policy, its current state must be Inactive. To deactivate a policy, its current state must be Active. You can select multiple policies, as required.

3. Activate or deactivate the selected policy.

What to do next
If you did not publish your policies, you can publish multiple policies. Select the check box next to the Policy names that you want to publish or select the **Select All** box next to the Policy name list. Select the **Activate** drop-down menu then **Publish latest**.

Note:
This only works with content-based policies and not user-based policies.

Duplicate a PaCE policy

Create a duplicate of an existing policy.

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Before you begin
Role required: sn_pace_admin

Procedure
1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** link for the policy that you want to duplicate.
3. In the Details page, click the **More Actions** icon and select **Duplicate**.
4. In the Duplicate Policy window, select the version of the policy you want to copy and click **Duplicate**.
   A new policy with the same parameters as the selected policy is created in an **Inactive** state. You must publish a version of the new policy before you can activate it.

Edit a PaCE policy

You can update any existing PaCE policies, whether they are activated or deactivated.

Before you begin
Role required: sn_pace.admin

Procedure
1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the information icon located to the left of the policy name to see a quick glance view of the policy.
   The policy details display to the right of the My Policies list and can be edited. You can also review the **Activity** stream to see a list of all changes made to the policy. This list can be filtered as required.
3. Edit the relevant details for the selected policy, and click **Save**.
4. Click the **Policy name** link on the All Policies page to update existing versions or add a new version.
5. Click the **Policy builder** tab, create a copy of the version in which you want to make changes, and make the relevant changes in the new version.
   You can select different versions of the policy in the Version drop-down menu. For more information about creating and managing versions, see Manage PaCE policy versions.

   Note:
   You can't update API Variables and Config Parameters for an existing policy version that is Current (published) or archived. To modify a Current version, create a copy of that version, as described in the Create a copy of a policy version section.

6. Select the overflow menu icon ⋮ and choose from the following options:
   - Version details
   - Create a new version
   - Switch to code editor

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- Save as Template
- Compare versions
- Duplicate
- Delete

7. When you're finished, click **Publish**.
8. Click the **Mappings** tab and make the relevant changes.
   For more information about defining caller and mapping inputs, see Map PaCE policies.

Delete a PaCE policy

You can delete a PaCE policy at any time. All related versions for that policy are also deleted. However, for auditing reasons you cannot delete policies that were or are currently in use.

Before you begin
Role required: sn_pace.admin

About this task
Policies and their related versions can be deleted. However, policies that are in use, or were used can't be deleted, including:

- Policies that are mapped to an object.
- Policies that were activated and executed in Standard mode. These policies, and their policy versions, include execution data critical for auditing purposes, and therefore cannot be deleted.
- Policies that have a version in either **Current** or **Archived** state.

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** link for the policy that you want to delete.

   Note:
   You can only delete individual policies. However, you can select multiple policies to activate or deactivate. For further information, see the Activate or deactivate a policy section.

3. In the displayed policy form, click **Delete**.
4. Click **Delete** to confirm.
   The policy versions that are to be deleted are displayed.

Map PaCE policies

For a policy to be invoked correctly, it must be mapped to an object (table or document ID). The defined mapping settings are automatically verified when the policy is invoked.

Mapping a policy to an object enables you to verify updates on that object, whenever a change in the provided inputs occurs.

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Define mappings for a PaCE policy

You can map a policy to any number of objects. When you map a policy, validate the inputs, and execute the policy, a compliant, non-compliant, or compliant-exception decision is returned.

Before you begin

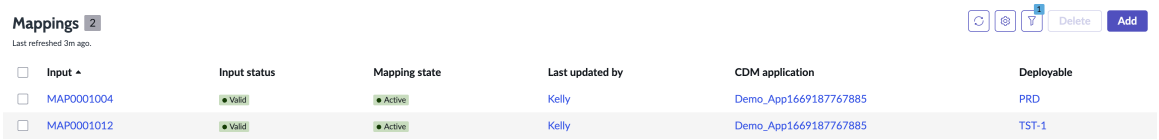
Role required: sn_pace.admin

Procedure

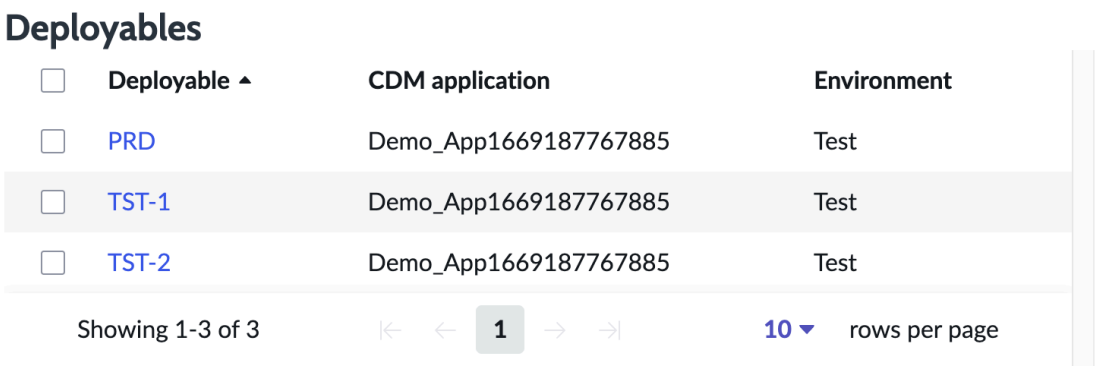
1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** link for the policy that you want to update.
3. Click the **Mappings** tab.
   If there are any existing mappings for the selected policy, they are displayed.



4. To add a new mapping input, click **Add**.
   Any objects that are available for mapping are displayed.



5. Select the check box to the left of each object that you want to map the policy to, and click **Map Policy**.
   The new mapping input is added to the list of policy mappings. In addition, an alert message indicates whether the mapping is valid and active. For information about editing existing mapping inputs, see Edit mapping inputs.

Edit mapping inputs

You can edit the mapping settings that map a policy to an object.

Before you begin

Role required: sn_pace.admin

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Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** link for the policy that you want to update.
3. Click the **Mappings** tab, and click the Mapping ID link in the Input field.
4. Click the mapping input that you want to update.
   In the displayed mapping input form, edit the details as required, and click **Save**.



PaCE Static and Dynamic Mapping

Static Mapping enables you to map a set of policies to a record or object such as an incident or deployable. Dynamic Mapping enables you to map a set of policies on a dynamic set of records or objects such as a set of incidents or a set of deployables.

Static Mappings

Static Mapping enables you to map multiple policies that you want to validate against a specific deployable or incident. For example, if you need to map a policy to multiple deployables, you'll need to map it multiple times to each deployable.

Dynamic Mappings

Dynamic Mapping enables you to map multiple policies that you want to validate against specified conditions. You can configure the conditions set to a specific table, each condition can return multiple records or objects. The condition is applied at a runtime where the set of policies will be mapped to the set of returned records by the condition. Multiple conditions can be defined in the condition fields in the Conditions tab.

Map PaCE policies using Static Mapping

Use Static Mapping to map multiple PaCE policies against a record such as a change request.

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Before you begin
Role required: sn_pace.admin

Procedure
1. Navigate to **Mappings** > **Static Mappings**.
2. Select **Add**.
3. Select a document type in the **Document Type** field.
4. Select a policy in the **Policy** field or you can select the Search icon to view and select multiple policies, then select **Map**.
5. When you're finished, select **Done**.

Result
The map will show up in the Static Mappings list. You can delete a map on the list by selecting the box next to the Input, then select **Delete**.

Map PaCE policies using Dynamic Mapping

Use Dynamic Mapping to map multiple PaCE policies against specified conditions.

Before you begin
If you don’t have a condition created, do the following steps.

1. Navigate to **Mappings** > **Conditions**.
2. Select **New**.
3. Fill in the **Short description** and **Table** field, then add the conditions of the deployables you want to map.
4. Select **Run** to preview the existing deployables that will be mapped in the condition.

   Note:
   The results are capped at 10,000 records.

5. Select **Save** or **Continue to mapping** to navigate to the Dynamic Mapping page.

   Note:
   When you select **Continue to mapping**, the condition is pre-selected based on the condition you created, additionally you can edit or delete the condition by selecting the short description.

Role required: sn_pace.admin

Procedure
1. Navigate to **Mappings** > **Dynamic Mappings**.
2. Select **Add**.
3. Select a document type in the **Document Type** field, then a condition in the **Condition** field.
4. Select a policy in the **Policy** field or you can select the Search icon to view and select multiple policies, then select **Map**.
5. When you're finished, select **Done**.

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Result

The map will show up in the Dynamic Mappings list. You can delete a map on the list by selecting the box next to the Input, then select **Delete**.

Request an exception for Dynamic Mapping

Request an exception on policies that are dynamically mapped to conditions.

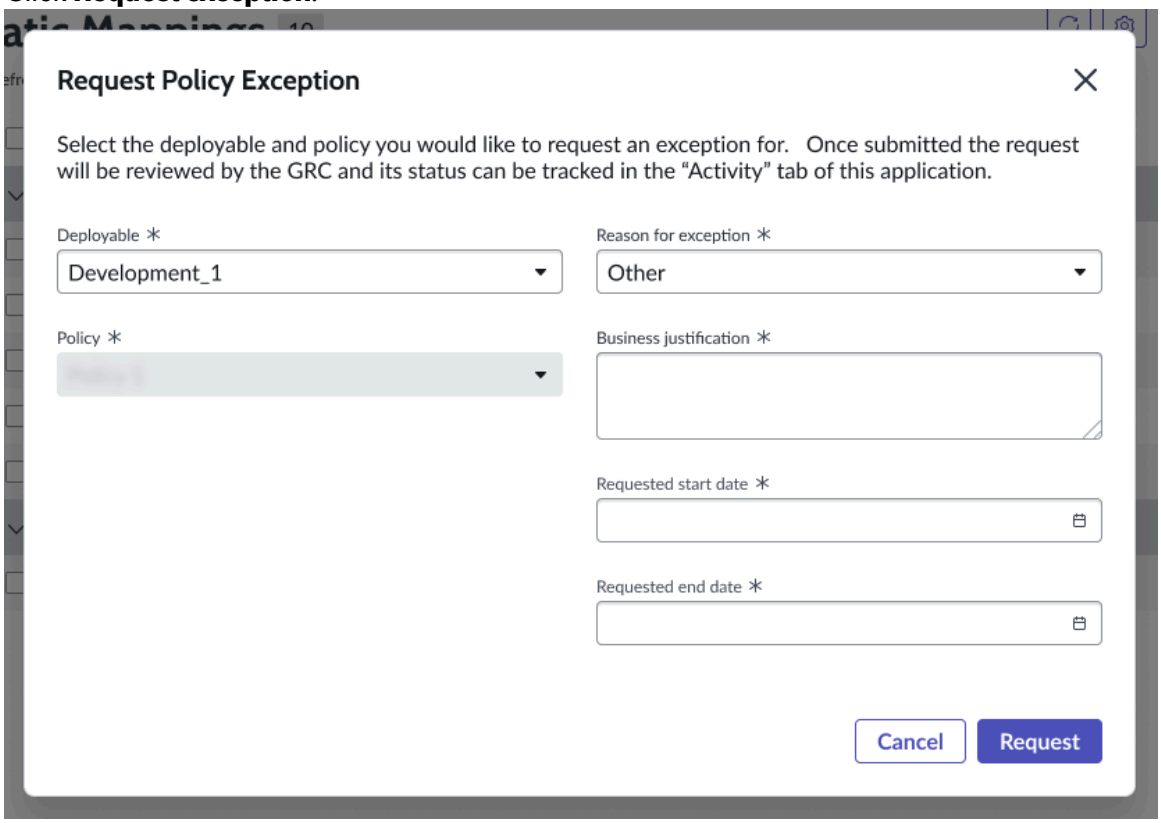
Before you begin

You need to have the Governance, Risk, and Compliance (GRC) application installed to have the Request Exception button to show up on the mappings list. If you don't have the GRC application, see the Download a GRC application from the ServiceNow Store for the first time topic.

Role required: sn_pace.admin, sn_pace.mapping_admin, or sn_pace.execution_reader

Procedure

1. Navigate to > **Mappings** > **Dynamic Mappings**.
2. Select the check box of the mapped policy you want to request an exception for.
3. Click **Request exception**.



4. In the Request policy exception form, fill in the fields.

Request policy exception

Field	Description
Deployable	Select the name of the deployable you want to request an exception for.

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Field	Description
	Note: The list of deployables is not filtered and all possible deployables will be available to be selected without filtering based on the dynamic mapping condition.
Reason for exception	Select a reason type why the exception is being requested.
Policy	Name of the policy.
Business justification	Explanation why the exception is being requested.
Requested start date	Select the date when this exception is submitted.
Requested end date	Select a date when you want this exception to be approved by.

5. Click **Request**.

Create a PaCE policy template

Create PaCE templates for the PaCE policy forms that you use frequently.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to **Templates** > **All Templates**.
2. Select **New**.
3. In the Create New Template form, fill in the fields.

Create New Template form

Field	Description
Name	Name of the policy template.
Document type	Select a document type for the table of items for the template to be applied to.
Template type	Template type organized by category. Template types enable you to select a category, if you have multiple types of policy templates. You can create a template type by following these steps: **a.** Navigate to **Templates** > **Template Type**. **b.** Select **New**. **c.** Fill in the **Name** and **Description** field. **d.** Select **Save**.

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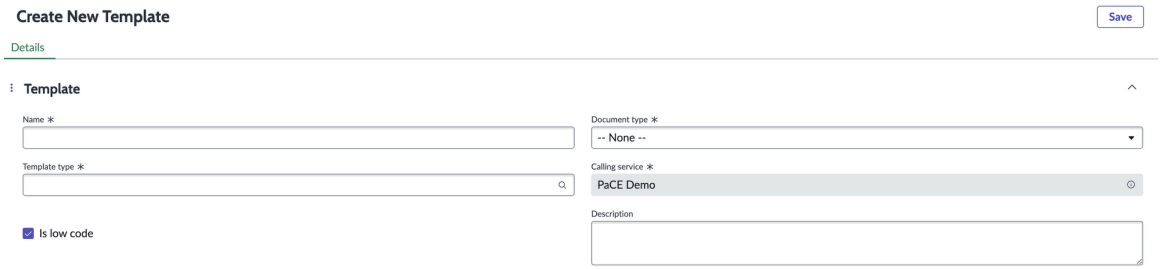
Field	Description
	The type can be selected from the **Template type** field.
Description	Additional details for this template.
Is low code	Select this check box if the policy template will be written in low-code. **Note:** You can switch to the code editor from low-code when you create the conditions, but you'll be unable to switch back to low-code.



4. Select **Save**.
   By default, when you create a template it's inactive and it will be filtered out on the New policy page. You can select the inactive filter box on the New policy page to see the inactive template.
5. Select the **Template Builder** tab and fill in the conditions in the Policy logic section, then **Save**.
   For more information about the parameters and condition fields, see the Passing parameters to PaCE policies and Policy logic condition fields topic.

What to do next

Before you activate your template, you can create a policy to test the template.

1. Navigate to **Policies** > **My Policies**.
2. Select **New**.
3. Select **Preview** on the template that you created to see if the information is correct.
4. Select **Save**.
5. Select the template that you want to create a policy with, then **Create**.
6. Fill in the fields, then select **Save**.
7. Select the new draft of the policy and select the **Test Playground** tab to test the policy.
8. When you're finished, navigate back to **Templates** > **All Templates**. Select the template that you tested, then **Activate**.

If you make any updates to a template, it won't affect previous policies that you created using the template.

Manage PaCE policy versions

PaCE policy versions contain the actual policy script, as well as API Variable and Config Parameter definitions used for validating policies. Each policy can have many versions, each of which can be easily managed.

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You can create a new policy version, search and review existing versions, and test changes to the policy script before it is deployed in a production environment. You can also compare policy versions, copy a policy, and modify it as required.

Note:
To activate a policy, a policy version must be created, and published to be in the **Current** state.

PaCE policy version states

A PaCE policy version can be in one of four states: Draft, Current, Archived, and Now-Content. The policy version state also defines the version numbering.

Only one policy version in each policy can be Current at any one time. There is no limit to the number of Draft or Archived policy versions.

Policy version states

State	Description
Draft	When a version is created, its initial state is Draft. The new Draft version can be saved as a Draft for later use, or published to become the Current version. The draft versions cannot be used until they are published.
Current	Draft versions can be published to Current, which means the former draft version becomes the default published version used for policy execution. **Note:** When publishing the version, if mapping exists, verification is performed to confirm that all required inputs for mapping inputs were provided. If you update the mapping inputs, you must update the inputs in the Mapping screen. If you updated caller inputs, you must update the PaCE API call to ensure that the policy is executed.
Archived	A published Current version becomes Archived when a different version is published. Only Current versions can be Archived. If necessary, you can also republish an Archived version. **Note:** When a version is published, it becomes the Current version irrespective of its previous states.
Ready	The Ready state is assigned to optional policies available when an application content pack is installed. These policies cannot be modified. If you want to modify a policy, create a copy and make the required changes.

Policy version numbering

There are three identifiers for each version: Version name, Version, and Revision number. These identifiers are shown as three separate columns in the **Versions** tab.

Identifier	Description
Version name	For Draft versions, the version name uses Draft-V{Revision number}. For Current (published) or Archived versions, V{Version} is used for the name.

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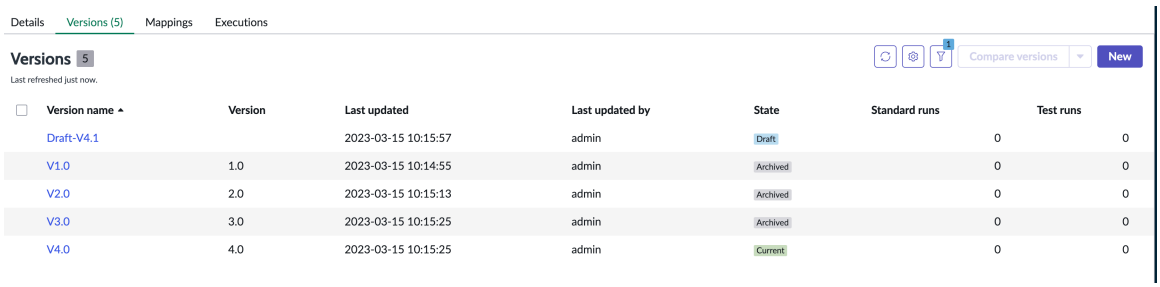
Identifier	Description
Version	The Version number is assigned only when you publish a version. The number is automatically created according to the existing version number. For the first Current (published) version, the number is 1.0 and for subsequent current versions, the number increases by +1.0. For example, 2.0, 3.0, 4.0, and so on. Current versions that have been Archived retain the original version number. Draft versions are not assigned a version number.
Revision number	The Revision number is derived from the version that it was created from. If an empty new policy is created, the initial draft version is assigned 0.1. Each subsequent draft version is assigned 0.2, 0.3, 0.4, and so on. If the version was created from a published (Current or Archived) version, it inherits the Version number. For example, you can create a draft version from the Current (published) version 2.0. The draft version is assigned the revision number 2.1.

The following image illustrates the different states and their version numbering.



As shown in the preceding image, the first draft policy version created was automatically assigned the Revision number 0.1. Each subsequent draft is assigned V0.2, V0.3, and so on. Draft version 0.2 (as indicated in the Revision number column) was published and became the Current version, with the Version name of V1.0.

A draft version of this Current version was created, with the Revision number 1.1. That draft was published to become the Current version and was assigned the Revision number 1.1. The previously Current version is now Archived, but retains the Revision number 0.2.

Create new PaCE policy versions

You can create new versions for any of your existing policies.

After you have created a policy, a draft policy version is automatically created. This policy version contains the actual policy script, and may also contain mapping inputs and caller input definitions.

You can create a policy version from scratch, using low-code, or copy an existing policy version and use that as the basis for a new version. The version can include input definitions for mapping or caller variables. These parameters are used with the logic of the policy to determine whether the policy is in compliance.

For example, for a travel expense policy you can create several policy versions. Each version can include different mapping inputs, for example, limiting the different types of expenses. In one version, the breakfast expense limit could be $25, and the dinner expense limit could be $50. Each time the policy (and the relevant Current version) is invoked, the various expenses are validated by the policy to ensure they are in compliance.

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Create a PaCE policy version

Create a version from scratch at any time for any of your existing PaCE policies.

Before you begin

Role required: sn_pace.admin

About this task

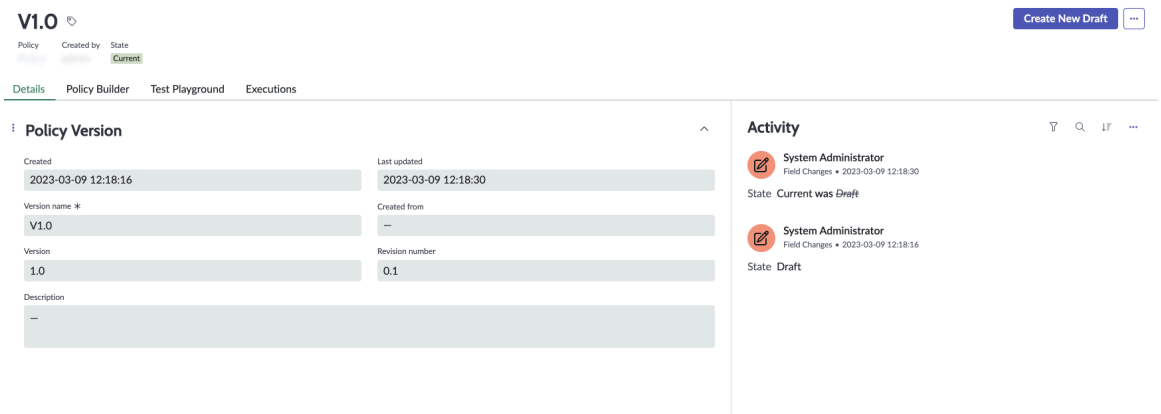
Note:
Your administrator may have pre-configured policy versions that contain default caller and mapping inputs. You may not be able to edit these input variables, but you can add new inputs, as required.

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy name for the policy that you want to add a new version to.
3. In the Policy Details page, click the **Versions** tab.
4. Click **New**.
   The New version page appears.
5. Select the New blank version tile or an existing policy template, then **Create**.
   Templates can be filtered by most used, alphabetically, state, and type. By default, inactive templates are hidden.
6. Clear the **Is low code** check box.
7. **Optional:** In the Create New Policy Version form, add a description in the **Description** field.



   Note:
   The **Description** field is the only editable field in the form. The version and revision numbering cannot be modified and are automatically assigned.

8. Click **Save**.

What to do next

The policy version is saved and the version is assigned a number according to policy numbering. You can:

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- Define API Variables, Config Parameters, and Record References.

  See Passing parameters to PaCE policies.

- Modify the policy script.

  See Edit a PaCE policy script.

- Test your policy version to ensure it is compliant.

  See Use the Test Playground for PaCE policies for details.

- Publish the policy version.

  See Publish a PaCE policy version.

- Review execution activity for the version.

  See Review executed policy activity.

- Delete the version.

  See Delete a PaCE policy version.

Create a PaCE policy version using low-code

Create a policy version using low-code for any of your existing PaCE policies.

Before you begin

Role required: sn_dev_ops_config.admin

About this task

The low-code function enables you to write policies using simple UI elements by defining conditions for the policy to determine if it's compliant or non-compliant. If the **Is low code** check box is selected when you create a policy version, the **Policy Builder** and **Test Playground** tabs will automatically have the Policy logic page set to low-code.

You can switch to the Policy Script to create a policy using JavaScript by selecting the **Switch to code editor** button, but you'll be unable to switch back to low-code. For more information on how to write PaCE policies using JavaScript, see How to write and test PaCE policies.

Note:
Policy Builder works best in Google Chrome and Firefox.

Procedure

1. Navigate to **Policies** > **My Policies**.
2. Select the policy name for the policy that you want to add a new version to.
3. In the Policy Details page, select the **Versions** tab.
4. Select **New**.
   The New version page appears.
5. Select the New blank version tile or an existing policy template, then **Create**.
   Templates can be filtered by most used, alphabetically, state, and type. By default, inactive templates are hidden.
6. Fill in the **Description** field.

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Note:
By default, the **Is low code** check box is automatically selected.

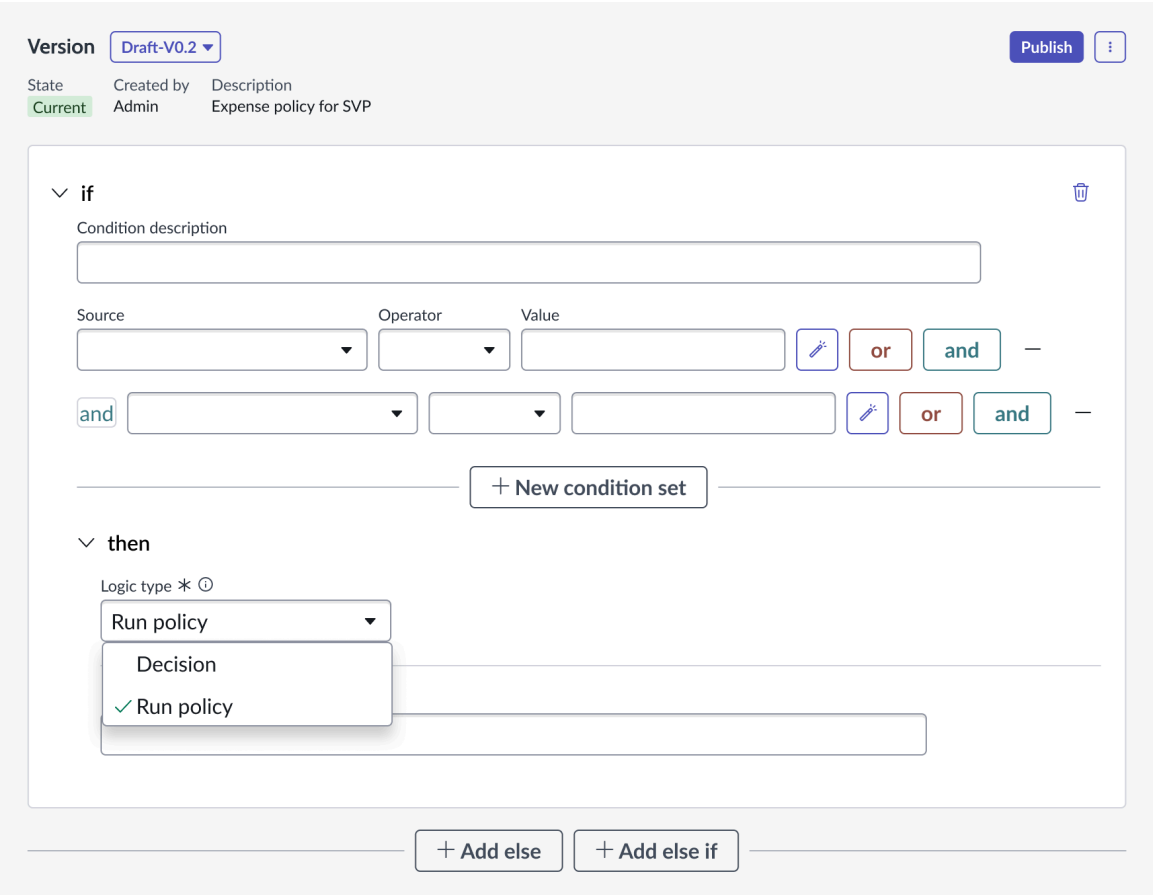
7. Select **Save**.

Result
The policy version is saved with an assigned number according to the policy numbering and will enable you to set the conditions using low-code.

Policy logic condition fields

Policy logic is a set of conditions that is used for determining whether a policy is compliant or non-compliant. You can use the condition builder to specify conditions for the policy.

Policy logic page



Select the **or** and **and** button to add multiple rules in the condition set. Select the minus icon to delete a condition.

You can add a condition set by selecting the **New condition set** button.

If and else if statement fields

Field	Description
Condition description	Description of the field.
Source	Variable of the source for the condition.

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If and else if statement fields (continued)

Field	Description
Operator	List of operators to filter the source for the condition. The list changes depending on the source selected.
Value	Value to enter text. Select the Data picker icon to concatenate multiple text strings with multiple data pills to select a variable for the log. **Note:** If your Source is choice, the Data pill picker icon is inactive.

The **else if** statement enables you to specify a new condition if the first condition is false. The **else** statement enables you to specify a new condition if it does not apply to the **if** statement.

You can add a dependent condition by selecting **or** or **and** next to the condition.

Then and else statement fields

Field	Description
Logic type	Select the logic type of the policy: • Decision: Determines if the policy is **Compliant** or **Non-compliant**. • Run policy: For nested policies, the parent policy will return the decision of the child policy that has been selected in the builder. **Note:** PaCE supports nesting policies for decision-making and up to two levels are supported, a child and a grandchild.
Log level	Level of the log.
Log message	Log message field to enter text or select the Data picker icon to concatenate multiple text strings with multiple data pills to select a variable for the log.
Output type	Output type of the log. You can select the plus icon + to add multiple output types or the minus icon − to delete the output type.
Data	Data field to enter text. Select the Data picker icon to concatenate multiple text strings with multiple data pills to select a variable for the log.

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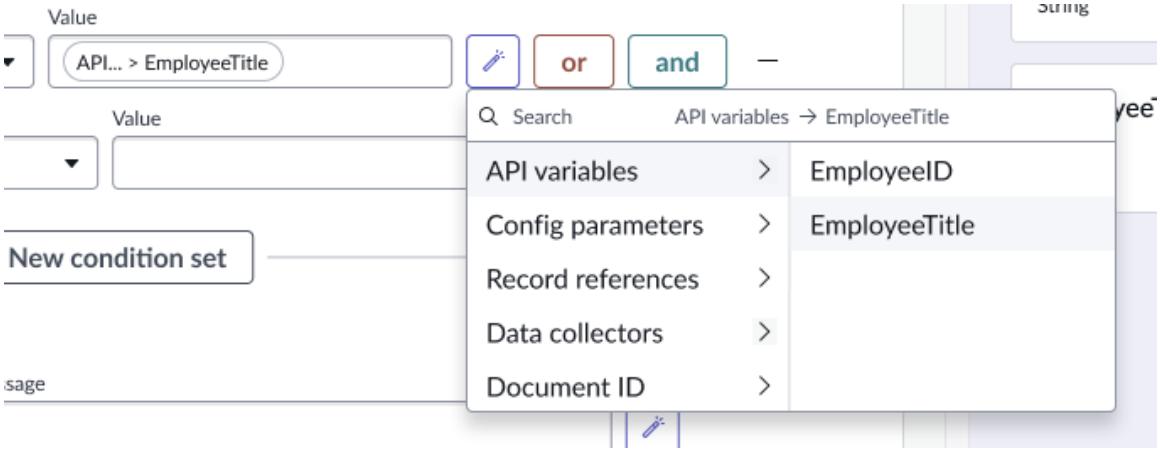
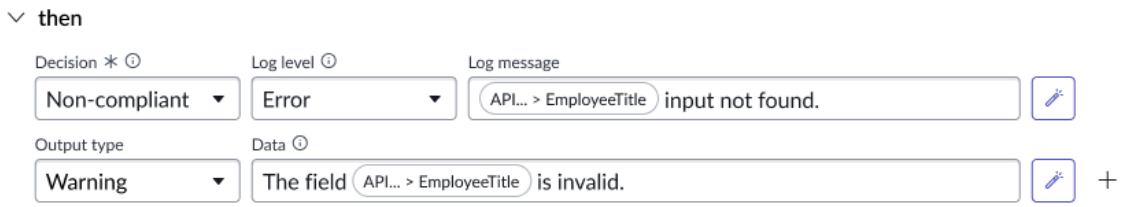
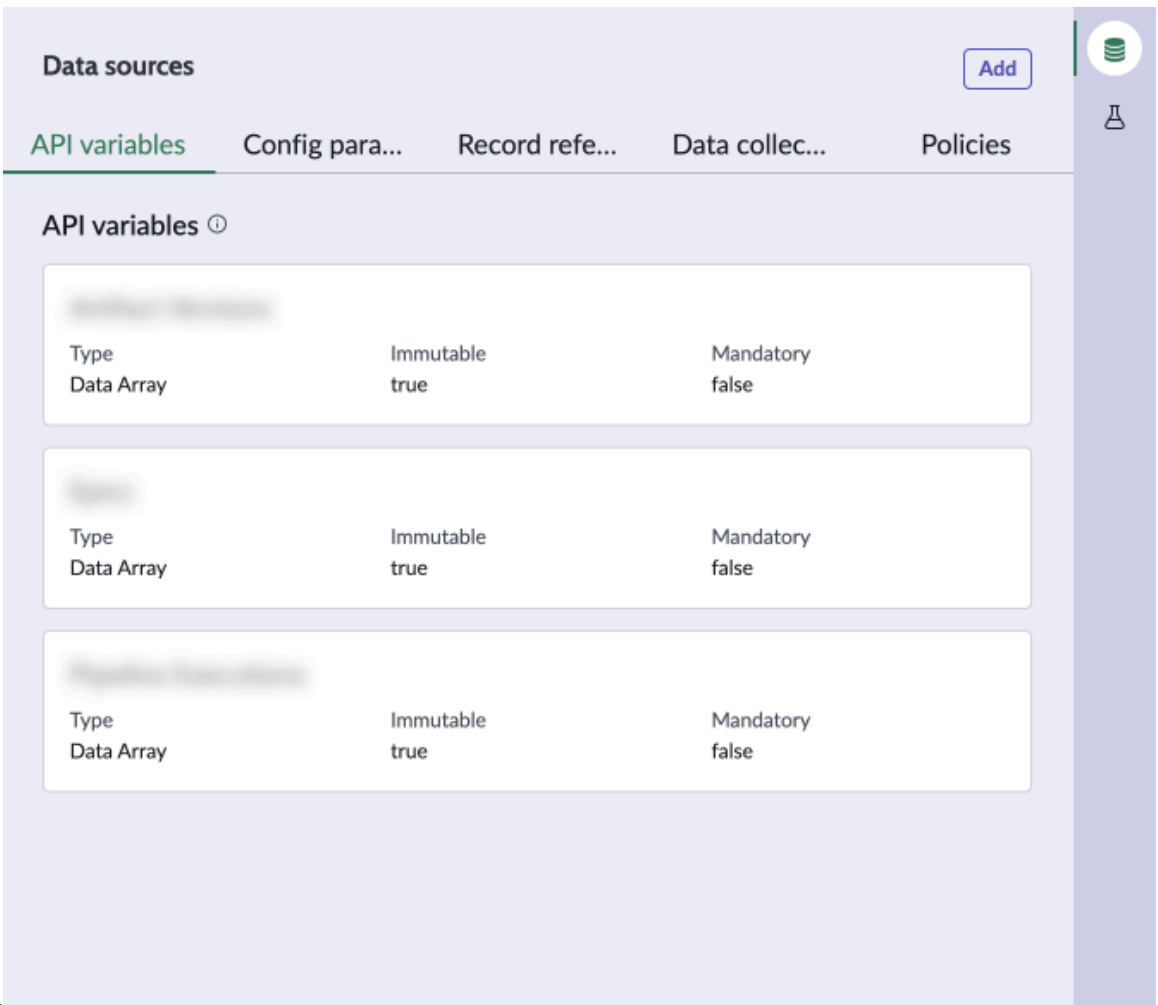
The following images show you are able to use the data pill picker to concatenate data in the fields:





You can see a list of the data sources under the Data source



tab.

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You can calculate fields using numeric operators and use these variables to calculate the desired value in a policy logic.

Note:
This only supports numeric fields.

Calculated fields

Operator	Description
Plus (+)	Add variables and constants. For example, "Var1 + Var2..."
Minus (-)	Subtract variables and constants. For example, "Var1 - Var2..."
Multiplication (*)	Multiple variables and constants. For example, "Var1 * Var2..."
Division (/)	Divide variables and constants. For example, "Var1 / Var2..."
Parentheses ()	Use parentheses to support the order of operators.
calc[]	Use the brackets to evaluate an expression.

You can mix and match between the operators. For example, "Var1 +Var2*Var3 / Var4".

Create a copy of a PaCE policy version

You can create a copy of an existing policy version. All the settings and mappings from the existing version are copied over to the new one.

Before you begin
Role required: sn_pace.admin

About this task
When you create a new policy version from an existing one, the input definitions and the policy script from the original version are copied to the new version. The version is assigned a number according to policy numbering.

Note:
The new policy version is initially created as a draft, with a revision number based on the original policy version. For further details about version states and numbering, see PaCE policy version states.

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the name of the policy for which a version is to be created.
3. In the Policy Details page, click the **Versions** tab.
4. Click the **Version name** link of the policy version that you want to copy.
5. Click **Create New Draft**.

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A new copy of this policy version is created.

6. Enter a description for the new version and click **Save**.

Duplicate PaCE policy versions

You can create a duplicate policy from a policy version or multiple versions from two or more policy versions. If you want to use a locked policy, you must first create a duplicate version and then modify the policy version as required.

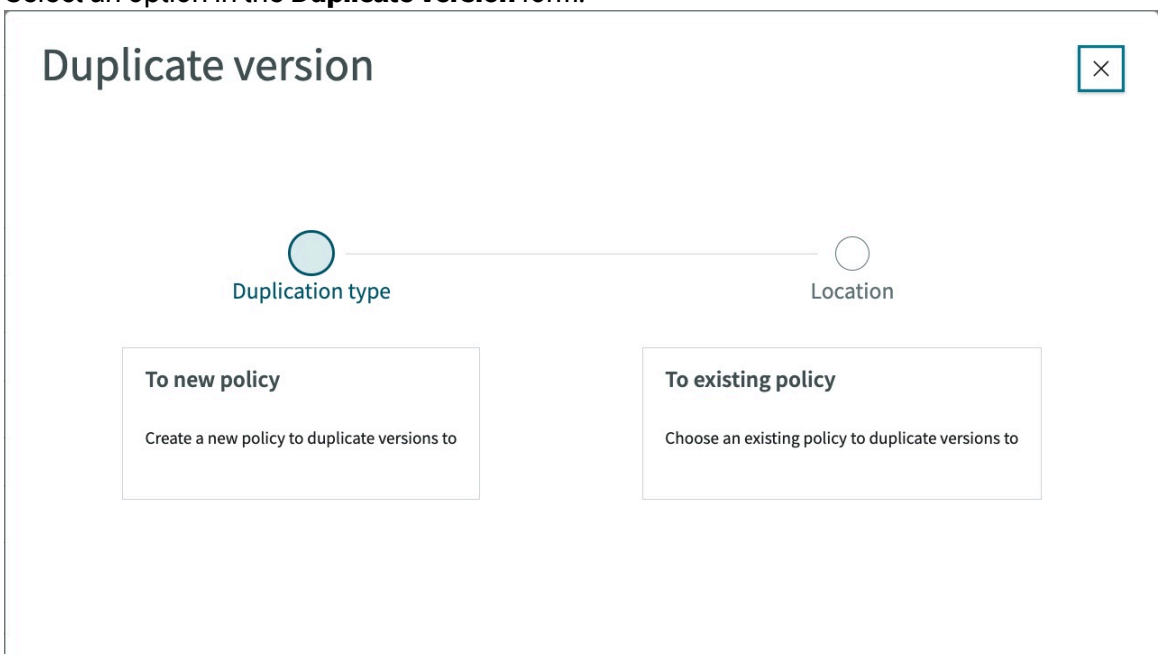
Duplicate a single policy version

To create a duplicate policy from a policy version, follow these steps:

1. Navigate to **All Policies** > **My Policies**.

> **Note:**
> To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Select the name of the policy that you want to duplicate.
3. In the Policy Details page, click the **Versions** tab and select the version you want to duplicate.
4. Click the **More Actions** icon and select **Duplicate**.
5. Select an option in the **Duplicate version** form.



- To new policy:
  a. Select this option to create a duplicate policy from this version.
  b. Enter the policy name, category, and description.
  c. Click **Duplicate**.

  The newly created policy is a duplicate copy and contains the same parameters and mappings of the selected policy version.

- To existing policy:
  a. Select this option to create a duplicate version for an existing policy.
  b. In the Duplicate Version form, select the policy to which the version is to be duplicated.

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c. Click **Duplicate**.

The newly created duplicate version is displayed in the Versions page of the selected policy.

Duplicate multiple policy versions

1. Navigate to **All Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Select the name of the policy that you want to duplicate.
3. In the Policy Details page, click the **Versions** tab.
4. Select the policies that you want to duplicate and from the drop-down list, select **Duplicate versions**.
5. Select an option in the **Duplicate version** form and follow the remaining steps as listed in Duplicate a single policy version.

Edit a PaCE policy script

Edit the PaCE policy script to apply any changes to the policy logic.

Before you begin
Role required: sn_pace.admin

About this task

Important:
For further information about testing your policy script, see Use the Test Playground for PaCE policies.

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Select the policy for which you want to update the script.
3. In the Details form of the relevant policy, click the **Versions** tab and select the version you want to edit.
4. In the policy version page, click the **Policy Builder** tab.

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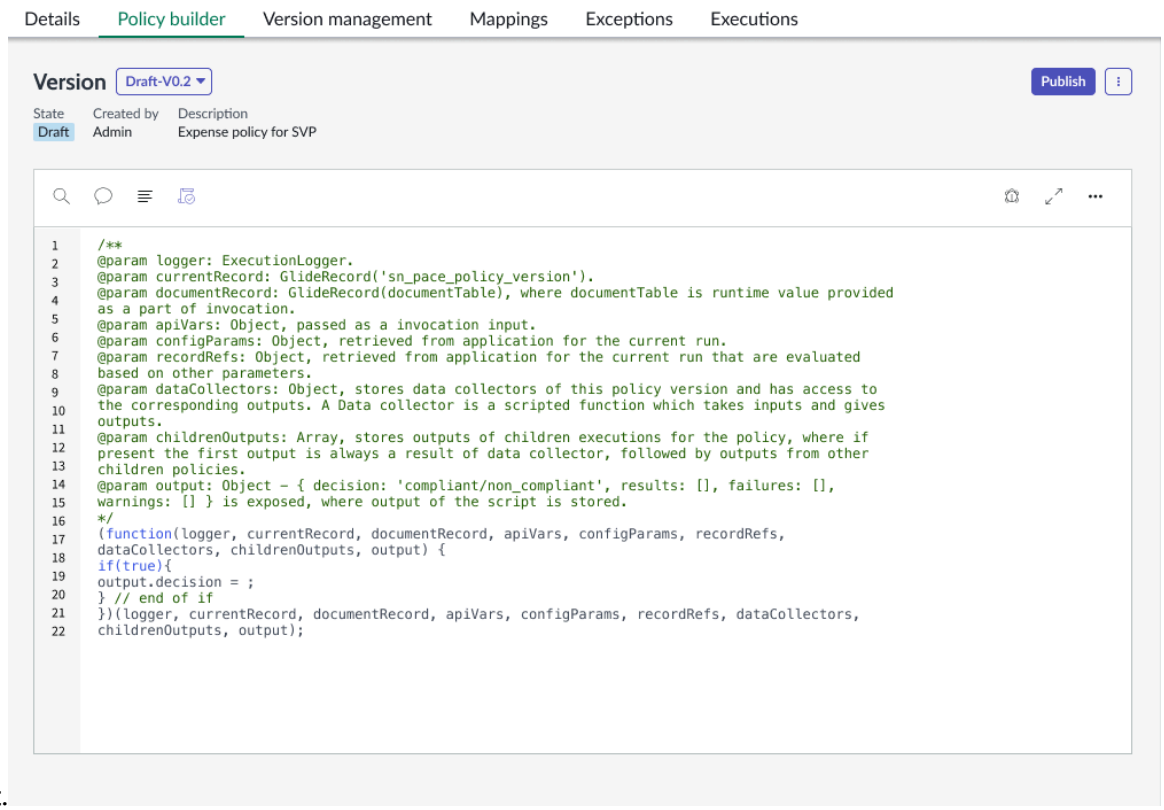
The following image shows a sample policy



script.

> **Note:**
> The script is editable for policy versions in Draft state only. For policy versions in Current or Archived state, the script is read-only.

5. Apply any changes to the policy script, as required.
6. Click **Save**.

Publish a PaCE policy version

You can publish a policy version at any time. When the policy is published, a compliant, non-compliant, or compliant-exception decision is made for objects (tables or document IDs) mapped to the policy.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

> **Note:**
> To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy name for the policy that includes the version you want to publish.
3. In the Details page, click the **Policy builder** tab.

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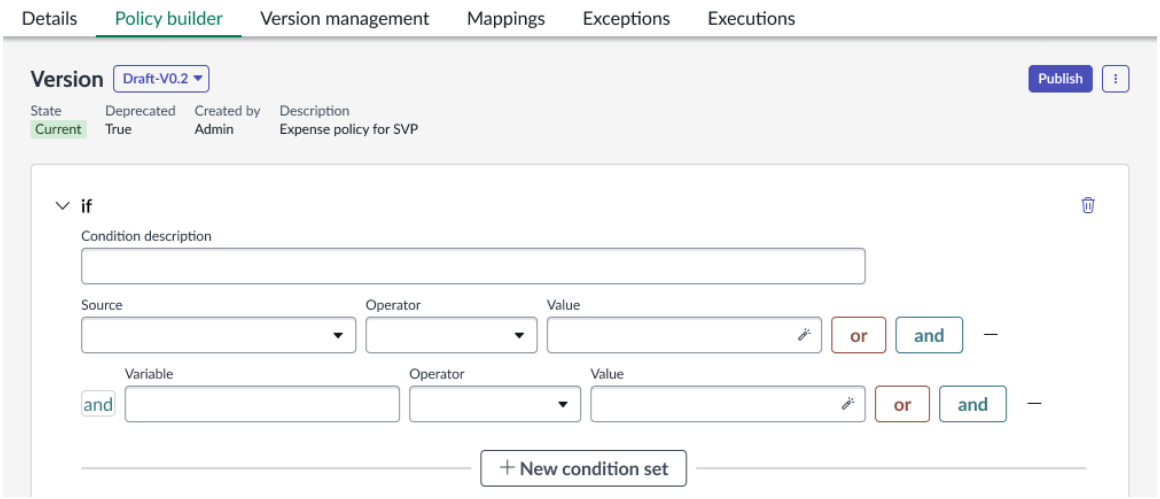
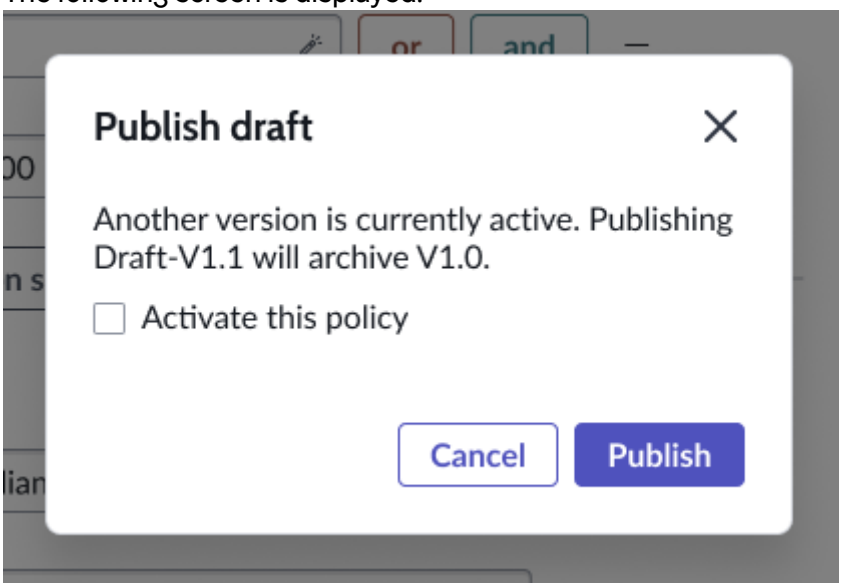


Typically you would publish a Draft policy, but you can also republish an Archived version.

4. Click **Publish**.
   The following screen is displayed.



5. Select the **Activate this policy** check box to activate the policy when it is published.
6. In the displayed confirmation message, click **Publish**.

   The policy version becomes the Current version and is used the next time the policy is invoked.

> **Note:**
> If the policy has an existing mapping to document IDs, when you publish a new version it verifies that all mandatory inputs for mapping inputs are provided. If you changed a mapping input, it must be updated. If you changed a caller input, you must update the PaCE API call to ensure that the policy is executed. If there is no mapping associated with the policy, or the policy is in an Inactive state, the mapping inputs are not verified.

Edit a draft PaCE policy version

You can edit a Draft PaCE policy version at any time. The Draft version can be published to become the Current version. You can also create multiple different Draft versions from different Archived versions.

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Before you begin
Role required: sn_pace.admin

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** for the policy that includes the version you want to edit.
3. In the Policy Details page, click the **Versions** tab.
4. Click the **Version name** that you want to edit.
5. Edit the information and inputs in the **Details** and **Policy Builder** tabs.

6. Perform one of the following actions.

Edit a current or archived PaCE policy version

To edit a Current (published) or Archived PaCE policy version, you must create a copy of that version, which can then be updated as required.

Before you begin
Role required: sn_pace.admin

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** for the policy that includes the version you want to edit.
3. In the Policy Details page, click the **Versions** tab.
4. Click the **Version name** that you want to edit.
   As you can't update a policy version that is Current (published) or Archived, the displayed fields are read-only.
5. Click **Create New Version**.
   In the Version page, define the details of the new version. For further information, see the Create a new version of a policy section. In addition, you can create multiple Draft versions from an Archived or Current (published) version and work on them in parallel.

Compare PaCE policy versions

You can compare two versions of a PaCE policy, whatever their state. Any differences between the two selected versions are highlighted for quick analysis.

Before you begin
Role required: sn_pace.admin

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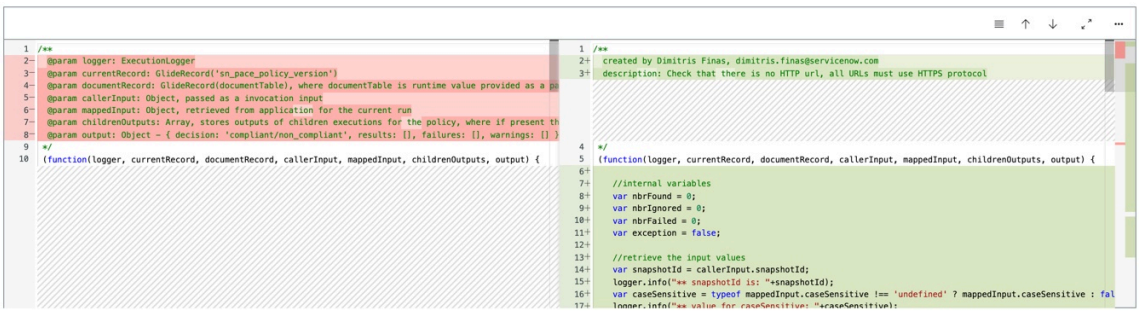
Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** for the policy that includes the versions you want to compare.
3. In the Policy Details page, click the **Versions** tab.
4. Select the relevant two versions to compare, and click **Compare**.
   The **Compare Versions** tab displays several container sections that highlight any differences between the two versions.
   - The **Details** container highlights differences between the details of the two versions. For example, differences between the state, version name and numbering, and the number of test or standard runs.
   - The **Script** container highlights any differences in the policy script of the two versions.

     Script

   - The **Mapping Inputs** container also lists any differences between the two versions.
5. To make any changes based on your analysis of the two compared versions, return to the **Versions** tab, select the relevant version, and modify and test as required.

Delete a PaCE policy version

You can delete a policy version at any time. However, only versions that have never been published can be deleted. Published versions are stored for auditing purposes.

Before you begin

Role required: sn_pace.admin

About this task

- Policy versions in Draft state can be deleted. When a version is deleted, all defined caller/mapping inputs and policy metadata associated with the version are also deleted.
- Policy versions that cannot be deleted include:
  - Policy versions in Current or Archived state.
  - Policy versions that have been executed in a Standard run.

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

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2. Click the **Policy name** for the policy that includes the version you want to delete.
3. In the Policy Details page, click the **Versions** tab.
4. Select the relevant version, click **Delete** and **OK** to confirm.

Passing parameters to PaCE policies

Parameters can be passed to a PaCE policy to validate updates to an object (tables and document IDs). These variables apply to authoring in both low-code or JavaScript. Policy versions include three types of parameter inputs: API Variables, Config Parameters, and Record References.

API Variables

Previously known as Caller Inputs, the API Variables is passed to the PaCE API at the time of invocation by a developer. The API Variable is a variable that enables you to pass the value to the policy whenever the policy is invoked. Specify a value for this API Variable when calling the API, otherwise the policy is not executed and no decision is reached. In the code editor, the variable name is `apiVars`.

For each PaCE policy, there is only one pre-defined API Variable called **SnapshotId**. This API Variable is Immutable and cannot be modified or deleted. You cannot define any additional API Variables for a policy.

Config Parameters

Previously known as Mapped Inputs, the Config Parameters can be passed when mapping policies to an object (tables and document IDs). When you define a Config Parameter, you are creating a parameter that enables you to pass values to the policy whenever the policy is mapped. If you define mandatory inputs, you must specify values for these inputs when mapping the policy. If the inputs you define are not mandatory, the policy is not executed (the status is set to inactive) and no decision is reached. In the code editor, the variable name is `configParams`.

For example, for a travel expenses policy you can add variables to define the limits of different types of expenses. The limits are specified when mapping the policy, and set the limits on the expense when the policy is invoked on this object. The breakfast expense limit for one group of employees could be $25, and for a different group of employees the limit could be $50. Each time the policy is invoked, the expenses are validated by the policy according to the limits specified in the mapping.

Record References

Record references define queries to extract data from any ServiceNow® tables and use the data to configure the policy logic. This feature enables you to retrieve additional data that may be required while defining the policy. You can define a query to perform aggregate functions for a record reference. In the code editor, the variable name is `recordRefs`.

Data Collectors

The data collectors function collects input process data from ServiceNow or an external data source to provide an output. The output can be used in the policy logic to make a decision. You can define and manage data collectors by creating, editing, updating, and activating them to your policy builder.

Data collectors can be accessed by using the `dataCollectors` object in JavaScript.

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Note:
Auto-completion lists all possible outputs and data collectors that are available to use.

While editing a policy in low-code, an output of the configured data collectors is available under the drop-down menu.

Create a new variable for a policy version

Create an API Variable, Config Parameter, or Record Reference for the policy version in the Define Variables section of the Policy Builder.

Before you begin

If you want to create a variable that will apply to all of your policies, then do the following:

1. Go to the Variable Definition section on the main page.
2. Select the variable section that you want to create.
3. Select **Add**.

When you save the variable, it will show up in the Define Variables section on the Policy Builder of the policy.

Role required: sn_pace.admin

Procedure

1. In the **Policy builder** tab, select the version of the policy you want to add a new variable to, then the Data sources icon .
2. Select the variable tab that you want to create a variable from then select **Add**.

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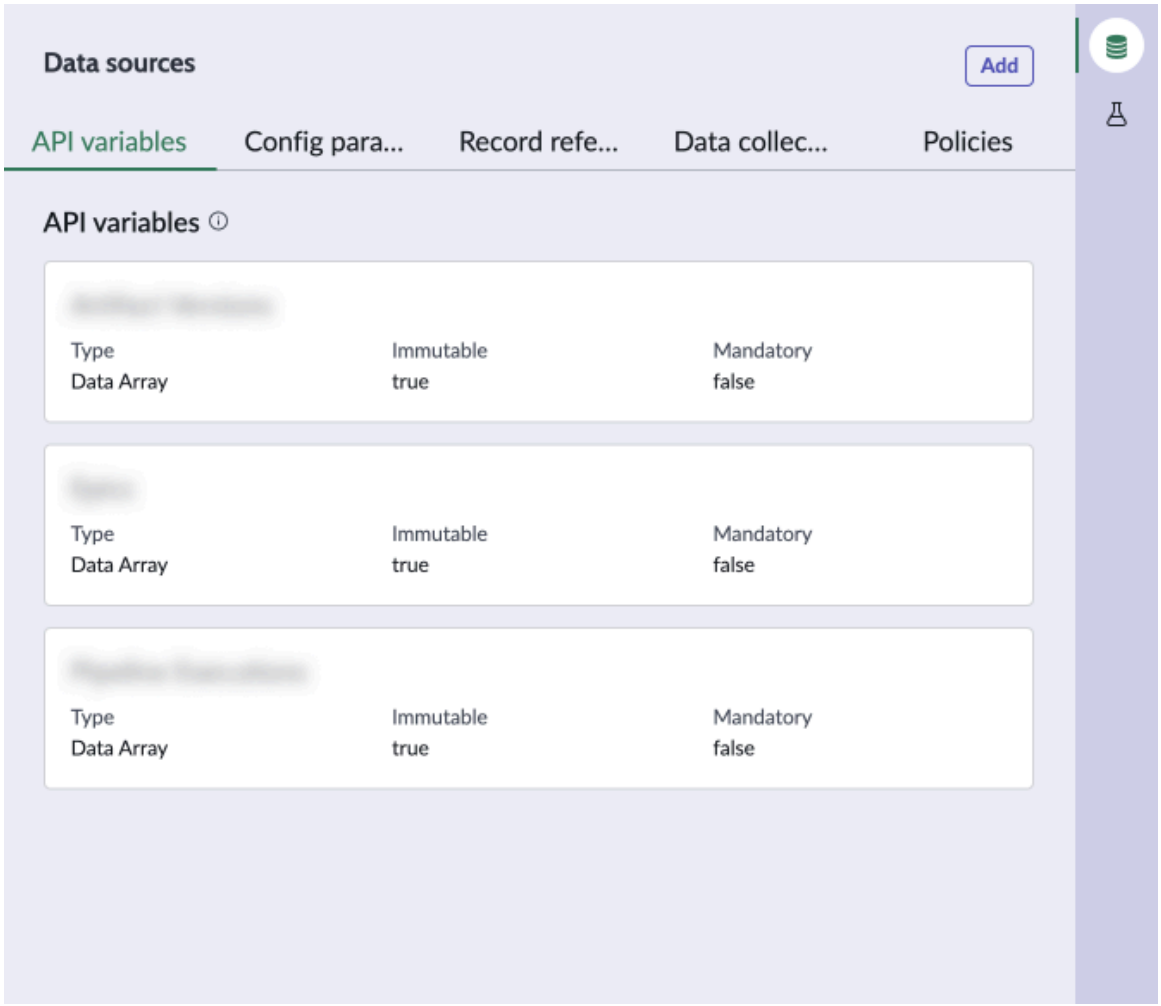

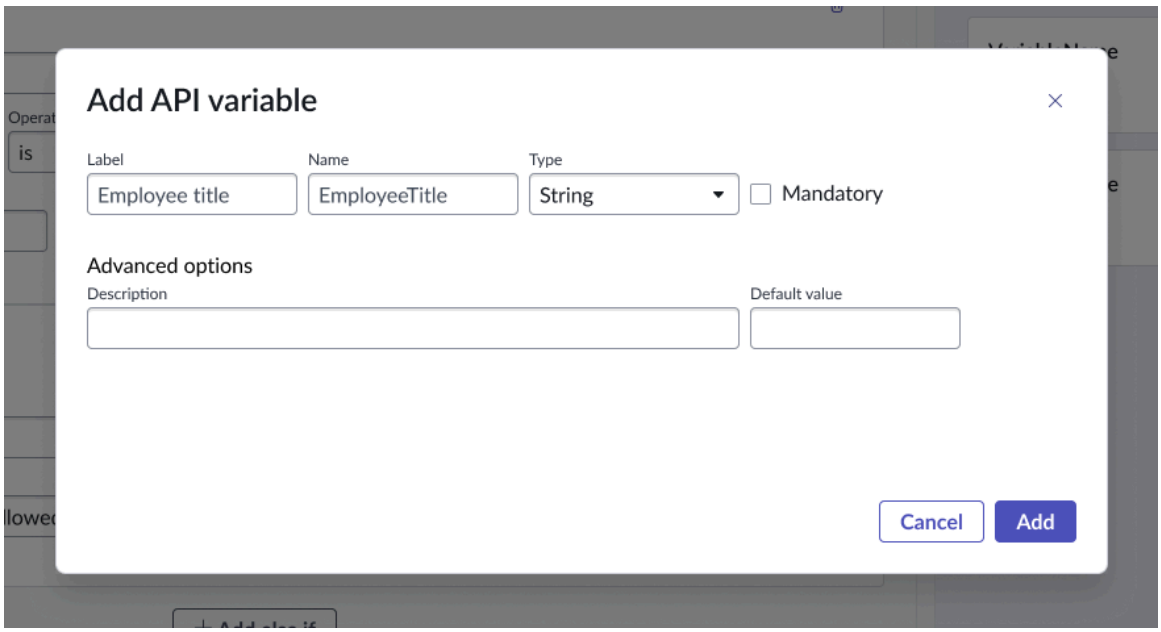

A pop-up window appears titled with the variable you want to create.

3. On the form, fill in the fields as needed.

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Create a new variable form

Field	Description
Label	Label name of the variable.
Name	Name of the variable.
Type	Drop-down list of input types: ○ Basic Date/Time ○ Basic Time ○ Choice ○ Data Array ○ Data Object ○ Decimal ○ Email ○ Integer ○ IP Address ○ JSON ○ Other Date ○ Reference ○ String ○ Sys ID (GUID) ○ True/False Depending on the input you choose, the Advanced Options provides different fields for some inputs. For more information, see the Data type descriptions topic. **Note:** The list only shows the most common used data types.
Mandatory	Option to make this variable mandatory. When the variable is mandatory, a value must be provided when mapping the policy. Otherwise the policy can't be executed.
Description	Description of the variable. **Note:** When you add a description for a Config Parameter variable, it will show up under the tool tip icon ⓘ in the Test Parameters tab.
Default Value	Default value for the variable.

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Field	Description
	Note: When you create a record reference, select a reference in the Table field, this field enables you to select a dependent document from the reference.
Function (Optional)	Functions to aggregate your condition. Choices are as follows: ○ Average: Average value of the condition. ○ Count: Count of the number of non-null values. ○ Maximum: Largest or maximum value. ○ Minimum: Minimum value. ○ Standard deviation: Population of standard deviation. ○ Sum: Sum of all values. **Note:** This field will only show up in the Record Reference variable form with the qualifier condition fields.
Match criteria	A match criteria for your record reference. Choices are as follows. ○ Select first match ○ Error on multiple When you create a Record Reference, it will query multiple answers. The match criteria enables you to filter out the match by selecting the first match or return an error if there are multiple answers. **Note:** This field will only show up in the Record Reference variable form with the qualifier condition fields. For more information about condition fields, see Policy logic condition fields.

4. Select **Save**.

Result

You can add your variables into the Policy Builder as needed. Additionally, you can delete a variable by selecting it and selecting the **Delete** button.

Data type descriptions

The following is a list of the most common data types for creating a variable.

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Data types

Data type	Description
Basic Date/Time	Day and time of day, which can be selected with a calendar widget.
Basic Time	Specific time.
Choice	Script that returns an array of choices that will be displayed for selection in a drop-down menu. If you select the **Multi select** check box, then multiple options can be selected from the drop-down. If it's unselected, then only one option can be selected.
Data Array	Data Array structure represented as a String.
Data Object	The Data Object input enables you to select the plus icon to add a new property to the data object or the minus icon to delete it. Additionally, you can select the Star icon that will search for a name if you don't know the structure of the JSON format property. A JSON path and match criteria field will appear and enable you to search for a key in the JSON structure.
Decimal	Number with up to two digits after the decimal points.
Email	Email represented as a String.
Integer	Number with zero decimal points.
IP Address	Variable character field that stores IPv4 and IPv6 addresses.
JSON	JavaScript Object Notation represented as a String.
Other Date	Date, which can be selected with a calendar widget.
Reference	Query that displays records from another table. The data type includes a match criteria field and qualifier conditions that you can set.
String	For 255 characters or less, the string field is a single-line text field.
Sys ID (GUID)	Field that contains a unique identifier for each record.
True/False	Boolean field that appears as a one-digit integer.

Create a data collector for a policy version

Create a data collector for a policy version in the Define Variables section of the Policy Builder.

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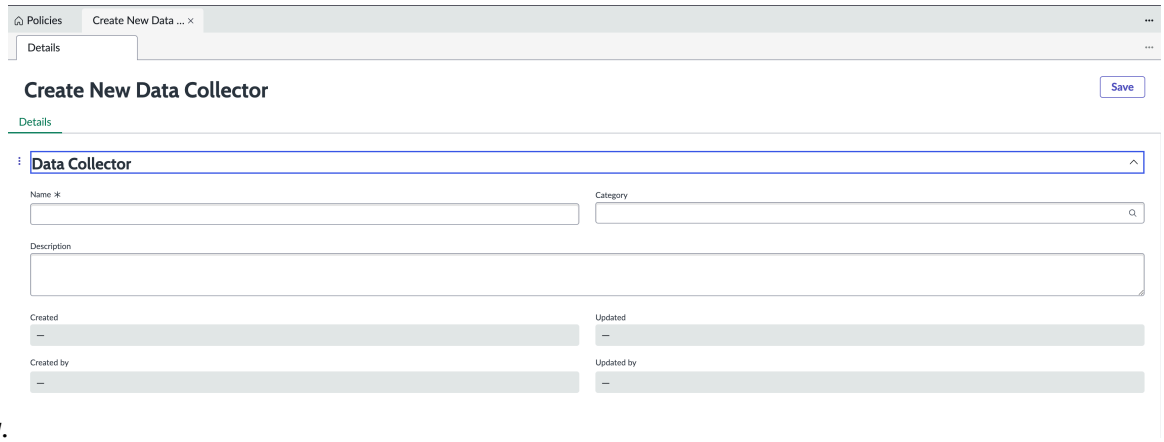
Before you begin

Role required: sn_pace.code_editor

Procedure

1. Navigate to **All** > **Variable Definition** > **Data Collectors**.
2. Select



New.

3. On the form, fill in the fields as needed.

Create New Data Collector

Field	Description
Name	Name of the data collector.
Category	Category of the data collector. See Managing categories in PaCE for details.
Description	Additional details of the data collector.
Created	Date and time when the data collector was created.
Created by	Name of the user who created the data collector.
Updated	Date and time when the data collector was updated.
Updated by	Name of the user who updated the data collector.

4. Click **Save**.

What to do next

- Activate and build data collectors
- Test a data collector for a policy version
- Add data collectors to a policy version

Structure of a data collector

This section describes the structure of a PaCE data collector.

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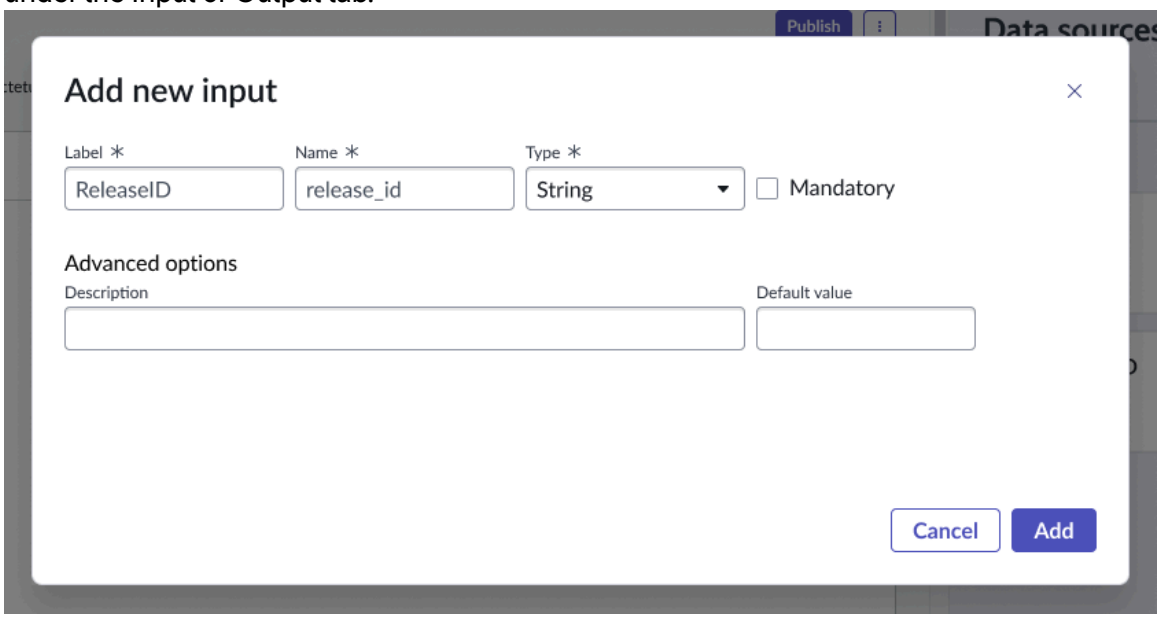
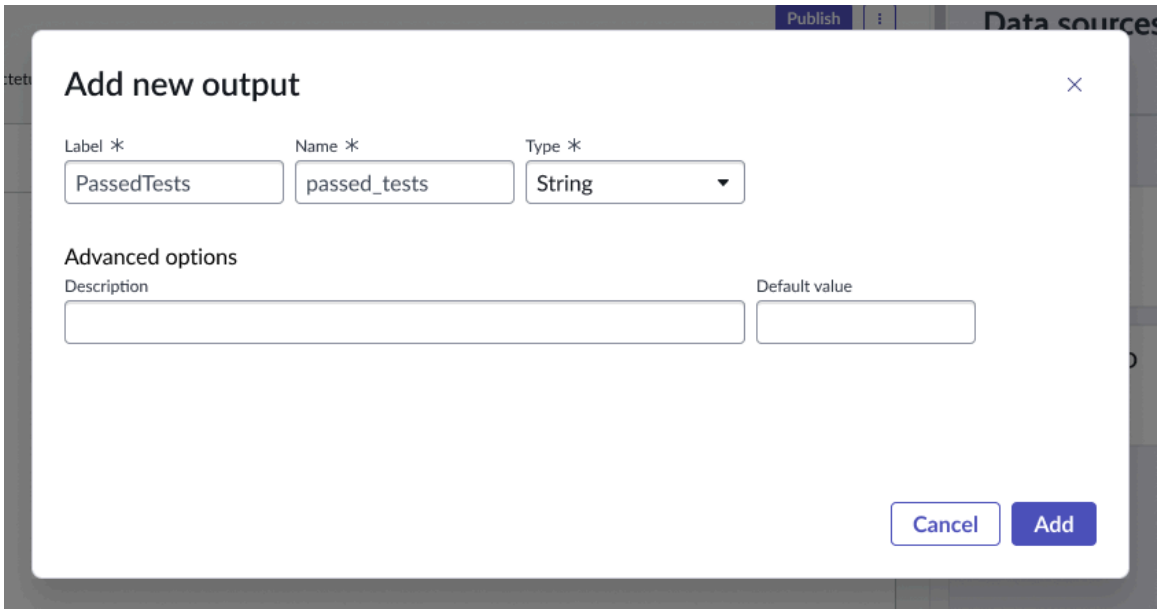
When you create a data collector, you can add inputs and outputs in the Javascript code. In the Data sources tab, select **Add** to create the inputs and outputs you want to add to your data collector. The following images show the pop-up window that will show up when you select **Add** under the Input or Output tab.





The following image shows a sample data collector:

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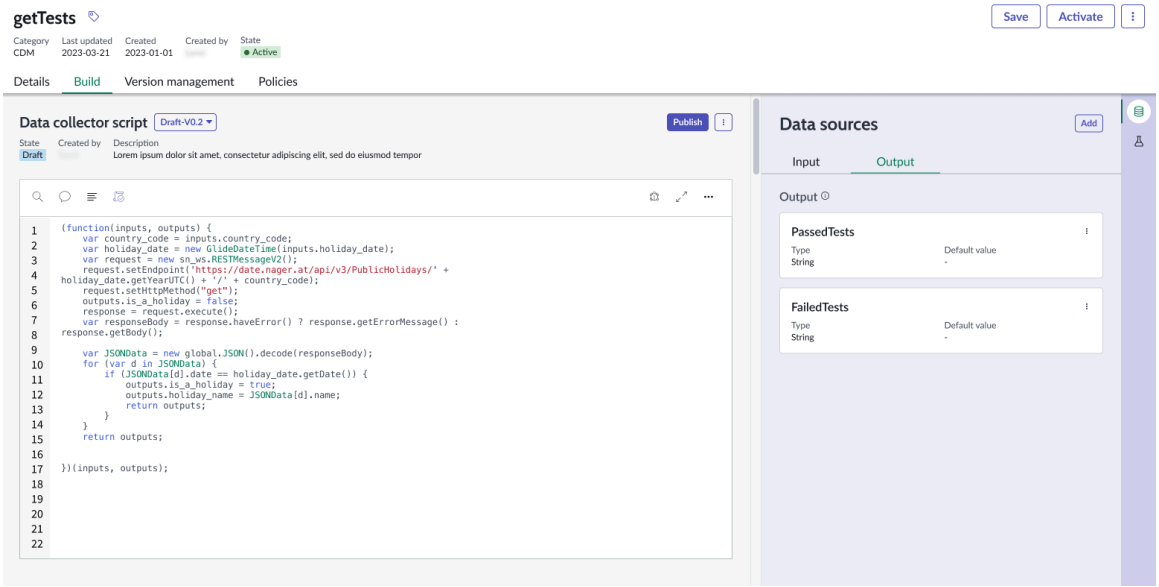

To debug the data collector script, select the Debugger script icon . For more information, see Script Debugger API.

The following table lists the data collector function parameters and how they can be used in the script.

Variable name	Description
Input	Inputs are used as parameters that help collect the correct data to be used in the policy.
Output	The parameter is used to pass the output of the data collector. Outputs are used to specify output variables that can be used in the policy logic.

Refer to the Data type descriptions topic to see a list of the supported data types for the inputs and outputs.

Activate and build data collectors

Activate and build data collectors to add to a policy.

Before you begin

Role required: sn_pace.code_editor

Procedure

1. Select the **Versions** tab, then the data collector draft name.
2. Select the **Build** tab.
3. In the Data sources section, select the variable tab you want to define.

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a. Click **Add**.



b. On the Add new input form, fill in the fields.

Add new input

Field	Description
Label	(Optional) Label of the input or output.
Name	Enter a name of the input or output.
Type	Select the type of the input or output.
Mandatory	Select this check box if the input is mandatory.
Description	Description of the input or output.
Default value	Specify a default value.

Note:
Inputs are used as parameters that help collect the correct data to be used in the policy. Outputs are used to specify output variables that can be used in the policy logic.

c. Click **Save**.

d. Repeat the steps to create the inputs and outputs as needed.

4. Enter your inputs or outputs and write your code in the Data collector script, as needed.
5. **Optional:** Add an exception error in your data collector by entering the following script: `throw new PaCEExecutionError`.
   When you execute the policy with the data collector exception, the error message will appear under the Output tab in the Execution errors section.
6. Click **Save**.
7. When you're finished, select **Publish**.

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8. In the Publish draft window, select the **Activate this data collector** check box, then **Publish**.

> **Note:**
> When the data collector has been activated, you will be unable to make changes to the inputs or outputs.

Test a data collector for a policy version

Test a data collector for a policy version in the Test Playground.

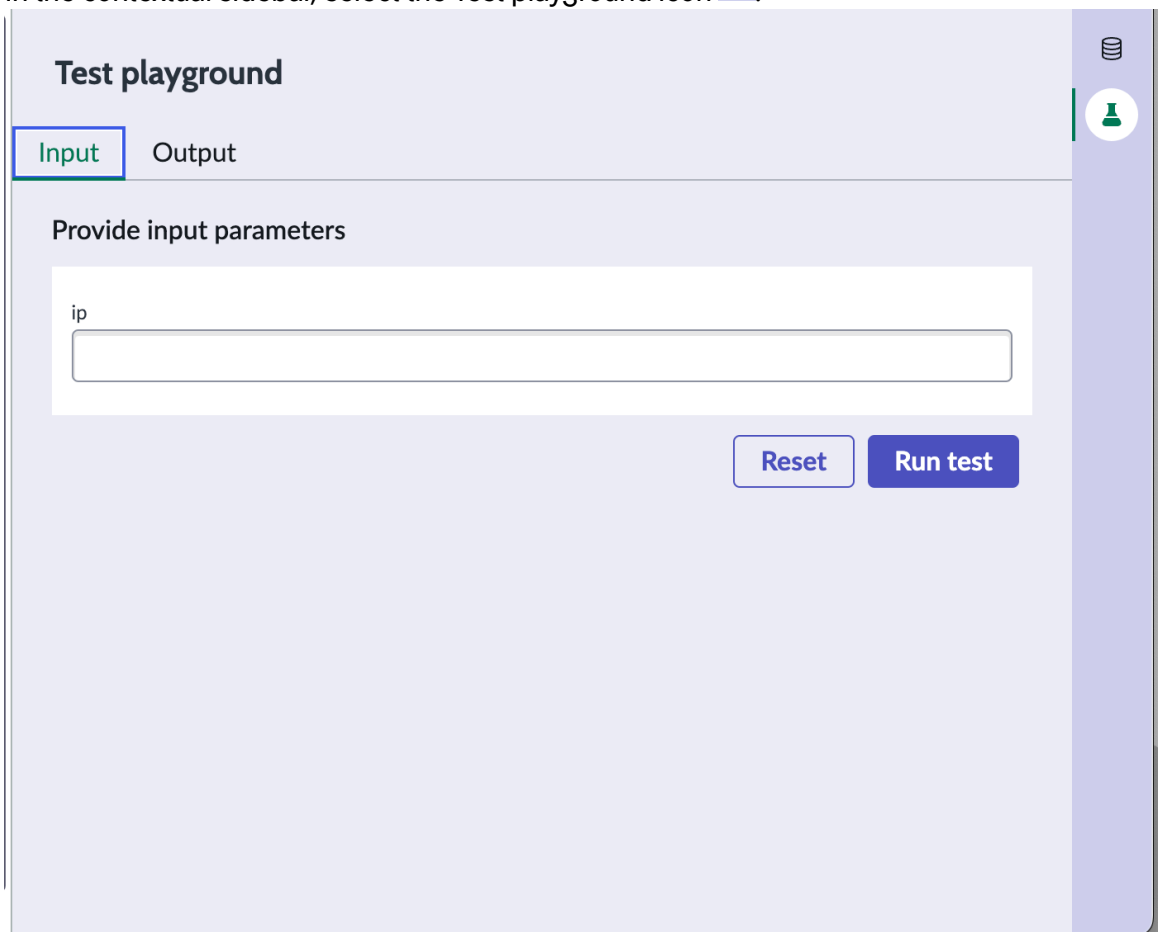
Before you begin

Make sure you created a data collector in the policy. For more information, see Create a data collector for a policy version.

Role required: sn_pace.code_editor

Procedure

1. Navigate to **All** > **Variable Definition** > **Data Collectors**.
2. Select the data collector you want to test.
3. Select the **Versions** tab, then the data collector name.
4. Select the **Build** tab.
5. In the contextual sidebar, select the Test playground icon .



6. Add the parameters in the inputs you want to test in the data collector, then select **Run test**.

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The results will appear in the Output tab.

7. In the Publish draft window, select the **Activate this data collector** check box, then **Publish**.

Add data collectors to a policy version

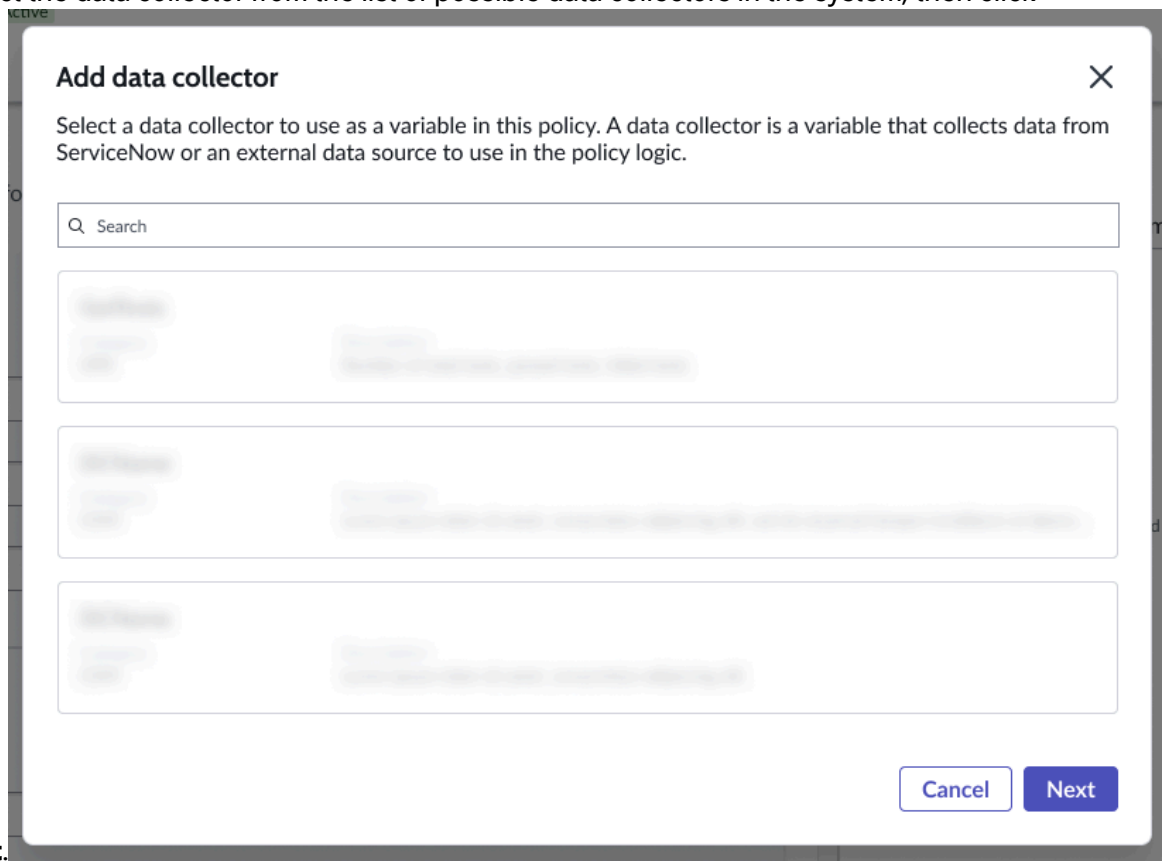
After testing the activated data collectors, add them to a policy in the Policy Builder.

Before you begin

Role required: sn_pace.code_editor

Procedure

1. In the Policy Builder tab, select the version of the policy you want to add the new data collector to, then the Data sources icon .
2. Select the data collector from the list of possible data collectors in the system, then click **Next**.



3. In the Add data collector page in the Details tab, give the data collector a label and variable name.

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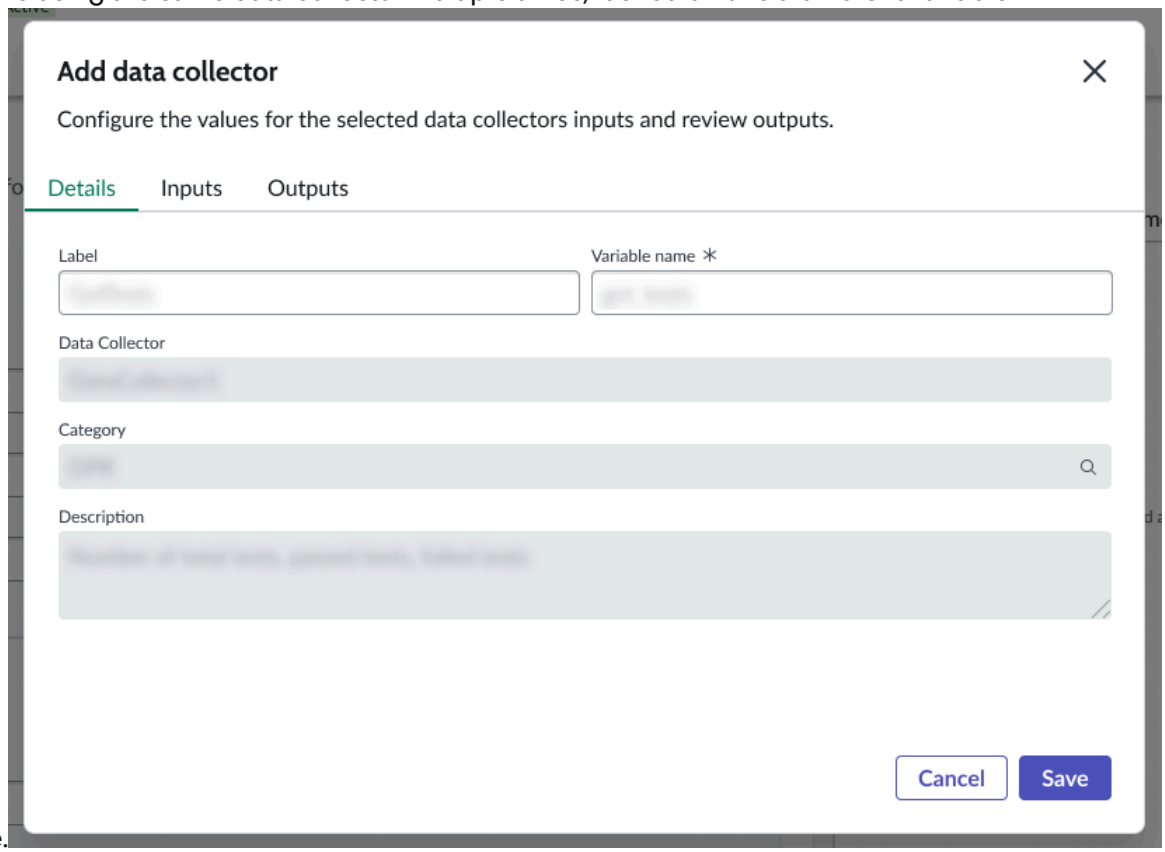
Note:
If you're using the same data collector multiple times, it should have a different variable name.



4. Provide inputs to complete the configuration of the data collector in the Input tab.

Note:
The input can be user-specified or selected from the data picker icon.

5. Click **Save**.
After the data collector is added and configured, you can access the data collector in the script editor using the data picker in low-code. Additionally, you can delete a data collector by selecting it and selecting the **Delete** button

Add nested policies in a policy

Add existing policies to a policy's conditions to define the order a policy's execution and the conditions is executed.

Before you begin

Note:
You must create a policy before adding it to another policy. For more information, see Create a PaCE policy.

You can add a policy multiple times with different names and parameters. The policies must be configured and mapped to a document, and API variables and Config parameters may be required and mapped to be configured. For more information on how to add variables, see Create a new variable for a policy version.

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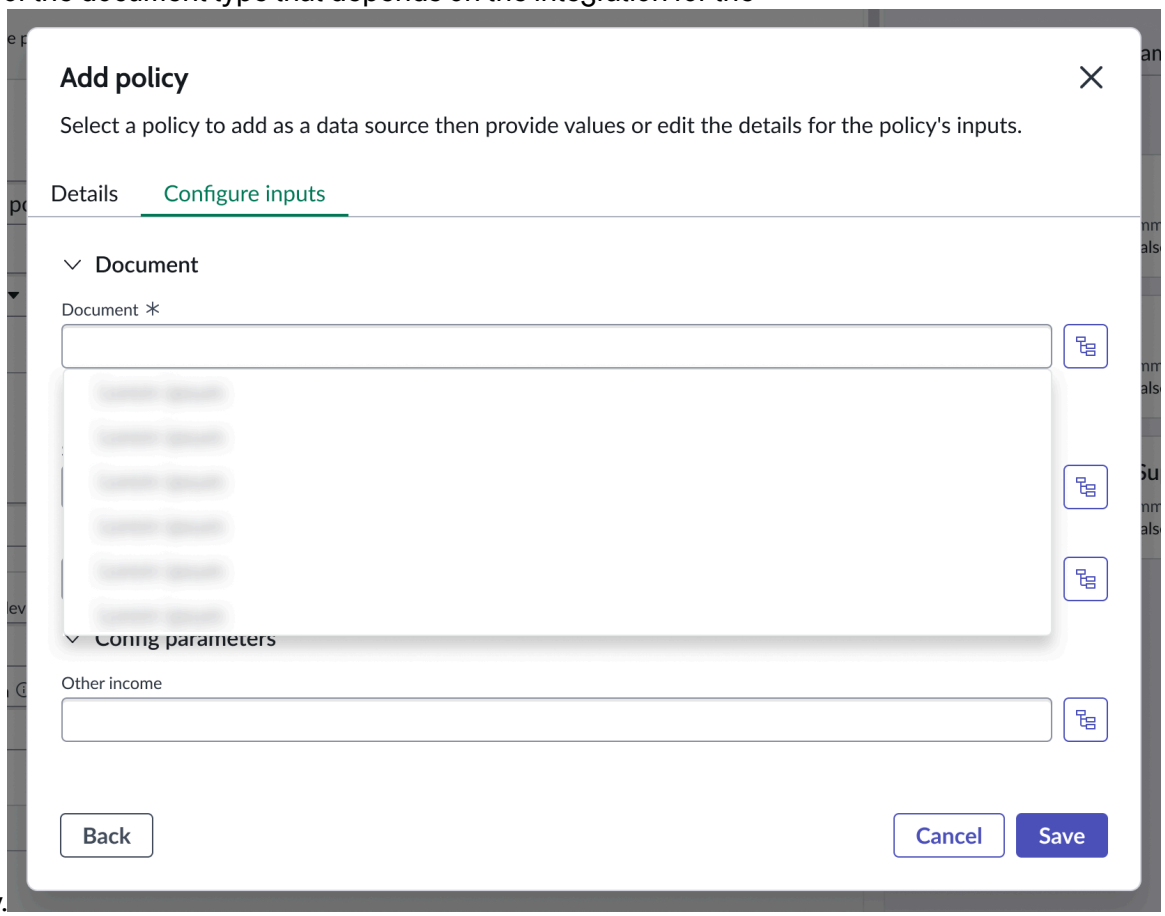
Procedure

1. Navigate to **Policies** > **My Policies**.
2. Select the policy you want to nest the policies in.
3. In the **Data sources** section, select the **Policies** tab.
4. Select **Add**.
5. In the Add policy window, search and select the policy you want to add as a data source, then select **Next**.
6. On the Details tab, enter the **Label** field and **Variable name** field and other configuration inputs as needed for the policy.
7. In the Configure Inputs tab, under the Document section, select the value of the document type that depends on the integration for the policy.



8. Pick a variable to pass for in the API variable and Config parameter sections you created in the beginning of this task.

Note:
You can specify the value in the fields as needed.

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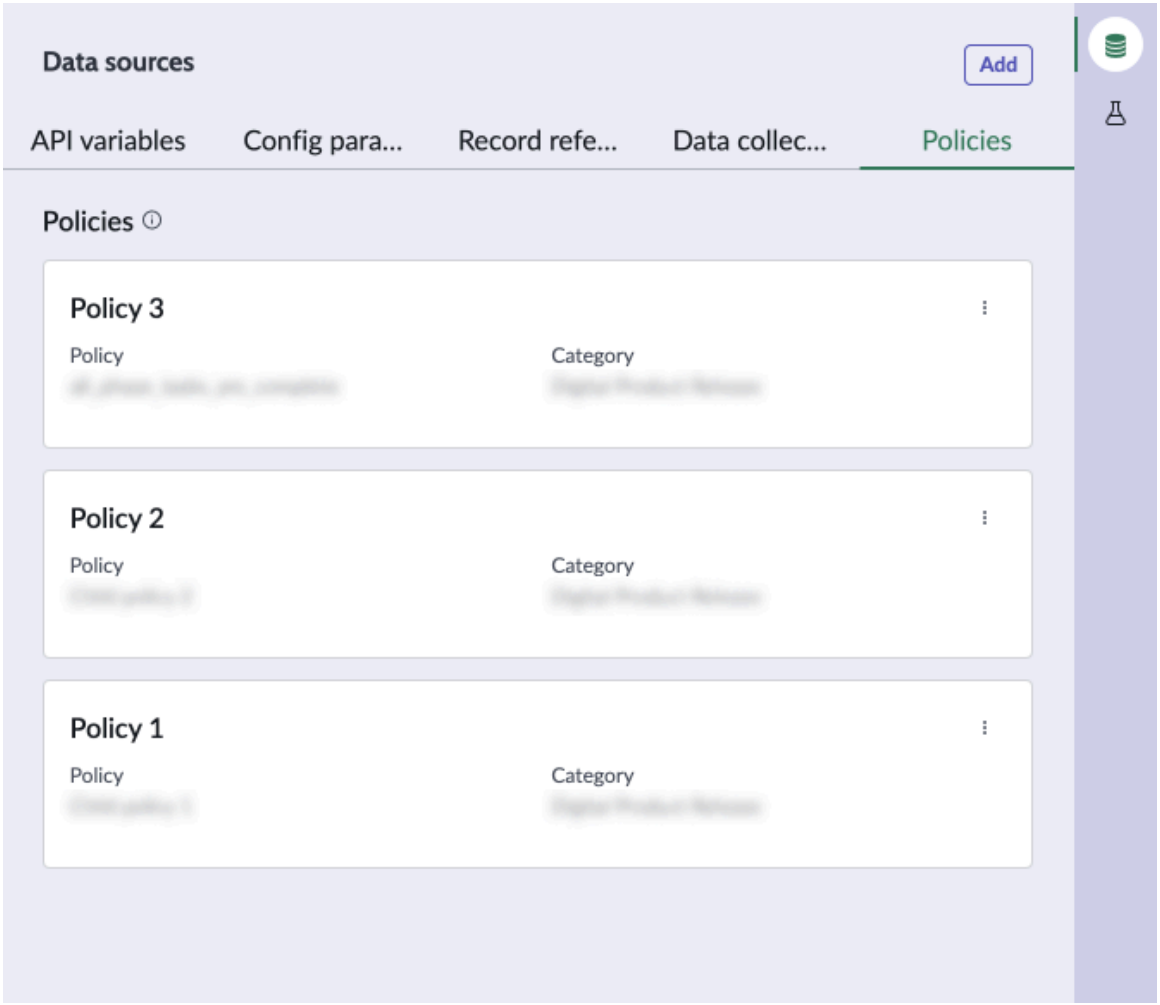
9. Select **Save**.



Result
The policies now appear on the Policies tab and can be added in the condition section or the Then section of the Policy builder. For more information on how to add the policies in the builder, see Policy logic condition fields.

Use the Test Playground for PaCE policies

The Test Playground enables you to test updates to a PaCE policy at any time, without the need to test or evaluate them in a Production environment.

You can update API Variables, Config Parameters, and Record References, and modify the policy script. After completing your changes, evaluate the updates in the Test Playground and review the execution output to ensure that the policy is compliant. Use the Test Playground to fine-tune your policy administration. Updates to a policy can be made on-the-fly, and tested in real time in a test environment. In addition, use the Test Playground to:

- Set execution parameters.
- Set and modify variables.
- Edit the policy script and policy logic.
- Use previously evaluated variables from a previous evaluation run.
- Review the execution output and the decision of compliance (compliant or non-compliant).
- Review a log of executions.

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Test updates to a PaCE policy version

Use the Test Playground to test updates to a PaCE policy script. You can evaluate changes to the policy script in real time, enabling you to determine if the changes that are applied render the policy compliant or non-compliant.

Before you begin

Role required: sn_pace.admin

About this task

The Test Playground enables you to apply changes to the policy script, and see the impact of those changes in real time. After the changes have been evaluated, save the script to ensure that the changes are implemented when the policy is next invoked.

Procedure

1. In the **Policy builder** tab, select the Test playground icon in the right-hand menu.
2. In the Test parameters tab, fill in the forms as needed.

Test options fields

Field	Description
Document	The document that you want to test the policy version with. **Note:** This field will change depending on which application PaCE is being used.
Log level	Level of the log.
Timeout	Timeout to determine the execution threshold of the test.
Execution log	Execution tag for the policy version.
Verbose	Option to make the test display in a verbose format.

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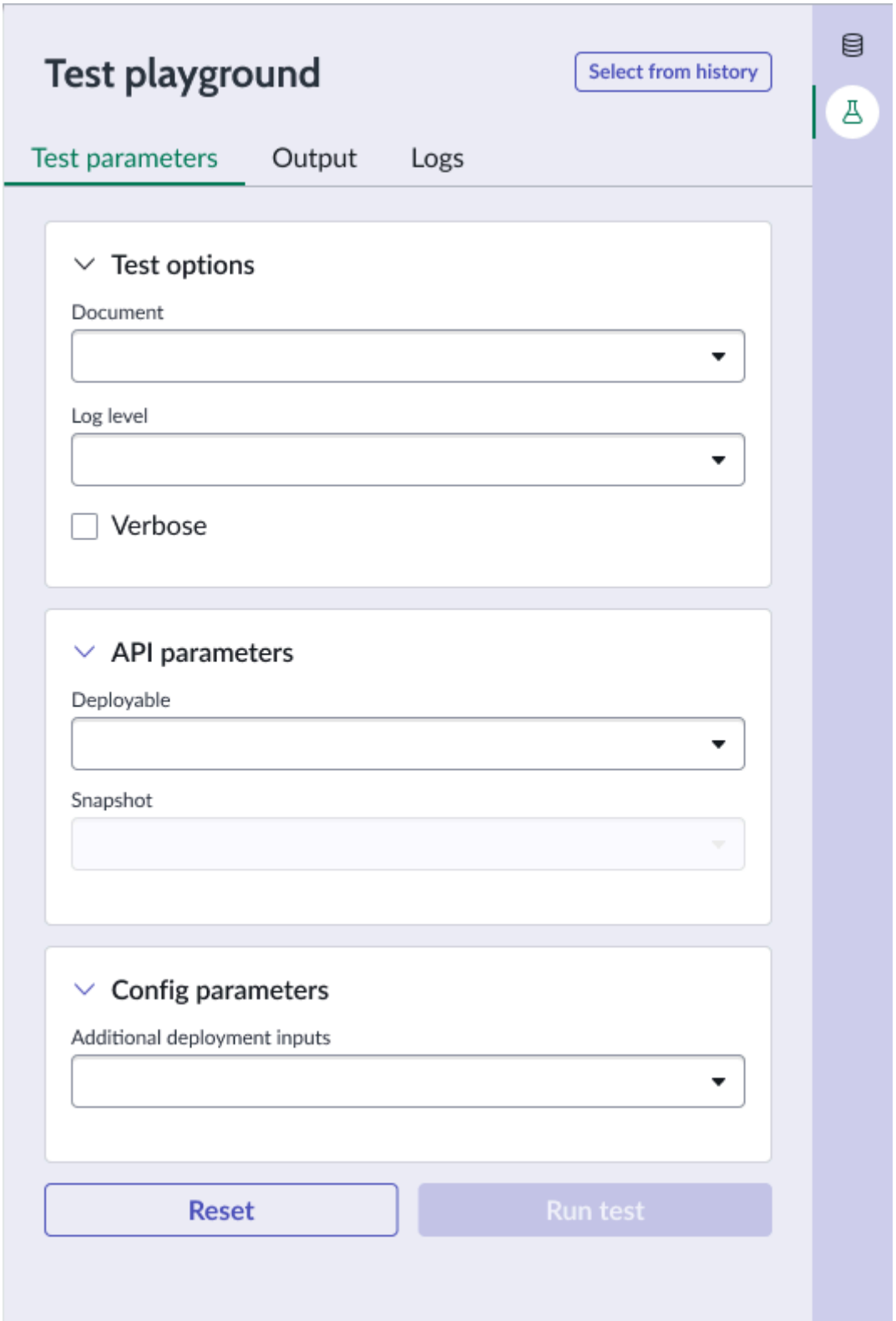

3. Under the **API parameters** and **Config parameters** tabs, select the variables you want to test with the policy version.
4. When you are done modifying your policy script, click **Run Test**.
   A decision is reached regarding the compliance or non-compliance of the policy, based on the changes you made to the script. In the Test Parameters section, either **Compliant** or **Non-compliant** is displayed, along with additional output on any warnings or failures, and how long the evaluation took.

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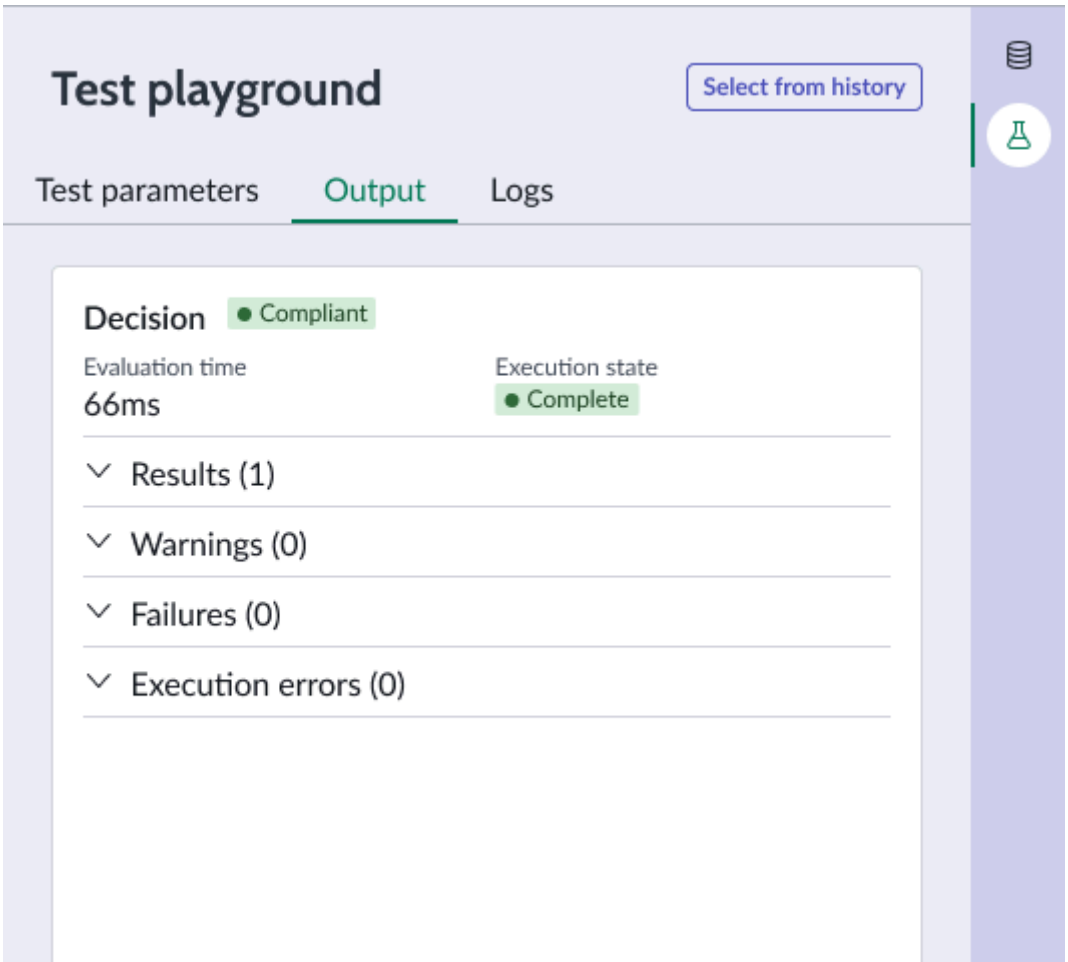
Note:
A decision with Compliant with exception will not work with a custom decision.



Review execution output and decision

After evaluating any changes made to the PaCE policy script, you can review the execution output and compliance decision reached. You can review this output immediately after evaluating any policy script changes.

Before you begin

Role required: sn_pace.admin

Procedure

1. In the **Policy builder** tab, click the policy version you want to evaluate.
2. Select the Test playground icon .
3. After modifying the policy script according to your requirements, click **Run Test**
   The **Output** tab is displayed automatically, and shows the output and the decision reached.

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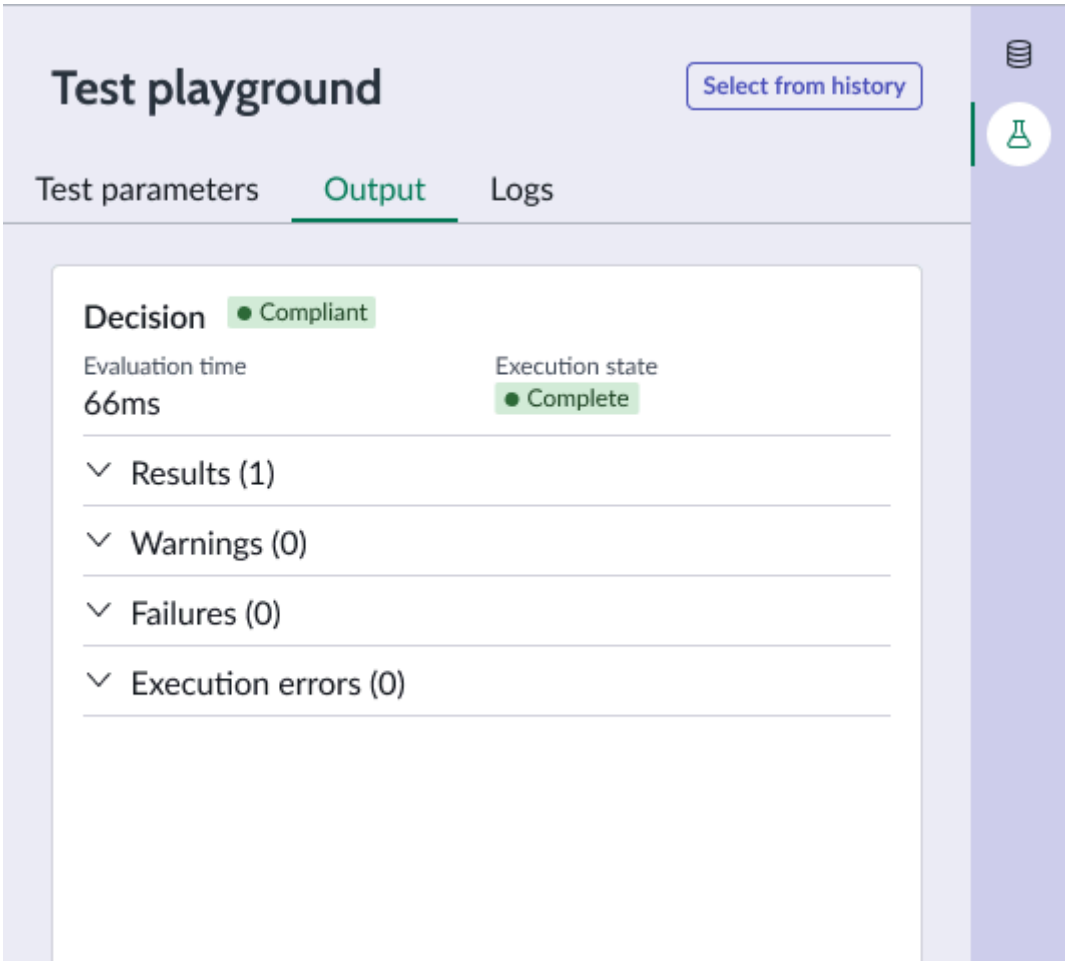

4. Review the execution output in the **Output** tab:

Output tab section	Description
Compliance decision	The decision can be: ○ **Compliant**: The changes you applied to the policy script are compliant with the policy logic. When you click **Save Script**, the changes are saved, and the changes implemented the next time the policy is invoked. ○ **Non-compliant**: The changes you applied to the policy script are not compliant with the policy logic. ○ **Compliant-exception**: In this case, if a policy exception has been approved, any policies that are non-compliant are set to the compliant-exception state. ○ **Name of a custom decision**: In this case, the decision is pre-defined by the admin for decisions other than complaint or non-complaint. **Note:** There could be multiple custom decisions depending on the type of application you're integrating with PaCE.
Warnings/ Failures	Lists the number of warnings or failures generated during the execution.
Evaluation time	Shows how long the evaluation took, in milliseconds.

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Output tab section	Description
Execution output	Shows the execution output in JSON format. You can integrate this output with other applications and services and present it in your required format.
Custom	Shows the custom output of the custom decision. **Note:** This tab will only show up if you are testing a custom decision.

If required, modify the policy script to resolve any issues that arose during the evaluation. You can also review policy execution logs for further analysis.

Review execution log

After evaluating any changes made to the PaCE policy script, you can review the execution log generated.

Before you begin

Role required: sn_pace.admin

Procedure

1. In the **Policy builder** tab, click the policy version you want to review/evaluate.
2. Select the Test playground icon  .
3. Click the **Logs** tab to view the execution logs generated.

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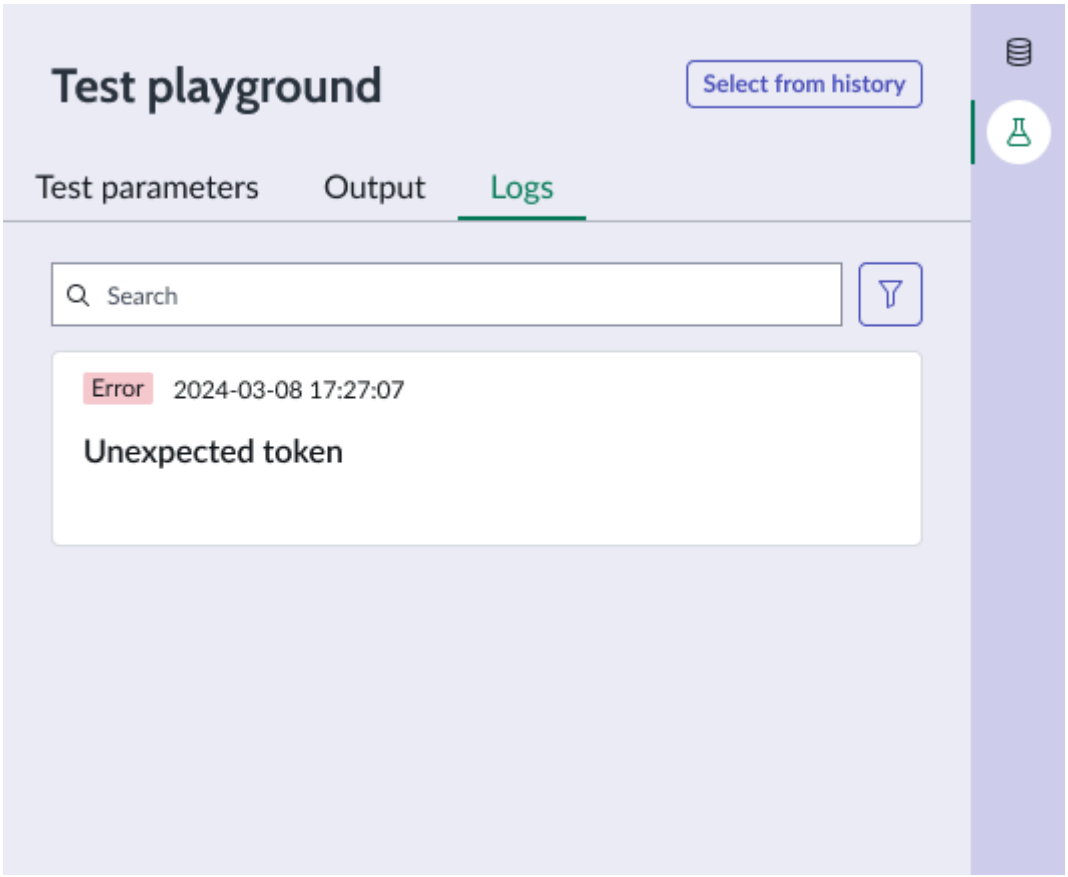

The displayed logs include all execution data generated during the evaluation. To filter logs, select the filter icon .

Execute policies

Execute a policy to determine if the policy is compliant or non-compliant. Executions can be run as part of your policy evaluation process, or in real time when mapped to an object (table or document ID).

Before you publish a policy version, you can run a test evaluation of the version to determine if it is compliant, non-compliant, compliant-exception, or other. Evaluating a policy enables you to test repeatedly and apply any required changes to the policy version, before moving it to a production environment. For further information about testing your policy version, see Use the Test Playground for PaCE policies.

When the version is ready to be moved into the production environment, make sure that all policy mappings are in place and verified. When the policy is invoked by the relevant object, its execution output is stored for review. For further information, see Review executed policy activity.

Review executed policy activity

You can review the execution activity of any policy at any time. Recorded execution activity includes the time taken to execute, decisions of compliance, execution types, and the outcome of the execution.

Before you begin
Role required: sn_pace.admin

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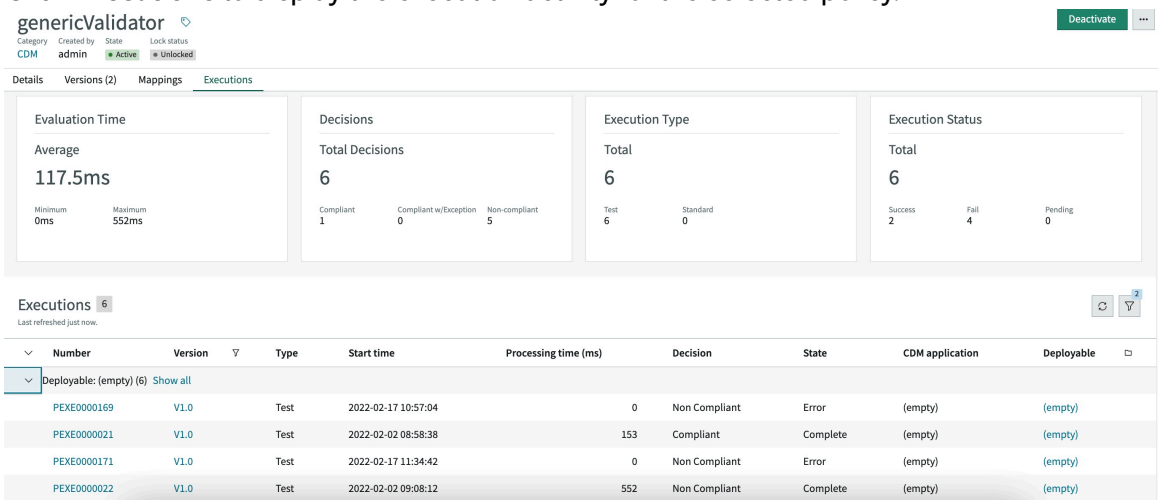
Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

> **Note:**
> To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click **Executions** to display the execution activity for the selected policy.



3. Review the execution information in the following columns.

Column	Description
Number	The automatically generated execution number. Click the link to review the following execution information: ○ Caller and mapping inputs used in the execution. ○ The JSON output generated on execution. ○ The execution log. ○ The policy script used in the execution.
Version	The policy version used in the execution. Click the link to review the version details.
Type	The type of execution performed: ○ Test ○ Standard
Start time	The time and date the execution was initiated.
Processing time (ms)	The execution processing time, in milliseconds.
Decision	The decision reached on execution: ○ Compliant ○ Non-compliant ○ Compliant-exception

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Column	Description
State	The state of the execution.
CDM application	The name of the relevant application. Click the link to review and update the application details.
Name	The name of the object. Click the link to review and update the object details.

Manage PaCE policy categories and tags

Use categories and tags to manage and group your PaCE policies more efficiently. As the policy administrator, you can create and edit any number of categories and tags.

You must have the sn_pace.admin role to manage categories and tags.

Policy categories and how to use them

Policy categories enable you to categorize your policies into relevant groups or sections.

You can create any number of categories, but only one category can be assigned at any one time to a policy. Categories can include product or industry-specific terms, such as PCI, HIPAA, or FedRAMP. If a PCI or HIPAA-specific update must be applied to a policy, select the relevant category to locate and update the policies under that category.

When creating or updating the policy with a category, the category must be pre-defined.

Policy tags and how to use them

Policy tags enable you to define a policy with relevant reference tags. These tags can be defined according to your requirements, providing an element of flexibility to your policy management. For example, if a group of users have access to some policies, you can create a meaningful tag or a set of tags only for those policies.

You can add any number of tags to a policy, and also configure who can view the tags. You can also add tags on-the-fly as you view or edit policies.

Tags can be especially useful in collaboration efforts, in turn making the entire policy life-cycle easier to manage.

Managing categories in PaCE

Use the Categories option to group your PaCE policies more efficiently. As the policy administrator, you can create and edit any number of categories.

Categories are especially useful for grouping your policies into relevant sections. You can create and edit categories as required, but only one category can be assigned at any one time to a policy.

In addition, when creating a policy, the category must be pre-defined to ensure it can be assigned to the policy.

Create a category

Create PaCE policy categories to assign to a policy when creating or updating a policy. Categories enable you to categorize and manage policies more efficiently.

Before you begin
Role required: sn_pace.admin

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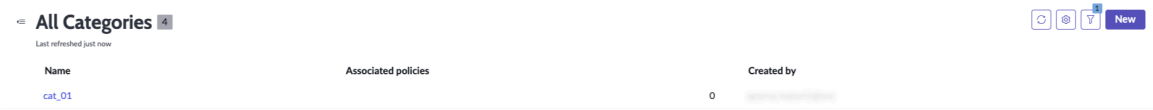
Procedure

1. Navigate to **Categories** > **All Categories**.



2. Click **New**.
3. In the Create New Category form, define a name and description for the category.
4. Click **Save**.
   The new category is added to the All Categories form.

Edit categories

Update categories for a PaCE policy as required. You can also update categories for Active policies.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to **Categories** > **All Categories**.



2. Click the name of the category that you want to edit.
3. In the Details form for the selected category, edit the category **Name** and **Description** fields, as required.
   When updating a category name, the update is applied to all policies assigned with that category, whatever their state.
4. Click **Save**.
   The edited category is updated in the All Categories form.

> **Note:**
> You can also delete a category, as long as the category is not assigned to an Active policy. To delete a category, in the Details form for the selected category, click **Delete**.

View PaCE policies associated with a category

You can view the PaCE policies that have been assigned to a specific category. All the categories created, together with their associated policies, can be viewed in the All Categories table.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to **Categories** > **All Categories**.
2. In the All Categories table, click the relevant category name.
3. In the displayed Details form, click the **Policies** tab.
   The policies associated with the selected category are displayed.

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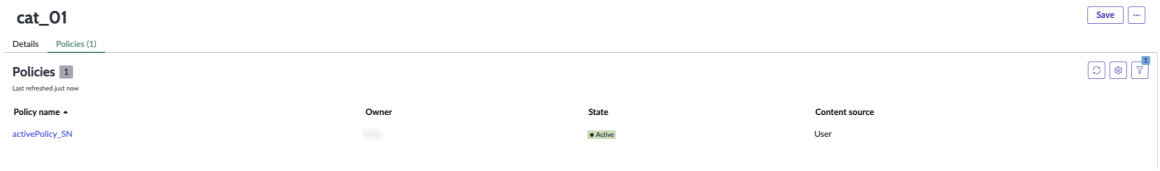


4. Click a policy name to view the policy and its settings.

Managing tags in PaCE

Use tags to manage your PaCE policies more efficiently. As the policy administrator, you can create and edit any number of tags.

Policy tags enable you to add any number of reference tags to a policy. Tags can be especially useful in collaboration efforts, and can easily be viewed and edited. They can also be used to group policies based on any number of tags.

Add tags to PaCE policies

Add or create policy tags on-the-fly for any PaCE policy, including currently Active policies. Tags enable you to manage policies more efficiently.

Before you begin

Role required: sn_pace.admin

Procedure

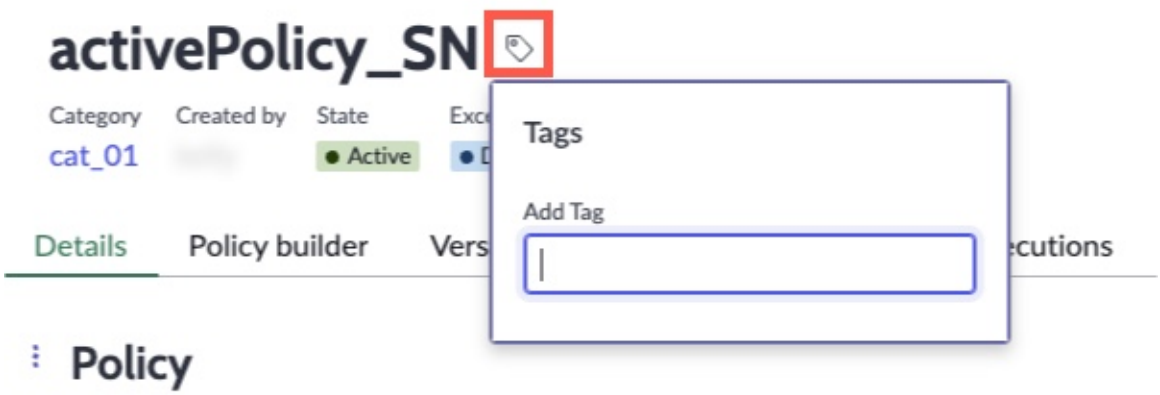
1. Navigate to **Policies** > **My Policies**.

> **Note:**
> To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy name for the policy that you want to add a tag to.
3. In the Policy Details page, click the tag icon.

> **Note:**
> Unlike categories, you do not have to pre-define a tag before adding it to a policy.

4. In the **Add Tag** field, enter the required tag.



5. Press **Enter** to add the tag.
   The tag is added to the **Tags** dialog.

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Note:
By default, the added tags are viewable to you only. Edit the tag to modify who can view the tag.

6. Repeat as required for additional tags.

Note:
- Tags are not case-sensitive, you cannot create tags using different capitalization.
- Tags are automatically assigned to the policy when added in the **Tags** dialog, you don't need to save the policy to save the assigned tags.

Edit PaCE policy tags

Edit and remove tags from a PaCE policy as required. When editing a tag, you can also define who can view the tag.

Before you begin
Role required: sn_pace.admin

Procedure
1. Navigate to **Policies** > **My Policies**.

Note:
To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy name for the policy that you want to edit or remove tags from.
3. In the Policy Details page, click the tag icon.
4. To edit a tag:
   a. Click the tag.
   b. In the Edit Tag dialog, edit the tag name.
   c. In the Viewable by list, select from **Me**, **Groups and Users**, or **Everyone**. By default, **Me** is selected when initially creating a tag.

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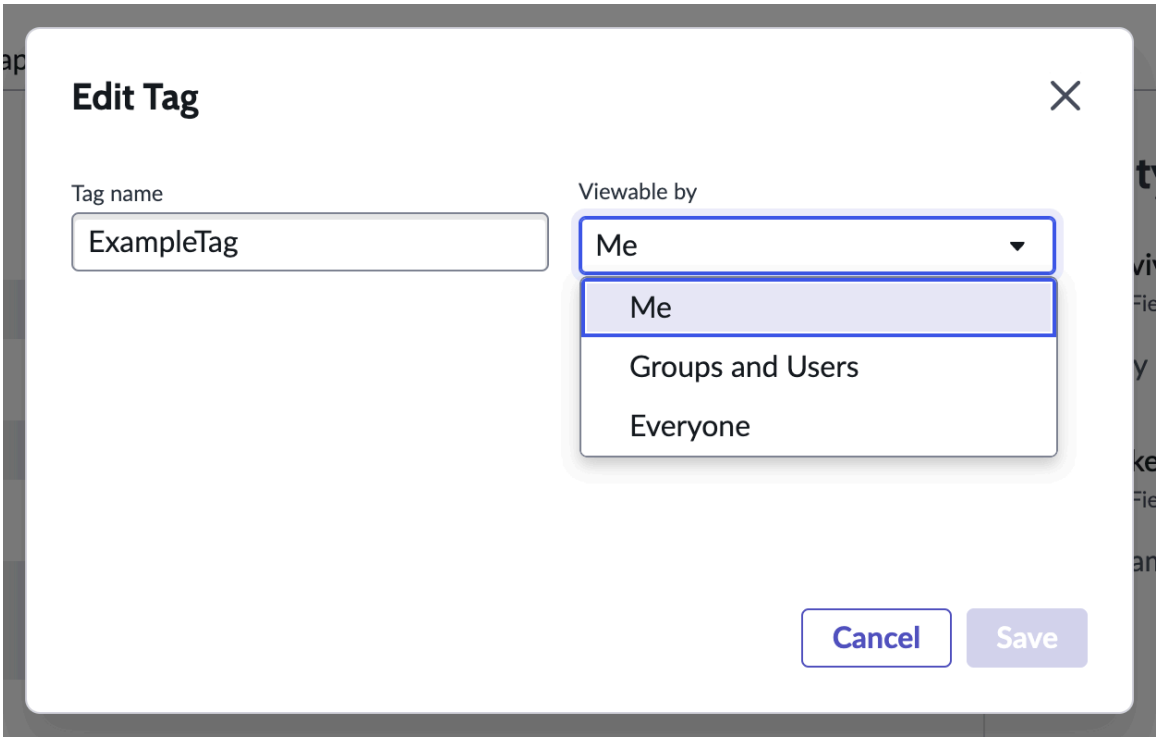
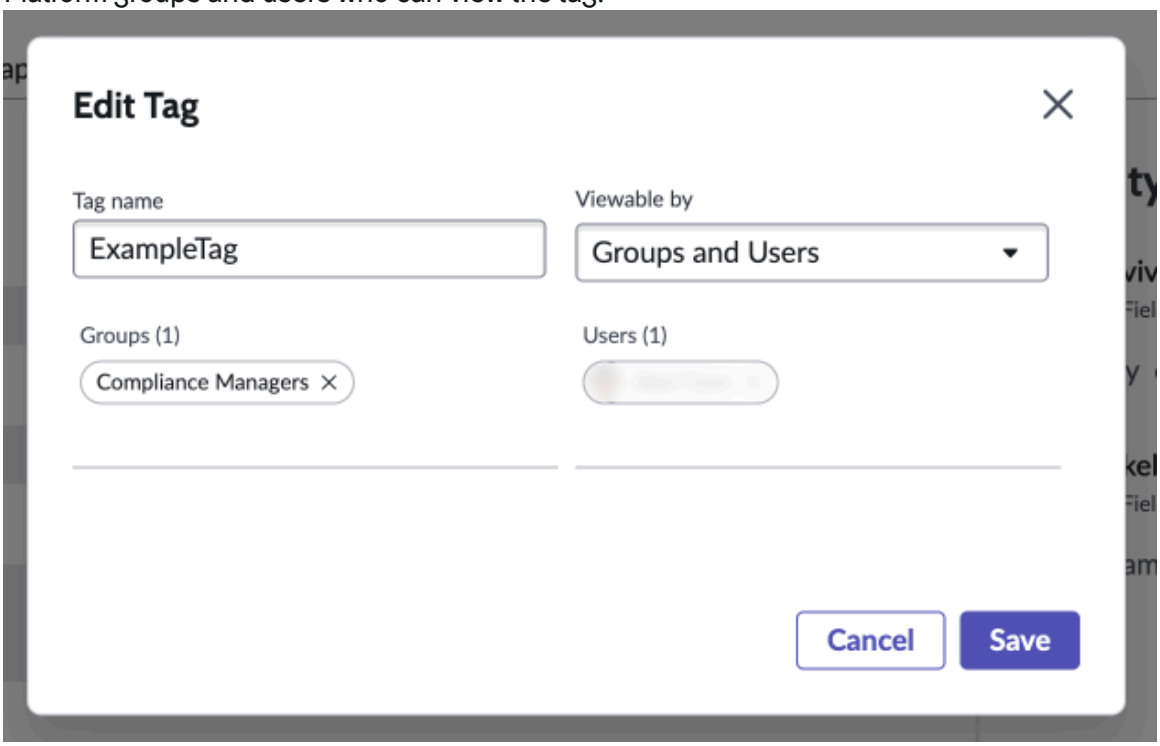


Note:
When you select **Groups and Users**, you are prompted to choose the ServiceNow AI Platform groups and users who can view the tag.



d. Click **Save**.

5. To remove a tag, click the x on the tag itself.

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The tag is removed from the policy.

View PaCE policies associated with a tag

You can view the PaCE policies that have been assigned to a specific tag. All tags together with their associated policies can be viewed in the All Tags table.

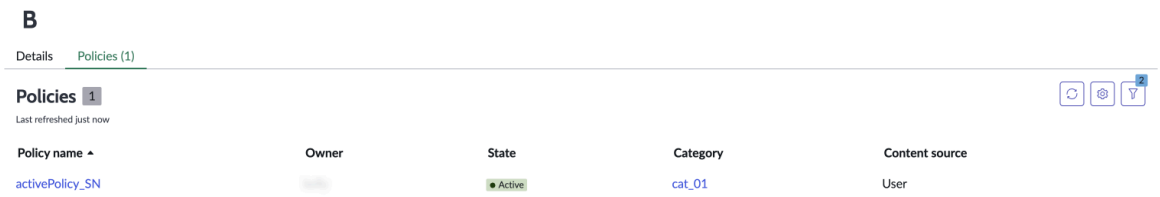
Before you begin
Role required: sn_pace.admin

Procedure

1. Navigate to **Tags** > **All Tags**.
2. In the All Tags table, click the name of the relevant tag.



3. In the displayed Details form, click the **Policies** tab.
   The policies associated with the selected tag are displayed.



4. Click a policy name to view the policy and its settings.

How to write and test custom PaCE policies

This section provides guidelines on how to write and test PaCE policies.

You can write PaCE policies using JavaScript and create the policy record within your instance application scope. PaCE policies can be executed within the scope in which they are created and all functions available in this scope are available to the policy.

When a policy is invoked, a default set of parameters is passed and these parameters can be used in the policy logic as required. A decision indicating whether the policy is compliant, non-compliant, or compliant-exception and additional information is returned using the decision object.

Structure of a PaCE policy script

This section describes the structure of a PaCE policy script.

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When a policy is executed, a set of parameters is passed and the policy developer can use these parameters in this policy script to make a decision whether it is compliant, non-compliant, or compliant-exception and return this decision back to the calling service. The following image shows a sample script:

Sample policy script

```
/**
  @param logger: ExecutionLogger.
  @param currentRecord: GlideRecord('sn_pace_policy_version').
  @param documentRecord: GlideRecord(documentTable), where documentTable is runtime value provided as a part of invocation.
  @param apiVars: Object, passed as a invocation input.
  @param configParams: Object, retrieved from application for the current run.
  @param recordRefs: Object, retrieved from application for the current run that are evaluated based on other parameters.
  @param dataCollectors: Object, stores data collectors of this policy version and has access to the corresponding outputs. A Data collector is a scripted function which takes inputs and gives outputs.
  @param childrenOutputs: Array, stores outputs of children executions for the policy, where if present the first output is always a result of data collector, followed by outputs from other children policies.
  @param output: Object - { decision: 'compliant/non_compliant', results: [], failures: [], warnings: [] } is exposed, where output of the script is stored.
*/
(function(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output) {
    var snapshotId = apiVars.snapshotId;
    var dbPort = configParams.dbPort;
    // var cdmQ = new sn_cmdb_ci_class.CdmQuery().version ("latest").snapshotId(snapshotId).query();
    var cdmQ = new sn_cdm. CdmQuery().version ("latest").followIncludes (true).decryptPassword(true).substituteVariable(true).useCache(true).snapshotId(snapshotId).query();
    while (node = cdmQ.next()) {
      if (node.getValue('name') === "dbPort") {
        if (!gs.nil(cdmQ.getValue('value')) && Number (node.getValue('value')>= 30000)) {
            logger.info("dbPort is: " + node.getValue('value'));
            output.failures.push('The DB Port is not in range');
        }
      }
    }
    output.decision = output. failures.length? "non_compliant": "compliant";
    return output;
})(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output);
```

To debug the script, select the Debugger script icon . For more information, see Script Debugger API.

The following table lists the policy function parameters and how can they be used in your policy script.

Variable Name	Description
logger	`Logger` is an object that the policy coder can use to log messages. The log messages are stored in the `sn_pace_execution_log` table. You can review these log messages for debugging, tracking, or monitoring purposes. The log messages can be logged with one of the following levels: • 1: info • 2: debug • 3: warning • 4: error When a policy is invoked through the API, you can specify the desired log level. For example:The format is as follows: `logger.info("** snapshotId is: "+snapshotId);`
current Record	`currentRecord` is an object of the current version of the policy that is executed when the policy is used. To view the `currentRecord` details, navigate to the **Versions** tab on the Policy Home page and locate the policy whose version state is set to **Current**. In the image below, you can see that the current active version of the policy highlighted. It shows the following details: • version number • last update date • the name of the user who updated the version

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Variable Name	Description
	• the number of times it was executed by the calling application • the number of times it was run in the test environment The policy script can access this data during policy execution time by interacting with the `currentRecord` object passed to the policy.  This example shows how a policy developer can access the properties of the policy version record: `(function(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output) { //retrieve the input values logger.info(currentRecord.getValue('name')); })(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output);`

document Record	The `documentRecord` is used to map the policy to the relevant object (table and documentID) that is being validated. The `documentRecord` is a combination of the table_name and sysID. Based on the properties of the object, the policy logic is used to manage and interact with the object being validated to determine the right decision.
	
	For example: In the DevOps Config environment, a policy can be mapped to the deployable. When the API is invoked, a query is initiated on the document (deployable) table and the Sys ID of the deployable.
	
	`{ "table": "sn_cdm_deployable", "sysId": "d1be8f5e87d80110eec7dbdd3fbb357d" }`
	
	This example shows how the documentRecord can be used in a policy script:
	
	`(function(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output) { //assuming that associated document has state field var documentState = documentRecord.getValue(“state”); if (documentState == “new”) … else … })(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output);`

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Variable Name	Description
apiVars	The apiVars is passed to the PaCE API when it is invoked. It includes all the API variables defined in the policy version. See <Defining Caller Inputs> section for details The Sample policy script shows how policies can be used to validate configuration data in the DevOps environment. In the sample script, the apiVars variable is defined as `var snapshotId = apiVars.snapshotId;` where the specified `snapshotId` is mapped to the corresponding `snapshotId` of the DevOps Config deployable being validated based on specified criteria. The policy developer can define logic in the policy script to use the apiVars values passed when the API is invoked to determine the decision. For example, the SnapshotID passed is used to identify key-values related to the specific snapshotID for a deployable passed in the documentRecord object.
configParams	Config Parameters are variables are passed when mapping the policy and includes all the Config Parameters variables defined for a specific version of the policy. The `configParams` variable is defined as follows in the Sample policy script. `var dbPort = configParams.dbPort;` The policy developer can define the logic in the policy script to use the values passed at mapping to determine the decision. For example, the `dbPort` number must be less than 30000, otherwise the policy is considered to be non_compliant.
recordRefs	Record references define queries to extract data from any ServiceNow® tables and use the data to configure the policy logic. There is an auto-completion function that can select the record reference in the Javascript editor.
dataCollectors	The data collectors function collects input process data from ServiceNow or an external data source to provide an output.
children	Not supported in this version.
Outputs	

output

This parameter is used to pass the output of the policy execution that includes the decision back to the calling service. It provides a decision related to this policy, with additional information such as errors, warnings, and result details.

This example shows a sample output with compliant and non_compliant decisions:

```
{
    "decision": "compliant",
    "results": [],
    "warnings": [],
    "failures": [],
    "state": "complete"
}
```

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Variable Name	Description

	<pre>{
	"decision": "non_compliant",
	"results": [],
	"warnings": [],
	"failures": [“Failed to validate key”],
	"state": "complete"
	}</pre>

output. decision	The decision property can be set to: • Compliant: Determines that the policy complies with requirements. • Non-compliant: Determines that the policy does not comply with the requirements. • Compliant-exception: Determines that an exception to the policy has been approved and any policies that are non-compliant are set to the compliant-exception state. The decision is returned in a JSON format back to the calling service. **Note:** If a value is not specified in the `output.decision` field in the script, when the policy is executed, by default this field is set to **compliant** if there are no failures.
output. results	The `results` property can be used to pass data back to the calling service on decisions made during the policy validation phase. A list object with a list of results can be passed back to the calling service.
output. warnings	The `warnings` property can be used to pass data back to the calling service on any warnings that occurred during the policy validation phase.
output. failures	The `failures` property can be used to pass data back to the calling service on any errors that occurred during the policy validation phase.
Note: The following fields are automatically filled in when the PaCE policy script is executed.	
output. name	The name (current version) of the policy being executed.
output. state	It indicates the state of the policy invocation. • Complete: The invocation was completed successfully. • Pending: Indicates that the policy could not be successfully executed and is an incomplete state.

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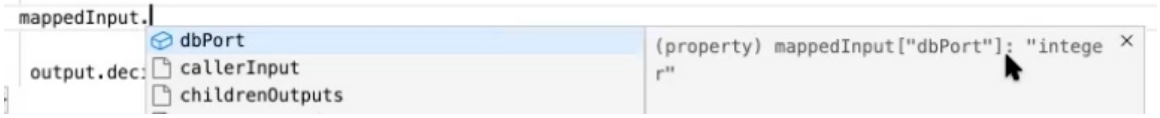
Note:

- Auto-complete suggestions are available in the policy script editor for the `logger`, `callerInput` and `mappedInput` parameter.
- To view additional information for a parameter, enter the parameter name and select one of the options as follows:



Policy invocation API

When a PaCE policy is invoked, the calling service passes the relevant object (tables and document IDs) that is being validated by providing the `documentRecord` object. A calling service is a service or product that uses the PaCE API. PaCE determines which policies must be executed by using the mapping table and the `documentRecord`.

All selected policies are executed concurrently. When all the policies have been executed, a final single decision is returned (in JSON format) with information on all executed policies and policy-level decisions. The final decision can be:

- compliant: Indicates that all the selected policies comply with the requirements and have returned a compliant decision.
- non_compliant: Indicates that one or more of the selected policies do not comply with the requirements and have returned a non_compliant decision.
- complaint-exception: Indicates that a policy exception has been approved and any policies that are non-compliant are set to the compliant-exception state.
- other: Indicates decisions that are not complaint, non_compliant, or complaint-exception.

Policy invocations can be in one of the following states:

- new
- in_progress
- complete
- canceled
- error
- timeout

Sample API

The following is a sample invocation request when the PaCE API is executed.

```
var request = {"documentIds":

 [{"table":"sn_cdm_deployable","sysId":"d1be8f5e87d80110eec7dbdd
3fbb357d"}],"service":"CDM","category":"CDM","data":{"snapshotId
":"2bcec7de87d80110eec7dbdd3fbb3529"},"options":{"verboseRespons
e":true,"logLevel":"debug","type":"standard","failFast":false,
 "executionTag":"cdm"}}


         try {
```

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```
            var api = new sn_pace.InvocationAPI();


            var execResponse = api.execute(request);


            gs.info(" Got execution response:\n " +
JSON.stringify(execResponse,null,4));


        } catch (err) {


            //var errJSON = JSON.parse(err);


            //gs.info(errJSON.code);


            gs.info(" Error message is:" + err + "\n stack:" +
err.stack);


            // gs.info(" Error is:" + err);


        }
```

PaCE API invocation parameters

This table describes the properties that can be configured when the PaCE API is invoked. These properties can be set whenever the API is invoked or when you test a policy in the Test Playground.

Property name	Required	Default value	Description
service	yes		The calling service that is invoking the API.
category	no		The category type.
type	no	standard	Can be standard or test.
documentIds	yes (array of table, sysID)		The documentIds is an array of the table and sysID (of the deployable).

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Property name	Required	Default value	Description
Note: The properties shown in the preceding table cannot be configured in the Test Playground. They can only be used when the PaCE API is invoked.			
data	yes		The policy-specific data that includes all possible caller inputs.
executionTag	no		Can be used to tag one or more policy executions records resulting from this invocation. It can be used to retrieve execution details of the policy based on the executionTag.

verboseResponse	no	false	Default value is **false**. If set to **true**, additional debug information (in this case the ids of the mapped policies) is returned.
			
			A sample invocation response with options.verboseResponse:true is shown here:
			
			`// Sample execution response`
			`{`
			`"rootExecutionId": "50202b3ec37b101017e06c576e40dd81",`
			`"mappedPolicies": [`
			`{`
			`"policyId": "3d1de0a8c363101017e06c576e40dde4",`
			`"policyName": "Production Database Policy",`
			`"shortDescription": "Policy to check database passwords",`
			`"versonId": "4ed08520c3a3101017e06c576e40ddcb",`
			`"versonTyep": "4f2cb75473331010ce6c39282bf6a753",`
			`"versionState": "published",`
			`"versionApproval": "approved"`
			`},`
			`{`
			`"policyId": "addd2ca8c363101017e06c576e40dd12",`

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Property name	Required	Default value	Description

			<pre>"policyName": "API Policy",
			"shortDescription": "Policy to check API policies",
			"versonId": "a6418920c3a3101017e06c576e40dd57",
			"versonTyep": "4f2cb75473331010ce6c39282bf6a753",
			"versionState": "published",
			"versionApproval": "approved"
			}
			],
			"logs": []
			}</pre> If `options.verboseResponse:false`, the mapped policies are not included in the response.

failFast	no	false	The default value is **false**. If this property is set to **true**, the first failed policy stops the execution of all the mapped policies.
logLevel	no	info	This parameter can be used to specify how the log messages should be displayed. • info • debug • warn • error
timeout	no	3600	The timeout period in seconds. The default value is 3600.
waitForResult	no	3600	The waitForResult period in seconds. **Note:** This parameter is available only in the Test Playground.

About policy exceptions

By integrating Policy as Code Engine with Integrated Risk Management and Policy and Compliance Management workspace, the Compliance administrator can manage an

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organization's overall compliance posture and provide a business and regulatory context for codified policies.

The Compliance administrator can associate PaCE policies with control objectives and map policies to other deployables. It enables preventive controls and ensures that no risky or non-compliant changes are introduced in the production environment. If required, you can also grant and monitor exceptions on these policies. This provides real-time risk visibility of control objectives and exception management to accelerate the pipeline process. Refer to the Governance, Risk, and Compliance documentation for more information on the exception management process.

Enable exceptions for a policy

Enable exceptions for a PaCE policy and associate it with a control objective in GRC.

Before you begin

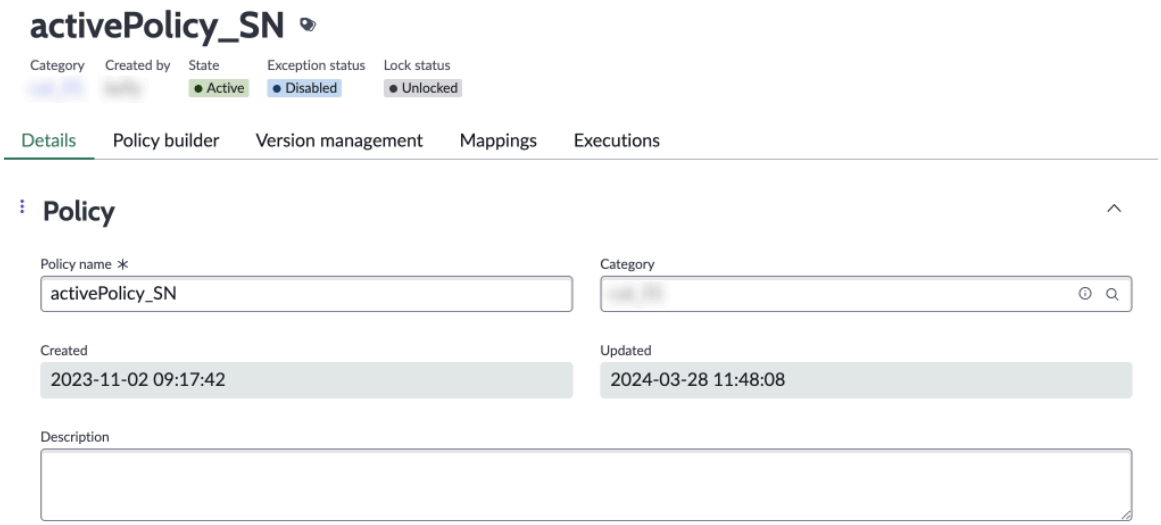
- Role required: sn_pace.admin
- Governance, Risk, and Compliance 14.1 or later

Procedure

1. Navigate to **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy for which you want to enable exceptions.
   The Details page is displayed.



   As you can see in this image, the Exception status is **Disabled**.

3. Click the **More Actions** icon and select **Enable exceptions**.
   The Exception status is changed to **Enabled**.

   Note:
   After an exception has been enabled, the policy must be configured in the Policy and Compliance Management workspace and connected to a control objective. See Policy as Code Engine for Preventive compliance management for details.

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Result

After the policy has been configured in Policy and Compliance Management workspace, the Exception status for the policy is updated to **Enabled and Configured**. The sn_pace.admin can then request exceptions to this policy.

Disable exceptions for a policy

You can disable exceptions for a policy for which exceptions have been granted. When this option is selected, you can no longer request exceptions and control objectives can no longer be associated with the policy.

Before you begin

- Role required: sn_pace.admin

Procedure

1. Navigate to **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy for which an exception has already been granted.
   The Details page is displayed.
3. Click the **More Actions** icon and select **Disable exceptions**.
   The Exception status is changed to **Disabled** You can no longer request exceptions for this policy.

Request exception for a policy

After a policy has been enabled and configured for exceptions, you can map a policy to a deployable and request an exception.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to the Mappings page.



2. Select a mapping from the list and click **Request exception.**.
3. In the Request policy exception window, specify the following:
   - Reason for exception: Select a reason for the exception from the drop-down list. Refer to the Governance, Risk, and Compliance for details.
   - Business justification: Enter a business justification for the exception.

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- Start and End Date: Specify the period for which the exception should be valid. The default validity period is 30 days. The default period can be modified by the Compliance administrator (sn_compliance.admin).

  Note:
  - You can also specify a Start Date that is in the future.
  - When the request is approved, the sn_compliance.admin can override the requested dates.

4. Click **Request** and navigate to the **Exceptions** tab to view the requested exceptions.

   You can see that the exception status is **Pending**. The Compliance Manager assesses this exception request and can choose to approve or reject the request. See Policy as Code Engine for Preventive compliance management for details. For each exception request, the following details are displayed:

   - Exception ID: Click the Exception ID to view detailed information about the exception request.
   - Deployable: Click the link to view the details of the deployable mapped to the policy.
   - Exception active: If the exception has been granted, the status is set to **Yes**.

     Note:
     If the exception has been granted for a future date, the status is set to **No** until the effective Start Date.

   - Status: The status of the request:
     - Pending: An exception request has been created but has not been approved.
     - Granted: The exception request has been approved.
     - Extension Pending: An extension request for a granted exception has been created.
     - Extension Granted: The extension request has been approved.
     - Declined: The exception request was not approved.
     - Extension Declined: The request to extend a granted exception was declined.
     - Expired: The period for which the exception was granted has expired.
     - Withdrawn: The granted exception request is withdrawn.
   - Expires in: The number of days after which the exception request expires.

5. After the request is approved, navigate to the **Exceptions** tab.
   You can see that the exception request status has changed to **Granted**. You can also see the number of days and minutes for which the exception is valid.
6. After an exception has been granted, you can request an extension before the end of the validity period.
7. Select a request with a **Granted** status and click **Extend**.

   Note:
   You can request an extension for only one policy at a time.

8. In the Request extension window, specify a business justification, an end date for the request and click **Request**.
9. Navigate to the **Exceptions** tab.

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The exception status has changed to **Extension Pending**. The sn_compliance.admin assesses this extension request and can choose to approve or reject the request. See Governance, Risk, and Compliance for details.

10. After the request is approved, navigate to the **Exceptions** tab.
    You can see that the exception request status has changed to **Extension Granted**. You can also see the number of days for which the extension is valid.

> **Note:**
> When you execute a policy with exceptions, it is validated and returns a **Compliant-exception** result.

Withdraw an exception request

If an exception is no longer required, you can withdraw a granted exception request for a policy.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to **Policies** > **My Policies**.
2. Navigate to the policy that has been enabled and configured for exceptions and click the **Exceptions** tab.
3. Select the granted exception request and click **Withdraw**.
   A confirmation message appears.
4. Click **Withdraw** to withdraw the exception request.
   The request status is changed to **Withdrawn**.

Integrating PaCE with other applications

Extend the capabilities of Policy as Code Engine (PaCE) by creating policies with other applications.

PaCE provides integrations with the applications listed in the following table:

PaCE Integrations

Integration	Description
Digital Product Release (DPR)	Define policies in Digital Product Release, see the Define policies in Digital Product Release topic.
Software Bill of Materials (SBOM)	Starting with version 4.0 of SBOM Response, an application that is part of the Security Operations suite of applications, you can view components that are identified as stale or abandoned as 'Non-compliant' in the Policy as Code Engine (PaCE) interface that is available in the Software Bill of Materials Workspace. • Determine if components are stale or abandoned with the *Run PaCE policies for SBOM Response* scheduled job. This scheduled job is deactivated by default.

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PaCE Integrations (continued)

Integration	Description
	• View components that are identified as stale or abandoned as Non-compliant in the PaCE interface that is available and viewed in the SBOM Workspace. See Configuring the Deps.dev, OSV.dev, and PaCE integrations for Software Bill of Materials for more information.

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